



## **Phase I & II Geo-Environmental Assessment**

### **Land South of Poplar Terrace**

Congerstone  
Leicestershire  
CV13 6PE

### **Prepared for:**

#### **Adi Newberry c/o Corporate Architecture Ltd**

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## LAND SOUTH OF POPLAR TERRACE, CONGERSTONE

### NON-TECHNICAL CLIENT SUMMARY

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

- The site is a parcel of land south of Poplar Terrace in the village of Congerstone, Leicestershire and evidence of former use has been limited to the presence of infilled soils at surface and in stockpiles (particularly in the west during the 1990s); anticipated to be the result of nearby construction activities. The proposed development includes the construction of a new residential scheme of five dwellings with private gardens and associated areas of public open space, access and infrastructure.
- Although no land uses in the surrounding area were considered to pose a risk to soil or groundwater beneath the study area, potential risks were identified associated with the quality of shallow soils (including fill materials) across the site, and particularly whether they would be suitable for use in residential gardens.
- Subsequent intrusive investigations involved the excavation of eight trial pits to a maximum depth of 2.5m. The ground conditions were found to comprise made ground to the west with topsoil more prevalent elsewhere, overlying natural firm to stiff clays of the Gunthorpe Member. No evidence of contamination was identified during the field works and laboratory analysis of shallow soils has confirmed the quality of the materials present is suitable for use in the proposed residential setting.
- That being said, precautionary recommendations have still been included to ensure safe development which comprise some advice for construction workers during the groundworks phase and for the installation of **100mm** certified clean imported soils in areas where soft landscaping (including private gardens) coincide with the made ground materials in the western part of the site. Full details can be found in Section 7.3.

### ENGINEERING SUMMARY

- The ground conditions across the site are considered suitable for conventional spread foundations with allowable bearing capacities starting from 90kN/m<sup>2</sup> at 1.0m, increasing to 145kN/m<sup>2</sup> at 2.0m.
- Suspended ground floor construction is recommended given that the natural clays of the Gunthorpe Member have been proven to have a 'medium volume change potential', and future design should take full account of this, as well as the presence of trees/ vegetation.
- Based on the results of the laboratory testing, together with EPS' experience of the natural soil encountered, a design CBR value of 4% is considered appropriate for the Gunthorpe Member at formation level, for areas of pavement / hardstanding.
- A design sulphate class of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1s is suitable for concrete in direct contact with the clay based soils of the Gunthorpe Member.

The above points represent a simplified summary of the findings of this assessment and **must 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.

|                             |                                                                                        |                                                                                                                           |
|-----------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Project Reference:</b>   | UK22.5955                                                                              |                                                                                                                           |
| <b>Title:</b>               | Phase I & II Geo-Environmental Assessment<br>Land South of Poplar Terrace, Congerstone |                                                                                                                           |
| <b>Client:</b>              | Adi Newberry c/o Corporate Architecture Ltd                                            |                                                                                                                           |
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If third parties have been contracted / consulted during compilation of this report, the validity of any data they may have supplied, and which are included in the report, have been assessed as far as possible by EPS however, EPS cannot guarantee the validity of these data.

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.

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The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS in house 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 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, 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 May 2022, Environmental Protection Strategies Ltd (EPS) was commissioned by Corporate Architecture Ltd on behalf of Adi Newberry to complete a Phase I & II Geo-Environmental Assessment for Land South of Poplar Terrace, Congerstone, Leicestershire, CV13 6PE ('the site'); see Figure 1.

The work was commissioned in order to support planning requirements as relating to potential land contamination and provide a geotechnical appraisal for the '*Erection of five dwellings (2 x 3no bed and 3 x 5no bed) with public open space provision, landscaping and associated infrastructure and access from Dovecot Close*', under Hinckley & Bosworth Borough Council planning application ref: 20/00444/FUL.

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

### 1.1 Objectives

The objectives of this investigation were as follows:

- a) Compile a Phase I desk study and Conceptual Site Model (CSM) to evaluate the potential risks the site may pose to human and environmental receptors, both currently and in future.
- b) Assess potential contaminant linkages identified through the CSM by means of investigating shallow soils and groundwater (if encountered).
- c) 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 Environment Agency's *Land Contamination: Risk Management* (2020) and the *National Planning Policy Framework*.
- d) Collect information on ground conditions and strength in order to make appropriate recommendations for geotechnical design.

### 1.2 Scope of Work

The scope of works was to perform an exploratory assessment of the site in accordance with the principles and requirements of DEFRA's '*Contaminated Land Statutory Guidance*' (2012), BS10175 (2011) – '*Investigation of Potentially Contaminated Sites*', BS5930:2015 '*Code of Practice for Ground Investigation*' and BS EN 1997:2007 '*Geotechnical Design*', and therefore, 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, obtaining photographic records.

- Health and safety briefing / site supervision.
- Formation of eight trial pits across the site to a maximum depth of 2.5m below ground level (bgl), using a mechanical excavator.
- Continual logging of ground conditions including inspection of samples for visual and olfactory contamination, and laboratory analysis of selected soil samples.

Reporting:

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

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

### **1.3 Project 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 ground conditions encountered may differ to those encountered 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.

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 SITE CHARECTERISATION

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

### 2.1 Site Location and Description

| Detail                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Location</b>                | The site is located in the north eastern part of Congerstone, a village in Leicestershire, adjacent to the south of Poplar Terrace which marks the north eastern border.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>National Grid Reference</b> | 437030, 305510                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Topography</b>              | Levels throughout the area are generally flat, undulating between 90 and 91m above ordnance datum (AOD).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description of Site</b>     | <p>A walkover survey was completed by EPS in June 2022 and the site was found to be irregular in shape and cover approximately 0.54 hectares in surface area.</p> <p>The plot was largely open and vacant, although some recent vegetation clearance appeared to have taken place together with a soils strip resulting in stockpiles and bunds of surfacing materials being present within the boundary (mainly in the east). Furthermore, a small compound had been established in the south western corner, where vehicular access is obtained off of Dovecot Close.</p> <p>No clear evidence of existing or previous structures was encountered, with soils appearing to be largely natural that were exposed across the majority of the surfacing. The exception to this would be the north west corner of the site which had limited evidence made ground (infilled soils) at ground level, which may have possibly been the result of nearby construction activities.</p> <p>In the east of the property were some stockpiles of soil (as previously mentioned) and discarded construction materials (including bricks, blocks and concrete rubble). The land was largely free of vegetation, except for some small semi-mature trees in the central area. The boundaries in the north, east and south are marked by a mixture of hedgerows and generally small sized, semi-mature, deciduous trees, with the west of the site separated from the adjacent residential dwellings by heras and wooden fencing.</p> <p>No significant evidence of fuel or chemical storage was identified during the inspection.</p> |
| <b>Surrounding Land Use</b>    | Beyond the southern border of the site is an agricultural field with residential dwellings to the east, west and north (on the opposite side of Poplar Terrace).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

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 the Envirocheck Report are included as Appendix C.

## 2.2 Geo-Environmental Setting

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

| Detail                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <b>Geology</b>                         | Geological mapping indicates the site is underlain by siltstone bedrock of the Gunthorpe Member. While no superficial geology is mapped on site, some local River Terrace Deposits (sand and gravel) are plotted in close proximity of the western limit. Information on the sites geological context is included as Appendix D,                                                                                                                                                                                                                                                                                                                                                                                       |                     |
| <b>British Geological Survey (BGS)</b> | <p>The nearest historic borehole records hosted by the BGS are from a collection of boreholes located approximately 470m south where Bosworth Road crosses the Ashby de la Zouch Canal. The deepest of these boreholes was drilled to approximately 7.0m and reports firm to stiff silty sandy clay to approximately 3.8m, before clayey sand containing mudstone fragments is recorded to 4.7m and siltstone and mudstone prevailing to beyond formation depth.</p> <p>These boreholes were drilled from levels comparable to the ground level in the area of investigation (~90mAOD), with groundwater first encountered at around 3.0m bgl. Relevant historic borehole logs are included as part of Appendix D.</p> |                     |
| <b>Geological Hazards</b>              | <b>Hazard</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>On Site Risk</b> |
|                                        | Mining Activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | No Hazard           |
|                                        | Collapsible Ground                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Very Low            |
|                                        | Compressible Ground                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | No Hazard           |
|                                        | Ground Dissolution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | No Hazard           |
|                                        | Running Sand                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | No Hazard           |
|                                        | Landslide                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Very Low            |
|                                        | Shrinking/ Swelling Clay                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Very Low            |
|                                        | No BGS recorded mineral sites, man-made or natural cavities are recorded within 1km of the study area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                     |
| <b>Radon</b>                           | The Envirocheck report indicates the site to lie in a location where the percentage of homes above the radon action level is less than 1%. It further reports that the site does not require any radon protection measures in the construction of new buildings or extensions.                                                                                                                                                                                                                                                                                                                                                                                                                                         |                     |
| <b>Hydrogeology</b>                    | Groundwater vulnerability maps for the area show that the bedrock Gunthorpe Member is classified as a Secondary Aquifer. No groundwater abstraction licenses are held within 1km and the site doesn't lie within a Source Protection Zone (SPZ) for local groundwater abstraction. Groundwater vulnerability maps are included as Appendix E.                                                                                                                                                                                                                                                                                                                                                                          |                     |

| Detail                                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                             |               |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------|
| <b>Hydrology</b>                           | <p>The nearest surface watercourse is the Ashby de la Zouch canal and is located approximately 82m south east. An unnamed drain is also positioned around 115m north that feeds into the River Sense which is located approximately 140m north west at its closest point.</p> <p>There are records of six discharge consents within 1km with the closest located 574m south west where sewage discharges from a pumping station operated by Severn Trent Water and were released between 1995 and 2010, before being revoked. One surface water abstraction is also listed within the same radius at 632m south west, whereby water is withdrawn from the River Sense and utilised for spray irrigation at Willow Brook Nurseries.</p> |                             |               |
| <b>Known Site Drainage &amp; Utilities</b> | No evidence of any on site drainage or utilities was apparent during EPS' site works.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |               |
| <b>Flood Risk</b>                          | <p>Review of the EA flood zone map for the area indicates that the site does not lie within a Flood Zone, which is defined within Table 1 of the technical guidance to the National Planning Policy Framework (NPPF) as '<i>the area with a low probability of flooding from rivers or the sea</i>'. It should be noted that the EA maps do not take into account flooding from other potential sources of floodwater, such as from poor drainage, or groundwater.</p> <p>An indicative flood zone map is also included in Appendix E.</p>                                                                                                                                                                                             |                             |               |
| <b>Landfill &amp; Waste</b>                | <p>A single historic landfill site is recorded within 1km, situated around 977m north, the exact nature of this feature, together with any other additional information such as dates of activity and types of wastes deposited have not been supplied.</p> <p>No registered waste transfer, treatment or disposal sites are recorded within 1km and there are also no records of any hazardous sites or substances held within 1km including registered radioactive substances.</p>                                                                                                                                                                                                                                                   |                             |               |
| <b>Licensed Industrial Activity</b>        | One site is licensed for industrial activity by the local authority within the local area. The facility was known as Paul Chapman & Sons Ltd and is located 20m north east and has a permitted status for mobile screening and crushing processes. The most recent date that the license/ permit appears to have been active was March 2012.                                                                                                                                                                                                                                                                                                                                                                                           |                             |               |
| <b>Industrial Land Use</b>                 | The Envirocheck report also lists a five industrial land uses within 1km, details of which are summarised below. It should be noted that all of the entries are shown to be inactive.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |               |
|                                            | <b>Land Use</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Distance (Direction)</b> | <b>Status</b> |
|                                            | Smarterclean (Carpet, Curtain & Upholstery Cleaners)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 30m (NW)                    | Inactive      |
|                                            | Meat Hygiene Services (Abattoirs)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 84m (W)                     | Inactive      |

| Detail                                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |          |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------|
| Industrial Land Use (cont.)           | Land Use                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Distance (Direction) | Status   |
|                                       | David G Lenton (Road Haulage Services)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 205m (SW)            | Inactive |
|                                       | W Rickard & Son (Road Haulage Services)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 432m (SW)            | Inactive |
|                                       | H M R (Commercial Vehicle Servicing, Repairs, Parts & Accessories)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 761m (W)             | Inactive |
|                                       | No fuel station entries are highlighted within 1km.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                      |          |
| Pollution Incidents                   | <p>Three pollution incidents have occurred within 1km, the closest being around 323m west in December 1996 when organic wastes (animal carcasses) were exposed to the River Sence due to 'inadequate construction'. This event was designated as a 'Category 3-Minor Incident'.</p> <p>Additionally, there is one entry on the substantiated pollution incident register within 1km; recorded in August 2001 at a location 312m north west, where the release of slurry and dilute slurry was designated as having a 'Category 2-Significant Impact' on water quality. There are no records of any prosecutions relating to controlled waters or authorised processes within 1km.</p> |                      |          |
| Sensitive Land Use                    | The site is reported to be located within a Nitrate Vulnerable Zone where surface water is considered to be susceptible to the leaching of nitrates from agricultural land.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |          |
| Previous Investigation or Remediation | EPS is not aware of any previous investigations or remedial works in the area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                      |          |

## 2.3 Site History

A summary of historical map data from 1885 to 2022 is summarised on the recent aerial photograph below. Key points are highlighted, and copies of relevant historic maps and any others examined during the investigation are included in this report as Appendix F.



- The area of investigation appears to have remained undeveloped throughout the majority of its history, despite much of Congerstone being established through the 20<sup>th</sup> century across the surrounding land. An aerial photograph from 1999 shows the west of the site may have contained some soil stockpiles/ made ground from surface, likely to have been associated with a commercial depot that was constructed to the west during this time. This facility has since been replaced by the houses along Dovecot Close, introduced in the last 10-15 years.
- Potentially contaminative land uses identified from historic maps in the surrounding area include infilled ponds approximately 20m west and 120m north west, and a possible gravel pit has also been identified 130m north west; appearing on maps from 1885 to 1903 respectively. A number of farms are also highlighted including Glebe Farm 100m west, Fox Covert Farm 120m south west and Church Farm 280m south west. The majority of the holdings recognised from historic records have subsequently been redeveloped with only Fox Covert Farm anticipated to be active at the time of writing.
- Gradual development of the land surrounding the site within Congerstone continued through the late 20<sup>th</sup> and early 21<sup>st</sup> century, with residential cul-de-sacs such as Chapel Lane on the opposite side of Barton Road and Dovecot Close along the western border being introduced.

### 3 PRELIMINARY RISK ASSESSMENT AND CONCEPTUAL SITE MODEL

In accordance with the Environment Agency's *Land Contamination: Risk Management* (LC:RM, 2020) guidance, there are three stages to managing contaminated land (Risk Assessment, Remedial Options Appraisal / Remediation and Verification). This section outlines the first tier of Stage 1, the Preliminary Risk Assessment.

The following section provides a review of the contaminant linkages that may be active at the site through examination of 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 Background

A preliminary risk assessment 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:

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

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.

#### 3.2 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 & Historic Site Use | Infill material of unknown origin (made ground) as well as soil stockpiles (including construction debris) noted in photographic records from the 1990's. These materials are anticipated to have been left over from the development of a former commercial facility (adjacent to the west); with some of its infrastructure having straddled the boundary of the study area. | PAH, Metals & ACM                 |

| Potential Source                        | Source Description                                                                                                                             | Principal Contaminants of Concern               |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Current & Historic Surrounding Land Use | Surrounding industrial land use including current and historic farms and a number of hauliers (most significantly a former depot to the west). | TPH, PAH, Metals, SVOC, ACM                     |
|                                         | A number of infilled land entries including some local pits and ponds identified in the historic mapping.                                      | Ground Gas (CH <sub>4</sub> , CO <sub>2</sub> ) |

**Notes:** PAH Polycyclic Aromatic Hydrocarbons ACM Asbestos Containing Materials  
TPH Total Petroleum Hydrocarbons SVOC Semi-Volatile Organic Compounds  
CH<sub>4</sub> Methane CO<sub>2</sub> Carbon Dioxide

### 3.3 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 have been further developed into six generic land uses in the Category 4 Screening Levels project for Land Affected by Contamination (DEFRA/Contaminated Land: Applications in Real Environments (CL:AIRE) Project Report SP1010, September 2014) which form a basis for the development of the Conceptual Site Model.

The proposed development is understood to include the construction of five residential dwellings including areas of public open space, private gardens and landscaping. The land use has therefore been considered as:

- Residential (with home-grown produce)

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 below:

| Receptor             | Site Specific Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Human</b>         | Future site users, construction workers involved in the proposed 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), including from former or adjacent land uses.                                                                                                                                                                                                                                  |
| <b>Groundwater</b>   | The Gunthorpe Member that underlies the majority of the site area is classified as a Secondary Aquifer. Whilst the site does not lie within a SPZ for nearby groundwater abstraction, the underlying geology does have some resource potential and therefore groundwater should initially be considered as a potential receptor to site derived contaminants.                                                                                                                                                  |
| <b>Surface Water</b> | The nearest surface watercourse is Ashby de la Zouch canal approximately 82m south east at its closest point. It is possible that site derived contaminants of concern may enter this watercourse (or others in the local area) by overland flow, migration through unsaturated soils or entering shallow surface drainage / historical land drainage which discharges to such features. Therefore, surface waters must also initially be considered as a sensitive receptor within the conceptual site model. |

| Receptor                              | Site Specific Description                                                                                                                                                                                                                                                                                                  |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Flora and Fauna</b>                | The proposed development is understood to include areas of public open space, private gardens and landscaping. Some of the identified contaminants of concern are known to be phytotoxic and as such, the potential for this impact should be considered.                                                                  |
| <b>Buildings &amp; Infrastructure</b> | 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, primarily from off-site sources. These include concrete used in building foundations, buried potable water supply pipes and other service lines and pipes. |
| <b>Adjacent Land</b>                  | Given the limited mobility of the identified site-derived contaminants of concern, adjacent properties including private residential dwellings are not considered to be at risk from potential contaminants.                                                                                                               |

### 3.4 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 outdoors
- Inhalation of vapours indoors

Clearly, not all of these potential pathways apply for every standard land-use. For example, ingestion of contaminated vegetables will not apply to land uses other than residential with plant uptake and allotments.

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 following:

- 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.

### 3.5 Summary of Site-Specific Contaminant Linkages

Considering the site use and environmental setting, and the proposed land use; the plausible contaminant linkages that require further investigation are summarised in the following table:

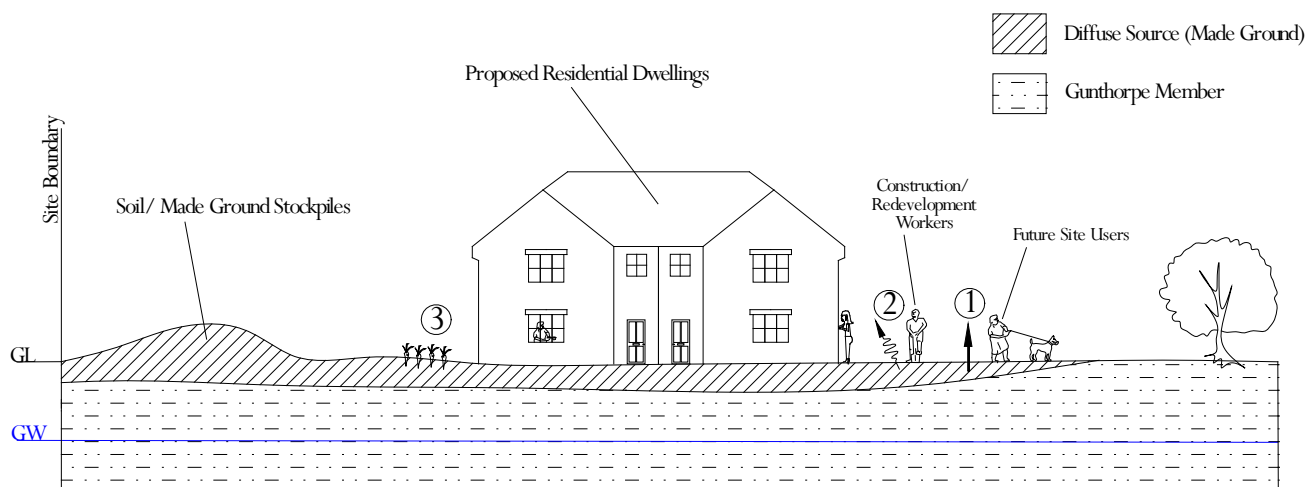
| Source            | Pathway                                                                                      | Receptor                                               |
|-------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Contaminated soil | Direct contact and inadvertent ingestion by eating or smoking with dirty hands               | Construction workers during redevelopment & site users |
|                   | Inhalation of fugitive dusts                                                                 | Site users                                             |
|                   | Direct uptake and / or adherence of contaminated soil to vegetation and subsequent ingestion |                                                        |
|                   | Direct uptake via root systems                                                               | Plants                                                 |

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:

- PAH's and metals have been identified as contaminants of concern associated with the historic on-site infill (which also includes some significant above-ground stockpiles). 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.
- Given the likely shallow nature of impacts to surface soils, and the nature of site derived contaminants of concern, no plausible risks have been identified at the site which could have a significant impact to the foundations of any on-site buildings/ infrastructure (such as buried services).
- A limited number of commercial sites are located in the surrounding area; however, with all due consideration to the nature, status and distance of these land uses, risks are not considered to be present associated with the on-site migration of organic compounds in groundwater from these sources. A former depot to the west is considered as the most significant land use in the local area, however, no significant fuel or chemical storage is anticipated as part of this facility, which was demolished in around 2010, and subsequently adopted for residential land use.
- Whilst a number of small ponds and pits have been historically infilled within the surrounding area, given the size, age, (and therefore likely nature of fill material) and distance >100m of these features from the site, a plausible contaminant linkage is not recognised from the on-site migration of ground gas.

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:

### Land South of Poplar Terrace, Congerstone – Illustrative Conceptual Site Model



#### Potential Pathways:

- 1 Direct Contact with / Ingestion of Soil
- 2 Inadvertant Contact with / Ingestion of Fugitive Soil Dust
- 3 Plant Uptake and Possible Ingestion

## **4 SUMMARY OF INTRUSIVE INVESTIGATIONS**

The intrusive ground investigation was undertaken on 16<sup>th</sup> June 2022, in accordance with EPS standard operating procedures, copies of which will be made available on request. A summary of the site activities is presented in the following sections:

### **4.1 Trial Pit Locations**

Trial pit locations were selected through consideration of the proposed development layout, the findings of the conceptual site model, the location of below ground utilities as well as operational and health & safety considerations.

The overall objective, in terms of trial pit locations, was to deliver an appropriate lateral and vertical coverage of the site in order to offer information relating to the nature, quality and strength of the underlying soils.

All trial pits were formed in accordance with standard EPS methodologies and all sub-contractors were supervised by an EPS engineer throughout the works.

A trial pit location plan is presented as Figure 4.

### **4.2 In-Situ Testing & Soil Sampling**

Each trial pit 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.

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. 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. However, given the findings of the conceptual site model and the fact that no visual or olfactory evidence of impacted soils / groundwater was encountered throughout the investigation, headspace testing was not undertaken as part of this investigation.

Hand-held shear vane testing (indicated as HVP on the trial pit logs) was undertaken where possible in the cohesive (clay soils) recovered from the trial pits. The peak undrained shear strength for each test is presented in kPa on the records which are included as Appendix G.

Soil samples were recovered from each location at regular intervals for record purposes and future laboratory testing. Selection of samples from the trial pits focused on providing an assessment of the geotechnical properties of the soils encountered, as well as the quality of sub-surface materials present across the site.

#### **4.3 Laboratory Testing**

Soil samples were obtained for analysis of selected contaminants of concern in order to identify the presence of any contamination and confirm their suitability for future use. Samples were submitted to Element Materials Technology of Flintshire, who hold appropriate UKAS/ MCERT accreditation for the required testing. Samples were transported in laboratory supplied containers and delivered by an approved courier.

Geotechnical testing was undertaken by Soil Property Testing, Huntingdon, a UKAS accredited laboratory.

Copies of the chain of custody documentation are held by EPS and will be made available on request. Furthermore, laboratory testing schedules detailing all samples submitted for environmental and geotechnical laboratory analysis are included within Table 1 and Table 2 respectively.

## 5 FINDINGS OF THE INVESTIGATION

This section of the report provides a summary of the various aspects of the intrusive investigations undertaken.

### 5.1 Ground Conditions

A total of eight trial pits were formed across the site and the ground conditions encountered, from surface level, have been interpreted to comprise:

- Topsoil/ Made Ground
- Gunthorpe Member

Site specific trial pit logs are included as Appendix G and give full descriptions and depths of strata encountered. A summary of the general ground profile beneath 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)     |
|----------------------|-----------------------------------------|--------------------------|
| Topsoil/ Made Ground | 0.6                                     | 0.3 – 0.6                |
| Gunthorpe Member     | >2.5                                    | >1.0 - >1.9 (not proven) |

#### 5.1.1 Topsoil/ Made Ground

Made ground was encountered in the west and north west of the site at TP08, TP07 and TP05 to depths of 0.3m, 0.6m and 0.4m respectively. At TP07 the made ground was described as a brown gravelly sand, with brick and concrete fragments, as well as rare wire and plastic piping. At TP08 and TP05 the made ground was shallower and was described as a brown gravelly sand with brick and concrete fragments (with some in-tact bricks in TP05). Although previously indicated on historical records, no stockpiles were identified in these areas during the intrusive works, but the presence of sub-surface infilled materials does align with some infrastructure/ former use in this part of the property, overlapping into the study area from the adjacent (former) depot.

Topsoil was encountered at all other trial pit locations (TP01-TP04 and TP06) and was consistently recovered as a brown, slightly gravelly silty sandy clay with common rootlets. The topsoil was fairly consistent in depth, ranging from approximately 0.4m to 0.6m.

#### 5.1.2 Gunthorpe Member

Natural soils considered to represent the Gunthorpe Member were encountered beneath surfacing materials at each trial pit. These soils were generally consistent across the site and included firm to stiff reddish brown slightly sandy silty clay with rare light grey mottling. At TP07 and TP08 in particular, the recovered material also included fine to coarse sub-angular to sub-rounded quartzite and sandstone gravel and some decayed roots.

## 5.2 Groundwater

A slight groundwater seepage was recorded at 2.0m bgl in TP01 and TP03, but did not amount to any resting water within the excavations upon completion and prior to reinstatement.

## 5.3 Physical Evidence of Contamination

Despite the presence of infilled soils in a few intrusive positions towards the west of the site, no clear visual or olfactory evidence of contamination was identified in any of the trial holes during the field works. The recovered soils did not include any notable signs of waste or putrefiable material, with hydrocarbon staining / odours also absent.

