



**Phase I-II
Geo-Environmental Site Assessment**

A11463

Treetops Nursery
Allington Lane
Fairoak
Eastleigh
SO50 7DD

Prepared for

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Executive Summary	
Site Address	Former Tree Tops Nursery, Fair Oak, SO50 7DD
National Grid Reference	448773 118002
Site Area	1.24ha
Current Site Use	The area of investigation was located in the south east of Fair Oak on an approximately rectangular shaped parcel of land approximately 1.24ha in size. The site was accessed via Allington Lane to the north west of the site. At the time of the site investigation the site comprised a residential house, garage, barn with adjoining stables and a former green house to the north west of the site. To the south east of the site was open fields, sloping to the south east with woodland immediately beyond.
Site History	The site comprised open agricultural fields from earlier available mapping c.1868 to 1957 where a building was noted to the north of the site. From 1981 the site is named Allington Nurseries with additional buildings noted on mapping. From 1992 to 2003 expansion of buildings is noted within the boundary, now named Treetops Nursery.
Geology, Hydrology & Hydrogeology	Geology and Hydrology BGS records indicate that the site is directly underlain by Bedrock deposits of the Wittering Formation, comprising sandy clay, which is classified as a Secondary A Aquifer. Review of the Groundsure report indicates that the site is not located within a Groundwater Source Protection Zone (SPZ) and no active groundwater, surface water or potable water abstractions licences are present within 1000m of the site. Based on local topographic and the location of surface water courses it is considered that shall groundwater, if present will flow towards the south and south west towards surface water body identified as Quobleigh Pond. Hydrogeology Nineteen (19no.) surface watercourse records, located between 53m south to 238m south west and 229m to 236m north east, were identified within 250m radius of the subject site. It is considered that records attributed to Quobleigh Pond and its unnamed tributaries. The environmental database indicates that the site is located within a surface water flooding associated within a 1 in 30-year event based on modelling between 0.3-1.0m, this classification is present through a small section in the north of the site as well as approximately 50m south and 10m north west of the subject site. Groundwater flooding is classified between moderate to high based on a risk assessment of 1 in 100-year return period. The site is not within 50m of a designated Risk of Flooding from River and Seas (RoFRaS) area. A Flood Zone 2 associated with land at risk of flooding is present 49m south and is associated with the Quobleigh Pond and water course.
Landfill Sites & Ground Gases	The Groundsure Report identified no Environment Agency historical landfill sites, landfills or waste treatment site within 250m of the site. A single record exists for areas of potentially infilled land, attributed to Made Ground located 219m north east of the site.
Radon	The Groundsure report indicates that the site is not in a radon affected area as defined by the Health Protection Agency (HPA) as less than 1% of the properties are above the Action Level. At this level BRE publication BR211 indicates that radon protective measures are not required in the construction of new extensions or dwellings.

Revised Conceptual Site Model
Following the completion of the Tier 1 risk assessment, pollution linkages involving elevated concentrations of Beryllium (WS101 at 0.10-0.30m bgl) were identified which are considered to have the potential to present a significant risk to future site users within areas of proposed soft landscaping or planting.
Concrete Classification
Soils encountered beneath the site have been classified in accordance with DS-1 , Aggressive Chemical Environment for Concrete Classification (ACEC) AC-2z with the recommendations provided in BRE Special Digest 1 (2005).
Ground Gas Classification
The development is classified as CS1 under 9.3.2 BS 8485:2015 - Type B Building – Private ownership with Central building Management and Green under NHBC Traffic light System - Situation B - Low Rise Housing. Both classifications do not require ground gas protection measures.
Geotechnical Assessment
The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of Specification for Highways Works. It is considered that Topsoil and Made Ground would not form a suitable founding stratum due to characteristic variability and the associated potential for differential settlement. As such it is recommended that loads are transferred through the Topsoil and Made Ground to a depth at which competent geology, sufficient to support the proposed load, is encountered. It is considered appropriate for low-rise housing to be founded between 2.00-3.00m bgl across the site area subject to confirmation of line loadings. Where low strength soils have been highlighted, WS107 in the southeast of the site, foundations should be locally deepened onto higher strength soils. Given the presence of mature trees around the perimeter of the site, there will likely be a requirement to locally deepen foundation depths in accordance with NHBC guidance in the Zones of influence of existing or recently removed trees, as set out by NHBC Guidance (Chapter 4.2 – Building near Trees), subject to confirmation of tree species and heights from a Tree Survey Report. Should loadings exceed those set out in Section 11 then alternative founding solutions will need to be explored with additional information from greater depths likely required. Foundation design should be completed by a suitably qualified Structural Engineer, with specific consideration given to the variability in soil types and strengths. Consideration may need to be given to the production of a geotechnical design report, to include a Tree Ring Diagram, to determine calculated bearing capacities and settlement. Consideration should also be given to surface water collection which may become perched above the underling impermeable soils, and the impact on construction.
Recommendations
Environmental
It should be noted that some areas of the site were inaccessible at the time of investigation due to the property being occupied. Therefore, it is recommended that intrusive investigation works are undertaken within these areas to assess the risks posed by underlying soils. Given the identification of elevated concentrations of Beryllium in near surface Made Ground (0.10-0.30m bgl) in the vicinity of location WS101, it is recommended that further investigation is undertaken in the vicinity of WS101 through the advancement of shallow hand dug pits to delineate the lateral extent of potentially impacted near surface Made Ground. If additional impact is identified from further testing then remedial action will be required to render the pollution linkages inactive. Remedial works should be set out within a standalone Remediation Method Statement (RMS) which should be submitted to the Local Authority for approval.

The exact age of the main residential property, disused stables and outbuildings is unknown, and it is therefore recommended that an asbestos survey is undertaken in accordance with current asbestos legislation prior to the commencement of any renovation/demolition works on-site.

As the site is within a Solent Nutrient Impact Area it is recommended that a Nitrate Neutrality Assessment is undertaken.

It is also recommended that the Tier I human health risk assessment is re-visited upon the production of a proposed site layout to fully assess the risks posed by Beryllium.

Should any previously unidentified obvious visual or olfactory evidence of contamination be encountered in areas of the site during site clearance and/or ground works, then site works should be halted, and contact made with a suitably qualified environmental consultant. As determined appropriate by the Consultant, further investigation and sampling may be required to determine the appropriate actions. Upon completion contact should be made with the relevant regulatory authority to achieve signoff of the works.

Geotechnical

Where bearing capacities are insufficient for the proposed scheme, alternative foundation solutions, such as a piled foundation solution may be suitable for the site. However, further ground investigation works would be required in order to prove competency of the encountered Wittering Formation strata to a sufficient depth.

It is recommended that a tree influence plan is produced to assist with determining foundation depths across site and development of a detailed foundation zoning plan. Further subject to NHBC and regulator requirements, the potential requirement exists to calculate bearing capacities and settlement through production of a Geotechnical Design Report (GDR).

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1 INTRODUCTION

1.1 Background

Omnia have been commissioned by Vistry Southern to undertake a Phase I-II Geo-environmental site assessment at the site of Treetops Nursery, Fair Oak, Eastleigh, SO50 7DD, which is current at the pre-purchase stage. A site location plan is presented as Figure 1.0 within Appendix III.

1.2 Proposed Development

It is understood that the proposed development is for a residential end-use comprising 35no. low-rise housing plots, with associated private gardens and communal soft landscaping and access infrastructure. A proposed development plan is provided as Figure 3.0 in Appendix III.

1.3 Objectives

The objectives of the Phase I-III Geo-Environmental Site Assessment are to:

- Undertake a site walkover and inspection including interviews with key site representatives if available;
- Review historical plans, site investigations, geology, hydrogeology, site sensitivity, flood-plain issues, mining records and any local authority information available in order to complete a Desk Study in line with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (Contaminated Land Report 11 (CLR11));
- Undertake an assessment of the near surface through intrusive site investigation;
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors; and,
- Provide a factual and interpretative report relating to the site and provide recommendations on any potential development issues with consideration of Residential, and Environmental receptors.

1.4 Sources of Information

Background information was sought from the following sources:

- Groundsure Environmental Database Search (GS-7230900);
- Historical Ordnance Survey Mapping (1868 –2020);
- The British Geological Survey (BGS) map for the site (Map Sheet 315, Southampton, Solid and Drift Edition at a scale of 1: 50,000); and
- Environmental Agency flood designations, aquifer designations and groundwater source protection zones, retrieved from <https://magic.defra.gov.uk/MagicMap.aspx>;
- BRE Digest 365 (2016) - Soakaway Design;
- CIRIA C665 - Assessing risks posed by hazardous ground gases to buildings;
- BS 8485:2015, Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings;
- BRE Special Digest 1:2005. Concrete in Aggressive Ground;
- Tomlinson, M.J., 2001. *Foundation Design and Construction*. 7th Edition. Pearson Prentice;
- NHBC Chapter 4.2 – Building Near Trees (2020);
- British Standards Institution (2015) *BS8004: Code of Practise for Foundations*.

1.5 Limitations

The limitations of this report are presented in Appendix I.

1.6 Confidentiality

Omnia has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Omnia; a charge may be levied against such approval.

2 SITE SETTING

2.1 Site Details

Table 2-1 Site Details

Site Address	Former Tree Tops Nursery, Fair Oak, SO50 7DD
National Grid Reference	448773 118002
Site Area	1.24ha

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location plan is presented as Figure 1.0 (Appendix III).

2.2 Current Site Use

2.2.1 Site Description

The area of investigation was located south east of Fair Oak on a roughly rectangular parcel of land approximately 12ha in size orientated north west to south east. The site was be accessed via Allington Lane.

At the time of the site investigation the northern parcel of the site comprised a residential house, garage, barn with adjoining stable and former greenhouse. To the south and south east, the site comprised an open grass field. The site was bounded by a hedgerow including semi mature and mature trees to the south and south east, an active construction site to the south west and north west and residential houses to the north east.

At the time of the site walkover, no entry was permitted to the private residence and the immediate vicinity due to the residence being occupied. In addition, access was not possible inside the former greenhouse, located in the north of the site area, or infrastructure that was in a poor state of repair due to health and safety risks.

The residential property comprised a single storey brick building with a tiled roof, a second smaller building was noted of the same construction south east. The main property had an extension which was constructed from a metal frame with glass panelling, the extensions were in a poor visual state of repair. The property did not have any Above ground or Below ground Storage Tank (AST or BST) associated with it.

Towards the north west of the residential property was a large wooden barn and adjoining metal framed greenhouse, both were in a poor visual state of repair and were inaccessible at the time of the site walkover.

Adjacent to the north east boundary of the site was a large single storey metal structure which is understood to have been a greenhouse associated with the former nursery. At the time of the walkover the majority of the glass panels were noted to have been removed or smashed and the building was overgrown. Access into the greenhouse was note possible due to safety concerns, however, there were no obvious signs of chemical/fuel storage.

Adjacent to the south west boundary of the site was a single storey wooden and metal framed barn with a sheet metal roof. The barn was split into a stable and hay and agriculture equipment storage,

however at the time of walkover the barn was used for storage including, hay, wood, plastic and metal pipework and small machinery equipment. Approximately five (5no.) 20-25 litre plastic containers were noted within the barn beneath a wooden pile and appeared to have contained fuel or oil. In addition, three (3no.) approximately 200 litre steel drums were noted to the north east of the barn within a dense vegetation, the drums were in a poor visual state of repair. No visual or olfactory signs of gross contamination were noted within the vicinity of plastic containers and steel fuel drums at the time of the site walkover.

At the time of walkover, a boat, caravan and wood pile were noted towards the south east of the residential property. The ground was primarily grassed with patio slabs and a gravel track leading to the rear of the property.

Towards the south east the site comprised a large open grass field bounded by hedgerows, mature and semi-mature trees. A drain was noted as crossing south west to north east through the site, noted by the presence of a manhole cover.

Within an area of dense vegetation to the north east of the site was one (1no.) 200 litre steel drum in a poor state of repair with no visual or olfactory signs of contamination.

The northern parcel of the site was primarily flat with a gentle slope noted towards the south of the site

An annotated site walkover plan is included within Figure 2.0.

2.2.2 Hazardous Materials Storage

As set out in the site description above, four (4no.) approximately 200 litre steel drums in a poor condition. In addition, approximately five (5no.) 20-25 litre plastic containers were noted beneath stored material within the barn. There were no visual or olfactory signs of contamination around the containers.

No further Hazardous Material Storage or Chemical Storage was noted onsite during the site walkover.

2.2.3 Potential Asbestos Containing Material (PACM)

No Potential Asbestos Containing Materials (PACMs) were noted on the ground surface within the area of the site inspected during the site walkover. However, from historic mapping however, it is evident that buildings have been present on the site from 1962, and therefore consideration should be given to the potential for PACM to be present within the building matrix. Therefore, it is recommended an asbestos survey of the buildings is undertaken in accordance with current legislation prior to the commencement of any demolition or refurbishment works.

2.2.4 Waste Storage

During the site walkover the open barn in the north west of the site contained waste in the form of hay, wood, plastic, metal and disused machinery equipment. In addition, a wood pile was noted to the south of the residential property.

2.2.5 Tree Species

Along the southern boundary and within some central areas of the site semi-mature to mature trees were noted and comprised species including species of oak.

2.2.6 Surrounding Area

The surrounding land uses are summarised below:

Table 2-2 Land Use

Direction	Land Use
North	Allington Lane and Allington Nursery
East	Residential Properties
South	Woodland
West	Construction Site (Residential Properties)

3 SITE HISTORY

3.1 On-Site Historical Development

A review of historical land use pertinent to the site and within a 250m radius is summarised in Table 3-1. A selection of Groundsure historical maps are presented as Appendix X.

Table 3-1 Historical Land Use

Map Edition	Historical Land Use	
	On Site	Off Site
1868-1869 1:10,560 1:2,500	Open ground and with four (4no.) trees. Two rectangular possible enclosures located to the southeast and northwest of the site.	The site is bounded by a mixture of open ground, woodland and Oak Lodge residential property. One (1no.) clay pit is noted 100m west of the site. Two (2no.) sluices and Quobleigh Ponds are noted 100m south of the site.
1888 1:10,560	No significant change.	No significant change.
1895-1896 1:10,560 1:2,500	No significant change.	New buildings and extensions including an aviary (c.1896) noted at Fair Oak Lodge adjacent to the north east boundary of the site.
1908-1909 1:10,560 1:2,500	No significant change.	No significant change.
1937-1939 1:10,560 1:2,500	No significant change.	A brick works is present 150m west of the site.
1957 1:10,560	A small building is present adjacent to the northern boundary of the site.	No significant change.
1962-1968 1:10,560 1:2,500	No significant change.	A large rectangular glass roofed building is noted along the north western boundary of the site. The previous brick works are now denoted as a factory. A refuse tip is noted 250m north east of the site.
1964-1967 1:2,500	A new rectangular building is present towards the northwest of the site orientated northeast to southwest.	Oak Lodge is now denoted as Saviour Convent.

Map Edition	Historical Land Use	
	On Site	Off Site
		Cattle grids located 100m northwest and 200m north.
1974-1975	Rectangular building in northwest of the site no longer visible on mapping.	The refuse tip is no longer present and is now shown to be residential housing.
1981-1986 1:2,500 (partial mapping) 1:10,000	A new building is present north of the site denoted as Allington Nurseries. A second building is present adjacent to the northeastern boundary of the site.	Playing fields located 1No other significant change (partial mapping).
1985-1990 1:2,500 (partial mapping) 1:10,000	No significant change (partial mapping).	Fair Oak Lodge present 50m southwest of the site. A Nursery is present 90m north west of the site. A factory is present 200m west of the site.
1992-1994 1:2,500	A tack is noted from Allington Lane onsite from the northern boundary.	No significant change.
2001 1:10,000	A new rectangular building is present along the north eastern boundary of the site. Extensions are noted associated with the previous buildings.	No significant change.
2003 1:2,500	The site now denoted as Treetops Nurseries and comprises of four (4no.) buildings.	Previous Saviour Convent is now The Kings School and Rockford House.
2010 1:10,000	No significant change.	No significant change.
2020 1:10,000	No significant change.	No significant change.

3.2 Planning History

Omnia have undertaken a review of on-line planning records held by Eastleigh Borough Council and found no environmentally pertinent planning applications relating to the site.

4 ENVIRONMENTAL SETTING

4.1 Geology and Hydrogeology

British Geological Survey Map (Southampton, Sheet 315, Solid and Drift Edition at a scale of 1: 50,000, 2012) indicates that the site is underlain by the following geological sequence:

Table 4-1 Geology

Geological Unit	Classification	Description	Aquifer Classification
Superficial	Absent	Absent	Absent
Bedrock	Wittering Formation	Sandy Clay	Secondary A Aquifer

BGS records show that the site is not underlain by superficial deposits, the nearest superficial deposits are located 52m south east attributing to Alluvium. BGS records indicate that the site is directly underlain by Bedrock deposits of the Wittering Formation which is classified as a Secondary A Aquifer, defined as having being a minor aquifer with permeable layers capable of supporting water supplies at a local level as well as supplying the base flows to rivers.

Review of the Groundsure report indicates that the site is not located within a Groundwater Source Protection Zone (SPZ) and no active groundwater, surface water or potable water abstractions licences are present within 250m of the site.

Groundwater vulnerability data indicates the site is underlain by soils classified as having a medium vulnerability with intergranular flow in the south of the site and having a high vulnerability with mixed flow in the north of the site within the Secondary A Aquifer classification. Near surface soils are characterised as having a low leaching class in to south of the site and an intermediate leaching class in the north of the site.

Based on local topography and the location of surface watercourses it is considered that groundwater, if present, will likely flow towards the south to southeast of the site towards Quobleigh Pond and unnamed water courses.

4.2 Hydrology and Flooding

Data obtained via the Groundsure Report identified nineteen (19no.) surface watercourse records, located between 53m south to 238m south east and 229m to 236m north east, within 250m radius of the subject site. It is considered that records to the south and south east are attributed to Quobleigh Pond and its unnamed tributaries. Records to the north east are associated with culverted water network orientating north west to south east which reaches confluence with the associated tributaries to the watercourse to the south of the site at approximately 250m north east of the study site.

The Groundsure report indicates that the study site is within the River Itchen catchment area.

The environmental database indicates that the site is located within a surface water flooding associated within a 1 in 30-year event based on modelling between 0.3-1.0m, this classification is present through a small section in the north of the site as well as approximately 50m south and 10m north west of the subject site.

The Groundsure Report indicates that the site is located within an area susceptible to groundwater flooding with a risk classification between moderate to high based on a risk assessment of 1 in 100-year return period. The highest classification attributing to the north west of the subject site.

The site is not within 50m of a designated Risk of Flooding from River and Seas (RoFRaS) area, with no historical flood event recorded by the Ground sure report. A Flood Zone 2 associated with land at risk of flooding is present 49m south and is associated with the Quobleigh Pond and water course.

4.3 Geotechnical Data

Geotechnical Data presented within the Groundsure Report identifies the following potential ground hazards:

Table 4-2 Geotechnical Data

Hazard	Designation
Shrink-Swell Clay	Moderate
Landslides	Very Low
Ground Dissolution	Negligible
Compressible Ground	Negligible
Collapsible Deposits	Very Low
Running Sand	Very Low

4.4 Mining and Ground Workings

The site is not located within an area that is affected by coal mining or non-coal mining, therefore no Coal Authority Coal Mining Report was obtained.

