



Preliminary Geo-Environmental Risk Assessment

Banbury Logistics Park, Oxford

Presented to: **Greystoke Land**




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Report Details

Client	Greystoke Land
Report Title	Preliminary Geo-Environmental Risk Assessment
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Report No.	21-2141.02
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Executive Summary

Brief	Delta-Simons was instructed by Greystoke Land to produce a Preliminary Geo-Environmental Risk Assessment for vacant land off A361, Oxford for the proposed development of a sustainable logistics park comprising commercial / distribution units with associated ancillary infrastructure and access.
Site Use & Surrounding Area	The Site currently comprises a large area of greenfield, comprising agricultural fields which are separated by hedgerow. An access road is located within the northern extent of the Site, leading to a likely farmhouse / farmyard. The Site is bordered by further agricultural land to the north and east, and the A422 to the south and the A362 to the west with a logistics park beyond subsequently the M40.
Environmental Setting	The Site is likely underlain by a sequence of Topsoil and / or limited Made Ground underlain by weathered bedrock deposits of the Charmouth Mudstone Formation and possible the Dryham Formation (both Secondary Undifferentiated aquifers) on the easternmost portion of the Site. The Site is not located within a source protection area and there are no licensed groundwater abstraction licences within 1 km of the Site boundary.
Contamination Potential Sources	Limited potential sources of contamination have been identified associated with the current and former use of the Site as agricultural land.
Contamination Land Risk Associated with Ownership	There is considered to be a low risk of enforcement action by the regulatory authorities. The potential for legal action by surrounding landowners / Third Parties based on the potential for contamination to migrate off-Site (ongoing or historically) and result in private or statutory nuisance is considered to be low.
Development Considerations	Widespread or significant contamination is considered unlikely and the preliminary risk assessment has identified a low risk of soil / groundwater contamination and a low to moderate risk of hazardous ground gas at the Site. Potential geohazards have been identified associated with shallow clay deposits at the Site due the pyritic nature and the effects of frost heave and shrink and swell associated with the trees. This will require further investigation to determine the extent and properties of the clay deposits and allow for development of an accurate ground model for foundation design.
Uncertainty and Data Gaps	This assessment is based on desk study information only. No Site-specific ground investigation data has made available for review.
Recommendations	It is recommended that an intrusive Site investigation is undertaken to provide an assessment of foundation and engineering solutions to be made. It would be prudent to undertake sampling to assess the potential for contamination and provide a ground gas risk assessment to investigate the risk of gases to impact on the proposed development. Consideration should be given to sampling and analysis of topsoil as a surplus would be anticipated given proposed development. The analysis of these soils would be required to inform re-use options of material off-site.
This is intended as a summary only. Further detail and the limitations of the assessment are provided within the main body of the Report.	

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Appendix E - Historical Mapping

Appendix F - Zetica Unexploded Bomb Risk Map

Appendix G - Landmark Envirocheck® Report

1.0 Introduction

1.1 Appointment

Delta-Simons Limited ("Delta-Simons") was instructed by Greystoke Land (the "Client") to prepare a Preliminary (Geo-Environmental) Risk Assessment for a proposed sustainable logistics park located adjacent to A361, Oxford, OX16 3AD (the "Site").

This Report was undertaken in accordance with Delta-Simons fee proposal dated 31st March 2022. The standard limitations associated with this Assessment are presented in Appendix A.

1.2 Context & Purpose

The aim of this Report is to consider the potential for land contamination and geotechnical constraints present at the Site in order to support an outline planning application for the proposed development.

It is understood that the proposed development for the Site is the construction of a sustainable logistics park comprising commercial / distribution units with associated ancillary infrastructure and access. A Proposed Site Layout plan has been provided and it is considered that earthworks will be required in order to deliver the proposed elevations, see Drawing 1.

To that end this study assesses the likely environmental and geotechnical issues associated with soil and groundwater conditions that may affect the proposed development of the Site. This Report is designed in general accordance with guidance on Land Contamination: Risk Management pages of the GOV.UK web pages, the relevant requirements of the National Planning Policy Framework (NPPF) (as revised 2021) (paragraphs 174 & 183-184)¹ and the Planning Practice Guidance (Land Affected by Contamination)².

1.3 Scope of Works

- Review of the environmental setting of the Site, including the current use / status of the Site and surrounding area, and review of the geology, hydrogeology and hydrology;
- Review of the historical activities of the Site and surrounding area;
- Review of regulatory information relating to the Site;
- Review of the online planning records for the Site;
- Consult and review information from the Local Authority in relation to Part 2A of the 1990 Environmental Protection Act;
- Review online records of potential unexploded ordnance risks;
- Complete a Site reconnaissance by undertaking a visual inspection of readily accessible areas of the Site;
- Develop an outline Conceptual Site Model and undertake a Preliminary Risk Assessment with respect to potential contamination focussed on the proposed land use;
- Provide commentary on potential land contamination and geotechnical constraints in the context of the proposed development.

Data sources used in this assessment are listed in Appendix B.

1

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004408/NPPF_JULY_2021.pdf

2 <https://www.gov.uk/guidance/land-affected-by-contamination>

1.4 Limitations

The standard limitations associated with this Assessment are presented in Appendix A. In addition, there are the following specific limitations that apply to this Assessment:

- The Site boundary was altered after the acquisition of the Landmark Envirocheck Report. As a result, the red-line boundary within the Envirocheck should be considered to be superceded.
- The Consultant undertaking the Site inspection maintained a general awareness for evidence of invasive plant species, particularly Japanese Knotweed. While none were observed during the walkover, it should be noted that the Consultant is not a trained ecologist and a separate survey undertaken by an experienced Ecologist would be necessary if a more robust assessment is needed;
- The Report includes an initial assessment of unexploded ordnance (UXO) risks for the Site using online data sources. A detailed UXO assessment falls outside of the scope of this Report, further specialist assessment may be required; and
- The Report includes a preliminary assessment for the potential for radon gas hazards. A detailed radon assessment falls outside of the scope of this Report, and the requirement for radon mitigation measures in the proposed development should be identified separately to the satisfaction of the Local Authority.

2.0 Site Context & Data Review

The following sections provide a summary of the key site features based on the data sources listed in Appendix B. All distances, measurements and dates are approximate and the accuracy limitations of the data sources should be noted.

2.1 Site Information

Co-ordinates	Centred at National Grid Reference 447584, 242284.	Elevation	98 - 122 m AOD
		Area	45.34 Ha
Site Location	<p>The Site is located off the A361, in the north-eastern outskirts of Banbury. Junction 11 of the M40 is located adjacent to the south-west of the Site.</p> <p>A Site Location Map is provided as Figure 1.</p> <p>Google Maps Link</p> <p>[Google, Imagery © 2022 Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map data ©2022]</p>		
Site Occupant(s)	It is understood that the fields are tenanted for cattle grazing.		
Site Description	<p>Delta-Simons conducted a Site visit on 28th March 2022. A series of photographs are presented as Appendix D, and a Site Layout Plan (Site boundary in red) is provided as Figure 2. Pertinent information from the Site is summarised below:</p> <ul style="list-style-type: none"> • The Site can be accessed via a lane east off the A361 or from the south via the A422 east bound; • The lane east off the A361 leads to a farmhouse / farmyard (located off-Site), a two-storey structure with a courtyard of hard standing opposite, surrounded by derelict barns and storage buildings. Evidence potential asbestos containing materials (ACM) were identified within the structures. In addition, evidence of hydrocarbon/gas-based heating and cooking systems could be observed, although no evidence of an above or below ground storage tank could be found in the vicinity of the farmhouse; • Another area of hardstanding is present in the south off the Site, off the lane coming off the A422 eastbound; • No other structures are present on-Site, other than a small brick outhouse structure in the eastern most field; and • Overhead electric cables, on telephone poles, cross a number of the fields. 		
Topography	A topographical survey was undertaken by Monument Geomatics Limited in November 2021. The topographical survey shows that the Site slopes from 155.47 metres Above Ordnance Datum (m AOD) in the north-east to 96.30 m AOD in the north-west of the Site.		
Description of Surrounding Land Uses	The Site is bordered by further agricultural land to the north and east, the A422 to the south and the A361 and Junction 11 of the M40 to the west with a logistics park beyond.		
<p><i>Historical and/or contemporary potential sources of significant contamination have not been noted on the Site during the site walkover. Given the agricultural nature of the surrounding land, it is considered that significant off-Site sources of contamination can be discounted at this time.</i></p>			

2.2 Physical Setting

The physical setting of the subject property can influence the susceptibility to, and relative magnitude of, environmental impacts and liabilities associated with on- and off-Site sources of contamination. The following table provides physical setting information for the subject property and surrounding area.

