



Land at Game Engineering For Game Engineering Ltd

Report no: 4974/1

Date: February 2024



GAME ENGINEERING SUMMARY OF GEOENVIRONMENTAL ISSUES

Job No.	4974	Site area/ha	1.3 ha
Client:	Game Engineering Ltd	NGR:	SK 895 627
Site:	Game Engineering	Nearest postcode:	LN6 9XP

The site is located off on un-named road within Witham St. Hughs Business Park, approximately 11km southwest of Lincoln city centre, and currently consists of a single parcel of land occupied by an existing commercial unit and external yards/storage areas.

Lithos were commissioned by Game Engineering Ltd to provide a preliminary geoenvironmental appraisal of the site. It is understood that the site is to be redeveloped with a single shed (c. 2,700m²), with associated external areas of hardstand and hard landscaping; a proposed layout has been prepared.

Lithos' investigation included an inspection of historical and geological maps and information provided by the British Geological Survey, the Landmark Information Group, and QGIS. In addition, a site inspection has been carried out.

A summary of salient geoenvironmental issues is provided in the table below.

Issue	Remarks
Former uses	The site is currently occupied by an existing Game Engineering workshop used for metal fabrication, with the area of proposed development currently consists of external yards/storage areas.
Anticipated ground conditions	Veneer of made ground is anticipated beneath concrete hardstand & tarmac areas. Bedrock is the Scunthorpe Mudstone Formation, no superficial deposits are mapped.
Anticipated contamination	Based on observations made during the site walkover, and given site's former and recent uses, a veneer of made ground is anticipated across the majority of the site, and it is considered likely some ground contamination will be present in shallow soils.
Hazardous gas	The site is in an area where less than 1% of homes are estimated to be above the radon action level. There are no known or suspected areas of landfilling within 250m, and the site is not in an area considered susceptible to mines gas, nor is it underlain by shallow mineworkings. As such, no special precautions against hazardous gas are required on this site.
Flooding & drainage	Given anticipated ground conditions, soakaways are considered unlikely to provide a viable solution for the disposal of surface water. Consequently, there may be a need for surface water balancing.
Preparatory works	General clearance of equipment/materials from site.
Anticipated foundation solutions	At present, no information has been made available on anticipated construction methods and loadings for the proposed builds. However, weathered bedrock should provide sufficient bearing capacity to enable the adoption of strip footings.
Recommendations for ground investigation	Machine-excavated trial pits to determine near surface ground conditions including depth to bedrock, with appropriate geotechnical and chemical testing.

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Appendix B – Drawings

Drawing	Title
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4974/5	Preliminary Conceptual Site Model

Appendix C - Commission

Appendix D – Historical OS plans*

Appendix E – Search responses*

From	Date	Content
Landmark	07/02/2024	Envirocheck report
Brimstone	14/02/2024	Stage 1 Preliminary UXO Risk Assessment

* Some of this data is not included within the paper or PDF copies of this report can be provided on request.

FOREWORD (GEOENVIRONMENTAL APPRAISAL REPORT)

This report has been prepared for the sole internal use and reliance of the Client named on page 1. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Lithos Consulting Limited (Lithos); such authorisation not to be unreasonably withheld. If any unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill.

This report has been reviewed by a Competent Person, as defined in the National Planning Policy Framework. We ensure that all projects are managed by individuals with necessary experience, relevant qualifications, and current membership of a relevant professional organisation. Records of engineers, project managers and reviewers involved in this project are maintained by us. Lithos QA/QC procedures for all our work forms an integral part of our ISO9001 accreditation and as such is regularly audited.

The report presents observations and factual data obtained during our site investigation and provides an assessment of geoenvironmental issues with respect to information provided by the Client regarding the proposed development. Further advice should be sought from Lithos prior to significant revision of the development proposals.

The report should be read in its entirety, including all associated drawings and appendices. Lithos cannot be held responsible for any misinterpretations arising from the use of extracts that are taken out of context. However, it should be noted that in order to keep the number of pages to a minimum, some information (e.g. full copy of the Landmark/Groundsure Report) is not included in the PDF; by request it can be provided.

The findings and opinions conveyed in this report (including review of any third-party reports) are based on information obtained from a variety of sources as detailed within this report, and which Lithos believes are reliable. Reasonable care and skill has been applied in examining the information obtained. Nevertheless, Lithos cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

Where the report refers to the potential presence of invasive weeds such as Japanese Knotweed, or the presence of asbestos containing materials, it should be noted that the observations are for information only and should be verified by a suitably qualified expert.

Lithos cannot be responsible for the consequences of changing practices, revisions to waste management legislation etc that may affect the viability of proposed remediation options.

The report represents the findings and opinions of experienced geoenvironmental consultants. Lithos does not provide legal advice and the advice of lawyers may also be required.

Lithos standard terms and conditions apply to the report, a copy of the terms and conditions can be found with our proposal in Appendix C.

**PRELIMINARY
GEOENVIRONMENTAL INVESTIGATION
of land at
GAME ENGINEERING**

1 INTRODUCTION

1.1 The commission and brief

- 1.1.1 Lithos Consulting were commissioned by Game Engineering Ltd to carry out a Preliminary Geoenvironmental Investigation of land at Game Engineering in Witham Saint Hughes.
- 1.1.2 Correspondence regarding Lithos' appointment, including the brief for this investigation, is included in Appendix C. The agreed scope of works included:
- A site walkover and inspection
 - An assessment of land use history
 - Determination of the site's environmental setting
 - Assessment of anticipated ground conditions, including potential contaminants
 - Assessment of anticipated foundation and engineering issues associated with redevelopment for a commercial end-use
 - Provision of recommendations for an appropriate ground investigation
- 1.1.3 This Preliminary Investigation comprised an inspection of historical and geological maps and information provided by the British Geological Survey, and the Landmark Information Group. In addition, a site inspection has been carried out by Lithos.
- 1.1.4 Primary aims of this investigation were to identify salient geoenvironmental issues affecting the site, and to satisfy requirements of the Planning Permission (ref. 23/0548/FUL), most notably Condition 8, Part A.

1.2 The proposed development

- 1.2.1 It is understood that consideration is being given to redevelopment of the site with a second commercial/industrial unit, comprising a single shed (c. 2,700m²) with associated external areas of hardstand and hard landscaping. A site layout has been provided by LHL Group (Drawing reference 09889 BSP 22-207, dated 12/04/23) which is reproduced as Drawing No. 4974/2 in Appendix B to this report.
- 1.2.2 The proposed development has Planning Permission (ref. 23/0548/FUL). With respect to ground, the planning consent includes a number of Conditions; most notably:
- Condition 8, which requires a: Desk Study (Part A), Site Investigation (Part B), and if necessary a Remediation Strategy (Part C) & verification of any remedial works (Part D).
- 1.2.3 This Report is a preliminary investigation, and therefore can only aid the discharge of Part A of Condition 8.

1.3 Report format and limitations

- 1.3.1 Standard definitions, procedures and guidance are contained within Appendix A, which includes background, generic information on assessment of the site's environmental setting.
- 1.3.2 General notes and limitations relevant to all Lithos preliminary investigations are described in the Foreword and should be read in conjunction with this report. The text of the report draws specific attention to any modification to these procedures and to any other special techniques employed.

2 SITE DESCRIPTION

2.1 General

2.1.1 The site's location is shown on Drawing 4974/1 presented in Appendix B to this report. Site details are summarised in the table below.

Detail	Remarks
Location	11 km southwest of Lincoln city centre
NGR	SE 895 627
Area	13,000 m ²
Known services	Underground electric & gas.

2.2 Site features

2.2.1 Lithos completed a walkover survey of the site on the 13th February 2024.

2.2.2 Existing salient features, at the time of the walkover are presented on Drawing 4974/3 in Appendix B to this report, and summarised in the table below.

Feature	Remarks
Current access	Off an un-named road within Witham St. Hughs Business Park
Topography	Relatively flat
Approximate areas	2,500m ² buildings 1,500m ² tarmac hardstand 2,500m ² concrete hardstand 4,000m ² gravel hardstand 2,500m ² grass
Nature of boundaries	North – hedges and trees East – overgrown trees and bushes (no physical boundary) South & west – Concrete post and wire fence
Surrounding land uses	North & east – open fields. South & west – industrial estate

2.2.3 Access to the site is via a gate on the southern boundary, leading to an area of hardstand car parking in the southwest and southeast corner of the site. A temporary office cabin is present in the northeast corner of the eastern car park.

2.2.4 The western half of the site is occupied by offices and a large workshop/warehouse used by Game Engineering for metal fabrication. Adjacent to this, and running through the centre of the site, is an area of concrete hardstand used by lorries for delivery/collection of goods and materials. Various skips and shipping containers are present in this area.

2.2.5 The eastern half of the site consists of gravel hardstand and rough grassland, and appears to be used as storage areas for both raw materials and finished products. Skips were also present, containing metal offcuts, metal waste and empty tins of paint/solvent.

2.2.6 Beyond the eastern boundary is an area of overgrown trees and bushes, no access was available and its current use is unknown.

2.2.7 In the southeastern corner there is a small stockpile of soil, concrete and brick. This is understood to be waste material produced during construction of the existing building.

2.2.8 In the northwest of the site, just beyond the redline boundary, is a sandblasting shed and associated stockpile of waste material produced by the sand blasting process. A tank of uncovered, unknown liquid (possibly oil) is situated just south of the shed.

2.2.9 A selection of site photographs is included on Drawing 4974/4.

2.3 Site operations

2.3.1 The site is currently operating as a metal fabrication works, out of the existing Game Engineering building in the western half of the site.

3 SITE HISTORY

3.1 In order to investigate the development history and previous land uses at the site and immediate surrounding land, site centred extracts from Ordnance Survey (OS) plans dating back to 1887 have been examined. These plans are presented in Appendix D to this report.

3.2 The table below provides a summary of the salient points relating to the history of the site with respect to the proposed end use. It is not the intention of this report to describe in detail all the changes that have occurred on or adjacent to the site. Significant former uses/operations are highlighted in **bold** text for ease of reference.

Date	Site	Surrounding land
1887	The site is part of a larger field.	Surrounded by farmland. Sheep Walks Farm to the northeast. Thurlby Village to the southeast.
1905	No significant changes.	
1948		
1966	Rough track shown on site.	Development of industrial/commercial area to the southwest, including an airfield (RAF Swinderby) . Residential development to the east.
1976	Two mounds/pits shown connected by roadways.	Further mounds/pits and buildings shown, linked by roadways leading towards the industrial/commercial area in the southwest.
1985	Mounds/pits and roadways no longer shown, site appears empty.	Depot shown the southwest.
1994	No significant changes.	No significant changes.
1995	Existing building is shown in the west.	
2000	No significant changes.	Industrial/commercial area no longer shown in the far south.
2006		Residential development in the far south – labelled as Witham St Hughs.
2023		Expansion of Witham St Hughs to the south.

3.1.2 Although not shown on the historic maps, RAF Swinderby airfield base first became operational on the 14th September 1940. By March 1943 over 3,000 personnel were based at the station.

3.1.3 The base was closed in 1993. By 2014 only all service buildings including the control tower had been demolished, only 2 hangars remained.

4 ENVIRONMENTAL SETTING

4.1 General

4.1.1 Notes describing how the site's environmental setting has been assessed are included in Appendix A to this report. Reference has been made to publicly available Government held digital data via QGIS (an Open Source Geographic Information System). The responses received from, the BGS and extracts from the Landmark Report are presented in Appendix E.

Issue	Data reviewed	Remarks
Geology	1:50,000 BGS map (Sheet 114)	Made ground – None mapped, likely veneer across yards & beneath building. Drift soils – None anticipated. Solid (bedrock) – Scunthorpe Mudstone Formation.
Mining	Coal Authority BGS maps	This site is located beyond the Coal Authority's defined coalfields.
Quarrying	Historical OS plans	None within 250m.
Landfills	Envirocheck	No known landfills within 250m.
Radon	Public Health England	The site lies in an area where less than 1% of homes are estimated to be above the action level.
Hydrogeology	Environment Agency electronic open data via QGIS	Source Protection Zone? No. Aquifer; Secondary B (Solid). Groundwater abstractions? None within 250m. Pollution incidents? Minor Incident on site of chemicals (paint/dyes) released to freshwater stream.
Hydrology	Defra Catchment data explorer Envirocheck Report	Nearest watercourse(s) – unnamed drain approximately 250m northeast, flowing east towards the River Witham. Water quality – unknown. Pollution incidents? None of significance. Abstractions? None. Discharge consents? None of significance.
Flood risk	Environment Agency electronic open data via QGIS	The site lies in Flood Zone 1, where the risk of flooding from rivers or the sea is classified as low. In accordance with Chapter 14 of the National Planning Policy Framework, a site-specific flood risk assessment is required for proposals of 1 hectare or greater in Flood Zone 1, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency).

4.2 Hazardous gas

Methane & carbon dioxide

4.2.1 The site is not believed to be affected by sources of hazardous gas generation as it is:

- Not located within 250m of a known former or current landfill site or backfilled feature (e.g. quarry, pond, canal etc)
- Neither underlain by shallow mineworkings nor located in an area considered susceptible to mines gas emissions
- Not underlain by a significant thickness of made ground
- Not underlain by peat or shallow chalk deposits

Radon

4.2.2 Requirements with respect to radon measures are set out in Building Regulations Approved Document C. Probability bandings (based on the proportion of properties in a given area that exceed the Action Level; currently 200 Bq.m⁻³) are used to determine whether a property requires no, basic or full measures.

4.2.3 At present Approved Document C advocates basic measures for the probability banding 3% to 10% (full measures if >10%). However, the UK Health Security Agency (HSA) would like to see all new build include basic measures.

4.2.4 In December 2022, the British Geological Survey (BGS), deployed a revised dataset which increased accuracy and also the number of properties falling within radon affected areas. This revised dataset is now referenced by maps on the HSA website.

4.2.5 Information from the HSA website indicates that the site lies in an area where **less than 1%** of homes are estimated to be above the action level.

4.2.6 As such, **no** special precautions against radon are required on this site.

5 UNEXPLODED ORDNANCE (UXO)

5.1.1 The term UXO refers to any unexploded ordnance which may occasionally be encountered within the ground. UXO is typically divided into 1 of 3 categories:

- Land Service Ammunition (LSA) – Fired, thrown or placed from a land-based gun (larger than a machine gun)/mortar/person. Includes bullets, shells, mortars and grenades.
- Small Arms Ammunition (SSA) – Fired from a machine gun & smaller. Comprises bullets.
- Air Dropped Weapons – Fired from a plane/blimp. Includes bombs, incendiaries, missiles and rockets in a variety of sizes (<25kg to >1 ton).

5.1.2 UXO presence is generally caused by one of the following:

- German bombing of Britain during WW1 and WW2.
- Anti-Aircraft batteries used to counter German attacks during WW2.
- Military training and exercises from 1700s to present day.
- Ordnance manufacture from 1700s to present day. Most intensively during WW1 (Kings Ordnance factories) and WW2 (National Filling factories).

5.1.3 Whilst UXOs are generally stable (buried bombs are considered often to be as stable as the day they were dropped) disturbance by excavation, impact, vibration, or heat can activate and detonate a hidden UXO. It is therefore important to try to avoid impact and disturbing bombs in the ground.

- 5.1.4 The site might be at risk of a UXO encounter during ground investigation and/or construction, due to the proximity of the former RAF Swinderby (less than 500m west). Therefore, there is a plausible risk of UXO presence in the ground.
- 5.1.5 Consequently, and in accordance with CIRIA C681¹ a preliminary desk-based Risk Assessment was commissioned from Brimstone Site Investigation. A copy of this report is included in Appendix E to this document.
- 5.1.6 Brimstone recommended a detailed risk assessment (Stage 2) to further assess the risk to the proposed ground investigation. Given time constraints associated with producing a detailed risk assessment, on site supervision from an Explosive Ordnance Disposal (EOD) engineer during the ground investigation was recommended.