However, the Groundsure Report identified twenty-one (21no.) records of surface ground working within a 250m of the subject site. Upon review, multiple entries have been attributed to five (5no.) sources based on distance and direction from the site. Ground working entries have been summarised below:

- Pond, dating 1908-1989 (49m to 92m south and south west);
- Unspecified pit, dated 1868 (96m south west);
- Refuse Heap, dated 1957 (225m north east);
- Pond, dated 1895 to 1938 (100m to 120 east); and,
- Pond, dated 1908 to 1968 (241m to 244m east).

4.5 Radon Risk Potential

The Groundsure report indicates that the site is not in a radon affected area as defined by the Health Protection Agency (HPA) as less than 1% of the properties are above the Action Level. At this level BRE publication BR211 indicates that radon protective measures are not required in the construction of new extensions or dwellings.

4.6 Industrial Land Uses

4.6.1 Historical Industrial Land Uses

There are eight (8no.) accounts of historical industrial land uses have been identified within 250m radius of the site by the Groundsure Report summarised below:

- Onsite, Nursery (Horticultural), dated 1989;
- 18m north west, Nursery (Horticultural), dating 1989;
- 96m south west, unspecified pit, dated 1868;
- 99m east, boat house, dated 1908-1938;
- 133m south west, unspecified factory, dated 1989;
- 136m south west, unspecified works, dated 1957;
- 225m north east, refuse heap, dated 1957-1968

Historical land uses outside of the 250m radius of the site include, disused pits, refuse heaps, nursery, a cemetery and a Police Station.

4.6.2 Historical Tank Database

The Groundsure Report did not identify any historic tanks within 250m of the site.

4.6.3 Historical Energy Features Database

The Groundsure Report identified two (2no.) historical energy feature within 250m of the site. From a review of the data it is considered that these are multiple entries of the same feature, as summarised below:

- 238-239m (Electricity substation) north east, dated 1974-1986 and 1997.

4.6.4 Historical petrol stations and garages

The Groundsure Report did not identify any historic petrol stations or garages within 250m of the site.

4.6.5 Current Industrial Land Uses

There are three (3no.) account of recent industrial land uses within 250m radius of the site by the Groundsure Report summarised below:

- 40m south west, Electrical Sub Station, Electrical Features; and
- Two entries for 221m south west, Andy's Car Repairs and Fair Oak Service Centre, Vehicle repair, testing and servicing.

4.7 Sensitive Land Uses

Environmentally sensitive land uses are listed within 250m of the site are summarised below;

- Nitrate Vulnerable Zone – Onsite;
- Solent Nutrient Impact Area - Onsite;
- Site of Specific Scientific Interest (SSSI) Impact Zone – Onsite ;
- Habitat of principal importance (Natural Environment and Rural Communities Act 2006) – 52m

to 324m south and south east relating to deciduous woodland.

Where a new development with overnight accommodation is being developed, Regulation 63 of the Conservation of Habitats and Species Regulations 2017 must be applied where a site has been identified as being within a Solent Nutrient Impact Area. Whilst the majority of nitrates entering The Solent are derived from current and historical agricultural sources, new housing developments have been deemed to result an increased load on existing Waste Water Treatment Works (WWTWs) resulting in increased nitrates being discharged into watercourses and ultimately entering The Solent. The new guidance by Natural England has resulted in local authorities in the Solent Region requiring nitrate neutrality calculations and reports to be produced for all new developments.

4.8 Site Sensitivity Assessment

The site is located within a moderate sensitivity setting due to the following reasons:

- Underlying Secondary (A) Aquifer within bedrock geology;
- Underlying deposits with a 'Medium to High' leaching potential;
- Surface water features within 250m of the site;
- Site located within a Nitrate Vulnerable Zone;
- Absence of underlying Source Protection Zone; and,
- Absence of active groundwater, surface and potable water abstraction licence within 250m radius.

5 CONSULTATIONS

5.1 Contaminated Land Officer

Contact was made with the Contaminated Land Officer (CLO) at Eastleigh Borough via email on the 10th November 2020, however at the date of issue, no response had been received.

5.2 Landfill and Waste Treatment Sites

The Groundsure Report did not identify any current or historic landfill sites, landfills or waste treatment sites within 250m of the site.

5.3 Potentially Infilled Land

The Groundsure Report identified a single entry relating to Made Ground located 219m north east of the subject site. The report did not identify any potentially infilled within 250m of the study site.

5.4 Regulatory Database

The following information has been obtained from a commercially available environmental database. The summary table only includes records not otherwise detailed in the report.

Table 5-1 Summary of Groundsure Data

	0-249m	250-500m	Details
Contaminated Land Register Entries and Notices	0	0	N/A
Authorised industrial processes (IPC/IPPC/LAPPC).	0	0	N/A
Licensed Radioactive Substances	0	0	N/A
Hazardous Substance Storage/ Usage	0	0	N/A
Enforcements, Prohibitions or Prosecutions	0	0	N/A
Licensed Pollutant Release (Part A(2)/B)	0	0	N/A
Licensed discharges to controlled waters	4	1	Onsite, New bungalow at Allington Nursey, Fair Oak Effluence type: Sewage discharges Issue date: 23/09/1976 80m south east, Allington Lane, Fair Oak Effluence type: Miscellaneous – surface water Issue date: 27/03/1990 127m north east, Church Hall at Allington Lane, Fair Oak Effluence type: Sewage discharges Issue date: 04/10/1977 195m west, Allington Lane, Fair Oak Effluence type: Trade discharges, unspecified

	0-249m	250-500m	Details
			Issue date: 23/01/1959 473m north east, Fratton Way Pumping Station, Fratton Way Effluence type: Sewage discharges – storm overflow Issue date: 01/04/1991
Pollution Incidents	0	8	305m north west – Dated 30/08/2003 Pollutant: Contaminated water (chemically contaminated runoff) Air Impact: Cat 4 (No impact) Water Impact: Cat 3 (Minor) Land Impact: Cat 4 (No impact) 478m north east (7no. entries) – Dated 30/06/2002 Pollutant: Inert materials and waste, waste specific materials, general biodegradable materials, and wastes (Vegetable cuttings and deposits, construction and demolition materials and wastes, vehicles and vehicle parts) Air Impact: Cat 4 (No impact) Water Impact: Cat 4 (No impact) Land Impact: Cat 2 (Significant)
Control of Major Accident Hazard (COMAH) Sites	0	0	N/A

6 CONCEPTUAL SITE MODEL (CSM)

6.1 Initial CSM

In accordance with Environment Agency, CLR 11 (2004) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), Omnia Environmental Consulting have developed an initial CSM to identify potential contamination sources, migration pathways and receptors within the study area. A residential end use has been adopted given the proposed site development.

6.1.1 On-site Potential Sources

Current

- Made Ground associated with existing buildings and infrastructure onsite; and
- Localised spills associated with historic metal drums identified on the site walkover.

Historic

- Horticultural Nursery.

6.1.2 Off-site Potential Sources

Current

- Electric Substation, 40m south west;
- Vehicle repair, testing and servicing (Fair Oak Service Centre), 211m south west.

Historic

- Unspecified pit, 96m south west, dated 1868;
- Boat House, 99m east, dated 1908-1938;
- Clay pit, 100m west, dated 1868-1909;
- Unspecified factory, 113m and 136m south west, dated 1989;
- Brick works, 150m north west, dated 1937-1939
- Unspecified works, 136m south west, dated 1957;
- Refuse Heap, 225m north east, dated 1957, removed in 1968; and,
- Electrical substation, 238m and 239m north east, dated 1974-1997.

6.1.3 Potential Pathways

- Ingestion of impacted soils, dusts and vegetables;
- Inhalation of fibres'
- Dermal Contact with impacted soils;
- Vertical and lateral migration;
- Inhalation of vapours; and,
- Migration of ground gas into confined spaces.

6.1.4 Potential Receptors

- Future Site Users; and,
- Controlled Waters.

Construction workers are not considered to be a plausible receptor due to management of their exposure through the use of suitable PPE and hygienic working practices as required under HSE/CDM

regulations. Furthermore, the length of any exposure is considered to be very short in comparison to the criteria for which the adopted end use has been derived.

An Initial Conceptual Site Model has been prepared for the site and is presented overleaf within Table 6-1

Table 6-1 Initial Conceptual Site Model

Source	Contaminant	Potential Migration Pathway	Potential Receptors	Likelihood of Occurrence	Magnitude of Occurrence	Overall Risk Rating	Active/Inactive
On-Site Potential Sources – Current							
Made Ground associated with existing buildings and infrastructure onsite.	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Ingestion of Impacted soils and dust	Future Site Users	Moderate	Moderate	Moderate	Potentially Active – Further Investigation Required.
		Vertical & Lateral Migration	Controlled Waters	Low	Minor	Low	
	Polycyclic Aromatic Hydrocarbons (PAH)	Ingestion of Impacted soils and dust	Future Site Users	Moderate	Moderate	Moderate	
		Vertical & Lateral Migration	Controlled Waters	Low	Minor	Low	
	Total Petroleum Hydrocarbons (TPH)	Ingestion of Impacted soils and dust	Future Site Users	Low	Moderate	Low/Moderate	
		Vertical & Lateral Migration	Controlled Waters	Low	Minor	Low	
		Inhalation of Vapours	Future Site Users	Low	Moderate	Low/Moderate	

	Asbestos fibres	Inhalation of fibres	Future Site Users	Medium	Medium	Moderate	
Localised spills associated with onsite drums	Total Petroleum Hydrocarbons (TPH)	Ingestion of Impacted soils and dust	Future Site Users	Moderate	Moderate	Moderate	Potentially Active – Further Investigation Required.
		Vertical & Lateral Migration	Controlled Waters	Moderate	Minor	Low/Moderate	
		Inhalation of Vapours	Future Site Users	Moderate	Moderate	Moderate	
	Chlorinated Solvents	Ingestion of impacted soils Dermal contact with impacted soils	Future Site Users	Moderate	Moderate	Moderate	
		Inhalation of Vapours	Future Site Users	Moderate	Moderate	Moderate	
		Vertical & Lateral Migration	Controlled Waters	Moderate	Moderate	Moderate	
		On-Site Potential Sources – Historic					
Horticultural Nursery	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni,	Ingestion of Impacted soils and dust	Future Site Users	Moderate	Moderate	Moderate	Potentially Active – Further Investigation Required.

	Zn)	Vertical & Lateral Migration	Controlled Waters	Low	Minor	Low	
	Polycyclic Aromatic Hydrocarbons (PAH)	Ingestion of Impacted soils and dust	Future Site Users	Moderate	Moderate	Moderate	
		Vertical & Lateral Migration	Controlled Waters	Low	Minor	Low	
	Herbicides and Pesticides	Ingestion of Impacted soils and dust	Future Site Users	Moderate	Moderate	Moderate	Potentially Active – Further Investigation Required.
		Vertical & Lateral Migration	Controlled Waters	Moderate	Minor	Low/Moderate	
	Asbestos (pipe lagging/ boilers)	Inhalation of fibres	Future Site Users	Medium	Medium	Moderate	Potentially Active – Further Investigation Required.
Off-Site Potential Sources – Current							
Electric Substation, 40m south west	Polychlorinated Biphenyls (PCBs)	Lateral Migration	Future Site Users	Low	Moderate	Low/Moderate	Inactive - PCBs are a DNAPL with low mobility, and if present, any impacted soils would be restricted to the area immediately surrounding and beneath the electrical substation. Due to the distance away from the subject site it is therefore considered unlikely that this source has the potential to impact the site.
Vehicle repair, testing and servicing, 211m	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migration	Future Site Users	Very Low	Minor	Very Low	Inactive – Based on the limited mobility of PAHs and metals and the associated distance and likely groundwater flow this source is not

south	Polycyclic Aromatic Hydrocarbons (PAH)	Lateral Migration	Future Site Users	Low	Minor	Low	considered to have the potential to impact the site.
	Total Petroleum Hydrocarbons (TPH)	Lateral Migration	Future Site Users	Low	Minor	Low	Inactive - Given the anticipated shallow groundwater flow direction towards the south and south east, the source is hydraulically downgradient, and it is considered unlikely that this source has the potential to impact the subject site.
	Volatile Organic Compounds (VOC)	Vertical and Lateral Migration into confined spaces	Future Site Users	Low	Moderate	Low/Moderate	Inactive – Based on the distance of the source from the site, it is considered unlikely that VOC will migrate onsite.
Off-Site Potential Sources – Historic							
Unspecified pit, 96m south west (c.1868)	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migrations	Future Site Users	Low	Minor	Low	Inactive – Based on the limited mobility of PAHs and metals and the associated distance and likely groundwater flow this source is not considered to have the potential to impact the site.
	Polycyclic Aromatic Hydrocarbons (PAH)	Lateral Migrations	Future Site Users	Low	Minor	Low	
	Total Petroleum Hydrocarbons (TPH)	Lateral Migrations	Future Site Users	Low	Moderate	Low/Moderate	Inactive - Given the anticipated shallow groundwater flow direction towards the south and south east, the source is hydraulically downgradient, and it is considered unlikely that this source has the potential to impact the subject site.

	Ground Gas (CO ₂ and CH ₄)	Vertical and Lateral Migration into confined spaces	Future Site Users	Low	Severe	Moderate	Potentially Active – Further Investigation Required.
Boat House, 99m east, dated 1908-1938	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migration	Future Site Users	Very Low	Minor	Very Low	Inactive –Any limited contamination generated by this source will likely have dissipated over this time. In addition, due the anticipated direction of groundwater flow to the south and south east, as well as the small size of the boat house it is not considered to present a risk.
	Total Petroleum Hydrocarbons (TPH)	Lateral Migration	Future Site Users	Low	Minor	Low	
	Chlorinated Solvents	Lateral Migration	Future Site Users	Low	Moderate	Low/Moderate	
Unspecified factory, 113m and 136m south west, dated 1989	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migration	Future Site Users	Very Low	Minor	Very Low	Inactive – Based on the limited mobility of PAHs and metals and the associated distance and likely groundwater flow this source is not considered to have the potential to impact the site.
	Polycyclic Aromatic Hydrocarbons (PAH)	Lateral Migrations	Future Site Users	Low	Minor	Low	
	Total Petroleum Hydrocarbons (TPH)	Lateral Migrations	Future Site Users	Low	Moderate	Low/Moderate	Inactive - Given the anticipated shallow groundwater flow direction towards the south and south east, the source is hydraulically downgradient, and it is considered unlikely that this source has the potential to impact the subject site.
	Volatile Organic Compounds (VOC/SVOC)	Vertical and Lateral Migration into confined spaces	Future Site Users	Low	Moderate	Low/Moderate	Inactive - Given the anticipated shallow groundwater flow direction towards the south and south east, the source is hydraulically downgradient, and it is considered unlikely that this source has the potential to impact the subject site.

Clay Pit, 100m west, dated 1868-1909.	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migrations	Future Site Users	Very Low	Minor	Very Low	Inactive – Based on the distance from the site and the inferred direction of groundwater flow to the south and south east. It is considered that this source does not have the potential to impact the subject site.
	Polycyclic Aromatic Hydrocarbons (PAH)	Lateral Migrations	Future Site Users	Low	Minor	Low	
	Ground Gas (CO ₂ and CH ₄)	Vertical and Lateral Migration into confined spaces	Future Site Users	Low	Severe	Moderate	Inactive – Based on historic mapping the pit appears to have been filled pre 1909, give the age it is likely that any potential source of ground gas would degraded and dissipated over this time.
Unspecified works, 136m south west, dated 1957	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migrations	Future Site Users	Very Low	Minor	Very Low	Inactive – Based on the limited mobility of PAHs and metals and the associated distance and likely groundwater flow this source is not considered to have the potential to impact the site.
	Polycyclic Aromatic Hydrocarbons (PAH)	Lateral Migrations	Future Site Users	Low	Minor	Low	
	Total Petroleum Hydrocarbons (TPH)	Lateral Migrations	Future Site Users	Low	Moderate	Low/Moderate	Inactive - Given the anticipated shallow groundwater flow direction towards the south and south east, the source is hydraulically downgradient, and it is considered unlikely that this source has the potential to impact the subject site.
	Volatile Organic Compounds (VOC/SVOC)	Vertical and Lateral Migration into confined spaces	Future Site Users	Low	Moderate	Low/Moderate	Inactive - Given the anticipated shallow groundwater flow direction towards the south and south east, the source is hydraulically downgradient, and it is considered unlikely that this source has the potential to impact the

							subject site.
Brick works, 150m north west, dated 1937-1939	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migrations	Future Site Users	Low	Minor	Low	Potentially Active – Further Investigation Required.
	Polycyclic Aromatic Hydrocarbons (PAH)	Lateral Migrations	Future Site Users	Low	Minor	Low	
	Total Petroleum Hydrocarbons (TPH)	Lateral Migrations	Future Site Users	Low	Moderate	Low/Moderate	
	Ground Gas (CO ₂ and CH ₄)	Vertical and Lateral Migration into confined spaces	Future Site Users	Low	Severe	Moderate	Potentially Active – Further Investigation Required.
Refuse Heap, 225m north east, dated 1957-1968	Metals (As, B, Cd, Cr, Pb, Hg, Se, Ni, Zn)	Lateral Migrations	Future Site Users	Low	Minor	Low	Inactive – Refuse heap no longer on mapping in c.1968 indicating removal. Based on the limited mobility of PAHs and metals and the associated distance and time since removal, as well as and likely groundwater flow this source is not considered to have the potential to impact the site.
	Polycyclic Aromatic Hydrocarbons (PAH)	Lateral Migrations	Future Site Users	Low	Minor	Low	
	Total Petroleum Hydrocarbons (TPH)	Lateral Migrations	Future Site Users	Moderate	Moderate	Moderate	
Electric Substation, 238m and 239m north east, dated 1974- 1997	Polychlorinated Biphenyls (PCBs)	Lateral Migration	Future Site Users	Low	Moderate	Low/Moderate	Inactive - PCBs are a DNAPL with low mobility, and if present, any impacted soils would be restricted to the area immediately surrounding and beneath the electrical substation. Due to the distance away from the subject site it is therefore considered unlikely that

							this source has the potential to impact the site.
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7 SITE INVESTIGATION

7.1 General

A ground investigation was designed based on the requirement for geo-environmental services to assist with the pre-purchase stage, as set out within Omnia proposal document ref: A11463/200828/L2, dated 5th October 2020.

Following completion of the desk study and a review of the available data, ground investigation works were required on site to investigate the potential for impacted materials to be present on-site from identified on-site and nearby off-site potential sources.

Exploratory fieldwork was conducted over five (5no.) working days, undertaken in two stages. The first stage was undertaken on the 6th to 7th October 2020, and the second stage was undertaken on the 13th to the 15th October 2020.