<p>Published Geology</p>	<p>British Geological Survey (BGS) online viewer (bgs.ac.uk/viewer) and geological mapping (bgs.ac.uk/maps) (1:50,000 Sheet Number 201, Banbury) indicates that ground conditions at the Site comprise:</p> <p>Made Ground: The Site is not recorded as being within an area underlain by artificial or Made Ground deposits. In addition, when considering the nature of the Site, it is unlikely that notable Made Ground deposits are present at the Site.</p> <p>Superficial deposits: No superficial deposits are mapped at the Site; however, weathered bedrock deposits may be present.</p> <p>Bedrock: Jurassic Charmouth Mudstone Formation comprising mudstone across the majority of the Site. Deposits of the Jurassic Dyrham Formation comprising interbedded siltstone and mudstone are indicated to be present across the eastern and south-eastern areas of the Site.</p> <p>There are no BGS recorded boreholes (bgs.ac.uk/viewer) on the Site. However, there are several within the local surrounding area to the west considered to be associated with the development of the M40. A BGS borehole (Ref. SP44SE175) is located adjacent to the south-west was progressed in 1978 to a base depth of 10 metres below ground level (m bgl). The boreholes is summarised as follows:</p> <ul style="list-style-type: none"> • Topsoil from ground level to 0.20 m bgl; • Stiff brownish orange mottled brown fissured slightly sandy silty CLAY with some roots. Desicated. (Colluvium) from 0.20 m to 0.70 m bgl; • Firm light brown mottled brownish orange fissured silty CLAY becoming firm to stiff light brown and grey mottled brownish orange fissured silty CLAY; (Weathered Lower Lias) from 0.70 m to 2.25 m bgl; • Stiff grey and light brown silty CLAY with light and dark brown iron staining on joint surface and traces of fine gypsum crystals at 2.50 m bgl from 2.25 m to 3.60 m bgl. • Very stiff to hard grey jointed calcareous silty CLAY with some shells from 3.60 m to 3.85 m bgl; • Moderately strong grey shelly silty LIMESTONE from 3.85 m to 4.15 m bgl; • Very stiff to hard grey jointed calcareous silty CLAY with some shells. Strong grey shelly silty LIMESTONE from 4.15 m to 5.15 m bgl; • Very stiff to hard grey jointed silty CLAY with occasional small shells. (Lower Lias) from 5.15 m to 9.90 m bgl; • Moderately strong grey shelly silty LIMESTONE from 9.90 m to the base of the borehole at 10.00 m bgl. <p>A water strike was recorded at 1.20 m bgl.</p> <p>It should be noted that the BGS record bedrock deposits of the Charmouth Mudstone Formation across the Site, however, the above BGS boreholes has identified limestone deposits. The bedrock deposits may therefore vary locally across the Site.</p>
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Site-Specific Geology	No on-site information has been identified for review.
Aquifers and Groundwater Receptors	<p>The Environment Agency (EA) data magic.defra.gov.uk provides the following aquifer classification and designations:</p> <p>Bedrock: The Charmouth Mudstone Formation and Dyrham Formation are both classified as Secondary Undifferentiated Aquifers.</p> <p>Source Protection Zones: The Site is not in a designated groundwater Source Protection Zone.</p> <p>Groundwater Abstractions: There are no licensed groundwater abstraction licences recorded within 500 m of the Site boundary.</p>
Groundwater Levels and Flow Direction	<p>The reviewed BGS borehole information indicated the presence of a water strike at 1.20 m bgl. There is the possibility that there may be some additional perched water above the clay and weathered mudstone deposits.</p> <p>Groundwater is expected to flow to the west, towards the River Cherwell.</p>
Hydrology	<p>The nearest watercourse is the River Cherwell (Main River - responsibility of the EA to maintain) which is located approximately 250 m west of the Site at its closest point. The River Cherwell flows in a generally southerly direction past the Site.</p> <p>A land drain is shown approximately 200 m off the north-eastern corner of the Site, which would flow in an easterly direction based on the Site topography. A drainage ditch also runs adjacent to the north-western Site boundary. It is likely that further land drainage ditches run throughout the Site along field boundaries.</p> <p>According to the Envirocheck Report, there are no licensed abstraction records from surface water located within 500 m of the Site.</p> <p>It is understood that a Flood Risk Assessment and Drainage Strategy by Delta-Simons (January 2022, 21-2141.01) has been provided to the Client. The findings should be read alongside this report.</p>
Mining & Quarrying	<p>Reference to the Coal Authority on-line viewer (bgs.ac.uk/coalauthority) indicates that the Site is not within a Coal Mining Reporting Area. Consequently, a Coal Mining Risk Assessment (CMRA) is unlikely to be required under the planning regime.</p> <p>The Envirocheck report records a BGS Recorded Mineral Site approximately 190 m to the south-east named as 'Grimsbury Green', which was a former opencast clay and shale mine.</p>
Ground Stability Hazards	<p>The Envirocheck Report indicates the following hazards in the area of the Site:</p> <ul style="list-style-type: none"> Dissolution hazards - no hazard Landslide - very low to moderate Shrinking and swelling clay hazards - low Collapsible ground - very low Compressible ground - no hazard Running sands - no hazard
Radon Gas	<p>Public Health England (ukradon.org) data indicates that the majority of the Site lies within an area of elevated radon potential, with a maximum radon potential of 10-</p>

	<p>30 %.The north-eastern portion of the Site lies within an area with a maximum radon potential greater than 30%.</p> <p>A detailed radon assessment falls outside of the scope of this Report, and the requirement for radon mitigation measures in the proposed development should be identified separately to the satisfaction of the Local Authority. It would be prudent at this stage to allow for incorporation of appropriate radon protection within buildings.</p>
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2.3 Sensitive Land Use

Ecological Receptors	<p>From the information provided within the Envirocheck Report, there are no significant statutory ecological receptors located within 500 m of the Site.</p> <p>The Site is located within a Nitrate Vulnerable Zone (Cherwell [Ray to Thames]) and Woodeaton Brook).</p>
Heritage Interest	<p>Historic England Records (historicengland.org.uk) indicate that no areas of designated heritage interest are located on the Site or within the immediate surrounding area.</p>

2.4 Historical Use of the Site & Surrounding Area

2.4.1 Approach

The historical development of the Site and surrounding area has been assessed through a review of historical maps, aerial photographs, internet sources, previous reports and Google Earth historical satellite imagery. A summary of the key historical Site uses and developments in the surrounding area is presented below. Copies of selected historical maps are included as Appendix E.

2.4.2 Historical Information Review

The following table provides a review of the historical information for the Site, adjacent and surrounding area.

