



Phase I & II Geo-Environmental Report

Project: Hook Norton Road, Sibford
Ferris, Banbury,
OX15 5BP

Client: Land and Partners Ltd

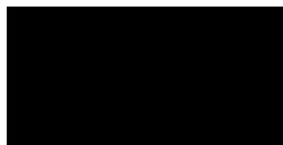
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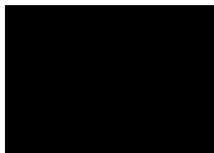
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EXECUTIVE SUMMARY

A **ground investigation** comprising 14 No. mechanically excavated trial pits, four in situ trial pit soakaway tests, and 6 No. dynamic cone probe tests was successfully undertaken at the Hook Norton Road, Sibford Ferris, Banbury, during September 2020.

A programme of **laboratory testing** comprising 2 No. Particle Size Distribution PSD (Wet/Dry sieve), JNP BRE Concrete Suite and 4 No. Atterberg limits including moisture content. Soil chemical testing undertaken comprised of 5no soils for metal contaminants, PAH, TPH and asbestos screening. 3. No samples underwent pesticide screening and Soil Organic Matter testing.

The **ground conditions** comprised a variable thickness of natural topsoil overlying superficial unit. Cohesive deposits of the Northampton Sand Formation were encountered across the site, this being the anticipated geology for the site. In four locations the cohesive Whitby mudstone formation was encountered below the Northampton Sand formation.

The ground conditions are suitable for traditional strip **foundations**. Where properties are within the influence zone of trees foundations will need to be deepened due to the ground conditions being a medium volume change potential. Foundation excavations should be taken through soft and compressible soils and placed within the Northampton Sand Formation at a minimum depth of 1.0 m bgl. An allowable bearing pressure of 100 kN/m² at 0.75 m bgl was calculated this bearing capacity increasing with depth.

Groundwater was locally encountered during the investigation in TP01 at 2m bgl.

Construction of the **roads** will have to be designed in line with a CBR value of 5.1 % is recommended for all cohesive soils at the site.

Surface water **drainage** to soakaways is considered feasible at the site.

In accordance with BRE SD1 (2005) "Concrete in aggressive ground", and assuming a mobile groundwater regime, a Design Sulphate Class of DS1 with an ACEC of AC-1 would apply for all **buried concrete** on the site.

No evidence of Made Ground, or metal or hydrocarbon **contamination** was recorded. Exceedances of arsenic, were found in TP01 0.10m bgl, TP03 0.30m bgl, TP04 0.30m bgl and in TP15 0.60m bgl in natural soils. It is recommended that further investigation is undertaken to assess the bioavailability of arsenic. Isolated minor exceedances of beryllium and vanadium are also noted.

Basic **Radon gas** protection measures are required.

1 INTRODUCTION

1.1.1 JNP Group was instructed by Land and Partners Ltd to undertake a desk study and ground investigation of a site known as Hook Norton Road, Sibford Ferris, Banbury (hereinafter referred to as 'the site'). This report is subject to the limitations presented in Appendix A.

1.1.2 It is understood that the site will be redeveloped for 25 new two storey residential properties, with access roads, private gardens and an area of allotments. The proposed redevelopment is shown in BHP Harwood Architects Drawing No. 3361.101 dated July 2018.

1.1.3 Any comments given are based on the understanding that the proposed redevelopment will be as detailed above.

1.2 Objectives

1.2.1 The purpose of the investigation was to address geotechnical and geo-environmental and issues relating to a proposed residential end-use of the site. The scope of work comprised desk study research, together with intrusive investigation and laboratory testing. This report contains details of the site, the work and laboratory testing undertaken, strata encountered, geotechnical and chemical laboratory test results, soakaway test results and provides an interpretative assessment of the ground conditions with regard to geotechnical and contaminated land issues.

1.3 Methodology

1.3.1 This report has been compiled in accordance with the on-line Land contamination: risk management (LCRM) guidance produced by the Environment Agency (June 2019). This can be found on the UK government website: <https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks>.

1.3.2 This report has been prepared following review of a previous investigation undertaken on the site by JNP Group 'Flood Risk Assessment and Drainage Strategy, Land West of Hook Norton Road Sibford Ferris, OX15 5RF' (Ref: C85855) dated September 2018.

2 SITE DESCRIPTION

- 2.1.1 The site is located off Hook Norton Road, in Sibford Ferris, Oxfordshire approximately 10.5 km south-west of Banbury town centre (see Figure 1 Key Plan). The centre of the site is located at National Grid Reference SP 35536 37060. The site covers an area of approximately 3.98 hectares.
- 2.1.2 The site comprises of the northern half of a single large agricultural field with hedgerow boundaries to the north, east and west. A number of mature trees are located within the hedgerow forming the northern boundary of the site.
- 2.1.3 The site slopes gently to the north-west, with its high-point in the south-eastern corner at an elevation of 181.7 m above Ordnance Datum (aOD), sloping down to an elevation of 170 m aOD in the north-western corner.
- 2.1.4 At the time of the investigation, a crop of maize 2.4 m high was present on the site.
- 2.1.5 Two sets of 11kV overhead power lines cross the site, one set crosses the site in an approximate north to south direction, just west of the centre of the site. The second set branches off the above power lines near the north of the site, and crosses directly eastwards.
- 2.1.6 The surrounding land uses are summarised in the following table.

Table 2-1: Surrounding Land Use

Direction	Land Use
North	Residential properties of Sibford Ferris
East	Hook Norton Road, sports halls and playing fields of Sibford School
South	Agricultural land and associated farm buildings.
West	Woodway Road, Agricultural Fields.

- 2.1.7 Reference should be made to JNP Group Drawing No. C85855-JNP-XX-XX-DR-G-2001. for full details of the site setting at the time of investigation.

3 GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

3.1 Geology

- 3.1.1 The geology of the site has been determined by reference to the 1:50,000 scale British Geological Survey (BGS) online Geoindex Tool
<http://mapapps2.bgs.ac.uk/geoindex/home.html>
- 3.1.2 No artificial or Made Ground is indicated to be present underlying the site.
- 3.1.3 No superficial deposits are indicated to be present by the (BGS) Geoindex Tool.
- 3.1.4 The underlying geology is indicated to be the Northampton Sand Formation, which is described by the BGS as *“Sandy, berthierine-oidal and sideritic ironstone, greenish grey where fresh, weathering to brown limonitic sandstone, typically displaying a box-stone structure”*.
- 3.1.5 The Northampton Sand Formation is underlain at shallow depth by the Whitby Mudstone Formation, which is described by the BGS as *“Medium and dark grey fossiliferous mudstone and siltstone, laminated and bituminous in part, with thin siltstone or silty mudstone beds and rare fine-grained calcareous sandstone beds; dense, smooth argillaceous limestone nodules very common at some horizons; phosphatic nodules at some levels. Nodular and fossiliferous limestones occur at the base in some areas.”*
- 3.1.6 Cross referencing between BGS mapping and the topographical survey, it is possible to determine that the interface between the Northampton Sand Formation and the Whitby Mudstone Formation dips gently to the north-west. The Whitby Mudstone is anticipated to be generally present within 5 m of the surface.
- 3.1.7 There are six faults located within 500 m of the site. The nearest of these being 100 m to the south-east of the site and being a *normal fault, inferred; Crossmark on downthrown side*. A further fault is noted 218 m south of the site and is also described as *“normal fault, observed; crossmark on downthrow side”*. Further faults are located 347 m to the north 466m to the east 486 m to the east and 493 m to the east all being described as a normal faults.
- 3.1.8 The following table details the risk of geological hazard potential on or underlying the site as identified in the Groundsure Report (included in Appendix C).

Table 3-1 Geological Hazards

Hazard	Risk
Shrinking or swelling clay	Negligible
Landslide ground	Very Low
Ground dissolution	Negligible
Compressible soils	Negligible
Collapsible soils	Very Low
Running sand	Negligible

- 3.1.9 Based upon the above, geological hazards are not considered to present a constraint to development.

3.2 BGS Borehole Records

3.2.1 The BGS Geindex indicates that there are no historical boreholes within 250 m of the site.

3.3 Background Soil Chemical Concentrations

3.3.1 The Groundsure Report provides an indication to the background concentrations of a number of metallic contaminants commonly recorded in soils:

- arsenic 35-45 mg/kg;
- cadmium < 1.8 mg/kg;
- chromium 60 - 90 mg/kg;
- lead <100 mg/kg;
- nickel 15 – 30 mg/kg

3.3.2 In addition, the UK Soil Observatory map viewer (<http://www.ukso.org/mapViewer.html>) provides an indication to the background concentrations of a number of metallic contaminants commonly recorded in soils:

- arsenic 38 mg/kg;
- cadmium 0.24 mg/kg;
- chromium 113 mg/kg;
- copper 18 mg/kg
- lead 45 mg/kg;
- nickel 41 mg/kg;
- zinc 113 mg/kg

3.3.3 Therefore, naturally elevated concentrations of metals are not anticipated at the site or in close proximity.

3.4 Ground Workings, Mining History and Natural Cavities

- No historical surface ground workings are recorded to be present within 250 m of the site;
- No historical underground workings within 1 km of the site;
- No current ground workings within 1 km of the site;
- No coal mining within 1 km of the site;
- There are no non-coal mining cavities located within 1 km of the site;
- There are no natural cavities located within 1 km of the site;
- No brine or gypsum extraction within 1 km of the site;
- No tin or clay mining areas within 1 km of the site.

3.5 Hydrology

- 3.5.1 The nearest surface water feature is located 796 m to the south-west of the site. This being the River Stour.
- 3.5.2 River quality data indicates that this section of the River Stour recorded a chemical General Quality Assessment (GQA) of (moderate) in 2016, and a chemical GQA of (Good) in 2016.
- 3.5.3 The site does not lie in area considered by the Environment Agency to be at risk of flooding.

3.6 Hydrogeology

- 3.6.1 The Aquifer Maps contained in the Groundsure Report indicates that the site is underlain by a Bedrock aquifer assigned Secondary-A Aquifer. This is described further below;

The Environment Agency define a Secondary-A Aquifer as:

“Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.”

- 3.6.2 The overlying soils are classified as having a high leaching potential, although this is uncertain, as a worst-case vulnerability classification is assumed by the Environment Agency (EA) for urban areas.
- 3.6.3 The Groundsure Report lists one ground water abstraction, located 850 m to the east of the site, at Bishop. The current status of the water abstraction is historical.
- 3.6.4 The site’s proximity to groundwater Source Protection Zones (SPZs) was determined by reference to the Environment Agency’s website. These zones show the risk of contamination from any activities that might cause pollution in the area, with the closer the activity, the greater the associated risk. The maps show three main zones (inner, outer and total catchment) to a groundwater source.
- 3.6.5 The site does not lie within any source protection zones.

4 SITE HISTORY

4.1.1 The history of the site and the surrounding area has been determined from historical map extracts. Copies of these extracts are included in Appendix D. The historical land uses on site and in close proximity to the site are summarised in the following table:

Table 4-1: Site History Summary

Date	On-site Historical Land Use	Off-site Historical Land Use
1881	The site was shown as open agricultural field.	Agricultural land was shown to exist in all directions except for the eastern boundary of the site featuring Hook Norton Road and a track on the western boundary of the site. Two wells were denoted and rectangle buildings 30 m to the east of the site. The village of Sibford Ferris was denoted 160 m to the north-east. Unspecified ground workings were denoted 433 m to the north of the site. A historical tank was denoted 407 m to the north-east. A number of quarries and limekilns were denoted 800 m to the south-west of the site situated around Temple Mills.
1886-1899	No changes.	No significant changes.
1899-1900	No changes.	A smithy was denoted 455 m to the north-east of the site.
1900-1906	No changes.	No significant change.
1922	No changes.	The area 30 m to the east of the site was now planted with trees.
1920-1923	No changes.	A unspecified quarry was indicated 426 m to the north-east of the site.
1938-1949	No changes.	No significant changes.
1955	No changes.	The area to the east of the site had been developed into Sibford School.
1973	No changes	The area had been developed to the north-east of the site with the residential estate of Cotswold Close. The area surrounding Sibford School was now labelled as "playing fields". A sewage works was denoted 265 m to the north of the site. A filter bed was denoted 281 m north-west of the site. An old malthouse is denoted 439 m to the north-east of the site. Development of an electricity substation is noted 44 m to the east of the site. A further electricity substation was denoted 253 m north-east of the site.
1974	No changes	No significant changes.
1977	No changes	A sewage works was denoted 261 m to the north of the site. Unspecified tanks were denoted 273 m north-west of the site.
1987	No changes	An electricity substation was now denoted 252 m to the north-east of the site.

1991-1993	No changes	An unspecified tank was denoted 346 m to the east of the site.
1993-2020	No changes	No Significant Changes.

4.2 Site History Summary

- 4.2.1 The site has been undeveloped agricultural land from the earliest mapping of 1881 to the present day.
- 4.2.2 The nearby area was subject to agricultural use and residential development in the early twentieth century. The surrounding area has had a number of historical industrial activities such as quarrying, black smiths, and historical tanks.

5 INFORMATION HELD BY STATUTORY AUTHORITIES

5.1.1 This section details any relevant information held in the registers maintained by statutory bodies as identified in the Groundsure Report (Appendix C).

5.2 Waste Management Facilities

5.2.1 The Groundsure Report does not identify any licensed waste management facilities located within 1 km of the site.

5.2.2 No historical landfills are located within 1 km of the site.

5.3 Historical IPC, IPPC Part A and B Activities and Enforcements

5.3.1 The Groundsure Report indicates that:

- There are no historical IPC authorisations within 500 m of the study site;
- There are no Part A (1) and IPPC authorised activities within 1 km of the site;
- There are no Part A (2) and Part B activity and enforcements within 500 m of the site.

5.4 Pollution Incidents to Controlled Waters

5.4.1 Records held by the Environment Agency identified no pollution incidents to controlled waters within 1 km of the site.

5.5 Discharge Consents

5.5.1 The Groundsure Report identifies five licensed discharge consents within 1 km of the site. These all appear to be at the similar locations with a slight difference in metres from site and dates. These are summarised below:

- 256 m to the north-west of the site, issued in October 1989, to discharge final/treated sewage effluent into surface waters of a tributary of the River Stour. The status of this license is revoked in October 2002;
- 266 m to the north-west of the site, issued in October 2002, to discharge final/treated effluent into surface waters of a tributary of the River Stour. The status of this licence is revoked in April 2006;
- 266 m to the north-west of the site, licensed in October 2002 to discharge final/treated effluent surface waters of a tributary of the River Stour. The status of this licence is revoked December 2009;
- 266 m to the north-west of the site, licensed in October 2009 to discharge final/treated effluent surface waters of a tributary of the River Stour. The status of this licence is revoked March 2010;
- 266 m to the north-west of the site, licensed in March 2010 to discharge final/treated effluent surface waters of a tributary of the River Stour. The status of this licence is unknown;

5.6 Fuel Sites

5.6.1 The Groundsure Report identifies no active fuel station entry within 500 m of the site.

5.7 Historical and Contemporary Industrial Data

5.7.1 The Groundsure Report identifies two potentially historical and contemporary contaminative industrial sites within 250 m of the site. The nearest are summarised as follows:

- Electricity substation located 35 m to the east of the site this categorised as infrastructure and facilities.
- A further Electricity substation located 223 m to the north-east of the site. This is also categorised as infrastructure and facilities.

1.1.1 The Groundsure Report states that the Health Protection Agency identified between 5 % and 10 % of homes above the action level. The British Geological Survey Information Services Group indicates that basic radon protection measures are necessary.

5.8 Environmentally Sensitive Areas

5.8.1 The sensitive land use map within the Groundsure Report indicates:

- The site is located within a Nitrate Vulnerable Zone (NVZ). NVZs are designated areas where concentrations of nitrate in surface water (due to agricultural practices) are above guideline values e.g. Drinking Water Standards. High concentrations of nitrate in surface water has given rise to environmental and health concerns and these have been reflected in the EC Nitrates Directive (91/676/EEC) which is aimed at reducing nitrate pollution in controlled waters from agriculture.
- The site is located within a site of special scientific interest SSSI impact zone. SSSI impact zones are around each SSSI which reflect the particular sensitivities of the feature for which it is notified and indicate the type of development proposal which could potentially have adverse impacts.

5.8.2 There is one site of special scientific interest located 1,821 m south-west of the site at Sharp's Hill Quarry.

6 UK CONTAMINATED LAND LEGISLATIVE FRAMEWORK

6.1 Legislation on Contaminated Land

6.1.1 Given that the site is being assessed with the potential for future development, the most applicable appraisal relates to the requirements of the Planning Regime as described in the National Planning Policy Framework. In order to proceed with an assessment of contamination issues it is essential that there is compliance with UK guidance as detailed within reports published by the Environment Agency 'Model Procedures for the Management of Land Contamination' (Environment Agency, 2004), and 'Guiding Principles for Land Contamination' (Environment Agency, 2010).

6.1.2 Part IIA of the Environmental Protection Act, 1990, which was enacted by Section 57 of the Environment Act 1995, and the associated Contaminated Land (England) Regulations 2000 (SI 2000/227), was introduced on 1 April 2000. It created a new statutory regime for the identification and remediation of land where contamination poses an unacceptable risk to human health and the environment. The guidance was subject to a review by DEFRA in 2012, and a revision was published.

6.1.3 Part IIA provides a statutory definition of contaminated land:

“any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is a significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused”.

6.1.4 Controlled waters are considered to be all groundwaters, inland surface waters, and estuarine and coastal waters.

6.1.5 To determine whether land falls under the Part IIA definition of contaminated land, the site should be evaluated in the context of a risk based framework. The assessment of contaminated land is typically a two-phase process, which is initially based on a qualitative assessment of the likelihood of complete pollution linkages, with a quantitative element that seeks to determine the degree and the significance of the harm. Land is only defined as 'Contaminated Land' if a “significant pollutant linkage” is present.

6.1.6 A pollutant linkage must comprise the following:

Source - a contaminant at a concentration capable of causing adverse health or environmental effects.

Receptor - there must be a receptor (e.g. human, controlled waters, ecological, or property) present, which may be at risk of harm or impact from the source.

Pathway - there must be an exposure pathway through which the receptor comes into contact with the contamination source.

6.1.7 Each of these elements can exist independently, but they create risk only when they are linked together, so that a particular contaminant affects a particular receptor, through a particular pathway.

6.1.8 The responsible authority then needs to consider whether the identified pollution linkage:

- is resulting in significant harm being caused to the receptor in the pollutant linkage;

- presents a significant possibility of significant harm being caused to that receptor;
 - is resulting in the pollution of controlled waters, which constitute the receptor; or is likely to result in such pollution.
- 6.1.9 If a pollutant linkage is demonstrated, then the Part IIA legislation provides powers for remedial action to be enforced by the Local Authority in whose area the contaminated land is situated.
- 6.1.10 In addition, JNP Group has undertaken a preliminary risk assessment based on the **probability** of receptor exposure to the identified source and the **consequences** of such exposure.
- 6.1.11 **Risk management**, which can include site surfacing, formal management systems, legal requirements; is then considered to provide an overall residual risk. The categories of environmental risk used by JNP Group are given in Table 6.1 that follows.

Table 6-1: Risk Matrix

Environmental Risks		
HIGH		Issues within this category likely to provide a significant cost or liability. Further detailed investigation may be required to clarify the risk.
MEDIUM		It is possible that issues within this category may provide a cost or liability. Further investigation may be required to clarify the risk.
LOW		It is unlikely that issues within this category will provide a significant cost or liability. Basic investigation may be required to clarify the risk.
NONE		No source – pathway – receptor linkage present.

7 CONCEPTUAL MODEL AND PRELIMINARY RISK ASSESSMENT

7.1 General

7.1.1 This section uses information from historical maps to provide a conceptual model and qualitative assessment of the potential risks posed to human health and environmental receptors from potential on-site and off-site sources of contamination. The assessment is presented as a 'source-pathway-receptor' model in accordance with Part IIA of the Environmental Protection Act 1990.

