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GEOENVIRONMENTAL APPRAISAL

of land at

HOLBEACH MEADOWS, HOLBEACH

Prepared on behalf of LNT Care Developments (3) Limited

Report 7092/1

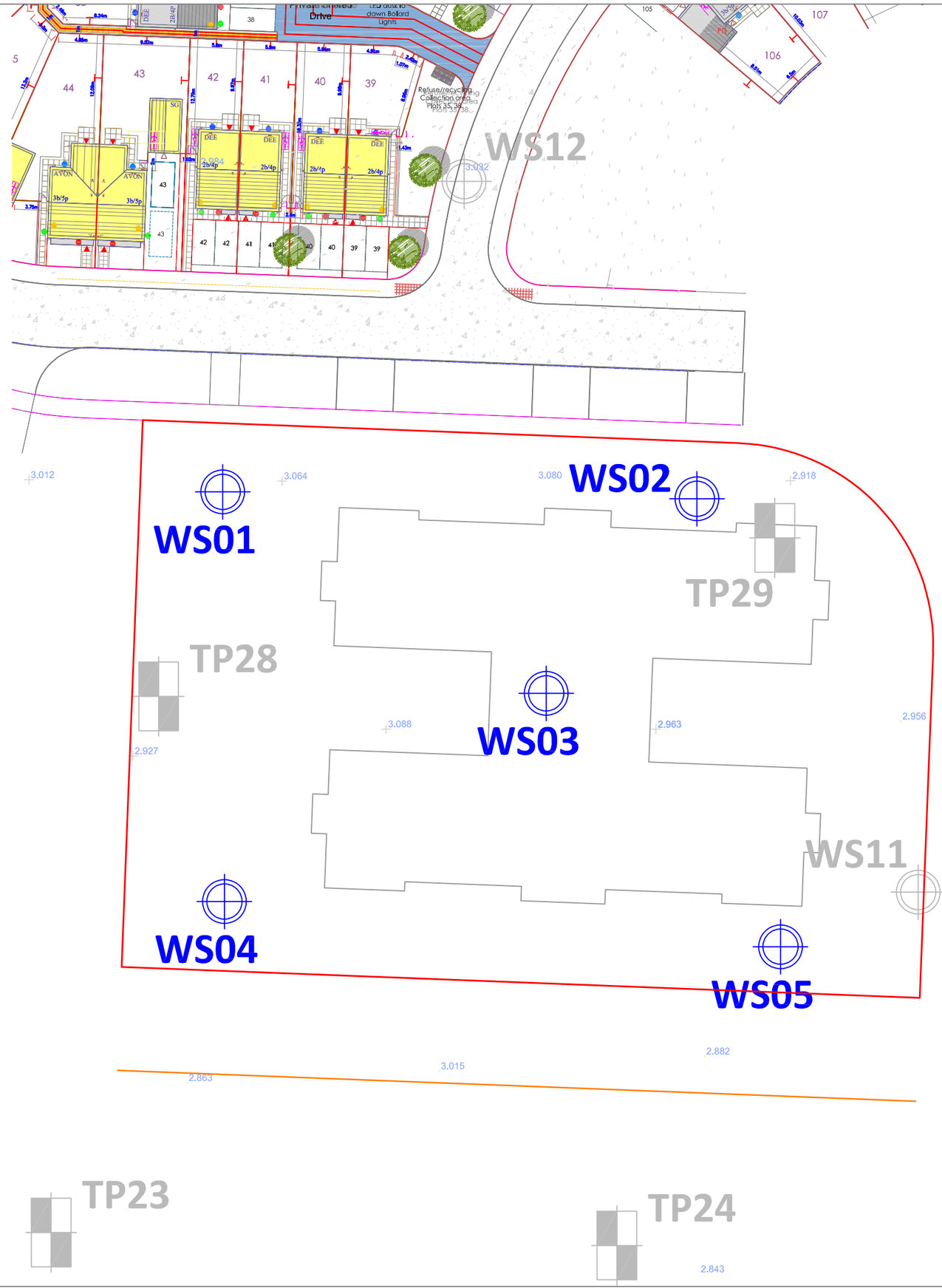
November 2020

GEOENVIRONMENTAL SUMMARY

Site Description	The site comprises part of a relatively level arable field. Residential development is underway immediately north of the site.
History	The site appears to have remained undeveloped throughout its history
Made Ground	Made ground was not encountered at the site during the Calabrian investigation and was not encountered within the three exploratory holes previously constructed on the care home site.
Natural Ground	TP28, TP29 and WS11 were constructed on site by Geomatters in 2016 these exploratory holes found around 250mm of topsoil overlying loose sand. SPTs within WS11 suggest that the sand becomes medium dense below around 3m depth. A similar sequence was identified by Calabrian.
Contamination & Remediation	The site has not been previously developed and made ground was not encountered at the site; laboratory analysis on topsoil samples has determined that it is 'clear'. Remediation of the site will not be necessary.
Hazardous Gas	There are no sources of hazardous gas generation within influencing distance of the site (landfills, infilled ground, deep made ground, mineworkings etc). A limited programme of gas monitoring across the wider site did not yield and elevated gas concentrations. Radon protection measures are not required.
Mining & Quarrying	The site is located beyond the coalfield and there are no quarries within 250m of the site.
Foundations	The loose natural sand deposits would yield unacceptable settlements under the proposed care home loads and it is envisaged that some ground improvement in the form of vibro-stone columns would be the most cost effective foundation solution.
Groundwater & Excavations	Previous excavations collapsed at around 1.5m depth and it is likely that ground beneath this depth is saturated with groundwater. Deep excavations will likely require some dewatering.
Flooding & Drainage	The site is located within Flood Zone 1. Given the likely shallow groundwater level beneath the site soakaways would not provide a suitable means of surface water disposal.

Significant developer abnormals relating to geoenvironmental issues at the site are:
- Unstable excavations below around 1.5m will require dewatering.
- Vibro-stone column foundations.

This brief summary should not be assumed to represent a complete account of all the potential geoenvironmental issues that may exist at the site. As such it is strongly recommended that the report be read in its entirety.



notes

Reproduced from LNT layout referenced PE12 7HZ-F-02 (FEAS-1) and dated 15th July 2020.

CALABRIAN INVESTIGATION 2020

WINDOW SAMPLE LOCATION

GEOMATTERS INVESTIGATION 2016

TRIAL PIT LOCATION

WINDOW SAMPLE LOCATION

APPROXIMATE SITE BOUNDARY

PROPOSED CARE HOME FOOTPRINT

rev. description

LNT Care Developments

client

HOLBEACH MEADOWS, HOLBEACH

project

GEOENVIRONMENTAL SUMMARY

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FOREWORD (Geoenvironmental Investigation Report)

This report has been prepared for the sole internal use and reliance of the LNT Care Developments (3) Limited. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Calabrian Limited (Calabrian); 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.

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 Calabrian prior to significant revision of the development proposals.

The report should be read in its entirety, including all associated drawings and appendices. Calabrian cannot be held responsible for any misinterpretations arising from the use of extracts that are taken out of context.

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 Calabrian believes are reliable. All reasonable care and skill has been applied in examining the information obtained. Nevertheless, Calabrian cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

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

Intrusive investigation can only investigate shallow ground beneath a small proportion of the total site area. It is possible therefore that the intrusive investigation undertaken by Calabrian, whilst fully appropriate, may not have encountered all significant subsurface conditions. Consequently, no liability can be accepted for conditions not revealed by the exploratory holes. Any opinion expressed as to the possible configuration of strata between or below exploratory holes is for guidance only and no responsibility is accepted as to its accuracy

It should be borne in mind that the timescale over which the investigation was undertaken may not allow the establishment of equilibrium groundwater levels. Particularly relevant in this context is that groundwater levels are susceptible to seasonal and other variations and may be higher during wetter periods than those encountered during this commission.

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.

This report assumes that ground levels will not change significantly from those existing at present and that the care home will be of two-storey construction. If this is not to be the case, then some modification to this report may be required.

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

Calabrian reserve the right to amend their conclusions and recommendations in the light of further information that may become available.

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DRAWINGS	
7092/1	Site Location Plan
7092/2	Proposed Site Layout
7092/3	Existing Site Features
7092/4	Site Photographs
7092/5	Preliminary Conceptual Site Model
7092/6	Exploratory Hole Location Plan
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ANNEX I	SUMMARY CONTAMINATION DATA (SOILS)
Table A	Summary of Contamination Results (Inorganics)

APPENDIX A	COMMISSION
APPENDIX B	HISTORICAL OS PLANS
APPENDIX C	SEARCHES
Landmark	Envirocheck Report
APPENDIX D	EXPLORATORY HOLE RECORDS
Window Sample Boreholes	WS01 to WS05
APPENDIX E	CHEMICAL TEST RESULTS
APPENDIX F	GEOTECHNICAL TEST RESULTS



1 INTRODUCTION

1.1 THE COMMISSION AND BRIEF

Calabrian Limited (Calabrian), were commissioned by LNT Care Developments (3) Limited (LNT) to carry out a geoenvironmental appraisal of land at Holbeach Meadows, Holbeach.

Correspondence regarding Calabrian's appointment, including the brief for this investigation, is included in Appendix A. The agreed scope of works included:

- A review of third-party reports;
- a site walkover and inspection;
- an assessment of the land use history;
- determination of the site's environmental setting;
- an intrusive ground investigation comprising five boreholes;
- assessment of the geotechnical properties of the near surface deposits to enable provision of foundation and highway recommendations;
- a qualitative assessment of contamination risks; and,
- recommendations for the necessary site preparatory and remediation works.

1.2 OBJECTIVES

Primary aims of this investigation were to identify salient geoenvironmental issues affecting the site to enable LNT to obtain budget costs for the necessary foundation, site preparatory and to support the submission of a planning application to the local authority.

1.3 DEVELOPMENT PROPOSALS

It is understood that consideration is being given to development of the site with a two-storey residential care home with associated gardens/landscaping, access road and car park. A Proposed site layout referenced PE12 7HZ -F-02, FEAS-1 has been provided by LNT and is copied ad Drawing 7092/2.

1.4 REPORT FORMAT AND LIMITATIONS

General notes and limitations relevant to all Calabrian 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

Details of the site are given below:

- Location: 11km east of Spalding town centre
- Nearest Post Code: PE12 7HZ
- National Grid Reference: TF 353 241
- Area: 0.52 hectares

Known Services:

- None on site.

2.2 SITE FEATURES

Calabrian completed a walkover survey of the site on 26th October 2020.

The site comprises a rectangular area of relatively flat agricultural land that was set to a crop of cabbages.

Immediately to the north, west and east lies a residential construction site with further agricultural land to the south.

Existing salient features, at the time of the walkover are presented on Drawing No. 7092/3. A selection of site photographs are included on Drawing 7092/4.

3 SITE HISTORY

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 B.

The site has remained undeveloped throughout its history.

4 ENVIRONMENTAL SETTING

4.1 GENERAL

The responses received from Landmark are presented in Appendix C.

Issue Data Reviewed	Remark
Geology 1:50,000 BGS map Borehole Data	Superficial - Tidal Flat Deposits - clay and silt. Solid - West Walton Formation - mudstone and siltstone. Shallowest coal seam – Not located in a coal mining area. Strata Dip – Not recorded. Faults – None beneath the site. TP28, TP29 and WS11 were constructed on site by Geomatters in 2016 these exploratory holes found around 250mm of topsoil overlying loose sand. SPTs within WS11 suggest that the sand becomes medium dense below around 3m depth.
Mining Coal Authority BGS maps	The site is located beyond the CA's defined coalfields.
Quarrying Landmark Report Historical OS Plans	None within 250m.
Radon BRE Report BR211	No protection measures required. The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level).
Hydrogeology Landmark Report Groundwater Vulnerability map	Source Protection Zone? No. Aquifers: Unproductive (Superficial); Unproductive (Solid). Groundwater abstractions? None within 2km. Pollution incidents? None relating to the site.
Hydrology Landmark Report	Nearest watercourse(s) – 69m east (open ditch). Water quality – Not recorded. Pollution incidents? None relating to the site. Abstractions? None within 1.7km. Discharge consents? None within 976m.
Landfill Sites Landmark Report	No landfills within 500m.
Flood Risk Landmark Report	The site lies in Flood Zone 2, where the risk of flooding from rivers or the sea is classified as low.

5 PREVIOUS INVESTIGATIONS

5.1 GENERAL

LNT have provided Calabrian with a copy of the following report:

- Phase I & II Area at Holbeach Meadows, Holbeach. Phase I & II Geo-Environmental Investigation for Ashwood Homes. Report prepared by Geo-matters, referenced GML16197, dated November 2016.

5.2 SUMMARY OF GEO-MATERS FINDINGS

The investigation found:

- The site has not been previously developed and made ground was not encountered at the site;
- TP28, TP29 and WS11 were constructed on site and found around 250mm of topsoil overlying loose sand. SPTs within WS11 suggest that the sand becomes medium dense below around 3m depth;
- laboratory analysis on samples from the wider site did not yield any evidence of contamination. Remediation of the site was not deemed necessary;
- there are no sources of hazardous gas generation within influencing distance of the site (landfills, infilled ground, deep made ground, mineworkings etc). A limited programme of gas monitoring across the wider site did not yield and elevated gas concentrations. Radon protection measures are not required; and,
- excavations collapsed at around 1.5m depth and it is likely that ground beneath this depth is saturated with groundwater. Deep excavations would likely require some dewatering.

6 GROUND INVESTIGATION DESIGN

6.1 ANTICIPATED GROUND CONDITIONS

Based on the Environmental Setting and previous land use data reviewed anticipated ground conditions are expected to comprise:

- **Made Ground** - not anticipated.
- **Natural Soils** - 250mm of topsoil overlying loose sand.
- **Bedrock –** not anticipated at shallow depth.
- **Mineworkings –** not in a coal mining area.
- **Groundwater –** likely at shallow depth.

6.2 Potential Issues

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:

Potential on-site contamination sources:

1. Former agricultural use.

Potential off-site contamination sources:

1. None.

Potential geotechnical hazards:

1. Loose sand and shallow groundwater.

Other potential constraints:

1. None.

6.3 Preliminary Conceptual Site Model

Historical plans show that the site has been occupied by arable farmland which is not considered likely to have caused significant ground contamination. Nonetheless, activities such as the discharge of chemicals to ground, unregulated burial, and burning of waste have all occurred on farmland.

Potential pollutants associated with farming activity might include any of the following:

- Crop & animal protection - pesticides & herbicides;
- Soil conditioners - metals, sulphates, PAH;
- Waste burial, land levelling, backfilling ponds\quarries - metals, PAH etc; and
- Waste burning - PAH, dioxins, metals.

6.4 Investigation Strategy

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

Exploratory Hole Type	Purpose
Trail Pits (Machine Excavated)	To determine the general nature of soils underlying the site, including the: • nature, distribution and thickness of shallow soils, including any made ground • suitability of the ground for founding structures and pavements

Proposed exploratory hole locations should be selected to provide a representative view of the strata beneath the. A nominal 30m grid spacing should be appropriate, with additional exploratory locations scheduled as necessary in light of the ground conditions actually encountered.

The number of soil samples taken should be reflective of the geological complexity actually encountered, but in general about two samples should be taken from most exploratory holes.

7 FIELDWORK

7.1 OBJECTIVES

The original investigation strategy is outlined in Section 6.4 above.

7.2 SCOPE OF WORKS

Fieldwork was supervised by Calabrian on 26th October 2020 and comprised the exploratory holes listed below.

Technique Type	Exploratory Holes	Final depth(s)	Remarks
Window Sample boreholes	WS01 to WS05	5.45m	SPTs typically at 1m centres.

Exploratory hole logs are presented in Appendix D. These logs include details of the:

- Samples taken;
- descriptions of the solid strata, and any groundwater encountered; and,
- Results of the in-situ testing.

Exploratory hole locations are shown on Drawing No. 7092/6.

8 GROUND CONDITIONS

8.1 GENERAL

A complete record of strata encountered beneath the proposed development site is given on the various exploratory hole records, presented in Appendix D.

Typical ground conditions encountered in each of these areas are described below in Sections 8.2 (made ground) and 8.3 (natural ground).

8.2 MADE GROUND

Made ground was not encountered at the site.

8.3 NATURAL GROUND

300mm of topsoil was found across the site. This was underlain by loose becoming generally medium dense (below around 3m depth) fine sand or clay/silt.

8.4 VISUAL & OLFACTORY EVIDENCE OF ORGANIC CONTAMINATION

No evidence of significant organic contamination was noted during the investigation.

Selected samples of topsoil were scheduled for chemical testing to confirm the suitability of existing topsoil for re-use; see Section 9.

8.5 GROUNDWATER

Although difficult to determine within the window sample boreholes groundwater appears to lie at around 1.5m depth.

8.6 STABILITY

Previous excavations collapsed at around 1.5m depth and it is likely that ground beneath this depth is saturated with groundwater. Deep excavations will likely require some dewatering as is being undertaken on the adjacent residential construction site where well-points are being used for sewer excavation.

8.7 REVISED CONCEPTUAL GROUND MODEL (GROUND CONDITIONS)

The Preliminary Conceptual Site Model has been revised in light of data obtained during the ground investigation, most notably with respect to the strength, nature, and depth of underlying natural strata.

Further refinement of the Conceptual Site Model is presented in Section 9, where the results of laboratory testing for contaminants have been considered.

9 CONTAMINATION (ANALYSIS, RISK ASSESSMENT & REMEDIATION)

9.1 GENERAL

The site has not been previously developed and there was no evidence of any made ground, burning or burials encountered during the ground investigation.

In the context of risks to human health associated with residential development, the Tier 1 Soil Screening Values referenced in this report have been derived by Land Quality Management Limited as their LQM/CIEH S4Uls, but amended, where appropriate, to be more specific to redevelopment within the planning process (see Notes in Annex I).

Where available, Category 4 Screening Levels (C4SL) have also been referenced; see Notes in Annex I for more detail.

This site is greenfield and no evidence of significant made ground or significant contamination was noted. Consequently, the Tier 1 Values used in this report have been derived with reference to a CSM that assumes no clean soil cover will be placed in gardens/landscaped areas (Calabrian Scenario A). In the event that determinands exceed these Tier 1 Values, the results will be reassessed.

9.2 Testing Scheduled

Based on the above assessment, Calabrian submitted a test schedule (summarised in the table below) to a UKAS accredited laboratory.

Type of Sample	No. of Samples	Determinands
Topsoil	5	Asbestos ID, TOC, pH, water soluble boron, and total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc) and Speciated Poly Aromatic Hydrocarbons (PAH).
	2	Organo-chlorine pesticides and organo-phosphorus pesticides

9.3 Soil Contamination Results

The soil contamination test results are summarised in the Tables in Annex I.

Laboratory test certificates as received from the laboratory are presented in Appendix E.

Inorganic Determinands

Of the five samples of topsoil analysed for inorganic parameters none could be classified as contaminated.