Date	Source	Site Description	Surrounding Area
1884	OS Mapping	The Site comprised several agricultural fields across field boundaries. Several ponds are present.	<p>The areas surrounding the Site are observed to largely comprise agricultural land. Huscote Farm with likely agricultural buildings is located is located off-Site within the Site boundary. Seale's Farm is located approximately 300 m north-east and Huscote Mill (corn) approximately 250 m north-west.</p> <p>A brick field with associated areas of earth cuttings are denoted adjacent to the south-eastern area of the Site.</p>
1900	OS Mapping	No other significant changes observed.	<p>A brick works and associated earth cuttings (potentially associated with clay extraction) are recorded between 100 m and 200 m to the south. The brick field is denoted as an old clay pit. No other significant changes observed.</p>

Date	Source	Site Description	Surrounding Area
1922	OS Mapping	No significant changes observed.	No significant changes observed. The old clay pit is no longer recorded and a well and pond are denoted. The brick works to the south is no longer recorded and a pond is located in the footprint of the potential former clay extraction area.
1938	OS Mapping	No significant changes observed.	Huscote Mill (located to the north-west) is noted to be disused.
1991 - 2021	OS Mapping, Google Earth	A sheepfold is located on the southern portion of the Site, no other significant changes observed, and the Site remains in this layout until the present day.	The M40 motorway, A361 and A432 are developed adjacent to the south, south-west and west.

2.4.3 Historical Use Summary

Based on a review of the compilation of historical sources dating back to 1884, it appears that the subject Site has largely been in use as agricultural land to present day.

The surrounding area was also in use as agricultural land with a farm located off-Site within the Site boundary and 150 m north-east. A brick field was also recorded adjacent the south-east on the earliest reviewed mapping dated 1884 up to 1900, when it was denoted as an old clay pit. By 1922, the old clay pit was no longer recorded and a pond and well were located in its position. A brick works, and associated earth cuttings were recorded within 100 m south from 1900 up to 1922. By 1991, the M40 motorway and local surrounding road network had been developed adjacent to the Site.

Potentially contaminative land uses identified in the surrounding area include agricultural buildings at Huscote Farm, the brick works and associated infilled former clay extraction pit located adjacent to the south-east and approximately 100 m south.

2.4.4 Unexploded Ordnance (UXO)

The Zetica Regional Unexploded Bomb Risk Map for the area of the Site (zeticauxo.com) indicates that there is a low risk of UXO in the area of the Site. The Risk Map is included in Appendix F.

A detailed UXO assessment falls outside of the scope of this Report, and specialist assessment may be required to support future groundworks.

2.5 Environmental Database Review

The Landmark Envirocheck® Report provides a database of environmental information held by various statutory bodies including the EA, Local Authority (LA), Health & Safety Executive (HSE) and Public Health England amongst others. It must be noted that due to a Site boundary change after the Envirocheck® Report was ordered, some entries shown as on-Site within the Envirocheck® Report are now located off-Site. A copy of the Envirocheck Report is provided in Appendix G and the most relevant information is summarised below.

Features On-Site	The Landmark Envirocheck® Report does not list any environmentally significant entries relating to the Site.
Potentially Contaminative Features Off-Site	There is a landfill located adjacent to the south-eastern boundary of the Site, named as Banbury Lane, which is listed as a historical landfill site, Local Authority

	<p>Recorded Landfill Site and a Registered Landfill Site. The following relevant information was identified:</p> <ul style="list-style-type: none"> • The first input of waste was dated June 1988 and the last was dated December 1989. The license is noted to have either lapsed or been cancelled or surrendered; • The type of waste accepted was solid inert (sub & topsoil, clay); and • The waste source was noted to be waste produced / controlled by the license holder. The license holder was named as John Jones (Excavation) Ltd. <p>In addition, the Landmark Envirocheck® Report lists the following entries located within 250 m of the Site:</p> <ul style="list-style-type: none"> • A Category 3 (Minor Incident) pollution incident to controlled waters is noted to have occurred approximately 210 m to the south-east of the Site involving an unknown pollutant; • There is a BGS Recorded Mineral Site located approximately 195 m south-east named as 'Grimsbury Green'. It relates to opencast extraction of common clay and shale from the Charmouth Mudstone Formation. This is not considered to relate to the brick field as identified on historical mapping; and • A Point of Interest - Manufacturing and Production entry for livestock farming (A J A Astell & Son) located approximately 145 m to the north-east.
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2.6 Planning Review/Regulatory Enquiries

On-line Planning Review	Cherwell District Council	Date Accessed	28/04/2022
On-Site Applications	<p>The following pertinent planning application identified at the Site relates to the proposed development, summarised below:</p> <ul style="list-style-type: none"> • <u>22/00385/SO</u> - 'Screening opinion - proposed construction of a commercial development of between 1.2 million and 1.5 million square feet of logistics / warehousing and associated infrastructure and landscaping at Junction 11 M40, Banbury, OX17 2BH', dated February 2022. It was decided in March 2022 that an EIA would be required to support the application for the proposed development. <p>No relevant information in relation to land contamination is included within the supporting documentation.</p>		
Part 2A of the Environmental Protection Act (EPA) 1990	<p>Cherwell District Council's contaminated land officer was contacted for information on the Site. No response has been received at the time of report issue. However, given the known history and current use of the Site and surrounding area, it is considered that the Site would be considered a low priority for inspection under Part 2A.</p>		

2.7 Previous Reports

No third-party reports have been made available to review from the Client or sourced through a review of planning application records.

3.0 Conceptual Site Model

3.1 Introduction

A Conceptual Site Model (CSM) represents the relationships between contaminant sources, pathways and receptors, to support the identification and assessment of contaminant linkages.

3.2 Overall Site Sensitivity

The Site is considered to be of a low to moderate environmental sensitivity given the presence of the underlying bedrock Secondary Undifferentiated Aquifers and the absence of a Source Protection Zone or groundwater abstractions and the on-Site and nearby surface water courses.

3.3 Potential Contamination Sources

A source is a contaminant or pollutant that is in, on or under the land that has the potential to cause harm or pollution.

The following identified potential contamination sources are considered in the CSM:

- Residual contaminants from the use of the Site as agricultural fields - potential historical use of pesticides / fertilisers.
- Off-Site brick works and infilled land may be a source of leachate material, however, due to the age of the landfilled materials and the nature of the input materials recorded, this is not considered to be environmentally significant. However, at this stage, it cannot be discounted.
- Ground gas from adjacent landfilled material - it is considered unlikely due to the age of the landfilled materials and the nature of the input materials recorded i.e., inert soil, however, it cannot be entirely discounted at this stage.

3.4 Potential Pathways

A pathway is a route by which a receptor is or could be affected by contaminant.

The potential pathways are considered to be as follows:

- Direct contact, ingestion or inhalation of soil bound contaminants / dust during or following redevelopment.
- Inhalation of organic vapours associated with contamination.
- Migration of ground gas / vapours into on-Site buildings causing asphyxiation or risk of explosion.
- Leaching of contamination into groundwater followed by migration of groundwater to the wider groundwater environment or discharge to surface waters.
- Contaminated surface water runoff; and
- Direct contact between aggressive ground conditions and new infrastructure.

3.5 Potential Receptors

A receptor is something that could be adversely affected by a contaminant, for example a person, controlled waters, an organism, an ecosystem, or Part 2A receptors such as buildings crops or animals.

Relevant potential receptors are considered to include:

- Future Site users and maintenance workers;
- Construction workers;
- Third parties during construction (adjacent Site users and adjacent residents); and
- On-Site surface watercourses (ponds) and the nearby River Cherwell watercourse.