## 5.4 Laboratory Analysis – Soil

An environmental laboratory analysis testing schedule is presented as Table 1 and all environmental soil analysis 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                | 5.2                         | 7.5  | TP05 (0.1-0.4)                   |
| Cadmium               | 5              | 0                | -                           | -    | -                                |
| Chromium III          | 5              | 5                | 44.4                        | 52.9 | TP05 (0.1-0.4)                   |
| Chromium VI           | 5              | 0                | -                           | -    | -                                |
| Copper                | 5              | 5                | 21                          | 31   | TP05 (0.1-0.4)                   |
| Lead                  | 5              | 5                | 30                          | 63   | TP01 (0.1-0.4)                   |
| Mercury               | 5              | 1                | 0.1                         |      | TP01 (0.1-0.4)                   |
| Nickel                | 5              | 5                | 15.5                        | 22.8 | TP05 (0.1-0.4)                   |
| Selenium              | 5              | 1                | 1                           |      | TP05 (0.1-0.4)                   |
| Zinc                  | 5              | 5                | 74                          | 141  | TP05 (0.1-0.4)                   |
| Benzo(a)pyrene        | 5              | 0                | -                           | -    | -                                |
| Dibenzo(ah)anthracene | 5              | 0                | -                           | -    | -                                |
| Naphthalene           | 5              | 0                | -                           | -    | -                                |
| PAH (Total of 16)     | 5              | 0                | -                           | -    | -                                |
| ACM (mass %)          | 5              | 0                | -                           | -    | -                                |

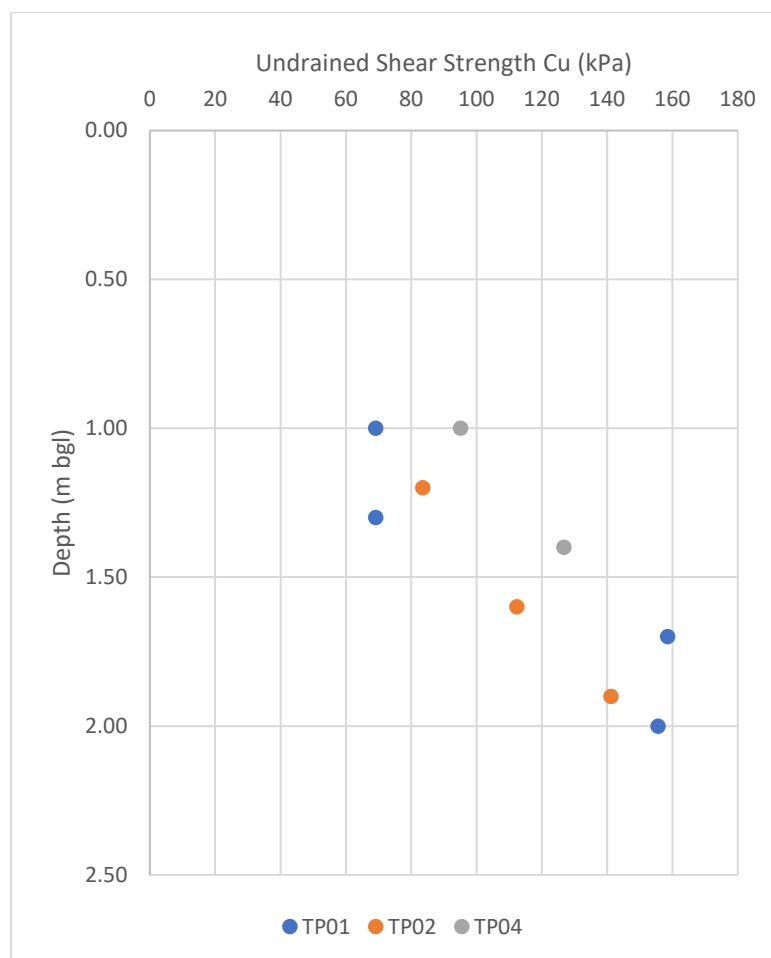
**Notes:** - Contaminant not identified above laboratory minimum instrument detection limits  
PAH Polycyclic Aromatic Hydrocarbons ACM Asbestos Containing Material

- The majority of metals and PAH compounds were detected at relatively low concentrations.
- No asbestos containing materials were identified in any of the shallow soil samples submitted for laboratory analysis, to a detection limit of 0.01% of each sample by mass.

## 5.5 Geotechnical Testing

### 5.5.1 In-Situ Geotechnical Testing

The results of hand-held shear vane testing undertaken throughout the soils recovered from three of the trial pits (TP01, TP02 and TP04), are summarised on the below graph.



These results taken from the clay based soils of the Gunthorpe Member show a general increase of shear strength with depth, with all materials appearing competent. In-situ strength results were not recorded from all of the locations due to a higher percentage of coarser material (sand and occasional gravel) within the profile of the Gunthorpe Member (particularly TP07 and TP08). Therefore, the data from these positions was not anticipated to be representative of the in-situ strength of the materials encountered.

### 5.5.2 Laboratory Geotechnical Testing

The results of geotechnical laboratory testing are summarised in the table below.

| Strata           | Range of Parameters  |      |                      |     |         |     |
|------------------|----------------------|------|----------------------|-----|---------|-----|
|                  | Moisture Content (%) |      | Plasticity Index (%) |     | CBR (%) |     |
|                  | Min                  | Max  | Min                  | Max | Min     | Max |
| Gunthorpe Member | 13.0                 | 21.3 | 15<br>[13]           | 29  | 5.8     | 7.8 |

**Note:** [-] indicates plasticity index modified for granular content

The water content, liquid and plastic limits and plasticity and liquidity indexes were established for five samples of predominantly cohesive soils, prepared and tested in line with BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2 and BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3 and 5.4 respectively.

A laboratory California Bearing Ratio (CBR) test was scheduled for one sample of soil prepared in line with BS1377: Part1: 2016 & BS1377: Part 4: 1990: 7.2.4.4 and tested in accordance with BS1377: Part 4: 1990: 7.

Sulphate contents and pH values determinations were carried out by the geotechnical laboratory for four samples, the results of which are summarised in Section 6.6.

A geotechnical laboratory analysis testing schedule is presented as Table 2 and all sample results obtained from the laboratory are included as Appendix I.

## 6 GEOTECHNICAL APPRAISAL

The ground conditions throughout the area have been found to comprise a limited thickness of topsoil or made ground (in the west), with the underlying natural soils comprising firm to stiff, silty sandy clays with occasional gravel, representative of the Gunthorpe Member.

Although the thickness of made ground was limited in the trial holes formed as part of the EPS intrusive works, it should be recognised that thicker deposits could be anticipated in other sections of the site (particularly towards the western boundary).

### 6.1 Geotechnical Category

| <b>Geotechnical Category<br/>(BS EN 1997-1:2004)</b> | <b>Definition</b>                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GC1</b>                                           | Geotechnical Category 1 (GC1) should only include small and relatively simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations with negligible risk in terms of overall stability or ground movements and in ground conditions which are known.                                                                                   |
| <b>GC2</b>                                           | Geotechnical Category 2 (GC2) should include conventional types of structure and foundation with no exceptional risk or difficult or loading conditions. Designs for structures in Geotechnical Category 2 should normally include quantitative geotechnical data and analysis.                                                                                                                                                                           |
| <b>GC3</b>                                           | Geotechnical Category 3 (GC3) should include structures or parts of structures, which fall outside the limits of Geotechnical Categories 1 and 2. This may include very large or unusual structures, structures involving abnormal risks, or unusual or exceptionally difficult ground or loading conditions, or structures in areas of probable site instability or persistent ground movements that require separate investigation or special measures. |

The proposed development is understood to include the construction of five residential dwellings with external works. Therefore, the below assessment has been undertaken in accordance with Geotechnical Category 2 (GC2), including conventional types of structure and foundation with no exceptional risk or difficult ground or loading conditions, as defined by BS EN 1997-1:2004.

### 6.2 Structural Foundations

#### 6.2.1 Spread Foundations

As detailed above, the development is anticipated to include the construction of a residential scheme with external works. The foundation assessment has therefore been undertaken in accordance with BS EN 1997-1:2004, to take in to account;

- Bearing Pressure (Ultimate Limit State)
- Settlement (Serviceability Limit State)

The ground conditions are considered suitable for the use of conventional spread foundations, either strip footings or pad foundations, bearing upon the underlying clay based soils of the Gunthorpe Member. Allowable bearing capacities have been calculated and are presented in the table below:

| <b>Foundation Depth<br/>(m bgl)</b> | <b>Allowable Bearing Capacity<br/>(kN/m<sup>2</sup>)</b> |
|-------------------------------------|----------------------------------------------------------|
| 1.0                                 | 90                                                       |
| 1.5                                 | 115                                                      |
| 2.0                                 | 145                                                      |

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 18kN/m<sup>3</sup>.

At the above allowable bearing capacities, total settlements are considered unlikely to exceed roughly 20 to 25mm. Settlements in cohesive soils will likely comprise a small amount of immediate settlement and a larger proportion of consolidation settlement, which will occur over a long period of time whereas settlement in granular soil will occur rapidly as loadings increase.

A minimum foundation depth of 0.9m, is considered suitable for the site, below existing or proposed ground level, subject to the following provisos:

- a) All foundations should fully penetrate any surfacing soils including made or disturbed ground and extend a minimum of 150mm into undisturbed natural strata. Whilst not encountered during this phase of works, should any lower strength clay layers be identified at the proposed foundation level, these materials should also be fully penetrated and progressed into soil with a minimum undrained shear strength of 60kPa.
- a)
  - b) The cohesive (clay) soils will be subject to volume change, (subsidence and / or heave) due to the presence of trees. Foundation design will therefore need to take into account the presence of trees, both those currently or previously present and those to be planted as well as to be removed from site and surrounding area as part of the future development. The predominantly cohesive soils of the Gunthorpe Member have been proven to have a 'medium volume change potential' and foundation design should be considered in full accordance with NHBC Standards Chapter 4.2 'Building Near Trees'.

It is also recommended that a full tree survey of the site and immediate surrounding area be undertaken to that the full impact of trees on foundation design can be fully considered. Where foundation depths exceed 1.5m due to the presence of trees, full anti-heave precautions will be required.

### 6.3 Ground Floor Construction

Given that natural clay based soils have been proven to have a 'medium volume change potential', suspended ground floor construction is recommended for any new buildings, incorporating a suitable sub-floor void.

## 6.4 External Works

### 6.4.1 Pavement Design

One bulk sample representative of the Gunthorpe Member was submitted for laboratory CBR testing as part of the investigation. The returned CBR values range from 5.8% to 7.8%.

Based on the results of the laboratory testing, together with EPS' experience of the natural soils encountered (clay with plasticity of ~20%), a design CBR value of 4% is considered appropriate for the natural soils, but could be increased depending on the thickness of pavement construction.

Once the formation level for the new pavement has been achieved, proof rolling should be carried out using a heavy roller, and any significant/ extensive soft areas revealed should be excavated and a greater depth of sub-base provided.

Exposed subgrades will likely deteriorate rapidly on exposure to wet weather and should be shaped to shed water. Sub-base should be placed as soon as possible to minimise the exposure of the subgrade to adverse weather conditions.

## 6.5 Groundworks

Shallow excavations in the natural soils of the Gunthorpe Member are likely to remain stable for short periods, however, the long term stability of these and any excavations in disturbed/ made ground not be relied upon.

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. Significant groundwater ingress is not anticipated within shallow excavations for foundations or drainage, while some groundwater seepage was noted in trial pits TP01 and TP03 at depths of around 2.0m, this is not likely to be constraining or to require groundwater control/ dewatering; with minor inflows anticipated to be slow and temporary.

## 6.6 Concrete Grade

Sulphate contents and pH value determinations were carried out by both the environmental and geotechnical laboratories. The results of this testing are summarised in the below table as well as being presented as part of Appendix I.

| Strata           | Water Soluble Sulphate 2:1 SO <sub>4</sub> (mg/l) |     | pH  |     | Design Sulphate Class | ACEC  |
|------------------|---------------------------------------------------|-----|-----|-----|-----------------------|-------|
|                  | Min                                               | Max | Min | Max |                       |       |
| Gunthorpe Member | <10                                               | 23  | 8.0 | 8.8 | DS-1                  | AC-1s |

In accordance with Part 1 of the BRE Special Digest 1 'Concrete in Aggressive Ground' 2005, a design sulphate class of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1s is considered suitable for concrete in direct contact with the natural soils of the Gunthorpe Member.

## 7 ENVIRONMENTAL APPRAISAL

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

In accordance with the Environment Agency's *Land Contamination: Risk Management* (2020) guidance, this section represents the second tier of Stage 1, the Generic Quantitative Risk Assessment.

Risks to controlled waters have not been assessed, as potential risks to these receptors (surface water and groundwater) were discounted as part of the Phase I risk assessment.

### 7.1 Human Health

#### 7.1.1 Land Use Setting & Generic Screening Criteria

It is understood that the site is being considered for potential redevelopment to include a new residential scheme, which is likely to include private gardens.

In order to screen laboratory data for concentrations of contaminant in soil with potential to cause harm to human health at a residential setting (with home-grown produce), relevant generic screening values have been used. These values are all based on suitable for use criteria for contaminants in soil. The technical framework used to derive the screening values 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)
- *Development of Category 4 Screening Levels for assessment of land affected by contamination* – SP1010 – DEFRA (2013)

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. For concentrations of Arsenic, Lead and BaP in soil, EPS has used DEFRA's C4SL as an appropriate guide for professional judgement with respect to reasonable 'low risk' levels in the context of this site and its suitability for use.

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

#### 7.1.2 Assessment of Soil Results

The results of the screening process for on-site human receptors showed that adopted criteria, representative of suitability limits to future site users were not exceeded for any contaminant at any location.

## 7.2 Summary of Findings

Through consideration of the site's history and environmental setting, the Phase I Desk Study established that a limited number of plausible contaminant linkages have the potential either to be currently active, or to become active as a result of the proposed development.

These contaminant linkages primarily comprised potential risks associated with the quality of shallow soils and the potential presence of made ground in the sub-surface towards the western boundary of the property; parts of which may have been impacted by the operation and development of a former depot and more recently as a residential cul-de-sac on the adjacent land.

Intrusive investigations comprised the excavation of eight trial pits to a maximum depth of 2.5m bgl throughout the property including in areas of proposed private gardens, as well as sections of existing infilled soils. The ground conditions were found to comprise made ground to the west with topsoil more prevalent elsewhere; overlying natural firm to stiff clays of the Gunthorpe Member. No evidence of contamination was identified during the field works and laboratory analysis of shallow soils has confirmed the quality of the materials present is suitable for use in the proposed residential setting.

As a result, no further environmental assessment is considered to be warranted, however a limited number of precautionary recommendations have been made below to ensure safe development.

## 7.3 Recommendations

In the context of potentially unacceptable or acceptable risks as outlined within the Environment Agency's *Land Contamination: Risk Management guidance* (LC:RM, 2020), the risks identified by this work will not require further assessment, providing the following control measures are adhered to at the appropriate stage in the redevelopment process:

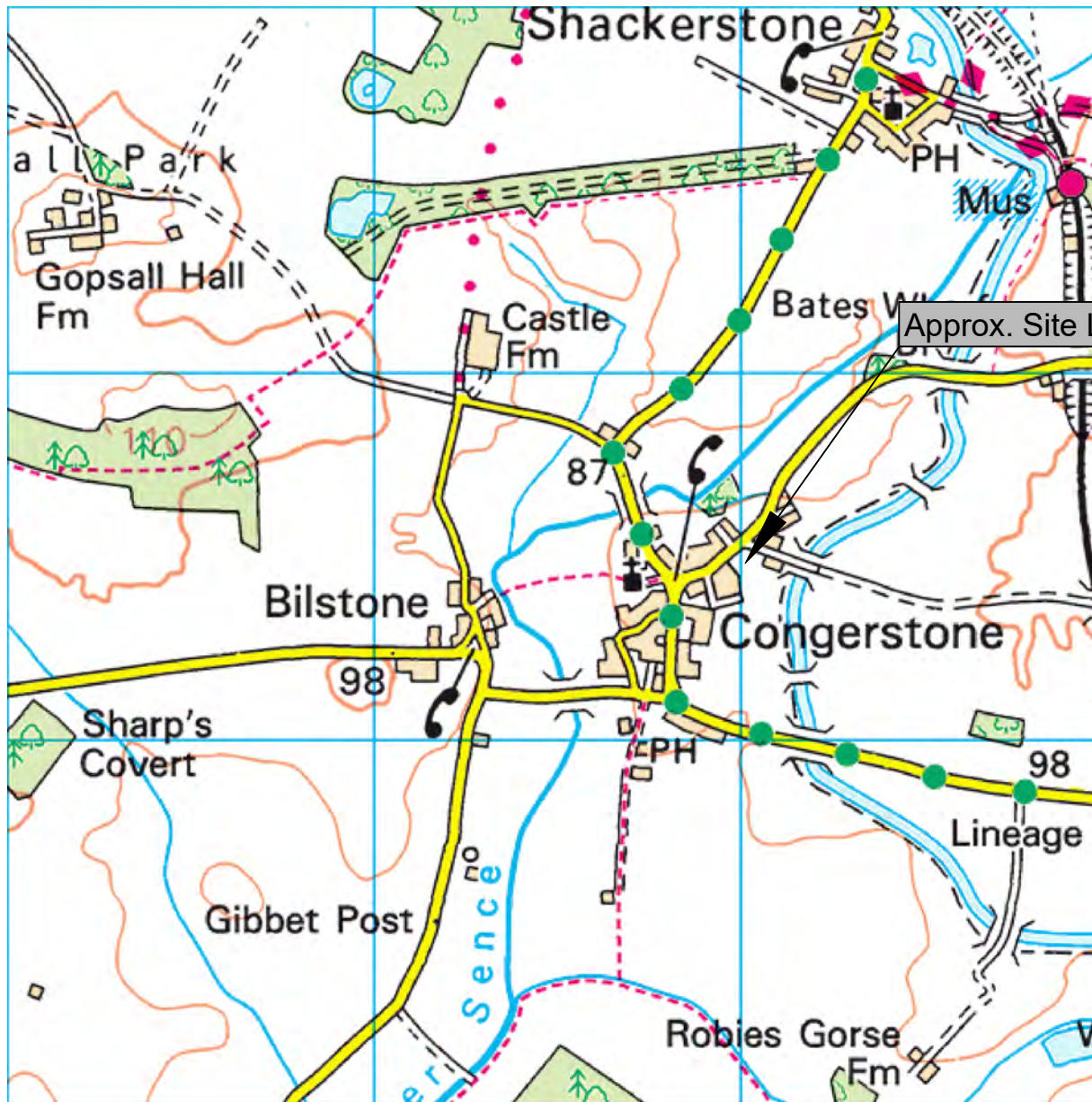
- a) Although the soils in place have been found to be suitable for use in a residential setting in terms of chemical quality, given the presence of made ground beneath the surface in certain sections of the site (particularly towards the western boundary), it would be prudent to install a simple cover system of **100mm** certified clean imported soils in selected areas. This would represent an appropriate measure for any areas which are intended as soft landscaping which currently have infilled soils present from surface, in order to provide an appropriate growing medium and conform to building control standards. It should be noted that this recommendation is made only for soft landscaped areas and there is no such requirement for areas beneath any proposed hardstanding / building footprints.

All imported topsoil/ subsoil for use within the cover system should be accompanied by appropriate laboratory analysis to demonstrate its chemical and physical suitability for use and ensure it meets the requirements of the checklist included in Appendix K. Details of the imported material and photographs of the installation should be provided to the local authority as evidence of completion of the measures.

- b) All construction workers operating at the site should be advised of the potential for contact with made ground material within shallow soils, particularly across the west of the site, as well as throughout the profile or any remaining soil stockpiles and/ or bunds. Appropriate health and safety precautions should be adopted during any excavation works to avoid exposure to infilled soils. Reference should be made to relevant health & safety guidance including the following CIRIA document: *R132 Guide to Safe Working on Contaminated Sites*.
- c) It is likely that the stockpiles currently present throughout the area include some made ground and construction debris that make the stockpiled soils unsuitable for use within the proposed residential setting. It is therefore recommended that these stockpiles should be disposed of off-site to an appropriately licensed waste facility. If the client is interested on re-using the stockpiled soil on site, samples of the stockpiled soil should be submitted for laboratory analysis to confirm their quality and suitability for use, especially if the stockpiled soil is being considered for use in areas of soft landscaping or gardens. The stockpiled materials should be treated with the appropriate duty of care under current waste legislation and EPS can provide further advice / information on re-using the stockpiled soils on request if necessary.
- d) 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 encountering any unexpected contamination is included as Appendix L of this report.

It is also recommended that a copy of this report be provided to the Environmental Health Department of Hinckley & Bosworth Borough Council for inclusion in their land quality records and to support the current planning application.

## FIGURES



KEY:  
— SURVEY AREA

Notes:

1. Base map reproduced under Crown Copyright Licence Number: 100054115

| Rev | Date | Drawn | Description | Check |
|-----|------|-------|-------------|-------|
|     |      |       |             |       |
|     |      |       |             |       |
|     |      |       |             |       |



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Site:  
Land off Dovecot Close  
Congerstone, Leicestershire, CV13 6NB

Client:  
Adi Newberry

Title:  
Figure 1 - Site Location Plan

|             |         |           |           |
|-------------|---------|-----------|-----------|
| Surveyed:   | 1:50000 | Drawn by: | OC        |
| Checked by: | BV      | Date:     | July 2022 |

Scale: NTS Drawing Reference: UK22.5955\_001

Job No: UK22.5955 Rev: 01



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|     |      |       |             |       |



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Site  
Land off Dovecot Close  
Congerstone, Leicestershire, CV13 6NB

Client  
Adi Newberry

Title  
Figure 2 - Current Site Layout Plan

|            |     |          |           |
|------------|-----|----------|-----------|
| Surveyed   | n/a | Drawn by | OC        |
| Checked by | BV  | Date     | July 2022 |

Scale  
NTS

Job No  
UK22.5955

Rev  
02



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|     |      |       |             |      |
| Rev | Date | Drawn | Description | CW/d |



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Site  
**Land off Dovecot Close  
Congerstone, Leicestershire, CV13 6NB**

Client  
**Adi Newberry**

Title  
**Figure 3 - Aerial Photograph**

|            |                   |          |           |
|------------|-------------------|----------|-----------|
| Surveyed   | n/a               | Drawn by | OC        |
| Checked by | BV                | Date     | July 2022 |
| Scale      | Drawing Reference |          |           |
| NTS        | UK22.5955_003     |          |           |
| Job No     | UK22.5955         |          | 03        |



**Key**

- Application Site Boundary (0.45 ha)
- Land Ownership Boundary (0.096 ha)
- 1.2m high 2 rail plot division fencing

Plot & POS Landscape details subject to specialist design

**KEY:**

- SURVEY AREA
- TRIAL PIT LOCATION

**Notes:**

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| Rev | Date | Drawn | Description | CHKD |
|-----|------|-------|-------------|------|
|     |      |       |             |      |
|     |      |       |             |      |
|     |      |       |             |      |



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Site  
**Land off Dovecot Close  
Congerstone, Leicestershire, CV13 6NB**

Client  
**Adi Newberry**

File  
**Figure 4 - Trial Pit Location Plan**

|            |     |          |           |
|------------|-----|----------|-----------|
| Surveyed   | n/a | Drawn by | OC        |
| Checked by | BV  | Date     | July 2022 |

Scale  
NTS      Drawing Reference: **UK22.5955\_004**

|                  |           |
|------------------|-----------|
| Job No           | Rev       |
| <b>UK22.5955</b> | <b>04</b> |

**Land off Dovecot Close, Congerstone**  
EMS.2559

**Schedule of Accommodation**

| House Type       | Beds | Storey | Total | Unj H2 | Coverage H2 |
|------------------|------|--------|-------|--------|-------------|
| <b>Dwellings</b> |      |        |       |        |             |
| HT A             | 5    | 2      | 3     | 2,000  | 6,000       |
| HT B             | 3    | 2      | 2     | 1,000  | 2,000       |

## TABLES



Table 1 – Environmental Laboratory Testing Schedule

| Sample ID | Sample Depth<br>(m bgl) | EPS Mini Suite |
|-----------|-------------------------|----------------|
| TP01      | 0.1-0.4                 | 1              |
| TP02      | 0.1-0.4                 | 1              |
| TP03      | 0.1-0.4                 | 1              |
| TP04      | 0.1-0.4                 | 1              |
| TP05      | 0.1-0.4                 | 1              |

Notes:

m bgl

EPS Mini Suite

1

meters below ground level

Organic Matter, Cyanide, Metals, PAH's, Phenols, pH, Water Soluble Sulphate and Asbestos Screen

Sample Analysed

**Table 2 – Geotechnical Laboratory Testing Schedule**

| Sample ID | Sample Depth (m bgl) | Atterberg Limits | Moisture Content | CBR | pH & Water-Soluble Sulphate |
|-----------|----------------------|------------------|------------------|-----|-----------------------------|
| TP02      | 0.8-1.0              | 1                | 1                | -   | 1                           |
| TP06      | 1.4-1.6              | 1                | 1                | -   | 1                           |
| TP07      | 2.0-2.2              | 1                | 1                | -   | 1                           |
| TP08      | 0.6-0.8              | 1                | 1                | -   | 1                           |
| TP08      | 1.0-1.5              | 1                | 1                | 1   | -                           |

**Notes:**

|       |                           |
|-------|---------------------------|
| m bgl | meters below ground level |
| CBR   | California Bearing Ratio  |
| 1     | Sample Analysed           |
| -     | Sample Not Analysed       |

## **APPENDICES**

## **APPENDIX A**

### **Selected Site Photographs**



KEY:  
— SURVEY AREA      ① PHOTOGRAPH LOCATION

Notes:  
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|     |      |       |             |       |
|-----|------|-------|-------------|-------|
|     |      |       |             |       |
|     |      |       |             |       |
| Rev | Date | Drawn | Description | CHK'd |



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Site  
**Land off Dovecot Close  
Congerstone, Leicestershire, CV13 6NB**