7.1.2 The conceptual model has been developed assuming that the site will be redeveloped for residential housing with private gardens.

7.2 Potential Sources of Contamination

Potential On-site Sources of Contamination

- The site has remained undeveloped to the present day and has been used for agricultural purposes. The possible presence of pesticides in the topsoil of the site is noted from this use.

Potential Off-Site Sources of Contamination

- An electricity substation located 35 m to the east of the site is the nearest potential source of contamination. Given the age of the substation possible polychlorinated biphenyls (PCB) could be present. However, given the distance and immobility of PCB's this is not considered likely to pose a risk to the site.
- A sewage works 256 m to the north-west of the site has a license to discharge final/treated sewage effluent into surface waters of a tributary of the River Stour. Given the distance from the site and being down gradient, this is not considered potential source.

7.3 Receptors

7.3.1 The site is to be redeveloped for residential housing with private gardens. In addition, the site overlies a Secondary-A Aquifer (Northampton Sand Formation). The primary receptors, considered to be potentially at risk from any identified contamination are as follows:

Human Health

- Construction workers during the redevelopment phase;
- Residential end users.

Controlled Waters

- The bedrock beneath the site is classified as a Secondary-A Aquifer. JNP Group do not consider groundwater to be a sensitive receptor;
- The nearest controlled surface water, the River Stour, is 796 m to the south-west. Given its distance from the site, JNP Group do not consider the River Stour to be a sensitive receptor.

Ecological

- The site is located within a SSSI Impact Zone.
- Given the site setting sensitive species are considered unlikely to be present at the site (subject to any ecological survey undertaken).

Property

- Concrete sulphate attack;

7.4 Pathways

7.4.1 Potential contaminant migration pathways considered relevant to the site are:

Human Health

- Ingestion of contaminated soils and dust particles;
- Direct physical contact with near surface soils and contaminated dust particles;
- Inhalation of wind-blown contaminated dust;
- Inhalation of vapours and gases, migrating vertically into the atmosphere;
- Inhalation of vapours and gases, migrating vertically into buildings and confined spaces;
- Consumption of vegetables cultivated in contaminated soils;
- Consumption of soil attached to vegetables cultivated in contaminated soils.

Infrastructure

- Water supply pipework.

Controlled Waters

- Leaching of contaminants in Made Ground;
- Lateral migration of contaminated groundwater into the River Stour;
- Vertical migration of contaminated shallow groundwater impacting deeper groundwater in the aquifer sequence.
- Run-off of site-derived contamination into the River Stour during construction.

Ecological

- Migration of contamination through groundwater and subsequent uptake by plant roots;
- Direct contact between ecological receptors and contaminated surface water;
- Direct contact between ecological receptors and contaminated soils;
- Ingestion of contaminated soils/surface waters by ecological receptors;
- Inhalation of vapours or wind-blown dust by ecological receptors.

7.5 Pollutant Linkages

7.5.1 A 'pollutant linkage' describes the relationship between a contaminant, a pathway and a receptor, a 'pollutant' being the contaminant in a pollutant linkage. A contaminant, pathway and receptor must all be present for a pollutant linkage to exist, which forms the basis for determination that a piece of land is Contaminated Land. Potential sources, pathways and receptors have been assessed. The following table summarises the significant pollutant linkages potentially active at the site.

Table 7-1: Potential Source-Pathway-Receptor Linkages for Human Health Risk Assessment

Source	Pathway	Receptor
Contaminated soils	Ingestion of soil	On site female child: 0 - 6 yrs old
		On site construction worker
	Ingestion of household dust	On site female child: 0 - 6 yrs old
	Ingestion of contaminated vegetables	On site female child: 0 - 6 yrs old
	Ingestion of soil attached to vegetables	On site female child: 0 - 6 yrs old
	Dermal contact	On site female child: 0 - 6 yrs old
		On site construction worker
	Dermal contact with household dust	On site female child: 0 - 6 yrs old
Inhalation of fugitive soil dust	On site construction worker	
	On site female child: 0 - 6 yrs old	
Inhalation of fugitive household dust	On site female child: 0 - 6 yrs old	

Table 7-2: Source-Pathway-Receptor Linkages for Controlled Waters Risk Assessment

Source	Pathway	Receptor
Contaminated soils	Leaching Mechanisms	Groundwater stored in the Northampton Sand Formation.
Contaminated groundwater	Vertical migration	Groundwater stored in the Northampton Sand Formation.
Contaminated groundwater	Lateral and vertical migration (baseflow)	River Stour.

7.6 Preliminary Risk Assessment

7.6.1 From the information obtained from the desk study JNP Group has undertaken a preliminary risk assessment.

Table 7-3: Preliminary Risk Assessment

Issue	Risk	Justification
LAND	Low	The site has historically been farmland to the present day.
GROUNDWATER	LOW	The site is located on a productive stratum (Secondary Aquifer) and is not within a SPZ (medium). However previous site investigations have identified the Whitby Mudstone formation as the bedrock strata which is unproductive. No significant contamination sources have been identified at the site.
SURFACE WATER	LOW	The nearest surface water course is located 796 m to the south-west of the site. Given its distance from the site, the River Stour is not considered to be at risk.
ECOLOGY	NONE	Based on the assumption that there are no sensitive/protected species on site (subject to any ecological survey undertaken).

7.6.2 In line with BS ISO 18400-202:2018 based on the conceptual site model as above the site is considered to be probably uncontaminated.

8 PREVIOUS WORK

8.1.1 The site has been subject to previous investigation by JNP Group (Report Ref: C85855-R001A, dated September 2018). The report comprised a Flood Risk Assessment and Drainage Strategy. The scope of the investigation and the results of the findings are summarised in the following sections.

8.2 Fieldwork

8.2.1 The intrusive fieldwork undertaken by JNP was undertaken on July 2018, and comprised five trial pits (denoted SA01, SA02, SA02A, SA03 and SA03A) to depths of between 1.10 m and 3.00 m below ground level (bgl).

8.3 Ground Conditions

8.3.1 The ground conditions recorded during the preliminary soakaway testing investigation indicated that the site is underlain by variably silty, variably gravelly, orange brown sand of the Northampton Sand Formation. The Northampton Sand Formation is underlain by grey clay of the Whitby Mudstone Formation. The Whitby Mudstone Formation was encountered within SA02 and SA03 in the southern part of the site. The trial pit logs from the preliminary soakaway investigation are reproduced in Appendix E.

8.4 Groundwater

8.4.1 Groundwater was not encountered during the fieldwork period.

8.5 Conclusions

- 8.5.1 The Flood Risk Assessment has identified that the site features.
- Groundwater has been identified as a possible risk to the site, specifically perched groundwater. This is due to the impermeable Whitby Mudstone being encountered at shallow depths in the southern end of the site.
 - The investigation works confirmed the strata to be Northampton Sand Formation (between 2m and 1m thick) over Whitby Mudstone Formation. The Northampton Sand was found to be of greater thickness in the north-east of the site (approx. 2m) and became shallower in the south.

9 CONCLUSIONS OF DESK STUDY

9.1 Conclusions

9.1.1 The desk study has identified that

- The geological succession is the Northampton Sand Formation, underlain by the Whitby Mudstone Formation.
- No significant contamination sources have been identified.
- Basic radon gas protection measures are required

9.1.2 Based on information contained within desk study, it is the opinion of JNP Group that the potential site conditions provide a LOW environmental risk and hence further, basic investigation and assessment is required.

9.2 Recommendations

9.2.1 Based on the conclusions from the desk study and the intended redevelopment of the site, JNP Group recommends that the following intrusive works are undertaken:

- Chemical testing of natural soils to a depth of 0.6m bgl beneath the site. The testing should comprise metals and pH, triband TPH testing, speciated PAH, asbestos screen with some samples scheduled for soil organic matter (SOM) and pesticide screening.
- Geotechnical testing of natural soils consisting of BRE, Sulphates, Atterberg's and PSD.
- Further soakaway testing in the soils of the Northampton Sand Formation.

10 FIELDWORK AND MONITORING

10.1.1 The intrusive fieldwork was undertaken by JNP Group on 8, 9 and 11th of September 2020 and comprised fifteen mechanically excavated trial pits, four of which were used for infiltration testing.

1.1.2 All site work was completed under the instruction and supervision of JNP Group with the ground investigation procedures and sample descriptions given in the following publications:

- BS 5930 (2015). Code of Practice for Site Investigations;
- BS 10175 (2001+A1:2013+A2:2017). Investigation of potentially contaminated sites - code of practice;
- BS EN ISO 14688-1. "Soil - Identification and Description;
- BS EN ISO 14688-2. Soil - Classification principles and quantification of descriptive characteristics;
- BS EN ISO 14689. Rock - Identification and description;
- BS 18400-104:2018. Soil Quality – Sampling. Part 104: Strategies;
- BS 18400-202:2018. Soil Quality – Sampling. Part 202: Preliminary Investigations;
- BS 18400-203: 2018. Soil Quality – Sampling. Part 203: Investigation of potentially contaminated sites;
- BS 18400-205: 2018. Soil Quality – Sampling. Part 205: Guidance on the procedure for investigation of natural, near natural and cultivated sites.

1.1.3 For sites affected by asbestos impacted soils, the guidance given in the following publications has been followed:

- Industry Guidance on Interpretation for Managing & Working with Asbestos in Soil and Construction and Demolition Materials (CL:AIRE 2016);
- Asbestos in Soil and Made Ground: a guide to understanding and managing risks (CIRIA C733 2014).

10.1.2 The locations of the exploratory holes are shown on JNP Group Drawing No. C85855 D002. The exploratory hole records are presented in Appendix E. The full details of the fieldwork undertaken are summarised in the following sections.

10.1.3 The scope of the intrusive works was agreed in the proposal with the client on 17th August 2020, document reference number C85855-JNP-XX-XX-FQ-Z-0001/CAW/hb.

10.2 Trial Pits

10.2.1 Seventeen trial pits, designated TP01 to TP14 were excavated on the 8th and the 11th September 2020 to depths of between 1.30 m and 3.10 m below ground level (bgl), at various locations across the site. The pits were excavated using a JCB 3CX excavator and logged by examining samples brought to the surface.

10.2.2 For full details of the depth of each trial pit, the strata encountered, samples taken, information on groundwater encountered, results of any in-situ testing and any other relevant information, reference should be made to the logs presented in Appendix E.

10.3 Soakaway Tests in Trial Pits

10.3.1 Four trial pits, designated TP05, TP06, TP07 and TP08 were excavated on 8th September 2020 to depths of between 1.40 m and 2.30 m bgl, at various locations across the site. These pits were then filled with a one-meter head of water, which was allowed to drain in accordance with the general guidance given in BRE365: 2016.

10.3.2 All soakaway tests achieved three full drain downs in accordance with BRE365.

10.3.3 The soakaway test depths were at the proposed depths of the full-size soakaways, as indicated by the client.

10.3.4 The soakaway calculations are included in Appendix F.

10.4 Dynamic Cone Penetrometer Tests

10.4.1 Six Dynamic Cone Penetrometer (DCP) tests were undertaken to a depth of 1 m bgl in order to determine California Bearing Ratio (CBR) values. All of the tests were undertaken within the areas of proposed new roads.

10.4.2 The DCP probe comprises a cone of a known surface area on a steel shaft, that is driven into the ground by a set mass falling a set distance. Readings or 'blow counts' are recorded, and these are mathematically converted into CBR values. The results of the DCP tests are included in Appendix G.

11 LABORATORY TESTING

11.1 Geotechnical

11.1.1 A programme of laboratory testing was scheduled by JNP Group to determine the geotechnical properties of selected soil samples obtained from the investigation. The details of the geotechnical testing are summarised below:

Table 11-1: Scheduled Geotechnical Laboratory Tests

Test Description	Number of Tests
Particle Size Distribution PSD (Wet/Dry sieve).	2
Atterberg limits including moisture content.	4
JNP BRE Concrete Suite.	4

11.1.2 Tests were undertaken in accordance with BS1377 (1990) "Methods of test for Soils for Civil Engineering purposes". The results of the geotechnical testing are presented in Appendix H.

11.2 Environmental

11.2.1 A programme of chemical laboratory testing was scheduled by JNP Group on selected soil samples taken from topsoil and subsoil in natural ground recovered from the trail pit locations. The samples were placed into suitable containers for the required chemical analysis.

11.2.2 All samples were transported to i2 Analytical Testing Services in Watford which is accredited under UKAS and MCerts. The following table summarises the contaminants scheduled:

Table 11-2: Scheduled Chemical Analysis

Determinant	No
Metals and semi-metals (arsenic, beryllium, boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium and zinc).	5
Polycyclic Aromatic Hydrocarbons (PAH) 16 USEPA Speciated.	5
Total Petroleum Hydrocarbons (TPH) Carbon banded.	5
JNP Pesticide Suite.	3
Soil Organic Matter (SOM)+pH	3
Asbestos screening	5

11.2.3 The results of the laboratory chemical testing are interpreted in Section 14 and presented in full in Appendix I.

12 GROUND AND GROUNDWATER CONDITIONS

12.1 Strata Encountered

12.1.1 The ground conditions encountered during the intrusive investigation were generally consistent with the published geological map and the findings of previous investigation by JNP Group. A variable thickness of brown sandy topsoil overlay both granular and cohesive soils of the Northampton Sand Formation, generally comprising clayey sand to sandy clay, with gravel and occasional cobbles and boulders of sandstone at depth. The Northampton Sand Formation overlay grey clay of the Whitby Mudstone Formation.

12.1.2 A summary of the strata encountered during the investigation is presented in Table 12.1 and described in the following sections, but for full details and descriptions, reference should be made to the exploratory hole records presented in Appendix F.

Table 12-1: Strata Encountered

Stratum	Depth to Top (m bgl)	Depth to Base (m bgl)	Thickness (m)
Topsoil All locations	0.00	0.10-0.60	0.20-0.60
Northampton Sand formation All locations	0.10-0.60	1.30-3.20	1.20-2.60
Whitby Mudstone Formation SA02, SA03, TP02, TP03, TP14 and TP15	2.20-2.90	Unproven	Unproven

12.2 Made Ground

12.2.1 Made Ground was not encountered during the investigation.

12.3 Northampton Sand Formation

12.3.1 Soils of the Northampton Sand Formation were encountered in all trial pit locations. This was encountered at depth of between 0.10 m bgl - 0.60 m bgl, achieving a maximum thickness of 2.90 m bgl in TP02.

12.3.2 The soils consisted of an orange-brown silty, clayey fine to medium sand with occasional sandstone cobbles, increasing frequency with depth. TP03 and TP08 featured pockets of grey clay, the largest of these being 10 cm.

12.3.3 This formation also consisted of orange-brown slightly sandy clay encountered in TP02, TP03, TP09, TP10, TP11, TP12, TP13, TP14 and TP15.

Table 12-2: Northampton Sand Formation– Geotechnical Laboratory Test Results Summary

Property	Number of Tests	Range	Mean	Assessment
Natural Moisture Content	4	16 - 23	19	Medium volume potential. Intermediate plasticity.
% passing 425 sieve	4	89 - 96	93	
Liquid Limit %	4	35 - 40	34	
Plastic Limit %	4	18 - 21	19	
Plasticity Index %	4	11 - 22	15	
Modified Plasticity Index %	4	10 - 21	14	
Hand Shear Vane (kN/m ²)	9	70 - 106	91	Firm to Stiff
Gravel Content %	2	17 - 55	36	Gravelly very clayey SAND-clayey sandy GRAVEL.
Sand Content %	2	27 - 46	36	
Silt / Clay Content %	2	17 - 36	26	

12.3.4 The depth profile is presented as Figure 3, particle size distribution charts as Figure 6, and a plasticity chart as Figure 4.

12.4 Whitby Mudstone Formation

12.4.1 Soils of the Whitby Mudstone Formation were encountered in trial pit locations SA02, SA03, TP02, TP03, TP14 and TP15. The unit was encountered at depths of between 2.20 m bgl – 2.90 m bgl to a maximum depth of 3.20 m bgl in TP15.

12.4.2 The upper surface of the Whitby Mudstone Formation dips gently to the north-west, in accordance with the BGS mapping. In addition, there are two step-offsets in the upper surface of the Whitby Mudstone Formation. These offsets are interpreted as the result of two un-mapped faults striking north-east to south-west, with down-throws to the north-west of approximately 2 m at each fault. The approximate locations of the faults are denoted on Figure 2.

12.4.3 The soils consisted of a yellowish brown slightly sandy clay with rounded limestone cobbles to a stiff grey clay and a stiff brown grey slightly silty clay.

12.4.4 A total of 8 hand shear vane tests were undertaken within the Whitby Mudstone Formation with values ranging from 30 to 130 kN/m². The mean value recorded was 80 kN/m² indicating that the soils are of medium to firm to stiff.

12.5 Groundwater

12.5.1 The levels of groundwater recorded during the fieldwork period, are summarised in the following table:

Table 12-3: Summary of groundwater observations

Exploratory Location	Groundwater during fieldwork	
	Strikes (m bgl)	Comments
TP01	2.00	Seepage

12.6 Contamination

12.6.1 No evidence of contamination was observed during the site investigation.

12.7 Trees and Tree Roots

12.7.1 No tree roots were encountered during the site investigation.

12.7.2 A number of mature trees located in the margins of the site are located in close proximity to the footprints of the proposed plots.

12.8 Desiccation

12.8.1 Following laboratory testing of cohesive soils, two commonly accepted methods for determining the degree of desiccation (as stated in BRE 412 'Desiccation in Clay Soils') are as follows:

1. Desiccation has occurred when the Moisture Content is less than the Plastic Limit;
2. Significant desiccation has occurred when the Moisture Content is less than 0.4 x the Liquid Limit.

12.8.2 When the results of laboratory testing are compared with Method 1, samples at TP03 at 1.00m and TP08 at 0.80m, are considered possibly desiccated.

12.8.3 When the results of laboratory testing are compared with Method 2, no samples are desiccated.

12.9 Obstructions

12.9.1 Trial pits TP02, TP04, TP05, TP06, TP07, TP08, TP09, TP10, TP11, TP12 and TP13 were all terminated on hard ground.

13 HUMAN HEALTH QUANTITATIVE RISK ASSESSMENT

13.1.1 Qualitative assessment of risks may be sufficient in many cases to eliminate the possibility of significant pollutant linkages. However, quantitative risk assessment is formally required to determine whether there is a 'significant possibility of significant harm being caused'. Part IIA of the Environmental Protection Act 1990 recommends that 'authoritative and scientifically based guideline values for concentrations of the potential pollutants in or under the land' be used to quantify the risk posed by contamination.

13.1.2 Under the Planning Regime, a quantitative risk assessment can be used to decide whether the site is suitable for the proposed use. In addition, the National Planning Policy Framework (March 2012) also indicates that after remediation, as a minimum land should not be capable of being determined as contaminated land under Part IIA.

13.2 Current UK Screening Values

13.2.1 The UK technical guidance for assessing risks to human health is issued from various UK bodies, including the Environment Agency (EA), DEFRA, Contaminated Land: Applications in Real Environment (CL:AIRE), Chartered Institute of Environmental Health (CIEH), and Land Quality Management (LQM) Ltd (part of the University of Nottingham).

13.2.2 New and updated screening values in the form of provisional Category 4 Screening Levels (C4SL) (published in 2014), and Suitable for Use Levels (S4UL), (published 2015), have been produced by DEFRA and CIEH / LQM respectively using modified versions of the EA's Contaminated Land Exposure Assessment (CLEA) software.