These samples are classified by comparison of concentrations with Calabrian Tier 1 Values for an end use including domestic gardens and any area where plants are to be grown (the most sensitive of the proposed end-uses).

Asbestos

No asbestos fibres were identified in any of the samples screened.

Organic Determinands

Samples have been classified by comparison with Calabrian risk-derived Tier 1 Values. These screening values assume a Soil Organic Matter (SOM) of 6% (equivalent to a TOC of 3.5%). Many organic contaminants are more mobile when the SOM is lower, and consequently lower screening values are then more appropriate for many organic contaminants.

In order to check the validity of Calabrian Tier 1 Values, the average TOC for each common fill type (beyond any areas of obvious hydrocarbon impact) have been determined.

Fill Type	Typical TOC/%	Comparison with revised Screening Value necessary?
Topsoil	<1.3	Yes, but no significant organic contamination was recorded in this soil type. All determinands well below "6%" screening value; all below limit of laboratory detection.

Poly Aromatic Hydrocarbons (PAH)

Speciated PAH analysis has been undertaken in order to determine concentrations of the key "marker" compounds: benzo(a)pyrene (considered the most toxic of the PAHs); and naphthalene (the most mobile and volatile of the PAHs).

Speciated analysis has confirmed the absence of significant concentrations of naphthalene in the soils beneath this site (no samples above the limit of detection at 0.03mg/kg).

No concentrations of benzo(a)pyrene were recorded above Calabrian' Tier 1 Value of 5mg/kg; in fact, none exceeded the limit of detection at 0.03mg/kg.

Pesticides

Two samples of topsoil were analysed for organo-chlorine pesticides and organo-phosphorus pesticides. None of the samples exceeded the laboratory limit of detection.

9.4 DISCUSSION

The site has not been previously developed and there was no evidence of any made ground, burning or burials encountered during the ground investigation.

Analysis has determined that topsoil at the site is 'clean' and suitable for reuse either on or off-site.

Waste Classification

Disposal of the made ground off site is generally not considered appropriate, economically viable, nor in line with current Government philosophy regarding sustainable development. However, some excess arisings may be generated by excavations for foundations, sewers etc. Disposal to landfill (or an appropriate soil / aggregate transfer station) may be the most practical solution if redistribution and retention on site is not feasible.

It should be noted that the classification and assessment of waste soils under the Environment Agency's Technical Guidance WM3, is a complex process (as of 1st July 2015 WM2 was archived and replaced by technical guidance WM3).

If waste soil is classed as hazardous following classification under WM3, and destined for landfill, waste acceptance criteria (WAC) leachate testing will need to be undertaken. However, non-hazardous soil waste can go to a non-hazardous landfill facility; no further testing (eg WAC) is required.

WAC analysis is different to the 'routine' laboratory testing (such as that included earlier in this Section) undertaken in order to determine hazardous properties. Calabrian typically only include WAC analysis if significant off-site disposal (of soil classified as hazardous waste) is anticipated.

It is critical if material is to be exported from site that this is allocated an appropriate waste code, following the steps within WM3. Waste carriers transporting, and sites accepting, this material should have a corresponding code within their permits. It is the responsibility of those generating the waste (i.e. the site), to ensure that the waste is handled and disposed of appropriately.

With respect to asbestos, waste soils will be classed hazardous if the soil mass contains more than 0.1% asbestos fibres that are free and dispersed. However, the 2013 edition of WM2 now states that where the waste contains identifiable pieces of asbestos (i.e. any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye), then the waste is hazardous if the concentration of asbestos in the pieces alone is 0.1%. If a stockpile of soil contained rare fragments of broken asbestos-cement sheeting, the whole stockpile would be classed as hazardous unless all the fragments could be picked-out (even though the concentration of asbestos in the soil mass might be an orders of magnitude less than 0.1%).

Contractors exporting waste from the site should be asked to review the site investigation data and make their own assessment. Alternatively, Calabrian could undertake this assessment once exported waste streams have been identified.

10 HAZARDOUS GAS

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;
- 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; and,
- not underlain by peat or shallow chalk deposits (chalk CO_2 only).

BRE Report BR211 (2015 Edition) indicates that radon protection measures are not required for new dwellings at the site. Information from Landmark confirms that the site is in an area where less than 1% of homes are estimated to be above the action level, and that radon protection measures are therefore not required.

As such, no special precautions against hazardous gas are required on this site

11 GEOTECHNICAL TESTING

11.1 General

A total of five samples of natural soil were delivered to a suitably accredited laboratory with a schedule of geotechnical testing drawn up by Calabrian.

The geotechnical laboratory test results are presented in Appendix F.

11.2 Atterberg Limits

The plasticity indices of five samples of cohesive soil have been determined; results are summarised below.

Soil type	Range of Plasticity Indices* (Average)	Shrinkability
Tidal Flat Deposits	9 (one sample only)	Non-plastic to low

** Modified where appropriate in accordance with revised Chapter 4.2 of the NHBC Standards (April 2003).*

Note. The term Shrinkability is equivalent to the term Volume Change Potential used in Chapter 4.2.

Only one of the five samples tested was found to be plastic (clay).

For the purposes of foundation design, it is recommended that any cohesive soils be regarded as being of low shrinkability.

11.3 Soluble Sulphate and pH

In accordance with BRE Special Digest 1:2005, this site has been classified as greenfield with a mobile groundwater regime.

It is envisaged foundations will extend to depths of about 5m through natural strata and samples taken from this depth range have been submitted for pH and water-soluble sulphate (2:1 soil/water extract).

The concentrations of sulphate in the aqueous natural soil extracts of five samples were determined.

The highest water-soluble sulphate concentration and the lowest pH value for each soil type analysed are shown in the Table below.

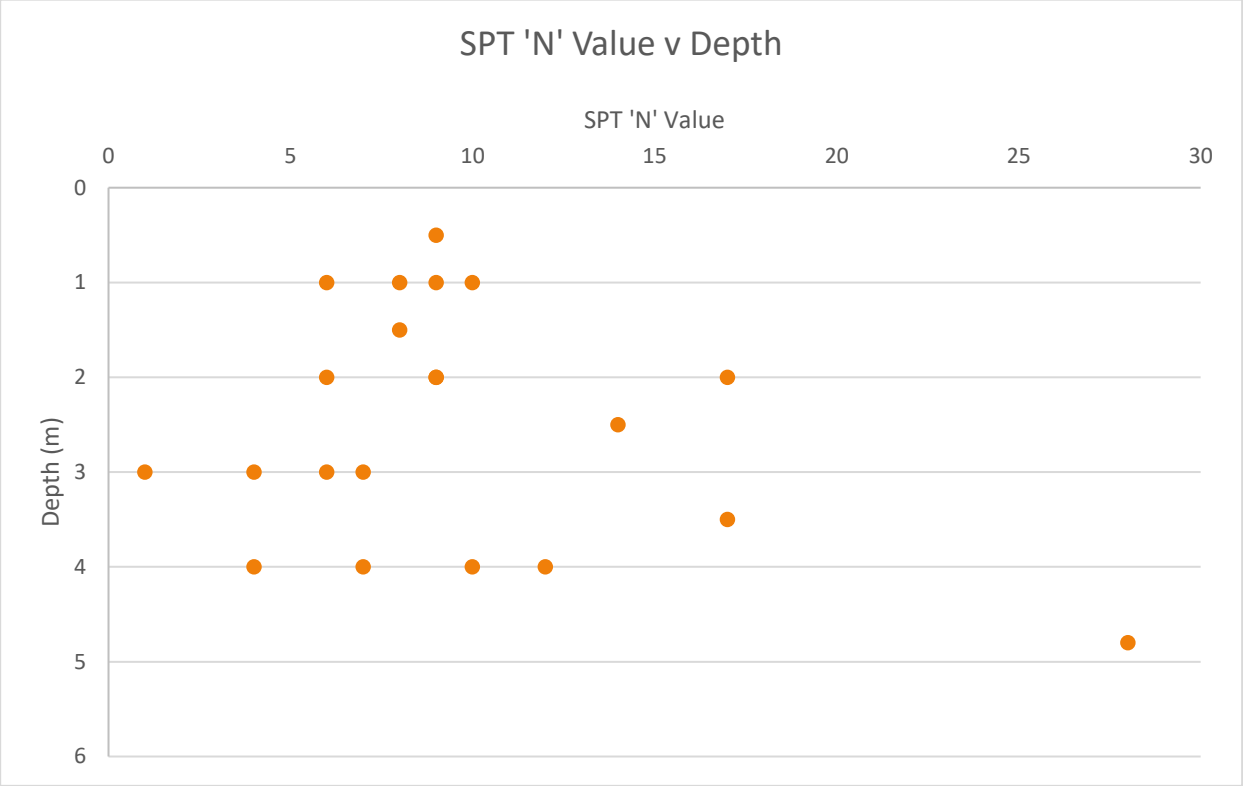
Soil type	Lowest pH values	Highest Soluble Sulphate Concentration (mg/l)
Tidal Flat Deposits	8.2	94

pH values were all above 5.5, therefore concentrations of chloride and nitrate are considered insignificant.

In accordance with Tables C1 and C2 of SD1, sub-surface concrete should be Design Sulphate Class DS-1, with the site allocated an ACEC Classification of AC-1.

11.4 Standard Penetration Test (SPT)

The in-situ relative density of granular soils was established by carrying out SPTs during the drilling of the window sample boreholes. The reported blow counts as summarised below suggest relative densities were loose becoming generally medium dense below 3m.



12 GEOTECHNICAL ISSUES

12.1 Conceptual Site Model

Made ground was not encountered at the site.

300mm of topsoil was found across the site. This was underlain by loose becoming medium dense (below around 3m depth) fine sand or clay/silt.

12.2 Mining & Quarrying

This site is located beyond the CA's defined coalfields.

There are no known quarries on, or within 500m of the site.

12.3 Foundation Recommendations

General

Foundation recommendations assume that the care home will be of two-storey construction and that line loads will not exceed 110kN/m run. If this is not the case significant alteration to these recommendations will be required.

We have assumed that final development levels will not differ significantly from ground levels existing at the time of investigation. Any digital terrain modelling undertaken or commissioned by LNT should consider implications for the foundation recommendations outlined below.

Sub-surface concrete in contact with the natural ground should be Design Sulphate Class DS-1, with the site allocated an ACEC Classification of AC-1.

Granular Soils (Sand)

The results of the in-situ standard penetration testing suggest that the granular deposits have a loose relative density (equivalent SPT 'N' Value typically <10).

Assuming a maximum foundation line load of 110kN/m run, a foundation geometry of length = 8m, breadth = 0.6m, thickness = 225mm, founding at 1m depth, and assuming an angle of shearing resistance of ϕ=25° for the granular deposits then this would suggest a safe bearing capacity of around 100kPa.

Assuming the foundation geometry detailed above, settlements greater than 25mm might be generated.

Vibro Replacement Stone Columns (Vibro)

Vibro is a technique used to improve the geotechnical characteristics of loose granular soils.

On low-rise developments, stone columns are typically 500mm to 700mm in diameter, and at spacings of between 1.5m and 2.0m. After treatment, structures can be founded on either strip footings or rafts.

Typically, the uppermost 3m to 4m of loose ground is treated.

Footings will be required to be reinforced top and bottom. For a 600mm wide, 300mm thick footing, B503 mesh is likely to provide suitable reinforcement, but further advice should be sought from the Structural Engineer.

Unless the ground beneath the whole building footprint is improved, a suspended floor should be constructed; this could be either block and beam or cast in-situ.

LNT should obtain written confirmation from the specialist contractor that the site is suitable for the proposed ground improvement.

The vibro contractor should be provided with a "specification" detailing the required bearing and settlement characteristics.

12.4 Designated Concrete Mixes

The following designated mixes in accordance with BRE Special Digest SD1 and BS 8500: Part 1: 2006 will be suitable for use on this site.

Application	DS-1 conditions (natural ground) ACEC Class AC-1
Reinforced strip/ trench fill footings (mesh reinforcement)	RC28/35
Pads, rafts and ground beams	RC28/35
Unreinforced concrete floor slabs	GEN2
In situ reinforced concrete floor slabs	RC28/35

12.5 Excavations

Based on the results of the investigation it is highly likely that major groundwater flows will be encountered in shallow excavations.

Previous excavations collapsed at around 1.5m depth and it is likely that ground beneath this depth is saturated with groundwater. Deep excavations will likely require some dewatering as is being undertaken on the adjacent residential construction site where well-points are being used for sewer excavation.

12.6 Drainage

Based on observations made during the investigation (principally shallow groundwater), soakaways will not provide a suitable drainage solution for surface water run-off at the site. Consequently, it will be necessary to consider alternative sustainable drainage systems (SUDS), and there may be a need for surface water balancing.

Any damage to the existing land drainage system caused by foundation or sewer excavations should be made good; this may require diversion and re-connection.

It is recommended that the developer contact Anglian Water Services with respect to capacity in existing foul and surface water sewers in the vicinity of the development area.

12.7 Pavements

Based on visual inspection of the natural materials and the recorded at the site, published tables (Interim Advice Note 73/06 Revision 1 (2009), Chapter 5. Characterisation of Materials Design Guidance for Road Pavement Foundations - Draft HD25) PDF p25 indicate that the sand deposits will have a CBR value of at least 3%. These values should be verified prior to or during construction.

12.8 External Works

Any digital terrain modelling undertaken or commissioned by LNT should be made available to their Engineering Designer prior to issue of an External Works Drawing.

13 REDEVELOPMENT ISSUES

13.1 General

This report has presented options with respect to foundation solutions and contamination assessment that are considered technically feasible and in line with current good practice. Consequently, we would expect to obtain regulatory approval for whichever option is adopted, although this cannot be guaranteed. Copies of this report should be forwarded to the relevant regulatory authorities for their comment/approval.

13.2 Preparation Works

Remove all stockpiles of soil and building materials along with stripping of any remaining topsoil.

13.3 Health & Safety Issues - Construction Workers

Access into excavations etc. must be controlled and only undertaken in accordance with the Confined Spaces Regulations 1997. The atmosphere in shored trenches in excess of 1.2m should be monitored for oxygen and hazardous gas (methane & carbon dioxide), prior to personnel entering such excavations. Monitoring should continue whilst personnel are working in deep excavations.

Before site operations are started, the necessary COSHH statements and Health & Safety Plan should be drafted in accordance with the CDM regulations.

13.4 New Utilities

It is strongly recommended that all statutory service bodies are consulted at an early stage with respect to the ground conditions within which they will lay services in order to enable them to assess at an early stage any potential abnormal costs.

This site is greenfield, and no previous or current usage of the site or its immediate surroundings is likely to have resulted in ground contamination. Furthermore, no significant made ground was encountered in any of the exploratory holes during the ground investigation.

Consequently, the use of 'standard' polyethylene water supply pipes should be acceptable, although LNT should consult the local water company at the earliest opportunity to confirm this.

14 CONCLUSIONS & RECOMMENDATIONS

14.1 General

Consideration is being given to development of the site with a two-storey residential care home with associated gardens/landscaping, access road and car park.

Made ground was not encountered at the site. 300mm of topsoil was found across the site. This was underlain by loose becoming medium dense (below around 3m depth) fine sand or clay/silt.

The site has remained undeveloped during its history.

14.2 Hazardous Gas

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.

The site is in an area where less than 1% of homes are estimated to be above the radon action level.

As such, no special precautions against hazardous gas are required.

14.3 Mining & Quarrying

This site is located beyond the CA's defined coalfields.

There are no known quarries on, or within 50m of the site.

14.4 Contamination & Remediation

The site has not been previously developed and no made ground encountered at the site. Topsoil at the site is 'clean'.

14.5 Foundations

Conventional strip foundations at around 1.0m depth will be suitable for the proposed care home.

14.6 Flooding

The EA indicate that the site is located within Flood Zone 2, where the risk of flooding from rivers or the sea is classified as low. The vast majority of the surrounding village is also located in Flood Zone 2.

14.7 Drainage

Soakaways would not provide a suitable drainage solution for surface water run-off at the site. Consequently, it will be necessary to consider alternative sustainable drainage systems (SUDS), and there may be a need for surface water balancing.

14.8 Pavements

The natural sand/silt deposits will have a CBR value of at least 3%. These values should be verified prior to or during construction.

DRAWINGS	
7092/1	Site Location Plan
7092/2	Proposed Site Layout
7092/3	Existing Site Features
7092/4	Site Photographs
7092/5	Preliminary Conceptual Site Model
7092/6	Exploratory Hole Location Plan
7092/7	Geoenvironmental Summary





DISTRICT

LNT Care Developments

client	
project	HOLBEACH MEADOWS, HOLBEACH
drawing title	SITE LOCATION
drawing number	7092/1
revision	–
drawing status	Final
scale	1:25,000 @ A4
date	17/11/2020
drawn by	RJH
checked by	–

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Reproduced from LNT drawing
referenced PE12 7HZ -F-02, FEAS-1

notes

rev. description

SITE AREA 5216m
(1.28 acres)

Phase 1
Phase 2

LAP

P.O.S.