6 PRELIMINARY CONCEPTUAL SITE MODEL

6.1 Potential contaminants

- 6.1.1 An assessment of potential contaminants associated with the former uses has been undertaken with reference to CLR8. As a consequence of this assessment, anticipated potential contaminants, within soil and/or groundwater include:
- Asbestos &/or ACMs within the made ground etc
 - TPH & PAH (fuels, oils associated with machinery use and maintenance, heating oils / tanks identified during the walkover)
- 6.1.2 A preliminary conceptual site model, presented as Drawing 4974/5 in Appendix B, has been prepared after consideration of all the data presented in Sections 2 to 4 inclusive of this report.
- 6.1.3 Potential contaminant linkages are shown on the preliminary conceptual site model.
- 6.1.4 The most significant potential contaminant **pathways** include:
- Ingestion
 - Dermal contact
 - Inhalation of contaminated particulates
 - Surface water run-off, including existing drainage infrastructure
- 6.1.5 The most significant potential contaminant **receptors** include:
- End users of the site (workers)
- 6.1.6 Clearly, the conceptual model will be subject to modification in light of data arising from the proposed intrusive ground investigation.

6.2 Anticipated ground conditions & potential issues

- 6.2.1 Based on the data reviewed in Section 4 (Environmental Setting), anticipated ground conditions are expected to comprise:

Anticipated condition	Remarks
Made ground	Veneer of made ground anticipated beneath concrete hardstand & tarmac areas.
Natural soils	No superficial deposits anticipated
Bedrock	Scunthorpe Mudstone Formation
Groundwater	Likely to lie at depth within bedrock

¹ CIRIA C681; *Unexploded Ordnance (UXO) – A guide for the construction industry*. CIRIA London 2009.

6.2.2 Based on the data above and that in Sections 2 (Site Description) and 3 (History), potential ground-related issues associated with this site are likely to include:

Type of issue	Specific issue	Remarks
Potential on-site contamination sources	<ol style="list-style-type: none"> Existing operations Fuel storage tanks Raw material storage etc 	<ol style="list-style-type: none"> Metal fabrication works Unknown oil/fuel tank adjacent to sandblasting shed Associated with metalworks
Potential off-site contamination sources	<ol style="list-style-type: none"> Surrounding industry 	<ol style="list-style-type: none"> Various including aggregate suppliers
Potential geotechnical hazards	<ol style="list-style-type: none"> Shallow bedrock 	<ol style="list-style-type: none"> Potential issues with deep drainage
Other potential constraints	<ol style="list-style-type: none"> Underground utilities 	<ol style="list-style-type: none"> Underground drainage

7 LAND CONTAMINATION – PART IIA & PLANNING

7.1 Local Authorities have responsibilities with respect to land contamination in the context both of Part IIA of the Environmental Protection Act 1990, and Planning.

7.2 The contaminated land regime in Part IIA was introduced specifically to address the historical legacy of land contamination. It applies where there is unacceptable risk, assessed on the basis of the **current** use and the relevant circumstances of the land. It is not directed to assessing risks in relation to a future use of the land that would require a specific grant of planning permission. This is primarily a task for the planning system, which aims to control development and land use in the **future**.

Planning

7.3 As of March 2012, Planning Policy Statement (PPS23) was replaced by the National Planning Policy Framework (NPPF), supported by web-based planning practice guidance. The NPPF (updated in September 2023) includes the following with respect to contamination and site investigation:

“Where a site is affected by contamination or land stability issues, responsibility for securing safe development rests with the developer and/or landowner”.

7.4 Planning policies and decisions should ensure that:

- The site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses, and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation
- After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the environmental protection act 1990
- Adequate site investigation information, prepared by a competent person, is presented'

7.5 Annex 2 of the NPPF states that 'all investigations of land potentially affected by contamination should be carried out in accordance with established procedures (such as BS10175²)'.

² BS10175 (2011) - Code of practice for the investigation of potentially contaminated sites

This site

- 7.6 The underlying Scunthorpe Mudstone Formation is classified as a Secondary B aquifer. The nearest surface watercourse is an unnamed drain, which flows in an easterly direction, approximately 250m beyond the site's eastern boundary. Therefore, the site's environmental setting is considered to be of low sensitivity.
- 7.7 With respect to human health, the proposed end use (industrial) is considered moderately sensitive.
- 7.8 Current and historical use of the site (fabrication & manufacturing) are likely to have given rise to some ground contamination.
- 7.9 However, it is considered that the site should be suitable for the proposed use subject to implementation of appropriate preparatory works.

8 GROUND INVESTIGATION DESIGN

8.1 General

- 8.1.1 Given the size of the proposed building, some geotechnical investigation to determine ground conditions (including the shrinkability of clay soils and concrete class) would be prudent.

8.2 Ground investigation design & strategy

- 8.2.1 The preliminary conceptual site model has been used as a basis for design of an appropriate ground investigation, the scope of which is summarised below.

Exploratory holes	Purpose
Ten Trial Pits	To determine the general nature of made ground underlying the site, including the: <ul style="list-style-type: none"> • Nature, distribution and thickness • Nature, degree and extent of contamination • Proportion of undesirable elements e.g. biodegradable matter, foundations etc • Suitability of the ground for founding structures and highways To determine the nature, distribution and thickness of shallow natural soils, including suitability of the ground for founding structures and highways.

- 8.2.2 Proposed exploratory hole locations should be selected to provide a representative view of the strata beneath the site and to target potential areas of interest identified in Section 4 above. A nominal 50m grid spacing should be appropriate, with additional exploratory locations scheduled as necessary in light of the ground conditions actually encountered.
- 8.2.3 Representative soil samples of natural and any man-made ground should be taken during the works. The number of soil samples taken should be reflective of the geological complexity actually encountered, but in general about 3 samples should be taken from most exploratory holes.
- 8.2.4 The investigation should be undertaken in general accordance with:
 - BS5930:2015 "Code of practice for site investigation"
 - BS10175:2017 "Code of practice for the investigation of potentially contaminated sites"
 - "Technical Aspects of Site Investigation" – EA R&D Technical Report P5-065/TR (2000)
 - "Development of appropriate soil sampling strategies for land contamination" – EA R&D Technical Report P5-066/TR (2001)

- 8.2.5 **Trial pitting** will enable determination of:
- Nature, distribution and thickness of shallow soils
 - Nature of made ground (uppermost 3m to 4m), including:
 - visual/olfactory evidence of potential contamination and the proportion of undesirable elements e.g. biodegradable matter, relict foundations etc
 - the proportion of “oversize”, boulder-sized material
 - Suitability of the ground for founding structures and highways
- 8.2.6 The mechanical excavator should be equipped with a breaker to enable excavation through near-surface and buried concrete slabs and obstructions.
- 8.2.7 The in-situ shear strengths of any cohesive soils encountered should be determined by use of a hand-held shear vane.
- 8.2.8 The potential for **soakaways** should be reviewed in light of ground conditions actually encountered, and if considered likely, soakaway tests should be commissioned. Testing would also remove any ambiguity with respect to Anglian Waters queries.
- 8.2.9 It should be noted that if the initial soakaway tests yield satisfactory results, in order to obtain approvals from the LLFA, Highways etc, the drainage designer is likely to require further testing: (a) within 25m of proposed chamber locations; and (b) to include 3 fills.
- 8.2.10 Appropriate **chemical analyses** based on the findings of this Report should be allowed for. This is likely to comprise 15 samples for a suite including heavy metals, asbestos ID, TOC, banded TPH (with supplementary speciation where appropriate), and speciated PAH. In the event that ground contamination is more significant or different to that anticipated, it might be necessary to carry out additional chemical testing.
- 8.2.11 On completion of the fieldwork and laboratory testing a comprehensive bound, factual and interpretative report should be issued. This should contain detailed engineering records, laboratory test results, copies of all relevant correspondence and drawings of the site. The report should also include qualitative risk assessment with respect to both controlled waters and human health.

9 CONCLUSIONS & RECOMMENDATIONS

9.1 General

- 9.1.1 The site comprises c. 1.3 hectares of land located in Witham St Hughes Business Park about 11km southwest of Lincoln city centre. The site is currently used as a yard/storage area by Game Engineering Ltd.
- 9.1.2 It is understood that consideration is being given to redevelopment of the site with a second commercial/industrial unit at the above land, comprising a single shed (c. 2,700m²) with associated external areas of hardstand and hard landscaping. A site layout has been provided by LHL Group (Drawing reference 09889 BSP 22-207, dated 12/04/23) which is reproduced as Drawing No. 4974/2 in Appendix B to this report.
- 9.1.3 The main issues considered in this report, and in particular in Sections 3 & 4 are based on a review of historical maps and available geological/environmental data. This report provides an assessment of geoenvironmental issues and implications associated with the proposed development of the site, together with any implications for current use of the site.

9.2 Hazardous gas

- 9.2.1 The site is in an area where less than 1% of homes are estimated to be above the radon action level.
- 9.2.2 There are no known or suspected areas of landfilling within 250m, and the site is not in area considered susceptible to mines gas, nor is it underlain by shallow mineworkings.
- 9.2.3 As such, no special precautions against hazardous gas are required on this site.

9.3 Foundations

- 9.3.1 At present, no information has been made available on anticipated construction methods and loadings for the proposed builds. In addition no site investigation data is available. The comments made below are indicative only and should be revised following a suitable ground investigation.
- 9.3.2 Made ground is not generally considered a suitable founding material and foundations should be taken through it, into underlying natural in-situ strata of adequate bearing capacity.
- 9.3.3 All concrete slabs and service ducts will require breaking out during the demolition of existing buildings. Foundations that conflict with relict foundations should be taken to greater depth than the relict foundations and into natural ground of adequate bearing capacity.
- 9.3.4 The published geological data suggests that site is underlain by the Scunthorpe Mudstone Formation, likely weathered near surface to a gravelly Clay.
- 9.3.5 Weathered bedrock should provide sufficient bearing capacity to enable the adoption of strip footings. Reinforcement, as a precaution against differential settlement, is recommended only where foundation excavations encounter significant lateral and vertical variations in strata.
- 9.3.6 If rock is encountered at shallow depth, foundations should be placed entirely on rock and not partially on rock and partially on residual soil. This may, depending on surface gradient, necessitate significant over deepening of foundations.

9.4 Highways and external works

- 9.4.1 Given the relatively level nature of the site, there should be no requirement for retaining walls, underbuild, tanking etc.
- 9.4.2 Weathered mudstone should yield a CBR of at least 3%. This value should be verified prior to or during construction.

9.5 Soakaways & drainage

- 9.5.1 Given anticipated ground conditions, soakaways are considered unlikely to provide a viable solution for the disposal of surface water. Consequently, there may be a need for surface water balancing.

9.6 Contamination

- 9.6.1 The site's environmental setting is considered to be of low sensitivity. With respect to human health, the proposed end use (industrial) is considered of moderate sensitivity.

9.6.2 Based on observations made during the site walkover, and given site's former and recent uses, a veneer of made ground is anticipated, and it is considered likely that some (probably minor) ground contamination will be present in shallow soils.

9.6.3 Consequently, a ground investigation is required in order to assess the degree and extent of any ground contamination, and enable the preparation of a Remediation Strategy.

9.7 Further investigation

9.7.1 Whilst the site is considered suitable for its current and proposed use, the proposed change in use will require intrusive investigation.

9.7.2 This would include:

- Machine-excavated trial pits to determine near surface ground conditions including depth to bedrock, the presence of obstructions, groundwater and stability
- Geotechnical soils analysis to enable foundation recommendations
- Chemical testing on soil and if necessary groundwater, samples to assess the significance of contamination, if any, as a result of former industrial land use

9.7.3 An appropriate ground investigation strategy is presented in Section 8.

Appendix A

General Notes

General

Third party information obtained from the British Geological Survey (BGS), the Coal Authority, the Local Authority etc is presented in the "Search Responses" Appendix of this Geoenvironmental Report.

Geology, mining & quarrying

In order to establish the geological setting of a site, Lithos refer to BGS maps for the area, and the relevant geological memoir. Further information is sourced by reference to current and historical OS plans.

In July 2011, the Coal Authority (CA) formalised their requirements in relation to planning applications and introduced some new terminology. The CA, using its extensive records has prepared plans for all coalfield Local Planning Authorities, which effectively refines the defined coalfield areas into High Risk and Low Risk areas. **High Risk** areas are likely to be affected by a range of legacy issues that pose a risk to surface stability, including: mine entries; shallow coal workings; workable coal seam outcrops; mines gas; and previous surface mining sites. **Low Risk** areas comprise the remainder of the defined coalfield, and are areas where no known defined risks have been recorded; although there may still be unrecorded issues. Where a site lies within either a High or Low Risk area, a mining report is obtained from the CA.

Landfills

Reference is made to publicly available Government held digital data via **QGIS** (an Open Source Geographic Information System), data from Landmark or Groundsure, and sometimes the Environment Agency and the Local Authority with respect to known areas of landfilling within 250m of the proposed development site.

Historical OS plans are also inspected for evidence of backfilled quarries, railway cuttings, colliery spoil tips etc.

Radon

Radon is a colourless, odourless gas, which is radioactive. It is formed in strata that contain uranium and radium (most notably granite), and can move through fissures eventually discharging to atmosphere, or the spaces under and within buildings. Where radon occurs in high concentrations, it can pose a risk to health.

In order to assess potential risks associated with radon gas, Lithos refer to BRE Report BR211¹, and the UK Health Protection Agency (HPA) website. In December 2022, the British Geological Survey (BGS), deployed a revised dataset which increased accuracy and also the number of properties falling within radon affected areas. This revised dataset is now referenced by maps on the HSA website.

Advice on the limitation of exposure of the population to radon in buildings was originally published in 1990 by the National Radiological Protection Board (NRPB), which joined the HPA in 2005; the HPA updated NRPB advice in July 2010².

The HPA recommended that the NRPB radon Action Level for homes be retained, and a new Target Level for radon in homes be introduced. The values of the Action Level and Target Level, expressed as the annual average radon concentration in the home, are 200 Bqm⁻³ and 100 Bqm⁻³ respectively. The Target Level was to provide an objective for remedial action in existing homes and preventive action in new homes.

The term 'radon Affected Area' is defined as those parts of the country with >1% of homes estimated to be above the Action Levels. The level of protection needed is site-specific and can be determined by reference to this mapping on the Public Health England website, which indicates the highest radon potential within each 1km grid square. Each 1km grid square is classified on the basis of the percentage of existing homes within that grid square estimated to have radon concentrations above the Action Level. There are 6 'bands': <1%; 1 to 3%; 3 to 5%; 5 to 10%; 10 to 30%; and >30%.

The NRPB advised that action should be taken to reduce radon concentrations in existing homes if the radon concentration exceeded the Action Level of 200 Bqm⁻³ in room air averaged over a year; ten times the average UK domestic radon concentration. NRPB advice informed changes in the requirements for radon protection in new buildings.

- **Basic** preventive measures are required in new buildings, extensions, conversions and refurbishments if the probability of exceeding the Action Level is >3% in England and Wales, and >1% in Scotland and Northern Ireland.
- Provision for further preventive (**Full**) measures is required in new buildings if the probability of exceeding the Action Level is >10%.

At present Building Regulations Approved Document C advocates basic measures for the probability banding 3% to 10%, and full measures if >10%. However, HPA would like to see all new build include basic measures.

Action & Target Levels should also be applied to non-domestic buildings with public occupancy exceeding 2,000 hrs/yr and to all schools.

Hydrogeology

Reference is made to publicly available Government held digital data via QGIS, and Landmark or Groundsure with respect to:

- Groundwater quality
- Recorded pollution incidents
- Licensed groundwater abstractions

From April 2010 the EA's Groundwater Protection Policy uses aquifer designations that are consistent with the Water Framework Directive. These designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply), but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey. The maps are split into two different types of aquifer designation:

- Superficial (Drift) - permeable unconsolidated (loose) deposits. For example, sands and gravels
- Bedrock - solid permeable formations e.g. sandstone, chalk and limestone

The maps display the following aquifer designations:

Principal aquifers: These are layers of rock or superficial deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Secondary aquifers: These include a wide range of rock layers or superficial deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into three types:

- **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
- **Secondary B** - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers
- Secondary undifferentiated - In most cases, this is because the rock type in question has previously been designated as both a minor and non-aquifer in different locations due to the variable characteristics.

¹ BRE Report BR211, 2023: "Radon: guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects)".

² Limitation of Human Exposure to Radon, Documents of the Health Protection Agency - Radiation, Chemical and Environmental Hazards, RCE-15. July 2010.

Unproductive strata: These are rock layers or superficial deposits with low permeability that have negligible significance for water supply or river base flow.