C4SL

13.2.3 Provisional C4SL have been derived by CL:AIRE (project team for DEFRA's SP1010 project) following revised statutory guidance, and as a tool to assist in applying the Part IIA Category 1- 4 classifications to a site. The purpose of the C4SL is to provide a simple test for deciding that land is suitable for use, and definitely not contaminated land under Part IIA. They describe a level of risk that is above minimal, but is still low.

13.2.4 In calculating provisional C4SL some of the exposure modelling scenarios and exposure parameters used in the CLEA software have been modified. These modifications are not discussed further, but reference should be made to the original CL:AIRE / DEFRA publications should further information or clarification be required. A list of the new publications is included in the references section at the end of this report.

13.2.5 To date, six contaminants have been assigned provisional C4SL: arsenic; benzene; benzo[a]pyrene; cadmium; chromium VI, and lead, for the standard land uses (residential with, and without plant uptake, allotments, commercial, and public open space (parks and residential)).

13.2.6 The C4SL are also considered suitable to be used under the planning regime, and DEFRA have confirmed this to all local authorities.

S4UL

13.2.7 The LQM / CIEH S4UL represent generic assessment criteria based on minimal or tolerable risk that are intended to be protective of human health. They have been derived in accordance with current UK legislation using a modified version of the CLEA software, and

are still based on many conservative assumptions. They represent values above which further assessment of the risks or remedial actions may be needed.

- 13.2.8 S4UL have been derived for a comprehensive list of metals, non-metals, petroleum hydrocarbons, polycyclic aromatic hydrocarbons, chlorinated hydrocarbons, phenolic compounds, explosives, and pesticides, for the standard land uses (residential with, and without plant uptake, allotments, commercial, and public open space (residential and park)).
- 13.2.9 For details of the exposure parameters and scenarios used to derive the S4UL the reader is reference to the original LQM / CIEH document “The LQM/CIEH S4UL for Human Health Risk Assessment” (2015).
- 13.2.10 Both sets of screening values can be used to undertake a generic risk assessment by comparing the data directly to the screening value which is considered a conservative approach or statistically to the screening value. Alternatively and if a sufficient dataset is available, a statistical assessment can be undertaken following the guidance given in the joint Chartered Institute of Environmental Health (CIEH) and the Contaminated Land: Applications in Real Environment (CL:AIRE) organisation publication “Guidance On Comparing Soil Contamination Data with a Critical Concentration” (CIEH / CL:AIRE May 2008).

13.3 Petroleum Hydrocarbons

- 13.3.1 JNP Group have followed the guidance given in the Environment Agency publication ‘The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils’ (Environment Agency, 2005). LQM S4UL values have been published based on carbon banded hydrocarbons with aliphatic and aromatic split, corresponding to the TPH CWG bands. JNP Group undertook carbon banded analysis using wider bands than used by TPH CWG without aliphatic and aromatic split.
- 13.3.2 JNP Group have compared the results of carbon-banded hydrocarbon analysis with the most sensitive LQM S4UL value within the band under scrutiny. Generally, the most sensitive band comprises the lightest aromatic fraction within the carbon band under scrutiny.
- 13.3.3 The Society of Brownfield Risk Assessment (SoBRA) have produced some Generic Assessment Criteria for assessing chronic risks from the inhalation of vapours arising from groundwater (GAC_{gwwap}) for a short list of 66 organic contaminants (SoBRA February 2017). These are designed to a defensible screening criteria to assist in evaluating this exposure pathway. They represent concentrations below which the chronic risks from vapour migration and inhalation can be considered low / tolerable. GAC_{gwwap} have been developed in line with current UK risk assessment guidance, and CLEA v1.07 software was used for residential and commercial land use scenarios.
- 13.3.4 Further details of the input parameters selected for use to generate the GAC_{gwwap} can be found in the SoBRA report, and have not been reproduced here. However, it should be noted that they have been derived using some conservative assumptions:
- Impacted ground / perched water is beneath the buildings;
 - An infinite source term is present;

- There is no biodegradation;
- Groundwater depth is 0.65m below ground;
- Use of a sand soil type (in line with SR3)

14 SOIL ASSESSMENT RESULTS

14.1 Soil Results and Assessment

14.1.1 The results of chemical testing of five samples of natural soils have been compared with the C4SL and the LQM S4UL for a 'residential with gardens end use'. One sample location (TP15) was positioned in the proposed location of allotments, shown on drawing C85855-D-001. The results from this sample location have been compared with the C4SL and the LQM S4UL for 'allotments end use'.

14.1.2 These comparisons are summarised in Table 14.1 and Table 14.2 that follow.

14.1.3 The following determinants were recorded at concentrations less than the limit of laboratory detection, and hence have not been included in this assessment: cadmium, mercury, selenium, phenol, naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenzo(a,h)anthracene, benzo(g,h,i)perylene, TPH C6-C10, TPH C25-C40, 1,2 dichlorobenzene, 1,3 dichlorobenzene, 1,4 dichlorobenzene, hexachlorobenzene and asbestos.

14.1.4 Two SOM tests were undertaken on samples within the area of proposed property construction. These were both in natural strata. A SOM value of 1% has been used due to being the most conservative and values being 2.90% in TP01 and 1.50% in TP06, this having an average SOM of 2.2%.

Table 14-1: Comparison of Soil Chemical Test Results with Residential with plant uptake Guideline Values

Determinant	Maximum Measured Concentration	LQM/CIEH S4UL: Residential with plant uptake (mg/kg)			Number of tests	Number of exceedances	Location of exceedances
		1%	2.5%	6%			
Arsenic	87	37			4	3	TP01-0.10mbgl TP03-0.30mbgl TP04-0.60mbgl
Beryllium	3.30	1.7			4	1	TP04-0.60mbgl
Boron	1.2	290			4	0	N/A
Chromium (trivalent or total)*	150	910			4	0	N/A
Copper	12	2400			4	0	N/A
Lead	25	200**			4	0	N/A
Nickel	29	180			4	0	N/A
Vanadium	330	410			4	0	N/A
Zinc	79	3700			4	0	N/A
		1%	2.5%	6%			
TPH C ₁₀ -C ₂₅ (TPH aromatic C ₁₀ -C ₁₂ ***)	40	74	180	380	4	0	N/A

*assumed all chromium on site is in trivalent form

** provisional C4SL

***most sensitive fraction within wider TPH band (specified)

14.1.5 One SOM tests was undertaken on a sample within the proposed area of allotments. This sample was taken from natural strata. A SOM value of 1% has been used due to the percentage of SOM in sample TP15 and 0.60m bgl being 1.6%.

Table 14-2: Comparison of Soil Chemical Test Results with Allotment Guideline Values

Determinant	Maximum Measured Concentration	LQM/CIEH S4UL: Allotment (mg/kg)	Number of tests	Number of exceedances	Location of exceedances
Arsenic	89	43	1	1	TP15-0.60mbgl
Beryllium	2.2	35	1	0	N/A
Boron	0.4	45	1	0	N/A
Chromium (trivalent or total)*	87	18000	1	0	N/A
Copper	15	520	1	0	N/A
Lead**	17	80	1	0	N/A
Nickel	30	230	1	0	N/A
Vanadium	190	91	1	1	TP15-0.60mbgl
Zinc	59	620	1	0	N/A

*assumed all chromium on site is in trivalent form

** provisional C4SL

***most sensitive fraction within wider TPH band (specified).

14.2 Interpretation

- 14.2.1 The analyses recorded marginally elevated concentrations of heavy metal (arsenic) with respect to published soil guideline values for the proposed end use of residential premises with gardens and allotments.
- 14.2.2 Elevated concentrations of arsenic were found in TP01 0.10m bgl, TP03 0.30m bgl, TP04 0.30 m bgl and in TP15 0.60 m bgl. Further elevated arsenic concentrations were found in TP15 at 0.60 m bgl in the proposed location of the allotments. The recorded arsenic concentrations are higher than the background concentrations given in Section 3.3. On the basis of that Made Ground was not present across the site and given the sites historical and present use as arable farmland a source of pesticides is a possibility, although it could be the background concentrations are slightly higher than those reported. Bio-accessibility testing could be undertaken to assess the likelihood of the arsenic being in a mobile form that could be ingested by a human receptor.
- 14.2.3 An elevated concentration of beryllium was recorded in one location of TP04 at 0.30 m bgl. Vanadium was recorded to be elevated in the proposed allotment location of TP15 at 0.60 m bgl. There are no background concentrations for comparison, however, these elevations could just reflect the natural concentrations, especially considering that no Made Ground was present at the site.
- 14.2.4 Given the neutral pH of the ground, mobility of these metals is not considered to be an issue at the site. However, in the case of arsenic bioaccessibility testing could be undertaken to assess the likelihood of the arsenic being in a mobile form that could be ingested by a human receptor.
- 14.2.5 On the basis of the proposed site layout shown in BHP Harwood Architects Drawing No. 3361.101. The sample locations TP01, TP03, and TP04 are positioned under proposed buildings. Therefore, contaminant exceedances at these locations have limited impact on the proposed development. Exceedances of Arsenic and Vanadium were found in TP15. This sample location is positioned in the proposed allotment area of the development.

1.2 Risk to Controlled Waters

- 14.2.6 Given the neutral pH of the ground, the mobility of metals is not considered to be an issue at the site.
- 14.2.7 Given the nearest surface water feature is located 796 m to the south-west of the site, surface run off is not considered to pose a risk this receptor.

14.3 Summary

- 14.3.1 On the basis of the chemical testing undertaken, JNP Group consider that a risk to human health is present in the form of elevated arsenic levels in near surface soils in the area of proposed construction and allotments. Bio-accessibility testing is recommended to further clarify the risks to human health.
- 14.3.2 Exceedances of beryllium and vanadium are proposed to be naturally occurring.
- 14.3.3 JNP Group consider that the concentrations of contaminants in the soil do not pose significant risk to controlled waters.

15 GEOTECHNICAL ENGINEERING ASSESSMENT

15.1 Proposed Development / Redevelopment

15.1.1 It is understood that the site will be redeveloped for 25 new two storey residential properties, with access roads, private gardens and an area of allotments. The proposed redevelopment is shown in BHP Harwood Architects Drawing No. 3361.101 dated July 2018.

15.2 Summary of Ground Conditions

15.2.1 The ground conditions encountered during the intrusive investigation were generally consistent with the published geological map and the findings of previous investigation by JNP Group. A variable thickness of brown sandy topsoil overlay both granular and cohesive soils of the Northampton Sand Formation, generally comprising clayey sand to sandy clay, with gravel and occasional cobbles and boulders of sandstone at depth. The Northampton Sand Formation overlay grey clay of the Whitby Mudstone Formation.

15.2.2 The upper surface of the Whitby Mudstone Formation dips gently to the north-west, in accordance with the BGS mapping. In addition, there are two step-offsets in the upper surface of the Whitby Mudstone Formation. These offsets are interpreted as the result of two un-mapped faults striking north-east to south-west, with down-throws to the north-west of approximately 2 m at each fault

15.2.3 A localised groundwater seepage was recorded within TP01 at 2.00 m.

15.3 Shallow Foundations

15.3.1 Traditional shallow strip or pad foundations are considered feasible, placed within the Northampton Sand Formation.

15.3.2 Foundation excavations should be taken through all topsoil, and foundations placed within the Northampton Sand Formation at a minimum founding depth of 0.90 m bgl, based upon soils of medium volume change potential. An allowable bearing pressure of 100 kN/m² would be available at 0.90 m bgl, based upon standard 0.6 m wide foundations. The allowable bearing capacity includes an overall factor of safety of 3 against bearing capacity failure, whilst ensuring total settlements are maintained at less than 25mm.

15.3.3 Where foundations are to be constructed within the influence of existing, felled or proposed trees, they are likely to need deepening, and heave precautions adopted in accordance with National House Building Council (NHBC) Chapter 4.2 'Building Near Trees', based upon soils of medium volume change potential. It is recommended that collapsible materials are used between foundations and cohesive soils to reduce heave pressures. JNP Group recommend that a tree species survey is undertaken, and the results are used to calculate their zones of influence, in order to define areas where foundations would require deepening.

15.3.4 JNP Group did not encounter tree roots during the 2020 investigation. However, due to the presence of trees on the edge of the site, roots are likely to exist on the boundaries of the site. It would be prudent for foundation excavations near existing trees to be visually inspected by an appropriate engineer to verify that tree roots are not present.

15.3.5 Trial pits TP03 and TP05 were unstable during excavation, therefore deeper foundation or infrastructure trenches might undergo collapse or spalling. In addition, groundwater was

encountered in TP01 during the investigation. This was the only location to feature groundwater, Hence JNP Group consider that groundwater inflow or excavation collapse for deeper excavations could present practical difficulties in certain areas of the site. Standard safety practices should be employed to avoid entry of personnel into unshored excavations of deeper than 1.20 m in depth and prevent positioning of heavy plant or materials directly adjacent to the sides of excavations.

- 15.3.6 When the natural moisture content of a soil lies close or less than the value of the plastic limit, the soil can be considered desiccated. In addition, Driscoll (1983) suggested that desiccation is assumed to be present when the moisture content falls below a level of 40% of the liquid limit. The index tests indicate that the two samples of Northampton Sand Formation are possibly marginally desiccated.
- 15.3.7 Groundwater was encountered in TP01 at 2.00m bgl during the fieldwork period. Groundwater control / dewatering measures, such as sump pumping / well pointing should be considered for excavations undertaken in this area of the site if deeper excavations are required.
- 15.3.8 Trial pits, trenches or boreholes carried out as part of this or previous investigations may represent soft spots and conduits/sumps for groundwater or surface water. In excavations, such materials may also be loose and unstable. Unless specifically stated, exploratory hole locations should be regarded as approximate. Consideration should be given to accurate location of such features where it is considered they may impact on the proposed development.
- 15.3.9 Conventional mechanical backhoe excavators should be suitable for excavation through the materials encountered at the site. However, should occasional larger boulders remain beneath the site, larger capacity excavators and pneumatic/hydraulic breakout equipment may be necessary. Additionally, the removal of such larger boulders may have implications for the stability of excavations.

15.4 Pavement Design

California Bearing Ratio

- 15.4.1 It is assumed that the pavement subgrade/formation would be in near surface soils at an approximate depth of 0.6 m below existing ground level. If cuttings were proposed, the formation level would need to be adjusted accordingly, and the specifying geotechnical engineer informed, so that an assessment of the appropriate soil layer can be made.
- 15.4.2 The results of six hand-held Dynamic Cone Penetrometer (DCP) tests recorded CBR values of between 5.1% and 14% at subgrade level, thus the pavement construction can proceed based upon a design CBR value of 5.1%. DCP calculations are presented in Appendix I.

Frost Susceptibility

Cohesive Soils

- 15.4.3 Soils with a Plasticity Index greater than 15 % would not generally be frost-susceptible (i.e. susceptible to ice lens formation in frosty conditions) (Croney and Jacobs, 1967). Cohesive soils were encountered across the site with plasticity indices of between 11 % and 22 %, hence cohesive soils at the site are considered frost-susceptible and should not be used within the upper 450 mm of road construction.

Granular Soils

15.4.4 Where granular soils are present and have fines content of greater than 10 %, they are considered frost-susceptible. The fines contents of both samples analysed exceeded 10 %, hence are considered frost-susceptible and should not be used within the upper 450 mm of road construction.

15.5 Chemical Considerations for Buried Concrete

15.5.1 Chemical analyses of 4 No. samples have been undertaken in accordance with BRE SD1 2005 “Concrete in aggressive ground” to determine their concrete classification.

Table 155.15-1: Concrete Classification Assessment

Strata	Details	Range	Concrete Class
Northampton Sand Formation	Number of Tests	4	DS1 – AC1
	Water Soluble Sulphates (mg/l)	7.6-12	
	pH	7.9-8.3	
	Total Potential Sulphate %	0.023 – 0.04	

15.5.2 On the basis of the above assessment, and in accordance with BRE SD1 (2005) “Concrete in aggressive ground”, a Design Sulphate Class of DS1, with an ACEC of AC-1s, would apply for all buried concrete.

16 SOAKAWAY DRAINAGE

- 16.1.1 Five Soakaway tests were undertaken during the 2018 JNP Group investigation with soakaway pits SA01, SA02 and SA03. A full drain down was only achieved in sample location SA01.
- 16.1.2 Twelve soakaway tests were undertaken during the 2020 JNP Group investigations within trial pits TP03, TP06, TP07 and TP08.
- 16.1.3 The soakaway rates calculated in accordance with the methodology given in BRE 365: 2016, are as follows:
- SA01 Test 1 – 2.2×10^{-3}
 - SA01 Test 2 – 2.0×10^{-3}
 - SA01 Test 3 – 1.3×10^{-3}
 - TP03 Test 1 – 1.6×10^{-3}
 - TP03 Test 2 – 1.4×10^{-3}
 - TP03 Test 3 – 1.2×10^{-3}
 - TP06 Test 1 – 2.4×10^{-3}
 - TP06 Test 2 – 8.5×10^{-3}
 - TP06 Test 3 – 1.1×10^{-2}
 - TP07 Test 1 – 9.4×10^{-5}
 - TP07 Test 2 – 6.7×10^{-5}
 - TP07 Test 3 – 6.8×10^{-5}
 - TP08 Test 1 – 8.6×10^{-5}
 - TP08 Test 2 – 7.4×10^{-5}
 - TP08 Test 3 – 5.2×10^{-5}
- 16.1.4 The soakaway test carried out in the sample locations all drained to 75 % with three drain downs achieved in all locations. Copies of the soakaway calculations are given in Appendix H. Thus, it is considered that an acceptable infiltration rate has been achieved at all locations.
- 16.1.5 Groundwater was encountered in TP01 during the intrusive investigation at a depth of 2.00 m bgl. No groundwater was noted in any of the trial pit soakaway locations. It should be noted that groundwater levels may fluctuate due to seasonal or other effects, such as droughts, tidal, or rainfall events. High groundwater levels can adversely affect the effectiveness of the full-size soakaways. Thus, it is recommended that groundwater level monitoring is undertaken during winter and spring, when levels will be highest.
- 16.1.6 The soakaway tests have been carried out at the anticipated depths of the full-size soakaways. If proposed soakaways are to be constructed at a significantly different depths than the tests, then the above calculated rates are not applicable, and JNP Group

recommend that further soakaway testing is undertaken at the revised depths of the full-size soakaways.

17 CONCLUSIONS AND RECOMMENDATIONS

17.1 Conclusions

17.1.1 JNP Group have determined through desk study research, intrusive investigation, laboratory testing, monitoring, and assessment that:

- A risk to future residential end users is present from arsenic concentrations at the site.
- Basic radon gas protection measures are required;
- The permeability characteristics of the granular Northampton Sand Formation are considered suitable for soakaway infiltration;
- Traditional shallow strip or pad foundations are considered feasible, placed within the Northampton Sand Formation. An allowable bearing pressure of 100 kN/m² would be available at 0.90 m bgl, based upon standard 0.6 m wide foundations;
- The site contains mature trees on its northern boundary, which would require foundations within influencing distance to be deepened, based upon soils of medium volume change potential;
- The pavement subgrade at an approximate depth of 0.6 m below existing ground level has an equilibrium minimum subgrade CBR value of 5 %.

17.2 Recommendations

17.2.1 JNP Group recommend that a tree survey be undertaken at the site, to be able to assess their impact upon foundations types and depths.

17.2.2 JNP Group recommend that the locations where arsenic is present should have further samples taken and receive laboratory testing to assess the bio-accessibility of the arsenic and confirm risks to human health

17.2.3 JNP Group recommend that a copy of this report is submitted to the Regulatory Authorities for their approval before any further work is undertaken at the site.