Table 7-1 Site Investigation Summary

Potential Source/Rationale	Location Hole	Type	Maximum Depth (m bgl)	Borehole Response Zone (m bgl)
General spread across the site for assessment of potential contamination and geotechnical assessment. Installation of Ground gas and groundwater monitoring installation.	WS101, WS105, WS107, WS109	Window Sample	5.00	WS101 (1.00-4.00mbgl) WS105 (1.00-3.00mbgl) WS107 (1.00-3.00mbgl) WS109 (1.00-3.00mbgl)
General spread across the site for assessment of potential contamination and geotechnical assessment.	WS102- WS104, WS106, WS108, WS110	Window Sample	5.00	N/A
Targeting shallow soils where two old drums (220L) were identified during site investigation.	HP101 HP102	Hand Dug Pit	0.20	N/A
General spread across the site for assessment of drainage properties of the near surface soils to facilitate drainage design.	TP101-TP103	Trial Pitting	2.80	N/A
General spread across the site for assessment of potential contamination and geotechnical assessment.	TP104	Trial Pitting	2.50	N/A

The exploratory hole locations are illustrated on Figure 4.0 (Appendix III). The ground conditions encountered are indicated on the exploratory hole logs, which are provided in Appendix V.

7.2 Laboratory Analysis

Selected soil samples were submitted for a range of chemical analysis including:

- CLEA Metals;
- Asbestos fibres in soil;
- Speciated Polycyclic Aromatic Hydrocarbons (PAH);
- Banded Total Petroleum Hydrocarbons (TPH);
- Speciated TPH;
- Volatile Organic Compounds (VOCs);
- Total Cyanide;
- Organochlorine Pesticides and Organophosphorus Pesticides;
- Acid Herbicides;
- Soil Organic Matter
- pH; and,
- Water-Soluble Sulphate (2:1 extract).

Element Materials Technology of Deeside undertook the analytical work in accordance with UKAS accreditation where applicable and the laboratory analysis certificates are presented as Appendix VI and discussed in Section 9.

Selected soil samples were submitted to I2 Analytical for a range of geotechnical testing, in accordance with UKAS methodology where applicable, comprising:

- Moisture Content;
- Atterberg Limits;
- Particle Size Distribution;
- pH; and,
- Water-Soluble sulphate (2:1 extract).

The geotechnical analysis certificates are presented in Appendix VIII.

7.3 Ground Gas and Groundwater Monitoring

Concentrations of methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) were measured using an infrared gas analyser (GA5000), calibrated to a reference standard (before and after each survey) and gas flow rates were measured using an internal flow pod. Gas measurements were recorded until concentrations stabilised for three consecutive readings, for a minimum of ninety seconds at each location, at which point the maximum concentration of CH₄ and CO₂, together with the lowest concentration of O₂ were recorded.

Groundwater monitoring was undertaken using an electronic dip tape to record the depth to groundwater. Ground gas and groundwater results are presented in Section 8.5 and discussed in Section 9.3.

8 GROUND AND GROUNDWATER CONDITIONS

8.1 Ground Conditions

The ground conditions encountered during the intrusive site investigation are detailed on the exploratory hole logs presented within Appendix V and generally confirmed BGS geology map sheet (Sheet 315, Southampton, Solid and Drift Edition at a scale of 1: 50,000) and the Groundsure report.

Ground conditions on site comprised Made Ground and Topsoil directly underlain by bedrock deposits attributed to the Wittering Formation. The base of the Wittering Formation was not encountered during the investigation.

8.1.1 Made Ground

Made Ground was encountered within WS101, WS102 and WS105, in the north of the site, with a maximum thickness of 0.35m and generally comprised a soft, brown, sandy, gravelly CLAY with variable silt content. Sand is medium to coarse. Gravel is angular to subrounded, fine to medium flint, brick and asphalt.

8.1.2 Topsoil

Topsoil was encountered within all locations on-site with a maximum thickness of 0.60m (WS106). Topsoil comprised grass over brown, very clayey silty fine to medium SAND with frequent rootlets. Occasional angular to subrounded flint gravel was noted within WS108.

8.1.3 Bedrock Deposits – Wittering Formation

Topsoil was found to be immediately underlain by the Wittering Formation, which was observed to generally comprise sediments of coarse-grained and fine-grained deposits.

The majority of the Wittering Formation at the site comprised a firm orangeish brown, sandy CLAY underlain by a firm orangeish brown mottled reddish orange and grey, variably sandy CLAY with occasional rounded flint gravels and frequent lignite and gleyed roots to an approximate depth of 3.00-4.00m bgl. A firm to stiff, grey occasionally stained orange and red, variably sandy CLAY was encountered below 3.00-4.00m bgl across the site. Occasional red oxidation and yellow staining within the laminated fine-grained deposits was noted within TP104 (2.00-2.50m bgl).

Coarse grained deposits were encountered within WS108 at 4.0m bgl where an orangeish grey medium and coarse SAND was recovered.

Within WS109 a red, sandy gravelly CLAY was encountered at 3.00m bgl with gravels of sandstone and within WS107 a gravelly CLAY with gravels of mudstone was encountered at 3.80m bgl associated with water bearing strata.

The base of the formation was not proven during the course of the investigation.

8.1.4 Groundwater Conditions

A summary of groundwater conditions that were encountered during the initial investigation phase are presented in the table below.

Table 8-1 Summary of groundwater conditions during initial siteworks

Location	Depth (m bgl)	Formation	Notes
WS101	1.20	Bedrock	Strike
WS102	0.60	Made Ground	Seepage
WS105	0.50	Made Ground	Seepage
WS107	2.10-2.80	Bedrock	Seepage
	3.00	Bedrock	Strike
WS108	3.00	Bedrock	Seepage
	4.00	Bedrock	Strike
WS109	3.00	Bedrock	Strike
TP102	2.10	Bedrock	Seepage
	2.20	Bedrock	Standing
TP104	2.00	Bedrock	Seepage

It is assumed that shallow groundwater (WS102 and WS105) is associated with perched water retained in the Made Ground and deeper strikes are associated with coarse-grained horizons of the Wittering Formation.

During return monitoring visits it was observed that water levels within the installed borehole monitoring wells were significantly higher than those encountered in the initial ground investigation. It is considered likely that due to the predominantly cohesive nature of the soils that the boreholes are acting a sump for surface water throughflow, given periods of heavy rain in October 2020, and are not considered to be representative of true groundwater levels. Return monitoring groundwater levels are summarised in the following table.

Table 8-2. Summary of groundwater conditions during return monitoring visits

Location	Depth (m bgl)	Notes
WS101	0.20	21/10/2020 visit
WS105	GL	21/10/2020 visit
	0.15	29/10/2020 visit
WS107	0.69	21/10/2020 visit
WS109	2.85	21/10/2020 visit
	1.24	29/10/2020 visit

8.2 Laboratory Classification Analysis

Soil classification testing, including Atterberg Limits, Particle Size Distribution and pH and Sulphate results are summarised in Table 8-3 to Table 8-5 with analysis certificates presented in Appendix VIII.

8.2.1 Soil Plasticity

Five (5no.) samples taken from cohesive deposits across the site were submitted to the laboratory for laboratory plasticity analysis. The results of this analysis have been summarised in Table 8-3 below.

Table 8-3. Summary of Soil Plasticity

Location	Depth (m bgl)	Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Percentage passing 425µm sieve (%)	Modified Plasticity Index	Plasticity	Volume Change Potential
TP101	1.00-1.50	22	47	20	27	100	27	Medium	Medium
TP102	0.50-1.00	26	54	24	30	100	30	High	Medium
TP103	2.60-2.80	17	49	20	29	100	29	Medium	Medium
TP104	2.00-2.50	28	54	24	30	100	30	High	Medium
WS106	2.80-3.00	29	56	25	31	100	31	High	Medium

The results presented in Table 8-3 indicate that the fine-grained soils between a depth of 0.50-3.00m bgl are of a medium to high plasticity clay with a medium volume change potential.

8.2.2 Particle Size Distribution Analysis

Two (2no.) soil samples were submitted to the laboratory for Particle Size Distribution (PSD) via sedimentation analysis, with the results presented below in Table 8-4. The results are generally consistent with the on-site observations and descriptions.

Table 8-4. Summary of Particle Size Distribution via sedimentation

Location	Depth (m bgl)	Granulometric Composition (%)					
		Laboratory Description	Clay	Silt	Sand	Gravel	Very Coarse
TP101	1.00-1.50	Brown sandy very clayey SILT	37.00	44.70	18.30	0.00	0.00
TP103	2.60-2.80	Brownish grey slightly gravelly very sandy very clayey SILT	33.30	38.60	25.50	2.60	0.00

8.2.3 pH and Sulphate

Chemical analysis for pH and soluble sulphate content are summarised in Table 8-5 below with analysis certificates presented as Appendix VI and VIII.

Table 8-5. Summary of pH and Sulphate Data

Location	Depth (m bgl)	SO ₄ in 2:1 water / soil (mg/l)	pH Value
TP101	1.0-1.5	4.2	7.2
TP103	2.6-2.8	4.2	6.7
TP104	2.0-2.5	14.2	5.5
TP102	0.5-1.0	5.8	6.3

Location	Depth (m bgl)	SO ₄ in 2:1 water / soil (mg/l)	pH Value
WS101	0.10-0.30	35.4	8.03
WS102	0.10-0.30	16.2	7.85
WS103	0.10-0.30	91.8	6.4
WS103	0.30-0.60	13.4	7.43
WS104	0.10-0.30	2.4	6.41
WS105	0.10-0.30	21.4	7.88
WS106	2.8-3.0	15.5	6.6

Due to the current and historic use of the site as a nursey and currently a residential property, the site has been classified utilising Table C2 of BRE Special Digest 1 (2005) for a brownfield development.

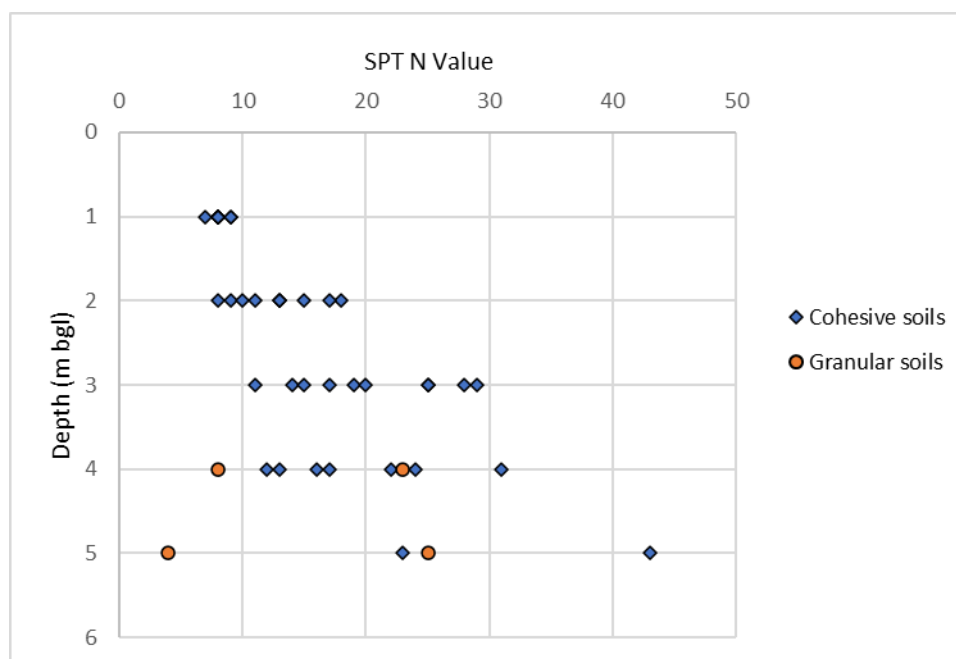
Due to the size of the data set being greater than 10, the mean of the highest 20% sulphate results and the mean of the lowest 20% pH values as stated in BRE Special Digest (2005) have been used for the site, giving a site characteristic value for sulphate of 57.01mg/l and a pH value of 5.89. Utilising Table C2 and the sulphate classes for groundwater and the water/soil extracts tests the results are indicative of a Design Sulphate Class 1 and an Aggressive Chemical Environment for Concrete of AC-2z.

8.3 In-Situ Testing

8.3.1 Standard Penetration Tests (SPT)

Standard Penetration Tests (SPT) were carried out in all windowless sampling and cable percussive boreholes in accordance with techniques outlined in BS1377, to assess the strength/density of the underlying strata. The 'N' value (number of blows per 300mm penetration) was recorded for each test. The results of these in-situ tests, including full blow counts, are presented below and on the borehole logs within Appendix V.

Table 8-6 SPT N results versus depth within the Wittering Formation at the study site



8.3.2 Hand Shear Vane Testing

In-situ testing via Hand Shear Vane was undertaken within all locations to aid geotechnical design and obtain a profile of in-situ strength. Hand Shear Vane Testing was carried out in accordance with techniques outlined in BS1377:7 to assess the strength profile of the underlying strata.

The results of these in-situ tests are presented below and on the borehole logs within Appendix V.

Table 8-7 Summary of Hand Shear Vane testing

Location	Depth (m bgl)	Undrained Shear Strength, C_u (kN/m ²)
WS106	2.00	41
WS106	3.00	52
WS107	3.00	51
WS109	2.00	44
TP101	1.00	65
TP101	1.90	46
TP102	0.80	66
TP102	2.00	65
TP103	1.20	84
TP103	1.50	73
TP103	2.80	61
TP104	0.80	36
TP104	1.50	28

8.3.3 Permeability Testing

In-situ permeability testing was undertaken in accordance with BRE Digest 365 – *Soakaway Design* within the near surface at locations TP101, TP102 and TP103 which were advanced to maximum depths ranging from 1.90m bgl to 2.80m bgl.

Table 8-8 Summary of in-situ soakaway testing within trial pit locations

Location	Test No.	Pit Depth (m bgl)	Strata Type	Soil Infiltration Rate (m/s)	Notes
TP101	1	1.90	Cohesive	N/A	Test unsuccessful
TP102	1	2.30	Cohesive	N/A	Test unsuccessful
TP103	1	2.80	Cohesive	N/A	Test unsuccessful

Water was left in TP101 for a maximum of 24 hours where the maximum level change was recorded was 0.46m. The 25% empty intercept was reached; however, the 75% intercept was not reached, and therefore the test was deemed unsuccessful.

Water was left in TP102 for a maximum of 24.5 hours where the maximum level change was recorded was 0.06m. The 25% and 75% empty intercept were not reached during the duration of the test, and therefore the test was deemed unsuccessful.

Water was left in TP103 for a maximum of 24 hours where the maximum level change was recorded was 0.10m. The 25% and 75% empty intercepts were not reached during the duration of the test, and therefore the test was deemed unsuccessful.

The results summarised in Table 8.5 indicate soil infiltration testing was unsuccessful as testing did not reach the required 75% empty intercept over the course of a 24hour period, as set out in BRE Digest 365 - Soakaway Design. Therefore, three fills were not completed due to the unsuccessful testing.

It is therefore considered that near surface soils are not suitable for conventional soakaway design. The adoption of soakaway drainage will ultimately be dependent on the specific requirements of the development and should be designed in accordance with BRE Special Digest DG365 – *Soakaway Design*.

8.3.4 Ground Gas

Three (3no.) ground gas and groundwater monitoring visits have been undertaken across three (3no.) monitoring wells at the site between 21/10/2020 and 04/11/2020. The results of the gas and groundwater monitoring are presented in Table 8-9 overleaf.

Table 8-9. Summary of Ground Gas and Groundwater Monitoring Results

Well	Date	CH ₄ Peak %v/v	CH ₄ Steady %v/v	CH ₄ GSV l/hr	CO ₂ Peak %v/v	CO ₂ Steady %v/v	CO ₂ GSV l/hr	O ₂ %v/v	Atmos (mb)	Atmos. Dynamic	Flow (l/hr)	Depth to Base (m bgl)	Depth to Water* (m bgl)
WS101	21/10/2020	0.1	<0.1	0.0260	2.4	2.4	0.6240	19.8	996	Rising	-26.0	3.68	0.20
	29/10/2020	<0.1	<0.1	0.0260	2.5	2.5	0.6500	18.8	1013	Steady	-26.0	3.75	0.20
	04/11/2020	<0.1	<0.1	0.0011	1.3	0.3	0.0143	20.0	1033	Rising	1.1	3.75	0.45
WS105	21/10/2020	<0.1	<0.1	0.0042	0.3	0.3	0.0126	20.8	997	Rising	-4.2	3.00	GL
	29/10/2020	0.1	<0.1	0.0160	1.6	1.6	0.2560	20.1	1011	Steady	-16.0	3.09	0.15
	04/11/2020	<0.1	<0.1	0.0190	1.9	1.9	0.3610	19.1	1032	Rising	-19.0	3.00	1.03
WS107	21/10/2020	0.1	<0.1	0.0109	1.7	1.7	0.1853	19.6	998	Rising	-10.9	2.94	0.69
	29/10/2020	<0.1	<0.1	0.0109	0.2	0.2	0.0218	21.1	1011	Steady	-10.9	3.04	0.96
	04/11/2020	<0.1	<0.1	0.0025	3.4	3.4	0.0850	18.8	1032	Rising	-2.5	3.95	0.87
WS109	21/10/2020	<0.1	<0.1	0.0001	1.3	1.3	0.0013	19.7	997	Rising	0.1	2.99	2.85
	29/10/2020	0.1	<0.1	0.0001	0.9	0.9	0.0009	19.2	1013	Steady	0.1	3.08	1.24
	04/11/2020	<0.1	<0.1	0.0001	1.1	0.9	0.0011	18.1	1031	Rising	0.1	3.05	1.35

Notes

Where a value of <0.1 has been recorded Omnia have adopted a conservative approach and assumed a value of 0.1 for the purposes of calculating Gas Screening Values (GSVs).

* Due to high water levels, the boreholes were purged and left for a total of 30 minutes prior to the commencement of ground gas monitoring.

9 TIER 1 QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

Omnia has undertaken a Tier 1 qualitative risk assessment to determine if any potential contaminants within the underlying soils pose an unacceptable level of risk to the identified receptors.

9.1 Human Health Risk Assessment

At a Tier 1 stage the long term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published by the EA (Contaminated Land Exposure Assessment (CLEA) Soil Guideline Values (SGV)) and where absent, Generic Assessment Criteria (GACs) published by LQM/CIEH Suitable for Use Levels (S4UL) 2015. Based on the proposed residential end use with private gardens, Omnia has adopted screening values for a residential end use with home grown produce. The origin of the GAC values are presented within Appendix VII.

The results of this comparison have been summarised within Table 9-1 and Table 9-2.