The EA maps only display the principal and secondary aquifers as coloured areas. All uncoloured areas on the map will be unproductive strata. However, for uncoloured areas on the superficial (drift) designation map it is not possible to distinguish between areas of unproductive strata and areas where no superficial deposits are present; to do this, it is necessary to consult the published geological survey maps.

For the purposes of the EA's Groundwater Protection Policy the following default position applies, unless there is site specific information to the contrary:

- If no superficial (drift) aquifers are shown, the bedrock designation is adopted
- In areas where the bedrock designation shows unproductive strata (the uncoloured areas) the superficial designation is adopted
- In all other areas, the more sensitive of the two designations is used (e.g. If secondary superficial overlies principal bedrock, an overall designation of principal is assumed)

The EA have also designated groundwater Source Protection Zones, which are based on proximity to a groundwater source (springs, wells and abstraction boreholes). The size of a Source Protection Zone is a function of the aquifer, volume of groundwater abstracted and the effective rainfall, and may vary from tens to several thousand hectares.

Hydrology

Reference is made to publicly available Government held digital data via QGIS, and Landmark or Groundsure with respect to:

- Surface water quality
- Recorded pollution incidents
- Licensed abstractions (groundwater & surface waters)
- Licensed discharge consents
- Site susceptibility to flooding

The EA have set **water quality** targets for all rivers. These targets are known as River Quality Objectives (RQOs). The water quality classification scheme used to set RQO planning targets is known as the River Ecosystem scheme. The scheme comprises five classes (RE1 to RE5) which reflect the chemical quality requirements of communities of plants and animals occurring in our rivers.

General Quality Assessment (GQA) grades reflect actual water quality. They are based on the most recent analytical testing undertaken by the EA. There are 6 GQA grades (denoted A to F) defined by the concentrations of biochemical oxygen demand, total ammonia and dissolved oxygen.

The susceptibility of a site to **flooding** is assessed by reference to a Flood Map on the Environment Agency's website. These maps show natural floodplains - areas potentially at risk of flooding if a river rises above its banks, or high tides and stormy seas cause flooding in coastal areas. There are two different kinds of area shown on the Flood Map:

1. Dark blue areas (Flood Zone 3) could be flooded by the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year, or by a river by a flood that has a 1% (1 in 100) or greater chance of happening each year
2. Light blue areas (Flood Zone 2) show the additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1% (1 in 1000) chance of occurring each year

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements. Where there is no blue shading (Flood Zone 1), there is less than a 0.1% (1 in 1000) chance of flooding occurring each year.

The maps also show all flood defences built in the last five years to protect against river floods with a 1% (1 in 100) chance of happening each year, or floods from the sea with a 0.5% (1 in 200) chance of happening each year, together with some, but not all, older defences and defences which protect against smaller floods.

The Agency's assessment of the likelihood of flooding from rivers and the sea at any location is based on the presence and effect of all flood defences, predicted flood levels, and ground levels.

It should also be noted that as the floodplain shown is the 1 in 100 year, areas outside this may be flooded by more extreme floods (e.g. the 1 in 1000 year flood). Also, parts of the areas shown at risk of flooding will be flooded by lesser floods (e.g. the 1 in 5 year flood). In some places due to the shape of the river valley, the smaller floods will flood a very similar extent to larger floods but to a lesser depth.

If a site falls within a floodplain, it is recommended that a flood survey be undertaken by a specialist who can advise on appropriate mitigating measures; i.e. raising slab levels, provision of storage etc. In accordance with Chapter 10 of the National Planning Policy Framework, a site-specific flood risk assessment is required for: proposals of 1 hectare or greater in Flood Zone 1, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and any new development in Flood Zones 2 and 3.

COMAH & explosive sites

Lithos obtain information from Landmark or Groundsure with respect to Control of Major Accident Hazards (COMAH) or explosive sites within 1km of the proposed development site. Lithos' report refers to any that are present, and recommends that the Client seeks further advice from the HSE.

Areas around COMAH sites (chemical plants etc) are zoned with respect to the implementation of emergency plans. The HSE are a statutory consultee to the local planning authority for all COMAH sites. The COMAH site may have to revise its emergency action plan if development occurs. This might be quite straightforward or could entail significant expenditure. Consequently, the COMAH site may object to a proposed development (although it is the Local Authority who have final say, and they are likely to place more weight on advice from the HSE).

Preliminary conceptual site model

The site's environmental setting (and proposed end use) is used by Lithos to assess the significance of any contamination encountered during the subsequent ground investigation.

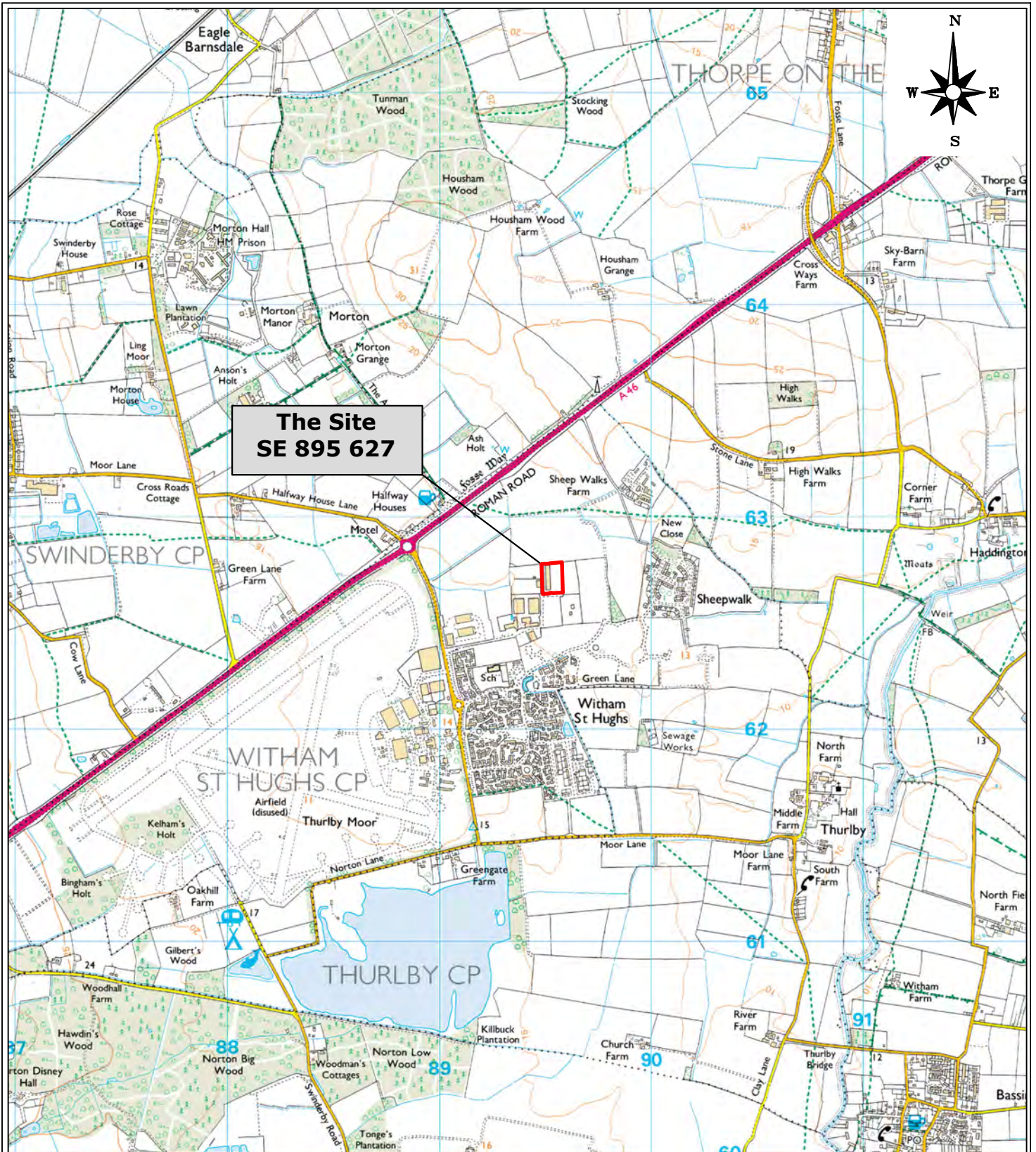
Assessment of contaminated land is based on an evaluation of pollutant linkages (source-pathway-receptor). Contaminants within the near surface strata represent a potential source of pollution. The environment (most notably groundwater), site workers and end users are potential receptors.

Potential pollutant linkages are shown on a preliminary conceptual site model (pCSM). A CSM is essentially a cross-section through a site that reflects both the surface topography and underlying geology, and shows surface features of interest. The most significant sources of contamination are then superimposed onto this cross-section together with potential receptors (human health & controlled waters), and plausible pathways between the two. In addition to environmental issues, the CSM should also highlight geotechnical issues.

A pCSM is prepared after consideration of all available "desk study" data, and before design of the ground investigation. Data reviewed should include historical plans (with superimposition on a current-day plan), previous SI reports, geological maps etc. The pCSM, in conjunction with knowledge of site constraints (buildings, services, slopes etc) is used to design the ground investigation.

The revised CSM takes account of data obtained during the ground investigation, including the distribution of made ground, the nature and distribution of contamination etc.

Appendix B
Drawings



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LTD

JOB TITLE

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HUGHS

DRAWING TITLE

SITE LOCATION
PLAN

DRAWN

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DATE

07 02 2024

CHECKED

REG

DATE

15 02 2024

STATUS

FOR COMMENT

DRAFT

FOR APPROVAL

FINAL

SCALE

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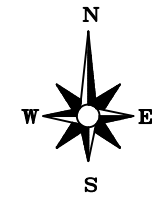
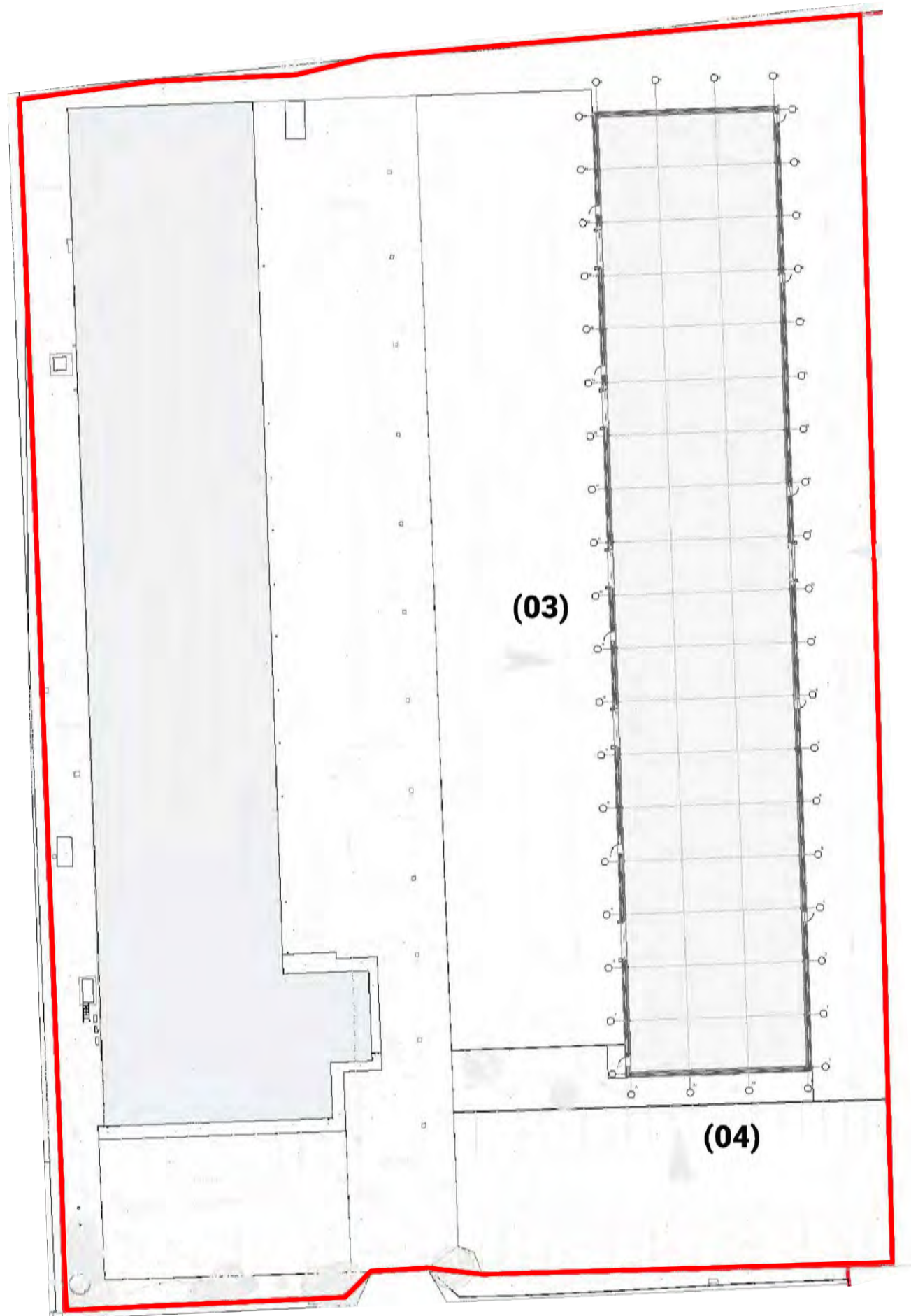
SHEET

A4

DRAWING NO.

4974/1

REVISION



NOTES

— APPROXIMATE SITE BOUNDARY

REPRODUCED FROM LHL GROUP DRAWING
REFERENCE 09889 BSP 22-207, DATED
12/03/2023

REV.	DESCRIPTION	DATE



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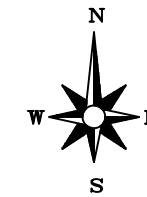
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NOTES

- GRASS
- OVERGROWN AREA
- BUILDING
- GRAVEL OR HARDCORE SURFACING
- TARMAC HARDSTAND
- CONCRETE HARDSTAND
- STORAGE TANKS
- APPROXIMATE SITE BOUNDARY

REV.	DESCRIPTION	DATE



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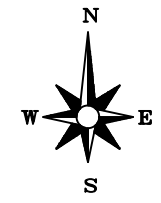
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DRAWING TITLE
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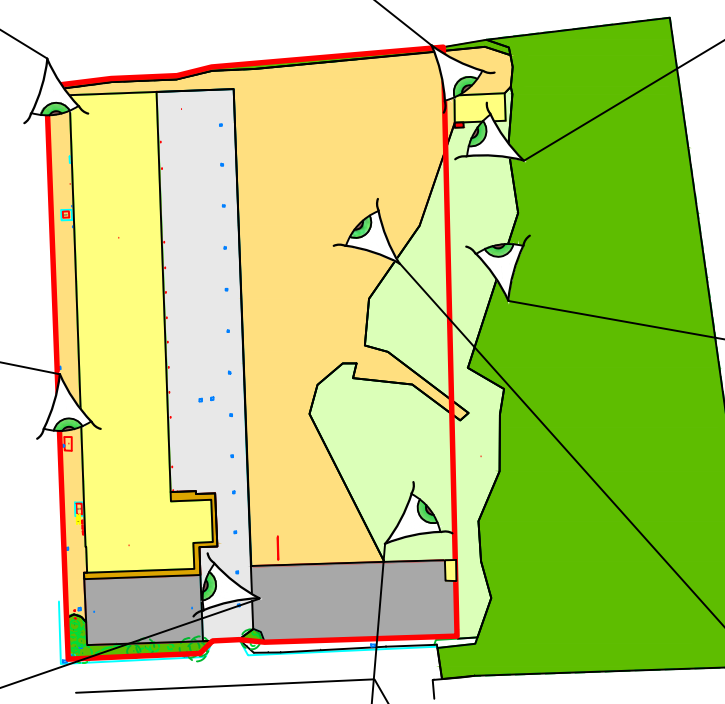
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CHECKED REG	DATE 15 02 2024	

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- NOTES
- GRASS
 - OVERGROWN AREA
 - BUILDING
 - GRAVEL OR HARDCORE SURFACING
 - TARMAC HARDSTAND
 - CONCRETE HARDSTAND
 - STORAGE TANKS
 - APPROXIMATE SITE BOUNDARY
 - LOCATION & ORIENTATION OF PHOTOGRAPH