Client  
**Corporate Architecture**

Title  
**Appendix A - Photoplan**

|            |     |          |           |
|------------|-----|----------|-----------|
| Surveyed   | n/a | Drawn by | OC        |
| Checked by | BV  | Date     | July 2022 |

|       |              |                   |
|-------|--------------|-------------------|
| Scale | 1:44 (Sheet) | Drawing Reference |
| NTS   |              | UK22.5955_A       |

|           |     |
|-----------|-----|
| Job No    | Rev |
| UK22.5955 | A   |

|                                                                                                        |                                                                                                          |
|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| <p>Photo 1: Image showing the entrance to the site and the site compound.</p>                          | <p>Photo 2: Image looking north west across the property.</p>                                            |
|                       |                        |
| <p>Photo 3: View looking north east across the site showing existing stockpiles of surfacing soil.</p> | <p>Photo 4: Photograph showing the profile of TP04.</p>                                                  |
|                      |                       |
| <p>Photo 5: Image showing largely in-tact bricks recovered at TP05.</p>                                | <p>Photo 6: Image showing made ground materials at the surface in the north west corner of the site.</p> |
|                     |                      |

## **APPENDIX B**

### **Proposed Development Plan**

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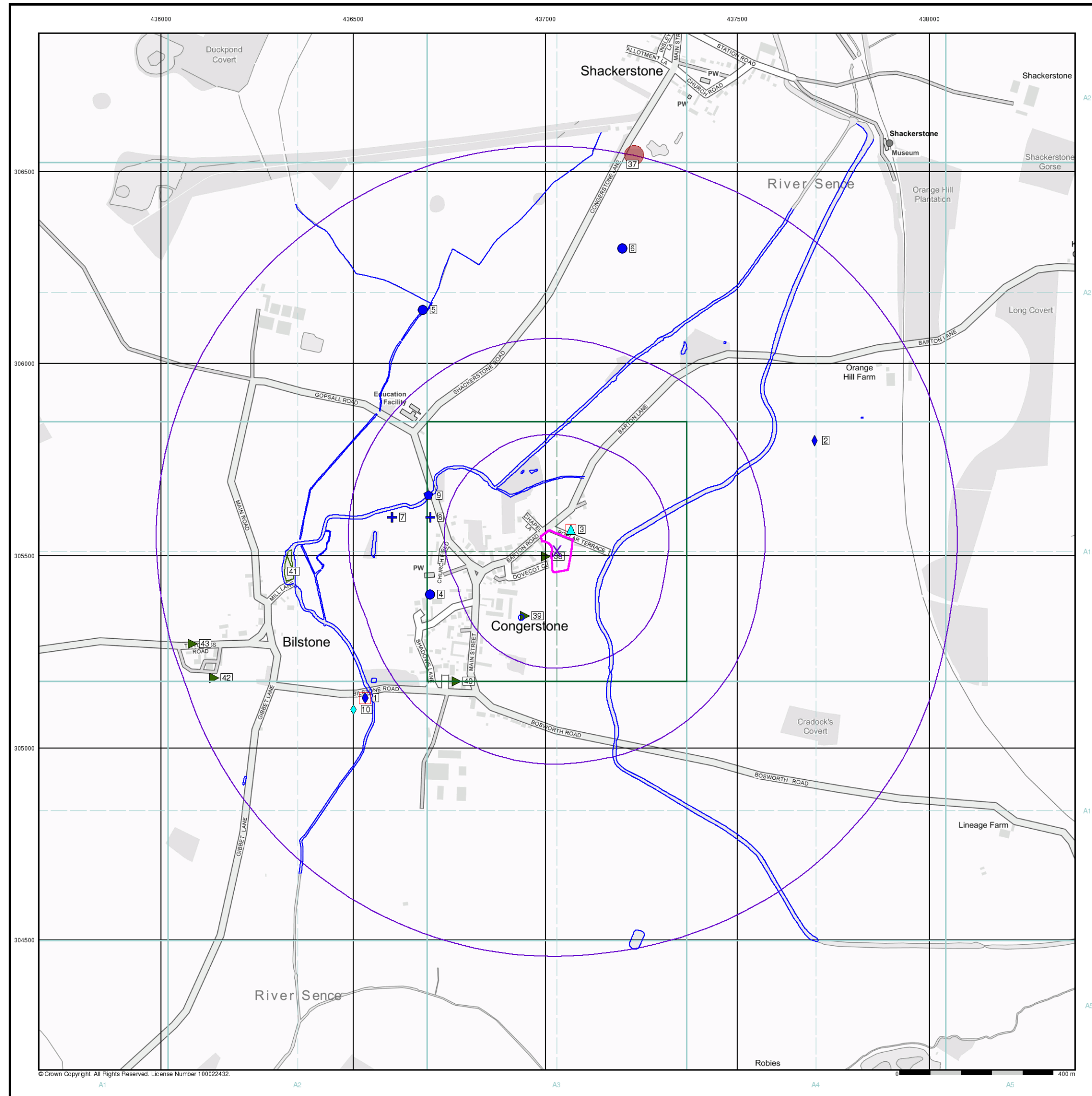
**Land off Dovecot Close, Congerstone**  
EMS.2559

**Schedule of Accommodation**

| House Type       | Beds | Storey | Total    | Unit ft <sup>2</sup> | Coverage ft <sup>2</sup> |
|------------------|------|--------|----------|----------------------|--------------------------|
| <b>DWELLINGS</b> |      |        |          |                      |                          |
| HT A             | 5    | 2      | 3        | 2,000                | 6,000                    |
| HT B             | 3    | 2      | 2        | 1,000                | 2,000                    |
| <b>Total</b>     |      |        | <b>5</b> |                      | <b>8,000</b>             |

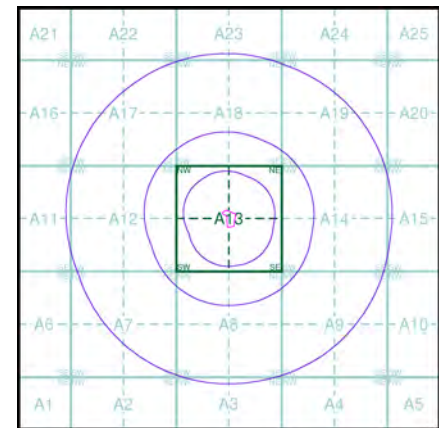
## **APPENDIX C**

### **Surrounding Land Use**



- General**
  - Specified Site
  - Specified Buffer(s)
  - Bearing Reference Point
  - Map ID
  - Several of Type at Location
- Agency and Hydrological**
  - Contaminated Land Register Entry or Notice (Location)
  - Contaminated Land Register Entry or Notice
  - Discharge Consent
  - Enforcement or Prohibition Notice
  - Integrated Pollution Control
  - Integrated Pollution Prevention Control
  - Local Authority Integrated Pollution Prevention and Control
  - Local Authority Pollution Prevention and Control
  - Local Authority Pollution Prevention and Control Enforcement
  - Pollution Incident to Controlled Waters
  - Prosecution Relating to Authorised Processes
  - Prosecution Relating to Controlled Waters
  - Registered Radioactive Substance
  - River Network or Water Feature
  - River Quality Sampling Point
  - Substantiated Pollution Incident Register
  - Water Abstraction
  - Water Industry Act Referral
- Waste**
  - BGS Recorded Landfill Site (Location)
  - BGS Recorded Landfill Site
  - EA Historic Landfill (Buffered Point)
  - EA Historic Landfill (Polygon)
  - Integrated Pollution Control Registered Waste Site
  - Licensed Waste Management Facility (Landfill Boundary)
  - Licensed Waste Management Facility (Location)
  - Local Authority Recorded Landfill Site (Location)
  - Local Authority Recorded Landfill Site
  - Potentially Infilled Land (Non-water)
  - Potentially Infilled Land (Non-water)
  - Potentially Infilled Land (Non-water)
  - Potentially Infilled Land (Water)
  - Potentially Infilled Land (Water)
  - Potentially Infilled Land (Water)
  - Registered Landfill Site (Location)
  - Registered Landfill Site (Point Buffered to 100m)
  - Registered Landfill Site (Point Buffered to 250m)
  - Registered Waste Transfer Site (Location)
  - Registered Waste Transfer Site
  - Registered Waste Treatment or Disposal Site (Location)
  - Registered Waste Treatment or Disposal Site
- Hazardous Substances**
  - COMAH Site
  - Explosive Site
  - NIHHS Site
  - Planning Hazardous Substance Consent
  - Planning Hazardous Substance Enforcement
- Geological**
  - BGS Recorded Mineral Site

Site Sensitivity Map - Slice A

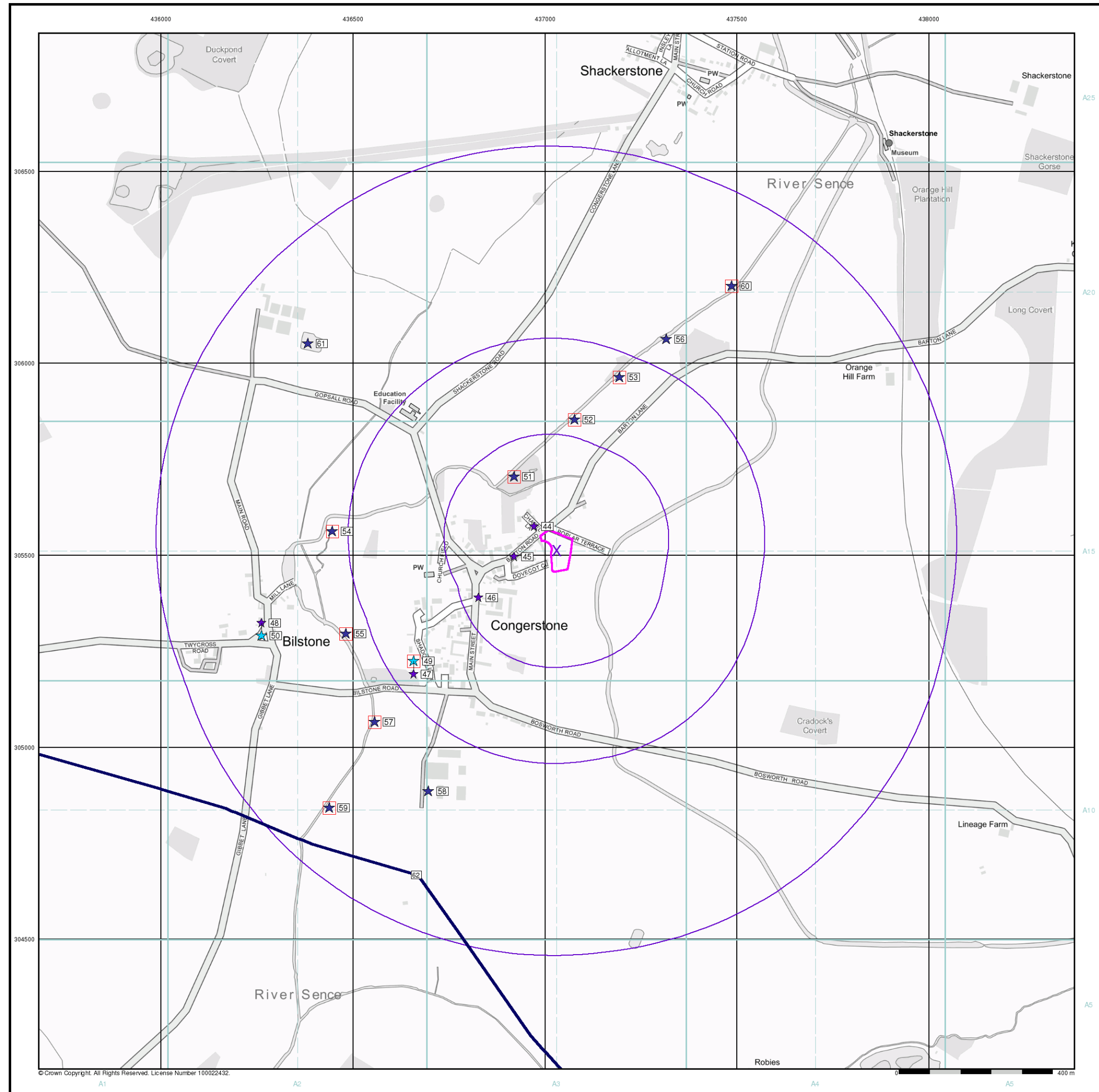


**Order Details**

|                          |                |
|--------------------------|----------------|
| Order Number:            | 296603024_1_1  |
| Customer Ref:            | UK22.5955      |
| National Grid Reference: | 437030, 305510 |
| Slice:                   | A              |
| Site Area (Ha):          | 0.54           |
| Search Buffer (m):       | 1000           |

**Site Details**

Poplar Terrace, Congerstone, Nuneaton, CV13 6NB



## Industrial Land Use Map

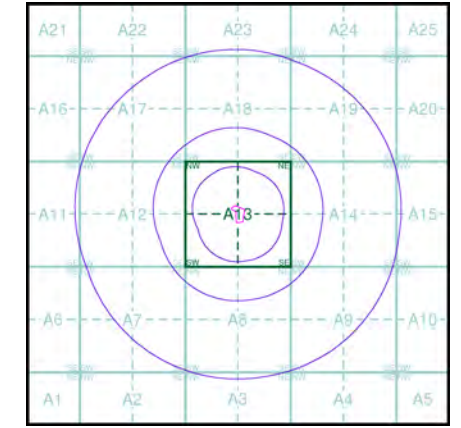
### General

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

### Industrial Land Use

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

### Industrial Land Use Map - Slice A



### Order Details

Order Number: 296603024\_1\_1  
Customer Ref: UK22.5955  
National Grid Reference: 437030, 305510  
Slice: A  
Site Area (Ha): 0.54  
Search Buffer (m): 1000

### Site Details

Poplar Terrace, Congerstone, Nuneaton, CV13 6NB



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Web: [www.envirocheck.co.uk](http://www.envirocheck.co.uk)

## **APPENDIX D**

### **Geological Context**

## Geology 1:50,000 Maps Legends

### Superficial Geology

| Map Colour                                                                        | Lex Code | Rock Name                               | Rock Type                   | Min and Max Age           |
|-----------------------------------------------------------------------------------|----------|-----------------------------------------|-----------------------------|---------------------------|
|  | ALV      | Alluvium                                | Clay, Silt, Sand and Gravel | Not Supplied - Holocene   |
|  | BOSW     | Bosworth Clay Member                    | Clay and Silt               | Not Supplied - Anglian    |
|  | THT      | THRUSSINGTON MEMBER                     | Diamicton                   | Not Supplied - Anglian    |
|  | ODT      | Oadby Member                            | Diamicton                   | Not Supplied - Anglian    |
|  | GFDMP    | Glaciofluvial Deposits, Mid Pleistocene | Sand and Gravel             | Not Supplied - Cromerian  |
|  | RTD2     | River Terrace Deposits, 2               | Sand and Gravel             | Not Supplied - Quaternary |
|  | RTD1     | River Terrace Deposits, 1               | Sand and Gravel             | Not Supplied - Quaternary |
|  | HEAD     | Head                                    | Clay, Silt, Sand and Gravel | Not Supplied - Quaternary |
|  | LDE      | Lacustrine Deposits                     | Clay, Silt and Sand         | Not Supplied - Quaternary |

### Bedrock and Faults

| Map Colour                                                                          | Lex Code | Rock Name        | Rock Type            | Min and Max Age        |
|-------------------------------------------------------------------------------------|----------|------------------|----------------------|------------------------|
|    | GUN      | Gunthorpe Member | Mudstone             | Not Supplied - Anisian |
|   | GUN      | Gunthorpe Member | Siltstone, Dolomitic | Not Supplied - Anisian |
|  |          | Faults           |                      |                        |



### Geology 1:50,000 Maps

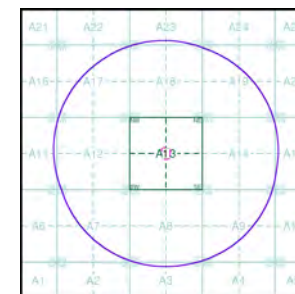
This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published 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:        | 155          |
| Map Name:            | Coalville    |
| Map Date:            | 2010         |
| Bedrock Geology:     | Available    |
| Superficial Geology: | Available    |
| Artificial Geology:  | Available    |
| Faults:              | Not Supplied |
| Landslip:            | Available    |
| Rock Segments:       | Not Supplied |

### Geology 1:50,000 Maps - Slice A



### Order Details:

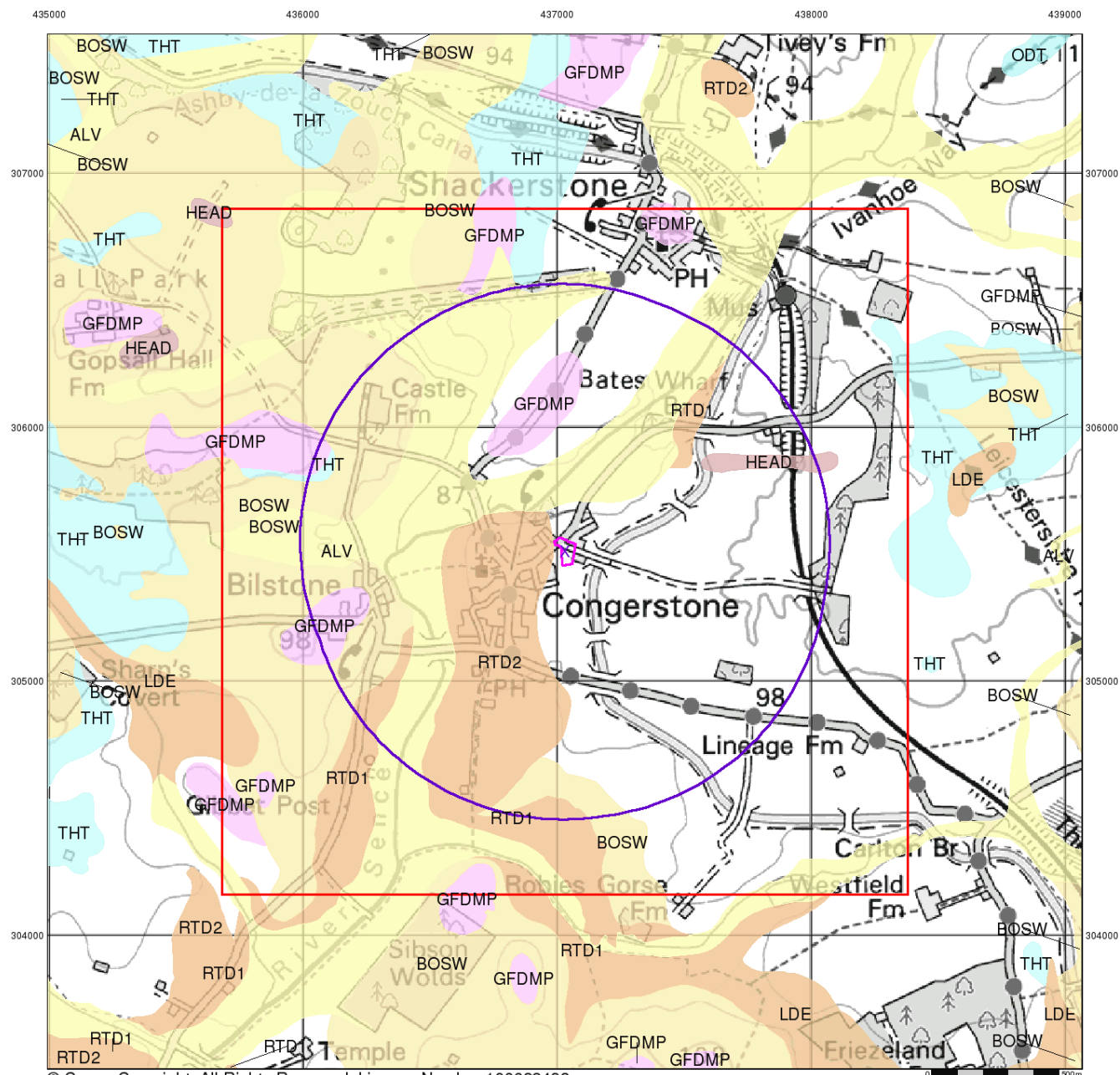
|                          |                |
|--------------------------|----------------|
| Order Number:            | 296603024_1_1  |
| Customer Reference:      | UK22.5955      |
| National Grid Reference: | 437030, 305510 |
| Slice:                   | A              |
| Site Area (Ha):          | 0.54           |
| Search Buffer (m):       | 1000           |

### Site Details:

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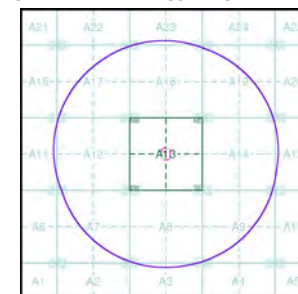
## Superficial Geology

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: 296603024\_1\_1  
 Customer Reference: UK22.5955  
 National Grid Reference: 437030, 305510  
 Slice: A  
 Site Area (Ha): 0.54  
 Search Buffer (m): 1000

## Site Details:

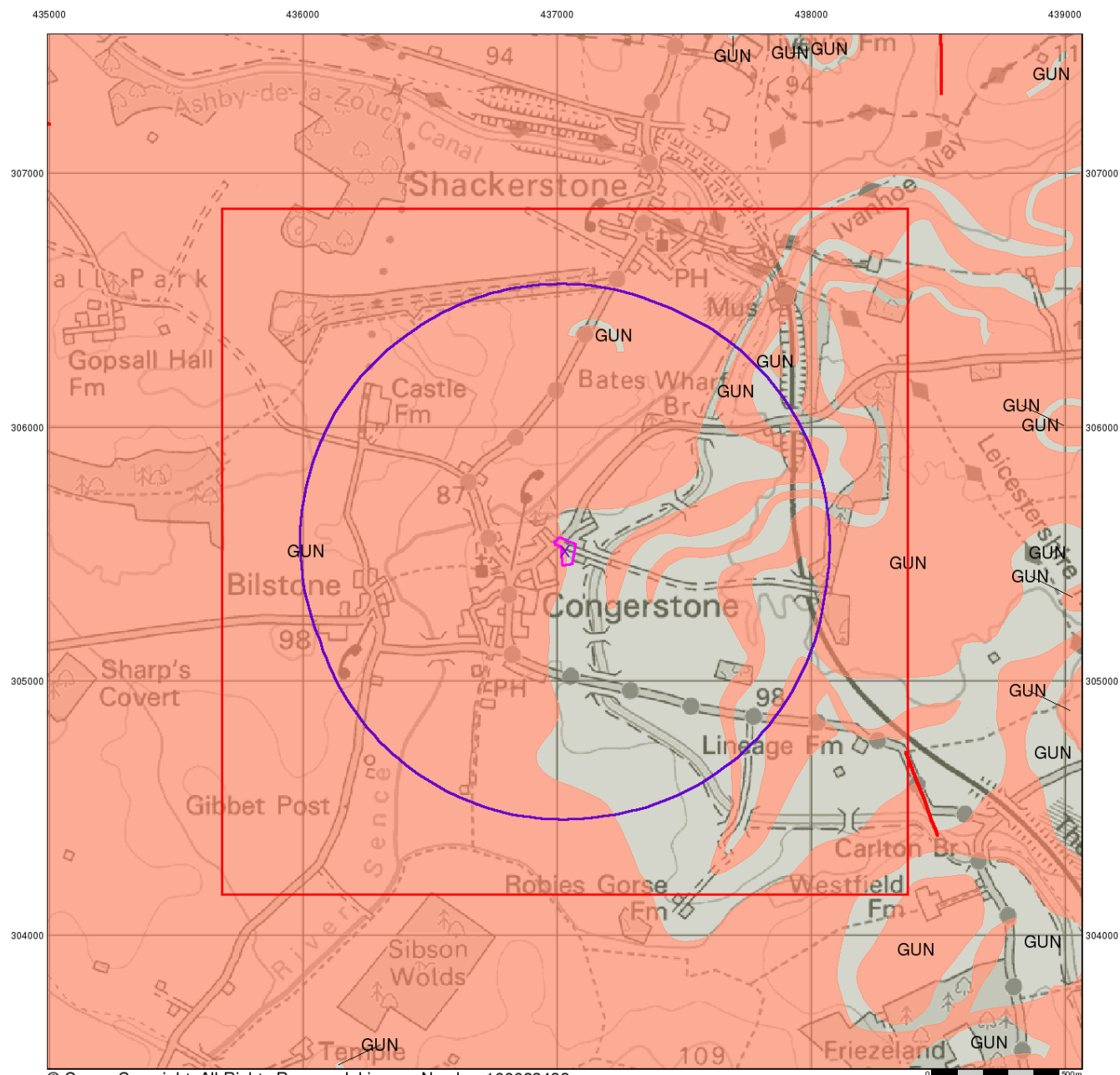
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Page 3 of 5



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### Bedrock and Faults

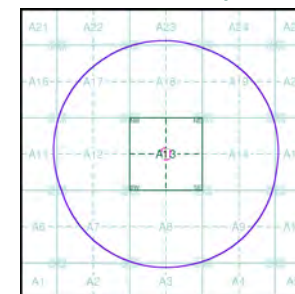
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

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

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

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

### Bedrock and Faults Map - Slice A



### Order Details:

Order Number: 296603024\_1\_1  
 Customer Reference: UK22.5955  
 National Grid Reference: 437030, 305510  
 Slice: A  
 Site Area (Ha): 0.54  
 Search Buffer (m): 1000