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APPENDIX A: LIMITATIONS / ASSUMPTIONS AND EXCLUSIONS

1 INTRODUCTION

- 1.1.1 This report is confidential and has been prepared solely for the benefit of the client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from JNP Group; a charge may be levied against such approval. JNP Group accepts no responsibility or liability for the consequences of this document being used for any purpose or project other than for which it was commissioned, and: this document to any third party with whom and agreement has not been executed.
- 1.1.2 Any comments given within this report are based on the understanding that the proposed works to be undertaken will be as described in the introduction and the information referred to and provided by others and will be assumed to be correct and will not have been checked by JNP Group and JNP Group will not accept any liability or responsibility for any inaccuracy in such information.
- 1.1.3 Any deviation from the recommendations or conclusions contained in this report should be referred to JNP Group in writing for comment and JNP Group reserve the right to reconsider their recommendations and conclusions contained within. JNP Group will not accept any liability or responsibility for any changes or deviations from the recommendations noted in this report without prior consultation and our full approval.
- 1.1.4 The details contained within this report reflect the site conditions prevailing at the time of investigation. JNP Group warrants the accuracy of this report up to and including that date. Additional information, improved practice or changes in legislation may necessitate this report having to be reviewed in whole or in part after that date. If necessary, this report should be referred back to JNP Group for re-assessment and, if necessary, re-appraisal.
- 1.1.5 This report is only valid when used in its entirety. Any information or advice included in the report should not be relied upon until considered in the context of the whole report. Whilst this report and the opinion made herein are correct to the best of JNP Groups' belief, JNP Group cannot guarantee the accuracy or completeness of any information provided by third parties.
- 1.1.6 The report represents the finding and opinions of experience geotechnical and geo-environmental engineers. JNP Group does not provide legal advice and the advice of lawyers may also be required.
- 1.1.7 It should be noted that the following were not included as part of the agreed scope of works with the client: detailed ecological surveys and assessment; groundwater monitoring and sampling.
- 1.1.8 JNP Group has provided advice and made recommendations based on the findings of the work undertaken, however this is subject to the approval / acceptance by the relevant Regulatory Authorities.

1.2 Objectives

- 1.2.1 The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with

(where appropriate) a brief walk over inspection of the site. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, JNP Group reserves the right to review such information and, if warranted, to modify the opinions accordingly. It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

1.3 Phase II Intrusive Investigations

- 1.3.1 The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made.
- 1.3.2 Where intrusive investigations have been undertaken they have been designed to provide a reasonable level of assurance on the conditions. Given the discrete nature sampling, no investigation technique is capable of identifying all conditions present in all areas. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised “hotspots” of contamination where concentrations may be significantly higher than those actually encountered. The risk assessment and opinions provided, inter alia, take into consideration currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.
- 1.3.3 The objectives of the investigation have been linked to establishing the risks associated with potential human targets, building materials, the environment (including adjacent land), and to surface and ground water. The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to areas unoccupied by the building(s) on the site and by buried services.
- 1.3.4 Gas and groundwater levels may vary from those reported due to seasonal, or other effects.

1.4 Gas Membranes

- 1.4.1 Where JNP Group are commissioned to undertake the inspection and validation of a gas membrane, we, at the time of inspection, will ensure that the membrane is laid in accordance with the relevant arrangements and sections. At that time we will ensure that the venting media is laid correctly in preparation of the membrane and we will ensure that any tears in the membrane or bad workmanship is reported and instructions given to be rectified. Thereafter it is the duty of the Principal Contractor to ensure that tears and defects are rectified.
- 1.4.2 Remediation and Verification Reports Limitations
- 1.4.3 The risk assessment and opinions provided, inter alia, take into consideration currently available guidance relating to acceptable contamination concentrations; no liability can be

accepted for the retrospective effects of any future changes or amendments to these values.

- 1.4.4 Where intrusive investigations have been undertaken they have been designed to provide a reasonable level of assurance on the conditions. Given the discrete nature sampling, no investigation technique is capable of identifying all conditions present in all areas. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised “hotspots” of contamination where concentrations may be significantly higher than those actually encountered.
- 1.4.5 If costs have been included in relation to the site remediation these must be confirmed by a qualified quantity surveyor. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed from Third Party should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, JNP Group reserves the right to review such information and, if warranted, to modify the opinions accordingly.
- 1.4.6 Whilst this report and the opinion made herein are correct to the best of JNP Groups’ belief, JNP Group cannot guarantee the accuracy or completeness of any information provided by third parties.
- 1.4.7 Gas and groundwater levels may vary from those reported due to seasonal, or other effects.

APPENDIX B: DRAWINGS / FIGURES

3361.SK02 Concept Schematic Proposed Site Plan

C85855-JNP-XX-XX-DR-G-2001 Trial pit location Plan

Geological Cross Sections

Figure 1

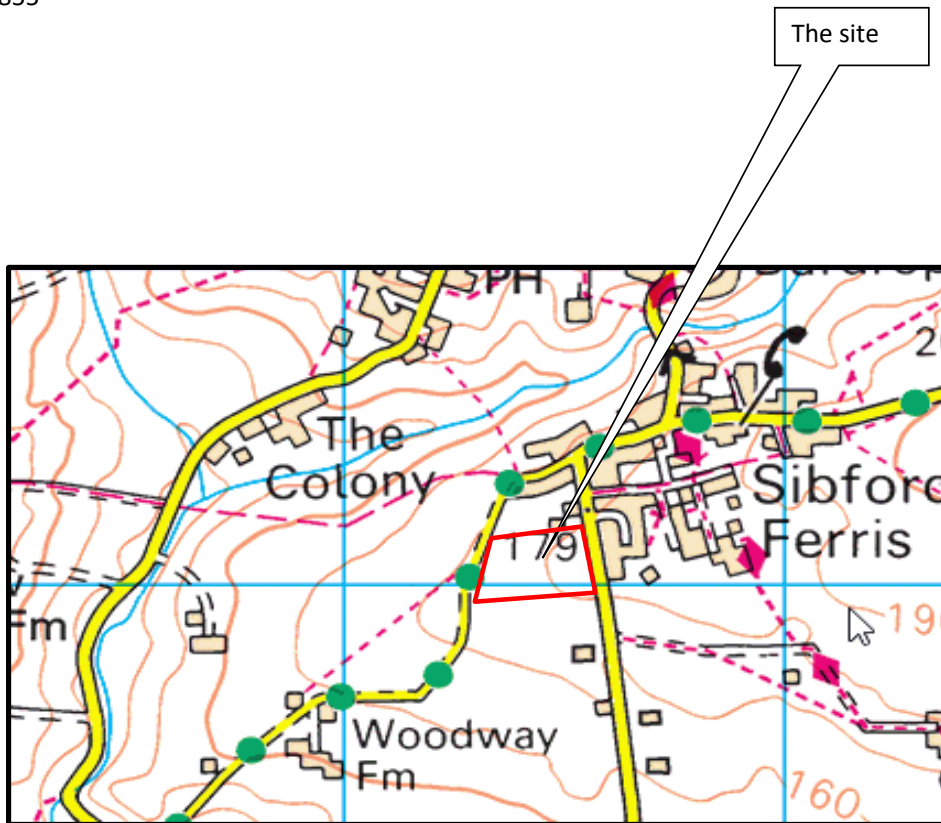
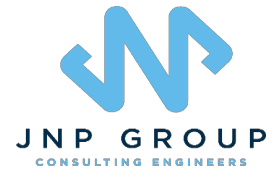
Site Location Plan

Project:

Hook Norton Road, Sibford Ferris

Project No:

C85855



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Figure 2

Geological Plan

Project:

Hook Norton Road, Sibford Ferris

Project No:

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Faults

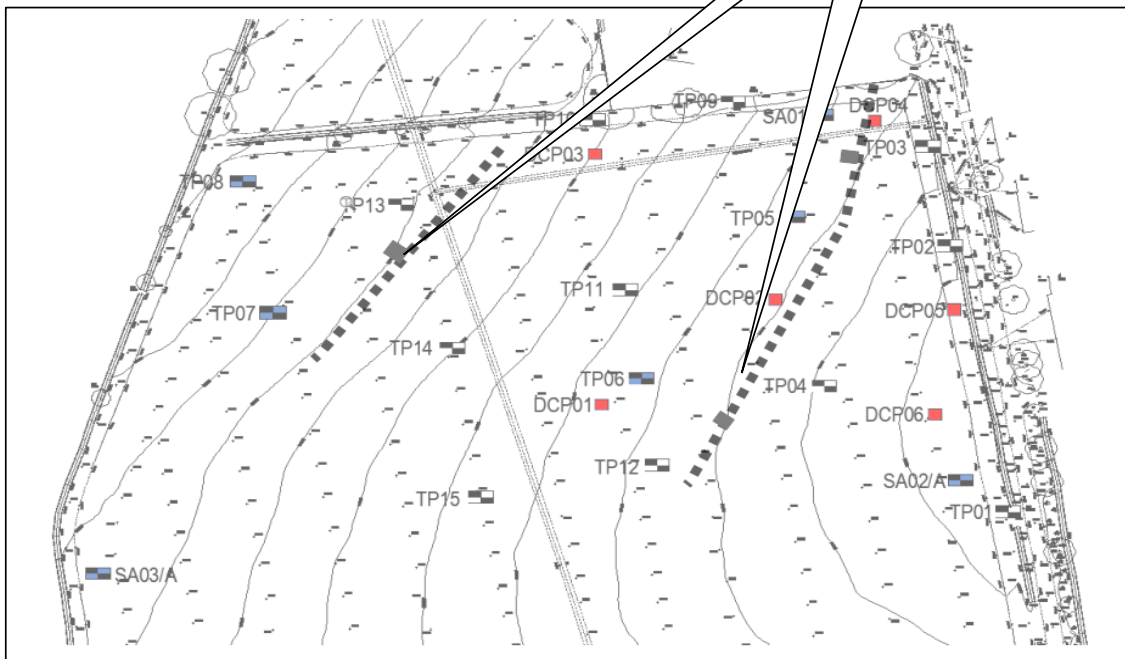


Figure 3

Undrained Shear Strength / Depth Relationship

Project:

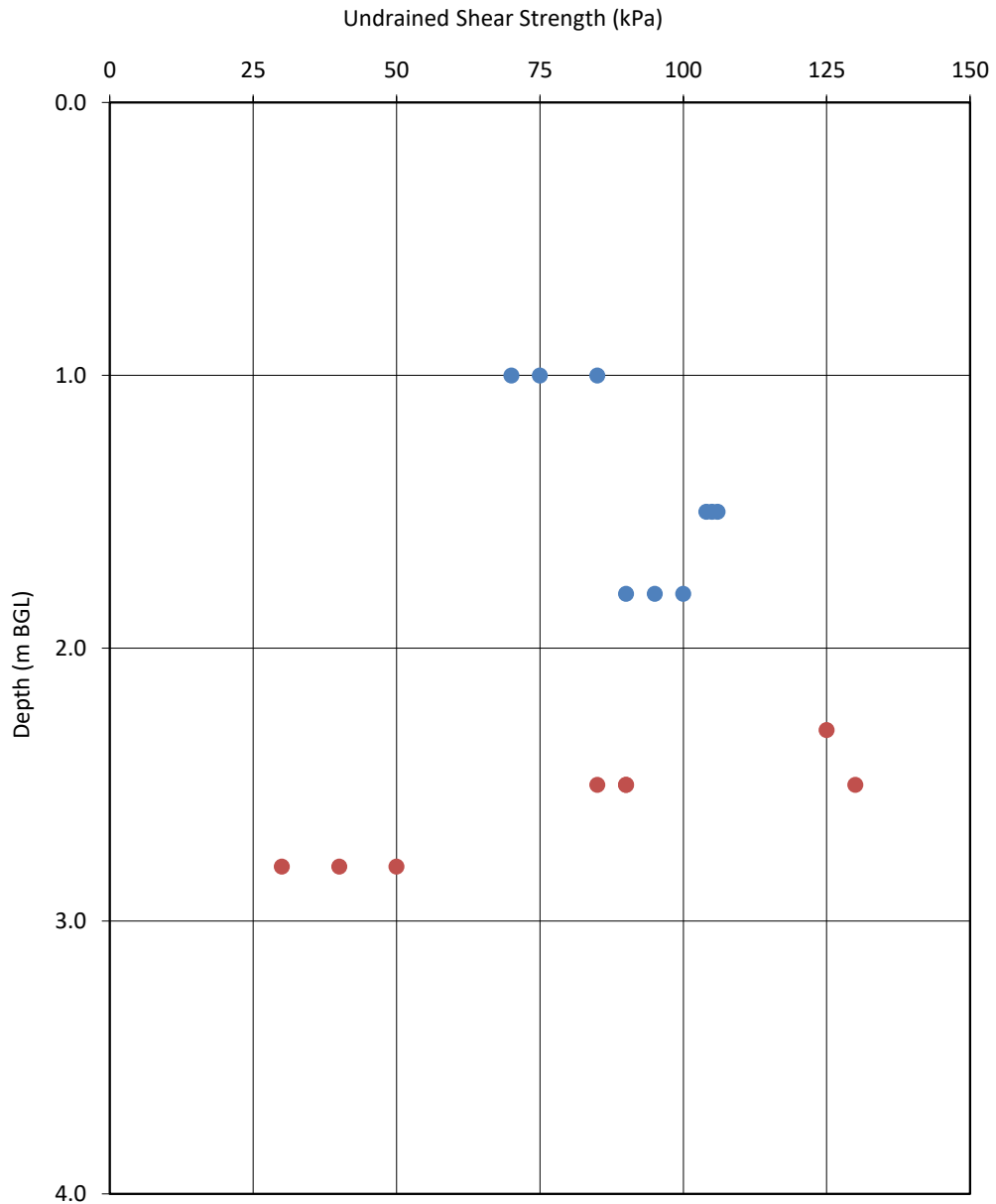
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● Northampton Sands Formation (Hand Shear Vane) ● Whitby Mudstone Formation (Hand Shear Vane)

Figure 4

Plasticity Index Chart

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Key:

C Clay M Silt

- L Low plasticity
- I Intermediate plasticity
- H High plasticity
- V Very high plasticity
- E Extremely high plasticity

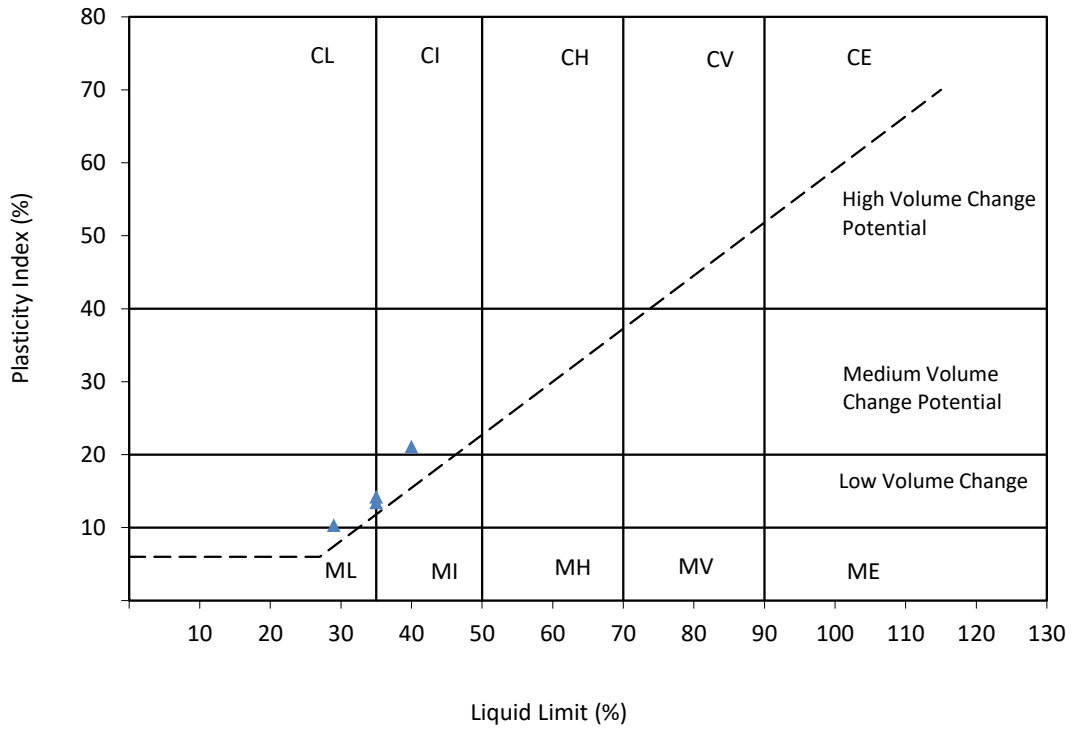


Figure 5

Moisture Content / Depth Relationship

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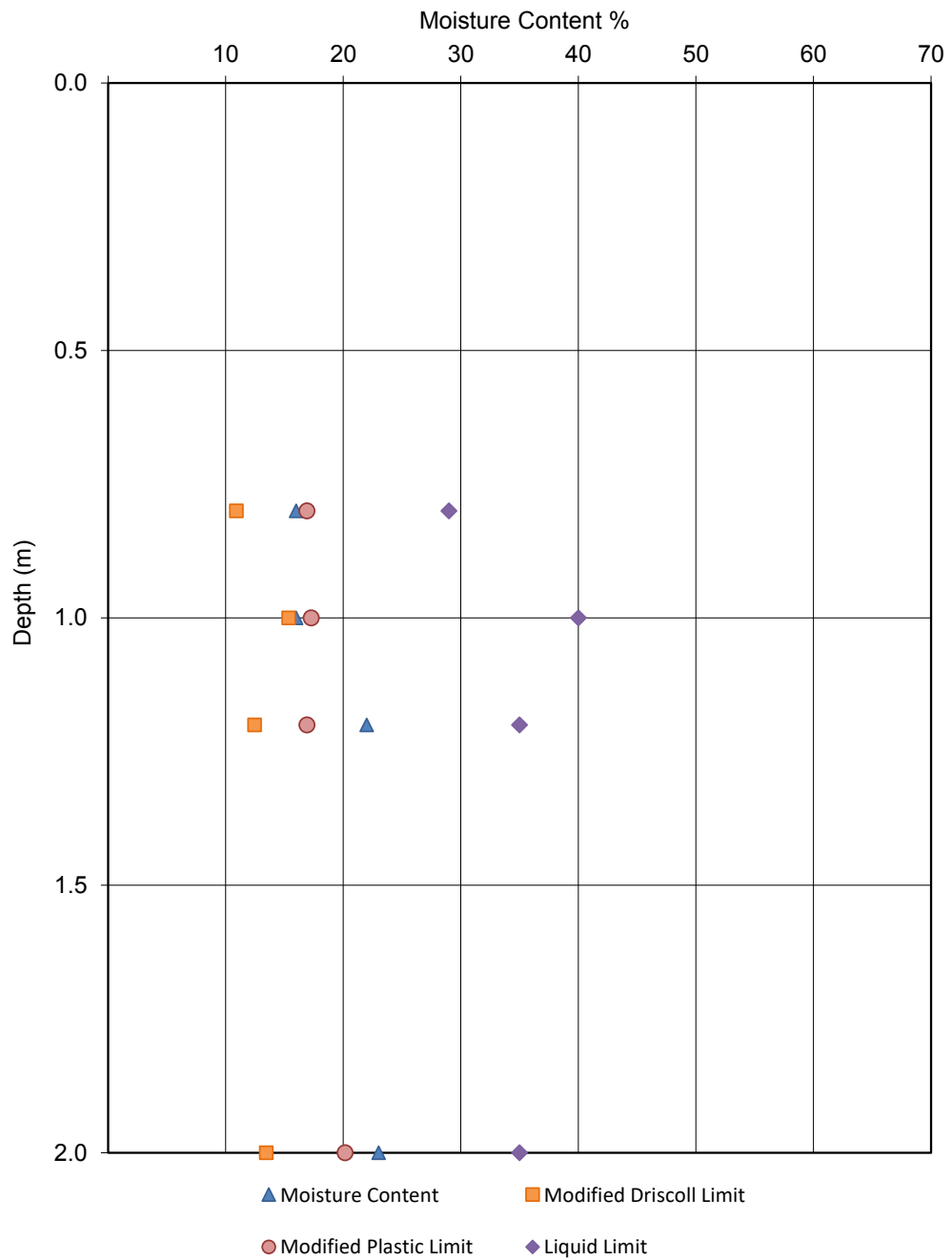
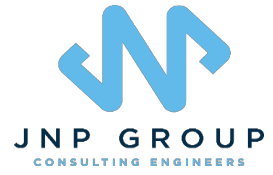