REV.	DESCRIPTION	DATE





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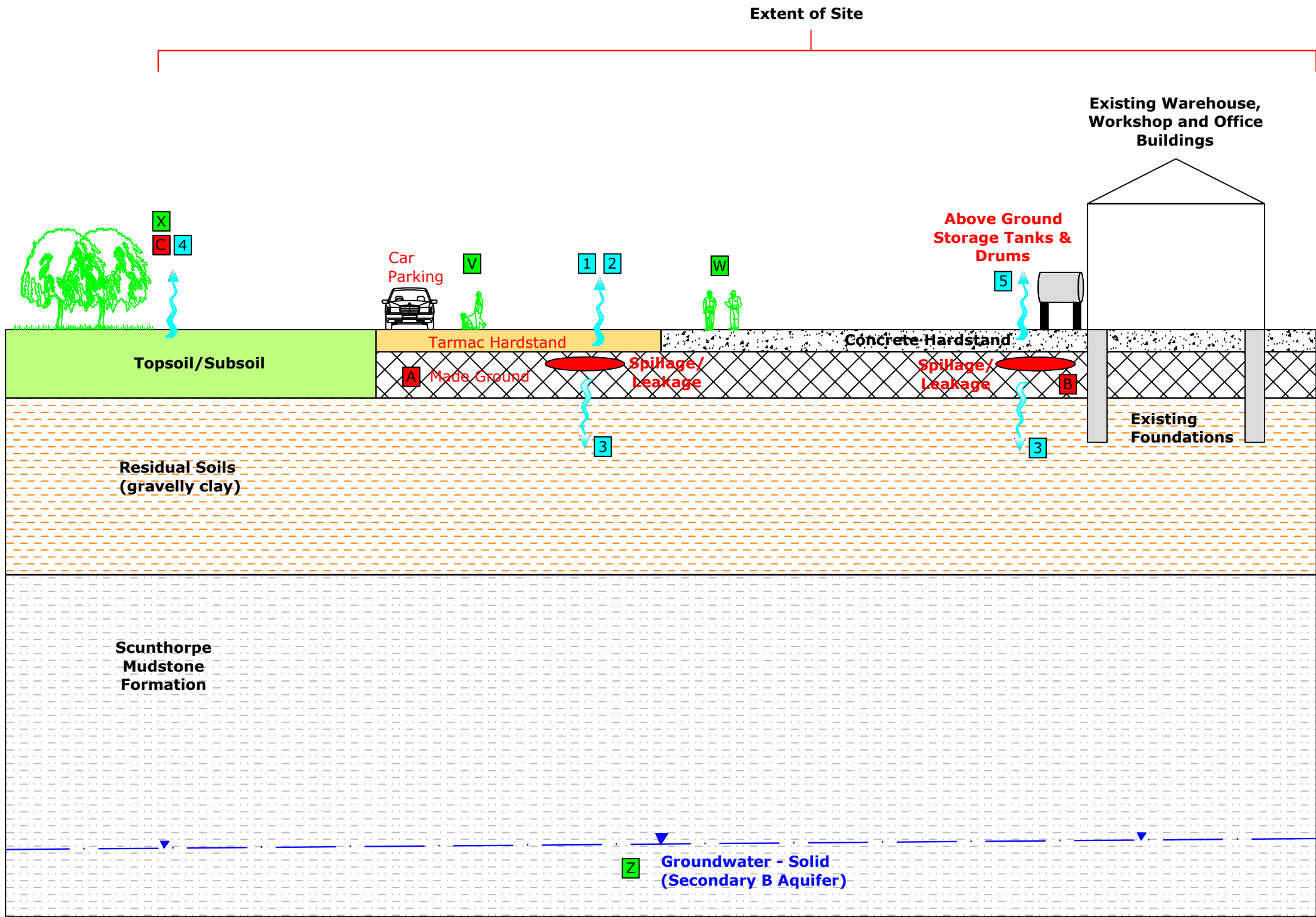
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DRAWING TITLE

SITE PHOTOGRAPHS

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				FINAL	<input checked="" type="checkbox"/>

SCALE	SHEET	DRAWING NO.	REVISION
NOT TO SCALE	A3	4974/4	



SOURCES	
A	MADE GROUND (INORGANICS)
B	LEAKAGE/SPILLAGE (ORGANICS)
C	INVASIVE PLANTS

PATHWAYS	
1	DERMAL CONTACT
2	INGESTION/INHALATION
3	LEACHING OF CONTAMINANTS
4	UPTAKE BY PLANTS
5	VOLATILISATION

RECEPTORS	
V	END USERS
W	SITE WORKERS
X	VEGETATION
Y	SURFACE WATERS
Z	GROUNDWATER

NOTES		
REV.	DESCRIPTION	DATE



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JOB TITLE
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DRAWING TITLE
PRELIMINARY CONCEPTUAL SITE MODEL

DRAWN WN	DATE 13 02 2024	STATUS FOR COMMENT <input type="checkbox"/> FOR APPROVAL <input type="checkbox"/> DRAFT <input type="checkbox"/> FINAL <input checked="" type="checkbox"/>
CHECKED REG	DATE 15 02 2024	

SCALE Not to scale	SHEET A3	DRAWING NO. 4974/5	REVISION
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Appendix C
Commission

002/4974/GLM

30th January 2024

Mr S Bennett
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Registered in England 07068066

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Dear Shaun

Game Engineering, Witham Saint Hughes

Further to your recent invitation, please find attached our proposal for undertaking a site investigation on the above land. We understand that your proposed development will comprise construction of a second commercial/industrial unit at the above land; a single shed (c. 2,700m²) with associated external areas of hardstand and hard landscaping.

We understand that your proposed build has planning permission (Application No. 23/0548/FUL). With respect to ground, the planning consent includes Condition 8 which requires a Desk Study (Part A), Site Investigation (Part B), and if necessary a Remediation Strategy (Part C) & verification of any remedial works (Part D). Parts C and D should only apply if contamination is found and remediation works are necessary. The work outlined in this proposal should enable discharge of Condition 8.

Review of the information supplied suggests that the site consists of a single parcel of land occupied by an existing commercial unit and external yards/storage areas.

Brief review of internet data suggests the site:

- Remained greenfield throughout the late 19th and early 20th Century, but has since been developed, along with surrounding land, with commercial/industrial units;
- Is not located within 250m of a known landfill site;
- Is not within a groundwater source protection zone;
- Is in an area where the risk of encountering UXO is considered moderate; and,
- Is located beyond the Coal Authority's defined coalfields.

Brief examination of the relevant geological map suggests the site is underlain by the Scunthorpe Mudstone Formation, likely weathered near surface to a gravelly Clay.

The scope of works outlined in this letter should enable us to assess abnormal development issues, associated with the ground. However, the nature of site investigation is such that it is not always possible to foresee all the potential issues. Consequently, it is sometimes necessary to recommend additional work, but where this occurs we will inform you immediately, provide costs, and seek your further instruction. We have visited site and reviewed available internet data and our geological maps in order to minimise the likelihood of further work.

We will need a Promap or topo survey in CAD format, to provide a base plan for technical drawings etc. If you do not have one, we could obtain for an EVO of £***.



Our site investigation will be undertaken in accordance with UK good practice (as outlined in BS5930, BS10175, LCRM etc).

Our Report may not be fully compliant with Eurocode 7 (EC7) and will not purport to be a Ground Investigation Report, nor a Geotechnical Design Report as defined by EC7. Our ground appraisal is intended to assist others as they proceed with design of the proposed development.

This proposal allows for the following works:

Desk study: Environmental search data and historical maps (obtained from Landmark or Groundsure), will be reviewed in order to determine whether past land uses have had any effect on the proposed development. In addition, published geological plans of the area will be examined.

We will also visit site to review current operations and undertake a walkover survey.

Given the sites location and history (less than 500m east of the former RAF Swinderby) the site might be at risk of a UXO encounter during ground investigation and/or construction. Consequently we have allowed for obtaining a **Stage 1 Preliminary UXO Risk Assessment** from our chosen UXO specialists (PLANIT). This survey should be completed before we carry out any intrusive ground investigation activities.

In the event that the Stage 1 Assessment determines that a plausible risk is present then we would need to obtain a Stage 2 Detailed Risk Assessment; allow an e/o cost of £*** to Item A of this quote. The Stage 2 assessment would be commissioned to consider the proposed construction works as well as Lithos' investigation; this assessment could be relied upon for the duration of the development.

Ground investigation activities may also need to be supervised by a UXO specialist (PLANIT) in addition to the geoenvironmental engineer (Lithos). PLANIT would undertake a non-intrusive UXO magnetometer survey, centred on each of the proposed trial pit positions to identify ferrous magnetic anomalies allowing them to be safely positioned. This would add £*** per day to the cost of the ground investigation.

Fieldwork: We have allowed for one day's trial pitting (about 10 pits) with all works being logged and supervised by an experienced geoenvironmental engineer.

Trial pitting will enable us to determine the:

- Nature of any made ground
- Nature, distribution and thickness of shallow soils
- Suitability of the ground for soakaways
- Suitability of the ground for founding structures and highways

The mechanical excavator used to excavate trial pits will be equipped with a breaker to enable excavation through near-surface and buried concrete slabs and obstructions.

Representative soil samples of natural and man-made ground, including any contaminated samples, will be taken during the works. In-situ shear strengths of any cohesive soils encountered will be determined by the use of a hand-held shear vane.

We will make every effort to compact arisings and 'sweep' them over each trial pit. However, you should be aware that on completion of the investigation, "graves" of spoil (each about 3m long by 1m wide) unsuitable for trafficking, will be left up to 400mm proud at each trial pit location. At this stage, no allowance has been made for any further reinstatement such as removal of excess arisings, reinstatement of the hardstanding etc.

If the pitting encounters significant thicknesses of made ground or very soft/loose deposits (neither considered likely), boreholes may be required to obtain geotechnical data from greater depth. We will advise you of any need for boreholes within 2 days of completion of the pitting.

Based on anticipated ground, **soakaways** are considered unlikely to provide a satisfactory solution for surface water drainage, consequently no allowance has been made for soakaway testing at this stage. If required, or considered feasible based on the ground actually encountered, soakaway tests could be undertaken for an additional fee of about £*** (allowing for provision of a tractor towed water bowser & attendance of a second engineer).

Exploratory holes will be positioned a hand-held GPS (typically +/- 3m accuracy); if required we could arrange for a **surveyor** to pick-up exploratory holes (and provide co-ordinates/ground levels) for an EVO cost of £***.

This site is brownfield and therefore likely to be underlain by made ground. However, the rate of **gas** generation within most made ground tends to be low, resulting in small concentrations and flows.

Consequently, at this stage, we have not allowed for undertaking a hazardous gas risk assessment but we will review the need for this in light of desk study data and the ground conditions actually encountered.

Testing: This will comprise routine **geotechnical** soils analysis, including 5 moisture content & Atterberg limits, and pH & water-soluble sulphates.

This site is brownfield and therefore likely to be underlain by made ground which in turn is likely to be subject to re-engineering prior to the construction of estate roads/loading yards. Consequently, there is no merit in obtaining CBR values at this stage.

At this stage, we have no reason to expect wide areas of the site to be underlain by significant thicknesses of made ground or gross contamination. Consequently, we have only allowed for **contaminant** testing of up to 15 made ground samples. The test suite will include heavy metals, speciated PAH, and banded TPH (with supplementary speciation as/where appropriate).

If more significant made ground, or evidence of contamination, is encountered, we will inform you immediately and provide costs for the recommended chemical testing.

Within in our proposal we have allowed for the screening (ID) of 14 samples for asbestos. In the event that positive IDs are reported, it is likely that we will need to schedule further analysis (asbestos quantification), in order to determine the significance of the results. Asbestos quantification is currently a relatively expensive test and consequently we have not allowed for it at this stage. We will inform you immediately after receipt of results if we consider asbestos quantification is required.

Reporting & timescales: In order to provide you with sufficient information to enable assessment of abnormal costs at the earliest opportunity we will issue a concise overview report within 3 days of fieldwork completion.

On completion of the desk study, fieldwork and laboratory testing a comprehensive, factual and interpretative report will be issued. This will contain exploratory hole logs, laboratory test results, copies of all relevant correspondence and drawings of the site. The report will include qualitative risk assessment with respect to both controlled waters and human health. The report will also include consideration of foundation types.

At the time of writing, fieldwork could be commenced within three weeks of receipt of your written instruction to proceed. Our comprehensive geoenvironmental appraisal report will be issued within 4 weeks of fieldwork completion.

A copy of the final report will be issued to the relevant regulatory authorities on receipt of written instruction from yourselves.

Invoicing: The attached proposal provides a breakdown of the costs associated with this project. This breakdown is for information only and the proposal can be regarded as a lump sum price of £*** plus VAT. Variation will only occur in the event that a given item is not undertaken or that substantial additional works are recommended, in which case we will inform you immediately, provide costs for the required works, and seek your prior consent. Revision of the costings provided may be required if works are not instructed within **3 months** of the date this proposal was issued.

Our proposal allows for submission of the report to the Local Authority and NHBC, and for submission of a single piece of subsequent correspondence with each regulator to address any queries they may have. Any further meetings, correspondence etc, would be chargeable.

We will submit invoices for this project on completion of each Item(s) instructed.

Please note if following instruction of the works outlined in this proposal, it is necessary to subsequently **postpone or cancel**, this should be done at least 3 working days before Lithos are due to commence intrusive investigation on site. We reserve the right to charge a cancellation fee in the event of later notification to cover plant / drill rig costs and abortive consultancy time. The cancellation fee will not exceed £*** plus VAT.

Health, safety & welfare: The works outlined above will be carried out in accordance with Lithos' task- and site- specific Risk Assessments and Method Statements.

Details of welfare will be included within the Method Statements. However we anticipate that Game Engineering already has welfare facilities established at the site and it would be appreciated if our Engineer and subcontractors could make use of these for the duration of the works.

Utility plans are required in order to protect operatives from the hazards associated with striking buried services and avoid potentially substantial disruption\repair costs. We will make every effort not to damage any services (including review of utility plans and use of a CAT detector). However, Lithos cannot accept liability for damage to any underground services that are not accurately marked on plans made available to us prior to commencement of our field investigation, or have not been accurately marked on the ground by a responsible third party (e.g. utility company, site owner).

It is highly likely that the site is underlain by many "private" services and drains etc which will not be shown on statutory utility plans. Consequently, it would be appreciated if copies of plans showing these services could be made available to our field engineer, and\or someone with site knowledge could advise us with respect to safe locations for our exploratory holes.

Under the **CDM** Regulations 2015, Lithos must be provided with pre-construction information already in your possession, or information that can reasonably be obtained through sensible enquiry. This information must be relevant to the project, have an appropriate level of detail, and be proportionate to the nature of the risks.

If no other designers or contractors have been appointed, Lithos could perform the role of Principal Contractor but only for the duration of the site investigation outlined in this proposal. If you require us to perform the role of Principal Contractor, please make this clear in your instruction. It should be noted that we are not suitably qualified to perform this role where other designers or contractors are also appointed.

It is anticipated that the site investigation outlined in this proposal will be undertaken several months before any construction is commenced on site. Consequently, our works can be considered in isolation and, given the anticipated number of person days on site, this site investigation is not notifiable to the HSE.

Terms & conditions: This work will be undertaken in accordance with our Standard Terms and Conditions, a copy of which are enclosed.

It is hoped the above is sufficient for your present needs. However, should you require any further information, please contact the undersigned.

Yours sincerely

A handwritten signature in black ink, appearing to read "George Morton".