### Site Details:

Poplar Terrace, Congerstone, Nuneaton, CV13 6NB



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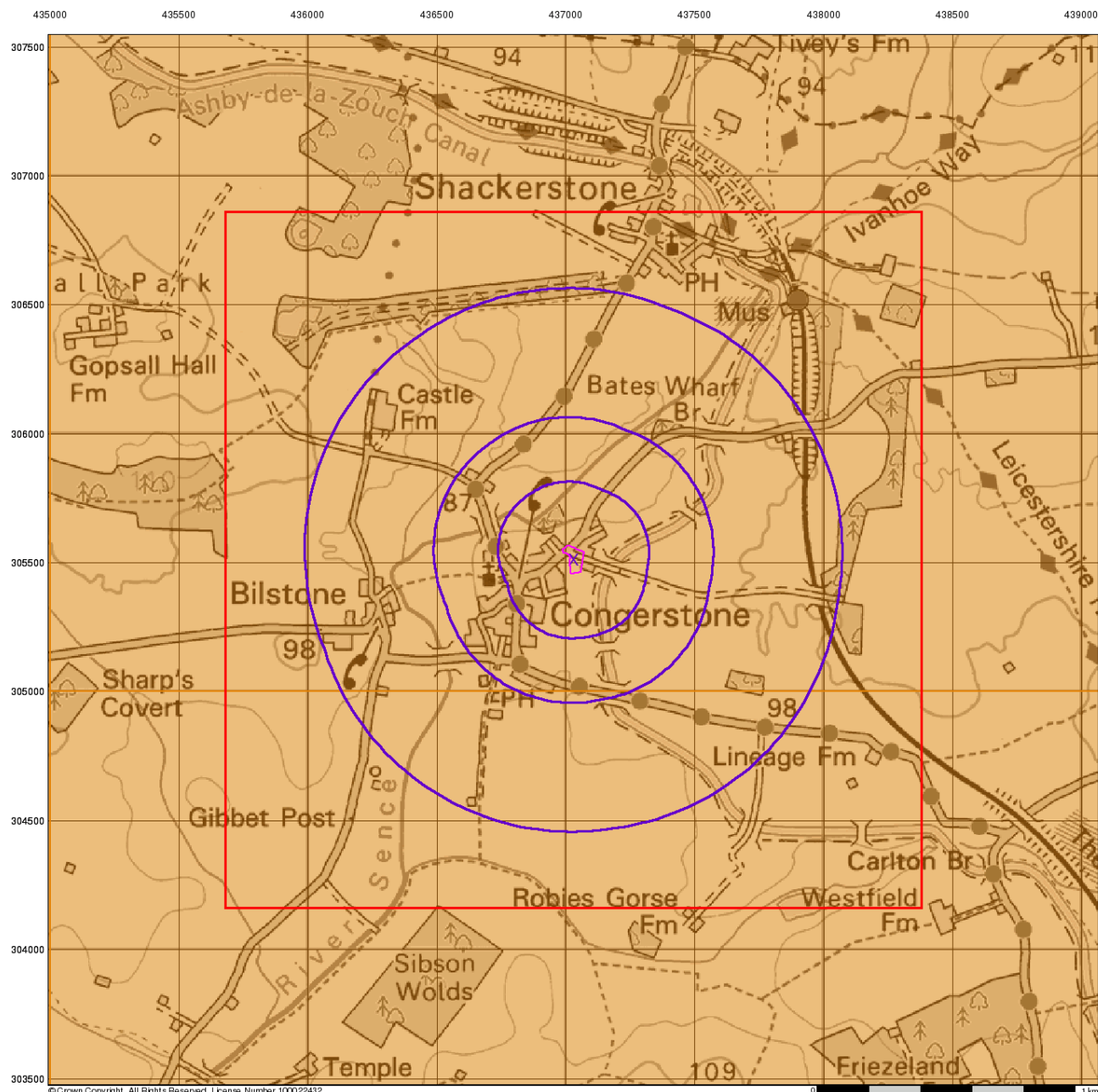
SK 30SE

SK 30SE/17

| DRILLING                                                                                                              |         |       | SAMPLING    |      |     | STRATA |       | TESTING                                                        |                                                       |    |      |                    |   |
|-----------------------------------------------------------------------------------------------------------------------|---------|-------|-------------|------|-----|--------|-------|----------------------------------------------------------------|-------------------------------------------------------|----|------|--------------------|---|
| RATE                                                                                                                  | CASING  | WATER | DEPTH       | TYPE | KEY | DEPTH  | LEVEL | DESCRIPTION                                                    | "M"                                                   | %  | C. # | lb/ft <sup>2</sup> | o |
| 1.6.70                                                                                                                | 8in dia |       |             |      |     |        |       | Sandy SOIL with pebbles. (FILL)                                |                                                       |    |      |                    |   |
|                                                                                                                       |         |       | 4'0"-5'6"   | U    |     | 3'6"   |       |                                                                | 45                                                    | 15 | 920  | 4                  |   |
|                                                                                                                       |         |       | 5'9"        | D    |     |        |       |                                                                | 10                                                    |    |      |                    |   |
|                                                                                                                       |         |       | 5'9"-7'3"   | S.D  |     |        |       | Firm red brown silty CLAY with rock fragments. (Presumed FILL) | (12)                                                  | 15 |      |                    |   |
|                                                                                                                       |         |       | 7'6"-9'0"   | U    |     | 7'6"   |       |                                                                | 100                                                   | 14 | 1580 | 9                  |   |
|                                                                                                                       |         |       | 9'3"        | D    |     |        |       |                                                                |                                                       |    |      |                    |   |
|                                                                                                                       |         |       | 9'3"-10'9"  | S.D  |     |        |       | Very stiff brown sandy CLAY with gravel.                       | (15)                                                  | 18 |      |                    |   |
|                                                                                                                       |         |       | 11'0"-12'6" | U    |     |        |       |                                                                | 110                                                   | 14 | 3150 | 5                  |   |
|                                                                                                                       |         |       | 12'9"       | D    |     | 12'6"  |       |                                                                |                                                       | 16 |      |                    |   |
|                                                                                                                       |         |       | 12'9"-14'3" | S.D  |     |        |       | Red brown clayey SAND with mudstone fragments.                 | (21)                                                  | 16 |      |                    |   |
|                                                                                                                       |         |       | 14'6"-16'0" | U    |     |        |       |                                                                | 100                                                   | 26 | 390  | 4                  |   |
|                                                                                                                       | 10'0"   |       | 15'0"       | W    |     |        |       |                                                                |                                                       |    |      |                    |   |
|                                                                                                                       |         |       | 16'3"       | D    |     | 15'6"  |       |                                                                |                                                       |    |      |                    |   |
|                                                                                                                       |         |       | 16'3"-17'9" | S.D  |     |        |       |                                                                | (74)                                                  | 17 |      |                    |   |
|                                                                                                                       |         |       | 20'0"-21'0" | S.D  |     |        |       | Grey SILTSTONE and red MUDSTONE.                               | (144)                                                 | 5  |      |                    |   |
| 23'0"                                                                                                                 | 20'0"   | 15'0" | 23'0"-23'1" | S.D. |     | 23'0"  |       | End of Borehole.                                               | (100)                                                 |    |      |                    |   |
| REMARKS • Number of blows for total recorded penetration<br>Trial pit 4' x 4' x 4' deep excavated to expose services. |         |       |             |      |     |        |       |                                                                | CONTRACT: CONGERSTONE<br>CONTRACT NO: 5/002/018/27030 |    |      |                    |   |
| BOREHOLE RECORD                                                                                                       |         |       |             |      |     |        |       |                                                                | BOREHOLE NO: 4/<br>(Sheet 1 of 1)                     |    |      |                    |   |
| exploration associates limited                                                                                        |         |       |             |      |     |        |       |                                                                | Ground level (Feet) AOD                               |    |      |                    |   |

## **APPENDIX E**

### **Groundwater Vulnerability and Flood Maps**



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0 1 km



## Bedrock Aquifer Designation

### General

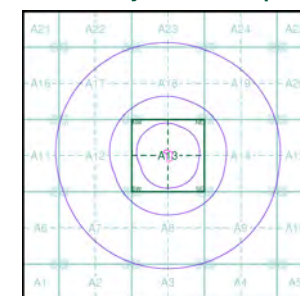
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

### Agency and Hydrological

#### Geological Classes

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

### Site Sensitivity Context Map - Slice A



### Order Details

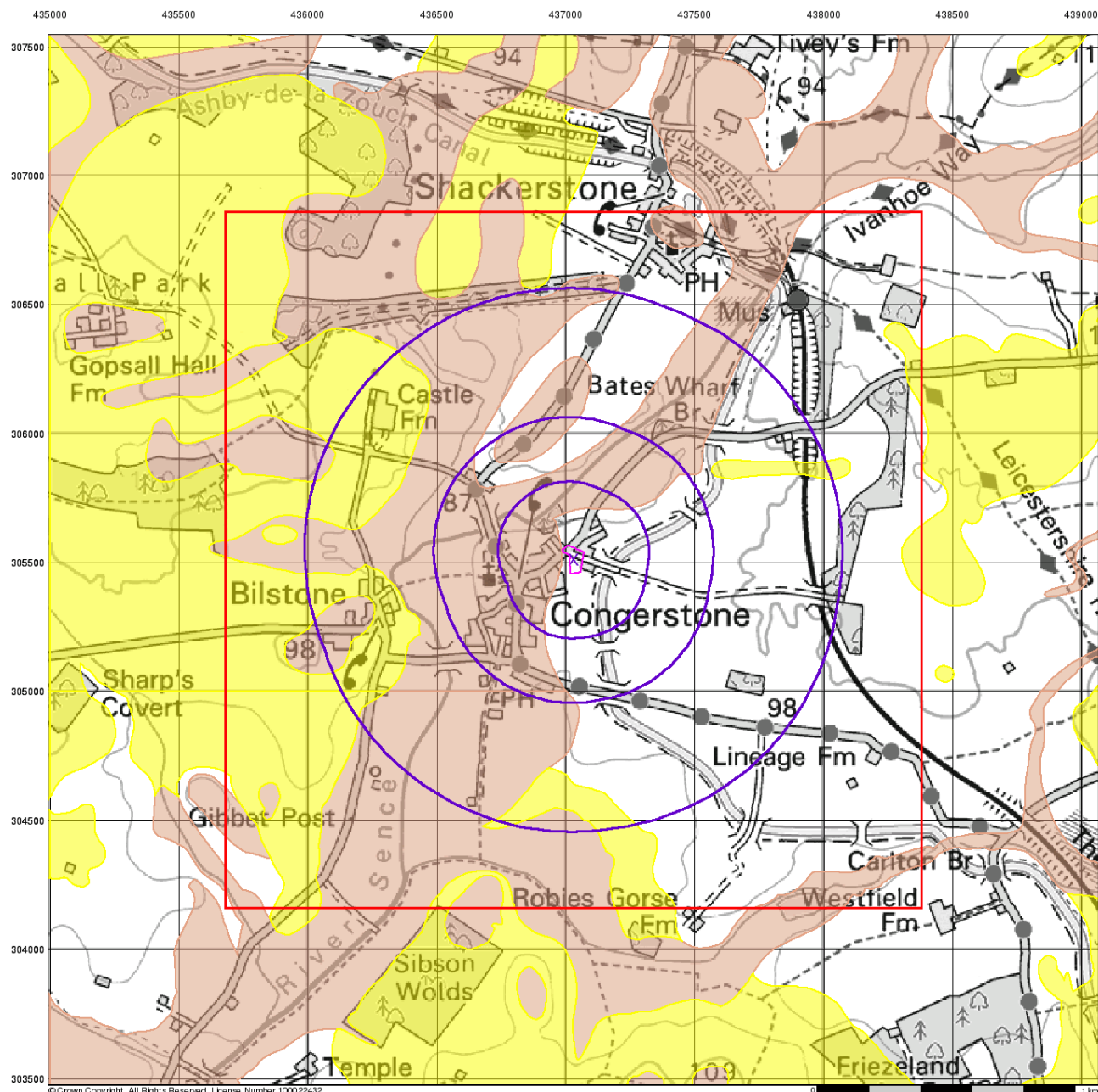
Order Number: 296603024\_1\_1  
 Customer Ref: UK22.5955  
 National Grid Reference: 437030, 305510  
 Slice: A  
 Site Area (Ha): 0.54  
 Search Buffer (m): 1000

### Site Details

Poplar Terrace, Congerstone, Nuneaton, CV13 6NB



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



## Superficial Aquifer Designation

### General

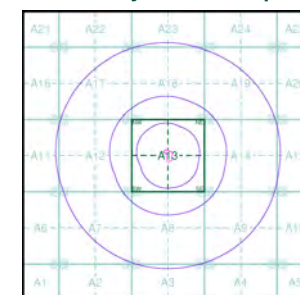
- ◇ Specified Site
- Specified Buffer(s)
- X Bearing Reference Point
- Slice
- B Map ID

### Agency and Hydrological

#### Geological Classes

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

### Site Sensitivity Context Map - Slice A



### Order Details

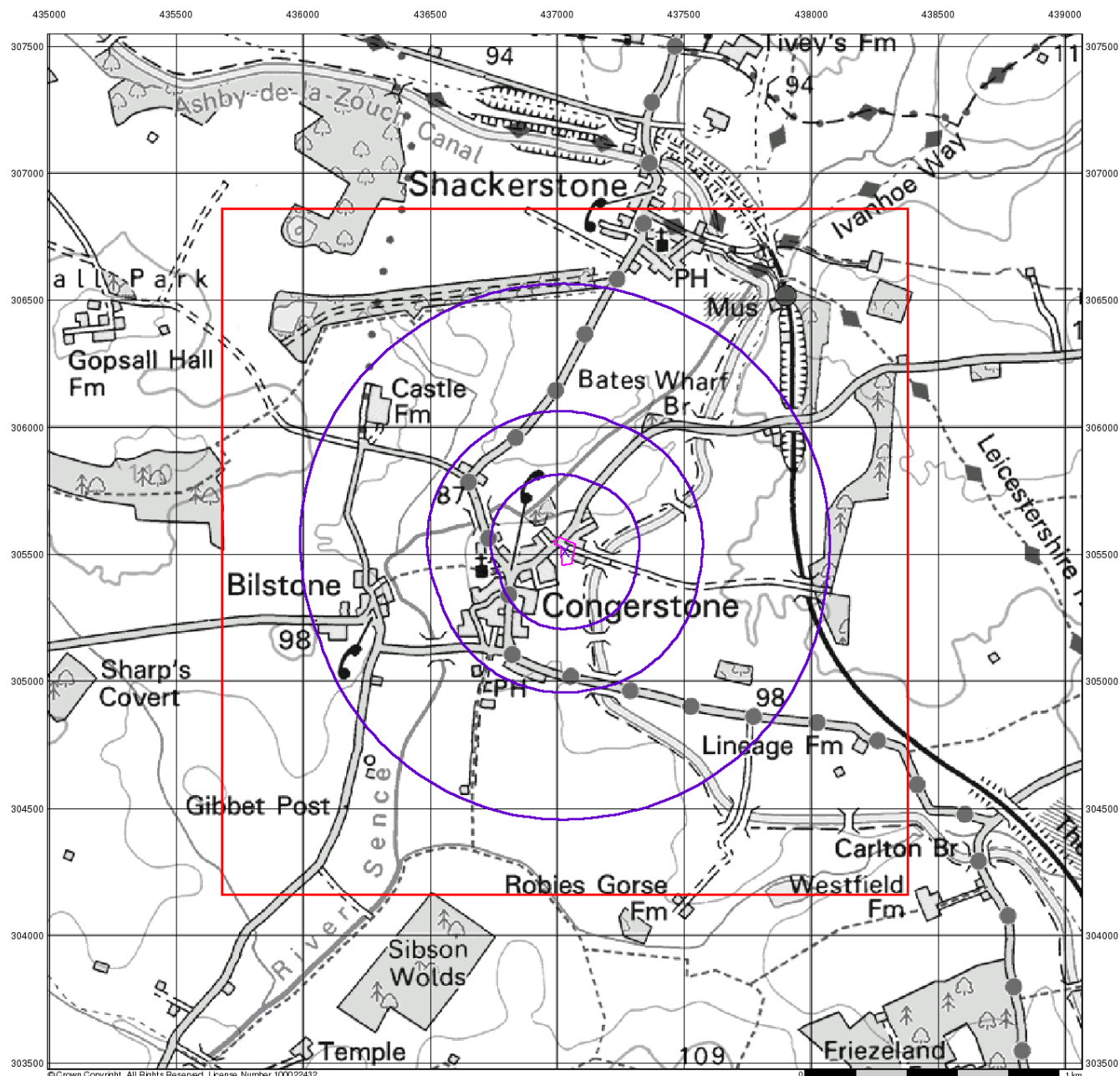
Order Number: 296603024\_1\_1  
 Customer Ref: UK22.5955  
 National Grid Reference: 437030, 305510  
 Slice: A  
 Site Area (Ha): 0.54  
 Search Buffer (m): 1000

### Site Details

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 Fax: 0844 844 9951  
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## Source Protection Zones

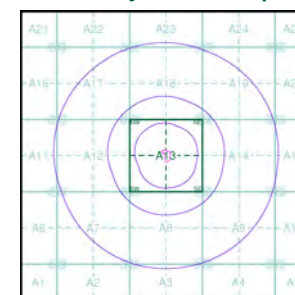
### General

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

### Agency and Hydrological

- Inner zone (Zone 1)
- Inner zone - subsurface activity only (Zone 1c)
- Outer zone (Zone 2)
- Outer zone - subsurface activity only (Zone 2c)
- Total catchment (Zone 3)
- Total catchment - subsurface activity only (Zone 3c)
- Special interest (Zone 4)

### Site Sensitivity Context Map - Slice A



### Order Details

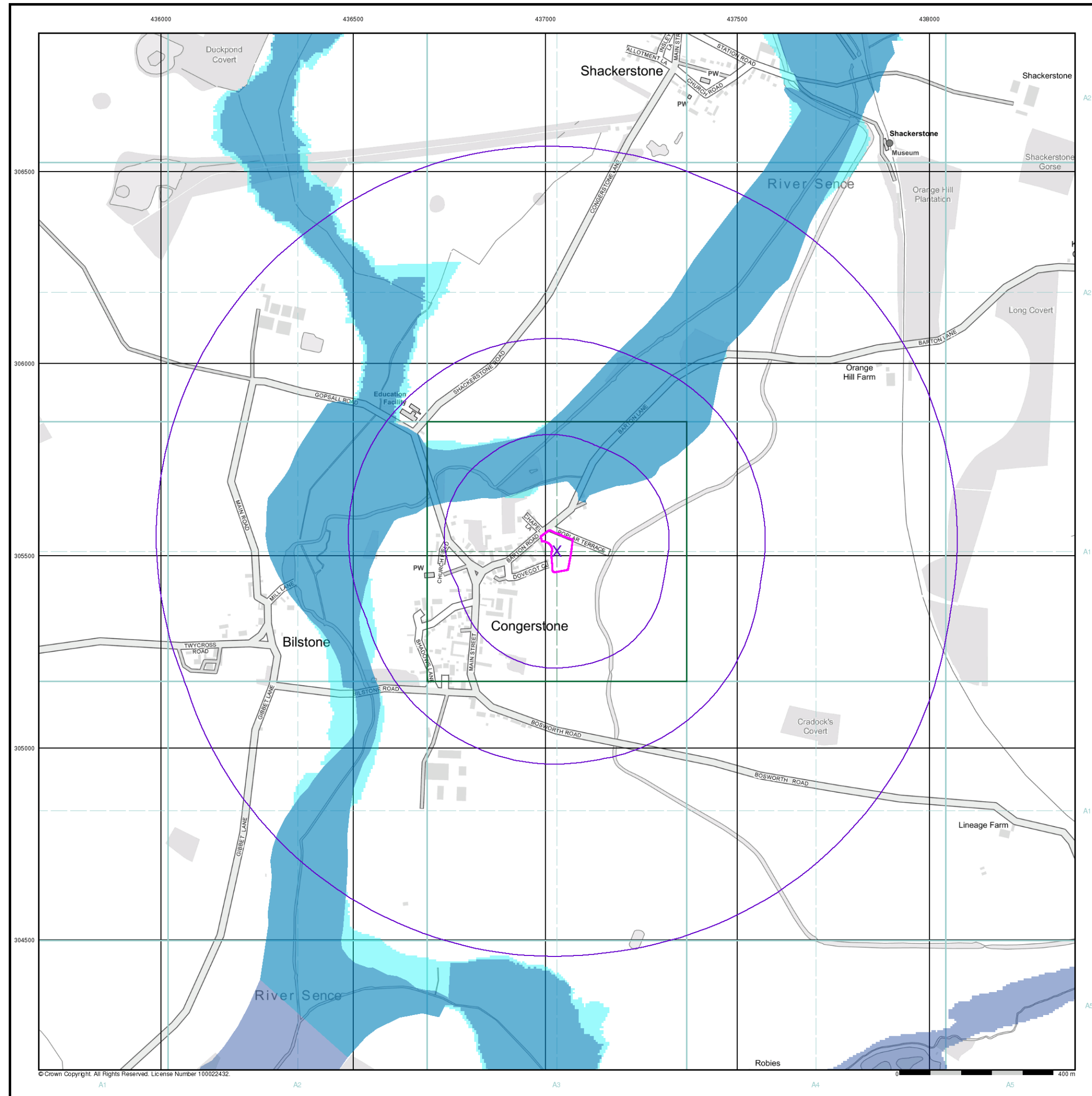
Order Number: 296603024\_1\_1  
 Customer Ref: UK22.5955  
 National Grid Reference: 437030, 305510  
 Slice: A  
 Site Area (Ha): 0.54  
 Search Buffer (m): 1000

### Site Details

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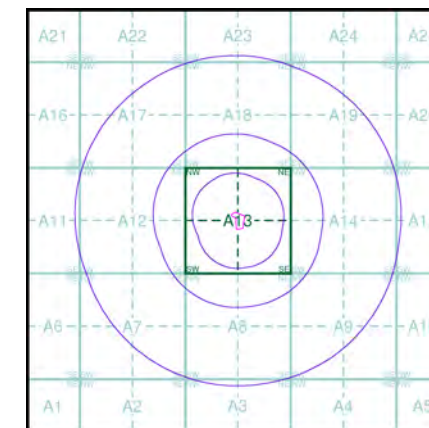
**General**

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

**Agency and Hydrological (Flood)**

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

**Flood Map - Slice A**



**Order Details**

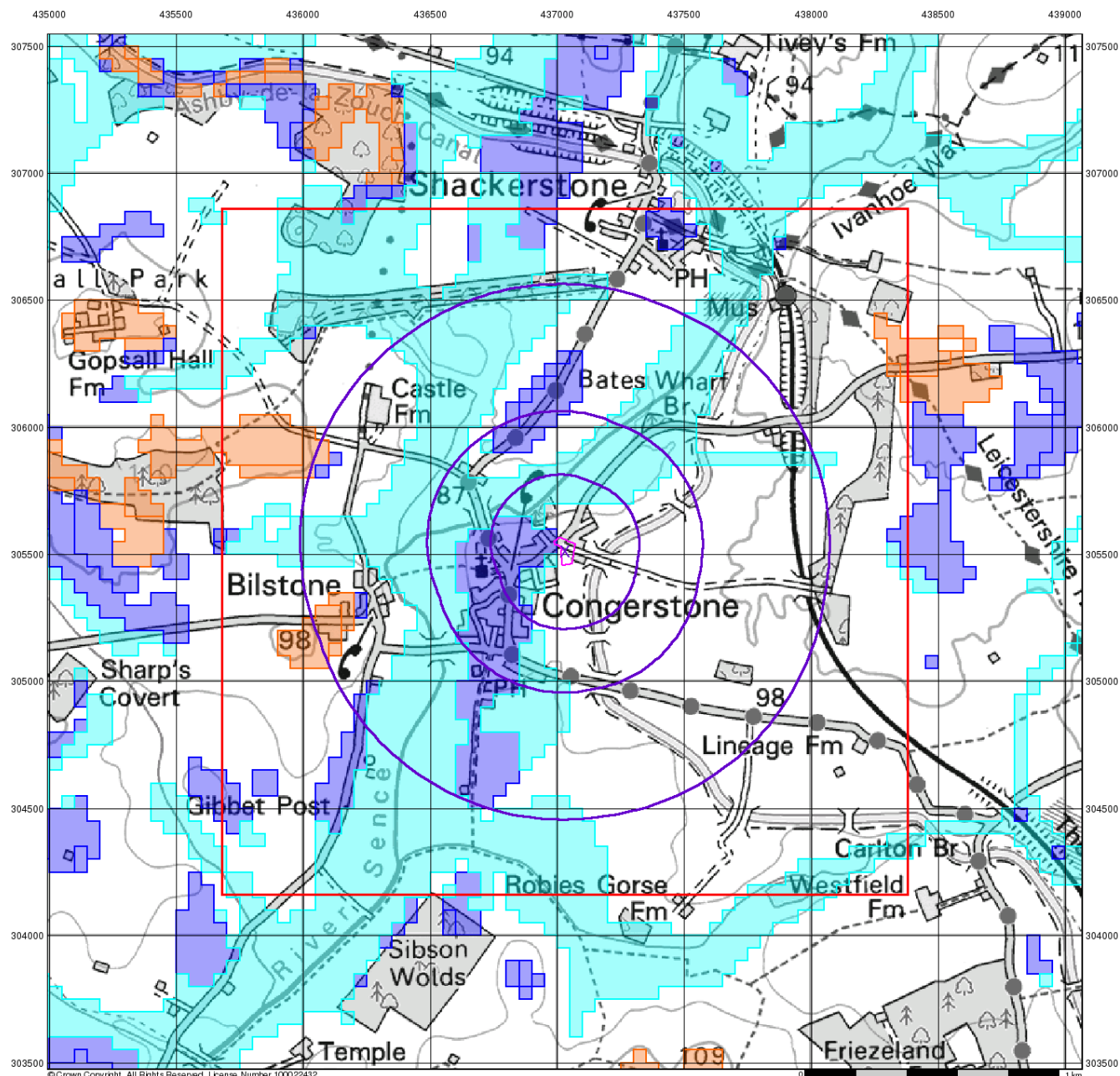
Order Number: 296603024\_1\_1  
Customer Ref: UK22.5955  
National Grid Reference: 437030, 305510  
Slice: A  
Site Area (Ha): 0.54  
Search Buffer (m): 1000

**Site Details**

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## BGS Flood GFS Data

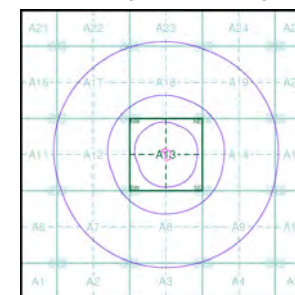
### General

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

### Agency and Hydrological (Flood)

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

### Site Sensitivity Context Map - Slice A



### Order Details

Order Number: 296603024\_1\_1  
 Customer Ref: UK22.5955  
 National Grid Reference: 437030, 305510  
 Slice: A  
 Site Area (Ha): 0.54  
 Search Buffer (m): 1000