Contaminant Linkage Assessment					
Source(s)	Pathway(s)	Receptor(s)	Risk	Comments	Requires Investigation
Potentially contaminated soils and/or groundwater located beneath the Site.	Direct contact/ ingestion and inhalation of dust and vapours.	Site users.	Low Risk	<p>Whilst significant potential sources of contamination have not been identified associated with the current use of the Site, there remains the potential for localised contamination associated with current and historical agricultural Site uses. However, given the proposed development to a commercial end-use, which will be predominantly covered by buildings and hardstanding, the risk to Site users is considered to be low.</p> <p>No significant potential sources of volatile contamination have been identified.</p> <p>It would be prudent to undertake a limited programme of soil sampling and analysis to further assess the risk.</p>	Yes
	Direct contact, ingestion and inhalation of dust and vapours.	Maintenance workers during any future sub-surface works at the Site.	Low Risk	<p>Site workers may become exposed to localised contaminated soils and shallow groundwater during intrusive groundworks undertaken at the Site. Safe working practices should be undertaken and appropriate Personal Protective Equipment (PPE) should be used that will reduce the risk to low. Intrusive investigation will inform potential risks in new development areas.</p>	Yes
	Leaching of contaminants and vertical migration.	On-Site surface watercourses.	Low Risk	<p>Significant potential sources of contamination have not been identified associated with the current and historical uses of the Site, therefore the risk to surface watercourses is considered to be Low.</p>	No
	Permeation of hydrocarbons through plastic pipe work.	Water supply pipes.	Low Risk	<p>Hydrocarbons, especially aromatics and chlorinated solvents are known to permeate plastic pipes, particularly when encountered at high concentrations. Given the absence of evidence of significant fuel or oil sources, the risk of contamination migrating into areas containing water supply pipes is considered to be low.</p>	No

Contaminant Linkage Assessment					
Source(s)	Pathway(s)	Receptor(s)	Risk	Comments	Requires Investigation
	Lateral migration through any groundwater beneath the Site.	Off-Site receptors (neighbouring properties/ users).	Low Risk	Given that significant potential sources of contamination have not been identified associated with the current or historical uses of the Site, the risk to off-Site receptors is considered to be Low.	No
Ground gas.	Vertical and lateral migration of ground gases.	Site users & the buildings on-Site.	Low to Moderate Risk	An adjacent landfill Site has been identified to the south-east. Although the migration of ground gas is considered unlikely due to the age of the landfilled materials and the recorded nature of the input materials recorded i.e., inert soil, it cannot be discounted at this stage. It is recommended that a targeted programmes of ground gas monitoring is undertaken in the vicinity of the landfill site in order to further assess the risk.	Yes
Potentially contaminated soil and groundwater from off-Site sources.	Lateral migration and subsequent inhalation.	Future Site users	Low Risk	A former landfill site was located adjacent to the south-eastern boundary, given the anticipated direction of groundwater flow, the Site is considered to be hydrogeologically downgradient of the landfill, therefore the risk from this is considered to be Low to Moderate based on the age and the nature of the landfilled material (i.e. inert soils).	Yes

4.0 Conclusions & Recommendations

4.1 Land Contamination Risks and Liabilities

Uncertainty and Data Gaps	This assessment is based on desk study information only. No Site-specific ground investigation data has been made available for review.
Soils	Significant widespread soil contamination is not anticipated. Localised contamination may be present associated with the current and former uses of the Site as agricultural land.
Groundwater	Significant widespread groundwater contamination is not anticipated.
Ground Gas	It is considered unlikely that a significant ground gas risk exists although it would be prudent to allow for basic ground gas protection measures until monitoring data is available for interpretation.
Potential Contaminated Land Development Risks	Widespread contamination is considered unlikely and the preliminary risk assessment has identified a low risk of soil/groundwater contamination and a low to moderate risk of hazardous ground gas at the Site.

4.2 Geotechnical Considerations

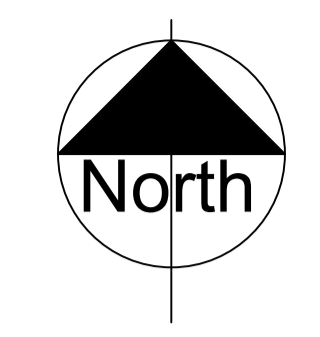
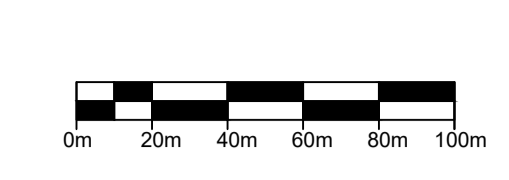
Uncertainty and Data Gaps	This assessment is based on desk study information only. No Site-specific ground investigation data has been made available for review.
Preliminary Ground Model	Based on the reviewed information, it is anticipated that the Site is likely underlain by a sequence of Topsoil (with the potential for limited Made Ground), directly underlain by weathered bedrock deposits of the Charmouth Mudstone Formation.
Plausible Geo-Hazards	<p>The geohazards listed below have been identified to follow guidance presented in the HE document CD622 'Managing Geotechnical Risk' (2019) which aims to identify and manage the geotechnical risks associated with a scheme throughout its lifespan, from planning to construction to maintenance.</p> <p>The following geohazards are considered to be substantial ground related risks associated with the proposed development. A substantial risk is defined by Delta-Simons in Appendix C.</p> <ul style="list-style-type: none"> • The weathered Charmouth Mudstone Formation may be recovered as cohesive clay deposits. As such, shallow cohesive soils may be subject to shrink and swell where trees / hedgerows are removed / planted; • Areas of perched / shallow groundwater may be present at the Site; • The Charmouth Mudstone Formation is likely to comprise of weathered mudstone, likely recovered as clay soils. These soils are likely to be of low permeability which does not typically provide favourable drainage characteristics and soakaway drainage is may not be feasible; and • The ground model has the potential to provide localised aggressive ground conditions.
Geotechnical Development Implications	It is considered likely that earthworks will be required to facilitate future redevelopment. Further assessment, in the form of intrusive investigation, will be required to determine an appropriate foundation and earthworks solution for new buildings associated with the Site's redevelopment.

4.3 Recommendations and Other Development Considerations

Ground Investigation Recommendations	It is recommended that an intrusive Site investigation is undertaken to provide an assessment of foundation and engineering solutions to be made. It would be prudent to undertake sampling to assess the potential for contamination and provide a ground gas risk assessment to investigate the risk of gases to impact on the proposed development. Consideration should be given to sampling and analysis of topsoil as a surplus would be anticipated given proposed development. The analysis of these soils would be required to inform re-use options of material off-site.
Other Development Considerations	The following development considerations/potentially pertinent factors could be anticipated with respect the site: <ul style="list-style-type: none">• Ecological surveys; and• Flood Risk Assessment.