George Morton
Principal Engineer
for and on behalf of
LITHOS CONSULTING LIMITED

1 DEFINITIONS AND INTERPRETATION

1.1 In this Agreement, unless the context otherwise requires, the following words and expressions have the following meanings:

"Agreement" means these Terms (entitled "Terms and Conditions for the Appointment of Lithos Consulting"), the Proposal, any document recording your unequivocal acceptance of the Proposal and any other documents or parts of other documents expressly referred to in any of the foregoing;

"Documents" means all documents of any kind and includes plans, drawings, reports, programmes, specifications, Bills of Materials, calculations, letters, e-mails, faxes, memoranda, films and photographs (including negatives), or any other form of record prepared or provided or received by, or on behalf of us, and whether in paper form or stored electronically or on disk, or otherwise;

"Intellectual Property" includes all rights to, and any interests in, any patents, designs, trade marks, copyright, know-how, trade secrets and any other proprietary rights or forms of intellectual property (protectable by registration or not) in respect of any technology, concept, idea, data, programme or other software (including source and object codes), specification, plan, drawing, schedule, minutes, correspondence, scheme, programme, design, system, process logo, mark, style, or other matter or thing, existing or conceived, used, developed or produced by any person;

"Project" means the project described in the Proposal and any enquiry from you on which we have based our Proposal;

"Proposal" means the offer document prepared by us in response to an enquiry or otherwise, in connection with the proposed provision of the Services;

"Services" means the work and services relating to the Project to be provided by us pursuant to the Agreement and as set out in the Proposal and includes any additions or amendments thereto made in accordance with these Terms;

"Terms" means these terms entitled "Lithos Consulting Terms of Appointment" as amended from time to time.

1.2 Words importing the singular only shall also include the plural and vice versa, where the context requires.

1.3 Words importing persons or parties shall include firms, corporations and any organisation having legal capacity and vice versa, where the context requires; and words importing a particular gender include all genders.

1.4 The sub-headings to the clauses of these Terms are for convenience only and shall not affect the construction of the Agreement.

1.5 A reference to legislation includes that legislation as from time to time amended, re-enacted or substituted and any Orders in Council, orders, rules, regulations, schemes, warrants, by-laws, directives or codes of practice issued under any such legislation.

1.6 In the event of conflict between the documents forming part of the Agreement, the Proposal shall prevail, followed by the Terms.

2 APPOINTMENT

2.1 You agree to engage us and we agree to provide the Services in accordance with the provisions of this Agreement.

3 OUR OBLIGATIONS

3.1 We shall perform the Services using the reasonable standard of skill and care normally exercised by qualified members of our profession, performing similar services under similar conditions.

3.2 We shall use all reasonable endeavours to perform the Services in accordance with relevant environmental and safety legislation.

4 YOUR OBLIGATIONS

4.1 Throughout the period of this Agreement you shall afford to us, or procure for our benefit, access to any site where access is required for the performance of the Services.

4.2 You accept responsibility for ensuring that we are notified in writing of all special site and/or plant conditions, including without prejudice to the generality of the foregoing, the existence and precise location of all underground services, cables, pipes, drains or underground buildings, constructions or any hazards, which you shall clearly mark on the ground or identify on accurate location plans supplied to us prior to the commencement of the Services. You shall also inform us in writing of any relevant operating procedures including any site safe operating procedures and any other regulations relevant to the carrying out of the Services. You shall indemnify us against all costs, losses, claims, demands and expenses arising as a result of any non-disclosure in this respect, including but not limited to indemnification against any action brought by the owner of the land or otherwise.

4.3 If you discover any conflict, defect or other fault in the information or designs provided by us pursuant to the Agreement, you will advise us in writing of such defect, conflict or other fault and we shall have the right to rectify the same or where necessary, to design the solution for rectification of any works carried out by others pursuant to the conflicting, defective or in any other way faulty information or designs.

5 COPYRIGHT

5.1 The copyright in all Intellectual Property prepared by or on behalf of us in connection with the Project for delivery to you shall remain vested in us.

5.2 You shall have a non-exclusive licence to copy and use such Intellectual Property for purposes directly related to the Project. Such licence shall enable you to copy and use the Intellectual Property but solely for your own purposes in connection with the Project and such use shall not include any licence to reproduce any conceptual designs or professional opinions contained therein nor shall it include any licence to amend any drawing, design or other Intellectual Property produced by us.

5.3 Should you wish to use such Intellectual Property in connection with any other works or for any other purpose not directly related to the Project or wish to pass any Intellectual Property to any third party, you must obtain our prior written consent. The giving of such consent shall be at our absolute discretion and shall be upon such terms as we may require. We shall not be liable to you for the use by any person of such Intellectual Property for any purpose other than that for which the same were prepared by or on our behalf.

5.4 Ownership of any proposals submitted to you that are not subsequently confirmed as part of the Services to be provided for you remain with us and such proposals must not be used as the basis for any future work undertaken by you or a third party and no liability can be accepted howsoever arising from such proposals.

5.5 In the event of you being in default of payment of any fees or other amounts due, we may suspend further use of the licence on giving no less than 2 calendar days' notice of the intention to do so. Use of the licence may be resumed on receipt of the outstanding amounts.

6 CONFIDENTIALITY

6.1 Neither you nor we shall at any time disclose to any person any confidential information concerning the business, affairs, customers, clients or suppliers of the other party or of any member of the group of companies to which the other party belongs, except as permitted by clauses 6.2 and 6.4.

6.2 Each party may disclose the other party's confidential information:

(a) to its employees, officers, representatives, contractors, sub-contractors or advisers who need to know such information for the purposes of exercising the party's rights or carrying out its obligations under or in connection with this Agreement. Each party shall ensure that its employees, officers, representatives, contractors, sub-contractors or advisers to whom it discloses the other party's confidential information comply with this paragraph 6; and

(b) as may be required by law, to a court of competent jurisdiction or any governmental or regulatory authority.

6.3 Neither you nor we shall use any other party's confidential information for any purpose other than to exercise our rights or perform our respective obligations under or in connection with this Agreement.

6.4 Subject to the above and our privacy policy which can be found on www.lithos.co.uk, we shall be permitted to use information related to the Services we provide in connection with the Project for the purposes of marketing its services and in proposals for work of a similar type.

7 ASSIGNMENT

7.1 You may assign the benefit of this Agreement on two occasions with our prior written consent (not to be unreasonably withheld) and any additional assignments shall be with our prior consent.

7.2 We may at any time assign, mortgage, charge, subcontract, delegate, declare a trust over or deal in any other manner with any or all of our rights and obligations under this Agreement.

8 INSURANCE

8.1 We shall maintain a professional indemnity insurance policy covering our liabilities for negligence under this Agreement, with a limit of indemnity of £5,000,000 (FIVE MILLION POUNDS) any one claim, save for pollution and contamination claims and asbestos claims both of which carry £2,000,000 (TWO MILLION POUNDS) in the aggregate cover. This policy is annually renewable and whilst renewal is not automatic, We shall maintain such insurance at all times until six years from the date of the completion (or termination) of the Services under this Agreement, provided such insurance is available at commercially reasonable rates and terms.

8.2 If for any period such insurance is not available at commercially reasonable rates and terms, we shall inform you and shall obtain in respect of such period such reduced level of professional indemnity insurance as is available and as would be fair and reasonable in the circumstances for us to obtain.

9 PAYMENT

9.1 Invoices for services rendered will be submitted for payment in accordance with the Proposal.

9.2 You shall pay you any VAT properly chargeable on the Services and any amount expressed as payable to us under this Agreement is exclusive of VAT unless stated otherwise.

9.3 The due date for payment is the date of the invoice and the final date for payment is 28 days from the date of the invoice.

9.4 If you dispute the amount included for payment in an invoice then you must serve a written notice on us no later than 14 calendar days before the final date for payment. If no notice is given within the required timeframe the amount due shall be the amount stated in the invoice.

9.5 If you fail to pay any monies in accordance with the foregoing payment provisions, we shall be entitled to charge interest on any monies owed to us, such interest to be at a rate of 4% above the base rate of a clearing bank from time to time calculated from the final date for payment to the date of actual payment on a compound basis. The parties acknowledge that our liability under this clause 10.5 is a substantial remedy for the purposes of section 9(1) of the Late Payment of Commercial Debts (Interest) Act 1998.

10 LIMITATIONS ON LIABILITY

10.1 Unless otherwise agreed in writing, our total liability under or in connection with this Agreement whether in contract, tort, negligence, breach of statutory duty or otherwise (other than in respect of personal injury or death) shall be limited to and shall not exceed the lesser of either the level of insurance cover referred to within clause 8.1 above, or 20 times the total value of invoices issued to you for the Services.

10.2 No action or proceedings under or in respect of the Agreement whether in contract, tort, negligence, under statute or otherwise shall be commenced against us after the expiry of a period of six years from the date of the completion (or termination) of the Services under this Agreement.

10.3 Whilst we usually scan for potential exploratory locations with a Cable Avoidance Tool, we shall not be liable for any damage to underground services, cables, pipes, drains or underground buildings, constructions and the like which were either not marked on site or for which accurate plans were not provided.

10.4 We shall not be liable for the cost of rectifying any defect, conflict or other fault in the information or designs provided by us or for the cost of designing a solution for and rectifying any subsequent works carried out by others pursuant to the conflicting, defective or in any other way faulty information or designs, unless we have been advised in writing of the same by you and have been given the opportunity to rectify the same or where necessary, to design the solution for rectification of any subsequent works carried out by others pursuant to the same.

11 DELAY

We shall comply with any timescale agreed for completion of the Services unless delayed or prevented by circumstances beyond our reasonable control and in the event of any such circumstances arising we undertake to complete the Services within a reasonable period, but will not be liable to you for any delay as a result.

12 TERMINATION

12.1 The Agreement may be terminated by either of us in the event of the other making a composition or arrangement with its creditors, becoming bankrupt, or being a company, making a proposal for a voluntary arrangement for a composition of debts, or has a provisional liquidator appointed, or has a winding-up order made, or passes a resolution for voluntary winding-up (except for the purposes of a bona fide scheme of amalgamation or reconstruction), or has an administrator or an administrative receiver appointed to the whole or any part of its assets. Notice of termination must be given to the party which is insolvent by the other party.

12.2 If for any reason our Services are suspended for a period in excess of three calendar months then we shall be entitled to terminate our appointment under this Agreement in respect of the Services by no less than seven days written notice to you.

12.3 If you fail to pay in full any sum due under the terms of this Agreement by the final date for payment for that sum and no effective pay less notice is issued, we may serve written notice to you demanding payment within 14 days of such notice. If you fail to comply with such notice, we shall be entitled to terminate our employment under this Agreement forthwith.

12.4 Any termination of our appointment howsoever caused shall be without prejudice to our rights to require payment for all Services performed up to the date of such termination including but not limited to payment of a fair and reasonable proportion of any figure identified in the Proposal or otherwise for fees in respect of a particular service which Lithos has started, but not completed.

13 THIRD PARTY RIGHTS

The Agreement shall not confer and shall not purport to confer on any third party any benefit or any right to enforce any term of this Agreement for the purposes of the Contracts (Rights of Third Parties) Act 1999 or otherwise.

14 COLLATERAL WARRANTIES & LETTERS OF RELIANCE

We shall consider and may consent to a request from you for us to enter into a collateral warranty or letter of reliance with a third party with regard to the Services provided under this Agreement. The giving of such consent shall be at our absolute discretion and providing we agree to our standard form of collateral warranty or letter of reliance (subject to any reasonable changes to be approved by us at our absolute discretion) and in return for payment of a fee (to be notified at the time of the request).

15 NOTICES

15.1 Any notice provided for in the Agreement shall be in writing and shall be deemed to be properly given if delivered by hand or sent by pre-paid first class post to the address of the relevant party as may have been notified by each party to the other or, in the absence of notification, to our respective registered office addresses.

15.2 Such notice shall be deemed to have been received on the day of delivery if delivered by hand or on the second working day after the day of posting if sent by pre-paid first class post.

16 ENTIRE AGREEMENT

16.1 The Agreement constitutes the complete and entire agreement between us with respect to the Services and supersedes any prior oral and/or written warranties, terms, conditions, communications and representations, whether express or implied and any claim against us in respect of the Services can only be made in contract under the provisions of this Agreement and not otherwise under the law or tort or otherwise.

16.2 No amendments, modifications or variation of this Agreement shall be valid unless made in writing and agreed to by us; such agreement must be recorded in writing by at least one of us.

16.3 We shall not be bound by any standard or printed terms or conditions furnished by you in any of your documents unless we specifically state in writing separately from such documents that we intend such terms and conditions to apply.

17 DISPUTES, JURISDICTION AND GOVERNING LAW

17.1 This Agreement shall be governed by and construed in accordance with English law and we irrevocably and unconditionally submit to the jurisdiction of the English Courts.

17.2 Where the Housing Grants, Construction and Regeneration Act 1996 applies, any dispute between us may be referred to adjudication in accordance with the Scheme for Construction Contracts Regulations 1998 or any amendment or modification thereof being in force at the time of the dispute, as applicable to England, Wales, Scotland and Northern Ireland.

Will Newton

Subject: Game Engineering Development Witham St Hughs

From: Shaun Bennett <shaun.bennett@lhlgroup.co.uk>

Sent: Tuesday, February 6, 2024 11:21 AM

To: George Morton <George.Morton@lithos.co.uk>

Cc: shane.york@lhlgroup.co.uk

Subject: Re: Request Fee Proposal - Game Engineering Development Witham St Hughs

Morning George,

Thank you for your fee proposal

Please see attached PO from Game to undertake the preliminary investigation

LHL Group will be collating the relevant consultants information and submitting the discharge of conditions application so could you please advise of your timescales to have the report completed

Regards

--



✉ shaun.bennett@lhlgroup.co.uk

☎ 07876 221717

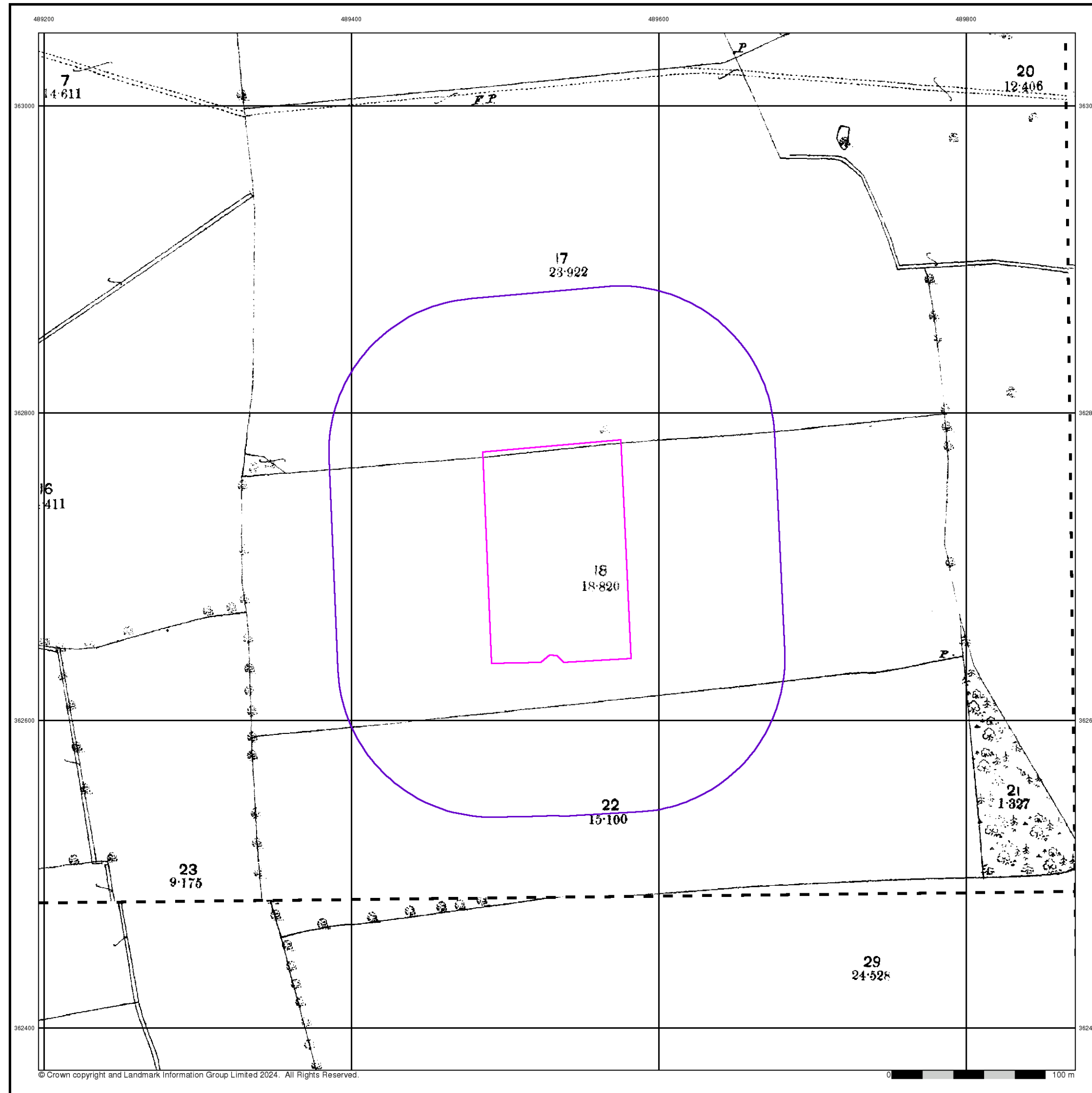
🌐 www.lhlgroup.co.uk

Stanley Harrison House, Bishopthorpe Road, York, YO23 1DE

Tel 01904 690699 | Fax 01904 690208



Appendix D
Historical OS Plans



Lincolnshire

Published 1887

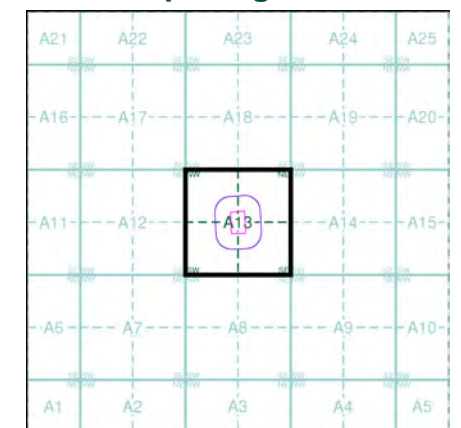
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 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.