### Site Details

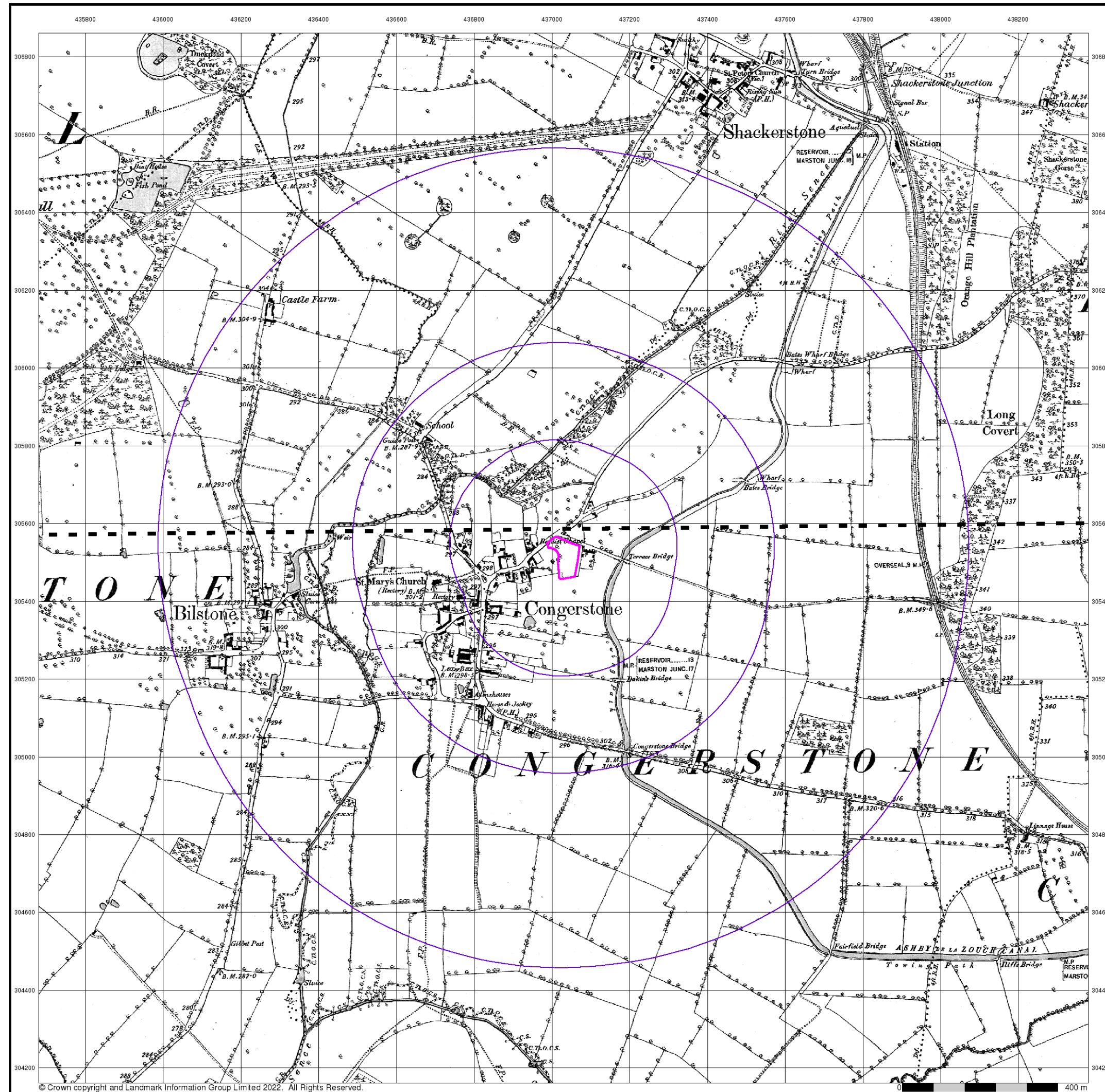
Poplar Terrace, Congerstone, Nuneaton, CV13 6NB



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 Fax: 0844 844 9951  
 Web: [www.envirocheck.co.uk](http://www.envirocheck.co.uk)

## **APPENDIX F**

### **A Selection of Historic Maps**



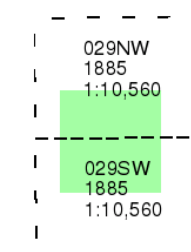
Leicestershire

Published 1885

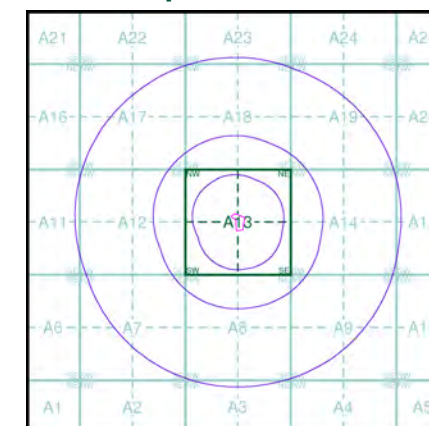
Source map scale - 1:10,560

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)



Historical Map - Slice A



Order Details

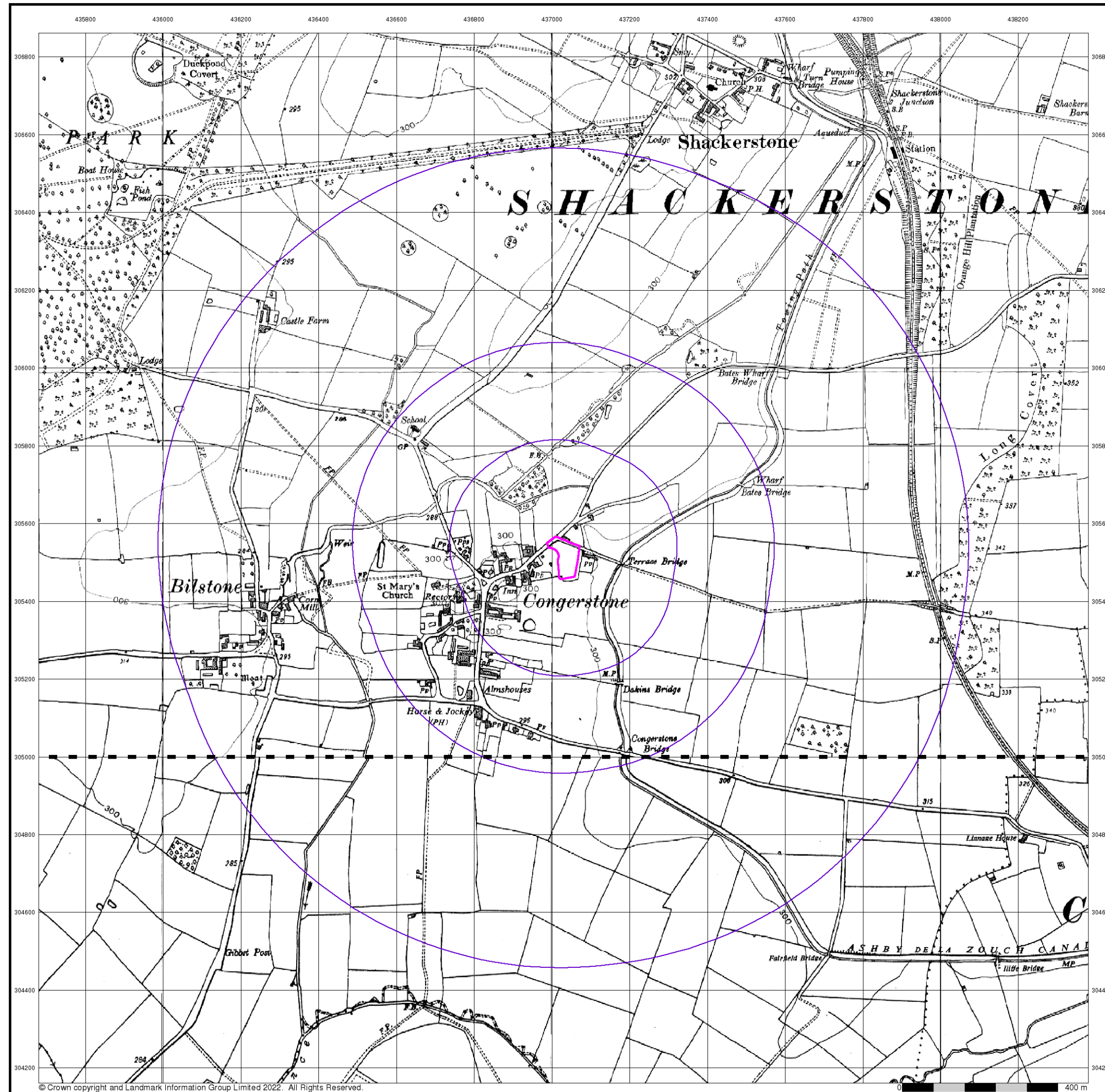
Order Number: 296603024\_1\_1  
Customer Ref: UK22.5955  
National Grid Reference: 437030, 305510  
Slice: A  
Site Area (Ha): 0.54  
Search Buffer (m): 1000

Site Details

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## Ordnance Survey Plan

Published 1955

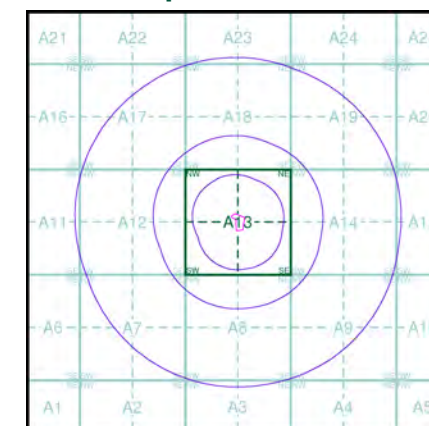
Source map scale - 1:10,000

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

## Map Name(s) and Date(s)

|        |      |
|--------|------|
| SK30NE | 1955 |
| SK30SE | 1955 |

## Historical Map - Slice A



## Order Details

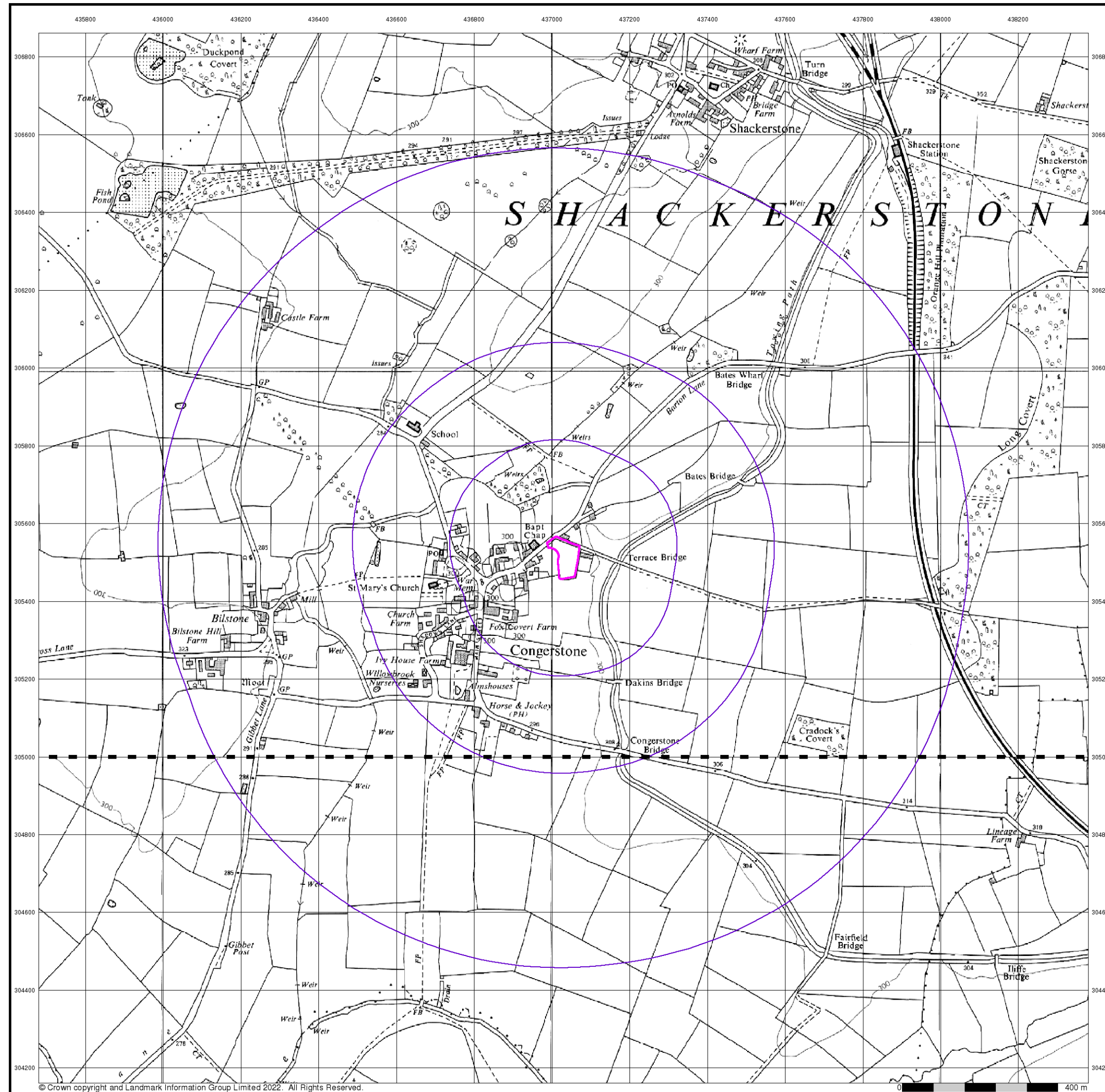
Order Number: 296603024\_1\_1  
Customer Ref: UK22.5955  
National Grid Reference: 437030, 305510  
Slice: A  
Site Area (Ha): 0.54  
Search Buffer (m): 1000

## Site Details

Poplar Terrace, Congerstone, Nuneaton, CV13 6NB



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## Ordnance Survey Plan

Published 1966

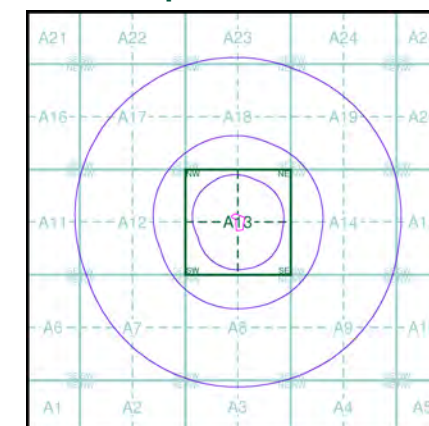
Source map scale - 1:10,000

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

### Map Name(s) and Date(s)

|          |      |
|----------|------|
| SK30NE   | 1966 |
| 1:10,560 |      |
| SK30SE   | 1966 |
| 1:10,560 |      |

### Historical Map - Slice A



### Order Details

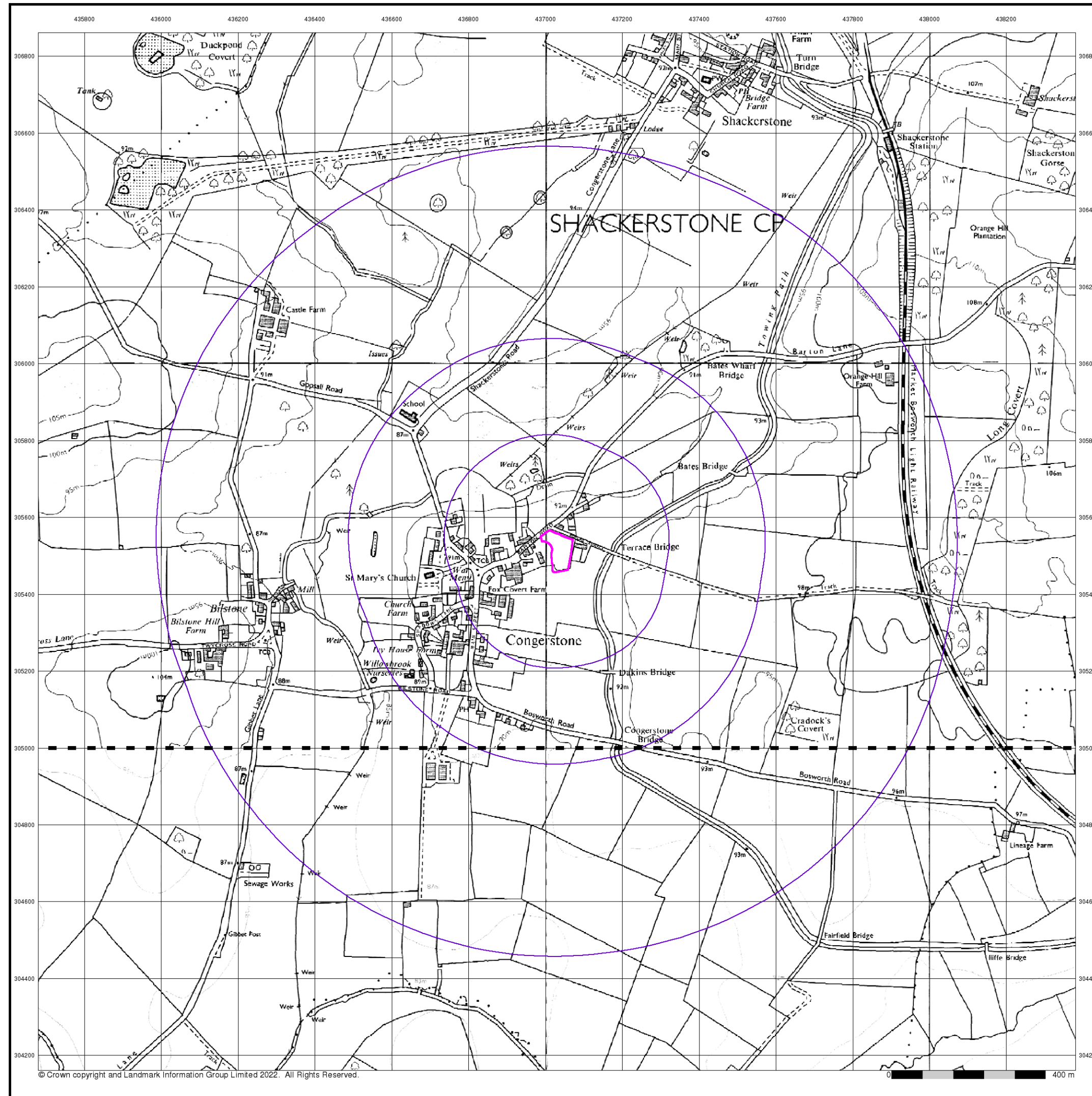
Order Number: 296603024\_1\_1  
Customer Ref: UK22.5955  
National Grid Reference: 437030, 305510  
Slice: A  
Site Area (Ha): 0.54  
Search Buffer (m): 1000

### Site Details

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## Ordnance Survey Plan

Published 1990 - 1991

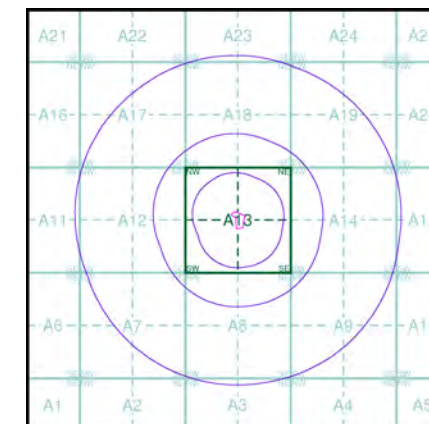
Source map scale - 1:10,000

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

## Map Name(s) and Date(s)

|          |      |
|----------|------|
| SK30NE   | 1990 |
| 1:10,000 |      |
| SK30SE   | 1991 |
| 1:10,000 |      |

## Historical Map - Slice A



## Order Details

Order Number: 296603024\_1\_1  
Customer Ref: UK22.5955  
National Grid Reference: 437030, 305510  
Slice: A  
Site Area (Ha): 0.54  
Search Buffer (m): 1000

## Site Details

Poplar Terrace, Congerstone, Nuneaton, CV13 6NB



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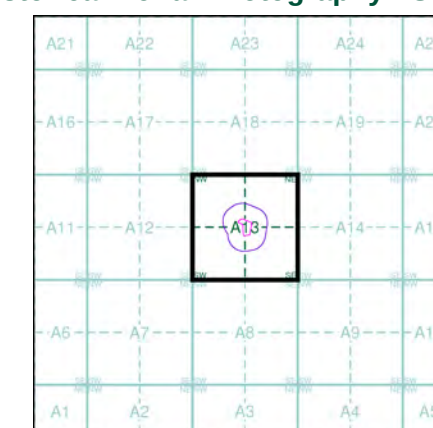


## Historical Aerial Photography

Published 1999

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

### Historical Aerial Photography - Segment A13



### Order Details

Order Number: 296603024\_1\_1  
Customer Ref: UK22.5955  
National Grid Reference: 437030, 305510  
Slice: A  
Site Area (Ha): 0.54  
Search Buffer (m): 100

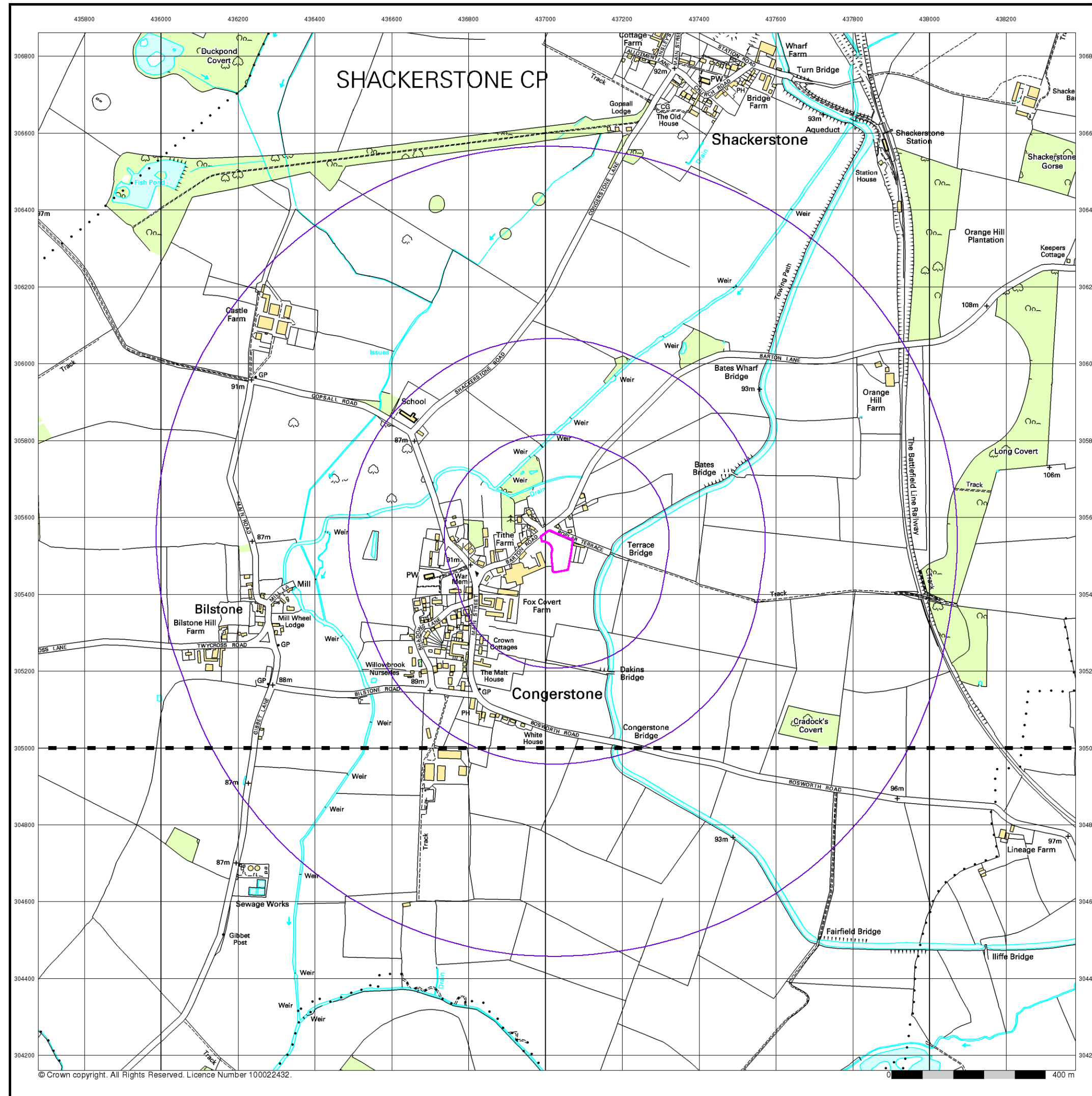
### Site Details

Poplar Terrace, Congerstone, Nuneaton, CV13 6NB

**Landmark**  
INFORMATION GROUP

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Fax: 0844 844 9951  
Web: [www.envirocheck.co.uk](http://www.envirocheck.co.uk)





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## 10k Raster Mapping

Published 2006

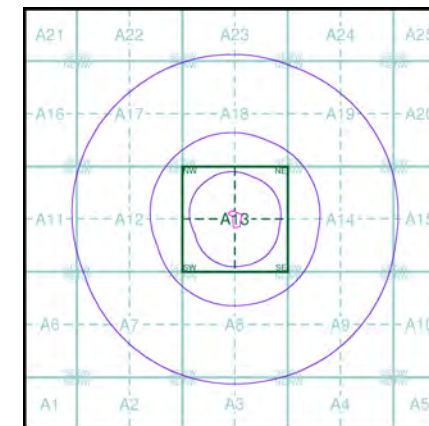
Source map scale - 1:10,000

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

### Map Name(s) and Date(s)

|        |      |          |
|--------|------|----------|
| SK30NE | 2006 | 1:10,000 |
| SK30SE | 2006 | 1:10,000 |

### Historical Map - Slice A



### Order Details

Order Number: 296603024\_1\_1  
Customer Ref: UK22.5955  
National Grid Reference: 437030, 305510  
Slice: A  
Site Area (Ha): 0.54  
Search Buffer (m): 1000

### Site Details

Poplar Terrace, Congerstone, Nuneaton, CV13 6NB



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## **APPENDIX G**

### **Site Specific Trial Pit Logs**



# Trial Pit Log

Trialpit No

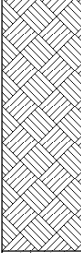
**TP01**

Sheet 1 of 1

Project Name: Land South of Poplar Terrace

Project No.  
UK22.5955Co-ords: -161833.28 - 6917755.51  
Level:Date  
16/06/2022Location: Land South of Poplar Terrace, Congerstone, Leicestershire,  
CV13 6PEDimensions  
(m):Depth  
2.20Scale  
1:15Logged  
OC

Client: Adi Newberry

| Water<br>Strike | Samples and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m) | Legend                                                                              | Stratum Description                                                                      |   |
|-----------------|-----------------------------|------|---------|--------------|--------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---|
|                 | Depth                       | Type | Results |              |              |                                                                                     |                                                                                          |   |
|                 | 0.10 - 0.40                 | ES   |         |              |              |    | Brown, slightly gravelly silty sandy clayey TOPSOIL with common rootlets.                |   |
|                 |                             |      |         | 0.50         |              |   | Firm to stiff, reddish brown, slightly sandy CLAY with grey mottling. (Gunthorpe Member) | 1 |
|                 |                             |      | HVP=69  |              |              |                                                                                     |                                                                                          |   |
|                 |                             |      | HVP=69  |              |              |                                                                                     |                                                                                          |   |
|                 |                             |      | HVP=159 |              |              |                                                                                     |                                                                                          |   |
|                 |                             |      | HVP=156 |              |              |                                                                                     |                                                                                          | 2 |
|                 |                             |      |         | 2.20         |              |  | End of pit at 2.20 m                                                                     | 3 |

Remarks: Slight groundwater seepage at 2.0m.