Edge of Cultivation

Small Trees

LNT Care Developments

client

HOLBEACH MEADOWS, HOLBEACH

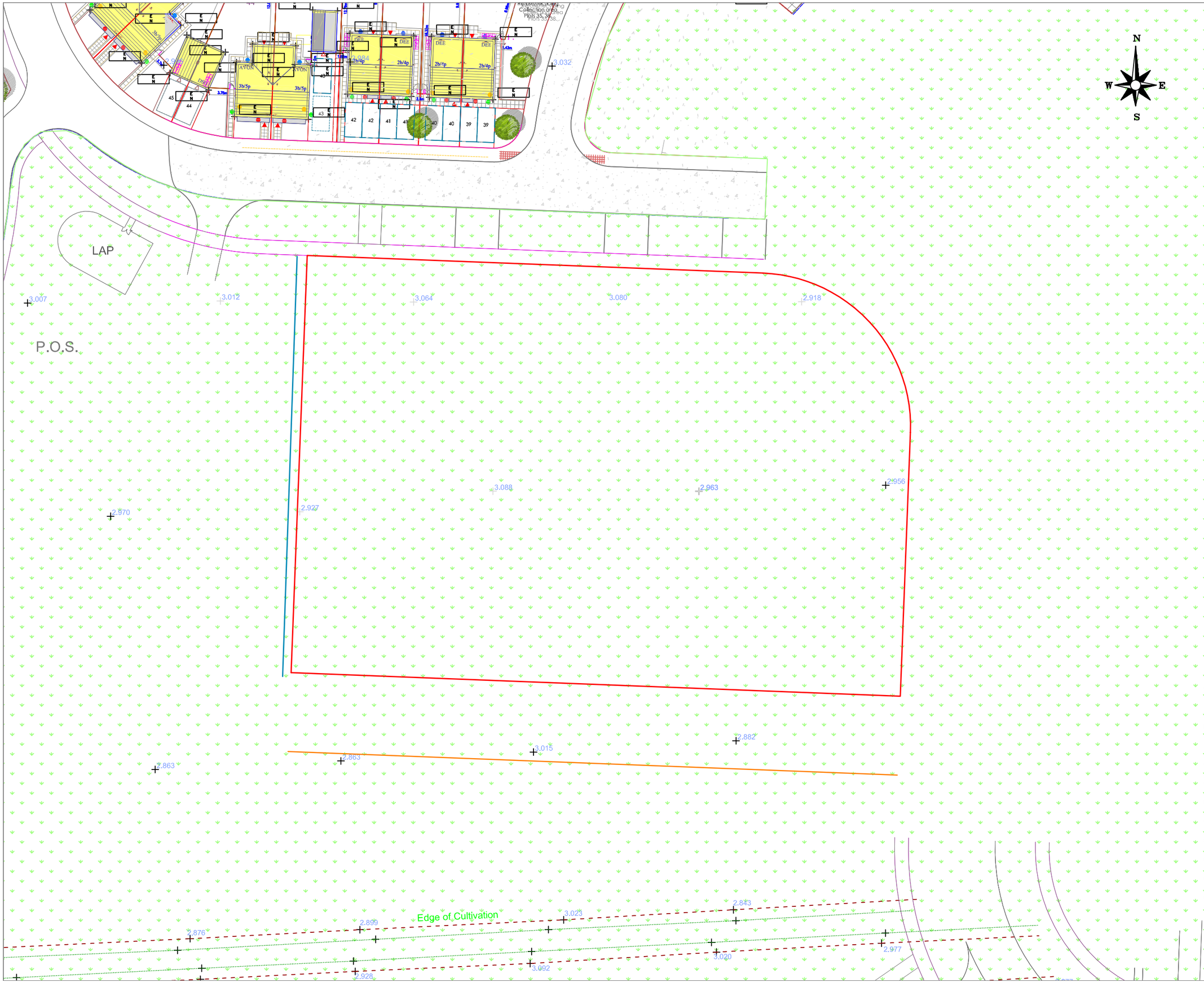
project

PROPOSED LAYOUT

drawing title

drawing number	7092/2
revision	–
drawing status	Final
scale	1:500@A3
date	17/11/2020
drawn by	RJH
checked by	–

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notes

rev. description

LNT Care Developments

client

HOLBEACH MEADOWS, HOLBEACH

project

SITE FEATURES

drawing title

drawing number 7092/3

revision –

drawing status Final

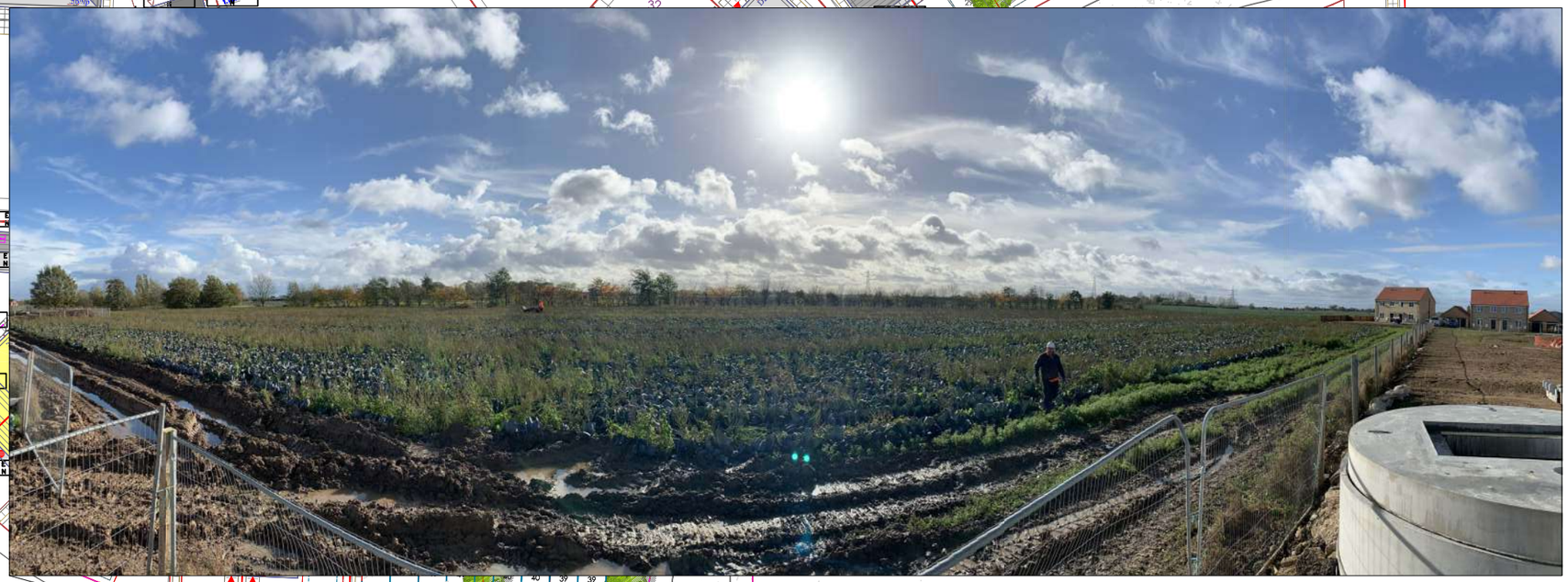
scale 1:500 @A3

date 17/11/2020

drawn by RJH

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N
W E
S

notes

APPROXIMATE SITE BOUNDARY

LOCATION & ORIENTATION OF PHOTOGRAPH

rev. description

LNT Care Developments

client

HOLBEACH MEADOWS, HOLBEACH

project

PHOTOGRAPHS

drawing title

drawing number 7092/4

revision –

drawing status Final

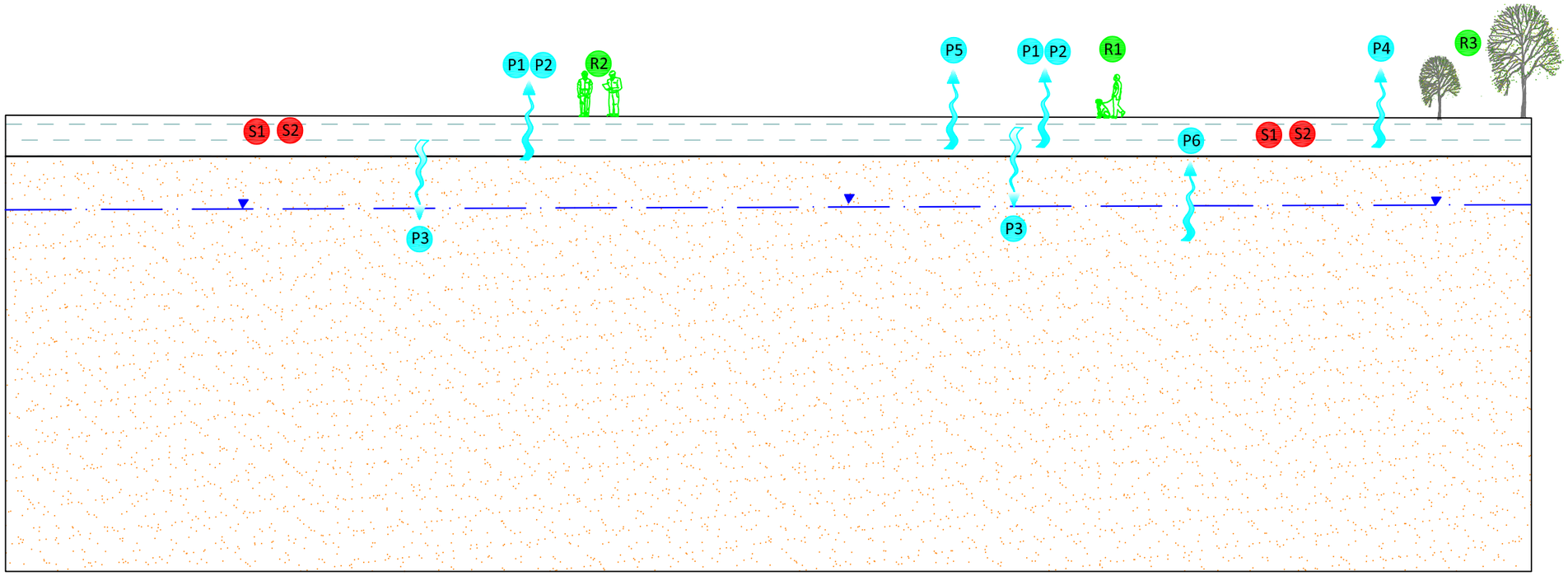
scale 1:500@A3

date 17/11/2020

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GEOLOGY

- TOPSOIL
- TIDAL FLAT DEPOSITS (clay and silt)

SOURCES

- S1 SOIL CONDITONER (INORGANICS)
- S2 PESTICIDES

POTENTIAL PATHWAYS

- P1 DERMAL CONTACT
- P2 INGESTION\INHALATION
- P3 LEACHING OF CONTAMINANTS
- P4 UPTAKE BY PLANTS
- P5 VOLATILISATION

SIGNIFICANT RECEPTORS

- R1 END USERS (RESIDENTS)
- R2 SITE WORKERS
- R3 VEGETATION

notes

rev. description

LNT Care Developments

client

HOLBEACH MEADOWS, HOLBEACH

project

PRELIMINARY CONCEPTUAL SITE MODEL

drawing title

drawing number 7092/5

revision –

drawing status Final

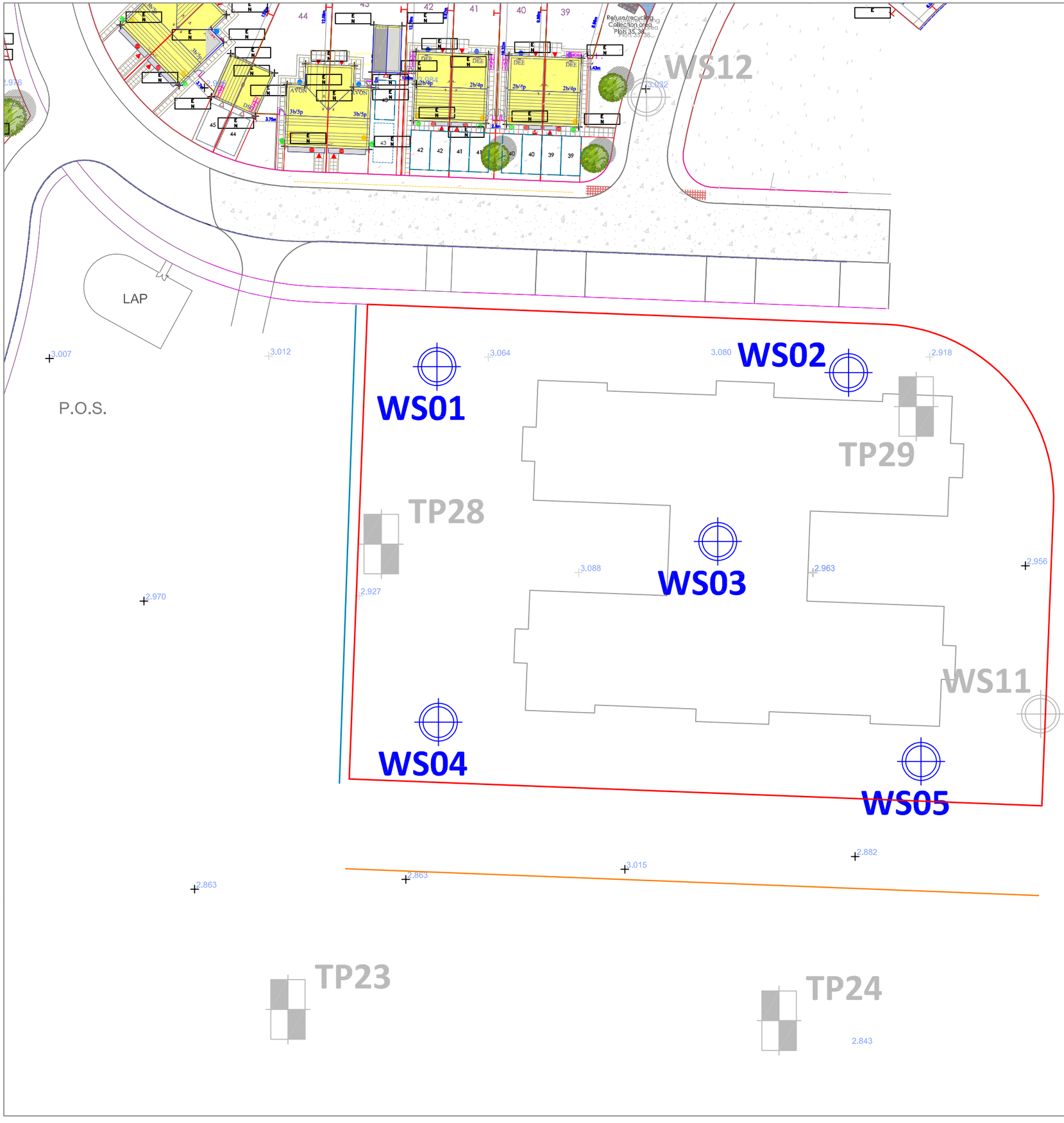
scale Not to Scale

date 17/11/2020

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notes

CALABRIAN INVESTIGATION 2020

WINDOW SAMPLE LOCATION

GEOMATTERS INVESTIGATION 2016

TRIAL PIT LOCATION

WINDOW SAMPLE LOCATION

APPROXIMATE SITE BOUNDARY

PROPOSED CARE HOME FOOTPRINT

rev. description

LNT Care Developments

client

HOLBEACH MEADOWS, HOLBEACH

project

EXPLORATORY HOLE LOCATION PLAN

drawing title

drawing number 7092/6

revision –

drawing status FINAL

scale 1:500 @A3

date 17/11/2020

drawn by RJH

checked by –

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ANNEX I	SUMMARY CONTAMINATION DATA (SOILS)
Table A	Summary of Contamination Results



Summary of Degree of Ground Contamination

Expl Hole	Depth (m)	Material	Concentrations in mg/kg unless otherwise stated. Results are quoted to 1 decimal place if <10, and whole numbers if >10. Trigger Level Concentrations are shown in **BLACK** and assume a **residential with gardens end-use**.													
			pH	% TOC	As 37	B 290	Cd 11	Cr 910	Cu 2400	Pb 200	Hg 40	Ni 130	Se 250	Zn 3700	B(a)P 5	Naphthalene 13	Asbestos
WS01	0.2	Topsoil	7.5	1.2	14	1	0.2	17	30	17	< 0.05	14	< 0.5	52	< 0.03	< 0.03	Not Identified
WS02	0.2	Topsoil	7.6	1.3	14	0.9	0.2	17	30	22	< 0.05	14	< 0.5	47	< 0.03	< 0.03	Not Identified
WS03	0.2	Topsoil	7.4	1.3	14	0.9	0.2	16	30	19	< 0.05	13	< 0.5	45	< 0.03	< 0.03	Not Identified
WS04	0.2	Topsoil	7.7	1.3	14	1	0.2	16	32	17	< 0.05	13	< 0.5	53	< 0.03	< 0.03	Not Identified
WS05	0.2	Topsoil	7.6	1.2	10	1	0.3	28	33	52	0.06	32	< 0.5	120	< 0.03	< 0.03	Not Identified

KEY

36	Parameter tested for and found to be in excess of Tier 1 concentration
179	Parameter tested for and found to be > 5 x Tier 1 concentration
12	Parameter tested for but not found to be in excess of Tier 1 concentration

Soil Screening Values used by Calabrian

In March 2002 DEFRA and the Environment Agency published a series of technical papers (R&D Publications CLR 7, 8, 9 and 10) outlining the UK approach to the assessment of risk to human health from land contamination. In 2008 CLR 7, 9 and 10 and all corresponding SGV and Tox reports were withdrawn and superseded by new guidance including:

- Guidance on Comparing Soil Contamination Data with a Critical Concentration - CL:AIRE and CIEH, May 2008
- Evaluation of models for predicting plant uptake of chemicals from soil - Science Report – SC050021/SR
- Human health toxicological assessment of contaminants in soil - Science Report: SC050021/SR2
- Updated technical background to the CLEA model - Science Report: SC050021/SR3
- CLEA Software (Version 1.05) Handbook Science report: SC050021/SR4
- Compilation of data for priority organic pollutants for derivation of Soil Guideline Values - Science Report: SC050021/SR7

The approach set out in these documents represents current scientific knowledge and thinking; and includes the Contaminated Land Exposure Model (CLEAv1.06). The Environment Agency are in the process of using this updated approach to regenerate a selection of Soil Guideline Values (SGVs).

CLEA SGVs were derived for standard land use scenarios predominantly in the context of Part IIA, using a conceptual site model (CSM) defined in SR3. Calabrian have incorporated amendments to the CSM used to derive SGVs that more accurately reflect redevelopment within the planning regime; consequently, Calabrian have not necessarily adopted any published SGV as a screening value.

The CLEA conceptual site model assumes a source located in a sandy loam, with 6% soil organic matter (SOM) - equivalent to 3.5% total organic carbon (TOC). Calabrian consider it reasonable to adopt the CLEA default TOC for made ground. However, where the average TOC value for a particular soil type is significantly lower than the 3.5%, Calabrian adopt refined Screening Values.

In March 2014 DEFRA published Category 4 Screening Levels (C4SLs) for six substances (arsenic, cadmium, chromium IV, lead, benzene & benzo(a)pyrene) for four generic land-uses comprising residential, commercial, allotments and public open space.

The methodology for deriving both the previous Soil Guideline Values and the new Category 4 Screening Levels is based on the Environment Agency's Contaminated Land Exposure Assessment (CLEA) methodology. Development of Category 4 Screening Levels has been achieved by modifying the toxicological and\or exposure parameters used within CLEA (while maintaining current exposure parameters).

The Part 2A Statutory Guidance was developed on the basis that Category 4 Screening Levels could be used under the planning regime. However, policy responsibility for the National Planning Policy Framework falls to the Department for Communities and Local Government. Defra anticipate that, where they exist, C4SLs will be used as generic screening criteria, and Calabrian consider C4SLs to be suitable for use as Tier 1 Screening Values. Calabrian have discussed this matter with both NHBC and YAHPAC (collection of Yorkshire & Humberside local authorities) and received confirmation that they are satisfied with this approach.

In general Calabrian have adopted the use of the LQM/CIEH Suitable 4 Use Levels (S4ULs) as Tier 1 Screening Criteria. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3373. All rights reversed.

Calabrian have adopted Tier 1 Screening Criteria for four different CSMs (Scenarios); these are:

- A - Residential with homegrown produce, but no cover (or only up to 300mm)
- B - Residential with homegrown produce and 600mm 'clean' cover
- C – Residential apartments with landscaping (i.e. no home grown produce)
- D - Commercial/industrial with landscaping.