Table 9-1. Summary of Inorganic and Hydrocarbon Toxicity Assessment for a Residential End Use with Home Grown Produce

Determinant	Units	GAC	n	MC	Loc. of Ex	Pathway	Assessment
Inorganics							
Metals							
Arsenic	mg/kg	37	6	11.6	N/A	1	No Further Action
Beryllium	mg/kg	1.7	6	5.5	WS101 at 0.10-0.30m	1	Further Assessment Required
Boron	mg/kg	290	6	1.1	N/A	1	No Further Action
Cadmium	mg/kg	11	6	0.3	N/A	2	No Further Action
Chromium (III)	mg/kg	910	6	120.4	N/A	1	No Further Action
Chromium (VI)	mg/kg	6	6	<0.3	N/A	2	No Further Action
Copper	mg/kg	2,400	6	59	N/A	2	No Further Action
Lead	mg/kg	200	6	56	N/A	1	No Further Action
Mercury	mg/kg	40	6	0.5	N/A	1	No Further Action
Nickel	mg/kg	180	6	44.7	N/A	1,2	No Further Action
Selenium	mg/kg	250	6	1	N/A	1,2	No Further Action
Vanadium	mg/kg	410	6	82	N/A	2	No Further Action
Zinc	mg/kg	3,700	6	128	N/A	2	No Further Action
General Inorganics							
Asbestos	%	0.001	6	NAD	N/A	5	No Further Action
Total Cyanide *	mg/kg	50	6	0.8	N/A	1	No Further Action
Organics							
Polycyclic Aromatic Hydrocarbons (PAH)							
Naphthalene	mg/kg	2.3	6	<0.04	N/A	2	No Further Action
Acenaphthylene	mg/kg	170	6	<0.03	N/A	2	No Further Action
Acenaphthene	mg/kg	210	6	<0.05	N/A	2	No Further Action
Fluorene	mg/kg	170	6	<0.04	N/A	2	No Further Action
Phenanthrene	mg/kg	95	6	0.09	N/A	2	No Further Action
Anthracene	mg/kg	2,400	6	<0.04	N/A	2	No Further Action
Fluoranthene	mg/kg	280	6	0.21	N/A	1,2	No Further Action
Pyrene	mg/kg	620	6	0.2	N/A	1,2	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	6	0.18	N/A	1	No Further Action
Chrysene	mg/kg	15	6	0.16	N/A	1	No Further Action
Benzo(b)Fluoranthene	mg/kg	2.6	6	0.24	N/A	1	No Further Action
Benzo(k)Fluoranthene	mg/kg	77	6	0.1	N/A	1	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	6	0.2	N/A	1	No Further Action

Indeno(123-cd)Pyrene	mg/kg	27	6	0.13	N/A	1	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24	6	<0.04	N/A	1	No Further Action
Benzo(ghi)Perylene	mg/kg	320	6	0.15	N/A	1	No Further Action
Banded Total Petroleum Hydrocarbons (TPH)							
TPH EC 5-6**	mg/kg	42	6	<0.1	N/A	4	No Further Action
TPH EC >6-8**	mg/kg	100	6	<0.1	N/A	4	No Further Action
TPH EC >8-10**	mg/kg	27	6	<5	N/A	4	No Further Action
TPH EC >10-12**	mg/kg	74	6	<10	N/A	2	No Further Action
TPH EC >12-16**	mg/kg	140	6	<10	N/A	2	No Further Action
TPH EC >16-21**	mg/kg	260	6	<10	N/A	1	No Further Action
TPH EC >21-35**	mg/kg	1,100	6	127	N/A	1	No Further Action
Notes Main Exposure Pathways: 1 = Ingestion of Soil & Indoor Dust, 2 = Consumption of Homegrown Produce & Attached Soil; 3 = Dermal Contact (Indoor & Outdoor); 4 = Inhalation of Vapour (Indoor & Outdoor); 5 = Inhalation of Dust (Indoor & Outdoor), 6 = Inhalation of Fibres Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance. Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide. ** The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. Omnia has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.							

On a return monitoring visit two (2no.) hand dug pits (HP101 and HP102) were advanced in locations where drums were noted during the site investigation. An intrusive location plan is presented as Figure 4.0 within Appendix III. Samples of the near surface were collected and subsequently scheduled for testing, adopting screening values for a residential end use with home grown produce.

Table 9-2 Summary of HP101 and HP102 results: Inorganic and Hydrocarbon Toxicity Assessment for a Residential End Use with Home Grown Produce

Speciated Total Petroleum Hydrocarbons (TPH)							
Aliphatic							
Aliphatic EC 5-6	mg/kg	42	2	<0.1	N/A	4	No Further Action
Aliphatic EC >6-8	mg/kg	100	2	0.1	N/A	4	No Further Action
Aliphatic EC >8-10	mg/kg	27	2	<0.1	N/A	4	No Further Action
Aliphatic EC >10-12	mg/kg	130 ^(vap)	2	<0.2	N/A	4	No Further Action
Aliphatic EC >12-16	mg/kg	1,100 ^(sol)	2	10	N/A	4	No Further Action
Aliphatic EC >16-35	mg/kg	65,000 ^(sol)	2	29	N/A	1	No Further Action
Aliphatic EC >35-44	mg/kg	65,000 ^(sol)	2	436	N/A	1	No Further Action
Aromatic							
Aromatic EC 5-7	mg/kg	70	2	<0.1	N/A	4	No Further Action
Aromatic EC >7-8	mg/kg	130	2	<0.1	N/A	4	No Further Action
Aromatic EC >8-10	mg/kg	34	2	<0.1	N/A	4	No Further Action
Aromatic EC >10-12	mg/kg	74	2	<0.2	N/A	2	No Further Action
Aromatic EC >12-16	mg/kg	140	2	<4	N/A	2	No Further Action
Aromatic EC >16-21	mg/kg	260	2	<7	N/A	2	No Further Action
Aromatic EC >21-35	mg/kg	1,100	2	235	N/A	1	No Further Action
Aromatic EC >35-44	mg/kg	1,100	2	235	N/A	1	No Further Action
Volatile Organic Compounds (VOCs)							
1,2 Dichloroethane	mg/kg	0.0071	2	<0.004	N/A	2	Further Action
1,1,1 – Trichloroethane	mg/kg	8.8	2	<0.003	N/A	2	No Further Action
1,1,2,2 – and 1,1,1,2 – Tetrachloroethane	mg/kg	1.6	2	<0.003	N/A	2	No Further Action
Tetrachloroethylene (PCE)	mg/kg	0.18	2	<0.003	N/A	2	No Further Action
Trichloroethylene (TCE)	mg/kg	0.016	2	<0.003		2	No Further Action

Trichloromethane (Chloroform)	mg/kg	0.91	2	<0.003	N/A	2	No Further Action
Chloroethene (Vinyl Chloride)	mg/kg	0.00064	2	<0.002	N/A	2	Further Action
Notes Main Exposure Pathways: 1 = Ingestion of Soil & Indoor Dust; 2 = Consumption of Homegrown Produce & Attached Soil; 3 = Dermal Contact (Indoor & Outdoor); 4 = Inhalation of Vapour (Indoor & Outdoor); 5 = Inhalation of Dust (Indoor & Outdoor); 6 = Inhalation of Fibres Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance. ** The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. Omnia has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health. (sol) – GAC presented exceeds the solubility saturation limit. (vap) – GAC presented exceeds the vapour saturation limit.							

Referring to Table 9-1 and Table 9-2 above the results of this direct comparison indicates that there have been exceedances of adopted Tier 1 screening criteria as follows:

Metals:

- Beryllium

Beryllium

A single concentration each of beryllium (5.5mg/kg) was found to exceed the Tier I screening criteria of 1.7mg/kg respectively at a depth of 0.10-0.30mbgl at location WS101. A review of the borehole logs indicates that the sample was collected from the Made Ground, described as a slightly silty, sandy CLAY with occasional brick and concrete. WS101 is located within the rear garden of Plots 5 to 8.

The main exposure pathway for the heavy metals detailed above is via soil ingestion. It is considered that the elevated concentration has the potential to pose a significant risk to human health within proposed areas of soft landscaping where an active pollution linkage will remain and will require remedial works to render them suitable for the intended use.

It is therefore considered that further investigation in the vicinity of WS101 (rear garden of Plots 5 to 8) is required by the advancement of shallow hand dug pits to delineate the extent of potential contamination within the Made Ground. If contamination is identified from further testing remedial action will be required to render the pollution linkages inactive with remedial works set out within a standalone Remediation Method Statement (RMS) which should be submitted to the Local Authority for approval.

Herbicides and Pesticides

Two (2no.) spot samples taken from across the site were analysed for a range of Herbicides and Pesticides in order to address the potential historic risk of contamination due to historical nursery. All samples yielded concentrations of less than the laboratory limit of detection and therefore herbicides and pesticides are not considered to pose a significant risk to future site users.

9.2 Controlled Waters Assessment

The site is not considered to have the potential to present a significant risk to controlled waters for the following reasons:

- Low permeability cohesive soils proven during soil soakage testing;
- Groundwater within return monitoring visits is attributed to surface throughflow and is not representative of site conditions;
- Elevated concentrations of beryllium within WS101 are relatively immobile and unlikely to migrate offsite;
- No other concentrations of contaminants exceeding the human health screening criteria have been identified in the near surface soils on site; and,
- Absence of groundwater and potable water supplies within 250m of the site.

9.3 Ground Gas Assessment

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report C665 (*Assessing risks posed by hazardous ground gases to buildings*, 2007). However, it is recommended that the full ground gas assessment and any recommended protection measures are agreed with the local authority prior to the adoption of any protection measures on-site. Furthermore, the installation of any gas protection measures should be validated by a suitably qualified engineer.

The results of the ground gas monitoring and calculated Gas Screening Values (GSVs) are presented in Table 8-9.

Three (3no.) ground gas monitoring visits have been undertaken at locations WS101, WS105, WS107 and WS109. CH₄ concentrations were recorded to a maximum concentration of 0.1% v/v at all locations. CO₂ concentrations were recorded to a maximum of 2.5% v/v at location WS101 on the 29/10/2020.

Negative ground gas flow was recorded at locations WS101, WS105 and WS109 with a maximum flow rate of -26.0l/hr recorded on 21/10/2020 within WS101. In accordance with current guidance, a conservative approach has been adopted with an assumption made that any negative flow rates could invert to become positive and as such negative flow rates have been treated as positive for the purposes of calculating a Gas Screening Value (GSV).

It should be noted that during October 2020 high groundwater levels were consistently recorded above the top of the borehole response zones within WS101, WS105 and WS109. Due to the fact that the borehole response zones were effectively sealed off, it was necessary to remove groundwater by bailing prior to monitoring ground gas concentrations. Boreholes were subsequently left for a period of 30 minutes for ground gas to re-accumulate before monitoring occurred.

The recorded negative flow rates at locations WS101, WS105 and WS109 are therefore considered to be artificially induced by disturbance caused by the purging and recharging of groundwater and are therefore not considered to be representative of site conditions. However, in order to adopt a conservative approach, the recorded ground gas flow rates have been used for the purposes of calculating tentative GSVs.

In accordance with the methodology outlined within the CIRIA publication C665, Omnia have utilised the results of the ground gas monitoring surveys to calculate a tentative Gas Screening Value (GSV). The maximum GSV calculated for methane was 0.026l/hr whilst the maximum GSV for carbon dioxide was 0.624l/hr.

It is understood that the proposed development is for a residential end-use comprising 35no. low-rise housing plots, with associated private gardens and communal soft landscaping and access infrastructure.

Therefore, the proposed development is composed of low-rise residential dwellings assessed under the NHBC Traffic Light System as **Situation B** and for high-rise flat blocks will be classified under BS 8485:2015 as private ownership with central building management classed as a **Type B** building.

9.3.1 NHBC Traffic Light System - Situation B - Low Rise Housing

Guidance set out in CIRIA C665, stipulates a site characteristic maximum GSV of <0.16 l/hr for methane and <0.78 l/hr for carbon dioxide, for classification as Green under the NHBC Traffic Light System.

The maximum recorded concentration and GSV for CH₄ (0.026l/hr) and CO₂ (0.624l/hr) meet the criteria for classification as Green. It is therefore considered that a **Green** classification is suitable for the low-rise housing at the site. A NHBC Green classification is indicative of a negligible ground gas regime and no special ground gas protection measures are required in the construction of new dwellings or extensions.

Developments classified as Green do not require any special ground gas protection measures.

9.3.2 BS 8485:2015 - Type B Building – Private ownership with Central building Management

Guidance set out in BS 8485:2015, which is equivalent to the characteristic situations of the modified Wilson & Card classification set out in CIRIA C665, stipulates a site characteristic maximum GSV of <0.07 l/hr, with typical maximum permissible concentrations of 1% v/v (CH₄) and/or 5% v/v (CO₂) for classification as Characteristic Situation 1 (CS1).

The maximum recorded concentrations and GSVs for CH₄ (0.1% v/v) and CO₂ (2.5% v/v) meet the criteria for **classification as CS1**

Developments classified as CS1 do not require special ground gas protection measures.

10 REVISED CONCEPTUAL SITE MODEL

Following the completion of the Tier 1 Risk assessment, active pollution pathways have been identified based on the areas accessible at the time of the investigation and the findings of the site investigation and Tier 1 risk assessment. Potentially active pollution linkages may exist in locations beneath existing infrastructure, e.g. existing residential house and out-houses, greenhouses and stables, which could not be assessed at the time of this investigation.

The table below summarised active pollution linkages.

Following completion of the Tier 1 risk assessment, a pollution linkage has been identified based on a commercial development of the site.

Table 10-1 Revised Conceptual Site Model

Source	Exposure Pathway	Potential Receptor	Probability of Exposure	Discussion of Pollutant Linkage
Heavy Metals (Beryllium)	Ingestion of Soil	Future Site Users	Likely	Mitigation measures are required to sever the pollution linkage between heavy metals and future site users within the vicinity of WS101 (Plots 5 to 8), which are considered to present a significant risk to human health. It is therefore considered that further testing within the Made Ground within the vicinity of WS101 is required by the advancement of shallow hand dug pits to delineate the extent of potential contamination. If contamination is identified from further testing remedial action will be required to render the pollution linkages inactive with remedial works set out within a standalone Remediation Method Statement (RMS) which should be submitted to the Local Authority for approval.

11 GEOTECHNICAL ASSESSMENT

11.1 Proposed Development

It is understood that the proposed development is for a residential end-use comprising 35no. low-rise housing plots, with associated private gardens and communal soft landscaping and access infrastructure. A proposed development plan is provided as Figure 3.0 in Appendix III.

11.2 Site Preparation

The site should be cleared of any vegetation below the areas of proposed development and stripped in accordance with Series 200 of Specification of Highway Works.

Any roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting voids in-filled with suitable compacted material. This should also be undertaken for any redundant or re-routed services and foundations for any existing structures.

11.3 Ground Profile

Based on the findings on the current ground investigation, ground conditions at the site comprise Topsoil and Made Ground overlying bedrock deposits of Wittering Formation which is dominantly cohesive in nature, to the full depth of the ground investigation, discussed in 8.1. Site ground conditions are summarised below.

Table 11-1 Summary of site ground conditions

Borehole	Made Ground Thickness (m)	Topsoil Thickness (m)	Bedrock	Groundwater (m bgl)
			Wittering Formation Thickness (m)*	
WS101	0.30	n/e	4.70	1.20
WS102	0.30	n/e	3.15	0.60
WS103	n/e	0.35	4.65	n/e
WS104	n/e	0.40	3.60	n/e
WS105	0.35	n/e	4.65	0.50
WS106	n/e	0.60	3.40	n/e
WS107	n/e	0.30	3.70	3.00
WS108	n/e	0.40	4.60	4.00
WS109	n/e	0.40	3.60	3.00
WS110	n/e	0.30	3.70	n/e
TP101	n/e	0.50	1.40	n/e
TP102	n/e	0.50	1.80	2.10
TP103	n/e	0.50	2.30	n/e
TP104	n/e	0.40	2.10	2.00

Notes

n/e where material was not encountered during investigation.

*Base not encountered during site investigation.

11.3.1 Groundwater

Groundwater was encountered at a depth of 0.50m to 1.20m bgl to the north of the site areas and 2.00m to 4.00m bgl in the south of the site area.

11.4 Foundation Depths

11.4.1 Shallow Foundations

The following geotechnical assessment has been undertaken based on in-situ testing, laboratory analysis, and field descriptions of the underlying geology during ground investigation. Foundation depths presented are based on a minimum presumed bearing value for a particular foundation type, based on Tomlinson (2001). Line loadings have not been made available such that the final depth and type of foundation required following design could vary.

It is considered that Topsoil and Made Ground would not form a suitable founding stratum due to characteristic variability and the associated potential for differential settlement. As such, it is recommended that loads are transferred through the Topsoil and Made Ground to a depth at which competent geology, sufficient to support the proposed load, is encountered.

11.4.2 Bearing Capacity

11.4.2.1 Wittering Formation

The Wittering Formation underlying the site is considered to be dominantly cohesive in nature across the site with limited granular deposits encountered at depth.

The presumed bearing capacities have therefore been determined through correlation of the Undrained Shear Strength (C_u) to presumed Bearing Capacities derived in Tomlinson (2001). The Undrained Shear Strength of cohesive soils has been determined by using the widely accepted empirical relationship of $C_u \times f_1$, where f_1 is based on the correlation factor based on the plasticity index of the soil (Stroud, 1974). The following undrained Shear Strengths (C_u) have been calculated using a correlation factor (f_1) of 4.5, in the equation below:

$$C_u = f_1 \times \text{SPTN}$$

Presumed Bearing Capacity at 1.00m bgl

SPT N Values ranged from N=7 to N=9 at a depth of 1.00m bgl within the Wittering Formation. Adopting a conservative value of N=7 and applying the correlation factor of 4.5, gives an undrained shear strength of 31.5kN/m². This equates to a presumed bearing capacity range of 50-100N/m² for a 1.00 wide traditional strip or trenchfill foundation at a depth of 1.00m bgl.

It is considered that the presumed bearing capacities at 1.00m bgl, outlined above, may not be suitable for low-rising housing given the low strength material. Where a higher load is required in the area, consideration should be given to locally deepening foundation depths onto higher strength material.

Presumed Bearing Capacity at 2.00m

SPT results range from N=8 to N=18 across the site at 2.00m bgl within the Wittering Formation. A single N value of N=8 is located at WS107 in the southeast of the site area, indicating lower strength material (C_u of 36kN/m²). N values ranged from N=9 to N=18 in the remainder of the site, indicating medium strength to high strength material (C_u of 41 to 81kN/m²), and therefore will be assessed separately.

Within the north-east corner of the site an N value of $N=8$ gives an undrained shear strength of 36kN/m^2 . It is therefore considered that a presumed bearing capacity of $50\text{--}100\text{kN/m}^2$ at for a 1.00m wide traditional strip or trenchfill foundation at 2.00m bgl is considered appropriate. It is considered that the presumed bearing capacity at 2.00 at WS107 may not be suitable for low rise housing given the low strength material and may require locally deepening foundations onto higher strength material.

Across the remainder of the site, adopting a conservative approach with an N value of $N=9$, correlating to an undrained shear strength of 41kN/m^2 , a presumed bearing capacity range of $100\text{--}200\text{kN/m}^2$ is considered appropriate for a traditional strip or trenchfill foundation at a depth of approximately 2.00m bgl. This is considered appropriate for low-rise housing subject to confirmation of line loadings.

Presumed Bearing Capacity at 3.00m bgl

SPT N Values ranged from $N=11$ to $N=29$ at a depth of 3.00m bgl within the Wittering Formation. Adopting a conservative value of $N=11$ gives an undrained shear strength of 49.5kN/m^2 . This equates to a presumed bearing capacity range of $100\text{--}200\text{kN/m}^2$ for a 1.00 wide traditional strip or trenchfill foundation at a depth of 3.00m bgl. This is considered appropriate for low-rise housing subject to confirmation of line loadings.

Should loadings exceed those set out above then alternative founding solutions will need to be explored with additional information from greater depths likely required. Foundation design should be completed by a suitably qualified Structural Engineer, with specific consideration given to the variability in soil strengths. Consideration may need to be given to the production of a geotechnical design report to determine calculated bearing capacities and settlement.