Stability:





# Trial Pit Log

Trialpit No

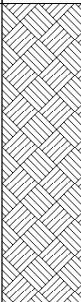
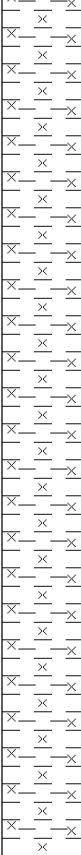
**TP02**

Sheet 1 of 1

Project Name: Land South of Poplar Terrace

Project No.  
UK22.5955Co-ords: -161832.38 - 6917788.95  
Level:Date  
16/06/2022Location: Land South of Poplar Terrace, Congerstone, Leicestershire,  
CV13 6PEDimensions  
(m):Depth  
2.30Scale  
1:15Logged  
OC

Client: Adi Newberry

| Water<br>Strike | Samples and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m) | Legend                                                                             | Stratum Description                                                                       |   |
|-----------------|-----------------------------|------|---------|--------------|--------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---|
|                 | Depth                       | Type | Results |              |              |                                                                                    |                                                                                           |   |
|                 | 0.10 - 0.40                 | ES   |         | 0.60         |              |   | Brown, slightly gravelly silty sandy clayey TOPSOIL with common rootlets.                 |   |
|                 | 0.80 - 1.00                 | D    |         |              |              |  | Firm to stiff, reddish brown silty CLAY with rare light grey mottling. (Gunthorpe Member) | 1 |
|                 |                             |      | HVP=84  | 2.30         |              |                                                                                    |                                                                                           |   |
|                 |                             |      | HVP=112 |              |              |                                                                                    |                                                                                           |   |
|                 |                             |      | HVP=141 |              |              |                                                                                    |                                                                                           | 2 |
|                 |                             |      |         |              |              |                                                                                    | End of pit at 2.30 m                                                                      | 3 |

Remarks: Groundwater not encountered.

Stability:





# Trial Pit Log

Trialpit No

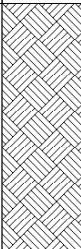
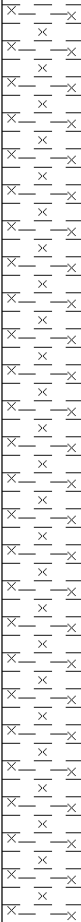
**TP03**

Sheet 1 of 1

Project Name: Land South of Poplar Terrace

Project No.  
UK22.5955Co-ords: -161818.65 - 6917823.28  
Level:Date  
16/06/2022Location: Land South of Poplar Terrace, Congerstone, Leicestershire,  
CV13 6PEDimensions  
(m):Depth  
2.35Scale  
1:15Logged  
OC

Client: Adi Newberry

| Water<br>Strike | Samples and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m) | Legend                                                                              | Stratum Description                                                                                 |   |
|-----------------|-----------------------------|------|---------|--------------|--------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---|
|                 | Depth                       | Type | Results |              |              |                                                                                     |                                                                                                     |   |
|                 | 0.10 - 0.40                 | ES   |         |              |              |    | Brown, slightly gravelly silty sandy clayey TOPSOIL with common rootlets. Gravel is fine to medium. |   |
|                 |                             |      |         | 0.50         |              |   | Firm to stiff, reddish brown silty CLAY with rare light grey mottling. (Gunthorpe Member)           | 1 |
|                 |                             |      |         | 2.35         |              |  | End of pit at 2.35 m                                                                                | 2 |
|                 |                             |      |         |              |              |                                                                                     |                                                                                                     | 3 |

Remarks: Slight groundwater seepage at 2.0m.

Stability:





# Trial Pit Log

Trialpit No

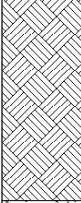
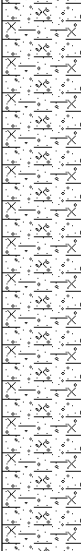
**TP04**

Sheet 1 of 1

Project Name: Land South of Poplar Terrace

Project No.  
UK22.5955Co-ords: -161847.61 - 6917821.19  
Level:Date  
16/06/2022Location: Land South of Poplar Terrace, Congerstone, Leicestershire,  
CV13 6PEDimensions  
(m):Depth  
1.50Scale  
1:15Logged  
OC

Client: Adi Newberry

| Water<br>Strike | Samples and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m) | Legend                                                                             | Stratum Description                                                                                             |   |
|-----------------|-----------------------------|------|---------|--------------|--------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---|
|                 | Depth                       | Type | Results |              |              |                                                                                    |                                                                                                                 |   |
|                 | 0.10 - 0.40                 | ES   |         | 0.40         |              |   | Brown, slightly gravelly silty sandy clayey TOPSOIL with common rootlets. Gravel is fine to medium, subangular. |   |
|                 |                             |      | HVP=95  |              |              |  | Firm, reddish brown slightly sandy slightly gravelly CLAY with rare light grey mottling. (Gunthorpe Member)     | 1 |
|                 |                             |      | HVP=127 | 1.50         |              |                                                                                    |                                                                                                                 | 2 |
|                 |                             |      |         |              |              |                                                                                    | End of pit at 1.50 m                                                                                            | 3 |

Remarks: Groundwater not encountered.

Stability:





# Trial Pit Log

Trialpit No

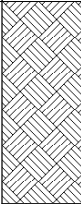
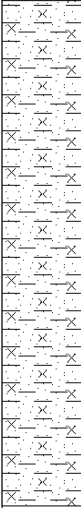
**TP05**

Sheet 1 of 1

Project Name: Land South of Poplar Terrace

Project No.  
UK22.5955Co-ords: -161866.42 - 6917821.79  
Level:Date  
16/06/2022Location: Land South of Poplar Terrace, Congerstone, Leicestershire,  
CV13 6PEDimensions  
(m):Depth  
1.40Scale  
1:15Logged  
OC

Client: Adi Newberry

| Water<br>Strike | Samples and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m) | Legend                                                                             | Stratum Description                                                                                           |   |
|-----------------|-----------------------------|------|---------|--------------|--------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---|
|                 | Depth                       | Type | Results |              |              |                                                                                    |                                                                                                               |   |
|                 | 0.10 - 0.40                 | ES   |         | 0.40         |              |   | MADE GROUND: Brown, gravelly SAND with brick and concrete fragments including whole bricks. Gravel is coarse. |   |
|                 |                             |      |         |              |              |  | Firm, reddish brown slightly sandy silty CLAY.<br>(Gunthorpe Member)                                          | 1 |
|                 |                             |      |         | 1.40         |              |                                                                                    | End of pit at 1.40 m                                                                                          | 2 |
|                 |                             |      |         |              |              |                                                                                    |                                                                                                               | 3 |

Remarks: Groundwater not encountered.

Stability:





# Trial Pit Log

Trialpit No

**TP06**

Sheet 1 of 1

Project Name: Land South of Poplar Terrace

Project No.  
UK22.5955Co-ords: -161847.01 - 6917859.11  
Level:Date  
16/06/2022Location: Land South of Poplar Terrace, Congerstone, Leicestershire,  
CV13 6PEDimensions  
(m):Depth  
2.50Scale  
1:15Logged  
OC

Client: Adi Newberry

| Water<br>Strike | Samples and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m) | Legend | Stratum Description                                                                                      |   |
|-----------------|-----------------------------|------|---------|--------------|--------------|--------|----------------------------------------------------------------------------------------------------------|---|
|                 | Depth                       | Type | Results |              |              |        |                                                                                                          |   |
|                 |                             |      |         |              |              |        | Brown, slightly gravelly silty sandy clayey TOPSOIL with common rootlets.                                |   |
|                 |                             |      |         | 0.60         |              |        | Firm to stiff, reddish brown slightly sandy silty CLAY with rare light grey mottling. (Gunthorpe Member) |   |
|                 | 1.40 - 1.60                 | D    |         |              |              |        |                                                                                                          | 1 |
|                 |                             |      |         | 2.50         |              |        |                                                                                                          | 2 |
|                 |                             |      |         |              |              |        | End of pit at 2.50 m                                                                                     | 3 |

Remarks: Groundwater not encountered.

Stability:





# Trial Pit Log

Trialpit No

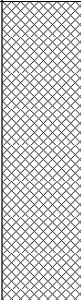
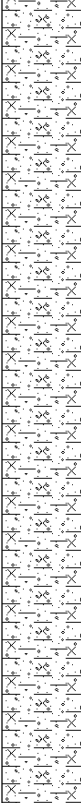
**TP07**

Sheet 1 of 1

Project Name: Land South of Poplar Terrace

Project No.  
UK22.5955Co-ords: -161904.64 - 6917872.55  
Level:Date  
16/06/2022Location: Land South of Poplar Terrace, Congerstone, Leicestershire,  
CV13 6PEDimensions  
(m):Depth  
2.20Scale  
1:15Logged  
OC

Client: Adi Newberry

| Water<br>Strike | Samples and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m) | Legend                                                                             | Stratum Description                                                                                                                                                                 |   |
|-----------------|-----------------------------|------|---------|--------------|--------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|                 | Depth                       | Type | Results |              |              |                                                                                    |                                                                                                                                                                                     |   |
|                 |                             |      |         | 0.60         |              |   | MADE GROUND: Brown, gravelly SAND with brick and concrete fragments with rare wire and plastic piping. Gravel is coarse.                                                            |   |
|                 | 2.00 - 2.20                 | D    |         | 2.20         |              |  | Firm to stiff, reddish brown slightly gravelly slightly sandy silty CLAY. Gravel is brown and grey fine to medium subangular and subrounded sandstone/siltstone. (Gunthorpe Member) | 1 |
|                 |                             |      |         |              |              |                                                                                    | End of pit at 2.20 m                                                                                                                                                                | 2 |
|                 |                             |      |         |              |              |                                                                                    |                                                                                                                                                                                     | 3 |

Remarks: Groundwater not encountered.

Stability:





# Trial Pit Log

Trialpit No

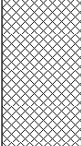
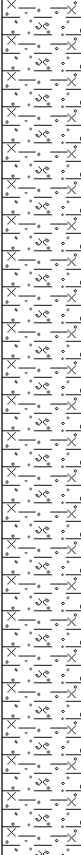
**TP08**

Sheet 1 of 1

Project Name: Land South of Poplar Terrace

Project No.  
UK22.5955Co-ords: -161882.25 - 6917822.99  
Level:Date  
16/06/2022Location: Land South of Poplar Terrace, Congerstone, Leicestershire,  
CV13 6PEDimensions  
(m):Depth  
2.00Scale  
1:15Logged  
OC

Client: Adi Newberry

| Water<br>Strike | Samples and In Situ Testing |      |         | Depth<br>(m) | Level<br>(m) | Legend                                                                             | Stratum Description                                                                                                                                                              |   |
|-----------------|-----------------------------|------|---------|--------------|--------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|                 | Depth                       | Type | Results |              |              |                                                                                    |                                                                                                                                                                                  |   |
|                 |                             |      |         | 0.30         |              |   | MADE GROUND: Brown, gravelly SAND with brick and concrete fragments.                                                                                                             |   |
|                 | 0.60 - 0.80                 | D    |         |              |              |  | Firm, reddish brown slightly sandy silty CLAY with occasional recently active and decayed roots. Gravel is fine to coarse subangular to subrounded quartzite. (Gunthorpe Member) |   |
|                 | 1.00 - 1.50                 | B    |         |              |              |                                                                                    |                                                                                                                                                                                  | 1 |
|                 |                             |      |         | 2.00         |              |                                                                                    | End of pit at 2.00 m                                                                                                                                                             | 2 |
|                 |                             |      |         |              |              |                                                                                    |                                                                                                                                                                                  | 3 |

Remarks: Groundwater not encountered.

Stability:



## **APPENDIX H**

### **Laboratory Results – Environmental**

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



**Attention :** Ben Virtue  
**Date :** 4th July, 2022  
**Your reference :** UK22.5955  
**Our reference :** Test Report 22/10370 Batch 1  
**Location :** Poplar Terrace Congerstone  
**Date samples received :** 14th June, 2022  
**Status :** Final Report  
**Issue :** 1

Five samples were received for analysis on 14th June, 2022 of which five 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.

**Authorised By:**



**Phil Sommerton BSc**

Senior Project Manager

Please include all sections of this report if it is reproduced

## Element Materials Technology

**Client Name:** EPS Ltd  
**Reference:** UK22.5955  
**Location:** Poplar Terrace Congerstone  
**Contact:** Ben Virtue  
**EMT Job No:** 22/10370

**Report : Solid**

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

| EMT Sample No.                          | 1-4        | 5-8        | 9-12       | 13-16      | 17-20      |  |  |  |  |  | Please see attached notes for all abbreviations and acronyms |       |            |
|-----------------------------------------|------------|------------|------------|------------|------------|--|--|--|--|--|--------------------------------------------------------------|-------|------------|
| Sample ID                               | TP01       | TP02       | TP03       | TP04       | TP05       |  |  |  |  |  |                                                              |       |            |
| Depth                                   | 0.10-0.40  | 0.10-0.40  | 0.10-0.40  | 0.10-0.40  | 0.10-0.40  |  |  |  |  |  |                                                              |       |            |
| COC No / misc                           |            |            |            |            |            |  |  |  |  |  |                                                              |       |            |
| Containers                              | V J T      | V J T      | V J T      | V J T      | V J T      |  |  |  |  |  |                                                              |       |            |
| Sample Date                             | 16/06/2022 | 16/06/2022 | 16/06/2022 | 16/06/2022 | 16/06/2022 |  |  |  |  |  |                                                              |       |            |
| Sample Type                             | Clay       | Clay       | Clay       | Clay       | Clay       |  |  |  |  |  |                                                              |       |            |
| Batch Number                            | 1          | 1          | 1          | 1          | 1          |  |  |  |  |  |                                                              |       |            |
| Date of Receipt                         | 14/06/2022 | 14/06/2022 | 14/06/2022 | 14/06/2022 | 14/06/2022 |  |  |  |  |  | LOD/LOR                                                      | Units | Method No. |
| Arsenic <sup>#M</sup>                   | 6.7        | 7.0        | 5.6        | 5.2        | 7.5        |  |  |  |  |  | <0.5                                                         | mg/kg | TM30/PM15  |
| Cadmium <sup>#M</sup>                   | <0.1       | <0.1       | <0.1       | <0.1       | <0.1       |  |  |  |  |  | <0.1                                                         | mg/kg | TM30/PM15  |
| Chromium <sup>#M</sup>                  | 51.1       | 48.7       | 46.9       | 44.4       | 52.9       |  |  |  |  |  | <0.5                                                         | mg/kg | TM30/PM15  |
| Copper <sup>#M</sup>                    | 29         | 29         | 24         | 21         | 31         |  |  |  |  |  | <1                                                           | mg/kg | TM30/PM15  |
| Lead <sup>#M</sup>                      | 63         | 55         | 30         | 30         | 58         |  |  |  |  |  | <5                                                           | mg/kg | TM30/PM15  |
| Mercury <sup>#M</sup>                   | 0.1        | <0.1       | <0.1       | <0.1       | <0.1       |  |  |  |  |  | <0.1                                                         | mg/kg | TM30/PM15  |
| Nickel <sup>#M</sup>                    | 18.4       | 18.3       | 15.8       | 15.5       | 22.8       |  |  |  |  |  | <0.7                                                         | mg/kg | TM30/PM15  |
| Selenium <sup>#M</sup>                  | <1         | <1         | <1         | <1         | 1          |  |  |  |  |  | <1                                                           | mg/kg | TM30/PM15  |
| Total Sulphate as SO4 <sup>#M</sup>     | 567        | 719        | 350        | 312        | 721        |  |  |  |  |  | <50                                                          | mg/kg | TM50/PM29  |
| Zinc <sup>#M</sup>                      | 103        | 119        | 76         | 74         | 141        |  |  |  |  |  | <5                                                           | mg/kg | TM30/PM15  |
| PAH MS                                  |            |            |            |            |            |  |  |  |  |  |                                                              |       |            |
| Naphthalene <sup>#M</sup>               | <0.04      | <0.04      | <0.04      | <0.04      | <0.04      |  |  |  |  |  | <0.04                                                        | mg/kg | TM4/PM8    |
| Acenaphthylene                          | <0.03      | <0.03      | <0.03      | <0.03      | <0.03      |  |  |  |  |  | <0.03                                                        | mg/kg | TM4/PM8    |
| Acenaphthene <sup>#M</sup>              | <0.05      | <0.05      | <0.05      | <0.05      | <0.05      |  |  |  |  |  | <0.05                                                        | mg/kg | TM4/PM8    |
| Fluorene <sup>#M</sup>                  | <0.04      | <0.04      | <0.04      | <0.04      | <0.04      |  |  |  |  |  | <0.04                                                        | mg/kg | TM4/PM8    |
| Phenanthrene <sup>#M</sup>              | <0.03      | <0.03      | <0.03      | <0.03      | <0.03      |  |  |  |  |  | <0.03                                                        | mg/kg | TM4/PM8    |
| Anthracene #                            | <0.04      | <0.04      | <0.04      | <0.04      | <0.04      |  |  |  |  |  | <0.04                                                        | mg/kg | TM4/PM8    |
| Fluoranthene <sup>#M</sup>              | <0.03      | 0.10       | <0.03      | <0.03      | 0.07       |  |  |  |  |  | <0.03                                                        | mg/kg | TM4/PM8    |
| Pyrene #                                | <0.03      | 0.09       | <0.03      | <0.03      | 0.07       |  |  |  |  |  | <0.03                                                        | mg/kg | TM4/PM8    |
| Benzo(a)anthracene #                    | <0.06      | <0.06      | <0.06      | <0.06      | <0.06      |  |  |  |  |  | <0.06                                                        | mg/kg | TM4/PM8    |
| Chrysene <sup>#M</sup>                  | <0.02      | 0.07       | <0.02      | <0.02      | 0.05       |  |  |  |  |  | <0.02                                                        | mg/kg | TM4/PM8    |
| Benzo(bk)fluoranthene <sup>#M</sup>     | <0.07      | 0.10       | <0.07      | <0.07      | <0.07      |  |  |  |  |  | <0.07                                                        | mg/kg | TM4/PM8    |
| Benzo(a)pyrene #                        | <0.04      | <0.04      | <0.04      | <0.04      | <0.04      |  |  |  |  |  | <0.04                                                        | mg/kg | TM4/PM8    |
| Indeno(123cd)pyrene <sup>#M</sup>       | <0.04      | <0.04      | <0.04      | <0.04      | <0.04      |  |  |  |  |  | <0.04                                                        | mg/kg | TM4/PM8    |
| Dibenzo(ah)anthracene #                 | <0.04      | <0.04      | <0.04      | <0.04      | <0.04      |  |  |  |  |  | <0.04                                                        | mg/kg | TM4/PM8    |
| Benzo(ghi)perylene #                    | <0.04      | <0.04      | <0.04      | <0.04      | <0.04      |  |  |  |  |  | <0.04                                                        | mg/kg | TM4/PM8    |
| PAH 16 Total                            | <0.6       | <0.6       | <0.6       | <0.6       | <0.6       |  |  |  |  |  | <0.6                                                         | mg/kg | TM4/PM8    |
| Benzo(b)fluoranthene                    | <0.05      | 0.07       | <0.05      | <0.05      | <0.05      |  |  |  |  |  | <0.05                                                        | mg/kg | TM4/PM8    |
| Benzo(k)fluoranthene                    | <0.02      | 0.03       | <0.02      | <0.02      | <0.02      |  |  |  |  |  | <0.02                                                        | mg/kg | TM4/PM8    |
| PAH Surrogate % Recovery                | 88         | 92         | 94         | 85         | 89         |  |  |  |  |  | <0                                                           | %     | TM4/PM8    |
| Total Phenols HPLC                      | <0.15      | <0.15      | <0.15      | <0.15      | <0.15      |  |  |  |  |  | <0.15                                                        | mg/kg | TM26/PM21B |
| Natural Moisture Content                | 24.9       | 24.6       | 22.3       | 20.8       | 18.6       |  |  |  |  |  | <0.1                                                         | %     | PM4/PM0    |
| Hexavalent Chromium #                   | <0.3       | <0.3       | <0.3       | <0.3       | <0.3       |  |  |  |  |  | <0.3                                                         | mg/kg | TM38/PM20  |
| Sulphate as SO4 (2:1 Ext) <sup>#M</sup> | 0.0065     | 0.0021     | 0.0120     | 0.0084     | 0.0179     |  |  |  |  |  | <0.0015                                                      | g/l   | TM38/PM20  |
| Chromium III                            | 51.1       | 48.7       | 46.9       | 44.4       | 52.9       |  |  |  |  |  | <0.5                                                         | mg/kg | NONE/NONE  |
| Total Cyanide <sup>#M</sup>             | <0.5       | <0.5       | <0.5       | <0.5       | <0.5       |  |  |  |  |  | <0.5                                                         | mg/kg | TM89/PM45  |
| Organic Matter                          | 3.8        | 4.0        | 1.9        | 1.6        | 4.2        |  |  |  |  |  | <0.2                                                         | %     | TM21/PM24  |

## Element Materials Technology

**Client Name:** EPS Ltd  
**Reference:** UK22.5955  
**Location:** Poplar Terrace Congerstone  
**Contact:** Ben Virtue  
**EMT Job No:** 22/10370

Report : Solid

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

[illegible]

**Note:**

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

[illegible]

**Client Name:** EPS Ltd  
**Reference:** UK22.5955  
**Location:** Poplar Terrace Congerstone  
**Contact:** Ben Virtue

[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

EMT Job No.: 22/10370

## SOILS and ASH

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. Asbestos samples are retained for 6 months.

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. Limits of detection for analyses carried out on as received samples are not moisture content corrected. 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. Ash samples are dried at 37°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.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

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.

## STACK EMISSIONS

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 for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

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

## DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

## 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.

Laboratory records are kept for a period of no less than 6 years.

## REPORTS FROM THE SOUTH AFRICA LABORATORY

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

### Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

### Customer Provided Information

Sample ID and depth is information provided by the customer.

## 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.                           |
| >>      | Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher. |
| *       | Analysis subcontracted to an Element Materials Technology 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                                                                                                            |

## HWOL ACRONYMS AND OPERATORS USED

|       |                                                                      |
|-------|----------------------------------------------------------------------|
| HS    | Headspace Analysis.                                                  |
| EH    | Extractable Hydrocarbons - i.e. everything extracted by the solvent. |
| CU    | Clean-up - e.g. by florisil, silica gel.                             |
| 1D    | GC - Single coil gas chromatography.                                 |
| Total | Aliphatics & Aromatics.                                              |
| AL    | Aliphatics only.                                                     |
| AR    | Aromatics only.                                                      |
| 2D    | GC-GC - Double coil gas chromatography.                              |
| #1    | EH_Total but with humics mathematically subtracted                   |
| #2    | EU_Total but with fatty acids mathematically subtracted              |
| _     | Operator - underscore to separate acronyms (exception for +).        |
| +     | Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total   |
| MS    | Mass Spectrometry.                                                   |

EMT Job No: 22/10370

| Test Method No. | Description                                                                                                                                                                                                                                                                                                                             | Prep Method No. (if appropriate) | Description                                                                                                                                                                                                                                                                                                           | ISO 17025 (UKAS/ANAS) | MCERTS (UK soils only) | Analysis done on As Received (AR) or Dried (AD) | Reported on dry weight basis |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------|-------------------------------------------------|------------------------------|
| PM4             | Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.                                                                                                                                                                           | PM0                              | No preparation is required.                                                                                                                                                                                                                                                                                           |                       |                        | AR                                              |                              |
| TM4             | Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.                                                                                                                                                                                                                                      | PM8                              | End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.                                                                                                                                                                                                 |                       |                        | AR                                              | Yes                          |
| TM4             | Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.                                                                                                                                                                                                                                      | PM8                              | End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.                                                                                                                                                                                                 | Yes                   |                        | AR                                              | Yes                          |
| TM4             | Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.                                                                                                                                                                                                                                      | PM8                              | End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.                                                                                                                                                                                                 | Yes                   | Yes                    | AR                                              | Yes                          |
| PM13            | A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.                                                                                                                                                                           | PM0                              | No preparation is required.                                                                                                                                                                                                                                                                                           |                       |                        | AR                                              | No                           |
| TM21            | Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO <sub>2</sub> generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4. | PM24                             | Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.                                                                                                                                                                  |                       |                        | AD                                              | Yes                          |
| TM26            | Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.                                                                                                                                                                                                                      | PM21B                            | As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.                                                                                                                                                                                                                                    |                       |                        | AR                                              | Yes                          |
| TM30            | Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996      | PM15                             | Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.                                                                                                                                                                         | Yes                   | Yes                    | AD                                              | Yes                          |
| TM38            | Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH <sub>4</sub> + 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I                     | PM20                             | Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker. | Yes                   | Yes                    | AD                                              | Yes                          |
| TM38            | Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH <sub>4</sub> + 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I                     | PM20                             | Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker. | Yes                   |                        | AR                                              | Yes                          |

EMT Job No: 22/10370

| Test Method No. | Description                                                                                                                                                                            | Prep Method No. (if appropriate) | Description                                                                                                                                                                                | ISO 17025 (UKAS/ANAS) | MCERTS (UK soils only) | Analysis done on As Received (AR) or Dried (AD) | Reported on dry weight basis |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------|-------------------------------------------------|------------------------------|
| TM50            | Acid soluble sulphate (Total Sulphate) analysed by ICP-OES                                                                                                                             | PM29                             | A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.                                                                            | Yes                   | Yes                    | AD                                              | Yes                          |
| TM65            | Asbestos Bulk Identification method based on HSG 248 Second edition (2021)                                                                                                             | PM42                             | Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065. | Yes                   |                        | AR                                              |                              |
| TM73            | Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.                                              | PM11                             | Extraction of as received solid samples using one part solid to 2.5 parts deionised water.                                                                                                 | Yes                   | Yes                    | AR                                              | No                           |
| TM89            | Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis. | PM45                             | As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.                                                                     | Yes                   | Yes                    | AR                                              | Yes                          |
| NONE            | No Method Code                                                                                                                                                                         | NONE                             | No Method Code                                                                                                                                                                             |                       |                        | AD                                              | Yes                          |
|                 |                                                                                                                                                                                        |                                  |                                                                                                                                                                                            |                       |                        |                                                 |                              |
|                 |                                                                                                                                                                                        |                                  |                                                                                                                                                                                            |                       |                        |                                                 |                              |
|                 |                                                                                                                                                                                        |                                  |                                                                                                                                                                                            |                       |                        |                                                 |                              |
|                 |                                                                                                                                                                                        |                                  |                                                                                                                                                                                            |                       |                        |                                                 |                              |
|                 |                                                                                                                                                                                        |                                  |                                                                                                                                                                                            |                       |                        |                                                 |                              |