The **exposure** pathways considered for each scenario are detailed in the Table below.

Scenario	Land use	Pathways	Justification
A	Residential with homegrown produce, but no cover (or only up to 300mm)	• Direct ingestion of soil • Dermal contact • Consumption of vegetables and soil attached to vegetables • Inhalation of indoor vapours and dust • Inhalation of outdoor vapours and dust	Minimal cover – insufficient to break any pathways therefore all exposure pathways are relevant
B	Residential with homegrown produce minimum 600mm cover	• Inhalation of indoor vapours • Inhalation of outdoor vapours	The 600mm cover removes the risk from all pathways other than inhalation.
C	Residential apartments with landscaped areas and minimum 300mm cover	• Direct ingestion of soil • Dermal contact • Inhalation of indoor vapours and dust • Inhalation of outdoor vapours and dust	All pathways applicable due to possible exposure from landscaped areas. However consumption of home grown produce not included as unlikely to be grown in landscaped areas. Where vegetables are to be grown site specific QRA may be required.
D	Commercial/ industrial with landscaped areas no cover	• Direct ingestion of soil • Dermal contact • Inhalation of indoor vapours and dust • Inhalation of outdoor vapours and dust	All pathways applicable due to possible exposure from landscaped areas. Assumed the commercial development consists of offices to provide a conservative assessment.
E	Grassed area or play park in close proximity to housing. Assumes minimum 300mm cover (growing medium).	• Direct ingestion of soil • Dermal contact • Inhalation of outdoor vapours and dust	All pathways applicable due to possible exposure from landscaped areas. Assumes an area where some children play regularly and others less.
F	Dedicated sports grounds. Assumes minimum 300mm cover (growing medium).	• Direct ingestion of soil • Dermal contact • Inhalation of outdoor vapours and dust	All pathways applicable due to possible exposure from landscaped areas. Assumes an where exposure only occurs to players and grounds staff

The Soil Screening Values referred to in this document are **not** intended to be used when considering potential risks associated with:

- existing land uses in the context of Part IIA of the Environment Protection Act 1990;
- end uses such as allotments, sports fields, children's playgrounds, care homes, hospitals etc; and
- controlled waters.

With respect to **inorganic** determinands, Calabrian derived Tier 1 values for the four Scenarios A to D are presented below:

Inorganic Contaminant	Source	Tier 1 Assessment Criteria (mg/kg) for Scenarios A to D									Comments/Notes
		SGV*	C4SL*	LQM/ CIEH S4UL	A	B	C	D	E	F	
As	CLEA	32	37	37	37	Use (A) in SI Report for initial "screen". If >5 x A, then consider increase of cover to 1,000mm	40	640	79	170	C4SLs adopted
Cd	CLEA	10	26	11	11		85	190	120	532	LQM/CIEH S4UL adopted
Cr	CLEA				910		910	8600	1,500	33,000	Assumes Cr is CrIII.
Pb	CLEA	(450)	200		200		310	2,330	630	1,300	C4SLs adopted
Ni	CLEA	130		130	130		180	980	230	3,400	LQM/CIEH S4UL. Assessment of health risk only
Se	CLEA	350		250	250		430	12,000	1,100	1,800	LQM/CIEH S4UL adopted
Hg	CLEA	170		40	40		56	11,000	120	240	LQM/CIEH S4UL. Assumes in an inorganic compound.
B	Drinking			290	290		11,000	240,000	21,000	46,000	LQM/CIEH S4UL adopted
Cu	EPA			2,400	2,400		7100	68,00	12,000	44,000	LQM/CIEH S4UL adopted
Zn	DoE	200		3,700	3,700		40,000	73,000	81,000	170,000	LQM/CIEH S4UL adopted
Cyanide	CLEA				527		530	14,000			

* *For a residential end use*

With respect to **organic** determinands, Calabrian derived Tier 1 values (assuming 6% SOM) for the four Scenarios A to D are presented below:

Organic Contaminant (all sourced via CLEA)	Tier 1 Assessment Criteria (mg/kg) for Scenarios A to D									Comments/Notes
	SGV*	C4SL*	LQM/ CIEH S4UL*	A	B	C	D	E	F	
Benzene	0.33	0.87	0.37	0.87	0.87	3.3	98	140	230	C4SLs adopted
Toluene	610		660	497	1,440	1,690	4,360	56,000#	100,000#	
Ethyl Benzene	350		260	240	416	498	2,840	25,000#	27,000#	
Xylenes	240		310	127	146	183	2,620	43,000#	31,000#	
Phenol	420			412	2,360	557	38,700			
PCBs				1.7	1.8	1.8	1.8			Based on toxicity of EC7.
Benzo(a)pyrene		5	3	5	25	5.3	77	10	21	C4SLs adopted. Where source **not** a coal tar.
Naphthalene			13	13	13	13	432	4,900#	3,000#	
Gasoline Range Organics				15	16	21	1,000	21	21	See **3-step** assessment of TPH below.
Diesel Range Organics				151	153	232	5,000	232	232	
Lubricating Range Org				1,000	5,000	1,000	5,000	1,000	1,000	

* *For a residential end use*

\# *LQM/CIEH S4UL adopted, 6% SOM*

Note: **PAH** cannot be assessed as a single "total" value, as each individual PAH compound has different toxicity and mobility in the environment. Speciated analysis is required to determine the concentrations of the various compounds, most notably the key PAHs: Benzo(a)Pyrene (considered the most toxic of the PAHs); and Naphthalene (the most mobile and volatile of the PAHs).

Similarly, **TPH** cannot be assessed as a single "total" value, and reference has been made to the Environment Agency's document P5-080/TR3, "*The UK approach for evaluating human health risks from petroleum hydrocarbons in soils*". This document supports the assumptions and recommendations made by the US Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG). The TPHCWG have broken down "TPH" into thirteen representative constituent fractions or "EC Bandings". The TPHCWG have derived a series of physiochemical and toxicological parameters for each of the thirteen bandings. The significance of speciated TPH results can be assessed by following the 3 steps outlined in the below.

Step	Result	Action
1. Consider indicator compounds: Are BTEX, Naphthalene, Benzo(a)pyrene above their respective Tier 1 values?	Yes	Remediation or DQRA required
	No	Proceed to Step 2
2. Consider individual TPH fractions: are they above respective screening values?	Yes	Remediation or DQRA required
	No	Proceed to Step 3
3. Assess Cumulative effects: Is the calculated Hazard Index for each source >1	Yes	Remediation or DQRA required
	No	TPH compounds pose no significant risk

Step 1 *- Assessing indicator compounds*

TPH fraction Indicator compound	End use specific screening value (mg/kg)			
	A: Residential no cover	B: Residential with 600mm cover	C: Residential no gardens	D: Commercial\ Industrial
Benzene	0.87	0.87	3.3	98
Toluene	497	1,440	1,690	4,360
Ethyl Benzene	240	416	498	2,840
Xylenes	127	146	183	2,620
Naphthalene	13	13	13	432

Step 2 *- Assessing individual TPH fractions*

TPH fraction		End use specific screening value (mg/kg)					
		A: Residential no cover	B: Residential with 600mm cover	C: Residential with no gardens	D: Commercial/ industrial	E: POS (Residential) S4UL	F: POS (Park) S4UL
Aliphatic 5-6	GRO	41	41	63	5,000^	160	160
Aliphatic 6-8	GRO	123	123	191		530	530
Aliphatic 8-10	GRO	30	31	48		150	150
Aliphatic 10-12	DRO	151	153	232		760	770
Aliphatic 12-16	DRO	500^	500^	500^		4,300	4,400
Aliphatic 16-21	DRO	1,000^	5,000#	1,000^		11,000	11,000
Aliphatic 21-35	LRO	1,000^	5,000#	1,000^			
Aromatic 5-7	GRO	52	56	72		300	1,400
Aromatic 7-8	GRO	15	16	21	1,000^	660	3,900
Aromatic 8-10	GRO	47	50	77	5,000^	190	270
Aromatic 10-12	DRO	212	282	390		380	1,200
Aromatic 12-16	DRO	683	1,000*	1,000*		660	2,500
Aromatic 16-21	DRO	1,000^	5,000#	1,000^		930	1,900
Aromatic 21-35	LRO	1,000^	5,000#	1,000^		1,700	1,900

* Calculated Screening Value exceeded soil saturation limit and could indicate free product, therefore calculated soil saturation limit adopted as a target

^ Calculated Screening Value close to soil saturation limit, screening value selected by Calabrian considering visual and olfactory impacts.

Five times the screening value for Scenario A.

S4UL LQM/CIEH S4UL adopted, 6% SOM

Step 3 *- Assessing Cumulative Effects*

$$HI = \sum_{F_i=1}^{16} HQ\ F_i = \frac{Measured\ concentration\ F_i\ (mg\,kg^{-1})}{SGV\ F_i\ (mg\,kg^{-1})}$$

where HI = Hazard Index
HQ = Hazard Quotient
F_i = Fraction $_i$
SGV = Soil Guideline Value

With respect to the interpretation of the **calorific values**, at present there are no accepted methods to assess whether a sample is combustible and under what circumstances it might smoulder. Some guidance is given in ICRCL Note 61/84 "Notes on the fire hazards of contaminated land" which states that:

"In general … it seems likely that materials whose CV's exceed 10MJ/kg are almost certainly combustible, while those with values below 2MJ/kg are unlikely to burn".

Tier 1 **groundwater** risk assessments are undertaken by comparing leachate or groundwater concentrations with the appropriate water quality standard. Tier 1 Screening Values have been discussed with the Environment Agency, and typically those in **bold** below are adopted.

Analyte	Source of Tier 1 Screening Value (µg/l)			
	Surface Water (Abstraction for Drinking) 1996	Water Supply Regulations. 2000	Water Framework Directive	Environment Agency Advice
Arsenic	50	10	**50**	
Selenium	10	**10**		
Cadmium	5	5	**1.5**	
Chromium	50	50	**32**	
Copper	50	2,000	**28**	
Lead	50	10	**7.2**	
Nickel		20	**20**	
Zinc	3,000		**125**	
Boron		**1,000**		
Mercury	1	1	**0.05**	
Polyromantic Hydrocarbons		0.01~	**0.002#**	
Petroleum Hydrocarbons				10
1,1,1-Trichloroethane			100	
1,1 Dichloroethane				100
1,2-Dichloroethane		3	10	
1,1-Dichloroethene				100
Benzene		1	10	
Ethylbenzene				10
Tetrachloroethene		10	10	
Toluene			50	
Trichloroethene		10	10	
Vinyl Chloride		0.5		
Trichloromethane			2.5	
Xylenes			30	
Chloroethane				**100**

~ sum of benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene
# sum of Benzo(b)fluoranthene + Benzo(k)fluoranthene + Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene

Possible Action in event of Tier 1 exceedance

Should any of the Tier 1 criteria detailed above be exceeded, then three potential courses of action are available. (The first is only applicable in terms of human health, but the second and third could also be applied to groundwater or landfill gas).

1. Undertake further statistical analysis following the approach set out in "*Guidance on Comparing Soil Contamination Data with a Critical Concentration - CL:AIRE and CIEH, May 2008*" in order to determine whether contaminant concentrations of inorganic contaminants within soil\fill actually present a risk (only applicable to assessing the risk to human health).
2. Carry out a more detailed quantitative risk assessment in order to determine whether contamination risks actually exist.
3. Based on a qualitative risk assessment, advocate an appropriate level of remediation to "break" the pollutant linkage - for example the removal of the contaminated materials or the provision of a clean cover.

Prior to undertaking any statistical analysis the issue of the **averaging area** requires further consideration. The CL:AIRE\CIEH document still refers to CLR 7, which suggests averaging area should reflect receptor behaviour and therefore might be a single garden, or an open area used by the local community as a play area. This approach to averaging areas is considered applicable within the context of Part IIA of the Environmental Protection Act (EPA) 1990, in terms of an existing residential development.

However, Calabrian consider the concept of a single garden as an averaging area to be inappropriate with respect to brownfield redevelopment, which is regulated by the planning regime. In this context, contamination across the entire site needs to be characterised by reference to the Conceptual Site Model. Consequently, Calabrian gather and analyse sample results by fill type, and\or by former use in a given sub-area of the site, before undertaking statistical analysis; ie the averaging area is associated with the extent of a particular fill type, or an area affected by spillage\leakage.

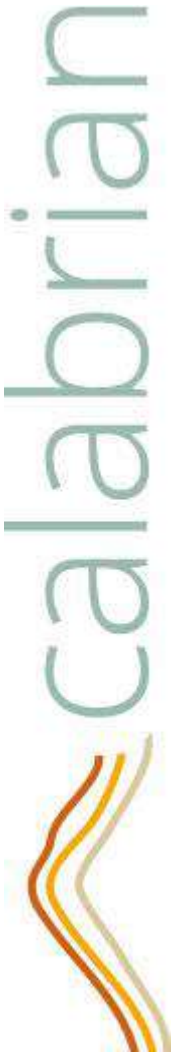
In terms of brownfield redevelopment, this is considered a more appropriate methodology which provides a more representative sample population for statistical analysis. As such the entire site is considered in terms of the proposed end use, be this residential with, or without gardens.

Analysis by soil\fill type is appropriate for essentially immobile contaminants associated with a particular fill type, for example arsenic in colliery spoil, metals in ash & clinker, sulphate in plaster-rich demolition rubble etc.

Analysis by former use is appropriate where more mobile contaminants have entered the ground, for example diesel associated with leakage from a former fuel tank, downward migration of leachable metals through granular materials, various soluble contaminants present in a wastewater leaking into the ground via a fractured sewer etc. In these circumstances, it may be appropriate to undertake statistical analysis of sample results from a variety of different soil\fill types. However, consideration would have to be given to factors such as porosity which might influence impregnation of a mobile contaminant into the soil mass; ie contamination would normally be more pervasive and significant in granular soils than cohesive soils.

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APPENDIX A COMMISSION



7092/002/RJH/rjh

6th October 2020

Mrs T Spencer
LNT Care Developments
Helios 47
Leeds
West Yorkshire
LS25 2DY

Dear Tracey

Holbeach Meadows, Holbeach

Please find enclosed our fee proposal for undertaking a site investigation on the above land.

The wider site masterplan (referenced 35-SL-01) suggests that the site consists of a single parcel of land with a plan area of approximately 0.52 hectares. Your proposed layout referenced PE12 7HZ-F-02 (FEAS-1) and dated 15th July 2020 indicates a residential care home development comprising a two-storey care home with associated gardens/landscaping, access road and car parking.

The site currently comprises part of a larger, relatively level agricultural field. At this stage access routes to the site are unclear although the surrounding residential development is under construction.

We have been provided with a copy of the following report which has been reviewed in the enclosed Drawing 7092/7R:

- Phase I & II Area at Holbeach Meadows, Holbeach. Phase I & II Geo-Environmental Investigation for Ashwood Homes. Report referenced GML16197, dated November 2016.

Our site investigation proposal allows for the following works:

Phase 1 Desk Study

Environmental search data and historical maps (obtained from Landmark) will be reviewed in order to determine whether any 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 undertake a walkover survey.

Fieldwork

We have allowed for one day's window sampling using a mini percussion drilling rig. Around six boreholes would be drilled along with insitu Standard Penetration Tests. All boreholes will be supervised and logged by an experienced geoenvironmental engineer.

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.

This site is greenfield and therefore highly unlikely to be underlain by made ground. Furthermore, we are not aware of any other sources of hazardous gas (shallow mine workings, landfill sites etc) within influencing distance of the site. Consequently, at this stage, we have not allowed for undertaking a hazardous gas risk assessment.

This proposal has been put together without a visit to the site and it has been assumed that access is available for a min-track mounted drilling rig.

Soils Testing: This will comprise routine geotechnical soils analysis, typical of that normally required for greenfield sites. Although no allowance has been made for in-situ or laboratory CBR testing, CBR values will be estimated from the strata descriptions and classification test results, where appropriate (i.e. if no significant regrading or reworking of made ground is proposed).

At this stage, we have no reason to expect wide areas of the site to be underlain by significant thicknesses of made ground. Consequently, we have only allowed for contaminant testing of up to six samples of topsoil to confirm its suitability for re-use.

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 five 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 detailed engineering records, 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 provide technically feasible options for redevelopment of the site with a care home, including consideration of foundation types and treatment\removal of contamination.

Fieldwork could be commenced within three weeks of receipt of your written instruction to proceed. Our comprehensive geoenvironmental appraisal report will be issued within four 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.

Our proposal allows for submission of the report to the Local Authority 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.

The investigation should be considered to comprise two elements. Each will be invoiced on completion of the relevant report as defined below:

1. Items A to C within five days of fieldwork completion, with exploratory hole logs and an interim letter report outlining our initial findings and Preliminary Recommendations Report; and,
2. Items D to F on issue of the comprehensive geoenvironmental appraisal report.

Health, Safety & Welfare

The works outlined above will be carried out in accordance with Calabrian task- and site- specific Risk Assessments and Method Statements.

Details of welfare will be included within the Method Statements, however, this investigation is expected to be completed within three working days and therefore it is not considered reasonably practicable to provide formal welfare facilities, and our proposal makes no allowance for so doing.

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).

Calabrian will obtain copies of the necessary utility plans (including electricity, gas, water, drainage & telecom) from Landmark as a utility report; however, if you already hold these it would be appreciated if you could forward these prior to the proposed fieldworks.

Terms & Conditions

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

Should you require any further information, please contact the undersigned.

Yours sincerely

Richard Hey - Managing Director
for and on behalf of
CALABRIAN LIMITED

enc

Terms and Conditions for the Appointment of Calabrian 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" shall mean these Terms (entitled "Terms and Conditions for the Appointment of Calabrian Limited"), the Proposal, any document recording the Client's unequivocal acceptance of the Proposal and any other documents or parts of other documents expressly referred to in any of the foregoing:

"Client" shall mean the party for whom the Services are being provided by Calabrian;

"Documents" shall mean all documents of any kind and includes plans, drawings, reports, programmes, specifications, Bills of Quantities, 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 Calabrian, and whether in paper form or stored electronically or on disk, or otherwise;

"Calabrian" shall mean Calabrian Limited whose registered office is at Market Chambers, 14 Market Place Bedale, DL8 1EQ.

"Intellectual Property" includes all rights to, and any interests in, any patents, designs, trade marks,

right, 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;

"Parties" shall mean the Client and Calabrian

"Project" shall mean the project described in the Proposal and any enquiry from the Client on which Calabrian has based its Proposal;

"Proposal" means the offer document prepared by Calabrian 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 Calabrian pursuant to the Agreement and as set out in the Proposal and shall include any additions or amendments thereto made in accordance with these Terms;

"Terms" means these terms entitled "Calabrian Terms of Appointment";

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 The Client agrees to engage Calabrian and Calabrian agrees to provide the Services in accordance with the provisions of the Agreement.