11.4.3 Areas of consideration

Particular consideration should also be given to areas of very low strength ground encountered at depth of 5.00m bgl within WS108 in the south east of the site, with an N value of $N=4$ associated with the water bearing sand horizons of the Wittering Formation.

Consideration should be given to the presence of mature and semi mature trees around the perimeter of the site. Within these areas, foundation depths will need to be increased in accordance with NHBC guidance in the Zones of influence of existing or recently removed trees, as set out by NHBC Guidance (Chapter 4.2 – Building near Trees).

11.4.4 Influence of groundwater on foundations

Groundwater was encountered at a depth of 0.50m to 1.20m bgl to the north of the site areas and 2.00m to 4.00m bgl in the south of the site area, during site investigation. However, during ground gas and water monitoring, water was recorded in locations WS101, WS105 and WS107 at depths $<1.00\text{m}$ bgl. Prior to gas monitoring locations water levels were lowered using a bailer and subsequently re-measured. At WS101 and WS105 water levels did not rise to levels of $<1.00\text{m}$ bgl, whereas within WS107 water levels rose to 0.81m bgl after purging.

Based on this, these measured levels are not considered representative of in-situ conditions, rather, that due to the cohesive nature of the soils, the boreholes are acting a sump for surface water throughflow following rainfall and as such are not considered to be representative of true groundwater conditions. However, it is considered that a groundwater depth of between 1.00

(WS107) and 2.00m bgl (WS101, WS105, WS109) should be considered in foundation design where groundwater rises to the base of the foundation.

Notwithstanding these, assessed groundwater conditions, given the impermeable nature of the soils and the potential for surface water to collect, consideration should be given to controlling surface water collection during construction.

11.4.5 Building Near Trees

The shallow cohesive strata at the site has been shown via laboratory analysis to predominantly be of medium to high plasticity with medium volume change potential in the shallow soils. Given this, foundations will need to be locally deepened where they are within the zone of influence of trees. The extent to which they should be deepened should be in accordance with NHBC guidance. A Tree Survey should be undertaken and reviewed, and applicable depths determined in association with a development layout.

In terms of new planting, NHBC guidance offers two foundation depth scenarios dependant on future planting regimes, as summarised in Table 11-2.

Table 11-2 Minimum depth of foundations for medium volume change soil (after NHBC 2020)

Depth of Foundation	Description	No Tree Planting Zone (m)		
		High Water Demand	Moderate Water Demand	Low Water Demand
0.90m	No tree planting within Zone of Influence	1.25 x mature height	0.75 x mature height	0.50 x mature height
1.25m	Restricted tree planting within zone of influence	1.00 x mature height	0.50 x mature height	0.20 x mature height

NHBC guidance indicates a minimum foundation depth of 0.90mbgl with no tree planting within a zone of tree influence, which is dependent on the tree species but may be up to 1.25 x mature tree height.

11.5 Ground Floor Slabs

It is considered that ground floor slabs may be suitable to bear on to the bedrock, subject to suitable design and inclusion of granular base layers. However, where Topsoil is encountered in excess of 600mm it is considered that ground floor slabs are not suitable for adoption and a suspended floor slab should be adopted.

Where the nature of the ground varies it is considered that a suspended floor slab should be adopted to mitigate against the effects of differential settlement across the site.

If levels were to be changed on site requiring steps in the substructure, further consideration should be given to the adoption of floor slabs, with reference to NHBC Standards (2011) 5.1 – *Substructure and ground bearing floors*.

11.6 Water Pipework

Given the greenfield nature of the site, and no evidence of widespread impact it is likely that standard potable supply pipework could be adopted. However, confirmation should be sought from the potable water supply company.

11.7 Concrete Durability

Soils encountered beneath the site have been classified in accordance with DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-2z with the recommendations provided in BRE Special Digest 1 (2005).

12 CONCLUSIONS AND RECOMMENDATIONS

Revised Conceptual Site Model
Following the completion of the Tier 1 risk assessment, pollution linkages involving elevated concentrations of Beryllium (WS101 at 0.10-0.30m bgl) were identified which are considered to have the potential to present a significant risk to future site users within areas of proposed soft landscaping or planting.
Concrete Classification
Soils encountered beneath the site have been classified in accordance with DS-1 , Aggressive Chemical Environment for Concrete Classification (ACEC) AC-2z with the recommendations provided in BRE Special Digest 1 (2005).
Ground Gas Classification
The development is classified as CS1 under 9.3.2 BS 8485:2015 - Type B Building – Private ownership with Central building Management and Green under NHBC Traffic light System - Situation B - Low Rise Housing. Both classifications do not require ground gas protection measures.
Geotechnical Assessment
The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of Specification for Highways Works. It is considered that Topsoil and Made Ground would not form a suitable founding stratum due to characteristic variability and the associated potential for differential settlement. As such it is recommended that loads are transferred through the Topsoil and Made Ground to a depth at which competent geology, sufficient to support the proposed load, is encountered. It is considered appropriate for low-rise housing to be founded between 2.00-3.00m bgl across the site area subject to confirmation of line loadings. Where low strength soils have been highlighted, WS107 in the southeast of the site, foundations should be locally deepened onto higher strength soils. Given the presence of mature trees around the perimeter of the site, there will likely be a requirement to locally deepen foundation depths in accordance with NHBC guidance in the Zones of influence of existing or recently removed trees, as set out by NHBC Guidance (Chapter 4.2 – Building near Trees), subject to confirmation of tree species and heights from a Tree Survey Report. Should loadings exceed those set out in Section 11 then alternative founding solutions will need to be explored with additional information from greater depths likely required. Foundation design should be completed by a suitably qualified Structural Engineer, with specific consideration given to the variability in soil types and strengths. Consideration may need to be given to the production of a geotechnical design report, to include a Tree Ring Diagram, to determine calculated bearing capacities and settlement. Consideration should also be given to surface water collection which may become perched above the underling impermeable soils, and the impact on construction.
Recommendations
Environmental
It should be noted that some areas of the site were inaccessible at the time of investigation due to the property being occupied. Therefore, it is recommended that intrusive investigation works are undertaken within these areas to assess the risks posed by underlying soils. Given the identification of elevated concentrations of Beryllium in near surface Made Ground (0.10-0.30m bgl) in the vicinity of location WS101, it is recommended that further investigation is undertaken in the vicinity of WS101 through the advancement of shallow hand dug pits to delineate the lateral extent of potentially impacted near surface Made Ground.

If additional impact is identified from further testing then remedial action will be required to render the pollution linkages inactive. Remedial works should be set out within a standalone Remediation Method Statement (RMS) which should be submitted to the Local Authority for approval.

The exact age of the main residential property, disused stables and outbuildings is unknown, and it is therefore recommended that an asbestos survey is undertaken in accordance with current asbestos legislation prior to the commencement of any renovation/demolition works on-site.

As the site is within a Solent Nutrient Impact Area it is recommended that a Nitrate Neutrality Assessment is undertaken.

It is also recommended that the Tier I human health risk assessment is re-visited upon the production of a proposed site layout to fully assess the risks posed by Beryllium.

Should any previously unidentified obvious visual or olfactory evidence of contamination be encountered in areas of the site during site clearance and/or ground works, then site works should be halted, and contact made with a suitably qualified environmental consultant. As determined appropriate by the Consultant, further investigation and sampling may be required to determine the appropriate actions. Upon completion contact should be made with the relevant regulatory authority to achieve signoff of the works.

Geotechnical

Where bearing capacities are insufficient for the proposed scheme, alternative foundation solutions, such as a piled foundation solution may be suitable for the site. However, further ground investigation works would be required in order to prove competency of the encountered Wittering Formation strata to a sufficient depth.

It is recommended that a tree influence plan is produced to assist with determining foundation depths across site and development of a detailed foundation zoning plan. Further subject to NHBC and regulator requirements, the potential requirement exists to calculate bearing capacities and settlement through production of a Geotechnical Design Report (GDR).

APPENDIX II

GLOSSARY

AST	ABOVE GROUND STORAGE TANK
BGS	BRITISH GEOLOGICAL SURVEY
BSI	BRITISH STANDARDS INSTITUTE
BTEX	BENZENE, TOLUENE, ETHYLBENZENE, XYLENES
CIEH	CHARTERED INSTITUTE OF ENVIRONMENTAL HEALTH
CIRIA	CONSTRUCTION INDUSTRY RESEARCH ASSOCIATION
CLEA	CONTAMINATED LAND EXPOSURE ASSESSMENT
CSM	CONCEPTUAL SITE MODEL
DNAPL	DENSE NON-AQUEOUS PHASE LIQUID (CHLORINATED SOLVENTS, PCB)
DWS	DRINKING WATER STANDARD
EA	ENVIRONMENT AGENCY
EQS	ENVIRONMENTAL QUALITY STANDARD
GAC	GENERAL ASSESSMENT CRITERIA
GL	GROUND LEVEL
GSV	GAS SCREENING VALUE
HCV	HEALTH CRITERIA VALUE
ICSM	INITIAL CONCEPTUAL SITE MODEL
LNAPL	LIGHT NON-AQUEOUS PHASE LIQUID (PETROL, DIESEL, KEROSENE)
ND	NOT DETECTED
LMRL	LOWER METHOD REPORTING LIMIT
NR	NOT RECORDED
PAH	POLY AROMATIC HYDROCARBON
PCB	POLY-CHLORINATED BIPHENYL
PID	PHOTO IONISATION DETECTOR
QA	QUALITY ASSURANCE
SGV	SOIL GUIDELINE VALUE
SPH	SEPARATE PHASE HYDROCARBON
SP.TPH (CWG)	TOTAL PETROLEUM HYDROCARBON (CRITERIA WORKING GROUP)
SPT	STANDARD PENETRATION TEST
SVOC	SEMI VOLATILE ORGANIC COMPOUND
UST	UNDERGROUND STORAGE TANK
VCCS	VIBRO CONCRETE COLUMNS
VOC	VOLATILE ORGANIC COMPOUND
WTE	WATER TABLE ELEVATION

UNITS

M	METRES
KM	KILOMETRES
%	PERCENT
%V/V	PERCENT VOLUME IN AIR
MB	MILLI BARS (ATMOSPHERIC PRESSURE)
L/HR	LITRES PER HOUR
µG/L	MICROGRAMS PER LITRE (PARTS PER BILLION)
PPB	PARTS PER BILLION
MG/KG	MILLIGRAMS PER KILOGRAM (PARTS PER MILLION)
PPM	PARTS PER MILLION
MG/M ³	MILLIGRAM PER METRE CUBED
M BGL	METRES BELOW GROUND LEVEL
M BCL	METRE BELOW COVER LEVEL

MAOD	METRES ABOVE ORDNANCE DATUM (SEA LEVEL)
KN/M ²	KILO NEWTONS PER METRE SQUARED
μM	MICRO METRE

APPENDIX III

DRAWINGS

Key



Site boundaries



The client must not amend any drawing, design or other intellectual property produced by Omnita Environmental Consulting (OEC) without permission in writing from OEC in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made OEC shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.

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Segensworth,
Fareham,
PO15 5TH
T: 01489 808088
E: info@omnia-consulting.co.uk
W: www.omnia-consulting.co.uk

ENVIRONMENTAL CONSULTING



Job Title:

Client:

Treetops Nursery, Fair Oak

Vistry Southern

Project No: A11463

Date: 11/11/2020

Drawn By:

GL

Authorised By:

AK

Scale:

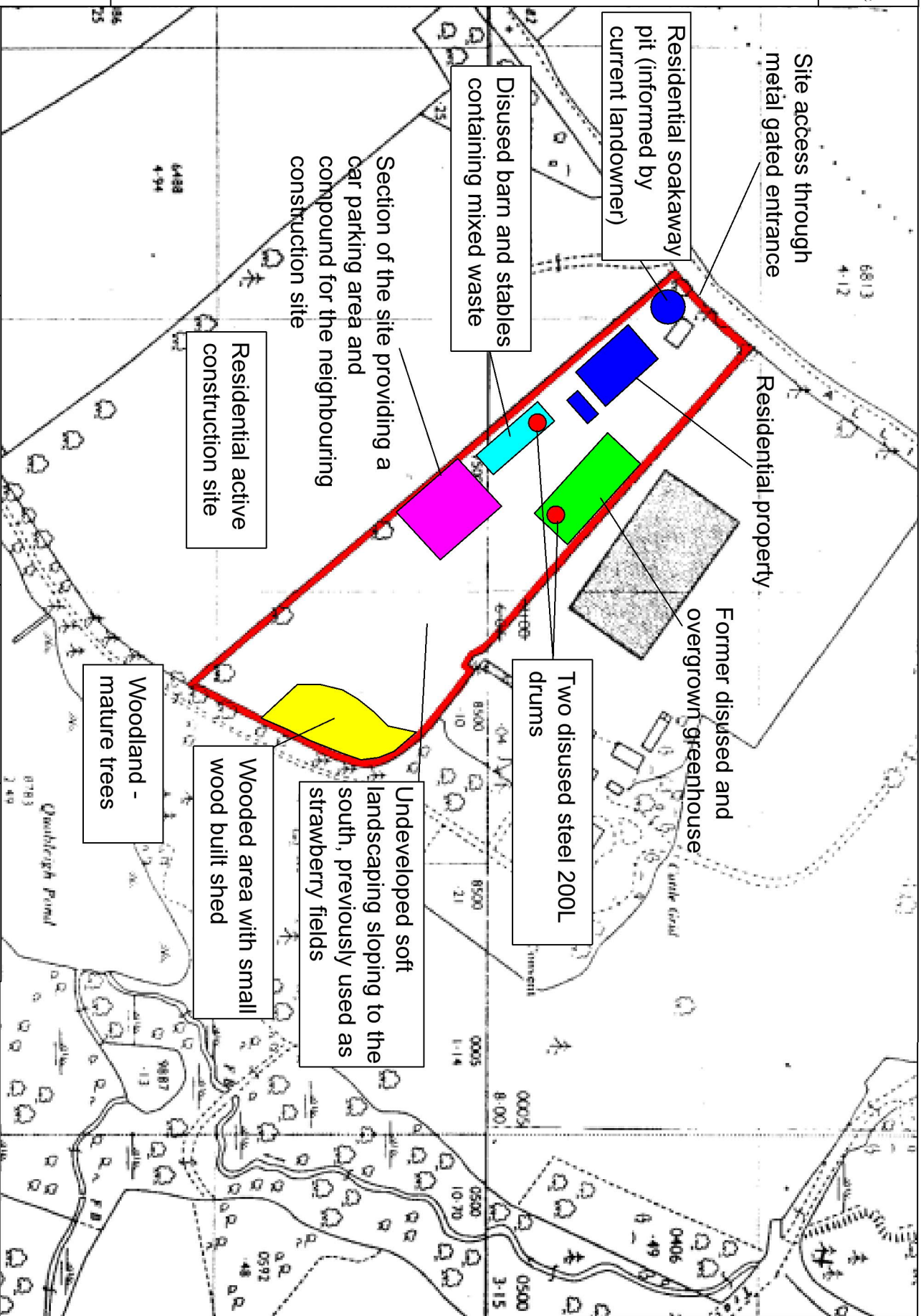
1 square
= 1km²

Notes:

Licence:
0100058169

Drawing Title:

Figure 1.0 - Site location plan



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Job Title:

Treetops Nursery, Fair Oak

Client:

Vistry Southern

Project No:

A11463

Date:

11/11/2020

Drawn By:

GL

Authorised By:

AK

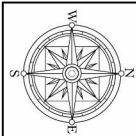
Scale:

Not to scale

Notes:

Drawing Title:

Figure 2.0 - Site walkover plan



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Job Title:

Treetops Nursery, Fair Oak

Client:

Vistry Southern

Project No:

A11463

Date:

11/11/2020

Drawn By:

GL

Authorised By:

AK

Scale:

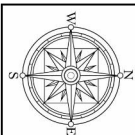
Not to
scale

Notes:

Drawing Title:

Figure 3.0 - Proposed
development plan

Key



- WS(i) Approximate Window Sample Probehole Location, (i) Monitoring Install
- TP Approximate Trial Pit Location
- HP Approximate Hand Dug Pit Location

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Job Title:

Treetops Nursery, Fair Oak

Client:

Vistry Southern

Project No:

A11463

Date:

11/11/2020

Drawing Title:

Figure 4.0 - Intrusive location plan

Drawn By:

GL

Authorised By:

AK

Scale:

Not to scale

Notes:

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W: www.omnia-consulting.co.uk



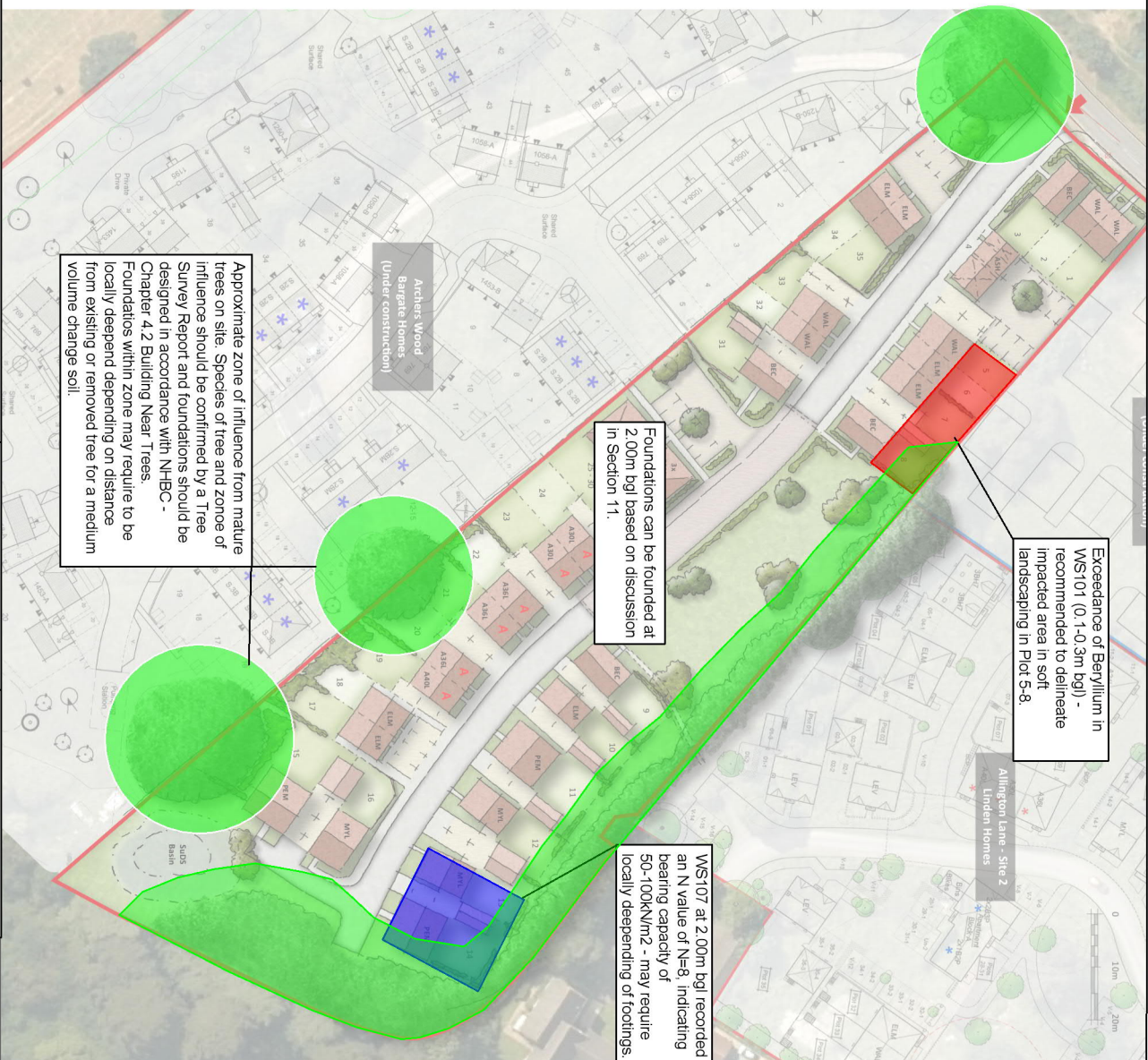
Client:

Project No: A11463

Date: 11/11/2020

Drawing Title:

Figure 5.0 - Outline Constraints Plan



APPENDIX IV
PHOTOGRAPHS



Photograph 1 Entrance to Treetops Nursery



Photograph 2 Looking north west showing caravan and residential property beyond and a unkept access road to the right of the photo



Photograph 3 Showing disused boat, outhouse and barn to the west of the site area.