## **APPENDIX I**

### **Laboratory Results – Geotechnical**



**TEST REPORT**  
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                         |                                                                                                                                                                                                                                                                                                                                                                        |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Contract</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | UK22.5955 - Poplar Terrace, Congerstone |                                                                                                                                                                                                                                                                                                                                                                        |  |
| <b>Serial No.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 40991_1                                 |                                                                                                                                                                                                                                                                                                                                                                        |  |
| <b>Client:</b><br>Environmental Protection Strategies Ltd<br>Unit 7<br>Caxton House<br>Broad Street<br>Great Cambourne<br>Cambridge<br>CB23 6JN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                         | <b>Soil Property Testing Ltd</b><br><br>15, 16, 18 Halcyon Court, St Margaret's Way,<br>Stukeley Meadows, Huntingdon,<br>Cambridgeshire, PE29 6DG<br><br>Tel: 01480 455579<br>Email: <a href="mailto:enquiries@soilpropertytesting.com">enquiries@soilpropertytesting.com</a><br>Website: <a href="http://www.soilpropertytesting.com">www.soilpropertytesting.com</a> |  |
| <b>Samples Submitted By:</b><br>Environmental Protection Strategies Ltd<br><br><b>Samples Labelled:</b><br>UK22.5955 - Poplar Terrace,<br>Congerstone                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                         | <b>Approved Signatories:</b><br><br><input checked="" type="checkbox"/> <b>J.C. Garner B.Eng (Hons) FGS</b><br>Technical Director & Quality Manager<br><br><input type="checkbox"/> <b>W. Johnstone</b><br>Materials Lab Manager<br><br>                                          |  |
| <b>Date Received:</b> 24/06/2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                         | <b>Samples Tested Between:</b> 24/06/2022 and 08/07/2022                                                                                                                                                                                                                                                                                                               |  |
| <b>Remarks:</b><br>For the attention of Oliver Calderbank<br>Your Reference No: UK22.5955<br>Your Order No: 29595<br>Sulphate tests subcontracted to Eurofins Chemtest - results included as Appendix A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                         |                                                                                                                                                                                                                                                                                                                                                                        |  |
| <b>Notes:</b><br><ol style="list-style-type: none"><li>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.</li><li>2 Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.</li><li>3 Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.</li><li>4 This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.</li><li>5 The results within this report only relate to the items tested or sampled.</li></ol> |                                         |                                                                                                                                                                                                                                                                                                                                                                        |  |



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|                  |      |                                         |           |                                                                                                                                                                           |   |   |   |   |   |  |  |             |  |            |  |  |  |                |                 |
|------------------|------|-----------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|--|--|-------------|--|------------|--|--|--|----------------|-----------------|
| Contract         |      | UK22.5955 - Poplar Terrace, Congerstone |           |                                                                                                                                                                           |   |   |   |   |   |  |  |             |  |            |  |  |  |                |                 |
| Serial No.       |      | 40991_1                                 |           |                                                                                                                                                                           |   |   |   |   |   |  |  | Target Date |  | 08/07/2022 |  |  |  |                |                 |
| Scheduled By     |      | Environmental Protection Strategies Ltd |           |                                                                                                                                                                           |   |   |   |   |   |  |  |             |  |            |  |  |  |                |                 |
| Schedule Remarks |      |                                         |           |                                                                                                                                                                           |   |   |   |   |   |  |  |             |  |            |  |  |  |                |                 |
| Bore Hole No.    | Type | Sample Ref.                             | Top Depth | Water Content (BS EN)<br>Liquid/Plastic Limits<br>Wet Sieve Preparation<br>Sulphate Content/pH Value<br>Total Sulphate Acid Soluble Soil<br>California Bearing Ratio Test |   |   |   |   |   |  |  |             |  |            |  |  |  | Sample Remarks |                 |
| TP02             | D    | -                                       | 0.80      | 1                                                                                                                                                                         | 1 |   | 1 | 1 |   |  |  |             |  |            |  |  |  |                |                 |
| TP06             | D    | -                                       | 1.40      | 1                                                                                                                                                                         | 1 |   | 1 | 1 |   |  |  |             |  |            |  |  |  |                |                 |
| TP07             | D    | -                                       | 2.00      | 1                                                                                                                                                                         | 1 | 1 | 1 | 1 |   |  |  |             |  |            |  |  |  |                |                 |
| TP08             | D    | -                                       | 0.60      | 1                                                                                                                                                                         | 1 |   | 1 | 1 |   |  |  |             |  |            |  |  |  |                |                 |
| TP08             | B    | -                                       | 1.00      | 1                                                                                                                                                                         | 1 | 1 |   |   | 1 |  |  |             |  |            |  |  |  |                |                 |
| Totals           |      |                                         |           | 5                                                                                                                                                                         | 5 | 2 | 4 | 4 | 1 |  |  |             |  |            |  |  |  |                | End of Schedule |



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|            |                                         |
|------------|-----------------------------------------|
| Contract   | UK22.5955 - Poplar Terrace, Congerstone |
| Serial No. | 40991_1                                 |

## SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

| Borehole /Pit No. | Depth (m)   | Type | Ref. | Water Content (%) | Liquid Limit (%) | Plastic Limit (%) | Plasticity Index (%) | Liquid-ity Index | Sample Preparation |                   |                     |                   | Description                                                                                                                                                                          | Class |
|-------------------|-------------|------|------|-------------------|------------------|-------------------|----------------------|------------------|--------------------|-------------------|---------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
|                   |             |      |      |                   |                  |                   |                      |                  | Method             | Ret'd 0.425mm (%) | Corr'd W/C <0.425mm | Curing Time (hrs) |                                                                                                                                                                                      |       |
| TP02              | 0.80 - 1.00 | D    | -    | 21.3              | 47               | 18                | 29                   | 0.11             | From Natural       | 0 (A)             |                     | 66                | Stiff reddish brown silty CLAY with rare light grey mottling                                                                                                                         | CI    |
| TP06              | 1.40 - 1.60 | D    | -    | 15.2              | 35               | 15                | 20                   | 0.01             | From Natural       | 0 (A)             |                     | 66                | Firm reddish brown slightly sandy silty CLAY with rare light grey mottling                                                                                                           | CL/CI |
| TP07              | 2.00 - 2.20 | D    | -    | 13.0              | 27               | 12                | 15                   | 0.07             | Wet Sieved         | 11 (M)            | 14.6*               | 71                | Stiff reddish brown slightly gravelly slightly sandy locally sandy silty CLAY. Gravel is brown, reddish brown and grey fine and medium subangular and subrounded sandstone/siltstone | CL    |
| TP08              | 0.60 - 0.80 | D    | -    | 19.5              | 43               | 18                | 25                   | 0.06             | From Natural       | <1% (A)           |                     | 68                | Firm reddish brown silty CLAY with rare decayed roots                                                                                                                                | CI    |
| TP08              | 1.00 - 1.50 | B    | -    | 19.2              | 44               | 17                | 27                   | 0.08             | Wet Sieved         | 8 (M)             | 20.9*               | 48                | Brown slightly gravelly slightly sandy silty CLAY with occasional recently active and decayed roots. Gravel is fine to coarse subangular to subrounded quartzite                     | CI    |
|                   |             |      |      |                   |                  |                   |                      |                  |                    |                   |                     |                   |                                                                                                                                                                                      |       |
|                   |             |      |      |                   |                  |                   |                      |                  |                    |                   |                     |                   |                                                                                                                                                                                      |       |
|                   |             |      |      |                   |                  |                   |                      |                  |                    |                   |                     |                   |                                                                                                                                                                                      |       |
|                   |             |      |      |                   |                  |                   |                      |                  |                    |                   |                     |                   |                                                                                                                                                                                      |       |

Method Of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2  
Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3, 5.4  
Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter  
Comments: \*Corrected water content assume material greater than 0.425mm is non-porous. See BS1377: Part 2: 1990 Clause 3 Note 1.  
Table Notation: Ret'd 0.425mm: (A) = Assumed, (M) = Measured



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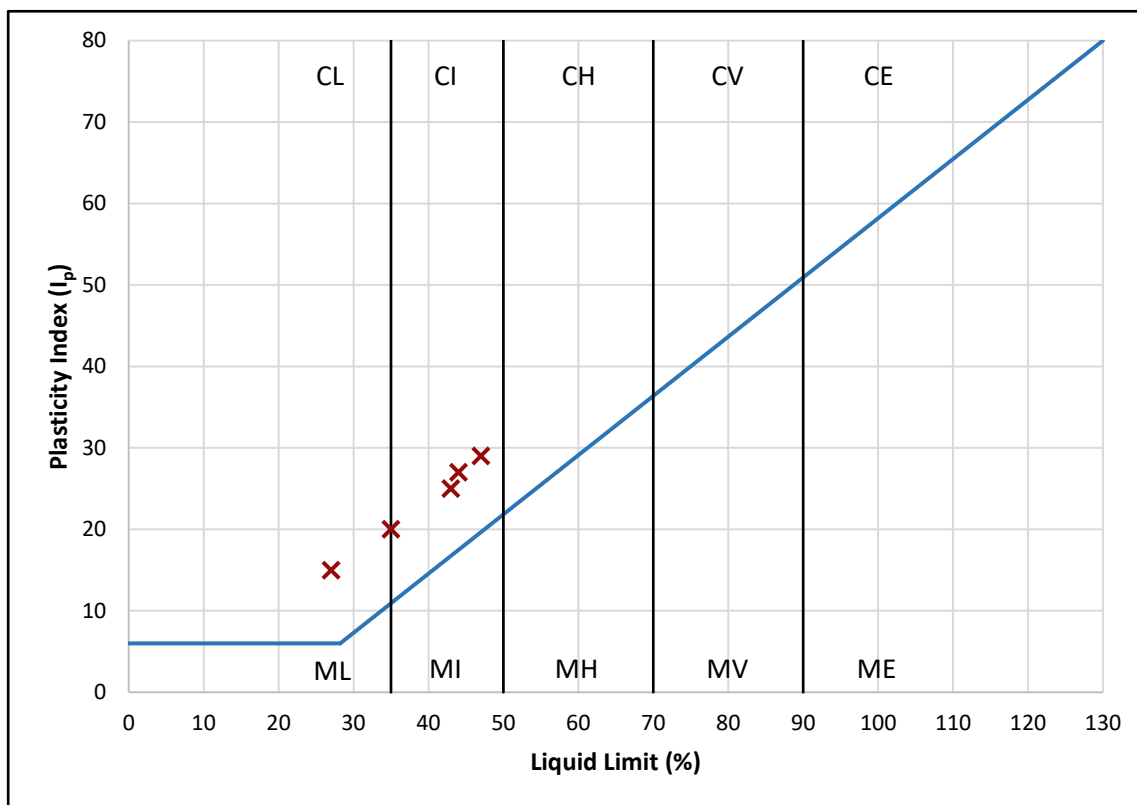


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|------------|-----------------------------------------|
| Contract   | UK22.5955 - Poplar Terrace, Congerstone |
| Serial No. | 40991_1                                 |

## PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

| Plasticity |        |      |           |                |
|------------|--------|------|-----------|----------------|
| Low        | Medium | High | Very High | Extremely High |



Plasticity Chart BS5930: 2015: Figure 8

|        |
|--------|
| High   |
| Medium |
| Low    |

NHBC Volume Change Potential

|                        |                                                                                                         |
|------------------------|---------------------------------------------------------------------------------------------------------|
| Method of Preparation: | BS 1377: Part 2: 1990: 4.2                                                                              |
| Method of Test:        | BS1377: Part 2: 3.2, 4.4, 5.3, 5.4                                                                      |
| Type of Sample Key:    | U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter |
| Comments:              | Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index                         |





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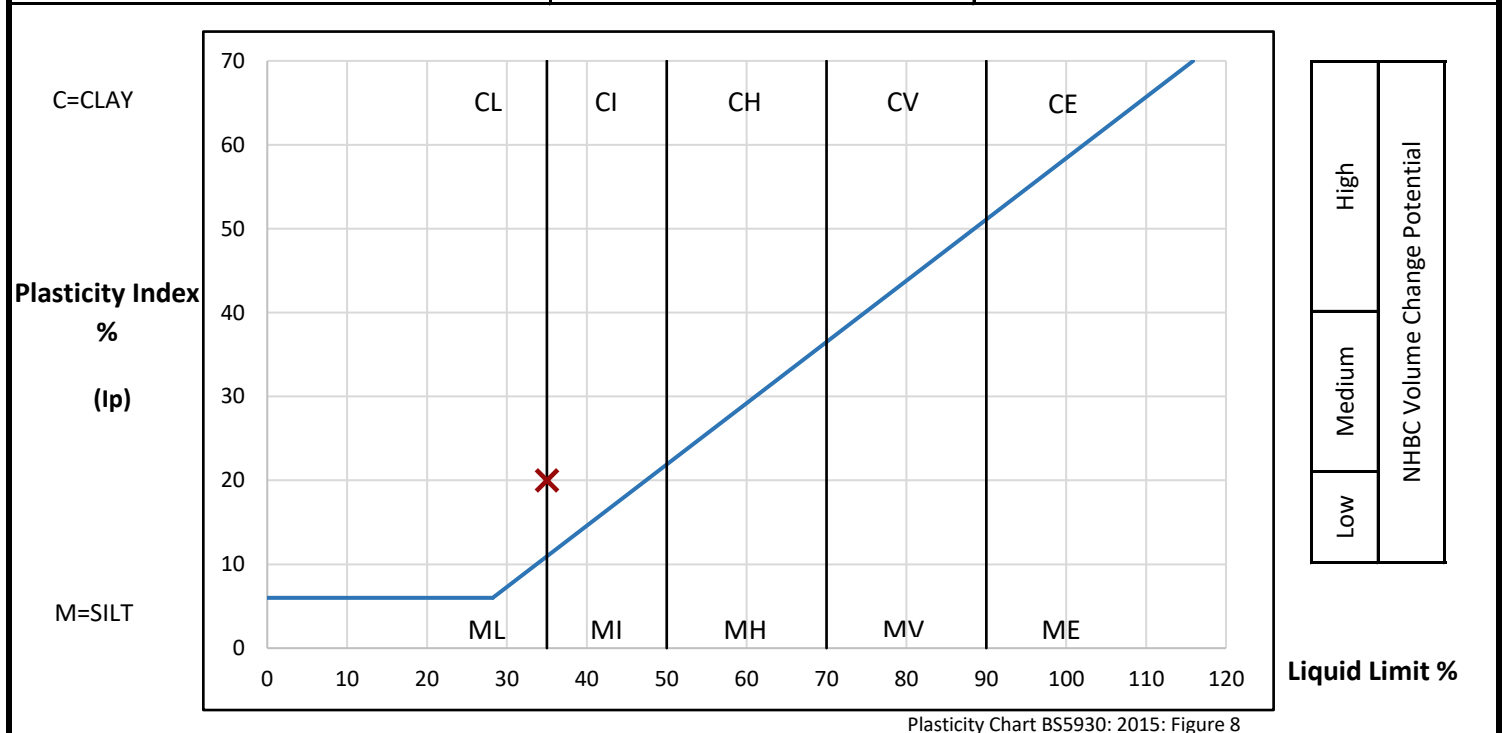
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|            |                                         |
|------------|-----------------------------------------|
| Contract   | UK22.5955 - Poplar Terrace, Congerstone |
| Serial No. | 40991_1                                 |

## DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

| Borehole<br>/ Pit No. | Depth<br>m     | Sample |           | Water<br>Content<br>(W) % | Description                                                                | Remarks |
|-----------------------|----------------|--------|-----------|---------------------------|----------------------------------------------------------------------------|---------|
|                       |                | Type   | Reference |                           |                                                                            |         |
| TP06                  | 1.40 -<br>1.60 | D      | -         | 15.2                      | Firm reddish brown slightly sandy silty CLAY with rare light grey mottling |         |

|                                                      |           |              |                     |                  |              |
|------------------------------------------------------|-----------|--------------|---------------------|------------------|--------------|
| PREPARATION                                          |           |              | Liquid Limit        | 35 %             |              |
| Method of preparation                                |           | From natural | Plastic Limit       | 15 %             |              |
| Sample retained 0.425mm sieve                        | (Assumed) | 0 %          | Plasticity Index    | 20 %             |              |
| Corrected water content for material passing 0.425mm |           |              | Liquidity Index     | 0.01             |              |
| Sample retained 2mm sieve                            | (Assumed) | 0 %          | NHBC Modified (I'p) | n/a              |              |
| Curing time                                          | 66 hrs    | Clay Content | Not analysed        | Derived Activity | Not analysed |



Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2  
Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4  
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter  
Comments:



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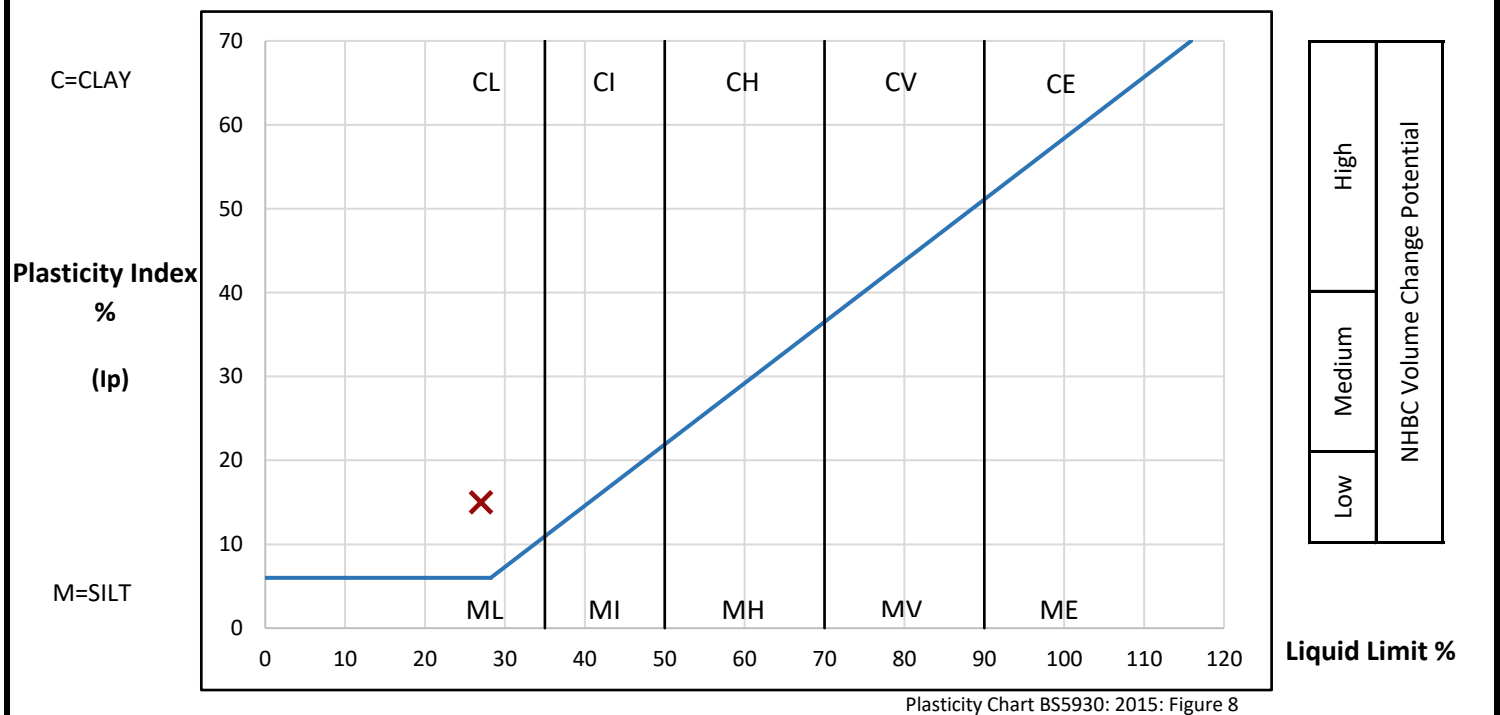
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|            |                                         |
|------------|-----------------------------------------|
| Contract   | UK22.5955 - Poplar Terrace, Congerstone |
| Serial No. | 40991_1                                 |

## DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

| Borehole / Pit No. | Depth m     | Sample Type | Sample Reference | Water Content (W) % | Description                                                                                                                                                                          | Remarks |
|--------------------|-------------|-------------|------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| TP07               | 2.00 - 2.20 | D           | -                | 13.0                | Stiff reddish brown slightly gravelly slightly sandy locally sandy silty CLAY. Gravel is brown, reddish brown and grey fine and medium subangular and subrounded sandstone/siltstone |         |

|                                                             |  |                           |  |                               |  |
|-------------------------------------------------------------|--|---------------------------|--|-------------------------------|--|
| PREPARATION                                                 |  |                           |  | Liquid Limit 27 %             |  |
| Method of preparation Wet sieved over 0.425mm sieve         |  |                           |  | Plastic Limit 12 %            |  |
| Sample retained 0.425mm sieve (Measured) 11 %               |  |                           |  | Plasticity Index 15 %         |  |
| Corrected water content for material passing 0.425mm 14.6 % |  |                           |  | Liquidity Index 0.07          |  |
| Sample retained 2mm sieve (Measured) 5 %                    |  |                           |  | NHBC Modified (I'p) 13 %      |  |
| Curing time 71 hrs                                          |  | Clay Content Not analysed |  | Derived Activity Not analysed |  |



|                        |                                                                                                                                                                                                                                                                                |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Method of Preparation: | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2                                                                                                                                                                                                                          |
| Method of Test:        | BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4                                                                                                                                                                                                           |
| Type of Sample Key:    | U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter                                                                                                                                                                                      |
| Comments:              | Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1<br>Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index<br>Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100) |



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| Contract                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                              | UK22.5955 - Poplar Terrace, Congerstone |           |                           |                                                       |                  |                     |                              |        |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------|-----------|---------------------------|-------------------------------------------------------|------------------|---------------------|------------------------------|--------|-----|
| Serial No.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              | 40991_1                                 |           |                           |                                                       |                  |                     |                              |        |     |
| DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND<br>DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX                                                                                                                                                                                                                                                                                                                                   |                              |                                         |           |                           |                                                       |                  |                     |                              |        |     |
| Borehole<br>/ Pit No.                                                                                                                                                                                                                                                                                                                                                                                                                                      | Depth<br>m                   | Sample                                  |           | Water<br>Content<br>(W) % | Description                                           | Remarks          |                     |                              |        |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                              | Type                                    | Reference |                           |                                                       |                  |                     |                              |        |     |
| TP08                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.60 - 0.80                  | D                                       | -         | 19.5                      | Firm reddish brown silty CLAY with rare decayed roots |                  |                     |                              |        |     |
| PREPARATION                                                                                                                                                                                                                                                                                                                                                                                                                                                |                              |                                         |           |                           | Liquid Limit                                          | 43 %             |                     |                              |        |     |
| Method of preparation                                                                                                                                                                                                                                                                                                                                                                                                                                      |                              |                                         |           |                           | From natural/gravel picked out by hand                | Plastic Limit    | 18 %                |                              |        |     |
| Sample retained 0.425mm sieve                                                                                                                                                                                                                                                                                                                                                                                                                              |                              |                                         |           |                           | (Assumed)                                             | 0 %              | Plasticity Index    | 25 %                         |        |     |
| Corrected water content for material passing 0.425mm                                                                                                                                                                                                                                                                                                                                                                                                       |                              |                                         |           |                           |                                                       |                  | Liquidity Index     | 0.06                         |        |     |
| Sample retained 2mm sieve                                                                                                                                                                                                                                                                                                                                                                                                                                  |                              |                                         |           |                           | (Assumed)                                             | <1 %             | NHBC Modified (I'p) | n/a                          |        |     |
| Curing time                                                                                                                                                                                                                                                                                                                                                                                                                                                |                              | 68 hrs                                  |           | Clay Content              | Not analysed                                          | Derived Activity | Not analysed        |                              |        |     |
| <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;"> <p>C=CLAY</p> <p>Plasticity Index % (I<sub>p</sub>)</p> <p>M=SILT</p> </div> <div style="flex-grow: 1;"> </div> <div style="margin-left: 10px; text-align: center;"> <table border="1"> <tr> <td>High</td> <td rowspan="3">NHBC Volume Change Potential</td> </tr> <tr> <td>Medium</td> </tr> <tr> <td>Low</td> </tr> </table> <p>Liquid Limit %</p> </div> </div> |                              |                                         |           |                           |                                                       |                  | High                | NHBC Volume Change Potential | Medium | Low |
| High                                                                                                                                                                                                                                                                                                                                                                                                                                                       | NHBC Volume Change Potential |                                         |           |                           |                                                       |                  |                     |                              |        |     |
| Medium                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                              |                                         |           |                           |                                                       |                  |                     |                              |        |     |
| Low                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |                                         |           |                           |                                                       |                  |                     |                              |        |     |
| Plasticity Chart BS5930: 2015: Figure 8                                                                                                                                                                                                                                                                                                                                                                                                                    |                              |                                         |           |                           |                                                       |                  |                     |                              |        |     |
| Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2                                                                                                                                                                                                                                                                                                                                                                               |                              |                                         |           |                           |                                                       |                  |                     |                              |        |     |
| Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4                                                                                                                                                                                                                                                                                                                                                                       |                              |                                         |           |                           |                                                       |                  |                     |                              |        |     |
| Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter                                                                                                                                                                                                                                                                                                                                              |                              |                                         |           |                           |                                                       |                  |                     |                              |        |     |
| Comments:                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                              |                                         |           |                           |                                                       |                  |                     |                              |        |     |



# TEST REPORT

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| <b>Contract</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                              | <b>UK22.5955 - Poplar Terrace, Congerstone</b> |           |                           |                                                                                                                                                                  |                     |                  |                              |        |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------------|-----------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------|------------------------------|--------|-----|
| <b>Serial No.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              | <b>40991_1</b>                                 |           |                           |                                                                                                                                                                  |                     |                  |                              |        |     |
| <b>DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND<br/>DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                              |                                                |           |                           |                                                                                                                                                                  |                     |                  |                              |        |     |
| Borehole<br>/ Pit No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Depth<br>m                   | Sample                                         |           | Water<br>Content<br>(W) % | Description                                                                                                                                                      | Remarks             |                  |                              |        |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                              | Type                                           | Reference |                           |                                                                                                                                                                  |                     |                  |                              |        |     |
| TP08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1.00 -<br>1.50               | B                                              | -         | 19.2                      | Brown slightly gravelly slightly sandy silty CLAY with occasional recently active and decayed roots. Gravel is fine to coarse subangular to subrounded quartzite |                     |                  |                              |        |     |
| <b>PREPARATION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                              |                                                |           |                           | Liquid Limit                                                                                                                                                     | 44 %                |                  |                              |        |     |
| Method of preparation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |                                                |           |                           | Wet sieved over 0.425mm sieve                                                                                                                                    | Plastic Limit       | 17 %             |                              |        |     |
| Sample retained 0.425mm sieve (Measured)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                              |                                                |           |                           | 8 %                                                                                                                                                              | Plasticity Index    | 27 %             |                              |        |     |
| Corrected water content for material passing 0.425mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                              |                                                |           |                           | 20.9 %                                                                                                                                                           | Liquidity Index     | 0.08             |                              |        |     |
| Sample retained 2mm sieve (Measured)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                              |                                                |           |                           | 6 %                                                                                                                                                              | NHBC Modified (I'p) | 25 %             |                              |        |     |
| Curing time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                              |                                                |           | 48 hrs                    | Clay Content                                                                                                                                                     | Not analysed        | Derived Activity | Not analysed                 |        |     |
| <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;"> <p>C=CLAY</p> <p>Plasticity Index<br/>%</p> <p>(Ip)</p> <p>M=SILT</p> </div> <div style="flex-grow: 1;"> </div> <div style="margin-left: 10px; text-align: center;"> <table border="1"> <tr> <td>High</td> <td rowspan="3">NHBC Volume Change Potential</td> </tr> <tr> <td>Medium</td> </tr> <tr> <td>Low</td> </tr> </table> </div> </div>                                                                                                                                              |                              |                                                |           |                           |                                                                                                                                                                  |                     | High             | NHBC Volume Change Potential | Medium | Low |
| High                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | NHBC Volume Change Potential |                                                |           |                           |                                                                                                                                                                  |                     |                  |                              |        |     |
| Medium                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                              |                                                |           |                           |                                                                                                                                                                  |                     |                  |                              |        |     |
| Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                              |                                                |           |                           |                                                                                                                                                                  |                     |                  |                              |        |     |
| Plasticity Chart BS5930: 2015: Figure 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                              |                                                |           |                           |                                                                                                                                                                  |                     |                  |                              |        |     |
| Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2<br>Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4<br>Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter<br>Comments: Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1<br>Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index<br>Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100) |                              |                                                |           |                           |                                                                                                                                                                  |                     |                  |                              |        |     |



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|            |                                         |
|------------|-----------------------------------------|
| Contract   | UK22.5955 - Poplar Terrace, Congerstone |
| Serial No. | 40991_1                                 |

## LABORATORY CALIFORNIA BEARING RATIO TESTS ADJUSTED FOR SEASONAL WATER CONTENT CHANGES

Due to seasonal variations of water content in near surface soils, many clients require CBR test samples to be subjected to sample preparation in the laboratory before testing. With Clay soils, liquid and plastic limits and water contents are carried out to classify them on material passing 20mm. The plastic limit is then compared against the water content with due regard to the proportion of material then retained on a 0.425mm sieve. If the water content is already 2% or more above the plastic limit, compaction may take place immediately. If this is not the case a calculated amount of water is added to the sample and cured for 24 hours before compaction. The samples are then cured for a further 24 hours before CBR tests are carried out at both the top and bottom of the sample.