Figure 6

Particle Size Distributions

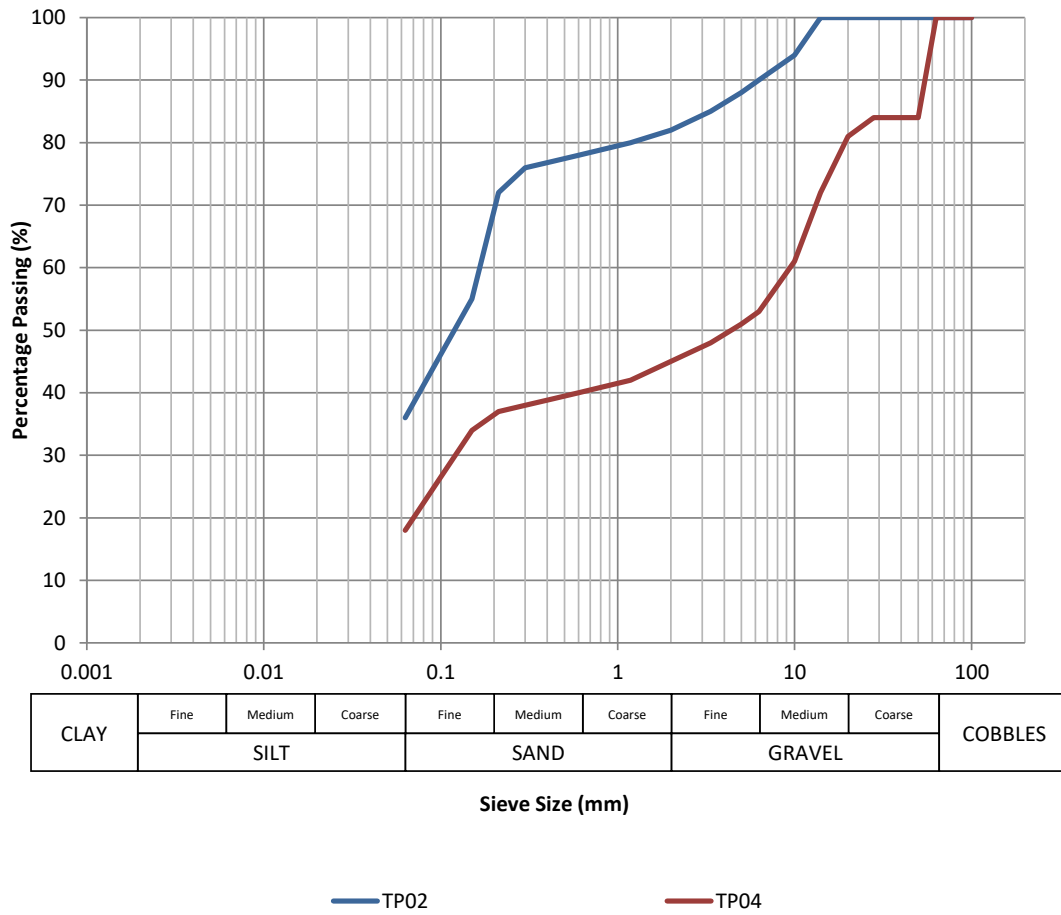
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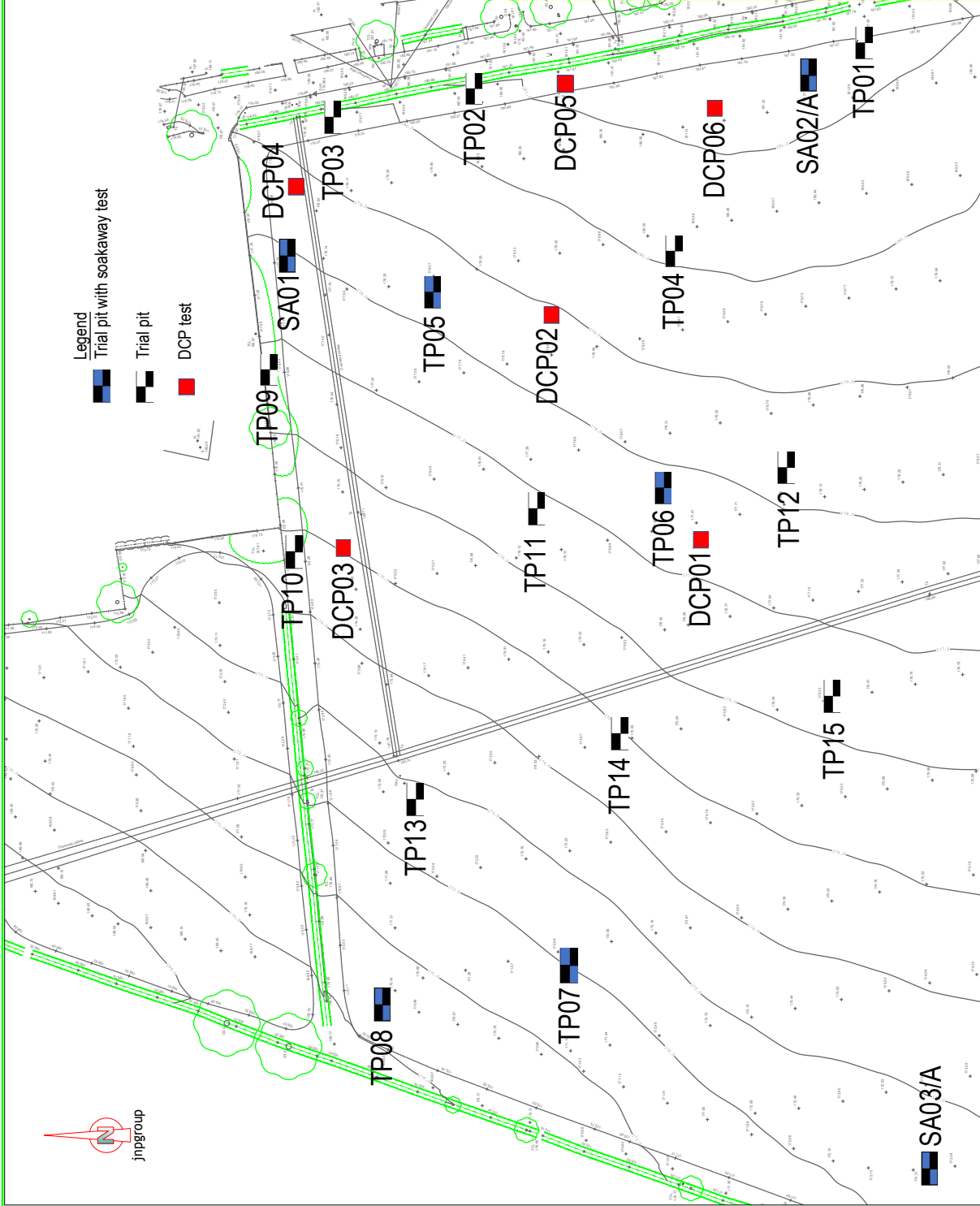
Hook Norton Road, Sibford Ferris



Project No:

C85855





- Legend**
- Trial pit with soakaway test
 - Trial pit
 - DCP test

Health & Safety Note

The details on this drawing have been prepared on the assumption that a competent contractor will be carrying out the works. If the contractor(s) considers that there is insufficient Health and Safety information on this drawing, this should immediately be brought to the attention of the designer.

HAZARD IDENTIFICATION BOX			
Hazard Ref	Hazard Type (Construction/Maintenance/Commissioning/Adaptation)	Hazard Description	Mitigation Measures/ Residual Risk

Rev	DATE	DESCRIPTION	Drawn/Checked/Approved

S2 - Suitable for Information

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john newson & partners
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Client: **Land and Partners Ltd**

Job: **Hook Norton Road, Sibford Ferris**

Title: **Exploratory Hole Location Plan**

Classification: **FL 60_20**

Scale @ A3: **1:1000**

Project- Originator- Volume/System- Level/Location- Type- Discipline- Number

C85855-JNP-XX-XX-DR-G-2001

Revision: **-**

NOTES:
 DIMENSIONS ARE NOT TO SCALE UNLESS INDICATED OTHERWISE
 ALL DIMENSIONS ARE TO FACE UNLESS INDICATED OTHERWISE
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REVISIONS		
Rev.	Date	Description



Client :
SIBFORD FERRIS BANBURY

Job :
LAND AND PARTNERS LTD.

Drawing Title:
Concept Schematic

Scale:
1:1000 @A2

Date:
MAY 2018

Drawn By:
KMF

Checked:
BDN

Drawing No.:
3361.SK02

Revision:
-

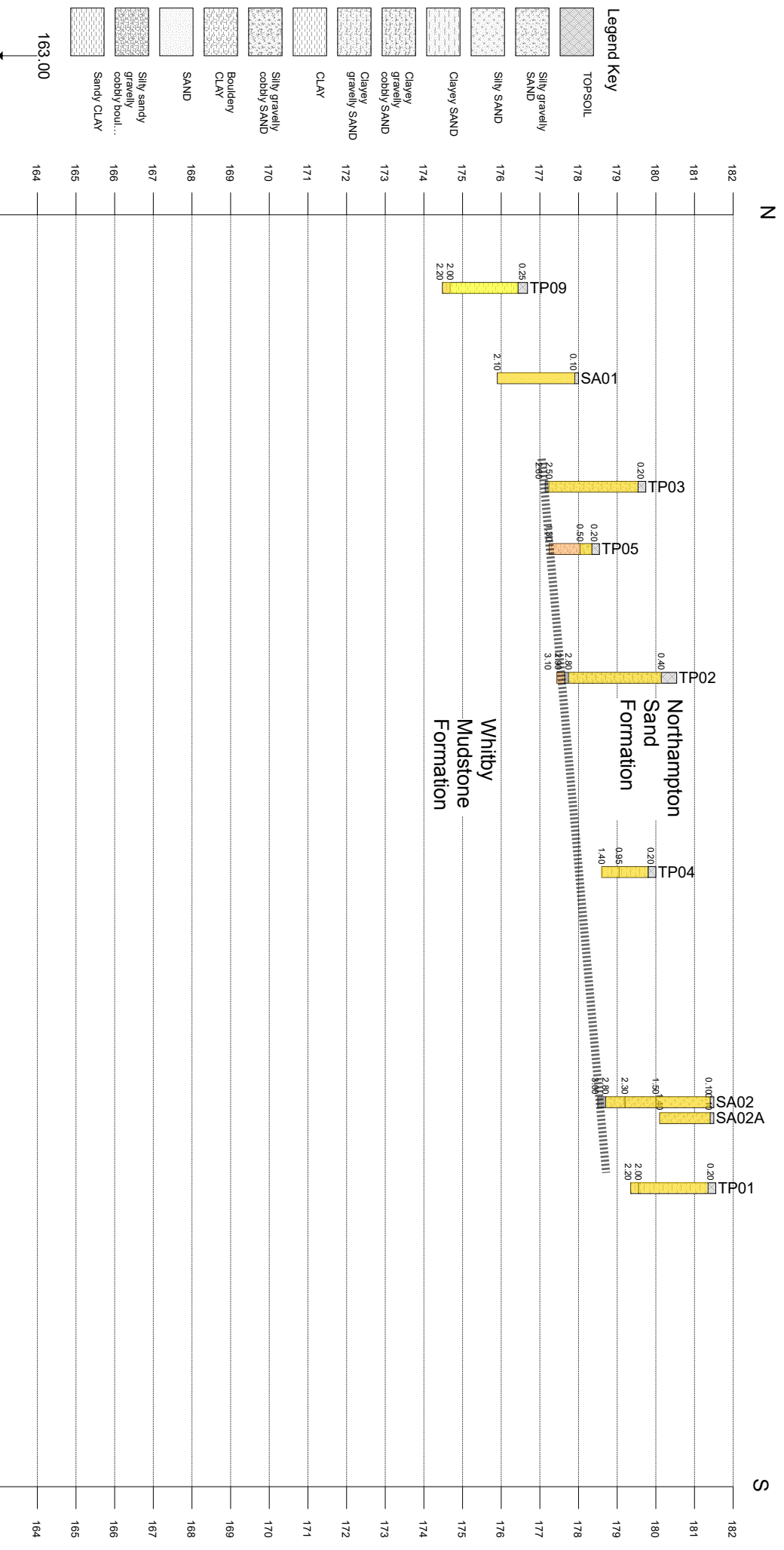
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 Wantage, Oxfordshire, OX12 8NE
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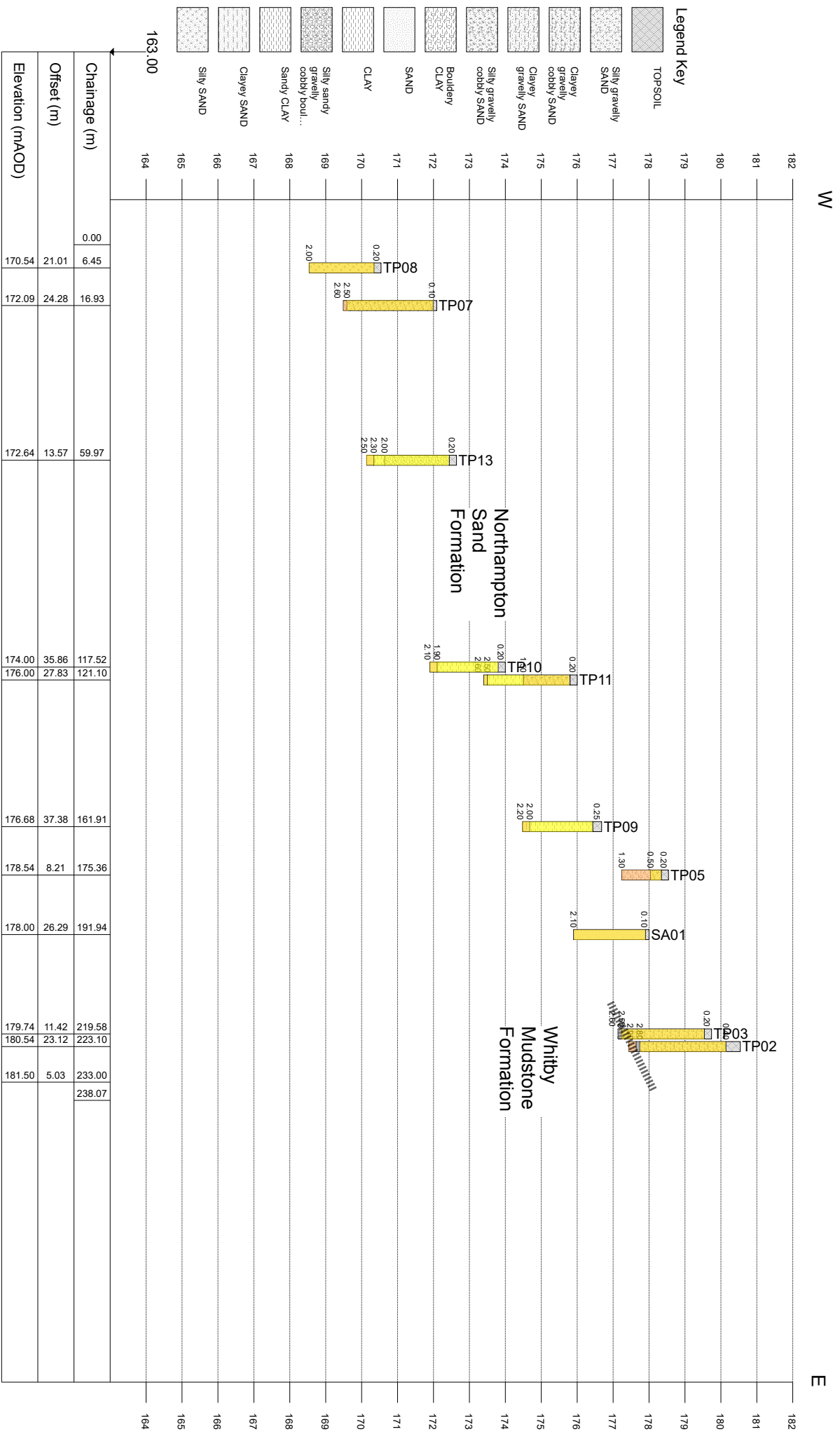
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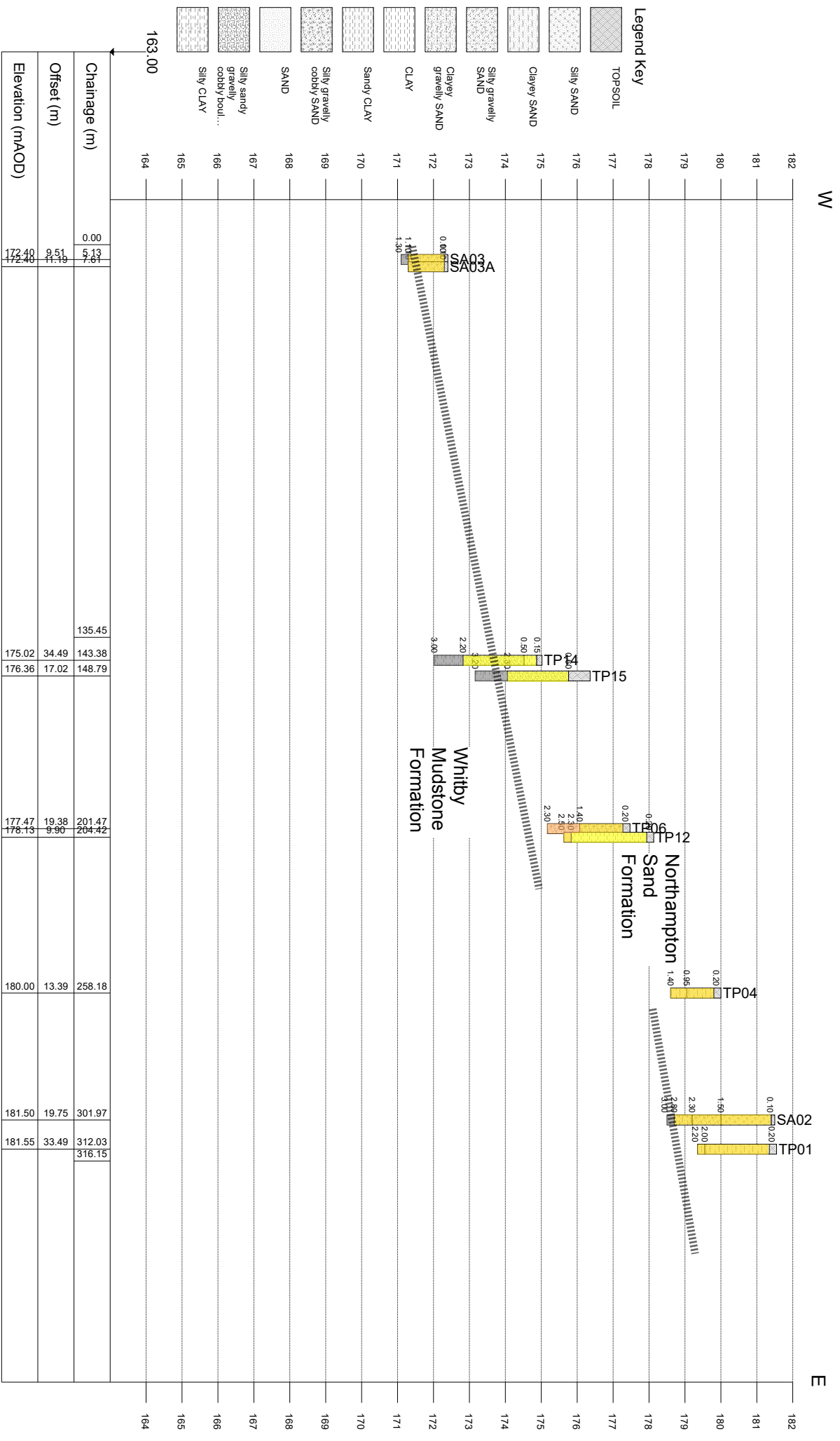
info@bhparchitects.co.uk - www.bhparchitects.co.uk