Drawings

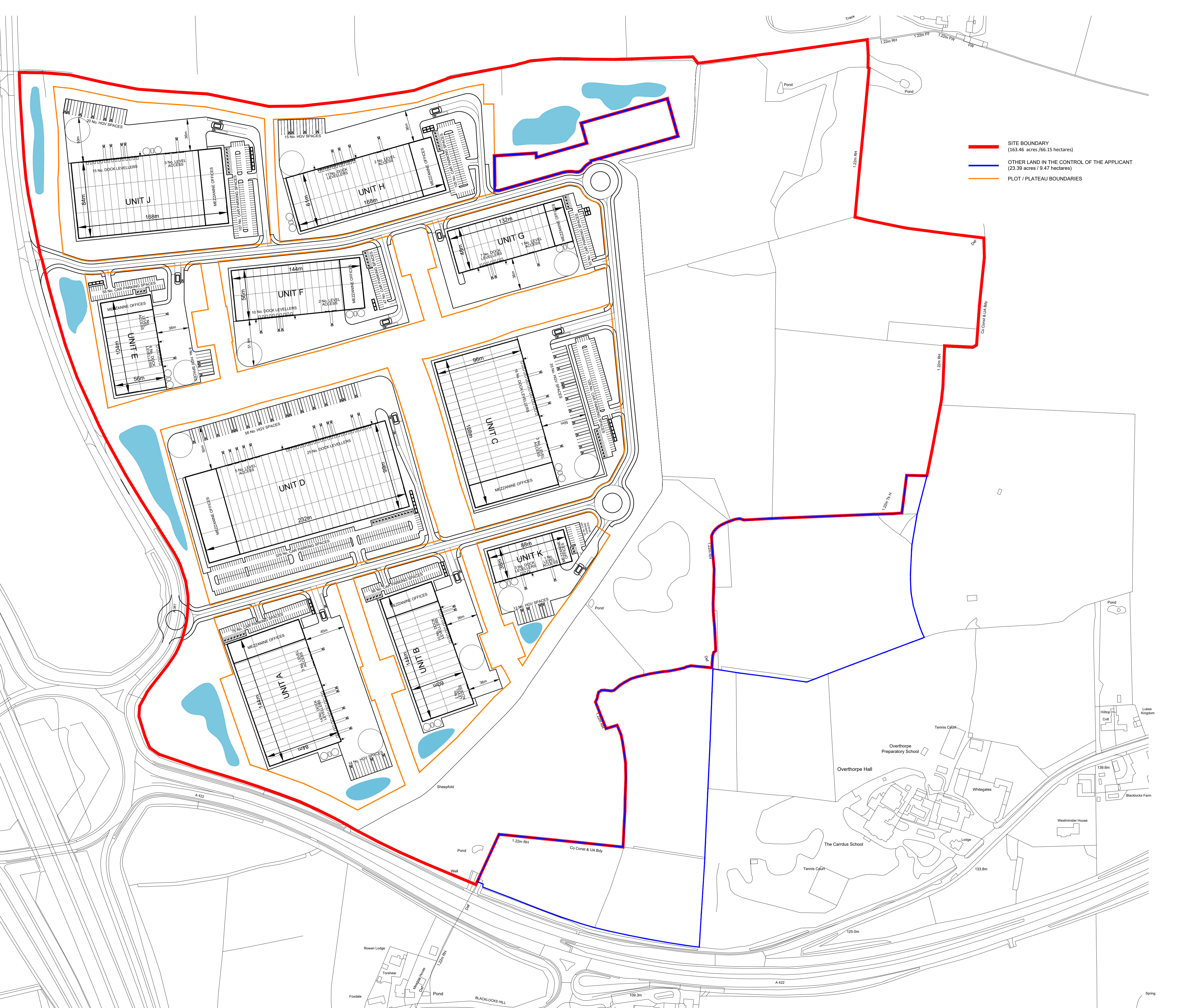
Drawing 1 - Proposed Site Plan



NOTES:
 Copyright Chetwoods (Birmingham) Limited. No implied licence exists.
 Contractors must verify all dimensions on site before commencing any work or shop drawings. This drawing is not to be scaled. Use figured dimensions only.
 Subject to statutory approvals and survey.
 Building areas are liable to adjustment over the course of the design process due to the ongoing construction detailing developments.
 Please note the information contained within this drawing is solely for the benefit of the employer and should not be relied upon by third parties.
 The CDM hazard management procedures for the Chetwoods aspects of the design of this project are to be found on the "Chetwoods - Hazard Analysis and Design Risk Assessment" and/or drawings. The full project design teams comprehensive set of hazard management procedures are available from the Principle Designer appointed for the project.

- NB.**
- SUBJECT TO SURVEYS, CONSTRAINTS & PLANNING.
 - LAYOUT TO BE TRACKED.
 - RED LINE INDICATIVE ONLY.

- SITE BOUNDARY (163.46 acres / 66.15 hectares)
- OTHER LAND IN THE CONTROL OF THE APPLICANT (23.39 acres / 9.47 hectares)
- PLOT / PLATEAU BOUNDARIES



P8	Drawing title updated and schedules removed	05/05/22	AK/TW
P7	Minor graphical updates	03/05/22	MM/TW
P6	Updated blue boundary	29/04/22	SA/TW
P5	Updated layouts of units B, E, F & G	26/04/22	SA/TW
P4	Minor updates to units	26/04/22	AW/TW
P3	Minor updates to units	22/04/22	AW/TW
P2	All units updated	21/04/22	AW/TW
P1	First Issue	22/12/21	AW/TW

Rev	Revision Description	Date	Author/Reviewer
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PRELIMINARY

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Project

LAND EAST OF JUNCTION 11, M40, BANBURY

Client

GREYSTOKE CB

Drawing Title

ILLUSTRATIVE SITE LAYOUT

Scale	Size	Drawn	Checked	Date
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1:2000 A1 AW TW 21/12/2021

Project	Original	Zone	Level	Type	Rate	Number	Rev
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5166 CA 00 00 DR A 05001 P8

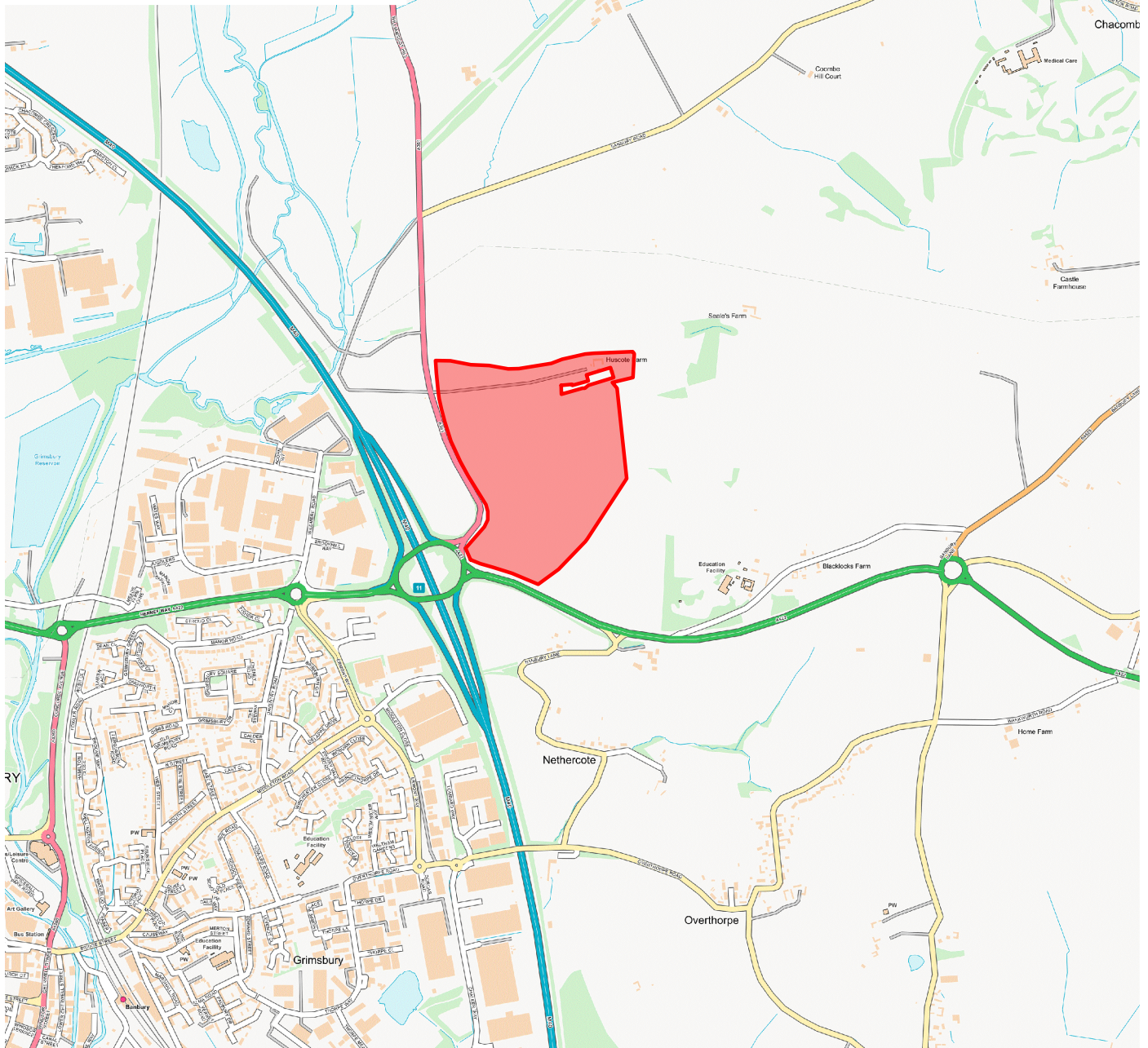
Figures

Figure 1 - Site Location Map



LEGEND

 Site Boundary



Scale: 1 / 10,000 @ A4

Contains OS data © , Crown Copyright and Database Right (2022)