3 OBLIGATIONS OF CALABRIAN

3.1 Calabrian shall perform the Services using the reasonable standard of skill and care normally exercised by similar professional Environmental firms in performing similar services under similar conditions.

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

4 OBLIGATIONS OF THE CLIENT

4.1 Throughout the period of this Agreement the Client shall afford to Calabrian or procure the affording to Calabrian of access to any site where access is required for the performance of the Services.

4.2 The Client accepts responsibility for ensuring that Calabrian is 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 known or suspected by the Client, which the Client shall clearly mark on the ground or identify on accurate location plans supplied to Calabrian prior to the commencement of the Services. The Client shall also inform Calabrian 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. The Client shall indemnify Calabrian against all costs, 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 the Client discovers any conflict, defect or other fault in the information or designs provided by Calabrian pursuant to the Agreement, he will advise Calabrian in writing of such defect, conflict or other fault and Calabrian 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 the conflicting, defective or in any other way faulty information or designs.

5 INTELLECTUAL PROPERTY

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

5.2 The Client shall have a non-exclusive licence to copy and use such Intellectual Property for purposes directly related to the Project. Such licence shall enable the Client to copy and use the Intellectual Property but solely for its 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 license to amend any drawing, design or other Intellectual Property produced by Calabrian.

5.3 Should the Client 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, it must obtain the prior written consent of Calabrian. The giving of such consent shall be at the discretion of Calabrian and shall be upon such terms as may be required by Calabrian. Calabrian shall not be liable 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 behalf of Calabrian.

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

5.5 In the event of the Client being in default of payment of any fees or other amounts due, Calabrian may suspend further use of the licence on giving 2 days' notice of the intention to do so. Use of the licence may be resumed on receipt of the outstanding amounts

6 TITLE

6.1 Calabrian shall transfer only such title or rights in respect of the Documents as it has, and if any part is purchased from a third party Calabrian shall transfer only such title or rights as that party had and has transferred to Calabrian.

6.2 Title in the Documents shall remain with and shall not pass to the Client until the amount due under the invoice(s) (including interest and costs) has been paid in full.

6.3 Until title passes, the Client shall hold the Documents as bailee for Calabrian and shall store or mark them so that they can at all times be identified as the property of Calabrian.

6.4 At any time before title passes (save and except where payment is not due), but only after prior consultation with the Client, Calabrian may without any liability to the Client repossess and use or sell all or any of part of the Documents and by doing so terminate the right of the Client to use, sell or otherwise deal in the Documents.

6.5 Calabrian may maintain an action for the price of the Documents notwithstanding that title in them has not passed to the Client.

7 CONFIDENTIALITY

7.1 Calabrian undertakes not to divulge or disclose to any third party without the written consent of the Client information which is designated confidential by the Client or which can reasonably be considered to be confidential and arises during the performance of the Services unless required to do so by law or necessary in the proper performance of its duties in relation to the Project, or in order to make full frank and proper disclosure to its insurers or intended insurers, or to obtain legal or accounting advice.

7.2 Subject to the above, Calabrian shall be permitted to use information related to the Services it provides in connection with the Project for the purposes of marketing its services and in proposals for work of a similar type.

8 THIRD PARTIES

8.1 The Agreement or any part thereof or any benefit or interest thereunder may not be assigned by the Client without the prior written consent of Calabrian. The giving of such consent shall be at the discretion of Calabrian and Calabrian will only agree to an assignment on its terms and in return for payment of a fee by the Client to Calabrian to cover Calabrian's legal and other costs associated with any assignment.

8.2 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.

8.3 Calabrian will consider and may consent to any request from the Client for Calabrian to enter a collateral warranty with a third party with regard to the Services provided under the Agreement. The giving of such consent shall be at the discretion of Calabrian and Calabrian will only enter a collateral warranty on its terms and in return for payment of a fee by the Client to Calabrian to cover Calabrian's legal and other costs associated with any collateral warranty.

9 INSURANCE

9.1 Calabrian warrants to the Client that there is in force a policy of Professional Indemnity insurance covering its liabilities for negligence under this Agreement, with a limit of indemnity of £5,000,000 (FIVE MILLION POUNDS) any one Single Claim, Defence Costs in addition. This policy is annually renewable and whilst renewal is not automatic, Calabrian agrees to use reasonable endeavours to maintain such insurance at all times until six years from the date of the completion (or termination) of the Services under the Agreement, provided such insurance is available at commercially reasonable rates having regard, inter alia, to premiums required and policy terms obtainable.

9.2 If for any period such insurance is not available at commercially reasonable rates, Calabrian shall forthwith inform the Client 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 Calabrian to obtain.

10 LIMITATIONS ON LIABILITY

10.1 Unless otherwise agreed in writing, Calabrian's liability under or in connection with the 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 five million pounds in the aggregate or 10 times the total value of invoices issued to the Client for consultancy work instructed under the Agreement.

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 Calabrian after the expiry of a period of six years from the date of the completion (or termination) of the Services under the Agreement.

10.3 Whilst Calabrian will scan all potential exploratory locations with a Cable Avoidance Tool, Calabrian 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 Calabrian shall not be liable for the cost of rectifying any defect, conflict or other fault in the information or designs provided by Calabrian 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 Calabrian has been advised in writing of the same by the Client and has 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 PAYMENT

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

11.2 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.

11.3 If the Client disputes the amount included for payment in an invoice a written notice must be served on Calabrian by the Client not later than 14 days before the final date for payment. If no notice is given the amount due shall be the amount stated in the invoice.

11.4 In the event of failure on the part of the Client to pay any monies in accordance with the foregoing payment provisions, Calabrian will be entitled to charge interest on any monies owed to it by the Client, such interest to be at a rate of 8% 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.

12 DELAY

12.1 Calabrian will comply with any timescale agreed for completion of the Services unless delayed or prevented by circumstances beyond its reasonable control and in the event of any such circumstances arising Calabrian undertakes to complete the Services within a reasonable period, but will not be liable to the Client for any delay as a result.

13 TERMINATION

13.1 The Agreement may be determined by either party 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 determination must be given to the party which is insolvent by the other party.

13.2 If for any reason the performance of the Services by Calabrian is suspended for a period in excess of three calendar months then Calabrian shall be entitled to determine its appointment in respect of the Services by seven days written notice to the Client.

13.3 If the Client shall fail to pay in full any sum due under the terms of the Agreement by the final date for payment for that sum and no effective notice of intention to withhold payment has been issued, Calabrian may serve written notice on the Client demanding payment within 14 days of such notice. If the Client shall fail to comply with such notice, Calabrian shall be entitled to terminate its employment under the Agreement forthwith.

13.4 Any determination of the appointment of Calabrian howsoever caused shall be without prejudice to the right of Calabrian to require payment for all services performed up to the date of such determination 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 Calabrian has started, but not completed.

14 NOTICES

14.1 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 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 the address of Calabrian set out above or to the registered address of the Client.

14.2 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 first class post.

15 ENTIRE AGREEMENT

15.1 The Agreement constitutes the complete and entire agreement between the Client and Calabrian 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 Calabrian in respect of the Services can only be made in contract under the provisions of the Agreement and not otherwise under the law or tort or otherwise.

15.2 No amendments, modifications or variation of the Agreement shall be valid unless made in writing and agreed to by both the Client and Calabrian; such agreement must be recorded in writing by at least one of the Parties.

15.3 Calabrian will not be bound by any standard or printed terms or conditions furnished by the Client in any of its documents unless Calabrian specifically states in writing separately from such documents that it intends such terms and conditions to apply.

16 DISPUTES AND GOVERNING LAW

16.1 The Agreement shall be governed by and construed in accordance with English law and the Parties irrevocably and unconditionally submit to the jurisdiction of the English Courts.

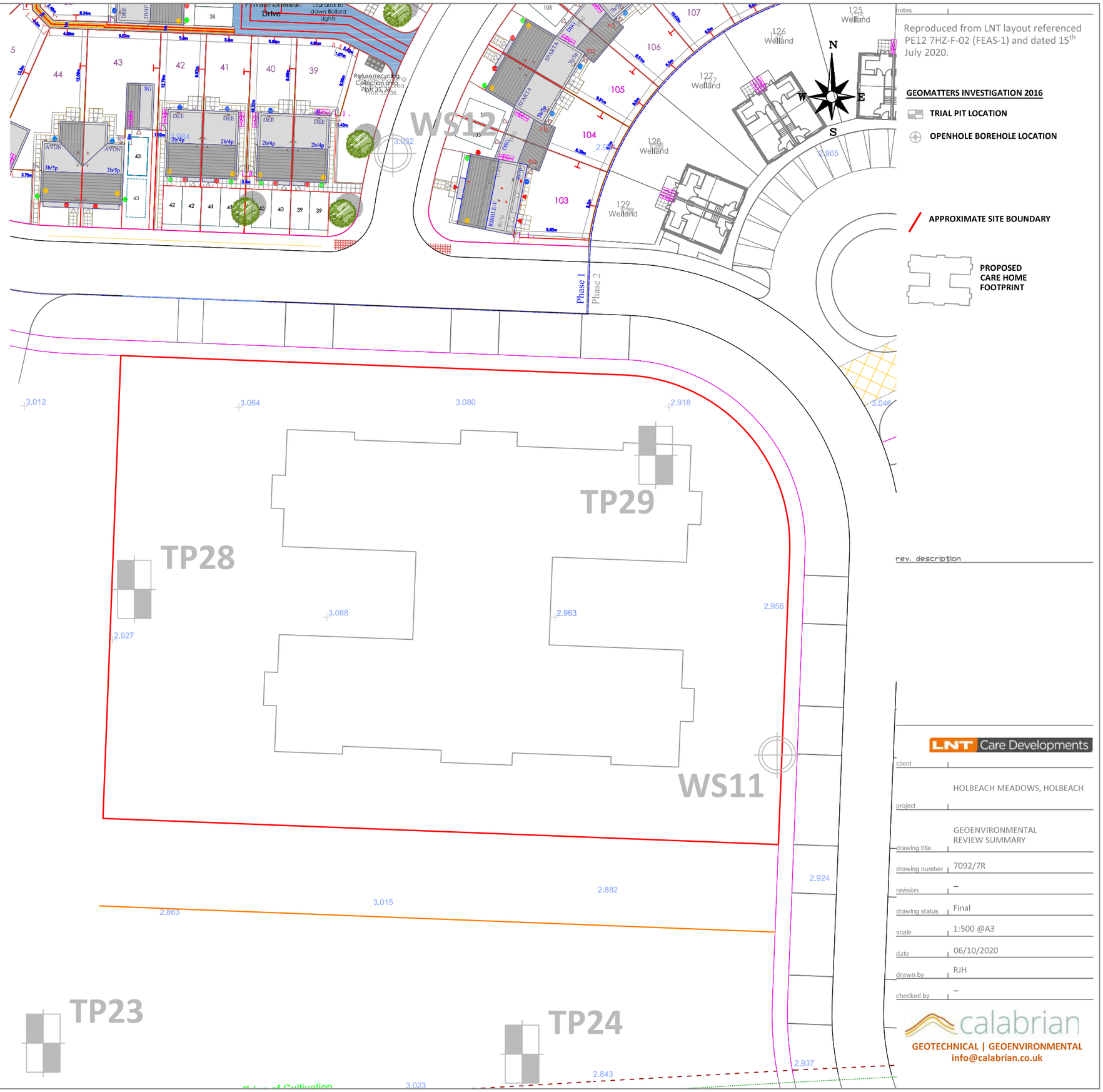
16.2 Where the Housing Grants, Construction and Regeneration Act 1996 applies, any dispute between the Parties may be referred to adjudication in accordance with The Scheme for Construction Contracts Regulations 1998 or any amendment or modification thereof being in force at the time of the dispute,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

GEOENVIRONMENTAL REVIEW SUMMARY

Site Description	The site comprises part of a relatively level arable field. Residential development is underway immediately north of the site.
History	The site appears to have remained undeveloped throughout its history
Made Ground	Made ground would not be expected at the site and was not encountered within the three previously constructed on the care home site.
Natural Ground	TP28, TP29 and WS11 were constructed on site by Geomatters in 2016 these exploratory holes found around 250mm of topsoil overlying loose sand. SPTs within WS11 suggest that the sand becomes medium dense below around 3m depth.
Contamination & Remediation	The site has not been previously developed and made ground was not encountered at the site; laboratory analysis on samples from the wider site did not yield any evidence of contamination. Remediation of the site will not be necessary.
Hazardous Gas	There are no sources of hazardous gas generation within influencing distance of the site (landfills, infilled ground, deep made ground, mineworkings etc). A limited programme of gas monitoring across the wider site did not yield and elevated gas concentrations. Radon protection measures are not required.
Mining & Quarrying	The site is located beyond the coalfield and there are no quarries within 250m of the site.
Foundations	The loose natural sand deposits would yield unacceptable settlements under the proposed care home loads and it is envisaged that some ground improvement in the form of vibro-stone columns would be the most cost effective foundation solution.
Groundwater & Excavations	Previous excavations collapsed at around 1.5m depth and it is likely that ground beneath this depth is saturated with groundwater. Deep excavations would likely require some dewatering.
Flooding & Drainage	The site is located within Flood Zone 1. Given the likely shallow groundwater level beneath the site soakaways would not provide a suitable means of surface water disposal.

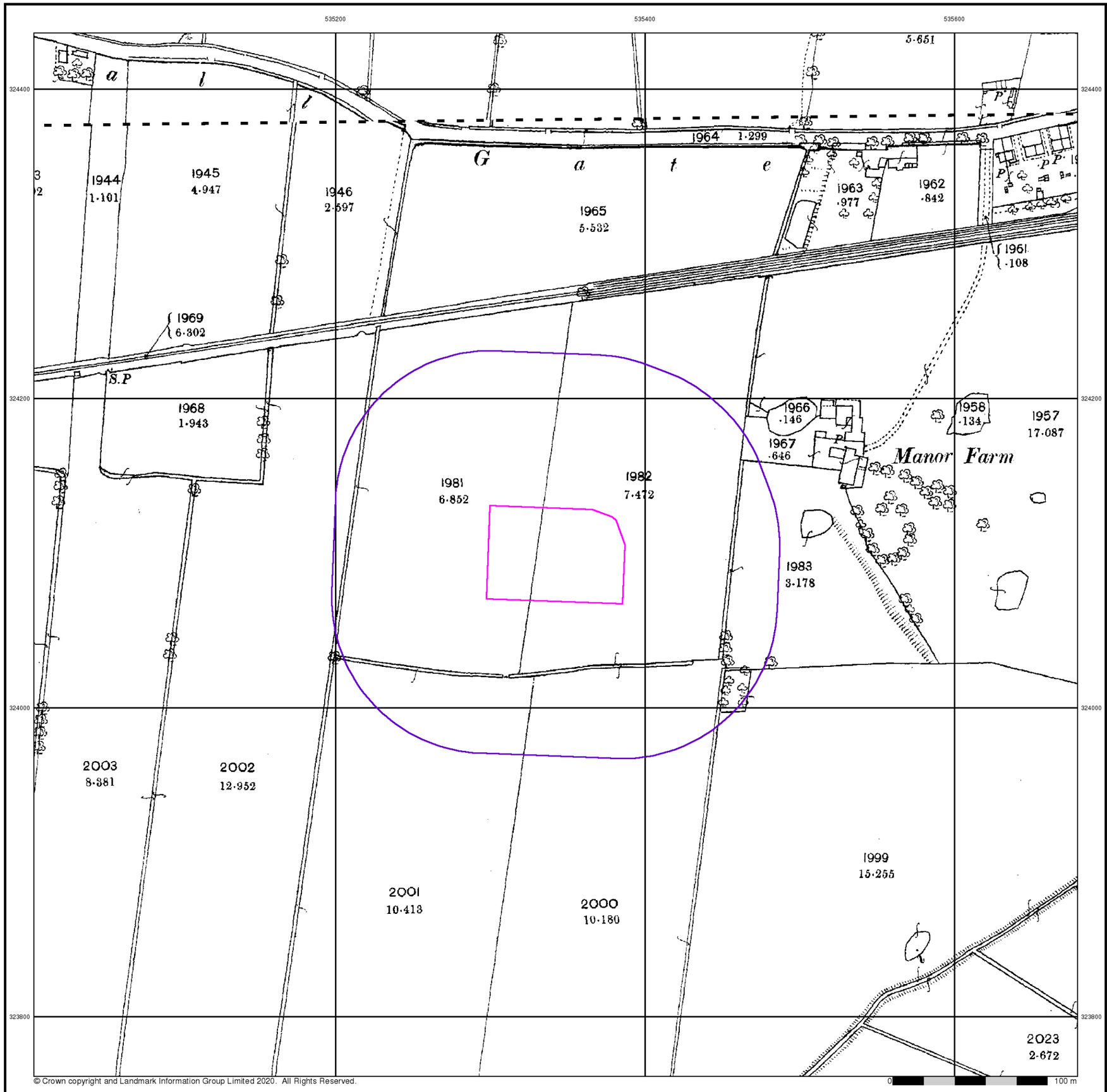
Significant developer abnormals relating to geoenvironmental issues at the site are:
- Unstable excavations below around 1.5m.
- Vibro-stone column foundations.

This brief summary should not be assumed to represent a complete account of all the potential geo-environmental issues that may exist at the site. As such it is strongly recommended that the report be read in its entirety.