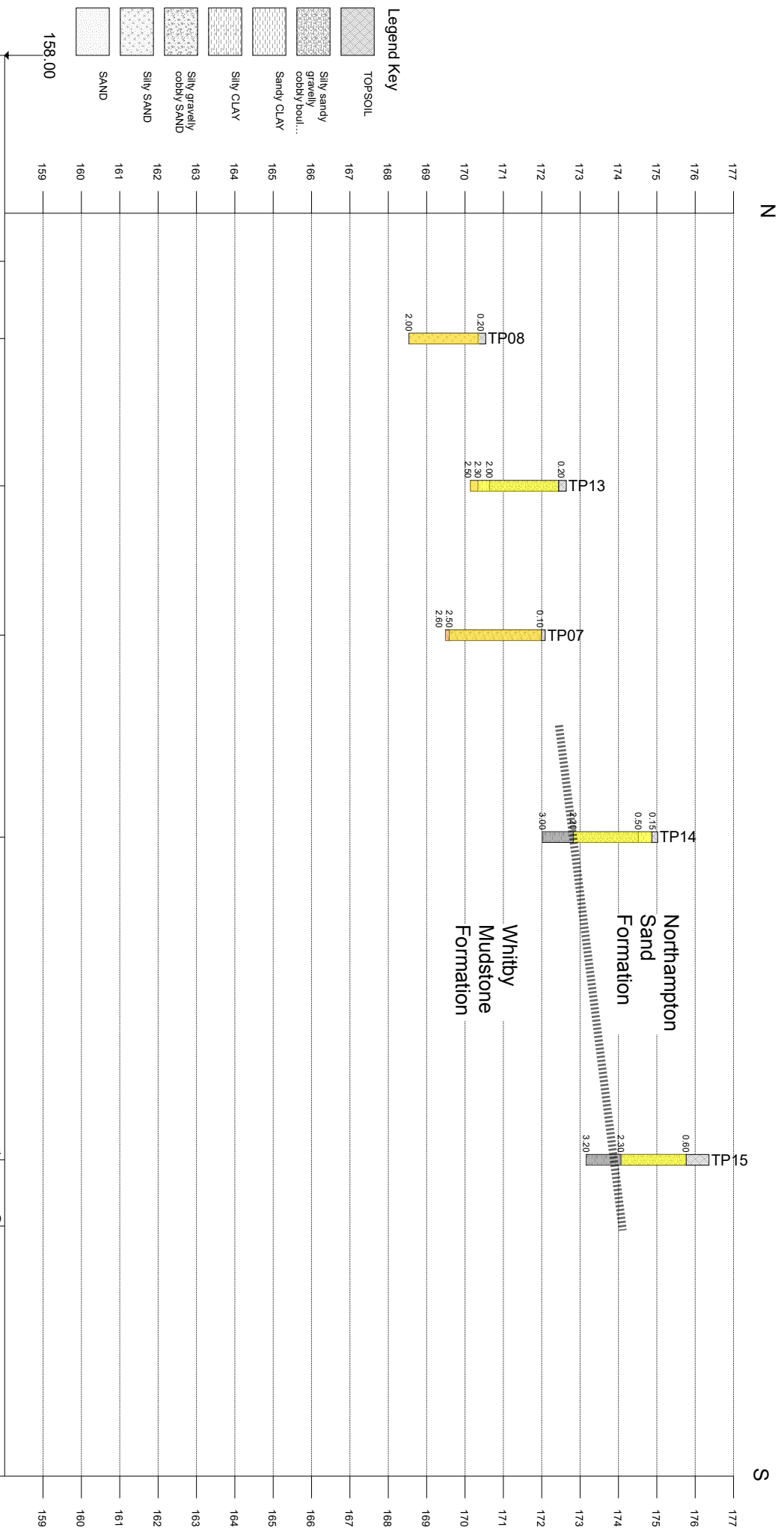




Chainage (m)	Elevation (mAOD)	
	Offset (m)	Elevation (mAOD)
0.00	176.68	176.68
4.48	19.62	178.00
20.83	7.90	179.74
40.47	32.38	178.54
51.76	14.66	180.54
75.07	29.59	180.00
110.24	21.29	181.50
151.91	14.47	181.50
154.79	13.63	181.55
167.47	21.39	181.55
172.49		







Chainage (m)	Offset (m)	Elevation (mAOD)
0.00		
12.07	25.90	170.54
35.08	22.99	172.64
58.43	29.36	172.09
89.99	11.54	175.02
140.44	0.18	176.36
150.79		

APPENDIX C: GROUNDSURE REPORT

435415 , 237090,

Order Details

Date: 07/09/2020
Your ref: G747
Our Ref: GS-7029613
Client: JNP Group

Site Details

Location: 435438 237024
Area: 3.87 ha
Authority: [Cherwell District Council](#)



Summary of findings

p. 2

Aerial image

p. 8

OS MasterMap site plan

p.13

groundsure.com/insightuserguide

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
14	1.1	<u>Historical industrial land uses</u>	0	1	1	9	-
15	1.2	<u>Historical tanks</u>	0	0	0	2	-
15	1.3	<u>Historical energy features</u>	0	1	0	2	-
16	1.4	Historical petrol stations	0	0	0	0	-
16	1.5	Historical garages	0	0	0	0	-
16	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
17	2.1	<u>Historical industrial land uses</u>	0	1	1	10	-
18	2.2	<u>Historical tanks</u>	0	0	0	2	-
18	2.3	<u>Historical energy features</u>	0	3	0	3	-
19	2.4	Historical petrol stations	0	0	0	0	-
19	2.5	Historical garages	0	0	0	0	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
20	3.1	Active or recent landfill	0	0	0	0	-
20	3.2	Historical landfill (BGS records)	0	0	0	0	-
21	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
21	3.4	Historical landfill (EA/NRW records)	0	0	0	0	-
21	3.5	Historical waste sites	0	0	0	0	-
21	3.6	Licensed waste sites	0	0	0	0	-
21	3.7	<u>Waste exemptions</u>	0	0	0	31	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
25	4.1	<u>Recent industrial land uses</u>	0	1	1	-	-
26	4.2	Current or recent petrol stations	0	0	0	0	-
26	4.3	Electricity cables	0	0	0	0	-
26	4.4	Gas pipelines	0	0	0	0	-
26	4.5	Sites determined as Contaminated Land	0	0	0	0	-



26	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
27	4.7	Regulated explosive sites	0	0	0	0	-
27	4.8	Hazardous substance storage/usage	0	0	0	0	-
27	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
27	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
27	4.11	Licensed pollutant release (Part A(2)/B)	0	0	0	0	-
28	4.12	Radioactive Substance Authorisations	0	0	0	0	-
28	4.13	<u>Licensed Discharges to controlled waters</u>	0	0	0	5	-
29	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
29	4.15	Pollutant release to public sewer	0	0	0	0	-
29	4.16	List 1 Dangerous Substances	0	0	0	0	-
29	4.17	List 2 Dangerous Substances	0	0	0	0	-
29	4.18	Pollution Incidents (EA/NRW)	0	0	0	0	-
30	4.19	Pollution inventory substances	0	0	0	0	-
30	4.20	Pollution inventory waste transfers	0	0	0	0	-
30	4.21	Pollution inventory radioactive waste	0	0	0	0	-

Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
31	5.1	<u>Superficial aquifer</u>	Identified (within 500m)				
32	5.2	<u>Bedrock aquifer</u>	Identified (within 500m)				
34	5.3	<u>Groundwater vulnerability</u>	Identified (within 50m)				
35	5.4	<u>Groundwater vulnerability- soluble rock risk</u>	Identified (within 0m)				
35	5.5	Groundwater vulnerability- local information	None (within 0m)				
36	5.6	<u>Groundwater abstractions</u>	0	0	0	0	7
38	5.7	Surface water abstractions	0	0	0	0	0
38	5.8	<u>Potable abstractions</u>	0	0	0	0	1
39	5.9	Source Protection Zones	0	0	0	0	-
39	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
40	6.1	Water Network (OS MasterMap)	0	0	0	-	-



40	6.2	Surface water features	0	0	0	-	-
41	6.3	<u>WFD Surface water body catchments</u>	1	-	-	-	-
41	6.4	<u>WFD Surface water bodies</u>	0	0	0	-	-
42	6.5	<u>WFD Groundwater bodies</u>	1	-	-	-	-
Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
43	7.1	Risk of Flooding from Rivers and Sea (RoFRaS)	None (within 50m)				
43	7.2	Historical Flood Events	0	0	0	-	-
43	7.3	Flood Defences	0	0	0	-	-
43	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
44	7.5	Flood Storage Areas	0	0	0	-	-
45	7.6	Flood Zone 2	None (within 50m)				
45	7.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding					
46	8.1	Surface water flooding	Negligible (within 50m)				
Page	Section	Groundwater flooding					
47	9.1	<u>Groundwater flooding</u>	Negligible (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
48	10.1	<u>Sites of Special Scientific Interest (SSSI)</u>	0	0	0	0	1
49	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
49	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
49	10.4	Special Protection Areas (SPA)	0	0	0	0	0
49	10.5	National Nature Reserves (NNR)	0	0	0	0	0
50	10.6	Local Nature Reserves (LNR)	0	0	0	0	0
50	10.7	Designated Ancient Woodland	0	0	0	0	0
50	10.8	Biosphere Reserves	0	0	0	0	0
50	10.9	Forest Parks	0	0	0	0	0
51	10.10	Marine Conservation Zones	0	0	0	0	0
51	10.11	Green Belt	0	0	0	0	0
51	10.12	Proposed Ramsar sites	0	0	0	0	0

51	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
51	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
52	10.15	Nitrate Sensitive Areas	0	0	0	0	0
52	<u>10.16</u>	<u>Nitrate Vulnerable Zones</u>	1	0	0	0	5
53	<u>10.17</u>	<u>SSSI Impact Risk Zones</u>	1	-	-	-	-
54	<u>10.18</u>	<u>SSSI Units</u>	0	0	0	0	1
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
55	11.1	World Heritage Sites	0	0	0	-	-
56	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
56	11.3	National Parks	0	0	0	-	-
56	<u>11.4</u>	<u>Listed Buildings</u>	0	0	4	-	-
57	<u>11.5</u>	<u>Conservation Areas</u>	0	0	1	-	-
57	11.6	Scheduled Ancient Monuments	0	0	0	-	-
57	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
58	<u>12.1</u>	<u>Agricultural Land Classification</u>	Grade 3 (within 250m)				
59	12.2	Open Access Land	0	0	0	-	-
59	12.3	Tree Felling Licences	0	0	0	-	-
60	<u>12.4</u>	<u>Environmental Stewardship Schemes</u>	0	0	1	-	-
60	<u>12.5</u>	<u>Countryside Stewardship Schemes</u>	0	0	2	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
61	13.1	Priority Habitat Inventory	0	0	0	-	-
61	13.2	Habitat Networks	0	0	0	-	-
61	13.3	Open Mosaic Habitat	0	0	0	-	-
61	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
62	<u>14.1</u>	<u>10k Availability</u>	Identified (within 500m)				
63	14.2	Artificial and made ground (10k)	0	0	0	0	-
64	<u>14.3</u>	<u>Superficial geology (10k)</u>	0	0	1	1	-

65	14.4	Landslip (10k)	0	0	0	0	-
66	14.5	<u>Bedrock geology (10k)</u>	1	0	4	5	-
67	14.6	<u>Bedrock faults and other linear features (10k)</u>	0	0	2	4	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
68	15.1	<u>50k Availability</u>	Identified (within 500m)				
69	15.2	Artificial and made ground (50k)	0	0	0	0	-
69	15.3	Artificial ground permeability (50k)	0	0	-	-	-
70	15.4	<u>Superficial geology (50k)</u>	0	0	1	0	-
71	15.5	Superficial permeability (50k)	None (within 50m)				
71	15.6	Landslip (50k)	0	0	0	0	-
71	15.7	Landslip permeability (50k)	None (within 50m)				
72	15.8	<u>Bedrock geology (50k)</u>	1	0	2	5	-
73	15.9	<u>Bedrock permeability (50k)</u>	Identified (within 50m)				
73	15.10	<u>Bedrock faults and other linear features (50k)</u>	0	0	2	2	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
75	16.1	BGS Boreholes	0	0	0	-	-
Page	Section	Natural ground subsidence					
76	17.1	<u>Shrink swell clays</u>	Negligible (within 50m)				
77	17.2	<u>Running sands</u>	Negligible (within 50m)				
78	17.3	<u>Compressible deposits</u>	Negligible (within 50m)				
79	17.4	<u>Collapsible deposits</u>	Very low (within 50m)				
80	17.5	<u>Landslides</u>	Very low (within 50m)				
81	17.6	<u>Ground dissolution of soluble rocks</u>	Negligible (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
82	18.1	Natural cavities	0	0	0	0	-
82	18.2	BritPits	0	0	0	0	-
82	18.3	Surface ground workings	0	0	0	-	-
82	18.4	Underground workings	0	0	0	0	0
83	18.5	Historical Mineral Planning Areas	0	0	0	0	-

83	18.6	Non-coal mining	0	0	0	0	0
83	18.7	Mining cavities	0	0	0	0	0
83	18.8	JPB mining areas	None (within 0m)				
83	18.9	Coal mining	None (within 0m)				
84	18.10	Brine areas	None (within 0m)				
84	18.11	Gypsum areas	None (within 0m)				
84	18.12	Tin mining	None (within 0m)				
84	18.13	Clay mining	None (within 0m)				

Page	Section	Radon					
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85	19.1	Radon	Between 5% and 10% (within 0m)				
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Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
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86	20.1	<u>BGS Estimated Background Soil Chemistry</u>	6	0	-	-	-
86	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
87	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-

Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
------	---------	-------------------------------------	---------	-------	---------	----------	-----------

88	21.1	Underground railways (London)	0	0	0	-	-
88	21.2	Underground railways (Non-London)	0	0	0	-	-
88	21.3	Railway tunnels	0	0	0	-	-
88	21.4	Historical railway and tunnel features	0	0	0	-	-
88	21.5	Royal Mail tunnels	0	0	0	-	-
89	21.6	Historical railways	0	0	0	-	-
89	21.7	Railways	0	0	0	-	-
89	21.8	Crossrail 1	0	0	0	0	-
89	21.9	Crossrail 2	0	0	0	0	-
89	21.10	HS2	0	0	0	0	-

Recent aerial photograph



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Capture Date: 24/08/2019

Site Area: 3.87ha



Recent site history - 2016 aerial photograph



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Capture Date: 05/05/2016

Site Area: 3.87ha



Contact us with any questions at:
info@groundsure.com
08444 159 000

Date: 7 September 2020

Recent site history - 2013 aerial photograph



Capture Date: 09/07/2013

Site Area: 3.87ha



Recent site history - 2006 aerial photograph



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Capture Date: 17/06/2006

Site Area: 3.87ha



Recent site history - 1999 aerial photograph



Aerial photography supplied by Getmapping PLC. © Copyright Getmapping PLC 2020. All Rights Reserved

Capture Date: 02/09/1999

Site Area: 3.87ha



OS MasterMap site plan

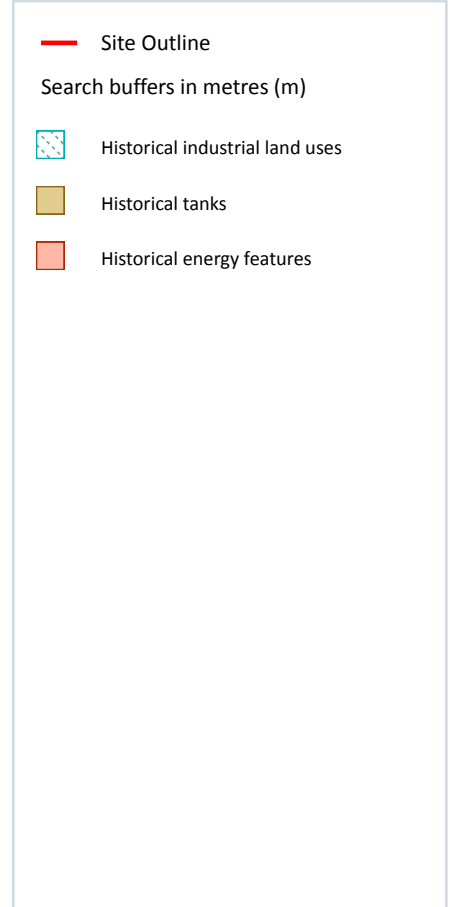
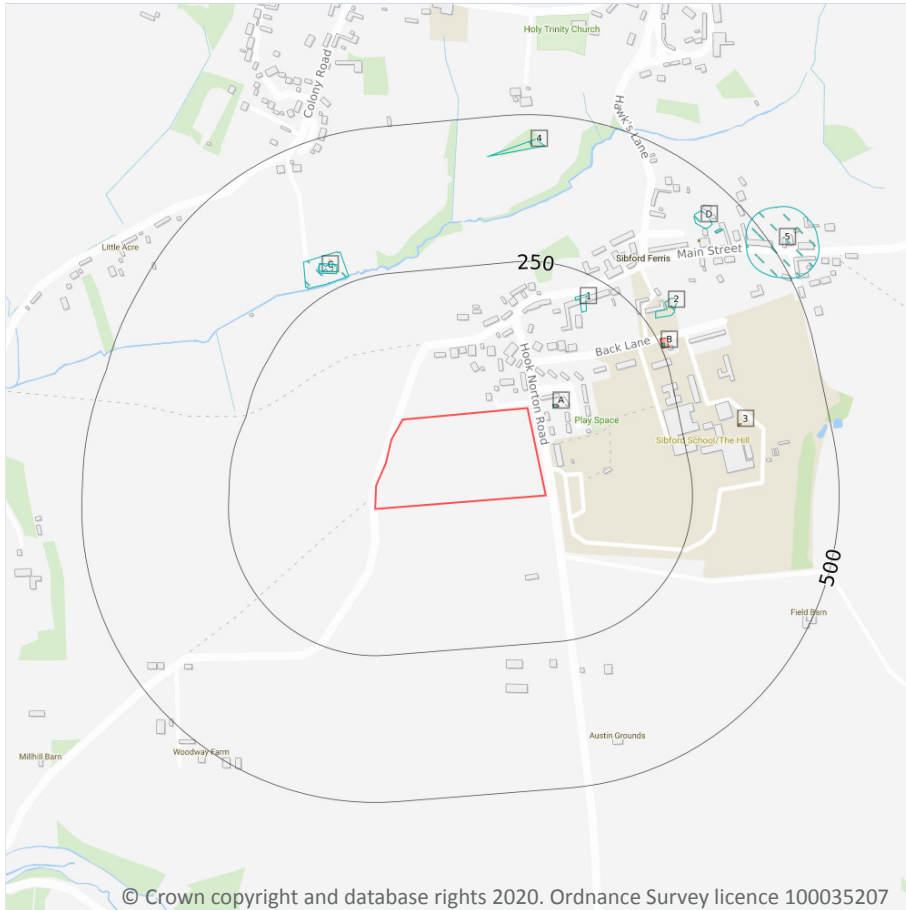


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Site Area: 3.87ha



1 Past land use



1.1 Historical industrial land uses

Records within 500m **11**

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

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
A	44m E	Electricity Substation	1973	1775400

ID	Location	Land use	Dates present	Group ID
1	188m NE	Old Bakehouse	1973	1761084
B	253m NE	Electricity Substation	1973	1775397
C	261m N	Sewage Works	1973 - 1976	1849950
2	267m NE	Unspecified Quarry	1881	1762651
C	273m NW	Unspecified Tanks	1976	1761181
C	281m NW	Filter Bed	1973	1753228
D	426m NE	Unspecified Quarry	1920	1762652
4	433m N	Unspecified Ground Workings	1881	1755339
D	439m NE	Old Malthouse	1973	1760723
5	455m NE	Smithy	1900	1784735

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m

2

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

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
3	346m E	Unspecified Tank	1991	284653
D	407m NE	Unspecified Tank	1881	284651

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m

3

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or



succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
A	44m E	Electricity Substation	1973 - 1991	174125
B	252m NE	Electricity Substation	1987 - 1991	179880
B	253m NE	Electricity Substation	1973	183612

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m

0

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

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m

0

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

This data is sourced from Ordnance Survey / Groundsure.