Map Name(s) and Date(s)

077_11 1887 1:2,500	077_12 1887 1:2,500
077_15 1887 1:2,500	

Historical Map - Segment A13



Order Details

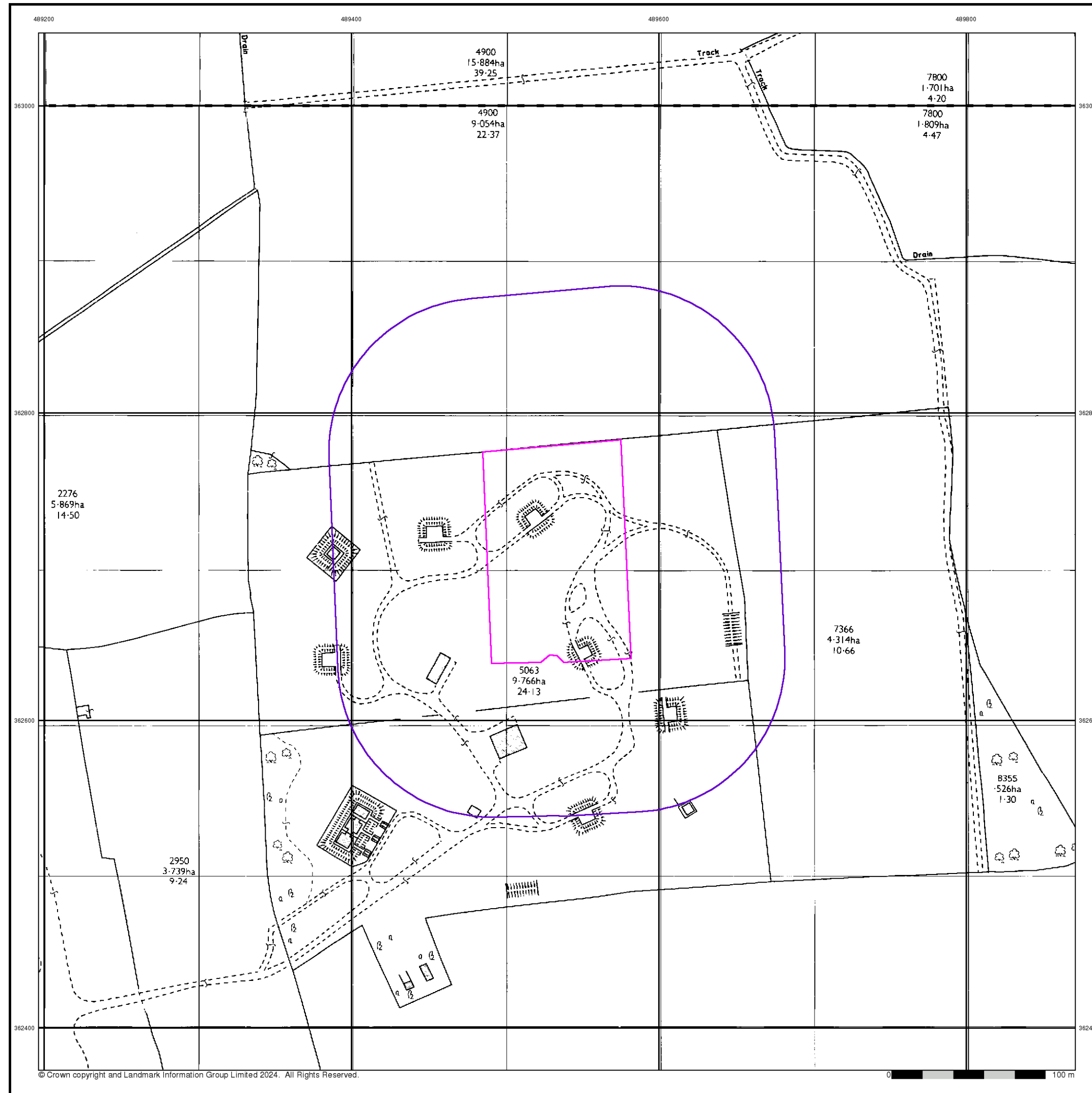
Order Number: 334376517_1_1
 Customer Ref: 4974
 National Grid Reference: 489530, 362710
 Slice: A
 Site Area (Ha): 1.27
 Search Buffer (m): 100

Site Details

Game Engineering Ltd, Witham St. Hughs, LN6 9TW



Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk



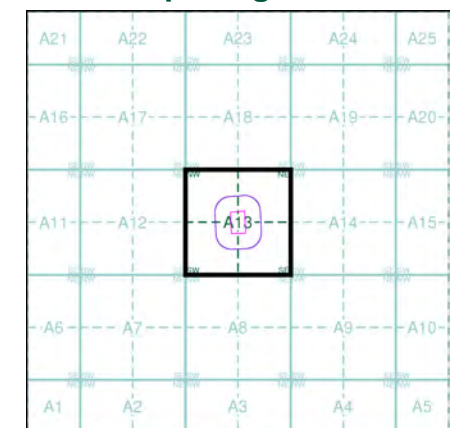
Ordnance Survey Plan
Published 1976
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 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.

Map Name(s) and Date(s)

SK8963	1976	1:2,500
SK8962	1976	1:2,500

Historical Map - Segment A13



Order Details

Order Number: 334376517_1_1
 Customer Ref: 4974
 National Grid Reference: 489530, 362710
 Slice: A
 Site Area (Ha): 1.27
 Search Buffer (m): 100

Site Details

Game Engineering Ltd, Witham St. Hughs, LN6 9TW



Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk



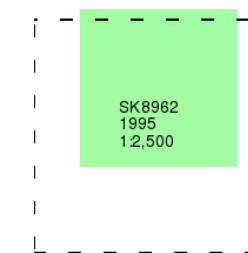
Large-Scale National Grid Data

Published 1995

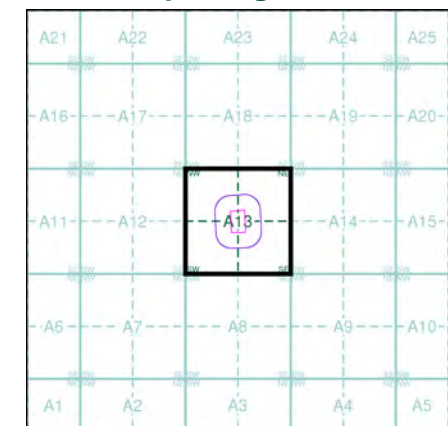
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

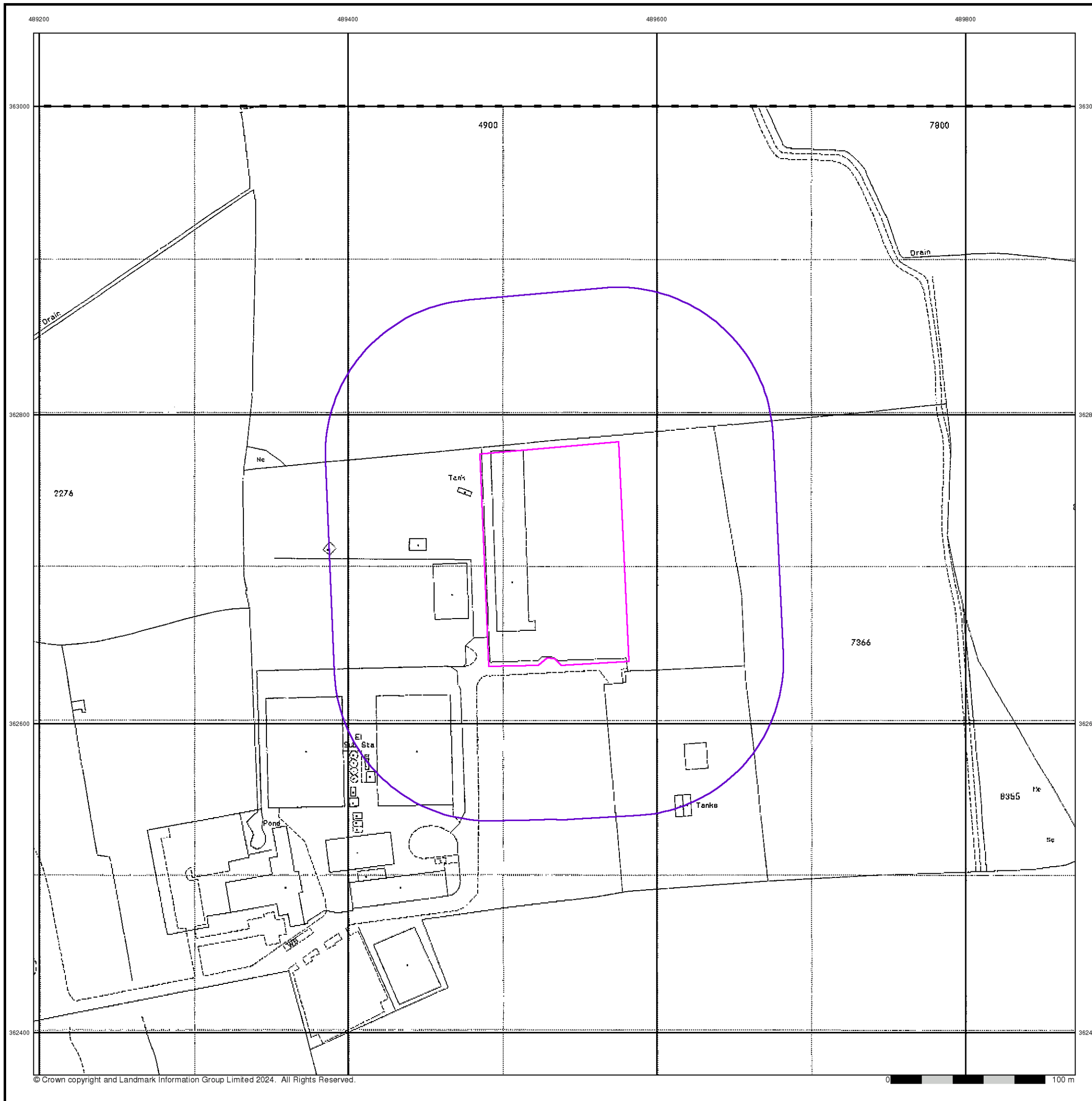
Order Number: 334376517_1_1
Customer Ref: 4974
National Grid Reference: 489530, 362710
Slice: A
Site Area (Ha): 1.27
Search Buffer (m): 100

Site Details

Game Engineering Ltd, Witham St. Hughs, LN6 9TW



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Appendix E

Search Responses & other Correspondence



Envirocheck[®] Report:

Datasheet

Order Details:

Order Number:

334376517_1_1

Customer Reference:

4974

National Grid Reference:

489530, 362710

Slice:

A

Site Area (Ha):

1.27

Search Buffer (m):

1000

Site Details:

Game Engineering Ltd

Witham St. Hughs

LN6 9TW

Client Details:

Mr M Perrin

Lithos Consulting Ltd

Parkhill

Walton Road

Wetherby

LS22 5DZ

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	15
Hazardous Substances	16
Geological	17
Industrial Land Use	19
Sensitive Land Use	23
Data Currency	24
Data Suppliers	30
Useful Contacts	31

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client. In this datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v53.0

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1		Yes		n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1	2	5		1
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 3		2		
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 3		Yes		
Pollution Incidents to Controlled Waters	pg 3	1			
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality					
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register	pg 3		1		
Water Abstractions	pg 3				(*10)
Water Industry Act Referrals					
Groundwater Vulnerability Map	pg 6	Yes	n/a	n/a	n/a
Groundwater Vulnerability - Soluble Rock Risk			n/a	n/a	n/a
Groundwater Vulnerability - Local Information			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 6	Yes	n/a	n/a	n/a
Superficial Aquifer Designations			n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
OS Water Network Lines	pg 6		2	16	52

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)	pg 15		1		
Local Authority Landfill Coverage	pg 15	2	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)					
Potentially Infilled Land (Water)					
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)	pg 16		1		
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)	pg 16		1		
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

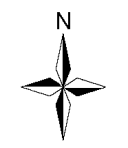
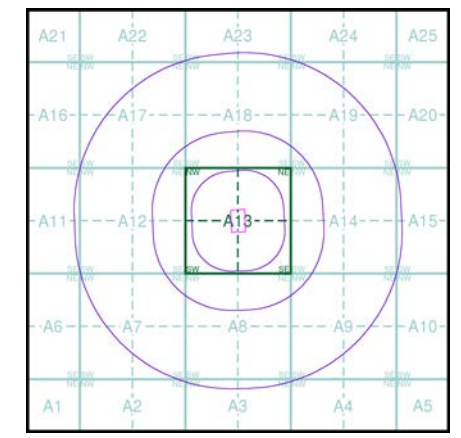
Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 17	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 17	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 17	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 17	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 18		Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 18	Yes		n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 19	2	6	2	10
Fuel Station Entries					
Points of Interest - Commercial Services	pg 20		1		
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 20		4		4
Points of Interest - Public Infrastructure	pg 21				4
Points of Interest - Recreational and Environmental	pg 21			2	3
Gas Pipelines					
Underground Electrical Cables					

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 23	1		1	
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					