### Calculation of Adjusted Water Content for CBR testing

When a significant proportion of a basically clay material is >0.425mm, the adjusted water content (WC) for test shall be derived as follows:

Obtain test specimens for CBR, Limits and Water Content from Material Passing 20mm. (If the sample is large enough a water content may also be carried out on a representative portion of the whole sample including material greater than 20mm, and reported for information)

The Plastic Limit (PL) for the fine fraction is obtained by testing material passing the 0.425mm sieve. A notional 5% Water Content is to be allowed for material passing 20mm, and retained on the 0.425mm sieve. The proportion passing the 0.425mm is obtained by the wet sieve preparation method.

If X% passes 0.425mm, (100-X) % is retained on 0.425mm and with the 5% WC required to be incorporated for the retained 0.425mm portion, the adjusted WC for test shall be at least:

$$\frac{X(PL+2) + (100-X)5}{100} \% \quad \text{for the sample passing 20mm}$$

| BH/ TP No. | Depth (m)   | Type | Reference | WC as received* (%) | Plastic Limit (%) | Passing 0.425mm (%) | >20mm excluded (%) | WC req. for CBR (%) | WC after CBR Test (%) | Remarks         |
|------------|-------------|------|-----------|---------------------|-------------------|---------------------|--------------------|---------------------|-----------------------|-----------------|
| TP08       | 1.00 - 1.50 | B    | -         | 19.2                | 17                | 92                  | 1.1                | 17.9                | 18.8                  | WC not adjusted |
|            |             |      |           |                     |                   |                     |                    |                     |                       |                 |
|            |             |      |           |                     |                   |                     |                    |                     |                       |                 |
|            |             |      |           |                     |                   |                     |                    |                     |                       |                 |
|            |             |      |           |                     |                   |                     |                    |                     |                       |                 |
|            |             |      |           |                     |                   |                     |                    |                     |                       |                 |
|            |             |      |           |                     |                   |                     |                    |                     |                       |                 |
|            |             |      |           |                     |                   |                     |                    |                     |                       |                 |
|            |             |      |           |                     |                   |                     |                    |                     |                       |                 |
|            |             |      |           |                     |                   |                     |                    |                     |                       |                 |
|            |             |      |           |                     |                   |                     |                    |                     |                       |                 |

\* Water content excluding material +20mm



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## CALIFORNIA BEARING RATIO TEST

| Borehole / Pit No. | Depth (m)   | Sample |           | Description                                                                                                                                                      | Remarks |
|--------------------|-------------|--------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
|                    |             | Type   | Reference |                                                                                                                                                                  |         |
| TP08               | 1.00 - 1.50 | B      | -         | Brown slightly gravelly slightly sandy silty CLAY with occasional recently active and decayed roots. Gravel is fine to coarse subangular to subrounded quartzite |         |

### Specimen Preparation

|           |                                                               |
|-----------|---------------------------------------------------------------|
| Condition | Remoulded                                                     |
| Details   | Recompacted with specified standard effort using 2.5kg rammer |

| Soaking Details          | Not Soaked |      |
|--------------------------|------------|------|
| Period of Soaking        |            | days |
| Time to Surface          |            | days |
| Amount of Swell Recorded |            | mm   |
| Initial Water Content    |            | %    |

|                                         |              |                        |
|-----------------------------------------|--------------|------------------------|
| Material Retained on 20mm Sieve Removed | 1.1          | %                      |
| Initial Specimen Details:               | Bulk Density | 1.93 Mg/m <sup>3</sup> |
|                                         | Dry Density  | 1.63 Mg/m <sup>3</sup> |

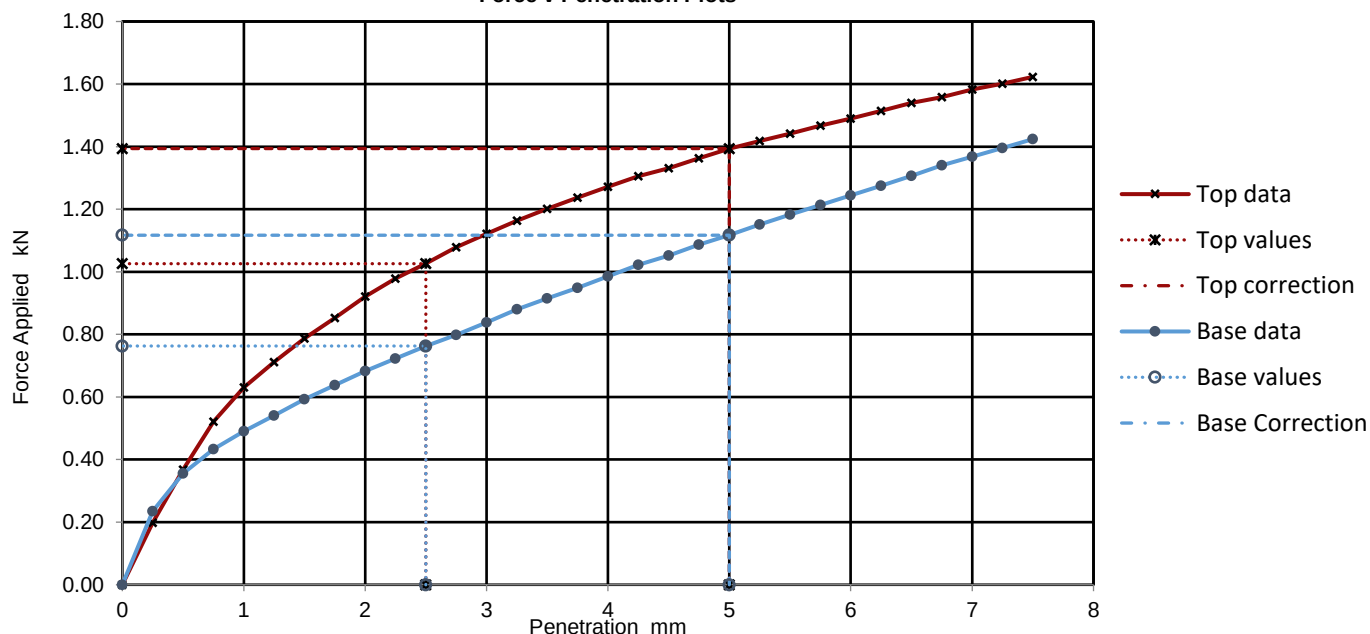
|                   |    |    |
|-------------------|----|----|
| Surcharge Applied | 15 | kg |
|-------------------|----|----|

### Test Results

|      | Curve Correction | CBR Values (%) |       |         |       |
|------|------------------|----------------|-------|---------|-------|
|      |                  | 2.5mm          | 5.0mm | Highest | Mean* |
| TOP  | No               | 7.8            | 7.0   | 7.8     |       |
| BASE | No               | 5.8            | 5.6   | 5.8     |       |

| Water Content (%) |
|-------------------|
| 18.8              |
| 18.7              |

Force v Penetration Plots



|                        |                                                                                                                                                                                                                             |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Method of Preparation: | BS1377: Part1: 2016 & BS1377: Part 4: 1990: 7.2.4.4                                                                                                                                                                         |
| Method of Test:        | BS 1377: Part 4: 1990: 7                                                                                                                                                                                                    |
| Type of Sample Key     | U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT= Split Spoon Sample, C = Core Cutter                                                                                                                      |
| Comments:              | *Only reported if the results from each end of the sample are within $\pm 10\%$ of the mean value.<br>Note:- CBR Results are water content dependent - an increase in water content will result in a decrease of CBR value. |
| Remarks to Include:    | Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C.                                                 |



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## Final Report

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|                               |                                                                                                      |                         |             |
|-------------------------------|------------------------------------------------------------------------------------------------------|-------------------------|-------------|
| <b>Report No.:</b>            | 22-24825-1                                                                                           |                         |             |
| <b>Initial Date of Issue:</b> | 05-Jul-2022                                                                                          |                         |             |
| <b>Client</b>                 | Soil Property Testing                                                                                |                         |             |
| <b>Client Address:</b>        | 18 Halycon Court<br>St Margarets Way<br>Stukeley Meadows<br>Huntingdon<br>Cambridgeshire<br>PE29 6DG |                         |             |
| <b>Contact(s):</b>            | Jon Garner                                                                                           |                         |             |
| <b>Project</b>                | 40991_1 Poplar Terrace, Congerstone                                                                  |                         |             |
| <b>Quotation No.:</b>         |                                                                                                      | <b>Date Received:</b>   | 01-Jul-2022 |
| <b>Order No.:</b>             | 40991_1                                                                                              | <b>Date Instructed:</b> | 01-Jul-2022 |
| <b>No. of Samples:</b>        | 4                                                                                                    |                         |             |
| <b>Turnaround (Wkdays):</b>   | 5                                                                                                    | <b>Results Due:</b>     | 07-Jul-2022 |
| <b>Date Approved:</b>         | 05-Jul-2022                                                                                          |                         |             |
| <b>Approved By:</b>           |                   |                         |             |
| <b>Details:</b>               | Stuart Henderson, Technical<br>Manager                                                               |                         |             |

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## Results - Soil

**Project: 40991 1 Poplar Terrace, Congerstone**

|                                                 |                             |            |              |            |           |             |           |           |
|-------------------------------------------------|-----------------------------|------------|--------------|------------|-----------|-------------|-----------|-----------|
| <b>Client: Soil Property Testing</b>            | <b>Chemtest Job No.:</b>    |            |              |            | 22-24825  | 22-24825    | 22-24825  | 22-24825  |
| Quotation No.:                                  | <b>Chemtest Sample ID.:</b> |            |              |            | 1459607   | 1459608     | 1459609   | 1459610   |
|                                                 | Client Sample ID.:          |            |              |            | D         | D           | D         | D         |
|                                                 | Sample Location:            |            |              |            | TP02      | TP06        | TP07      | TP08      |
|                                                 | Sample Type:                |            |              |            | SOIL      | SOIL        | SOIL      | SOIL      |
|                                                 | Top Depth (m):              |            |              |            | 0.80      | 1.40        | 2.00      | 0.60      |
| <b>Determinand</b>                              | <b>Accred.</b>              | <b>SOP</b> | <b>Units</b> | <b>LOD</b> |           |             |           |           |
| Moisture                                        | N                           | 2030       | %            | 0.020      | 15        | 14          | 11        | 14        |
| pH                                              | U                           | 2010       |              | 4.0        | [A] 8.6   | [A] 8.8     | [A] 8.3   | [A] 8.0   |
| Sulphate (2:1 Water Soluble) as SO <sub>4</sub> | U                           | 2120       | g/l          | 0.010      | [A] 0.019 | [A] < 0.010 | [A] 0.015 | [A] 0.023 |
| Sulphate (Total)                                | U                           | 2430       | %            | 0.010      | [A] 0.039 | [A] 0.027   | [A] 0.020 | [A] 0.028 |

## Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

| Sample: | Sample Ref: | Sample ID: | Sample Location: | Sampled Date: | Deviation Code(s): | Containers Received: |
|---------|-------------|------------|------------------|---------------|--------------------|----------------------|
| 1459607 |             | D          | TP02             |               | A                  | Plastic Tub<br>500g  |
| 1459608 |             | D          | TP06             |               | A                  | Plastic Tub<br>500g  |
| 1459609 |             | D          | TP07             |               | A                  | Plastic Tub<br>500g  |
| 1459610 |             | D          | TP08             |               | A                  | Plastic Tub<br>500g  |

## Test Methods

| SOP  | Title                                                      | Parameters included                  | Method summary                                                                                       |
|------|------------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------|
| 2010 | pH Value of Soils                                          | pH                                   | pH Meter                                                                                             |
| 2030 | Moisture and Stone Content of Soils(Requirement of MCERTS) | Moisture content                     | Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C. |
| 2040 | Soil Description(Requirement of MCERTS)                    | Soil description                     | As received soil is described based upon BS5930                                                      |
| 2120 | Water Soluble Boron, Sulphate, Magnesium & Chromium        | Boron; Sulphate; Magnesium; Chromium | Aqueous extraction / ICP-OES                                                                         |
| 2430 | Total Sulphate in soils                                    | Total Sulphate                       | Acid digestion followed by determination of sulphate in extract by ICP-OES.                          |

## **Report Information**

### **Key**

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|     |                                                                                                               |
|-----|---------------------------------------------------------------------------------------------------------------|
| U   | UKAS accredited                                                                                               |
| M   | MCERTS and UKAS accredited                                                                                    |
| N   | Unaccredited                                                                                                  |
| S   | This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis     |
| SN  | This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis |
| T   | This analysis has been subcontracted to an unaccredited laboratory                                            |
| I/S | Insufficient Sample                                                                                           |
| U/S | Unsuitable Sample                                                                                             |
| N/E | not evaluated                                                                                                 |
| <   | "less than"                                                                                                   |
| >   | "greater than"                                                                                                |
| SOP | Standard operating procedure                                                                                  |
| LOD | Limit of detection                                                                                            |

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

### **Sample Deviation Codes**

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- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

### **Sample Retention and Disposal**

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All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

[customerservices@chemtest.com](mailto:customerservices@chemtest.com)

## **APPENDIX J**

### **Summary of Screening Criteria**

## EPS Generic Quantitative Risk Assessment - Residential Land Use

| Contaminant            | Soil Targets   |                   |             |
|------------------------|----------------|-------------------|-------------|
|                        | Human Health   | Controlled Waters |             |
|                        |                | Surface Water     | Groundwater |
| Unit                   | mg/kg          |                   |             |
| Arsenic                | See C4SL       | n/c               | n/c         |
| Cadmium                | See C4SL       | n/c               | n/c         |
| Chromium III           | 910            | n/c               | n/c         |
| Chromium VI            | See C4SL       | n/c               | n/c         |
| Copper                 | 2400           | n/c               | n/c         |
| Mercury (elemental)    | 1.2            | 0.085             | 1.22        |
| Nickel                 | 180            | n/c               | n/c         |
| Lead                   | See C4SL       | n/c               | n/c         |
| Selenium               | 250            | n/c               | n/c         |
| Zinc                   | 3700           | n/c               | n/c         |
| Benzene                | See C4SL       | 0.064             | 0.0064      |
| Toluene                | 130            | 1.33              | 12.6        |
| Ethylbenzene           | 47             | 0.77              | 11.5        |
| Xylene (para)          | 56             | 1.18              | 19.6        |
| MTBE#                  | 49             | 4.41              | 0.026       |
| Benzo(a)Pyrene         | See C4SL       | n/c               | n/c         |
| Naphthalene            | 2.3            | 0.11              | 0.11        |
| Aliphatic C5-C6        | 42             | 4.06              | 0.81        |
| Aliphatic C6-C8        | 100            | 17.8              | 3.57        |
| Aliphatic C8-C10       | 27             | n/c               | n/c         |
| Aliphatic C10-C12      | 130(48)*       | n/c               | n/c         |
| Aliphatic C12-C16      | 1100(8.48)**   | n/c               | n/c         |
| Aliphatic C16-C35      | 65000 (8.48)** | n/c               | n/c         |
| Aromatic C8-C10        | 34             | 6.71              | 1.34        |
| Aromatic C10-C12       | 74             | 10.6              | 2.13        |
| Aromatic C12-C16       | 140            | 21.2              | 4.23        |
| Aromatic C16-C21       | 260            | n/c               | n/c         |
| Aromatic C21-C35       | 1100           | n/c               | n/c         |
| Tetrachloroethene      | See C4SL       | 0.24              | 0.24        |
| Trichloroethene        | See C4SL       | 0.13              | 0.13        |
| cis-1,2 Dichloroethene |                | 0.21              | 0.21        |
| Vinyl Chloride         | See C4SL       | 0.0012            | 0.0012      |

| Human Health | Groundwater Targets |             |
|--------------|---------------------|-------------|
|              | Controlled Waters   |             |
|              | Surface Water       | Groundwater |
| Unit         | µg/l                |             |
| n/c          | 50                  | 10          |
| n/c          | 2.5#                | 5           |
| n/c          | 4.7                 | 50          |
| n/c          | 3.4                 |             |
| n/c          | 93.1#               | 2000        |
| 1.1          | 1                   | 1           |
| n/c          | 14.8#               | 20          |
| n/c          | 27.7#               | 10          |
| n/c          | 10                  | 10          |
| n/c          | 373#                | 3000        |
| 210          | 10                  | 1           |
| 230,000      | 74                  | 700         |
| 10,000       | 20                  | 300         |
| 9,900        | 30                  | 500         |
| 83,000       | 2600                | 15          |
| n/c          | 0.005 (0.00017)     | 0.01        |
| 220          | 2                   | 2           |
| 1,900        | 50                  | 10          |
| 1,500        | 50                  | 10          |
| 57           | 50                  | 10          |
| 37           | 50                  | 10          |
| n/c          | 50                  | 10          |
| n/c          | 50                  | 10          |
| 1,900        | 50                  | 10          |
| 6,800        | 50                  | 10          |
| 39,000       | 50                  | 10          |
| n/c          | 50                  | 10          |
| n/c          | 50                  | 10          |
| 34           | 10                  | 10          |
| 5.7          | 10                  | 10          |
| 130          | 50                  | 50          |
| 0.62         | 0.5                 | 0.5         |

### Notes:

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)

n/c = not calculated. Under normal conditions contaminant exhibits low solubility /volatility, therefore risks from leaching and or vapour pathways are considered low.

# To establish suitable compliance criteria for Surface Water review of baseline groundwater quality in England and Wales was completed following research reported in Shand, P, Edmunds, W M, Lawrence, A R, Smedley, P L, and Burke, S. 2007. The natural (baseline) quality of groundwater in England and Wales. British Geological Survey Research Report No. RR/07/06. Where compliance criteria was found below the 97.7 percentile of baseline value, the latter was adopted as GAC.

### 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 Surface Water and Groundwater respectively (see notes for GW targets).

### Groundwater Targets

For Surface Water, targets have been taken as Freshwater EQS where available. For MTBE Predicted No Effect Concentration (European Risk Assessment Report, 2002) was used. For individual TPH fractions, in absence of UK EQS, a 5 times multiplier of UKDWS has been taken.

For Groundwater, targets have been taken as UKDWS where available. In the absence of UK targets internationally recognised criteria were adopted. For MTBE, WHO taste threshold has been adopted.

Targets for Human Health have been taken from Society of Brownfield Risk Assessment (SoBRA) 'Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater' - Version 1.0, February 2017, derived using sandy soil and 1%SOM. GAC were set up assuming source at 50cm below typical ground bearing slab of 15cm thickness. GAC were derived for vapour pathways only. For sites where ground conditions, or differ significantly from described above, the generic human health targets may be revised.



## EPS Generic Quantitative Risk Assessment

### Generic Screening Criteria (C4SLs) - 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  |
| Chloroethene (Vinyl Chloride) | 0.017                   | 0.029                      | 0.0058     | 2.2        | 7.8                | 19    |
| Trichloroethene (TCE)         | 0.043                   | 0.045                      | 0.16       | 3.4        | 79                 | 69    |
| Tetrachloroethene (PCE)       | 1.6                     | 1.6                        | 11         | 130        | 3400               | 2500  |

#### Notes:

Targets for Human Health have been taken from the publicly available Category 4 Screening Levels (C4SLs) for assessment of land affected by contamination issued by DEFRA/CL:AIRE in December 2013 and May 2021.

Within the modelling for C4SLs, a Soil Organic Matter content of 6% has been used. Reference to site-specific data should be made where possible.

The C4SLs for the contaminant benzene along with the three chlorinated solvents are the most susceptible to changes in SOM.

May-22

## **APPENDIX K**

### **Cover Soils Checklist**



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## ADVISORY NOTE

### SOILS FOR USE IN COVER SYSTEMS

This note applies where there is a need for a control measure in the form of a defined thickness of clean soil to be used in gardens and soft landscaped areas in order to reduce risks from underlying contamination (a 'cover system'). Where a specific thickness has been presented, it is what EPS consider sufficient provided the soil forming the cover system is good quality, as it is assumed that over time this soil will become intermixed with the underlying soils and therefore needs to have the necessary 'dilution' effect. The aim being that an acceptable reduction in exposure to contamination is achieved, rather than absolute prevention.

These simple cover systems are designed in general accordance with the BRE 2004 guidance '*Cover Systems for Land Regeneration, Thickness of Cover Systems for Contaminated Land*'. In many cases guidance from a Local Planning Authority or NHBC/Approved Inspector may also apply and need to be taken into account. In most cases, to design the cover system EPS have to assume a certain quality of cover soils in advance. In these circumstances, we utilise what we consider to represent 'good quality soil' in that the soil could never be considered 'contaminated' but is also pragmatic and does not represent an unrealistic or unsustainable objective for much of the soils in the UK. In numerical terms, this standard typically equates to soil containing contaminants at around 25% of their adopted screening values in the risk assessment.

For the cover system itself, EPS would usually carry out a verification process of your site to demonstrate the control measure has been implemented as intended to satisfy all interested parties such as planning authorities, the NHBC and the future property owner. To document this process, EPS will prepare a Verification Report. If you wish for EPS to do this, we will need the following points confirmed relating to the soils preferably before they are installed in gardens.

If there are any queries, please contact EPS before purchasing any soil.

#### **EPS Contact Details:**

Tel: 01954 710666

Email: [info@epstrategies.co.uk](mailto:info@epstrategies.co.uk)



| Pre-Verification Cover System Checklist |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Yes? |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Soil Source                             | The soil must not be a waste. Has it been confirmed that the soil is not a waste and has never been deemed as such in the past?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |
|                                         | Has the source of the soil been provided?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |
|                                         | Have all the delivery notes confirming the source, volume and type of soil been provided for all that is to be used? Where suppliers such as British Sugar are used, the soils should be delivered direct to site (not via an intermediary depot).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |
| Soil Quality                            | The soils are free of invasive plant species such as Japanese Knotweed, and have not been sourced from an affected area?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |
|                                         | Do the soils look clean and of a high quality? I.e. the soil must not have an odour or contain any visual evidence of contamination, including oils, asbestos, glass, plastic, rubble, metal, ash, sharp objects or tarmac/bitumen?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |
|                                         | Testing to 'BS 3882:2015 <i>Specification for topsoil and requirements for use</i> ' is preferable but generally not essential for public health regulation, provided you can confirm the soils comply with the above points, are suitable for their intended purpose and will provide an adequate growing medium?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |
|                                         | Has the soil been chemically tested prior to it arriving at site?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |
|                                         | Any soil test results presented to EPS by a third party must be current and clearly relate to the soil used, i.e. the testing must generally be dated within 6 weeks of delivery. The quantity of testing will be dependent on how much confidence is generated in the quality of the material, as well any specific local regulatory requirements. If the soil is clean soil from an established source such as British Sugar, the testing they provide at source may be sufficient alone without further testing (by EPS).<br><br>For other soils, EPS can advise on the likely testing frequencies but as a rule of thumb, anticipate at least one sample per average-sized plot. The testing would usually comprise the following: Heavy Metals, Poly Aromatic Hydrocarbons, Asbestos and Total Petroleum Hydrocarbons at an accredited lab. If adequate testing has not been completed, then EPS will need to test it from stockpiles prior to installation. Installing the soils into gardens without any testing data is not advised, as it may need to all be removed later. |      |
| Cover Thickness                         | Are all excavations ready which will allow the necessary thickness of cover soils to be installed?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |
|                                         | If yes, can you provide waste transfer documentation for any excavated soils?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |

## **APPENDIX L**

### **Method Statement for Encountering Unexpected Contamination**



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## 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:

|               |                    |                    |
|---------------|--------------------|--------------------|
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| Will Evans    | Director           | Tel: 0781 253 9655 |
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