Photograph 4 Showing disused barn and stable to the west of the site area.



Photograph 5 Showing disused green houses



Photograph 6 Showing disused steel oil drum.



Photograph 7 Showing a section of the site used as a compound area for the adjacent site.



Photograph 8 Showing trial pitting in the south of the site area.

APPENDIX V
EXPLORATORY HOLE LOGS



3-6 The Quarterdeck
Port Solent
Portsmouth
PO6 4TP

Trial Pit Log

Trialpit No

TP101

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -
Level:

Date
13/10/2020

Location: Fair Oak

Dimensions
(m):

2.5

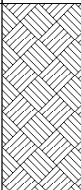
Scale
1:20

Client: Vistry Southern

Depth
1.90

0.6

Logged
GL

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10 - 0.50	B		0.50			Grass cover over brown clayey silty fine SAND with frequent rootlets. (TOPSOIL)	
	1.00 - 1.50	B	HVR=64 HVR=67				Firm orangeish brown mottled orange sandy CLAY with occasional gleyed roots. (WITTERING FORMATION)	1
			HVR=44 HVR=51	1.90			At 1.70m bgl occasional rounded flint gravel.	
							End of pit at 1.90 m	2
								3
								4

Remarks: Cleared by Cable Avoidance Tool. No groundwater encountered.

Stability: Stable





3-6 The Quarterdeck
Port Solent
Portsmouth
PO6 4TP

Trial Pit Log

Trialpit No

TP102

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -
Level:

Date
13/10/2020

Location: Fair Oak

Dimensions
(m):

2.2

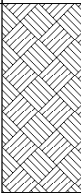
Depth
2.30

0.65

Scale
1:20

Logged
GL

Client: Vistry Southern

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.50 - 1.00	B	HVR=65 HVR=67	0.50			Grass cover over brown clayey silty fine SAND with occasional rare rounded flint gravel. (TOPSOIL)	
							Firm orangeish brown mottled orange sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)	1
▼	2.00 - 2.30	B	HVR=58 HVR=73	2.30			At 2.00m bgl rare to occasional rounded flint gravel.	2
							End of pit at 2.30 m	3
								4

Remarks: Cleared by Cable Avoidance Tool. Groundwater encountered as a seepage at 2.10m bgl and standing at 2.20m bgl.

Stability: Stable





3-6 The Quarterdeck
Port Solent
Portsmouth
PO6 4TP

Trial Pit Log

Trialpit No

TP103

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -
Level:

Date
13/10/2020

Location: Fair Oak

Dimensions
(m):

2.4

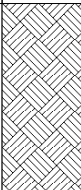
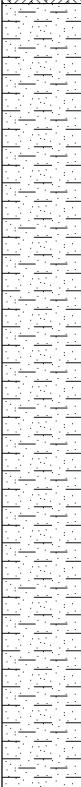
Client: Vistry Southern

Depth
2.80

0.6

Scale
1:20

Logged
GL

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00 - 1.50	B	HVR=84 HVR=73	0.50			Grass cover over brown very clayey silty fine SAND with occasional rootlets. (TOPSOIL)	
							Firm orangeish brown mottled orange sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)	1
							At 1.70m bgl mottled of grey fine sand.	
							At 2.00m bgl occasional to rare rounded flint gravel.	2
	2.60 - 2.80	B	HVR=61	2.60 2.80			Firm to stiff grey slightly gravelly CLAY. Gravel is rounded to subrounded fine and medium flint gravel. (WITTERING FORMATION)	
							At 2.70m bgl becomes slightly mottled orange sandy clay. Sand is fine.	
							End of pit at 2.80 m	3
								4

Remarks: Cleared by Cable Avoidance Tool. No groundwater encountered.

Stability: Stable



Trial Pit Log

Trialpit No

TP104

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -
Level:

Date
13/10/2020

Location: Fair Oak

Dimensions
(m):

2.6

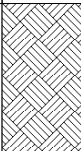
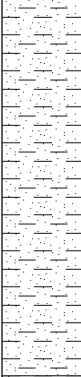
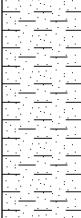
Client: Vistry Southern

Depth
2.50

0.6

Scale
1:20

Logged
GL

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
▼	0.50 - 1.00	B	HVR=35 HVR=38	0.40			Grass cover over dark brown slightly sandy slightly gravelly SILT with occasional rootlets. (TOPSOIL)
	1.40 - 1.50 1.40 - 2.00	ES B	HVR=26 HVR=29	1.40			Firm orangeish brown mottled orange and grey sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)
	2.00 - 2.50	B		2.00			Firm grey mottled greenish brown slightly sandy CLAY. Sand is fine and medium. Moderate to strong organic odour. Occasional dark grey mottles. (WITTERING FORMATION)
				2.50			Firm orangeish brown mottled orange and red sandy CLAY. Sand is fine and medium. Frequent red oxide and yellow staining. Occasional gravels of weak mudstone.
							End of pit at 2.50 m

Remarks: Cleared by Cable Avoidance Tool. Groundwater at 2.00m bgl.

Stability: Stable

Borehole Log

Borehole No.

WS101

Sheet 1 of 2

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -

Hole Type
WLS

Location: Fair Oak

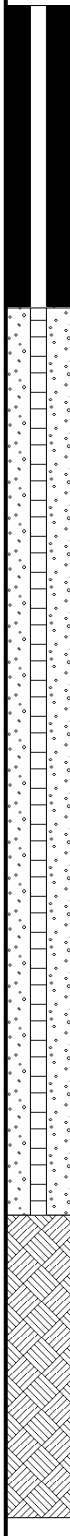
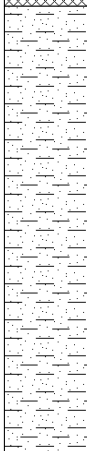
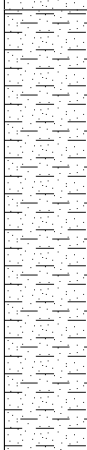
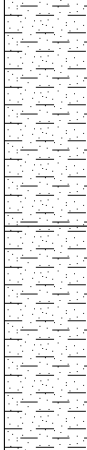
Level:

Scale
1:25

Client: Vistry Southern

Dates: 05/10/2020 -

Logged By
RD

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10 - 0.30	ES		0.30			Soft brown slightly silty sandy CLAY with occasional fine and medium subrounded gravels of brick and concrete. (MADE GROUND)	1
		0.30 - 0.60	ES					Brown slightly silty sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)	
		1.00 1.00 - 1.50	D	N=8 (1,2/2,2,2,2)	1.80			Stiff mottled brown and orange slightly silty sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)	2
		2.00		N=17 (2,3/3,4,4,6)					
		3.00 3.00 - 3.50	B	N=29 (4,5/5,6,8,10)	4.00			Stiff grey slightly silty very sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)	4
		4.00		N=24 (2,3/5,6,6,7)					
					5.00				5

Continued on next sheet

Remarks

Cleared by Cable Avoidance Tool. Groundwater encountered at 1.20m bgl.



3-6 The Quarterdeck
Port Solent
Portsmouth
PO6 4TP

Borehole Log

Borehole No.

WS101

Sheet 2 of 2

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -

Hole Type
WLS

Location: Fair Oak

Level:

Scale
1:25

Client: Vistry Southern

Dates: 05/10/2020 -

Logged By
RD

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		5.00		N=43 (8,8/10,10,11,12)				End of borehole at 5.00 m	
									6
									7
									8
									9
									10

Remarks

Cleared by Cable Avoidance Tool. Groundwater encountered at 1.20m bgl.



Borehole Log

Borehole No.

WS102

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -

Hole Type
WLS

Location: Fair Oak

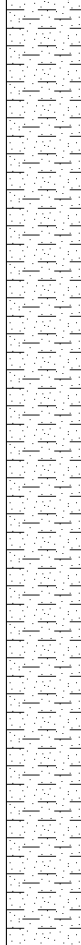
Level:

Scale
1:25

Client: Vistry Southern

Dates: 05/10/2020 -

Logged By
RD

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10 - 0.30	ES		0.35			Soft brown sandy gravelly CLAY. Sand is fine and medium. Gravel is angular to subrounded fine and medium flint, brick, concrete. (MADE GROUND)	
		0.30 - 0.60	ES					Soft brown slightly silty sandy CLAY. Sand is fine and medium. (WITTERING FOMATION)	
		1.00		N=7 (1,2/2,2,1,2)					1
		2.00		N=12 (1,2/2,3,3,4)					2
		3.00		N=25 (4,4/5,6,6,8)					3
					3.50			End of borehole at 3.50 m	4
									5

Remarks

Cleared by Cable Avoidance Tool. Groundwater encountered at 0.60m bgl.

Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -

Hole Type
WLS

Location: Fair Oak

Level:

Scale
1:25

Client: Vistry Southern

Dates: 05/10/2020 -

Logged By
RD

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10 - 0.30	ES		0.35			Soft dark brown slightly silty sandy CLAY. Sand is fine and medium. Occasional rootlets. (TOPSOIL)	1
		0.30 - 0.60	ES					Soft brown slightly silty sandy CLAY. Sand is fine to coarse. (WITTERING FORMATION)	
		1.00 1.00 - 1.50	B	N=7 (1,2/1,2,2,2)	1.10			Soft to firm brown mottled grey and orange slightly silty sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)	2
		2.00		N=13 (1,3/3,3,3,4)					
		3.00 3.00 - 3.50	B	N=28 (3,5/6,6,7,9)					
		4.00		N=31 (4,6/7,7,8,9)	4.50				4
		5.00		N=33 (3,5/6,7,9,11)				Grey slightly clayey silty fine and medium SAND. (WITTERING FORMATION)	
		5.00			5.00			End of borehole at 5.00 m	5

Remarks

Cleared by Cable Avoidance Tool. No groundwater encountered.

Borehole Log

Borehole No.

WS104

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -

Hole Type
WLS

Location: Fair Oak

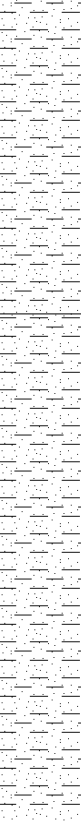
Level:

Scale
1:25

Client: Vistry Southern

Dates: 10/11/2020 -

Logged By
RD

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10 - 0.30	ES		0.40			Soft dark brown slightly sandy CLAY. Sand is fine and medium. (TOPSOIL)	
		0.30 - 0.60	ES					Soft light brown mottled grey sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)	
		1.00		N=9 (1,2/2,2,2,3)	1.80				1
		2.00		N=18 (2,3/4,4,5,5)				Stiff brown mottled grey slightly silty sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)	
		3.00		N=25 (3,4/5,6,6,8)	3.50				2
		3.50 - 4.00	B					Grey slightly clayey silty fine and medium SAND. (WITTERING FORMATION)	
		4.00		N=23 (2,3/4,5,6,8)	4.00			End of borehole at 4.00 m	3
									4
									5

Remarks

Cleared by Cable Avoidance Tool. No groundwater encountered.

Borehole Log

Borehole No.

WS105

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -

Hole Type
WLS

Location: Fair Oak

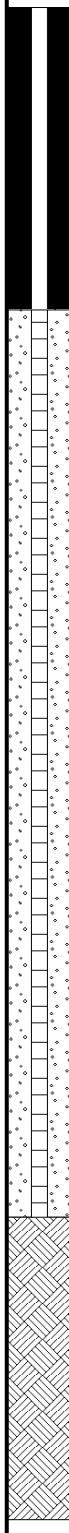
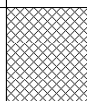
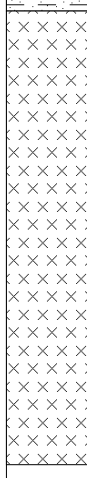
Level:

Scale
1:25

Client: Vistry Southern

Dates: 06/10/2020 -

Logged By
RD

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.10 - 0.30	ES		0.35			Dark brown slightly silty clayey fine and medium SAND. (MADE GROUND)		
		0.35 - 0.60	ES							Stiff brown mottled grey slightly silty sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)
		1.00		N=8 (1,2/2,2,2,2)	3.50				1	
		1.50 - 2.00	B							
		2.00		N=15 (1,3/3,4,4,4)						
		3.00		N=20 (2,4/4,5,5,6)						
		3.50 - 4.00	B		5.00			Grey slightly clayey SILT. (WITTERING FORMATION)	2	
		4.00		N=22 (3,3/4,5,6,7)						
		5.00		N=23 (2,4/4,5,6,8)	5.00				3	
		End of borehole at 5.00 m								
									5	

Remarks

Cleared by Cable Avoidance Tool. Groundwater encountered at 0.50m bgl.

Borehole Log

Borehole No.

WS106

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -

Hole Type
WLS

Location: Fair Oak

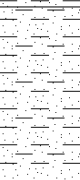
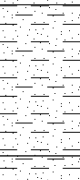
Level:

Scale
1:25

Client: Vistry Southern

Dates: 15/10/2020 -

Logged By
GL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.40	ES		0.60			Grass cover over dark brown very clayey silty fine and medium SAND with frequent rootlets (TOPSOIL)	1
		0.60 - 0.70	ES						
		0.80 - 1.00	D						
		1.00		N=8 (1,2/2,2,2,2)	1.00		Soft to firm orange mottled grey sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)	2	
		1.80 - 2.00	D						
		2.00		N=10 (1,2/2,2,3,3) HVR=51					
		2.80 - 3.00	D						
		3.00		N=15 (2,3/3,3,4,5) HVR=44	3.00				
		3.50 - 3.70	D		3.50		Firm to stiff grey sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)	4	
		4.00		N=17 (1,2/3,4,4,6)	4.00				
							----- End of borehole at 4.00 m	5	

Borehole Log

Borehole No.

WS107

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -

Hole Type
WLS

Location: Fair Oak

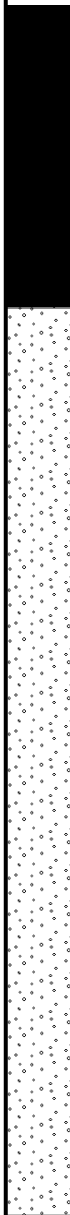
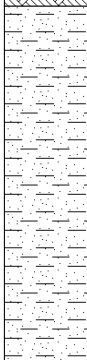
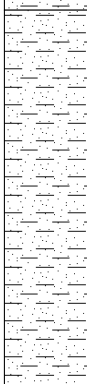
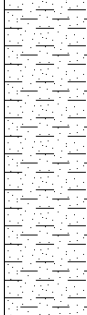
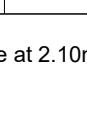
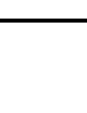
Level:

Scale
1:25

Client: Vistry Southern

Dates: 15/10/2020 -

Logged By
GL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20 - 0.30	ES		0.30			Grass cover over brown very clayey silty fine and medium SAND with frequent rootlets. (TOPSOIL)	
		0.50 - 0.60	ES					Soft to firm orangeish brown sandy CLAY. Sand is fine and medium. Frequent lignite and gleyed roots. (WITTERING FORMATION)	
		1.00 - 1.20	D	N=9 (1,1/2,2,2,3)					1
		1.50 - 1.70	D		1.50			Soft to firm orange mottled grey sandy CLAY. Sand is fine and medium. occasional roots and gleying. (Wittering Formation)	
	▼	2.00		N=8 (1,2/2,2,2,2)				Clay is soft. Sandy layers with possible seepage.	2
		2.50 - 2.70	D						
	▼	3.00		N=11 (2,2/2,2,3,4) HVR=52					3
		3.50 - 3.70	D						
		4.00		N=13 (2,3/3,3,3,4)	4.00			Slightly gravelly, Gravel of mudstone End of borehole at 4.00 m	4
									5

Remarks

Cleared by Cable Avoidance Tool. Groundwater encountered as a seepage at 2.10m bgl and a strike at 3.00m bgl.

Borehole Log

Borehole No.

WS108

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -

Hole Type
WLS

Location: Fair Oak

Level:

Scale
1:25

Client: Vistry Southern

Dates: 15/10/2020 -

Logged By
GL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
	 <								

Remarks

Cleared by Cable Avoidance Tool. Groundwater encountered as a seepage at 3.00m bgl and a strike at 4.00m bgl.

Borehole Log

Borehole No.

WS109

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -

Hole Type
WLS

Location: Fair Oak

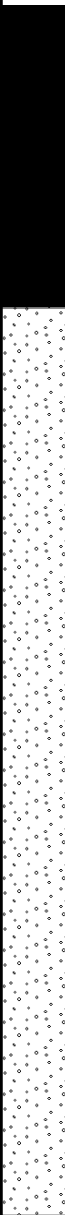
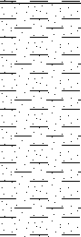
Level:

Scale
1:25

Client: Vistry Southern

Dates: 15/10/2020 -

Logged By
GL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.40	ES		0.40			Grass cover over brown slightly clayey silty fine and medium SAND. Occasional flint gravel. (TOPSOIL)	
		0.50 - 0.60 0.50 - 0.70	ES D					Soft to firm orange and brown sandy CLAY. Sand is fine and medium. (WITTERING FORMATION)	
		1.00 - 1.20 1.20	D	N=9 (1,2/2,2,2,3)	1.00			Firm orangeish brown slightly mottled grey slightly sandy CLAY. Sand is fine and medium. Frequent lignite. (WITTERING FORMATION)	1
		2.00 2.00 - 2.20	D	N=9 (1,2/2,2,2,3) HVR=41	2.00			Firm orangeish brown mottled reddish orange and grey slightly sandy CLAY with frequent lignite and gleyed roots. (WITTERING FORMATION)	2
		2.80 - 3.00 3.00	D	N=14 (2,2/3,3,4,4)	2.80			Firm grey sandy CLAY frequent red and orange staining and frequent lignite. (WITTERING FORMATION) <i>Red Sandy CLAY with frequent lignite slightly gravelly of flint and sandstone</i>	3
		3.80 - 4.00 4.00	D	N=12 (1,1/2,3,3,4)	4.00			End of borehole at 4.00 m	4

Remarks
Cleared by Cable Avoidance Tool. Groundwater encountered at 3.00m bgl.