1.6 Historical military land

Records within 500m

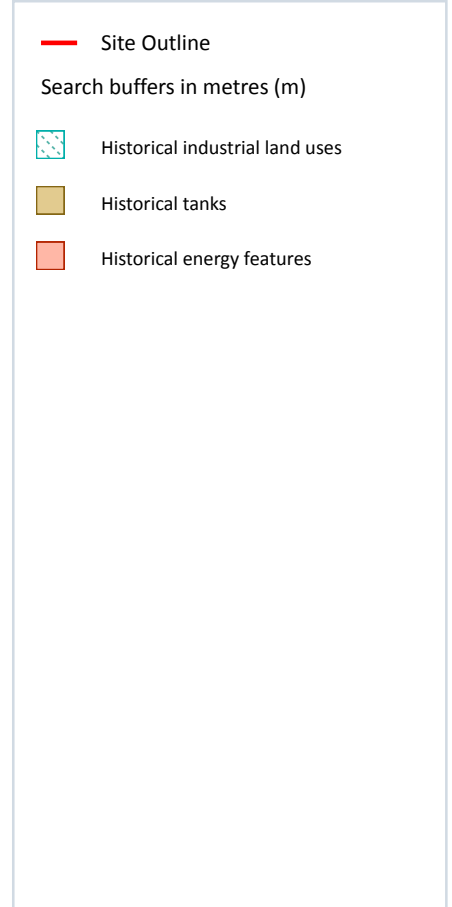
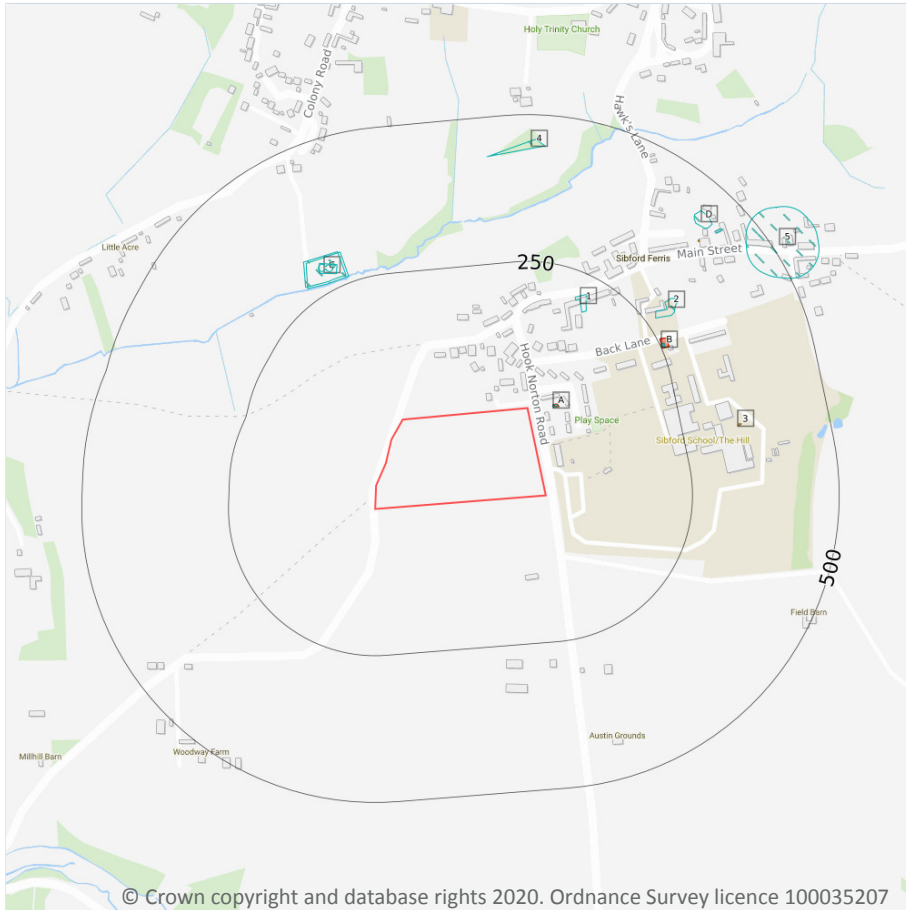
0

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

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



2 Past land use - un-grouped



2.1 Historical industrial land uses

Records within 500m **12**

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

Features are displayed on the Past land use - un-grouped map on **page 17**

ID	Location	Land Use	Date	Group ID
A	44m E	Electricity Substation	1973	1775400
1	188m NE	Old Bakehouse	1973	1761084
B	253m NE	Electricity Substation	1973	1775397

ID	Location	Land Use	Date	Group ID
C	261m N	Sewage Works	1976	1849950
C	265m N	Sewage Works	1973	1849950
2	267m NE	Unspecified Quarry	1881	1762651
C	273m NW	Unspecified Tanks	1976	1761181
C	281m NW	Filter Bed	1973	1753228
D	426m NE	Unspecified Quarry	1920	1762652
4	433m N	Unspecified Ground Workings	1881	1755339
D	439m NE	Old Malthouse	1973	1760723
5	455m NE	Smithy	1900	1784735

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m

2

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

Features are displayed on the Past land use - un-grouped map on **page 17**

ID	Location	Land Use	Date	Group ID
3	346m E	Unspecified Tank	1991	284653
D	407m NE	Unspecified Tank	1881	284651

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m

6

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

Features are displayed on the Past land use - un-grouped map on **page 17**



ID	Location	Land Use	Date	Group ID
A	44m E	Electricity Substation	1973	174125
A	46m E	Electricity Substation	1987	174125
A	46m E	Electricity Substation	1991	174125
B	252m NE	Electricity Substation	1987	179880
B	252m NE	Electricity Substation	1991	179880
B	253m NE	Electricity Substation	1973	183612

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m **0**

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

This data is sourced from Ordnance Survey / Groundsure.

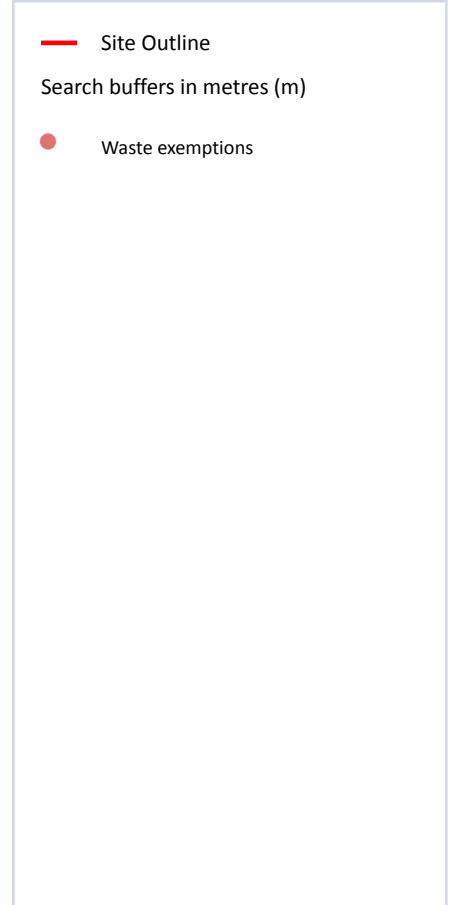
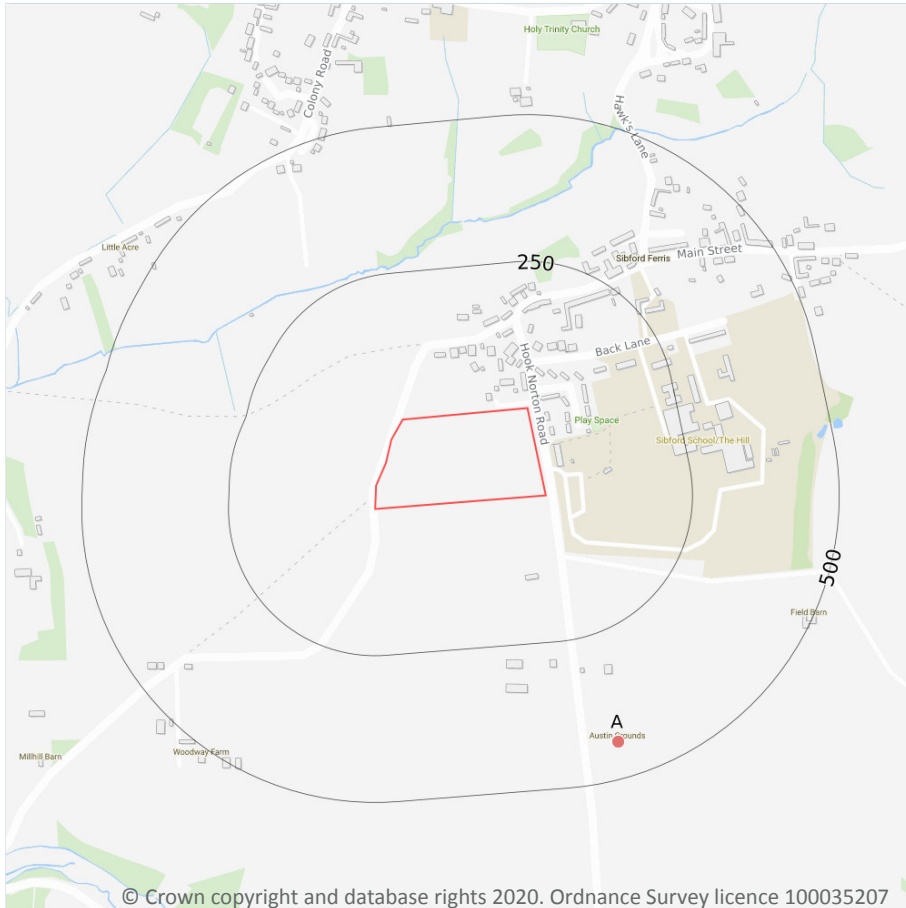
2.5 Historical garages

Records within 500m **0**

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

This data is sourced from Ordnance Survey / Groundsure.

3 Waste and landfill



3.1 Active or recent landfill

Records within 500m	0
---------------------	---

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

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

3.2 Historical landfill (BGS records)

Records within 500m	0
---------------------	---

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

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m	0
----------------------------	----------

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

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

3.4 Historical landfill (EA/NRW records)

Records within 500m	0
----------------------------	----------

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

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

3.5 Historical waste sites

Records within 500m	0
----------------------------	----------

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

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

3.6 Licensed waste sites

Records within 500m	0
----------------------------	----------

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

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

3.7 Waste exemptions

Records within 500m	31
----------------------------	-----------

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

Features are displayed on the Waste and landfill map on **page 20**

ID	Location	Site	Reference	Category	Sub-Category	Description
A	437m S	Austins Ground Farm Hook Norton Road BANBURY Oxfordshire OX15 5QR	EPR/PH0678XF /A001	Disposing of waste exemption	Agricultural Waste Only	Burning waste in the open
A	437m S	Austins Ground Farm Hook Norton Road BANBURY Oxfordshire OX15 5QR	EPR/PH0678XF /A001	Treating waste exemption	Agricultural Waste Only	Treatment of waste wood and waste plant matter by chipping, shredding, cutting or pulverising
A	437m S	Austins Ground Farm Hook Norton Road BANBURY Oxfordshire OX15 5QR	EPR/PH0678XF /A001	Using waste exemption	Agricultural Waste Only	Use of waste in construction
A	437m S	Austins Ground Farm Hook Norton Road BANBURY Oxfordshire OX15 5QR	EPR/PH0678XF /A001	Using waste exemption	Agricultural Waste Only	Spreading waste on agricultural land to confer benefit
A	437m S	Austins Ground Farm Hook Norton Road BANBURY Oxfordshire OX15 5QR	EPR/PH0678XF /A001	Using waste exemption	Agricultural Waste Only	Use of mulch
A	437m S	Austins Ground Farm Hook Norton Road BANBURY Oxfordshire OX15 5QR	EPR/PH0678XF /A001	Using waste exemption	Agricultural Waste Only	Spreading of plant matter to confer benefit
A	437m S	Austins Ground Farm Hook Norton Road BANBURY Oxfordshire OX15 5QR	EPR/PH0678XF /A001	Using waste exemption	Agricultural Waste Only	Incorporation of ash into soil
A	437m S	Austins Ground Farm Hook Norton Road BANBURY Oxfordshire OX15 5QR	EPR/PH0678XF /A001	Using waste exemption	Agricultural Waste Only	Burning of waste as a fuel in a small appliance
A	437m S	Austins Ground Farm Hook Norton Road BANBURY Oxfordshire OX15 5QR	EPR/PH0678XF /A001	Using waste exemption	Agricultural Waste Only	Use of waste for a specified purpose
A	437m S	Austins Ground Farm Hook Norton Road BANBURY Oxfordshire OX15 5QR	EPR/PH0678XF /A001	Using waste exemption	Agricultural Waste Only	Use of waste to manufacture finished goods
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX174268	Using waste exemption	On a farm	Use of waste in construction
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX174268	Using waste exemption	On a farm	Use of mulch



ID	Location	Site	Reference	Category	Sub-Category	Description
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX174268	Using waste exemption	On a farm	Incorporation of ash into soil
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX174268	Using waste exemption	On a farm	Burning of waste as a fuel in a small appliance
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX174268	Using waste exemption	On a farm	Use of waste for a specified purpose
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX174268	Using waste exemption	On a farm	Spreading waste on agricultural land to confer benefit
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX174268	Using waste exemption	On a farm	Use of effluent to clean a highway gravel bed
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX174268	Treating waste exemption	On a farm	Treatment of waste wood and waste plant matter by chipping, shredding, cutting or pulverising
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX174268	Disposing of waste exemption	On a farm	Burning waste in the open
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX174268	Using waste exemption	On a farm	Use of waste to manufacture finished goods
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX174268	Using waste exemption	On a farm	Spreading of plant matter to confer benefit
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX013419	Disposing of waste exemption	On a farm	Burning waste in the open

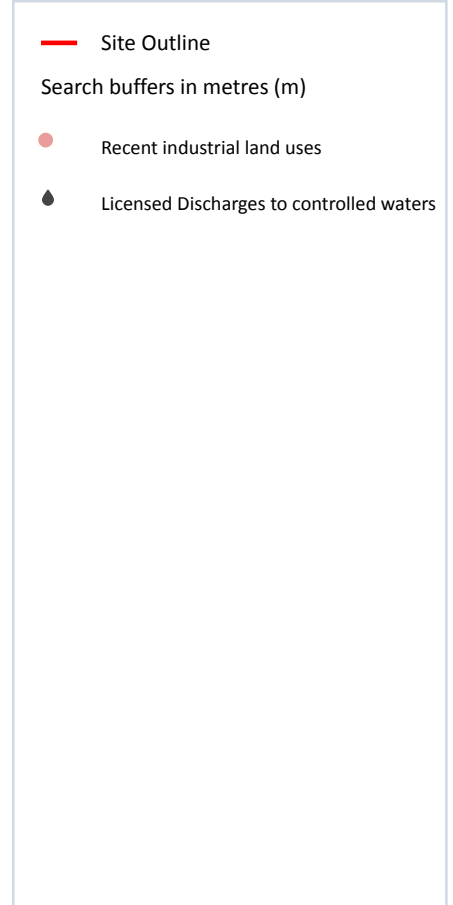
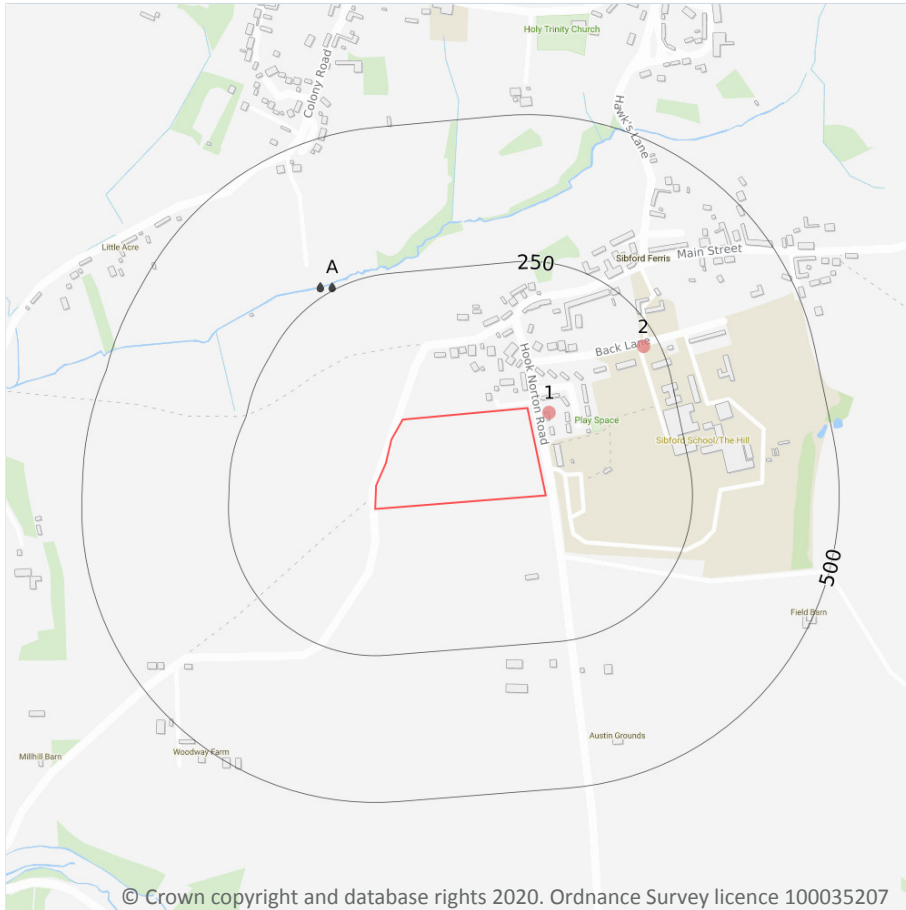


ID	Location	Site	Reference	Category	Sub-Category	Description
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX013419	Treating waste exemption	On a farm	Treatment of waste wood and waste plant matter by chipping, shredding, cutting or pulverising
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX013419	Using waste exemption	On a farm	Spreading waste on agricultural land to confer benefit
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX013419	Using waste exemption	On a farm	Use of mulch
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX013419	Using waste exemption	On a farm	Spreading of plant matter to confer benefit
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX013419	Using waste exemption	On a farm	Incorporation of ash into soil
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX013419	Using waste exemption	On a farm	Burning of waste as a fuel in a small appliance
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX013419	Using waste exemption	On a farm	Use of effluent to clean a highway gravel bed
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX013419	Using waste exemption	On a farm	Use of waste for a specified purpose
A	437m S	AUSTINS GROUND FARM, HOOK NORTON ROAD, SIBFORD FERRIS, BANBURY, OX15 5QR	WEX013419	Using waste exemption	On a farm	Use of waste to manufacture finished goods

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



4 Current industrial land use



4.1 Recent industrial land uses

Records within 250m

2

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 25**

ID	Location	Company	Address	Activity	Category
1	35m E	Electricity Sub Station	Oxfordshire, OX15	Electrical Features	Infrastructure and Facilities
2	223m NE	Electricity Sub Station	Oxfordshire, OX15	Electrical Features	Infrastructure and Facilities

This data is sourced from Ordnance Survey.