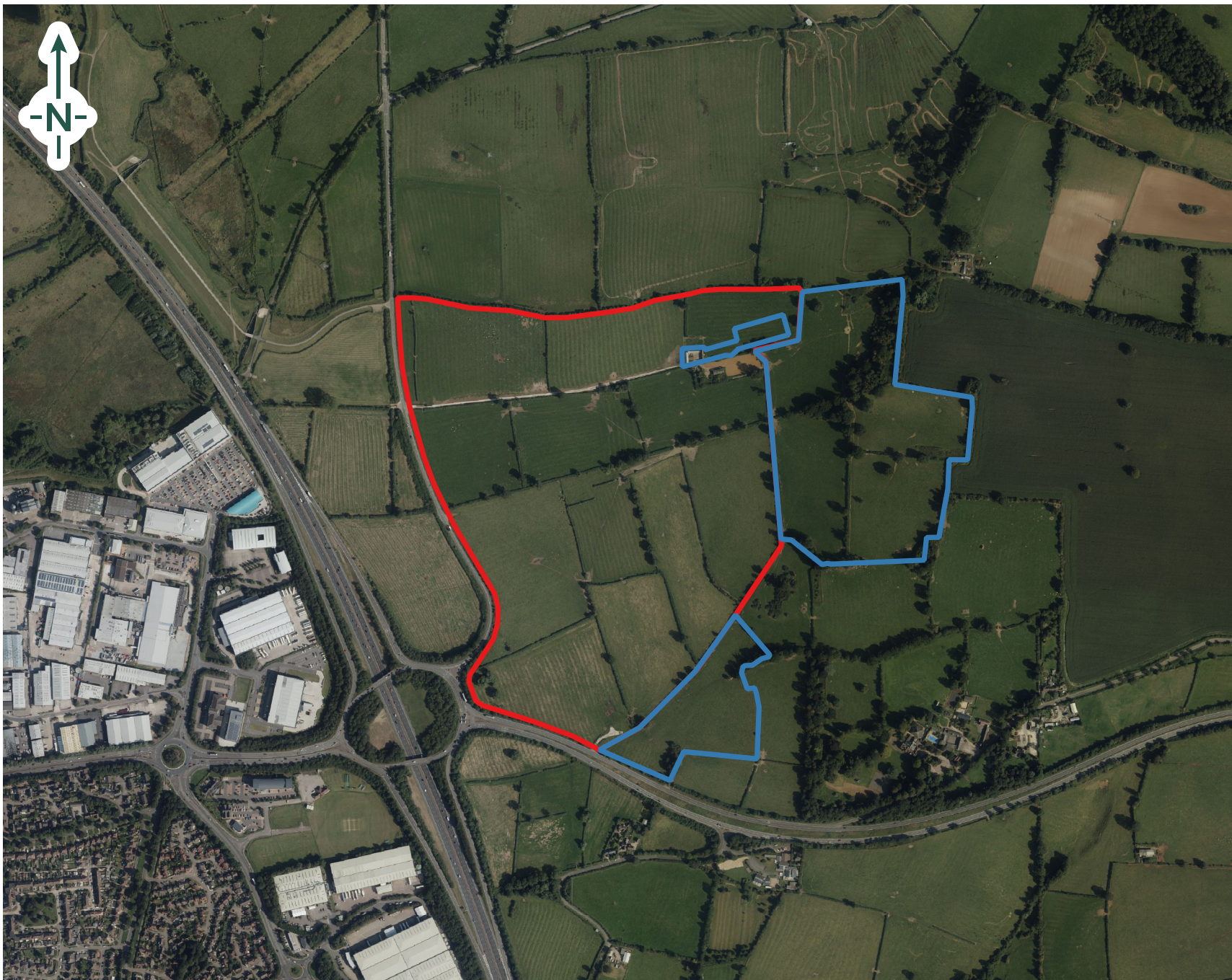


TITLE:
Site Location Map
Banbury Oxford

DRAWN BY:	JM	SCALE:	To Scale@A4
CHECKED BY:	EC	REVISION:	1
DATE:	29 April 2022		

PROJECT NO:	21-2141.02
FIGURE NO:	1

Figure 2 - Site Layout Plan



Bing

LEGEND

- Excluded from Site Area
- Site Boundary



TITLE:
Site Layout Plan

DRAWN BY: EC	SCALE (@A4): 1:10,237	PROJECT NO: 21-2141.01
CHECKED BY: EP	REVISION: -	FIGURE NO: 2
DATE: 29 April 2022		

Appendices

Appendix A - Limitations

Limitations

This Report was prepared by Delta-Simons Ltd (Delta-Simons) for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. Delta-Simons does not intend, without its written consent through a formal letter of reliance or warranty, for this Report to be disseminated to any party other than the named Client or to be used or relied upon by any party other than the named Client. Use of the Report by any other party is unauthorised and such use is at the sole risk of the user. Any party using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by Delta-Simons. Unless explicitly agreed otherwise, in writing, this Report has been prepared under Delta-Simons' Standard Terms and Conditions as included within our proposal to the Client.

The recommendations contained within this Report represent Delta-Simons professional opinions, based upon the information detailed within the Report, exercising the reasonable skill and care to be expected of a professional consultant holding itself out as having the competence, experience and resources necessary for the purpose of carrying out similar work in scope and character to the services performed. The Report needs to be considered in the light of the proposal and associated limitations of scope. The Report needs to be read and considered in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the Report.

Where Delta-Simons has obtained, reviewed and evaluated information in preparing this Report from the Client and others and Delta-Simons conclusions, opinions and recommendations has been reasonably determined using this information, Delta-Simons does not warrant the accuracy of the third-party information provided to it and cannot be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

Site surveys document the conditions encountered at the time of survey only and conditions may change due to natural processes or human intervention. As such, surveys represent an assessment at a specific point in time and Delta-Simons cannot be responsible for adverse conditions which arise or become apparent after the time of the survey or for conditions which sit outside the scope for which the survey or Report was commissioned.

Where intrusive investigations have been completed, information, comments and opinions given in this report are based on the ground conditions encountered during the site work period and on the results of laboratory and field tests performed during the investigation. Ground conditions are inherently variable such that no investigation can be exhaustive to the extent that all adverse conditions are revealed. Conditions may therefore be present beneath the site that were not apparent in the data reviewed or obtained as part of this assessment. It should be noted that groundwater levels vary due to seasonal and other effects and may at times differ to those measured during the investigation. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions. Where risk assessment is undertaken, this is based upon the standards, guidance and common practice at the time of the assessment and Delta-Simons cannot be responsible for conditions which become apparent following changes in guidance or practice or advancements in scientific knowledge which change the position in relation to assessment of risk.

No aspect of this Report constitutes a design. Where this information is used in design, the designer should verify the information has been used appropriately.

Where budgets are prepared and presented within the Report, these are for information only to indicate the likely magnitude of a cost and do not represent an invitation to treat for the works. All budgets and programmes presented should be reviewed and verified by appropriately qualified and experienced independent Project Managers and Cost Consultants.