Borehole Log

Borehole No.

WS110

Sheet 1 of 1

Project Name: Tree Tops Nursery, Fair Oak

Project No.
A11463

Co-ords: -

Hole Type
WLS

Location: Fair Oak

Level:

Scale
1:25

Client: Vistry Southern

Dates: 15/10/2020 -

Logged By
GL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10 - 0.20	ES					Grass cover brown clayey slightly gravelly CLAY. Gravel is Angular to Subrounded medium and coarse flint. Frequent Rootlets.	
		0.40 - 0.50	ES		0.30			(TOPSOIL)	
		0.50 - 0.70	D		0.50			Firm orangeish brown sandy CLAY. Sand is fine and medium.	
								(WITTERING FORMATION)	
		1.00		N=8 (1,2/2,2,2,2)				Firm orange and grey gravelly slightly sandy CLAY. Sand is medium, Gravel is subrounded and rounded medium and coarse flint.	1
								(WITTERING FORMATION)	
		2.00							
		2.00 - 2.20	D	N=13 (2,3/3,3,3,4)	2.00			Firm grey frequently stained red and orange sandy CLAY	2
								(WITTERING FORMATION)	
		3.00							
		3.00 - 3.20	D	N=17 (2,2/3,4,5,5)					3
		3.80 - 4.00	D						
		4.00		N=16 (2,1/2,2,5,7)	4.00				4
								End of borehole at 4.00 m	
									5

Remarks

Cleared by Cable Avoidance Tool. No groundwater encountered.

APPENDIX VI
CHEMICAL ANALYSIS CERTIFICATES

Omnia
3-6 The Quarterdeck
Port Solent
Portsmouth
PO6 4TP



Attention :	Richard Durrant
Date :	6th November, 2020
Your reference :	A11463
Our reference :	Test Report 20/13928 Batch 3
Location :	Former Tree Tops Nursery
Date samples received :	3rd November, 2020
Status :	Final report
Issue :	1

Two samples were received for analysis on 3rd November, 2020 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Phil Sommerton BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Omnia
Reference: A11463
Location: Former Tree Tops Nursery
Contact: Richard Durrant
EMT Job No: 20/13928

Report : Solid

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

EMT Sample No.	45-46	47-48									Please see attached notes for all abbreviations and acronyms		
Sample ID	HP101	HP102											
Depth	0.00-0.20	0.00-0.20											
COC No / misc													
Containers	V J	V J											
Sample Date	29/10/2020	29/10/2020											
Sample Type	Soil	Soil											
Batch Number	3	3											
Date of Receipt	03/11/2020	03/11/2020									LOD/LOR	Units	Method No.
Methyl Tertiary Butyl Ether #	<2	<2									<2	ug/kg	TM15/PM10
Benzene #	<3	<3									<3	ug/kg	TM15/PM10
Toluene #	<3	<3									<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3									<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5									<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3									<3	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	66	89									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	60	73									<0	%	TM15/PM10
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1 ^{SV}	<0.1									<0.1	mg/kg	TM36/PM12
>C6-C8 #	0.1 ^{SV}	<0.1									<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1 ^{SV}	<0.1									<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2									<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	10	<4									<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	29	<7									<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	436	<7									<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	475	<19									<19	mg/kg	TM5/PM8/PM16/PM10
Aromatics													
>C5-EC7 #	<0.1 ^{SV}	<0.1									<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1 ^{SV}	<0.1									<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1 ^{SV}	<0.1									<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2									<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4									<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7									<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	235	<7									<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	235	<19									<19	mg/kg	TM5/PM8/PM16/PM10
Total aliphatics and aromatics(C5-35)	710	<38									<38	mg/kg	TM5/PM8/PM16/PM10
Natural Moisture Content	46.7	34.1									<0.1	%	PM4/PM0

Client Name: Omnia
Reference: A11463
Location: Former Tree Tops Nursery
Contact: Richard Durrant
EMT Job No: 20/13928

VOC Report : Solid

EMT Sample No.	45-46	47-48									Please see attached notes for all abbreviations and acronyms		
Sample ID	HP101	HP102											
Depth	0.00-0.20	0.00-0.20											
COC No / misc													
Containers	V J	V J											
Sample Date	29/10/2020	29/10/2020											
Sample Type	Soil	Soil											
Batch Number	3	3											
Date of Receipt	03/11/2020	03/11/2020									LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2									<2	ug/kg	TM15/PM10
Chloromethane #	18	<3									<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2									<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1									<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2									<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2									<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6									<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<30	<30									<30	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3									<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3									<3	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3									<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4									<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3									<3	ug/kg	TM15/PM10
Chloroform #	<3	<3									<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3									<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3									<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4									<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4									<4	ug/kg	TM15/PM10
Benzene #	<3	<3									<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3									<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6									<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3									<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3									<3	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4									<4	ug/kg	TM15/PM10
Toluene #	<3	<3									<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3									<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3									<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3									<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3									<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3									<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3									<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3									<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<3	<3									<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3									<3	ug/kg	TM15/PM10
m/p-Xylene #	<5	<5									<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3									<3	ug/kg	TM15/PM10
Styrene	<3	<3									<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3									<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3									<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3									<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2									<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4									<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4									<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3									<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3									<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3									<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5									<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6									<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4									<4	ug/kg	TM15/PM10
4-Isopropyltoluene #	<4	<4									<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4									<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4									<4	ug/kg	TM15/PM10
n-Butylbenzene #	<4	<4									<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4									<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #	<4	<4									<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene #	<7	<7									<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4									<4	ug/kg	TM15/PM10
Naphthalene	<27	<27									<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene #	<7	<7									<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	66	89									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	60	73									<0	%	TM15/PM10

Client Name: Omnia
Reference: A11463
Location: Former Tree Tops Nursery
Contact: Richard Durrant

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/13928

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

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

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

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

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

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

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

Measurement Uncertainty

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/13928

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

Omnia
3-6 The Quarterdeck
Port Solent
Portsmouth
PO6 4TP



Attention : Richard Durrant
Date : 28th October, 2020
Your reference : A11463
Our reference : Test Report 20/13928 Batch 1
Location : Former Tree Tops Nursery
Date samples received : 10th October, 2020
Status : Final report
Issue : 1

Ten samples were received for analysis on 10th October, 2020 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Phil Sommerton BSc

Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Omnia
Reference: A11463
Location: Former Tree Tops Nursery
Contact: Richard Durrant
EMT Job No: 20/13928

Report : Solid

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

EMT Sample No.	1-2	5-6	9-10	11-12	15-16	19-20					Please see attached notes for all abbreviations and acronyms		
Sample ID	WS101	WS102	WS103	WS103	WS104	WS105							
Depth	0.10-0.30	0.10-0.30	0.10-0.30	0.30-0.60	0.10-0.30	0.10-0.30							
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J							
Sample Date	06/10/2020	06/10/2020	06/10/2020	06/10/2020	06/10/2020	06/10/2020							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	10/10/2020	10/10/2020	10/10/2020	10/10/2020	10/10/2020	10/10/2020					LOD/LOR	Units	Method No.
Arsenic #	6.1	11.6	11.6	11.0	10.3	6.3					<0.5	mg/kg	TM30/PM15
Barium #	443	91	65	40	67	40					<1	mg/kg	TM30/PM15
Beryllium	5.5	1.0	0.8	1.2	0.7	<0.5					<0.5	mg/kg	TM30/PM15
Cadmium #	<0.1	<0.1	0.2	<0.1	0.3	0.2					<0.1	mg/kg	TM30/PM15
Chromium #	120.4	46.0	52.0	57.2	52.6	40.8					<0.5	mg/kg	TM30/PM15
Copper #	59	17	41	9	21	11					<1	mg/kg	TM30/PM15
Lead #	23	19	49	12	56	24					<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	0.5	<0.1	<0.1	<0.1					<0.1	mg/kg	TM30/PM15
Nickel #	44.7	13.5	12.0	14.0	11.6	8.9					<0.7	mg/kg	TM30/PM15
Selenium #	1	1	1	1	1	<1					<1	mg/kg	TM30/PM15
Vanadium	82	44	42	58	40	34					<1	mg/kg	TM30/PM15
Water Soluble Boron #	1.1	1.1	1.0	0.6	1.0	0.6					<0.1	mg/kg	TM74/PM32
Zinc #	47	62	109	46	128	62					<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04					<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03					<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04					<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.09	<0.03	0.04	<0.03	<0.03	<0.03					<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04					<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.21	0.06	0.11	<0.03	0.07	0.10					<0.03	mg/kg	TM4/PM8
Pyrene #	0.20	0.05	0.09	<0.03	0.05	0.10					<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.18	0.08	0.09	<0.06	<0.06	0.09					<0.06	mg/kg	TM4/PM8
Chrysene #	0.16	0.05	0.07	<0.02	0.04	0.09					<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.34	0.12	0.13	<0.07	<0.07	0.20					<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.20	0.06	0.07	<0.04	<0.04	0.11					<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	0.13	0.05	<0.04	<0.04	<0.04	0.08					<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04					<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.14	<0.04	<0.04	<0.04	<0.04	0.10					<0.04	mg/kg	TM4/PM8
PAH 16 Total	1.7	<0.6	0.6	<0.6	<0.6	0.9					<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.24	0.09	0.09	<0.05	<0.05	0.14					<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.10	0.03	0.04	<0.02	<0.02	0.06					<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	93	96	93	96	95	93					<0	%	TM4/PM8

Element Materials Technology

Client Name: Omnia
Reference: A11463
Location: Former Tree Tops Nursery
Contact: Richard Durrant
EMT Job No: 20/13928

Report : Solid

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

EMT Sample No.	1-2	5-6	9-10	11-12	15-16	19-20					Please see attached notes for all abbreviations and acronyms		
Sample ID	WS101	WS102	WS103	WS103	WS104	WS105							
Depth	0.10-0.30	0.10-0.30	0.10-0.30	0.30-0.60	0.10-0.30	0.10-0.30							
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J							
Sample Date	06/10/2020	06/10/2020	06/10/2020	06/10/2020	06/10/2020	06/10/2020							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	10/10/2020	10/10/2020	10/10/2020	10/10/2020	10/10/2020	10/10/2020					LOD/LOR	Units	Method No.
Pesticides													
Organochlorine Pesticides													
Aldrin	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Alpha-HCH (BHC)	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Beta-HCH (BHC)	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Delta-HCH (BHC)	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Dieldrin	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Endosulphan I	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Endosulphan II	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Endosulphan sulphate	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Endrin	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Gamma-HCH (BHC)	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Heptachlor	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Heptachlor Epoxide	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
p,p'-DDE	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
p,p'-DDT	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
p,p'-TDE	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Total Methoxychlor	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Organophosphorus Pesticides													
Azinphos methyl	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Diazinon	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Dichlorvos	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Disulfoton	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Ethion	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Ethyl Parathion (Parathion)	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Fenitrothion	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Malathion	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Methyl Parathion	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8
Mevinphos	-	<10	-	-	-	-					<10	ug/kg	TM42/PM8

Element Materials Technology

Client Name: Omnia
Reference: A11463
Location: Former Tree Tops Nursery
Contact: Richard Durrant
EMT Job No: 20/13928

Report : Solid

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

EMT Sample No.	1-2	5-6	9-10	11-12	15-16	19-20					Please see attached notes for all abbreviations and acronyms		
Sample ID	WS101	WS102	WS103	WS103	WS104	WS105							
Depth	0.10-0.30	0.10-0.30	0.10-0.30	0.30-0.60	0.10-0.30	0.10-0.30							
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J							
Sample Date	06/10/2020	06/10/2020	06/10/2020	06/10/2020	06/10/2020	06/10/2020							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	10/10/2020	10/10/2020	10/10/2020	10/10/2020	10/10/2020	10/10/2020					LOD/LOR	Units	Method No.
Acid Herbicides													
2,3,6 - TBA	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
2,4 - D	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
2,4 - DB	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
2,4,5 - T	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
4 - CPA	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Benazolin	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Bentazone	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Bromoxynil	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Clopyralid	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Dicamba	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Dichloroprop	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Diclofop	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Fenoprop	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Flamprop	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Flamprop – isopropyl	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Ioxynil	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
MCPA	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
MCPB	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Mecoprop	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Pentachlorophenol	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Picloram	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
Triclopyr	-	<0.1	-	-	-	-					<0.1	mg/kg	TM42/PM8
EPH >C8-C10 #	<5	<5	<5	<5	<5	<5					<5	mg/kg	TM5/PM8
EPH >C10-C12 #	<10	<10	<10	<10	<10	<10					<10	mg/kg	TM5/PM8
EPH >C12-C16 #	<10	<10	<10	<10	<10	<10					<10	mg/kg	TM5/PM8
EPH >C16-C21 #	<10	<10	<10	<10	<10	<10					<10	mg/kg	TM5/PM8
EPH >C21-C40	75	<10	23	<10	81	127					<10	mg/kg	TM5/PM8
EPH >C8-C40	75	<30	<30	<30	81	127					<30	mg/kg	TM5/PM8
GRO (>C4-C6)	<100	<100	<100	<100	<100	<100					<100	ug/kg	TM36/PM12
GRO (>C6-C8) #	<100	<100	<100	<100	<100	<100					<100	ug/kg	TM36/PM12
GRO (>C4-C8)	<100	<100	<100	<100	<100	<100					<100	ug/kg	TM36/PM12
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15					<0.15	mg/kg	TM26/PM21
Natural Moisture Content	25.3	29.8	34.8	30.4	36.5	25.3					<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0354	0.0162	0.0918	0.0134	0.0024	0.0214					<0.0015	g/l	TM38/PM20
Chromium III	120.4	46.0	52.0	57.2	52.6	40.8					<0.5	mg/kg	NONE/NONE
Total Cyanide #	0.8	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5	mg/kg	TM89/PM45

Client Name: Omnia
Reference: A11463
Location: Former Tree Tops Nursery
Contact: Richard Durrant
EMT Job No: 20/13928

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

Please see attached notes for all abbreviations and acronyms

Client Name: Omnia
Reference: A11463
Location: Former Tree Tops Nursery
Contact: Richard Durrant

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

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

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/13928	1	WS101	0.10-0.30	2	24/10/2020	General Description (Bulk Analysis)	soil.stones
					24/10/2020	Asbestos Fibres	NAD
					24/10/2020	Asbestos ACM	NAD
					24/10/2020	Asbestos Type	NAD
					24/10/2020	Asbestos Level Screen	NAD
20/13928	1	WS102	0.10-0.30	6	24/10/2020	General Description (Bulk Analysis)	soil.stones
					24/10/2020	Asbestos Fibres	NAD
					24/10/2020	Asbestos ACM	NAD
					24/10/2020	Asbestos Type	NAD
					24/10/2020	Asbestos Level Screen	NAD
20/13928	1	WS103	0.10-0.30	10	24/10/2020	General Description (Bulk Analysis)	soil.stones
					24/10/2020	Asbestos Fibres	NAD
					24/10/2020	Asbestos ACM	NAD
					24/10/2020	Asbestos Type	NAD
					24/10/2020	Asbestos Level Screen	NAD
20/13928	1	WS103	0.30-0.60	12	26/10/2020	General Description (Bulk Analysis)	soil.stones
					26/10/2020	Asbestos Fibres	NAD
					26/10/2020	Asbestos ACM	NAD
					26/10/2020	Asbestos Type	NAD
					26/10/2020	Asbestos Level Screen	NAD
20/13928	1	WS104	0.10-0.30	16	26/10/2020	General Description (Bulk Analysis)	soil.stones
					26/10/2020	Asbestos Fibres	NAD
					26/10/2020	Asbestos ACM	NAD
					26/10/2020	Asbestos Type	NAD
					26/10/2020	Asbestos Level Screen	NAD
20/13928	1	WS105	0.10-0.30	20	26/10/2020	General Description (Bulk Analysis)	soil.stones
					26/10/2020	Asbestos Fibres	NAD
					26/10/2020	Asbestos ACM	NAD
					26/10/2020	Asbestos Type	NAD
					26/10/2020	Asbestos Level Screen	NAD

Client Name: Omnia
Reference: A11463
Location: Former Tree Tops Nursery
Contact: Richard Durrant

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/13928

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

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

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

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

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

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

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

Measurement Uncertainty

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/13928

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC-FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

EMT Job No: 20/13928

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM42	Modified US EPA method 8270D v5:2014. Pesticides and herbicides by GC-MS	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes

APPENDIX VII
ORIGIN OF GAC VALUES

Determinant	Unit	GAC	Exposure Pathway	Origin of Risk Assessment Value
Metals				
Arsenic	mg/kg	37	1	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Arsenic
Beryllium	mg/kg	1.7	1	LQM CIEH Suitable for Use Levels (S4UL) 2015
Boron	mg/kg	290	1	
Cadmium	mg/kg	11	2	
Chromium (III)	mg/kg	910	1	
Chromium (VI)	mg/kg	6	2	
Copper	mg/kg	2,400	2	
Lead	mg/kg	200	1	Category 4 Screening Level (C4SL) utilising exposure parameters from CLEA SR3 report.
Mercury	mg/kg	40	1	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Mercury
Nickel	mg/kg	180	1,2	LQM CIEH Suitable for Use Levels (S4UL) 2015
Selenium	mg/kg	250	1,2	
Vanadium	mg/kg	410	2	
Zinc	mg/kg	3,700	2	
General Inorganics				
Total Cyanide*	mg/kg	50	1	Dutch Intervention Values 2010
Asbestos	%	0.001%	6	OEC Derived Value based on ICRL
General Organics				
Phenol	mg/kg	280	2	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM
PAHs				
Naphthalene	mg/kg	2.3	2	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Acenaphthylene	mg/kg	170	2	
Acenaphthene	mg/kg	210	2	
Fluorene	mg/kg	170	2	
Phenanthrene	mg/kg	95	2	
Anthracene	mg/kg	2,400	2	
Fluoranthene	mg/kg	280	1,2	
Pyrene	mg/kg	620	1,2	
Benzo(a)Anthracene ^l	mg/kg	7.2	1	
Chrysene	mg/kg	15	1	
Benzo(b)Fluoranthene	mg/kg	2.6	1	
Benzo(k)Fluoranthene	mg/kg	77	1	
Benzo(a)Pyrene	mg/kg	2.2	1	
Indeno(123-cd)Pyrene	mg/kg	27	1	
Dibenzo(a,h)Anthracene	mg/kg	0.24	1	

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Determinant	Unit	GAC	Exposure Pathway	Origin of Risk Assessment Value
Benzo(ghi)Perylene	mg/kg	320	1	
BTEX & MTBE				
Benzene	mg/kg	0.087	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM
Toluene	mg/kg	130	2,4	
Ethylbenzene	mg/kg	47	2,4	
Xylenes	mg/kg	56	2,4	LQM CIEH Suitable for Use Levels (S4UL) 2015 1% SOM o-Xylene
MTBE	mg/kg	49	4	Soil Generic Assessment Criteria for Human Health Risk Assessment (2010)
TPH-CWG				
Aliphatic				
Aliphatic EC 5-6	mg/kg	42	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Aliphatic EC >6-8	mg/kg	100	4	
Aliphatic EC >8-10	mg/kg	27	4	
Aliphatic EC >10-12	mg/kg	130 ^(vap)	4	
Aliphatic EC > 12-16	mg/kg	1,100 ^(sol)	4	
Aliphatic EC > 16-35	mg/kg	65,000 ^(sol)	1	
Aliphatic EC >35-44	mg/kg	65,000 ^(sol)	1	
Aromatic				
Aromatic EC 5-7	mg/kg	70	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Aromatic EC>7-8	mg/kg	130	4	
Aromatic EC> 8-10	mg/kg	34	4	
Aromatic EC> 10-12	mg/kg	74	2	
Aromatic EC> 12-16	mg/kg	140	2	
Aromatic EC> 16-21	mg/kg	260	2	
Aromatic EC> 21-35	mg/kg	1,100	1	
Aromatic EC> 35-44	mg/kg	1,100	1	
Banded TPH				
TPH EC 5-6**	mg/kg	42	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM, utilising the most conservative of the Ali/Aro chain lengths.
TPH EC >6-8**	mg/kg	100	4	
TPH EC >8-10**	mg/kg	27	4	
TPH EC> 10-12**	mg/kg	74	2	
TPH EC> 12-16**	mg/kg	140	2	
TPH EC> 16-21**	mg/kg	260	1	
TPH EC> 21-35**	mg/kg	1,100	1	

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	DOC REF	DOCUMENT NAME
	TECH11101	Residential End Use with Homegrown Produce

Determinant	Unit	GAC	Exposure Pathway	Origin of Risk Assessment Value
TPH EC> 35-44**	mg/kg	1,100	1	

Notes

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance.