4.2 Current or recent petrol stations

Records within 500m	0
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Open, closed, under development and obsolete petrol stations.

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	0
----------------------------	----------

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	0
----------------------------	----------

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m	0
----------------------------	----------

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

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m	0
----------------------------	----------

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

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m	0
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Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m	0
---------------------	---

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

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m	0
---------------------	---

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

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

4.10 Licensed industrial activities (Part A(1))

Records within 500m	0
---------------------	---

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

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

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

Records within 500m	0
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Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m
0

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

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

4.13 Licensed Discharges to controlled waters

Records within 500m
5

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

Features are displayed on the Current industrial land use map on **page 25**

ID	Location	Address	Details	
A	256m NW	SIBFORD FERRIS STW, SIBFORD FERRIS, OXFORDSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: S/14/20062/R Permit Version: 1 Receiving Water: TRIB OF RIVER STOUR	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 31/10/1989 Effective Date: 31/10/1989 Revocation Date: 24/10/2002
A	266m NW	SIBFORD FERRIS STW, SIBFORD GOWER, OXFORDSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: S/14/26023/R Permit Version: 1 Receiving Water: TRIB RIVER STOUR	Status: MODIFIED - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 25/10/2002 Effective Date: 25/10/2002 Revocation Date: 03/04/2006
A	266m NW	SIBFORD FERRIS STW, SIBFORD GOWER, OXFORDSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: S/14/26023/R Permit Version: 2 Receiving Water: TRIB RIVER STOUR	Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 25/10/2002 Effective Date: 04/04/2006 Revocation Date: 31/12/2009
A	266m NW	SIBFORD FERRIS STW, SIBFORD GOWER, OXFORDSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: S/14/26023/R Permit Version: 3 Receiving Water: TRIB RIVER STOUR	Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 24/09/2009 Effective Date: 01/01/2010 Revocation Date: 30/03/2010
A	266m NW	SIBFORD FERRIS STW, SIBFORD GOWER, OXFORDSHIRE	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - WATER COMPANY Permit Number: S/14/26023/R Permit Version: 4 Receiving Water: TRIB RIVER STOUR	Status: VARIED BY APPLICATION - (WRA 91 SCHED 10 - AS AMENDED BY ENV ACT 1995) Issue date: 31/03/2010 Effective Date: 31/03/2010 Revocation Date: -



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

4.14 Pollutant release to surface waters (Red List)

Records within 500m	0
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Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

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

4.15 Pollutant release to public sewer

Records within 500m	0
----------------------------	----------

Discharges of Special Category Effluents to the public sewer.

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

4.16 List 1 Dangerous Substances

Records within 500m	0
----------------------------	----------

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

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

4.17 List 2 Dangerous Substances

Records within 500m	0
----------------------------	----------

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

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

4.18 Pollution Incidents (EA/NRW)

Records within 500m	0
----------------------------	----------

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

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



4.19 Pollution inventory substances

Records within 500m

0

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

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

4.20 Pollution inventory waste transfers

Records within 500m

0

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

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

4.21 Pollution inventory radioactive waste

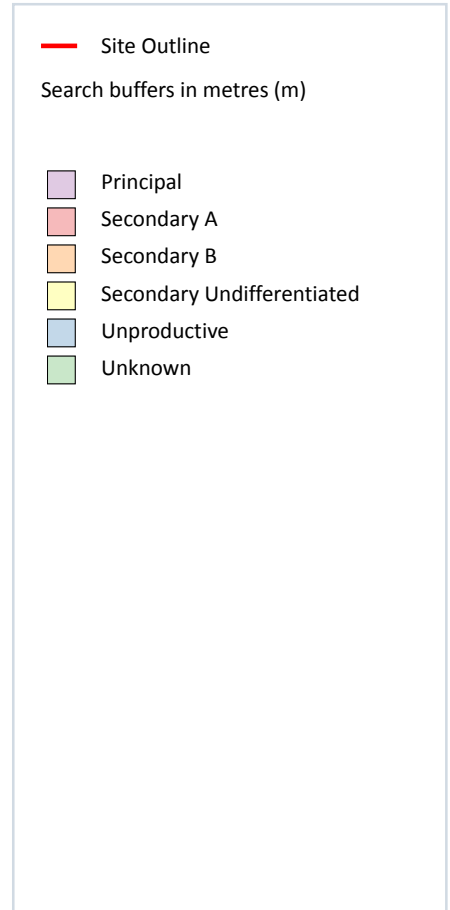
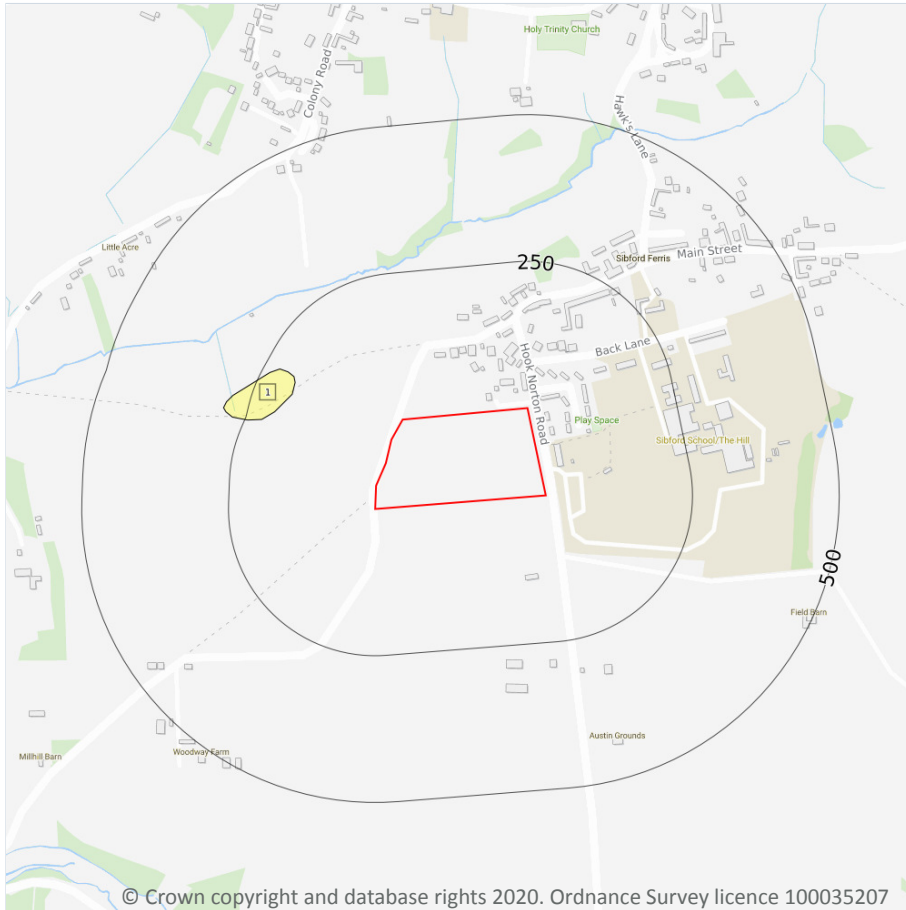
Records within 500m

0

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

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

5 Hydrogeology - Superficial aquifer



5.1 Superficial aquifer

Records within 500m	1
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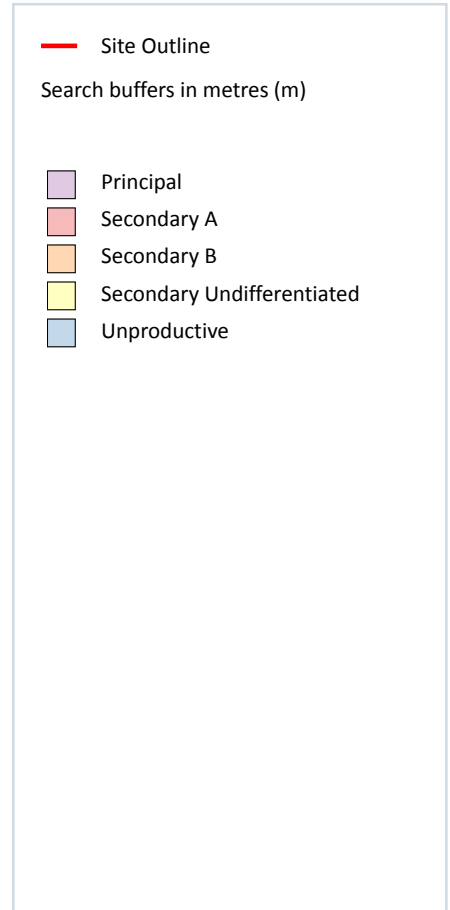
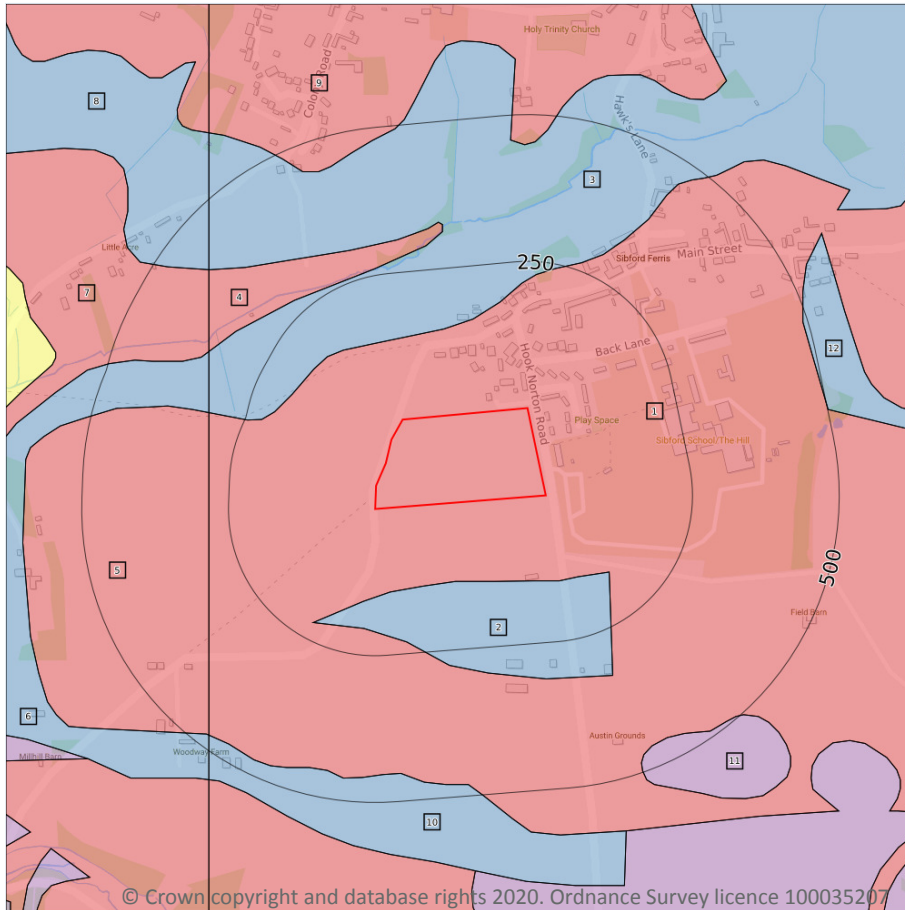
Aquifer status of groundwater held within superficial geology.

Features are displayed on the Hydrogeology map on **page 31**

ID	Location	Designation	Description
1	186m NW	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

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

Bedrock aquifer



5.2 Bedrock aquifer

Records within 500m	12
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Aquifer status of groundwater held within bedrock geology.

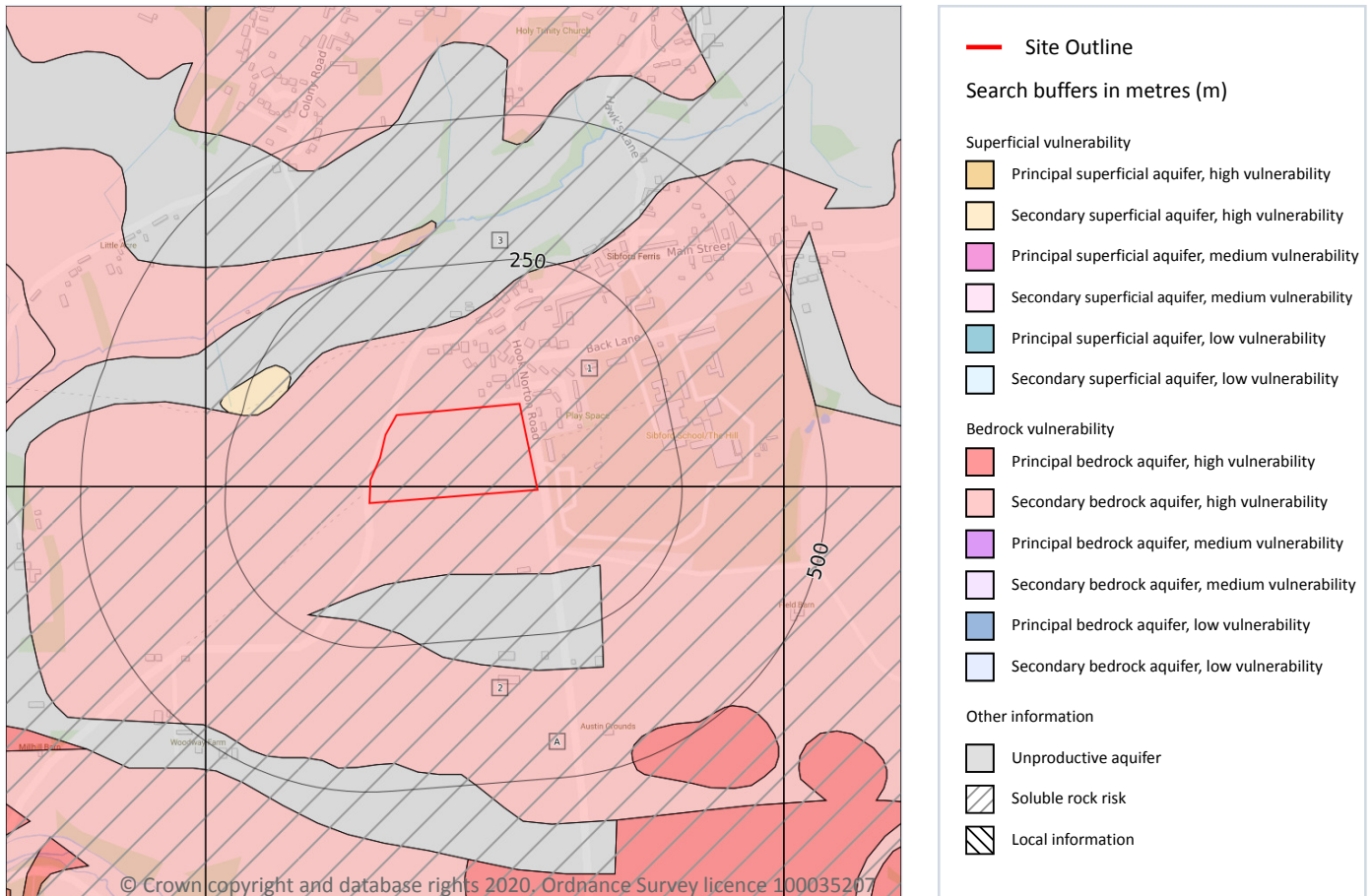
Features are displayed on the Bedrock aquifer map on **page 32**

ID	Location	Designation	Description
1	On site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	134m S	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

ID	Location	Designation	Description
3	137m N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
4	257m N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
5	283m W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
6	311m NW	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
7	345m NW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
8	417m NW	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
9	446m N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
10	452m S	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
11	462m SE	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
12	492m E	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

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

Groundwater vulnerability



5.3 Groundwater vulnerability

Records within 50m

2

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

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

Features are displayed on the Groundwater vulnerability map on **page 34**



ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Intermediate Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures
A	On site	Summary Classification: Secondary bedrock aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, No Superficial Aquifer	Leaching class: Intermediate Infiltration value: >70% Dilution value: <300mm/year	Vulnerability: - Aquifer type: - Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures

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

5.4 Groundwater vulnerability- soluble rock risk

Records on site	2
------------------------	----------

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

ID	Maximum soluble risk category	Percentage of grid square covered by maximum risk
2	Significant soluble rocks are likely to be present. Problems unlikely except with considerable surface or subsurface water flow.	28.999999999999996%
3	Significant soluble rocks are likely to be present. Problems unlikely except with considerable surface or subsurface water flow.	0.0%

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

5.5 Groundwater vulnerability- local information

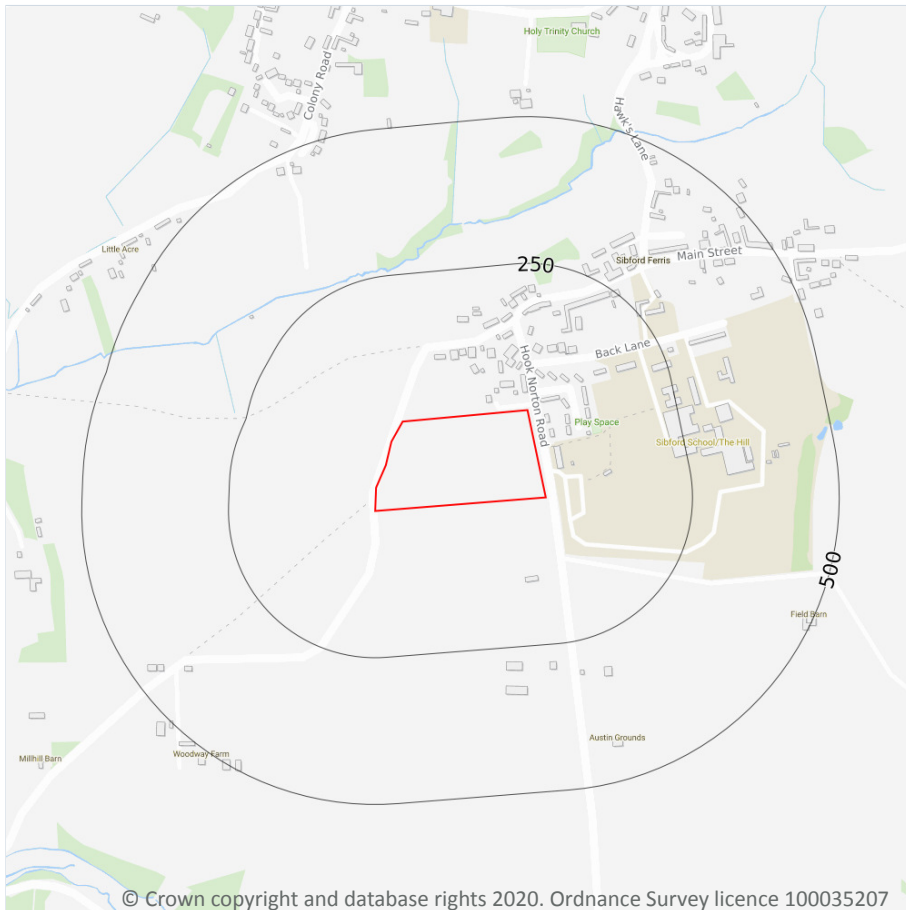
Records on site	0
------------------------	----------

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

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



Abstractions and Source Protection Zones



5.6 Groundwater abstractions

Records within 2000m

7

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

Features are displayed on the Abstractions and Source Protection Zones map on **page 36**