Appendix B - Data Sources

In completing this Assessment, Delta-Simons has utilised the following data sources and third-party information:

- Current and Historical Ordnance Survey (OS) maps;
- British Geological Survey (BGS) data;
- Environment Agency (EA) online data;
- Coal Authority (CA) online data;
- A Landmark Envirocheck Report for the Site (Ref. 293547534_1_1), dated April 2022; and
- Historical Maps included as part of the Envirocheck Report.

Appendix C - Risk Definitions

Contaminated Land Risk Definitions

The following methodology is based on the methodology presented in CIRIA C552 Contaminated Land Risk Assessment: A Guide to Good Practice 2001. It requires the classification of the:

Magnitude of the potential consequence (severity) of the Risk occurring: and

Magnitude of the Probability (likelihood) of the Risk occurring.

The classifications are then compared to indicate the risk presented by each pollutant linkage.

Consequence to Receptor Definition Matrix

	Human Health	Controlled Waters	Buildings/Services
Severe Consequence	Acute or chronic permanent impact on human health.	Sensitive controlled water pollution ongoing, or just about	Catastrophic collapse
Medium Consequence	Chronic permanent impact on human health	Gradual pollution of sensitive controlled water	Degradation of materials
Mild Consequence	Chronic temporary impact on human health	Gradual pollution of non-sensitive controlled water	Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor Consequence	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc).	Slight discoloration of water	Easily repairable effects of damage to buildings, structures and services, i.e. discoloration of concrete

Probability Definitions

Probability	Definition in Context
Higher	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution. Positive evidence of source, pathway and receptor.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term. Suspect source, pathway, and receptor
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term. No evidence of hazard, pathway, and receptor

Standard Risk Matrix

		Consequence/Magnitude of impact			
		Severe	Medium	Mild	Minor
Probability	High	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/low	Low
	Low Likelihood	Moderate	Moderate/low	Low	Very Low
	Unlikely	Moderate/low	Low	Very Low	Very Low

Classified Risks and Likely Action

Significance Level	Definition/Comments
Very High Risk	<p>There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening.</p> <p>This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.</p> <p>Demonstrable contaminated land situation, highest threat & liability level, urgent action recommended.</p>
High Risk	<p>Harm is likely to arise to a designated receptor from an identified hazard.</p> <p>Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.</p> <p>Likely contaminated land situation, risk assessment and action recommended.</p>
Moderate	<p>It is possible that harm could arise to a designated receptor from an identified hazard. However, if it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild.</p> <p>Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.</p> <p>Plausible contaminated land situation, risk assessment and possible action recommended.</p>
Low Risk	<p>It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.</p> <p>Unlikely contaminated land situation, possible risk assessment and possible action.</p>
Very Low Risk	<p>There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.</p> <p>Negligible risk, no action recommended except vigilance for changes in conditions.</p>

Geotechnical Risk Classification

The geohazards listed in the report within Section 4 follow guidance presented in Clayton, C.R.I. (2001) *Managing Geotechnical Risk*, Thomas Telford and the Highways Agency document CD622 '*Managing Geotechnical Risk*' (2008) which aims to identify and manage the geotechnical risks associated with a scheme throughout its lifespan, from planning to construction to maintenance.

For each geohazard the probability of the hazard occurring (P) has been considered together with the impact it would have (I) if it were to happen to calculate the risk rating between 1 and 25.

Risks that fall within Moderate, Significant and Severe categories below are considered to be **substantial** and are therefore listed within the report.

Probability	(P)	X	Impact	(I)	=	(R)	Risk
Very Likely (VLk)	5		Very High (VH)	5		20 - 25	Severe
Likely (Lk)	4		High (H)	4		15 - 19	Substantial
Plausible (P)	3		Medium (M)	3		10 - 14	Moderate
Unlikely (U)	2		Low (L)	2		5 - 9	Minor
Very Unlikely (VU)	1		Very Low (VL)	1		1 - 4	Negligible

Appendix D - Site Photographs

Site Photographs



Photograph 1 - Looking north along the western boundary and A361



Photograph 2 - Access along the track on the northern portion of the Site



Photograph 3 - Northern portion of the Site from the track



Photograph 4 - Eastern portion of the Site, looking south-west



Photograph 5 - Small brick outhouse located in easternmost field



Photograph 6 - Relict structures considered to relate to a former water tank in the easternmost field



Photograph 7 - Looking south-west towards southern boundary



Photograph 8 - Looking north-west towards new development across A361

Appendix E - Historical Mapping

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

	Gravel Pit		Sand Pit		Other Pits
	Quarry		Shingle		Orchard
	Osiers		Reeds		Marsh
	Mixed Wood		Deciduous		Brushwood
	Fir		Furze		Rough Pasture
	Arrow denotes flow of water		Trigonometrical Station		
	Site of Antiquities		Bench Mark		
	Pump, Guide Post, Signal Post		Well, Spring, Boundary Post		
	-285 Surface Level				
	Sketched Contour		Instrumental Contour		
	Main Roads		Minor Roads		
	Sunken Road		Raised Road		
	Road over Railway		Railway over River		
	Railway over Road		Level Crossing		
	Road over River or Canal		Road over Stream		
	Road over Stream				
	County Boundary (Geographical)				
	County & Civil Parish Boundary				
	Administrative County & Civil Parish Boundary				
	County Borough Boundary (England)				
	County Burgh Boundary (Scotland)				
	Rural District Boundary				
	Civil Parish Boundary				

Ordnance Survey Plan 1:10,000

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Scrub
	Coppice		Bracken
	Heath		Rough Grassland
	Marsh		Reeds
	Saltings		
	Building		Glasshouse
	Sloping Masonry		Pylon
	Electricity Transmission Line		Pole
	Cutting		Embankment
	Standard Gauge Multiple Track		Standard Gauge Single Track
	Siding, Tramway or Mineral Line		Narrow Gauge
	Geographical County		
	Administrative County, County Borough or County of City		
	Municipal Borough, Urban or Rural District, Burgh or District Council		
	Borough, Burgh or County Constituency Shown only when not coincident with other boundaries		
	Civil Parish Shown alternately when coincidence of boundaries occurs		
	BP, BS Boundary Post or Stone		Pol Sta Police Station
	Ch Church		PO Post Office
	CH Club House		PC Public Convenience
	F E Sta Fire Engine Station		PH Public House
	FB Foot Bridge		SB Signal Box
	Fn Fountain		Spr Spring
	GP Guide Post		TCB Telephone Call Box
	MP Mile Post		TCP Telephone Call Post
	MS Mile Stone		W Well

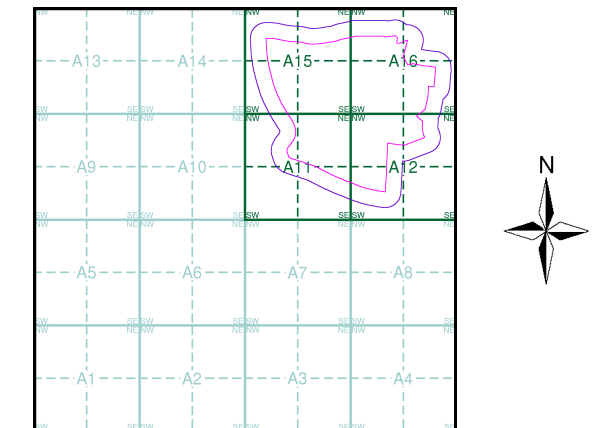
1:10,000 Raster Mapping

	Gravel Pit		Refuse tip or slag heap
	Rock		Rock (scattered)
	Boulders		Boulders (scattered)
	Shingle		Mud
	Sand		Sand Pit
	Slopes		Top of cliff
	General detail		Underground detail
	Overhead detail		Narrow gauge railway
	Multi-track railway		Single track railway
	County boundary (England only)		Civil, parish or community boundary
	District, Unitary, Metropolitan, London Borough boundary		Constituency boundary
	Area of wooded vegetation		Non-coniferous trees
	Non-coniferous trees (scattered)		Coniferous trees
	Coniferous trees (scattered)		Positioned tree
	Orchard		Coppice or Osiers
	Rough Grassland		Heath
	Scrub		Marsh, Salt Marsh or Reeds
	Water feature		Flow arrows
	MHW(S) Mean high water (springs)		MLW(S) Mean low water (springs)
	Telephone line (where shown)		Electricity transmission line (with poles)
	Bench mark (where shown)		Triangulation station
	Point feature (e.g. Guide Post or Mile Stone)		Pylon, flare stack or lighting tower
	Site of (antiquity)		Glasshouse
	General Building		Important Building