APPENDIX B HISTORICAL OS PLANS





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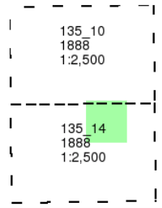
Lincolnshire

Published 1888

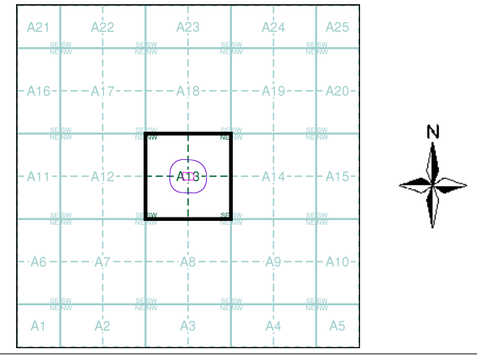
Source map scale - 1:2,500

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)



Historical Map - Segment A13



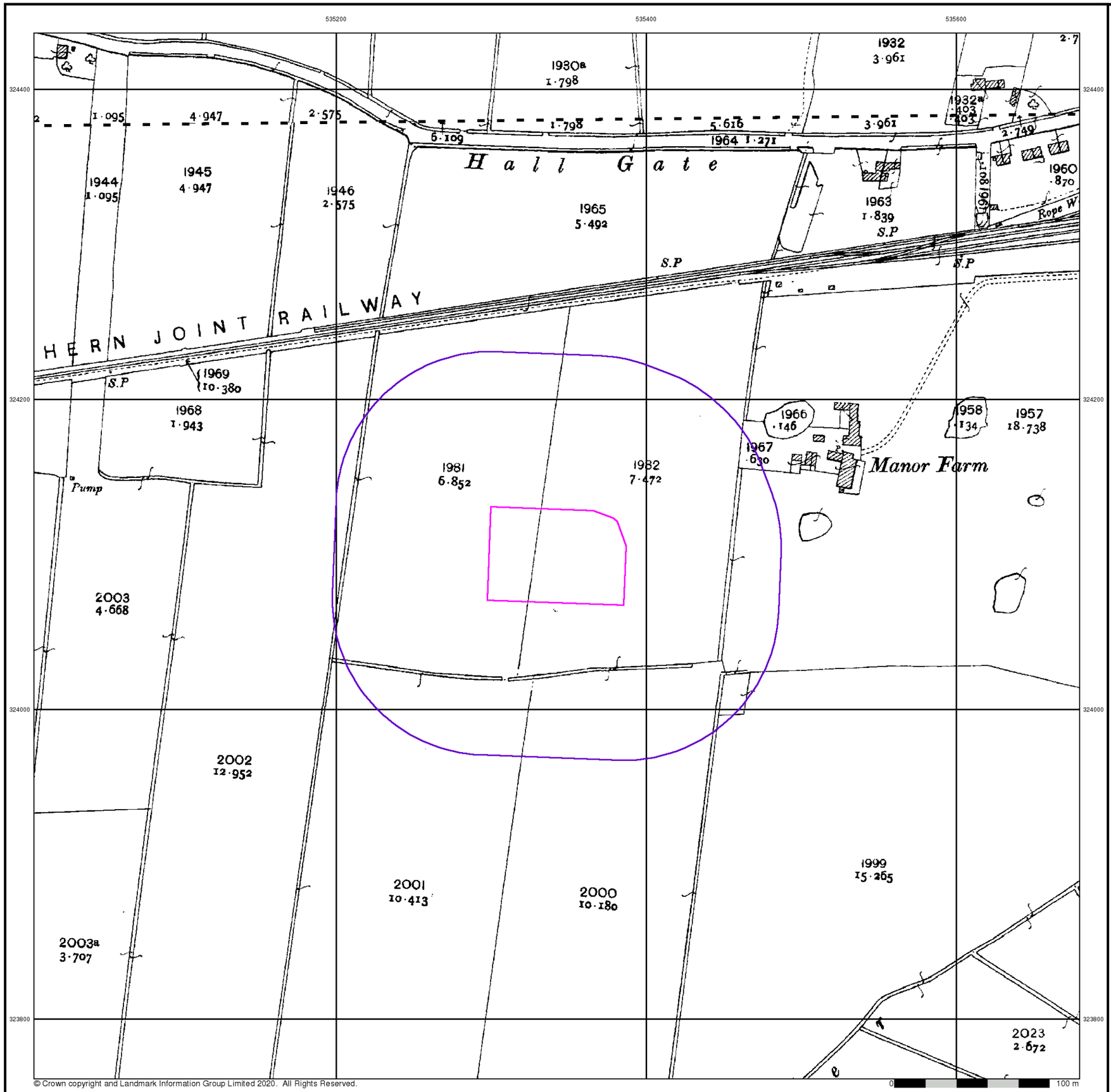
Order Details

Order Number:	266314310_1_1
Customer Ref:	7092
National Grid Reference:	535340, 324100
Slice:	A
Site Area (Ha):	0.52
Search Buffer (m):	100

Site Details

Site at 535342,324099

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



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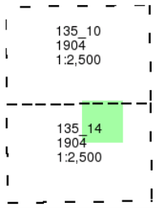
Lincolnshire

Published 1904

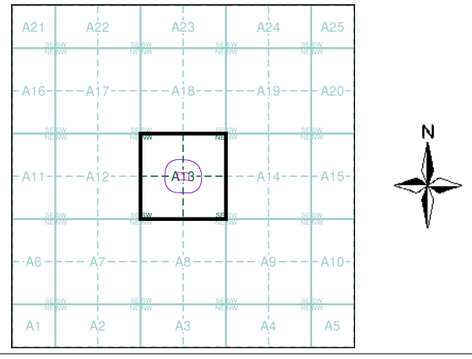
Source map scale - 1:2,500

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Historical Map - Segment A13



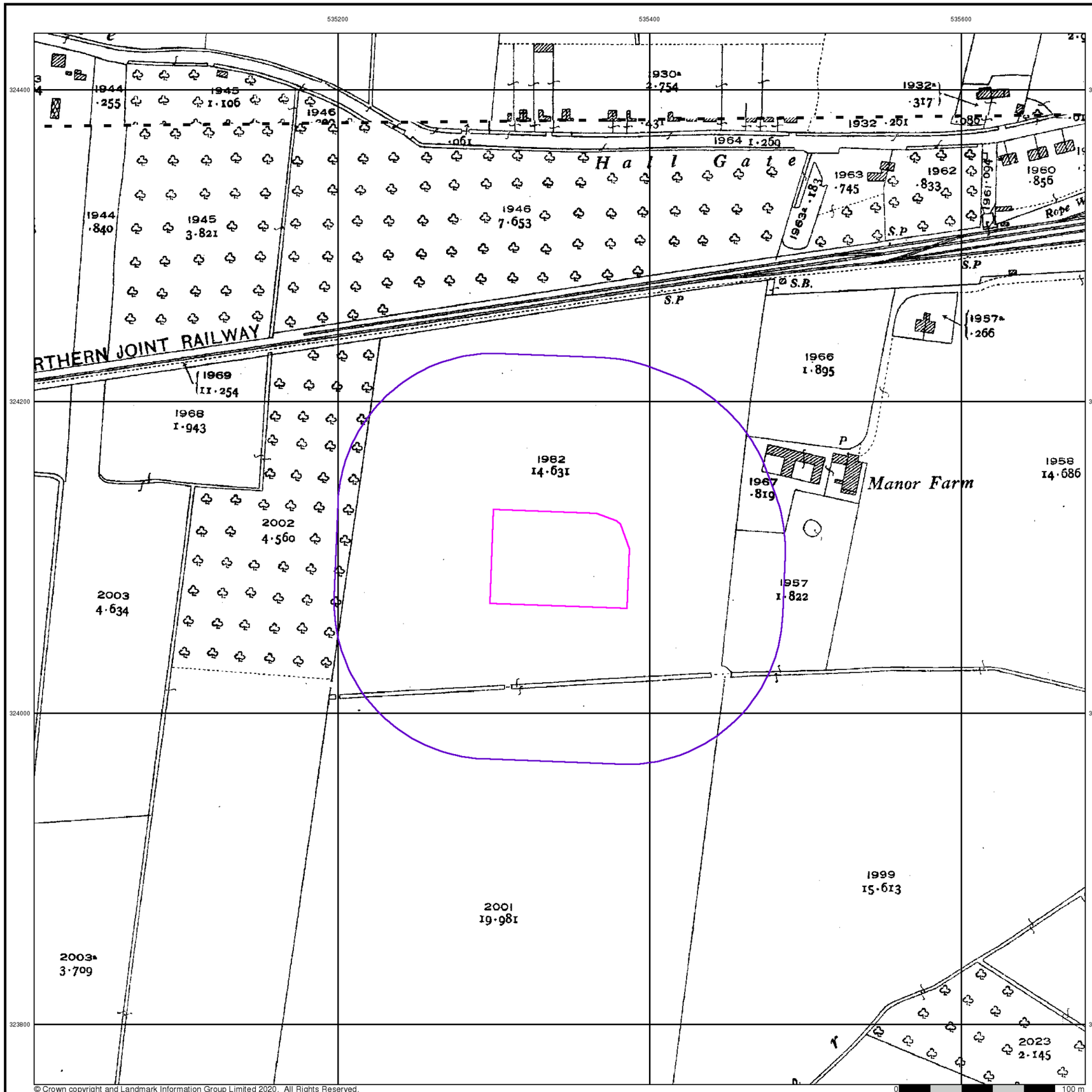
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Site Area (Ha):	0.52
Search Buffer (m):	100

Site Details

Site at 535342,324099

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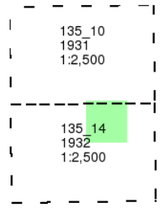
Lincolnshire

Published 1931 - 1932

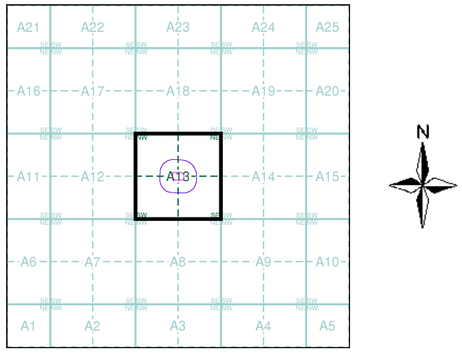
Source map scale - 1:2,500

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)



Historical Map - Segment A13



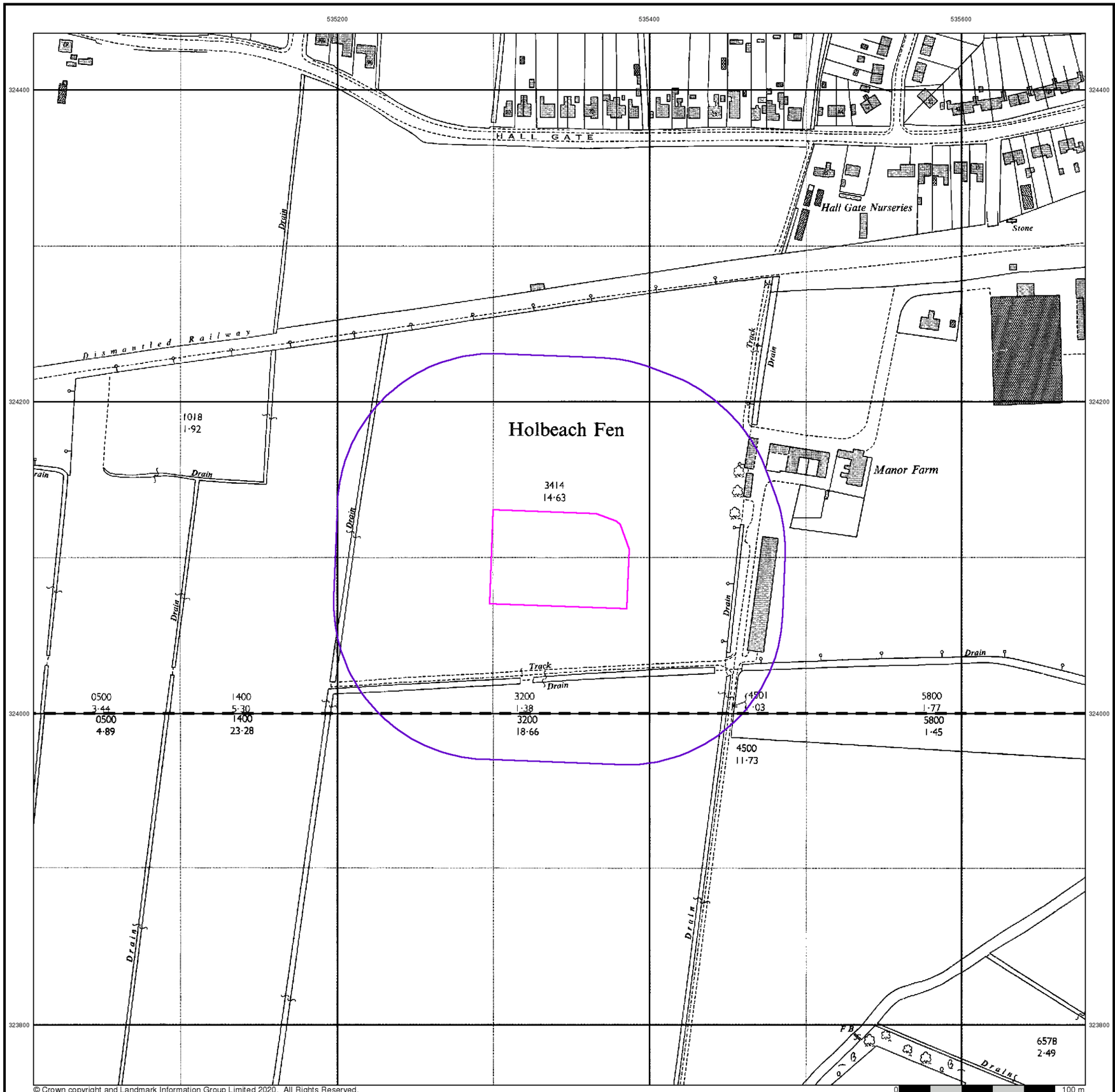
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Order Number:	266314310_1_1
Customer Ref:	7092
National Grid Reference:	535340, 324100
Slice:	A
Site Area (Ha):	0.52
Search Buffer (m):	100

Site Details

Site at 535342,324099

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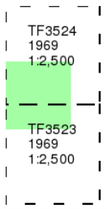
Ordnance Survey Plan

Published 1969

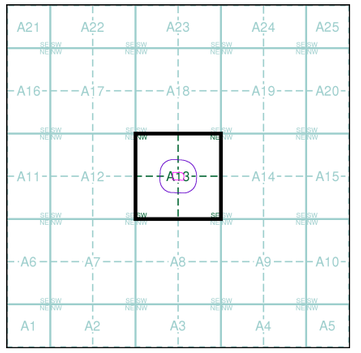
Source map scale - 1:2,500

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)



Historical Map - Segment A13



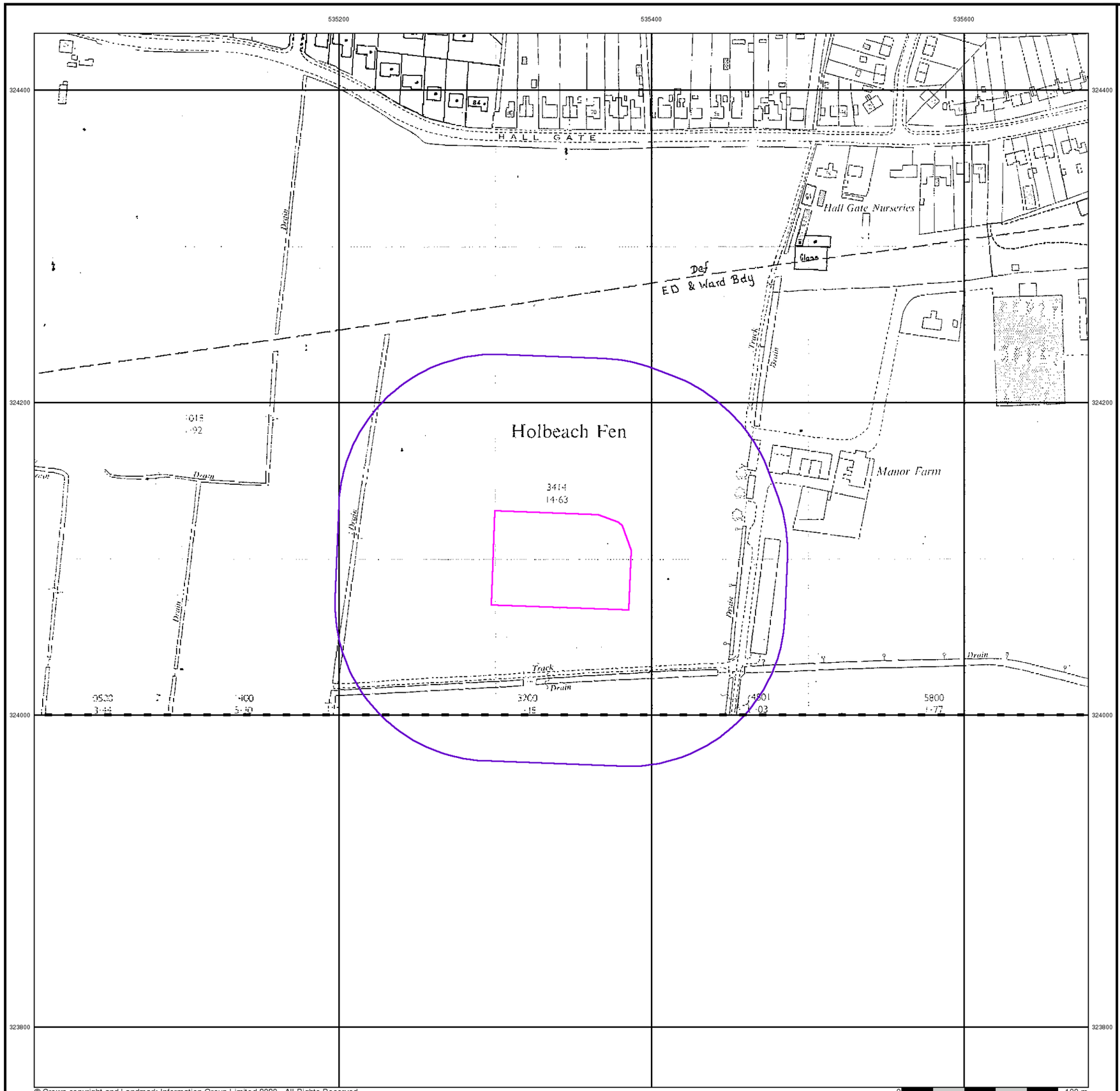
Order Details

Order Number:	266314310_1_1
Customer Ref:	7092
National Grid Reference:	535340, 324100
Slice:	A
Site Area (Ha):	0.52
Search Buffer (m):	100

Site Details

Site at 535342,324099

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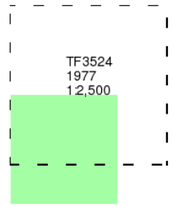
Additional SIMs