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

Site Sensitivity Map - Slice A



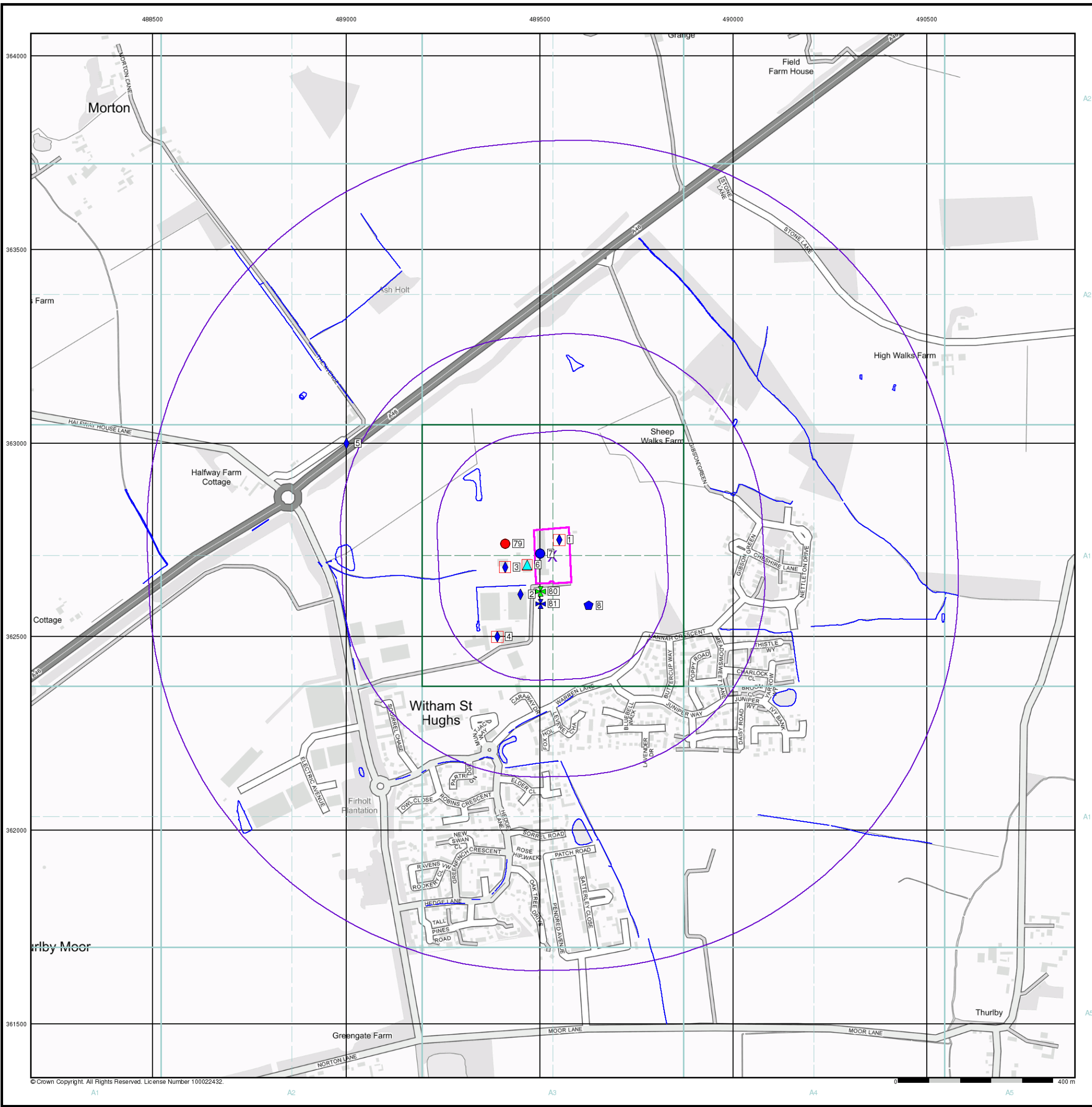
Order Details

Order Number: 334376517_1_1
 Customer Ref: 4974
 National Grid Reference: 489530, 362710
 Slice: A
 Site Area (Ha): 1.27
 Search Buffer (m): 1000

Site Details
 Game Engineering Ltd, Witham St. Hughs, LN6 9TW

Landmark
 INFORMATION GROUP

Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk



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General

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

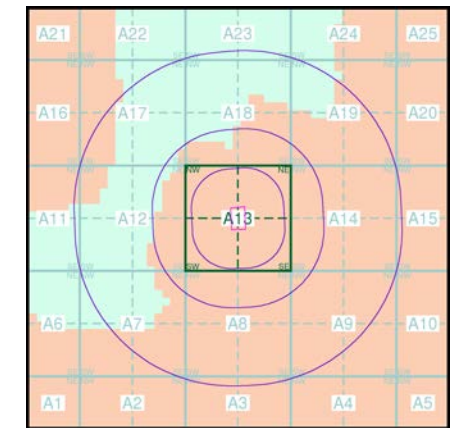
Risk of Flooding from Surface Water

- High - 30 Year Return
- Medium - 100 Year Return
- Low - 1000 Year Return

Suitability

- See the suitability map below
- National to county
 - County to town
 - Town to street
 - Street to parcels of land
 - Property

EANRW Suitability Map - Slice A



Order Details

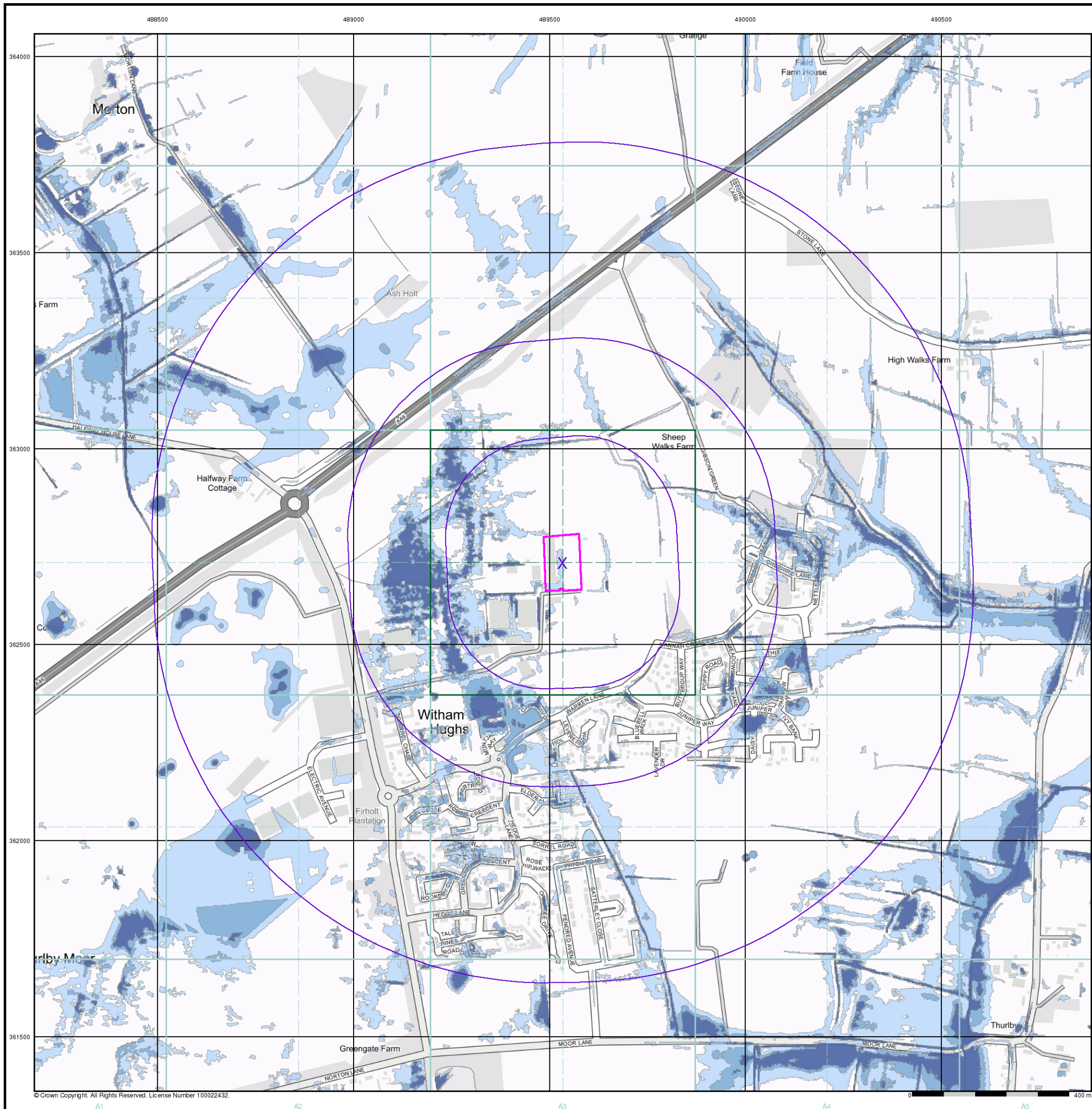
Order Number: 334376517_1_1
 Customer Ref: 4974
 National Grid Reference: 489530, 362710
 Slice: A
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General

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

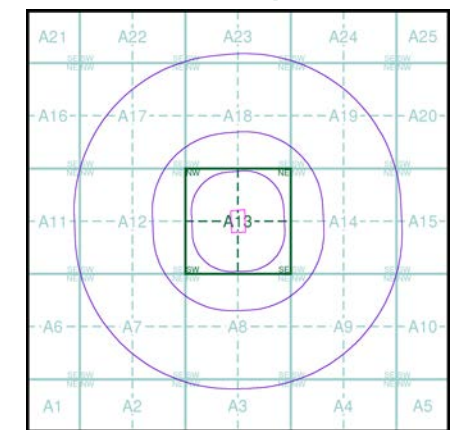
OS Water Network Data

- | | | | |
|--|--------------|--|-------------------------|
| | Canal | | Drain |
| | Reservoir | | Other |
| | Foreshore | | Lake |
| | Marsh | | Transfer |
| | Tidal River | | Lock Or Flight Of Locks |
| | Inland River | | Sea |

Contours (height in meters)

- Standard Contour 105
- Master Contour 100
- Spot Height 167.3
- Mean Low Water
- Mean High Water

OS Water Network Map - Slice A



Order Details

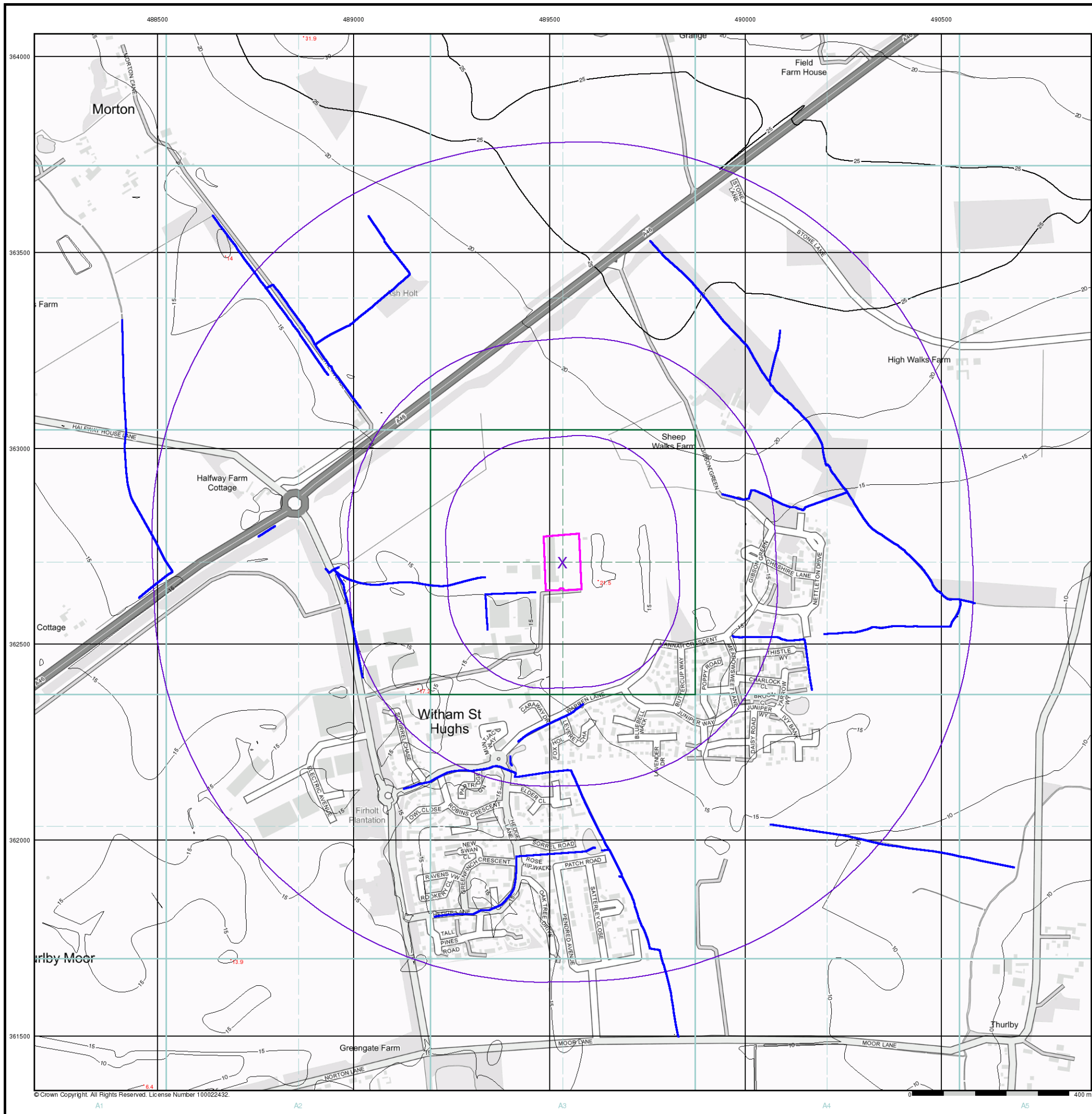
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 Customer Ref: 4974
 National Grid Reference: 489530, 362710
 Slice: A
 Site Area (Ha): 1.27
 Search Buffer (m): 1000

Site Details

Game Engineering Ltd, Witham St. Hughs, LN6 9TW

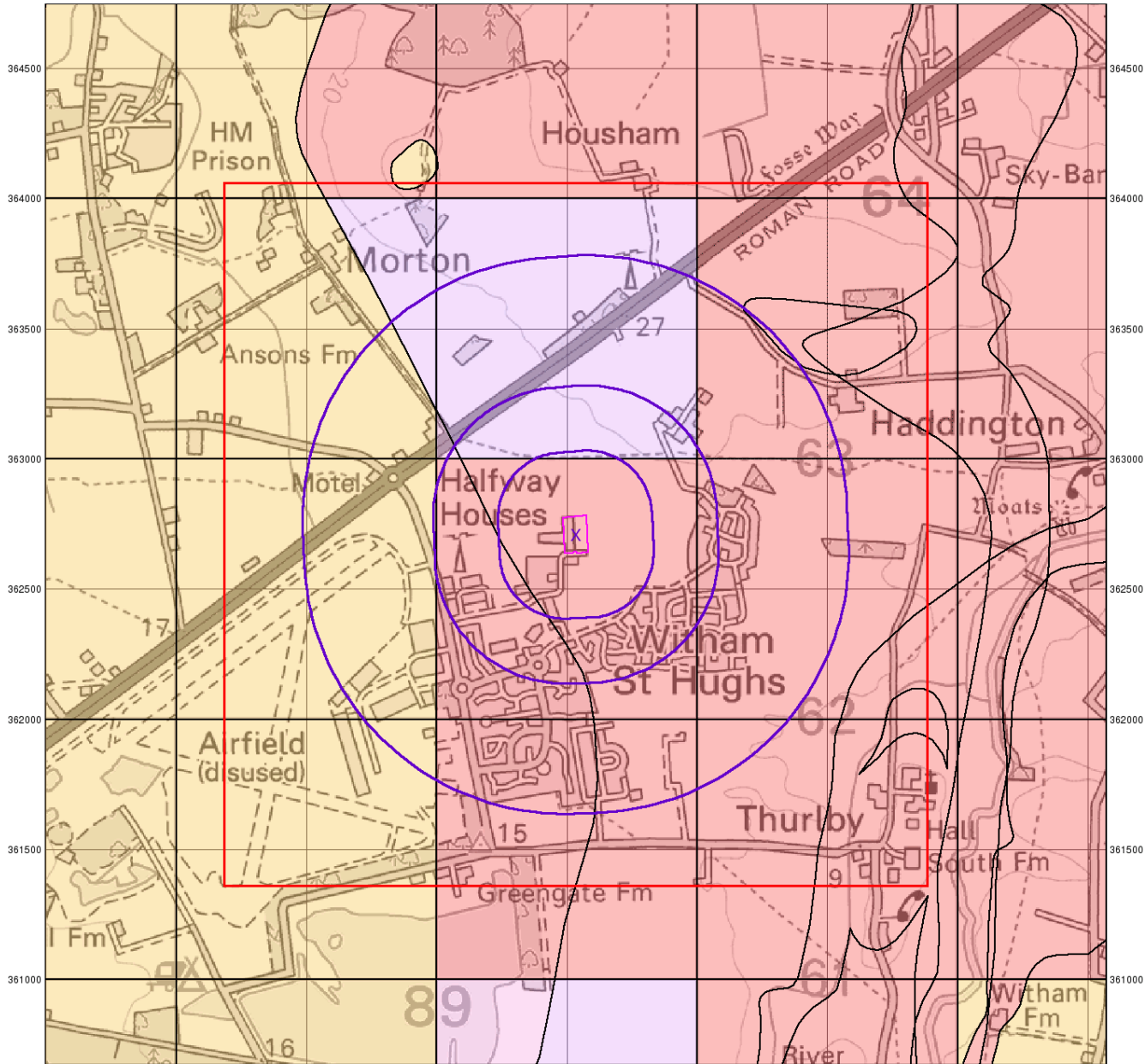


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487500 488000 488500 489000 489500 490000 490500 491000 491500