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Northamptonshire	1:10,560	1883 - 1884	2
Oxfordshire	1:10,560	1885	3
Oxfordshire	1:10,560	1900	4
Northamptonshire	1:10,560	1923	5
Northamptonshire	1:10,560	1938	6
Historical Aerial Photography	1:10,560	1948	7
Ordnance Survey Plan	1:10,000	1955	8
Ordnance Survey Plan	1:10,000	1968	9
Ordnance Survey Plan	1:10,000	1978	10
Ordnance Survey Plan	1:10,000	1994	11
10K Raster Mapping	1:10,000	1999	12
10K Raster Mapping	1:10,000	2006	13
VectorMap Local	1:10,000	2021	14

Historical Map - Slice A



Order Details

Order Number: 293743707_1_1
 Customer Ref: 21-2141.02
 National Grid Reference: 447380, 241830
 Slice: A
 Site Area (Ha): 73.45
 Search Buffer (m): 1000

Site Details

Land off Junction 11 of M40, BANBURY, OX16 3AD

Northamptonshire

Published 1883 - 1884

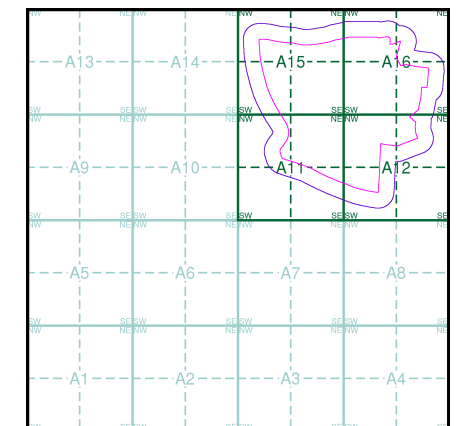
Source map scale - 1:10,560

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

Map Name(s) and Date(s)

058NW	1884
1:10,560	
058SW	1883
1:10,560	

Historical Map - Slice A

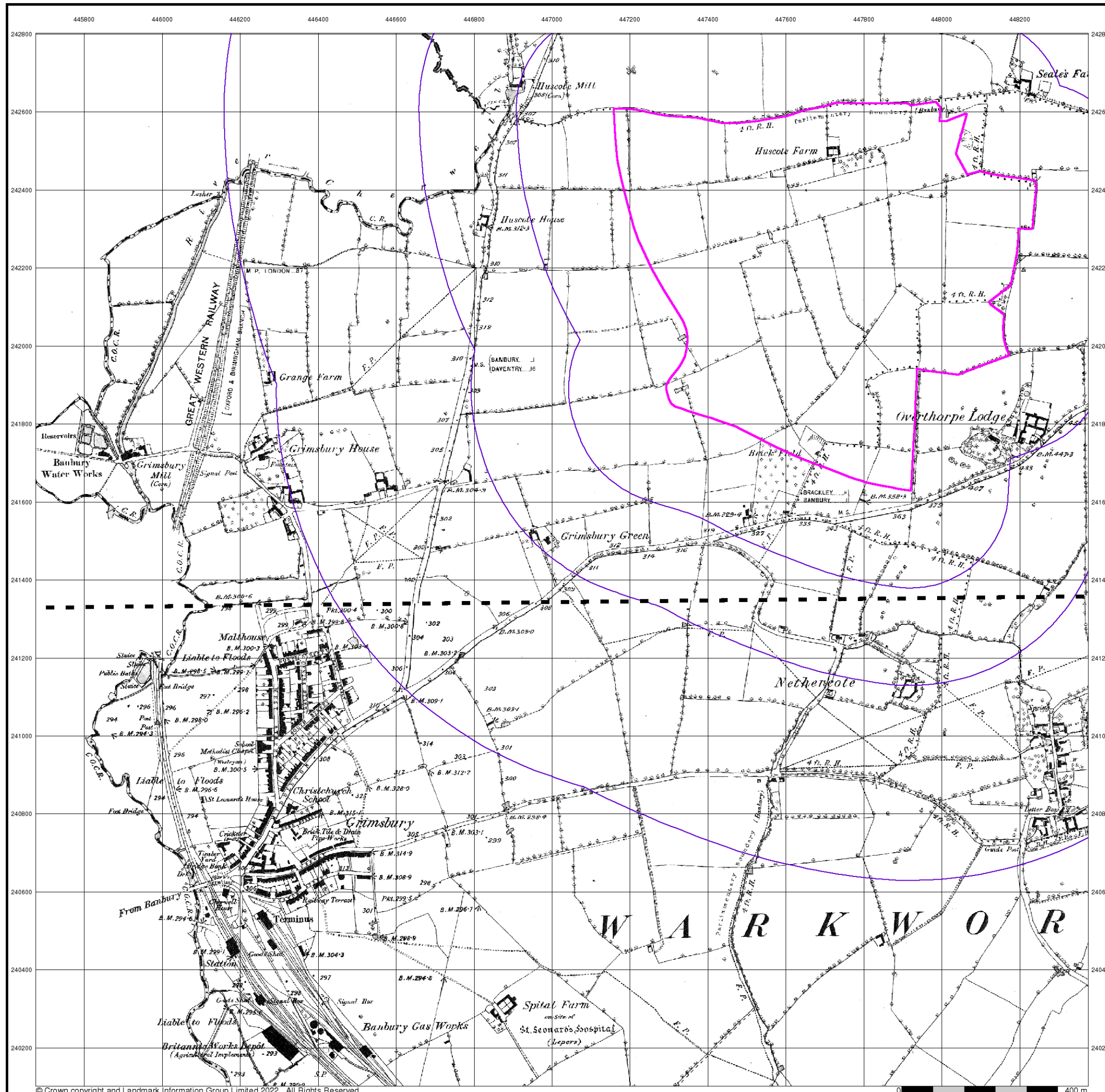


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 Slice: A
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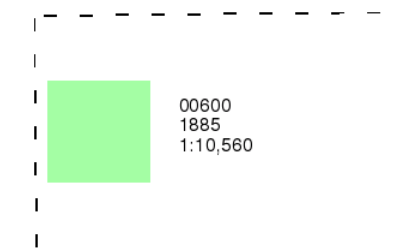
Oxfordshire

Published 1885

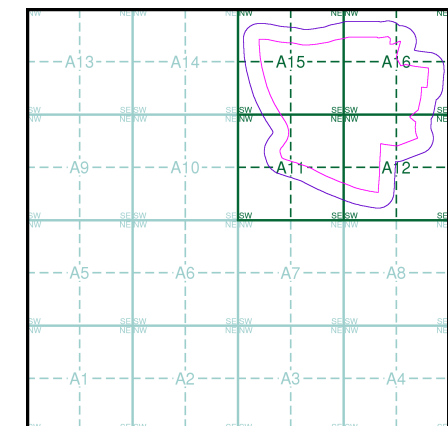
Source map scale - 1:10,560

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Historical Map - Slice A



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