Published 1977

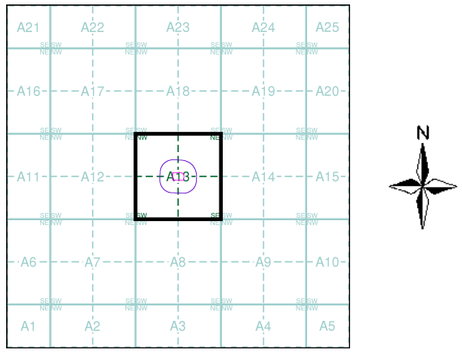
Source map scale - 1:2,500

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



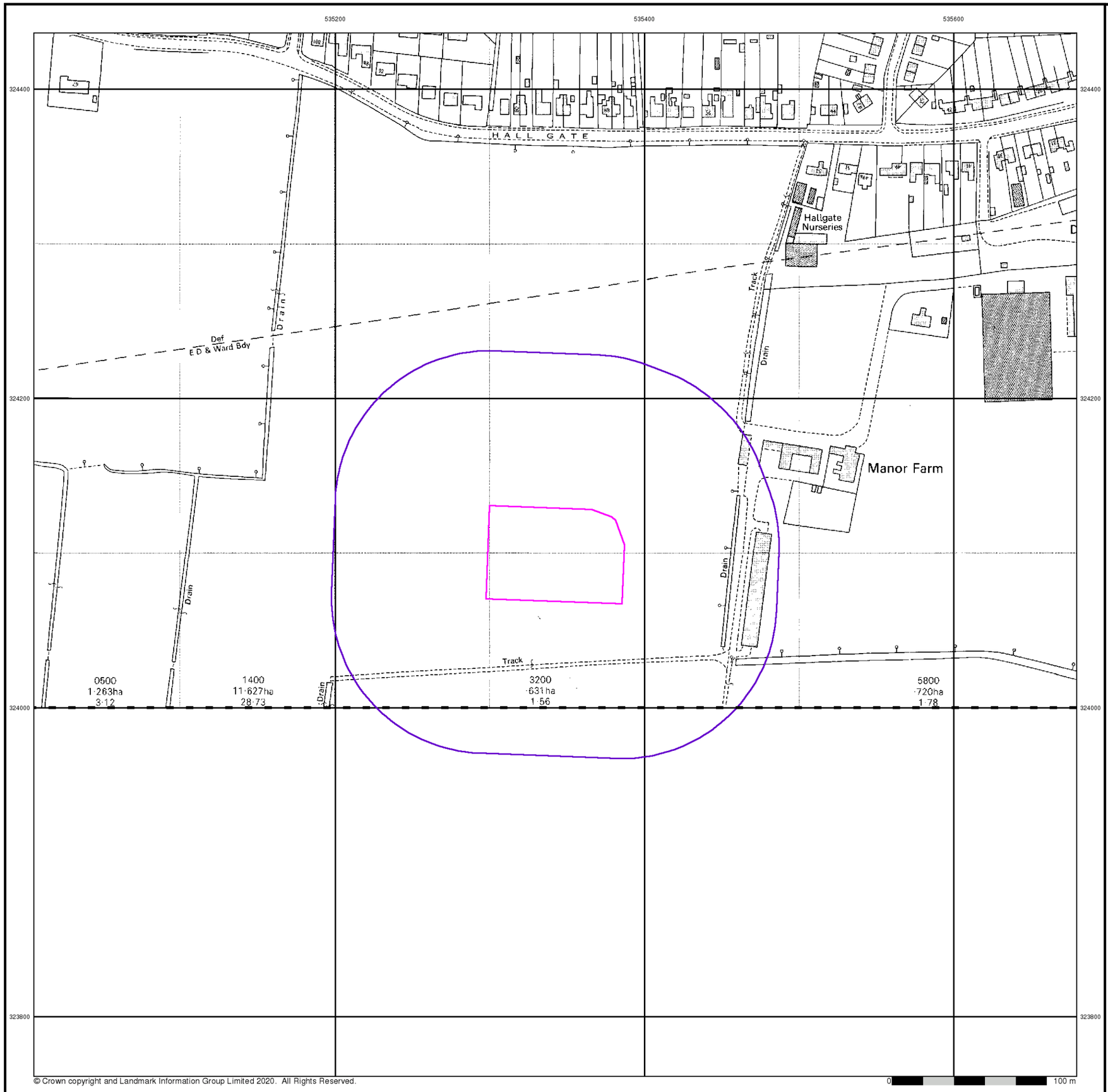
Order Details

Order Number:	266314310_1_1
Customer Ref:	7092
National Grid Reference:	535340, 324100
Slice:	A
Site Area (Ha):	0.52
Search Buffer (m):	100

Site Details

Site at 535342,324099

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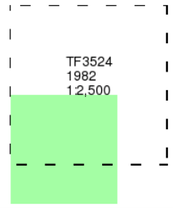
Ordnance Survey Plan

Published 1982

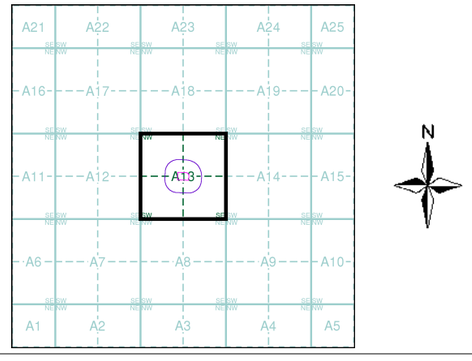
Source map scale - 1:2,500

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)



Historical Map - Segment A13



Order Details

Order Number:	266314310_1_1
Customer Ref:	7092
National Grid Reference:	535340, 324100
Slice:	A
Site Area (Ha):	0.52
Search Buffer (m):	100

Site Details

Site at 535342,324099

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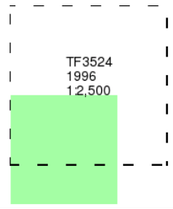
Large-Scale National Grid Data

Published 1996

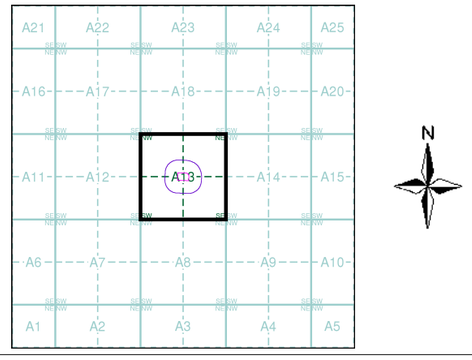
Source map scale - 1:2,500

'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:	266314310_1_1
Customer Ref:	7092
National Grid Reference:	535340, 324100
Slice:	A
Site Area (Ha):	0.52
Search Buffer (m):	100

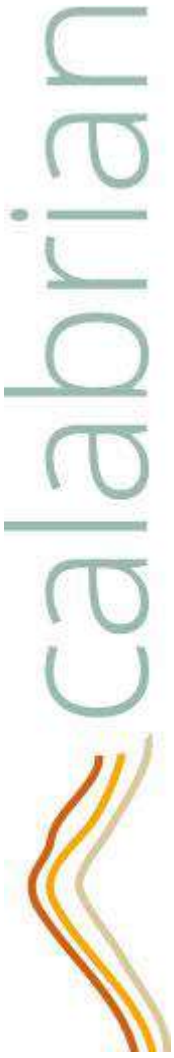
Site Details

Site at 535342,324099

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APPENDIX C	SEARCHES
Landmark	Envirocheck Report



Envirocheck® Report:

Datasheet

Order Details:

Order Number:
266314310_1_1

Customer Reference:
7092

National Grid Reference:
535340, 324100

Slice:
A

Site Area (Ha):
0.52

Search Buffer (m):
1000

Site Details:

Site at 535342,324099

Client Details:

Mr R Hey
Calabrian Limited
Market Chambers
14 Market Place
Bedale
North Yorkshire
DL8 1EQ

Prepared For:

LNT Care Developments

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility					n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1				2
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 1				6
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 2		Yes		
Pollution Incidents to Controlled Waters	pg 2			1	2
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 2				1
Water Abstractions	pg 3				(*1)
Water Industry Act Referrals					
Groundwater Vulnerability Map	pg 3	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 3	Yes	n/a	n/a	n/a
Superficial Aquifer Designations	pg 3	Yes	n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences	pg 3	Yes	Yes	n/a	n/a
Flooding from Rivers or Sea without Defences	pg 4	Yes	Yes	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 4		5	27	105

Summary

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	pg 20				2
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)	pg 20				1
Local Authority Landfill Coverage	pg 20	2	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)	pg 20				3
Potentially Infilled Land (Water)	pg 20		3	3	18
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites	pg 22				1
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

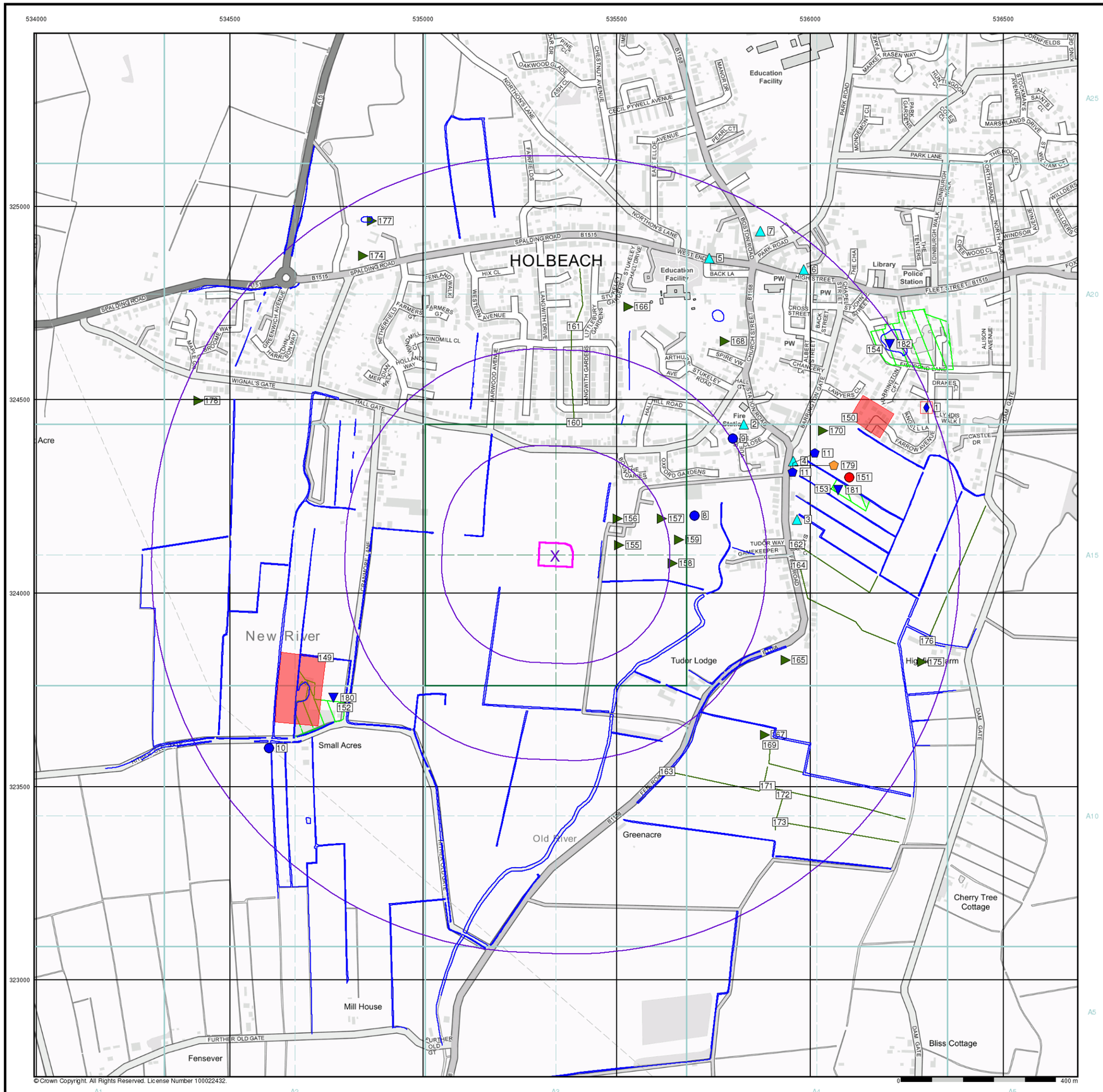
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Summary

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 23	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 23	Yes	Yes		
BGS Recorded Mineral Sites	pg 23				3
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				n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 24	Yes		n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 24	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 24	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 24	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 25			2	38
Fuel Station Entries	pg 28				4
Points of Interest - Commercial Services	pg 28				12
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 29			1	1
Points of Interest - Public Infrastructure	pg 30			1	5
Points of Interest - Recreational and Environmental	pg 30				2
Gas Pipelines					
Underground Electrical Cables					

Summary

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 31				1
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					



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General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Map ID

Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

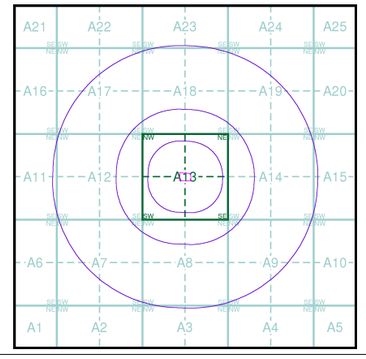
Geological

- BGS Recorded Mineral Site

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
- 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

Site Sensitivity Map - Slice A



Order Details

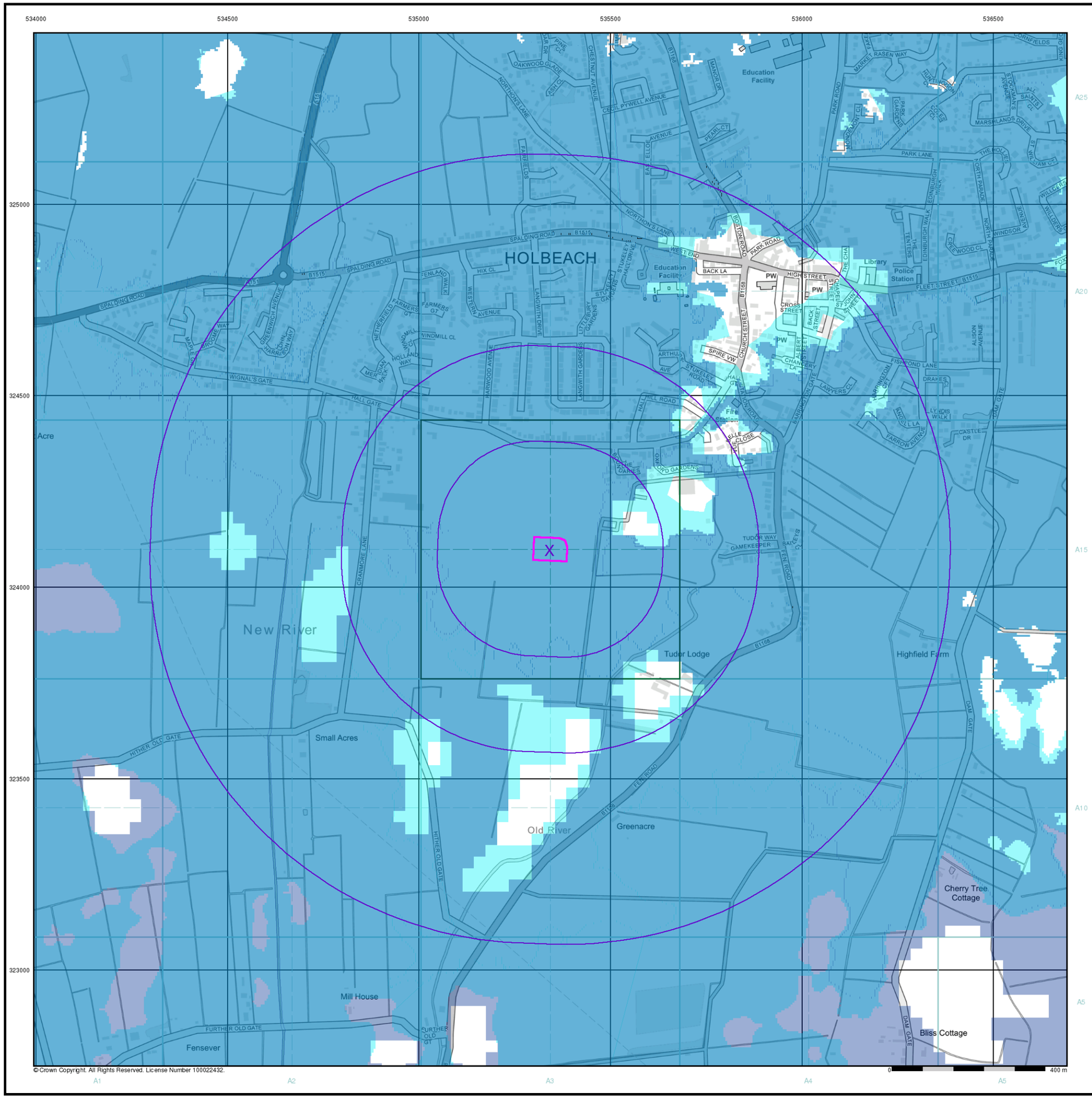
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Customer Ref:	7092
National Grid Reference:	535340, 324100
Slice:	A
Site Area (Ha):	0.52
Search Buffer (m):	1000

Site Details

Site at 535342,324099

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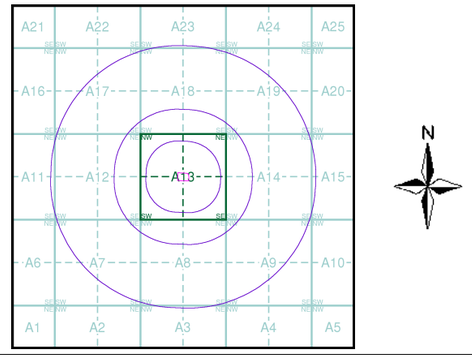
General

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

Agency and Hydrological (Flood)

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

Flood Map - Slice A



Order Details

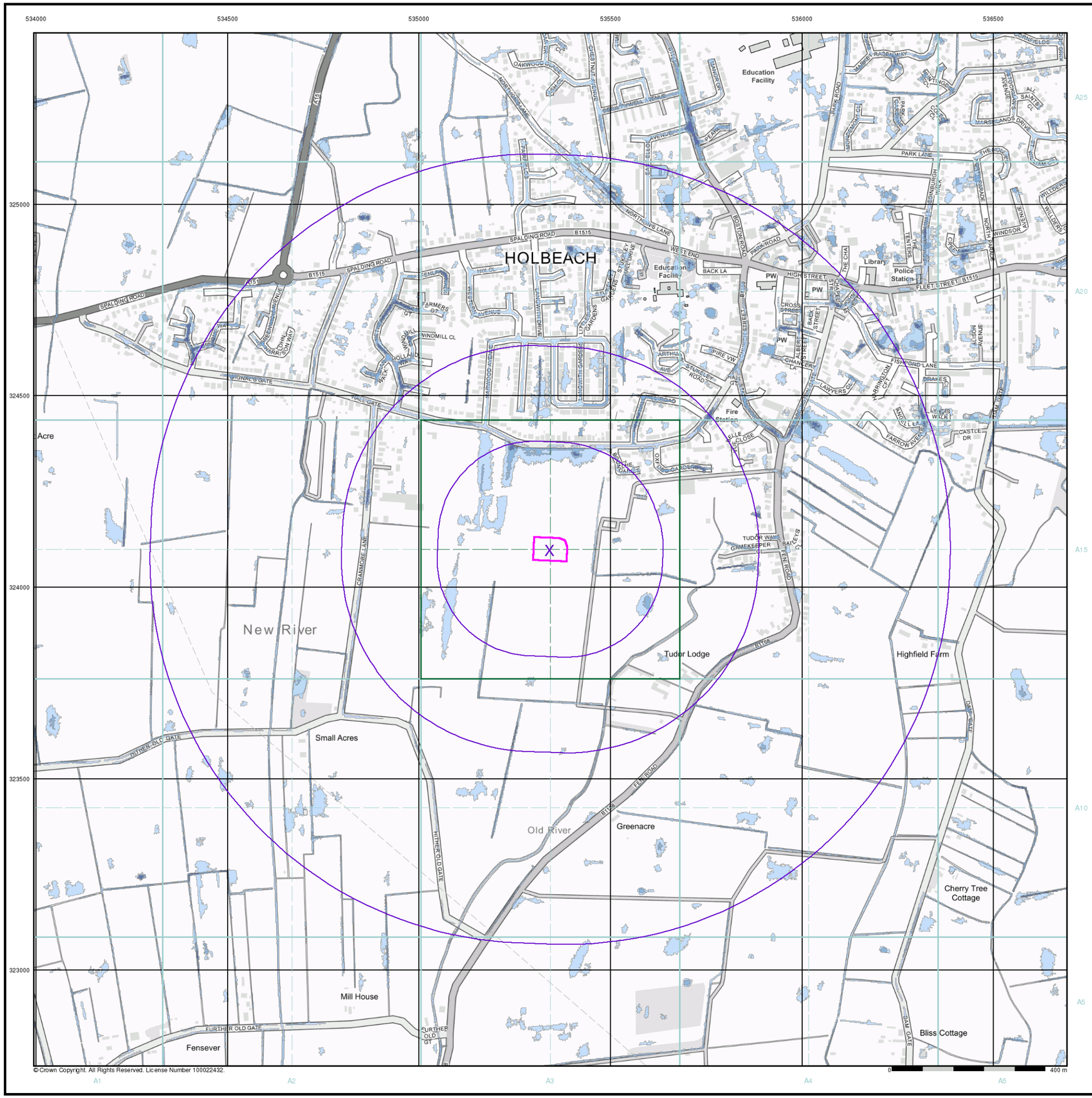
Order Number:	266314310_1_1
Customer Ref:	7092
National Grid Reference:	535340, 324100
Slice:	A
Site Area (Ha):	0.52
Search Buffer (m):	1000