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Groundwater Vulnerability

General

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

Agency and Hydrological

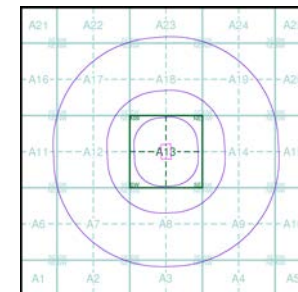
Bedrock Aquifers

- High Vulnerability, Principal Aquifer
- High Vulnerability, Secondary Aquifer
- Medium Vulnerability, Principal Aquifer
- Medium Vulnerability, Secondary Aquifer
- Low Vulnerability, Principal Aquifer
- Low Vulnerability, Secondary Aquifer
- Unproductive Aquifer
- Soluble Rock

Superficial Aquifers

- High Vulnerability, Principal Aquifer
- High Vulnerability, Secondary Aquifer
- Medium Vulnerability, Principal Aquifer
- Medium Vulnerability, Secondary Aquifer
- Low Vulnerability, Principal Aquifer
- Low Vulnerability, Secondary Aquifer

Site Sensitivity Context Map - Slice A



Order Details

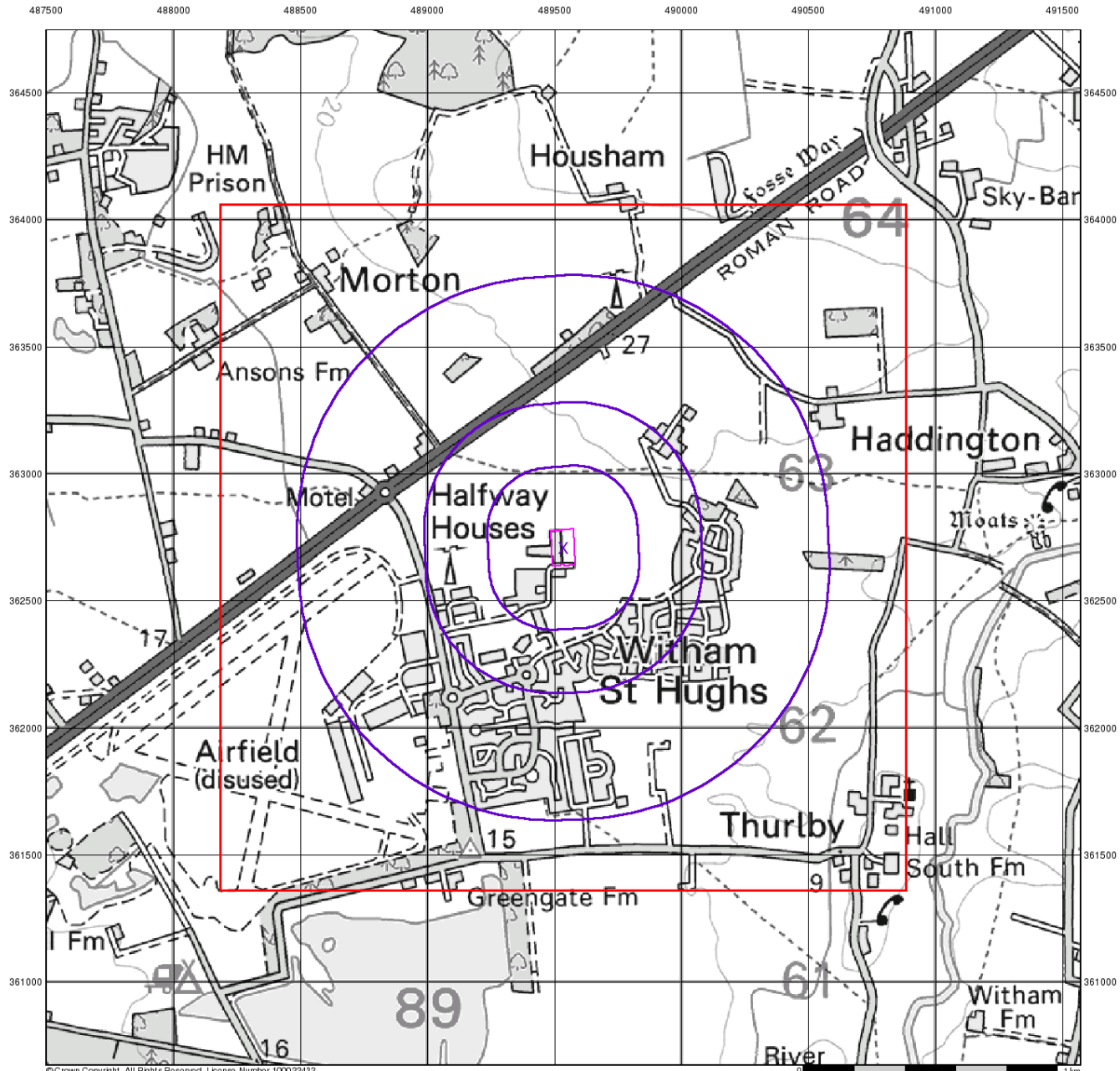
Order Number: 334376517_1_1
 Customer Ref: 4974
 National Grid Reference: 489530, 362710
 Slice: A
 Site Area (Ha): 1.27
 Search Buffer (m): 1000

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Source Protection Zones

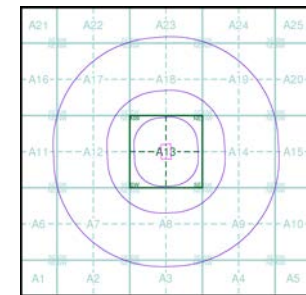
General

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

Agency and Hydrological

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

Site Sensitivity Context Map - Slice A



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 Web: www.envirocheck.co.uk

STAGE 1 PRELIMINARY UXO RISK ASSESSMENT

Report Ref: PRA-24-2382 | Author: EE | Reviewer: CB



Innovation Centre Medway, Maidstone
Road, Chatham, ME5 9FD
020 7117 2492
www.brimstoneuxo.com

Client: Lithos Consulting Ltd
Project: Game Engineering, Witham St Hughs
Date: 14/02/2024

INTRODUCTION

The Stage 1 Preliminary Risk Assessment is an initial screening assessment designed to highlight any sources of unexploded ordnance (UXO) with the potential to contaminate a given site.

The aim of the Stage 1 assessment is to identify or discount the need for further detailed research - a Stage 2 Detailed UXO Risk Assessment.

This desktop assessment has been researched and written by a dedicated Researcher / Risk Assessor and produced in accordance with the CIRIA C681 Guidelines: 'Unexploded Ordnance, a Guide for the Construction Industry' (published in 2009).

In preparation for this assessment, original wartime records, historic OS mapping and the *Brimstone UXO Sources Database* have been reviewed. The latter incorporates multiple datasets plotting the positions of a variety of domestic military sites and confirmed historic German bombing targets.

The Stage 1 Preliminary Risk Assessment considers the following:

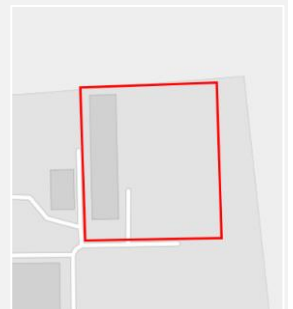
1. The Proposed Works
2. Enemy Action During WWI and WWII
3. British / Allied Military Activity
4. Historic Site Occupancy
5. Risk Mitigating Factors

THE SITE

The Site (approximately centred on the National Grid Ref: SK 89533 62714) is located in Witham St Hughs Industrial Estate, within the county of Lincolnshire, approximately 400m north of the village section of Witham St Hughs.

The Site primarily comprises open, undeveloped ground and hardstanding in its eastern extent, with a low-rise industrial warehouse structure located in the west alongside hardstanding car parking facilities and an accessway.

It is bound to the north and east by mature vegetation, to the south by a hardstanding accessway, whilst an accessway, an industrial yard and an industrial structure are present to the west.



THE PROPOSED WORKS

Future SI works will likely comprise machine excavated trial pitting to an unspecified depth.

Future development works will comprise the construction of a second commercial/industrial unit and a single shed with associated external areas of hardstanding and hard landscaping.

ENEMY ACTION DURING WWI AND WWII

Potential Source of UXO	Significant?	Details
WWI German Bombing	✘	No raids affected Witham St Hughs during WWI.
WWII German Bombing	✔	British District Bombing Density Statistics The Site is located within the former Rural District of North Kesteven which sustained 4.7 bombs / 1,000 acres, a very-low bombing density.

		Evidence of Bomb Strikes / Damage	<p>Written records of bombing incidents within Lincolnshire record at least one large raid on RAF Swinderby, of which the Site appears to have been encompassed by. It is reported that the bombs falling during this raid missed their target, anticipated to have been the airfield's technical area and runways; as the Site was in a peripheral area of the airfield, it cannot be discounted that this raid affected the Site.</p> <p>No evidence of damage occurring within the Site footprint has been identified at a preliminary stage; however, any such evidence is unlikely to have been identifiable within consulted pre- and post-WWII OS mapping owing to the largely undeveloped nature of the Site during wartime. It must be noted that no historic aerial photography covering the Site footprint could be located at a preliminary stage and therefore accurate analysis of wartime ground conditions is limited.</p>
		Local Bombing Decoy Sites	None located within a significant distance. The closest was located approximately 4.9km south-east.
		Local German Bombing Targets	No confirmed identified Luftwaffe targets in the wider Site area. However, RAF Swinderby, which appears to have encompassed the Site, may have provided a target of opportunity. The same can be said for further military infrastructure in the wider area, such as RAF Morton Hall approximately 1.8km north-west of the Site.
WWII German Cross Channel Artillery Shelling	x	n/a	

BRITISH / ALLIED MILITARY ACTIVITY

Potential Source of UXO	Significant?	Details
WWII Home Guard (HG) Activity	x/✓	Soldiers of the 1 st Kesteven (North) HG Battalion may have been active local during WWII. The possibility that the Site was accessed by armed HG troops on patrol cannot be discounted at this stage due to the Site's undeveloped nature. However, it is more likely to have been accessed by troops stationed at RAF Swinderby.
Site Requisitioned for Wartime Military Use	x/✓	No such evidence found at this stage. The possibility that the Site was requisitioned for temporary wartime use cannot be ruled out entirely (e.g., tented military camp, LAA gun battery, searchlight battery, RAF barrage balloon site), or any usage associated with RAF Swinderby.
Existing or Historic Army or RAF Training Area / Weapons Range	x/✓	A small arms range was located approximately 700m south-west within RAF Swinderby. Further ranges could have been located within the vicinity of the airfield.

Existing or Historic Military Bases and Other Installations	✓	As identified in post-WWII OS mapping, a section of the technical area of RAF Swinderby was located on Site; an accessway present on Site connects to the main road leading to the airfield's technical area. The airfield was active from 1940 until 1993, under the command of No. 1 Group RAF and housed several bomber squadrons as part of RAF Bomber Command. It was sold in 1995 and the technical area is now the Witham St Hughs industrial estate, whilst the domestic area became the village of Witham St Hughs.
Existing or Historic Munitions or Explosives Factories	✗	A forward bomb filling depot was located within RAF Swinderby, approximately 1km south-west of the Site.
Existing or Historic Military Defensive Fortifications	✗	The closest recorded emplacement (a pillbox) on an in-house geodata set displaying the locations of defensive fortifications was situated approximately 1.5km south-west. Due to the Site's situation within RAF Swinderby, it is anticipated that the wider study area saw the erection of temporary defences; the possibility that temporary defences were constructed within the Site's boundary or in the immediate surrounds cannot be discounted at a preliminary stage due to the largely undeveloped nature of the Site during wartime.
WWII Light and / or Heavy Anti-Aircraft (LAA and HAA) Fire	✗/✓	Two HAA batteries were active within range of the Site during WWII; LAA guns may have been present within range of the Site, likely defending RAF airfields. However, Luftwaffe activity in the region was infrequent. Therefore, these guns likely fired an insignificant amount of ammunition, and it is unlikely, albeit not impossible, that an unexploded AA shell struck the Site.
Pipe-Mined Locations and Beach Minefields	✗	n/a
UXO Finds	✗	n/a

SITE HISTORY

What was the Site occupancy historically, especially during WWI and WWII?

At the outbreak of WWII, the Site will have likely comprised entirely of open undeveloped ground. However, after the RAF airfield expansion plans were actioned and RAF Swinderby became fully operational in 1940, an accessway connected to the main road of the airfield's technical area was developed on Site.

RISK MITIGATING FACTORS

Post-Conflict Ground Works

Post-conflict groundworks have comprised the laying of further hardstanding and the construction of the low-rise industrial unit in the west; this is known to have occurred by 2000 according to recent aerial photography. Associated excavations likely disturbed WWII-era soil to very shallow (<1m bgl) and shallow (1-2m bgl) depths.

Likelihood of UXO Remaining

The risk associated with (any) very shallow buried UXO will have been partially mitigated by the laying of new hardstanding. The risk associated with (any) shallow buried UXO will have been partially mitigated in the footprint of the low-rise structure in the west of the Site. The risk associated with (any) deep (>2m bgl) buried UXO almost certainly remains unmitigated.

CONCLUSIONS

German UXO:

- Although bombing in the local area appears to have been infrequent based on information available at a preliminary stage, RAF Swinderby, which the Site was situated within according to post-WWII OS mapping, was subject to at least one confirmed 'large-scale' air raid; the record states that the bombs dropped missed their targets.
- Any further bombing incidents in the region can likely be attributed to opportunistic raids aimed at the airfield as well as further military infrastructure in the surrounding area, such as RAF Morton Hall approximately 1.8km north-west. Further research into local written records and airfield specific records is deemed necessary to further analyse bombing incidents occurring within the study area.
- No aerial photography was available for the Site at a preliminary stage; however, as the Site was occupied largely by undeveloped land during WWII, any evidence of damage occurring will not have been visible within the consulted OS mapping.
- As the majority of the Site comprised open undeveloped ground at the outset of WWII, any UXB strike could have easily occurred unobserved and remained undetected, its entry hole obscured in overgrown vegetation had it been present. This ground cover also indicates that the Site would not have been frequently accessed in the early stages of WWII. Whilst the accessways developed on Site during WWII as part of the airfield expansion may have resulted in more frequent levels of access, this is unlikely to have been a significant increase.
- As post-conflict groundworks have consisted of the laying of hardstanding and the construction of a low-rise industrial warehouse, partially disturbing ground to shallow and very shallow depths, the risk associated with (any) deep buried UXBs almost certainly remains unmitigated. It is also possible that a UXB penetrating to a shallow depth could remain in between previous post-WWII intrusions.
- In summary, although enemy bombing occurring over the Site area appears sparse in records available at a preliminary stage, it is possible that further raids may be recorded in records kept by personnel stationed at RAF Swinderby. Additionally, wartime ground conditions are anticipated to have been largely uncondusive to the visual detection of UXBs, whilst access levels are likely to have been largely infrequent given its location in a peripheral area of the airfield; the combination of these factors heightens the likelihood of a UXB falling unnoticed. Subsequently, further research is recommended.

British / Allied UXO:

- The Site was situated within RAF Swinderby during WWII, comprising a section of a perimeter track and undeveloped, open ground within the technical area.
- The airfield was used for the filling of bombs and was a part of bomber command. Whilst no evidence of practice bombing or other means of Allied UXO use occurring on Site or in the immediate surrounds has been identified, it cannot be ruled out at a preliminary stage. Further research will be required to better determine the possibility that UXO may have come to contaminate the Site area.
- Although unlikely based on the small number of batteries in range of the Site, it is possible that an unexploded British AA shell struck the Site during WWII and penetrated to a shallow depth. Any such UXO could feasibly remain in situ in undisturbed areas / areas subject to very shallow post-WWII intrusions.

RECOMMENDATIONS

SI Works

A **Stage 2 Detailed Risk Assessment** is recommended in order to further assess the risk to proposed works. In lieu of a Detailed UXO Assessment, Brimstone recommends on-Site support for any planned ground works.

Development Works