Site Details

Site at 535342,324099

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General

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

Risk of Flooding from Surface Water

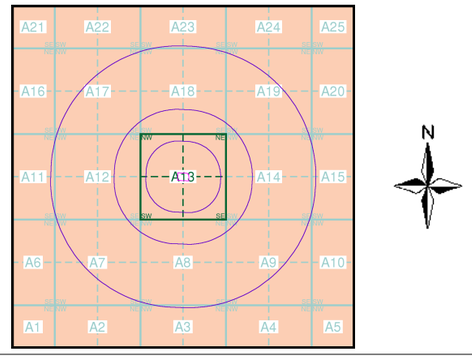
- High - 30 Year Return
- Medium - 100 Year Return
- Low - 1000 Year Return

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number:	266314310_1_1
Customer Ref:	7092
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Site Area (Ha):	0.52
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Site Details

Site at 535342,324099

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APPENDIX D	EXPLORATORY HOLE RECORDS
Window Sample Boreholes	WS01 to WS05



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Borehole Log

Borehole No.
WS01
Sheet 1 of 1

Project Name: Holbeach Meadows	Project No. 7092	Co-ords: -	Hole Type WS
Location: Holbeach		Level:	Scale 1:50
Client: LNT Care Developments		Dates: 26/10/2020 - 26/10/2020	Logged By RJH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	J,K&T		0.30			MADE GROUND: Soft brown slightly organic slightly clayey silt. TOPSOIL
		0.50		N=9 (1,2/2,2,2,3)				Loose light brown SILT. TIDAL FLATS DEPOSITS
		1.00	D					
		1.50		N=8 (1,1/2,2,2,2)	1.40			Loose thinly laminated light brown silty fine SAND. TIDAL FLATS DEPOSITS
		2.50		N=14 (3,4/4,4,3,3)				
		3.50		N=17 (2,3/3,3,5,6)	3.10			Medium dense thinly laminated grey clayey SILT. TIDAL FLATS DEPOSITS
					5.45			End of borehole at 5.45 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out.

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Borehole Log

Borehole No.
WS02
Sheet 1 of 1

Project Name: Holbeach Meadows	Project No. 7092	Co-ords: -	Hole Type WS
Location: Holbeach		Level:	Scale 1:50
Client: LNT Care Developments		Dates: 26/10/2020 - 26/10/2020	Logged By RJH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	J,K&T		0.40			MADE GROUND: Soft brown slightly organic slightly clayey silt. TOPSOIL
		1.00		N=10 (2,2/2,3,3,2)				Loose light brown SILT. TIDAL FLATS DEPOSITS
		1.20	D					
		2.00		N=17 (2,2/3,4,5,5)				
		3.00		N=7 (1,2/1,2,2,2)	2.90			Loose thinly laminated light brown silty fine SAND. TIDAL FLATS DEPOSITS
		4.00		N=12 (1,1/3,3,3,3)	3.50			Medium dense thinly laminated grey clayey SILT. TIDAL FLATS DEPOSITS
					5.45			End of borehole at 5.45 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out.

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Borehole Log

Borehole No.
WS03
Sheet 1 of 1

Project Name: Holbeach Meadows	Project No. 7092	Co-ords: -	Hole Type WS
Location: Holbeach		Level:	Scale 1:50
Client: LNT Care Developments		Dates: 26/10/2020 - 26/10/2020	Logged By RJH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	J,K&T		0.30			MADE GROUND: Soft brown slightly organic slightly clayey silt. TOPSOIL
		1.00	D					Loose light brown SILT. TIDAL FLATS DEPOSITS
		1.00		N=9 (2,2/2,2,2,3)				
		2.00		N=9 (1,2/2,2,2,3)				
		3.00		N=4 (1,1/1,1,1,1)	2.80			Loose thinly laminated light brown silty fine SAND. TIDAL FLATS DEPOSITS
		4.00		N=10 (2,1/3,2,3,2)	3.70			Medium dense thinly laminated grey clayey SILT. TIDAL FLATS DEPOSITS
					5.45			End of borehole at 5.45 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out.

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Borehole Log

Borehole No.
WS04
Sheet 1 of 1

Project Name: Holbeach Meadows	Project No. 7092	Co-ords: -	Hole Type WS
Location: Holbeach		Level:	Scale 1:50
Client: LNT Care Developments		Dates: 26/10/2020 - 26/10/2020	Logged By RJH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	J,K&T		0.30			MADE GROUND: Soft brown slightly organic slightly clayey silt. TOPSOIL
		1.00		N=6 (2,1/2,1,2,1)				Loose light brown SILT. TIDAL FLATS DEPOSITS
		1.20	D					
		2.00		N=6 (2,1/2,1,2,1)	1.80			Loose thinly laminated light brown silty fine SAND. TIDAL FLATS DEPOSITS
		3.00		N=6 (0,1/0,1,3,2)				
		4.00		N=7 (1,1/1,2,2,2)	3.60			Medium dense thinly laminated grey clayey SILT. TIDAL FLATS DEPOSITS
					5.45			End of borehole at 5.45 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out.

AGS

calabrian

Borehole Log

Borehole No.
WS05
Sheet 1 of 1

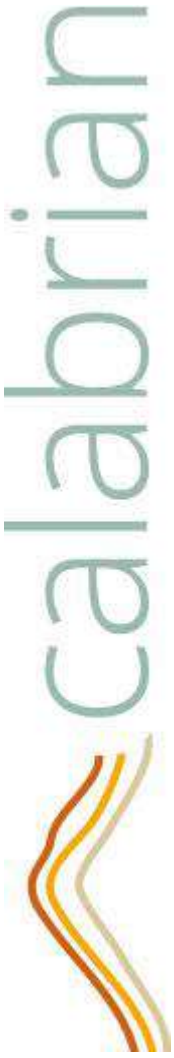
Project Name: Holbeach Meadows	Project No. 7092	Co-ords: -	Hole Type WS
Location: Holbeach		Level:	Scale 1:50
Client: LNT Care Developments		Dates: 26/10/2020 - 26/10/2020	Logged By RJH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	J,K&T		0.30			MADE GROUND: Soft brown slightly organic slightly clayey silt. TOPSOIL
		1.00		N=8 (1,2/2,2,2,2)				Loose light brown SILT. TIDAL FLATS DEPOSITS
		2.00		N=9 (2,2/3,2,2,2)	1.90			Loose thinly laminated light brown silty fine SAND. TIDAL FLATS DEPOSITS
		3.00		N=1 (0,1/0,1,0,0)				
		3.50	D					
		4.00		N=4 (0,2/0,0,0,4)	3.80			Medium dense thinly laminated grey clayey SILT. TIDAL FLATS DEPOSITS
		4.80		N=28 (3,5/6,7,7,8)				
					5.45			End of borehole at 5.45 m

Remarks
1. Prior to drilling a Cable Avoidance Tool (CAT) survey was carried out.

AGS

APPENDIX E CHEMICAL TEST RESULTS



Certificate of Analysis

Certificate Number 20-22197

09-Nov-20

Client Calabrian
Market Chambers
14 Market Place
Bedale
DL8 1EQ

Our Reference 20-22197

Client Reference 7092

Order No PO-2442/7092

Contract Title Holbeach Meadows, Holbeach

Description 5 Soil samples.

Date Received 03-Nov-20

Date Started 03-Nov-20

Date Completed 09-Nov-20

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Asbestos Analysis

Soil Samples

Our Ref 20-22197
Client Ref 7092
Contract Title Holbeach Meadows, Holbeach

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1754977	WS01 0.20	SOIL	NAD	none	Jordan Eadington
1754978	WS02 0.20	SOIL	NAD	none	Jordan Eadington
1754979	WS03 0.20	SOIL	NAD	none	Jordan Eadington
1754980	WS04 0.20	SOIL	NAD	none	Jordan Eadington
1754981	WS05 0.20	SOIL	NAD	none	Jordan Eadington

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Summary of Chemical Analysis

Soil Samples

Our Ref 20-22197
Client Ref 7092
Contract Title Holbeach Meadows, Holbeach

				Lab No	1754977	1754978	1754979	1754980	1754981
				Sample ID	WS01	WS02	WS03	WS04	WS05
				Depth	0.20	0.20	0.20	0.20	0.20
				Other ID					
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	26/10/2020	26/10/2020	26/10/2020	26/10/2020	26/10/2020
				Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	14	14	14	14	10
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	1.0	0.9	0.9	1.0	1.0
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.2	0.2	0.2	0.3
Chromium	DETSC 2301#	0.15	mg/kg	17	17	16	16	28
Chromium III	DETSC 2301*	0.15	mg/kg	17	17	16	16	28
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	30	30	30	32	33
Lead	DETSC 2301#	0.3	mg/kg	17	22	19	17	52
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	0.06
Nickel	DETSC 2301#	1	mg/kg	14	14	13	13	32
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	52	47	45	53	120
Inorganics									
pH	DETSC 2008#		pH	7.5	7.6	7.4	7.7	7.6
Total Organic Carbon	DETSC 2084#	0.5	%	1.2	1.3	1.3	1.3	1.2
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
OCPs									
alpha-BHC	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
gamma-BHC (Lindane)	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
beta-BHC	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
delta-BHC	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Heptachlor	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis

Soil Samples

Our Ref 20-22197
Client Ref 7092
Contract Title Holbeach Meadows, Holbeach

			Lab No	1754977	1754978	1754979	1754980	1754981
			Sample ID	WS01	WS02	WS03	WS04	WS05
			Depth	0.20	0.20	0.20	0.20	0.20
			Other ID					
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	26/10/2020	26/10/2020	26/10/2020	26/10/2020	26/10/2020
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Aldrin	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Heptachlor epoxide	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
gamma-Chlordane	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Endosulphan I & Alpha-chlorodane	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
4,4-DDE	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Dieldrin	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Endrin	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Endosulphan II & 4,4-DDD	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Endrin aldehyde	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
4,4-DDT	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Endosulphan sulphate	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Methoxychlor	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Endrin ketone	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
OPPs								
Dichlorvos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Mevinphos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Demeton-O	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Ethoprop	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Naled	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Phorate	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Demeton-S	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Diazinon	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Disulfoton	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Methylparathion	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Ronnel	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Fenthion	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Chlopyrifos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Trichlorinate	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Merphos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Stirofos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Tokuthion	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Fensulfothion	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Bolstar	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Azinphos methyl	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1
Coumaphos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1

Information in Support of the Analytical Results

Our Ref 20-22197
Client Ref 7092
Contract Holbeach Meadows, Holbeach

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1754977	WS01 0.20 SOIL	26/10/20	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)	
1754978	WS02 0.20 SOIL	26/10/20	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)	
1754979	WS03 0.20 SOIL	26/10/20	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)	
1754980	WS04 0.20 SOIL	26/10/20	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)	
1754981	WS05 0.20 SOIL	26/10/20	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)	

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

APPENDIX F GEOTECHNICAL TEST RESULTS

calabrian

LABORATORY REPORT

4043

Contract Number: PSL20/6067

Report Date: 23 November 2020

Client's Reference: 7092

Client Name: Calabrian
Market Chambers
14 Market Place
Bedale
DL8 1EQ

For the attention of: Richard Hey

Contract Title: Holbeach Meadows, Holbeach

Date Received: 3/11/2020
Date Commenced: 3/11/2020
Date Completed: 23/11/2020

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
S Royle (Laboratory Manager)	S Eyre (Senior Technician)	L Knight (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS01	2	D	1.00		Brown very clayey silty SAND.
WS02	2	D	1.20		Brown silty SAND.
WS03	2	D	1.00		Brown silty SAND.
WS04	2	D	1.20		Brown silty SAND.
WS05	2	D	3.50		Brown silty SAND.

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS01	2	D	1.00		20			31	22	9	100	Low Plasticity CL
WS02	2	D	1.20		22				NP			
WS03	2	D	1.00		21				NP			
WS04	2	D	1.20		23				NP			
WS05	2	D	3.50		22				NP			

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Holbeach Meadows, Holbeach

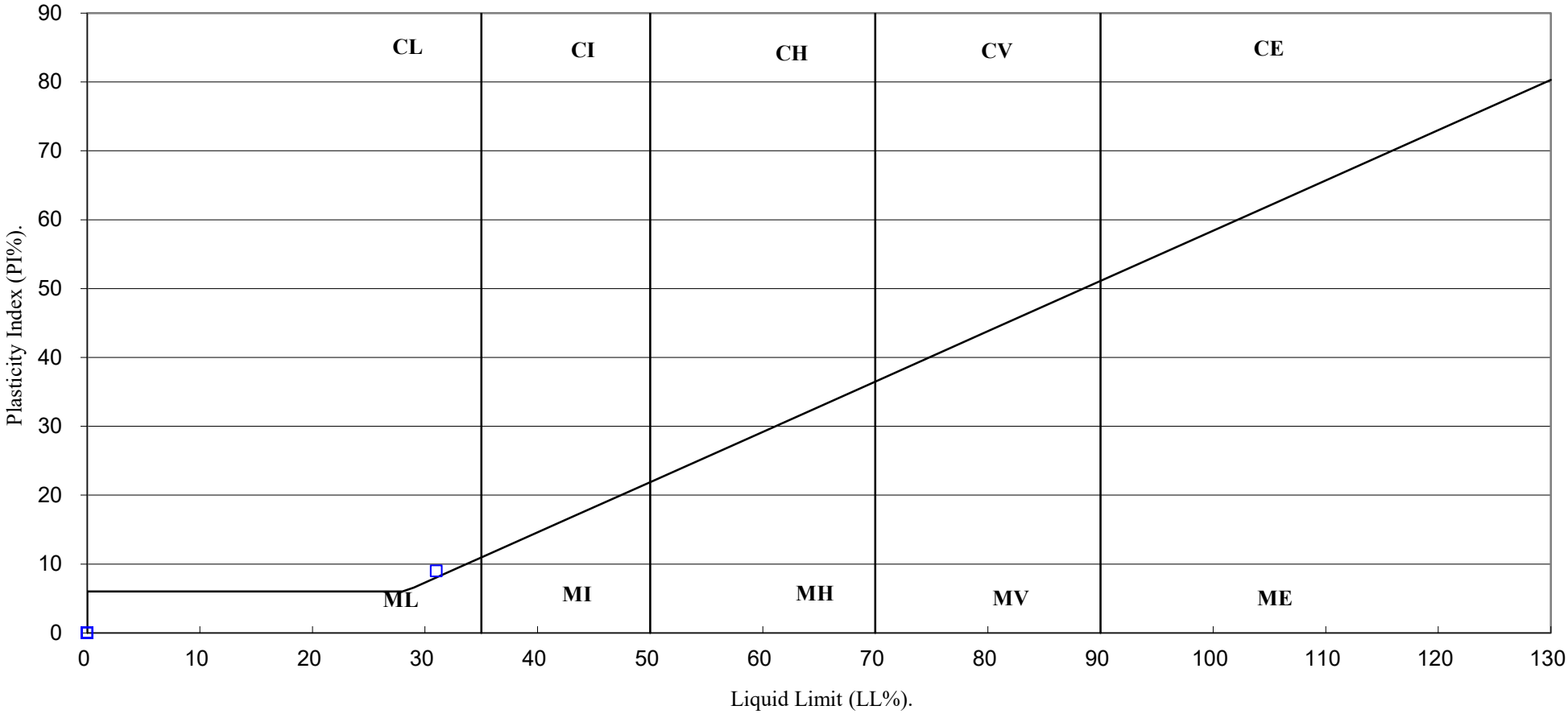
Contract No:

PSL20/6067

Client Ref:

7092

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	Holbeach Meadows, Holbeach	Contract No: PSL20/6067 Client Ref: 7092

2531

ANALYTICAL TEST REPORT

Contract no:	90930
Contract name:	Holbeach Meadows, Holbeach
Client reference:	PSL20/6067
Clients name:	Professional Soils Laboratory
Clients address:	5/7 Hexthorpe Road Doncaster DN4 0AR
Samples received:	10 November 2020
Analysis started:	10 November 2020
Analysis completed:	17 November 2020
Report issued:	17 November 2020

Notes:

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:

U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing

Approved by:

K Campbell

Karan Campbell
Director

Chemtech Environmental Limited

SOILS

Lab number			90930-1	90930-2	90930-3	90930-4	90930-5
Sample id			WS01	WS02	WS03	WS04	WS05
Depth (m)			1.00	1.20	1.00	1.20	3.50
Date sampled			09/11/2020	09/11/2020	09/11/2020	09/11/2020	09/11/2020
Test	**Method**	**Units**					
pH	CE004 [U]	units	8.2	8.5	8.2	8.7	8.4
Sulphate (2:1 water soluble)	CE061	mg/l SO_4	36	26	23	21	94

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		10	mg/l SO_4

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
90930-1	WS01	1.00	N	
90930-2	WS02	1.20	N	
90930-3	WS03	1.00	N	
90930-4	WS04	1.20	N	
90930-5	WS05	3.50	N	