Main Exposure Pathways: 1 = Ingestion of Soil & Indoor Dust, 2 = Consumption of Homegrown Produce & Attached Soil; 3 = Dermal Contact (Indoor & Outdoor); 4 = Inhalation of Vapour (Indoor & Outdoor); 5 = Inhalation of Dust (Indoor & Outdoor), 6 = Inhalation of Fibres

* Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide.

** The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. OEC has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.

(sol) – GAC presented exceeds the solubility saturation limit.

(vap) – GAC presented exceeds the vapour saturation limit.

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APPENDIX VIII
GEOTECHNICAL ANALYSIS CERTIFICATES



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

Client: OMNIA Environmental Consulting

Client Reference: A11463

Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Job Number: 20-36302

Date Sampled: 13/10/2020

Date Received: 19/10/2020

Date Tested: 23/10/2020

Sampled By: Client - RD/GR

Contact: Richard Durrant

Site Address: Former Tree Tops Nursery, Fair Oak

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1655123

Hole No.: TP101

Sample Reference: Not Given

Soil Description: Brown sandy very clayey SILT

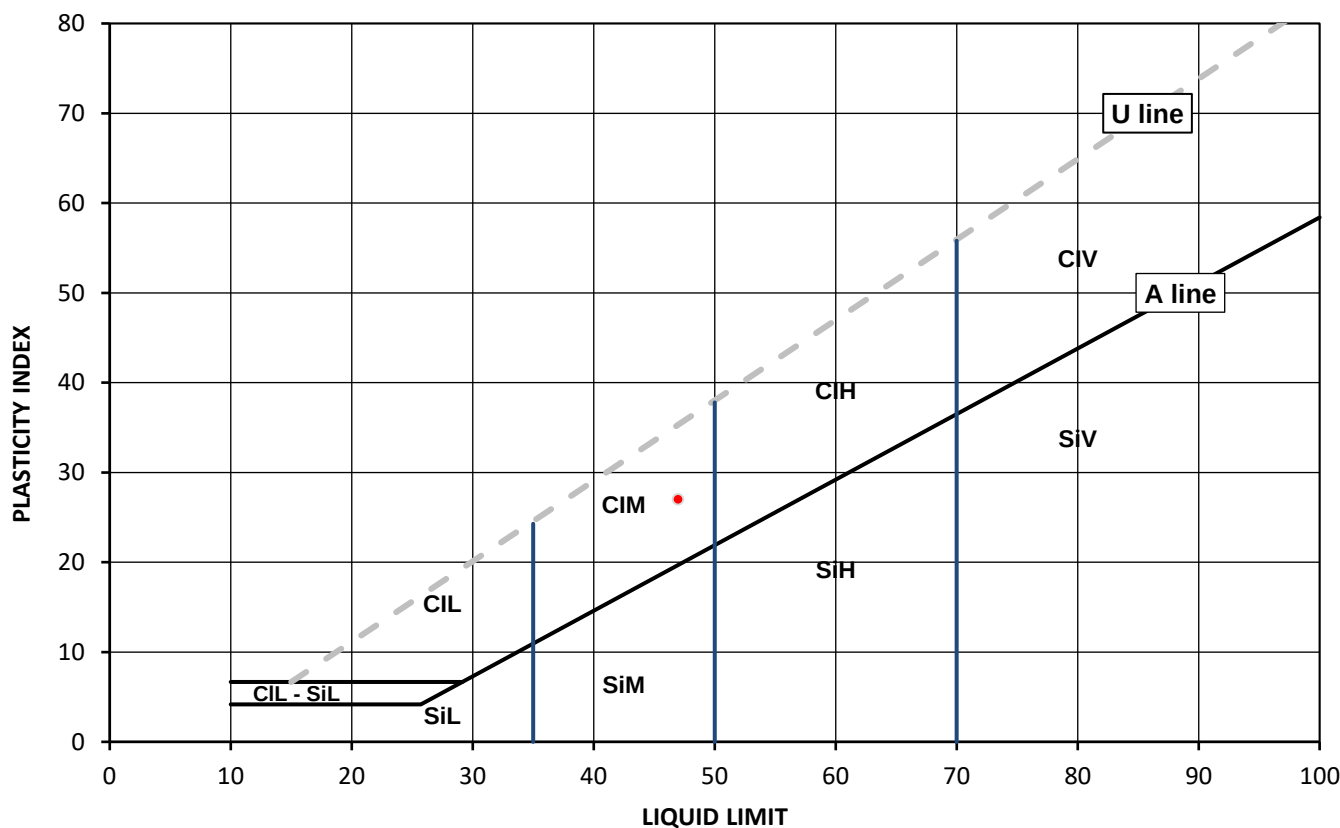
Depth Top [m]: 1.00

Depth Base [m]: 1.50

Sample Type: B

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
22	47	20	27	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Date Reported: 02/11/2020

GF 236.10



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

Client: OMNIA Environmental Consulting

Client Reference: A11463

Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Job Number: 20-36302

Date Sampled: 13/10/2020

Date Received: 19/10/2020

Date Tested: 23/10/2020

Sampled By: Client - RD/GR

Contact: Richard Durrant

Site Address: Former Tree Tops Nursery, Fair Oak

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1655124

Hole No.: TP103

Sample Reference: Not Given

Soil Description: Brownish grey slightly gravelly very sandy very clayey SILT

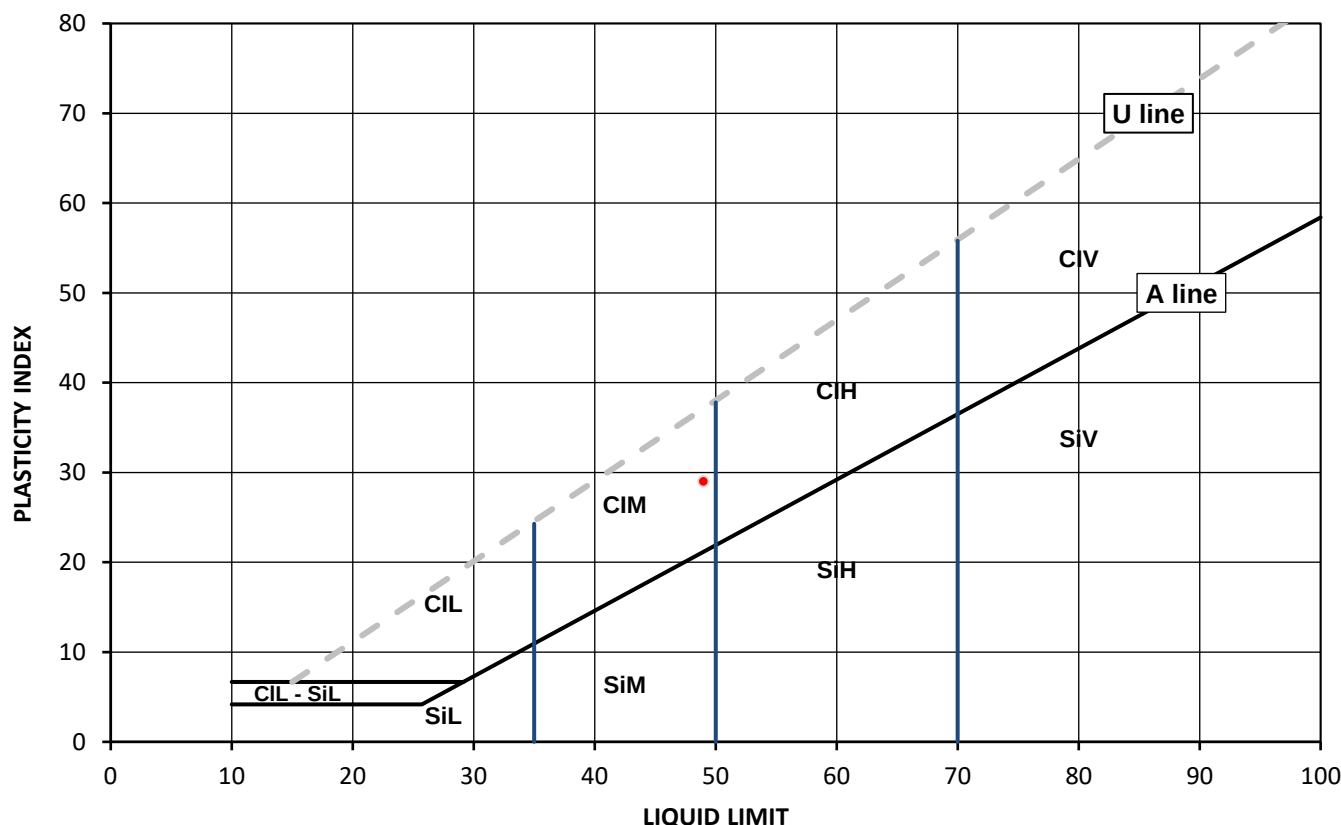
Depth Top [m]: 2.60

Depth Base [m]: 2.80

Sample Type: B

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	49	20	29	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Cl	Clay	Plasticity	Liquid Limit
Si	Silt	L Low	below 35
		M Medium	35 to 50
		H High	50 to 70
		V Very high	exceeding 70
		O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Date Reported: 02/11/2020

GF 236.10



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

Client: OMNIA Environmental Consulting
Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Client Reference: A11463
Job Number: 20-36302
Date Sampled: 13/10/2020
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Sampled By: Client - RD/GR

Contact: Richard Durrant
Site Address: Former Tree Tops Nursery, Fair Oak

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

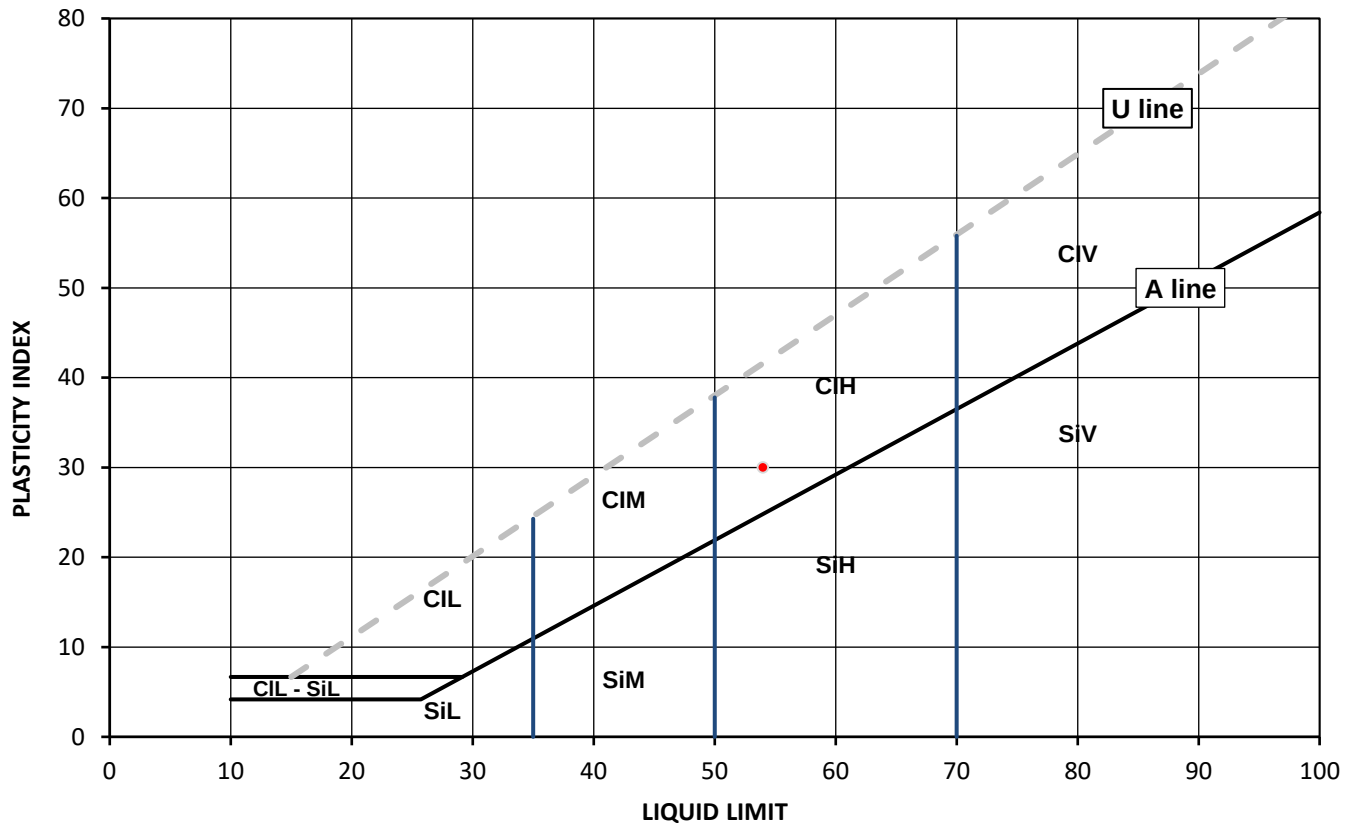
Test Results:

Laboratory Reference: 1655125
Hole No.: TP104
Sample Reference: Not Given
Soil Description: Brownish grey slightly sandy CLAY

Depth Top [m]: 2.00
Depth Base [m]: 2.50
Sample Type: B

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
28	54	24	30	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

Client: OMNIA Environmental Consulting

Client Reference: A11463

Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Job Number: 20-36302

Date Sampled: 13/10/2020

Date Received: 19/10/2020

Date Tested: 23/10/2020

Sampled By: Client - RD/GR

Contact: Richard Durrant

Site Address: Former Tree Tops Nursery, Fair Oak

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1655126

Hole No.: TP102

Sample Reference: Not Given

Soil Description: Brown slightly sandy CLAY

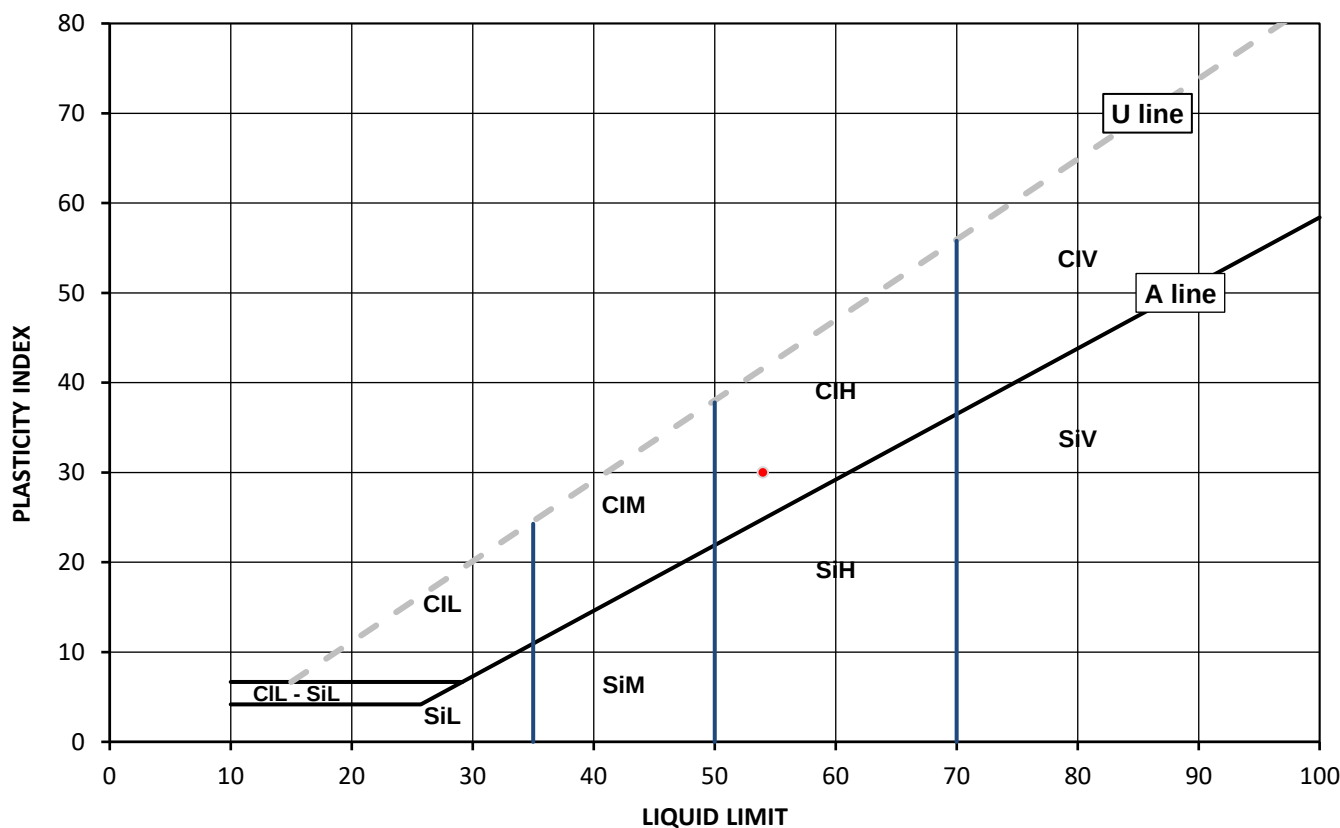
Depth Top [m]: 0.50

Depth Base [m]: 1.00

Sample Type: B

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
26	54	24	30	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Page 1 of 1

Date Reported: 02/11/2020

GF 236.10



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

Client: OMNIA Environmental Consulting
Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Client Reference: A11463
Job Number: 20-36302
Date Sampled: 13/10/2020
Date Received: 19/10/2020
Date Tested: 23/10/2020
Sampled By: Client - RD/GR

Contact: Richard Durrant
Site Address: Former Tree Tops Nursery, Fair Oak

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

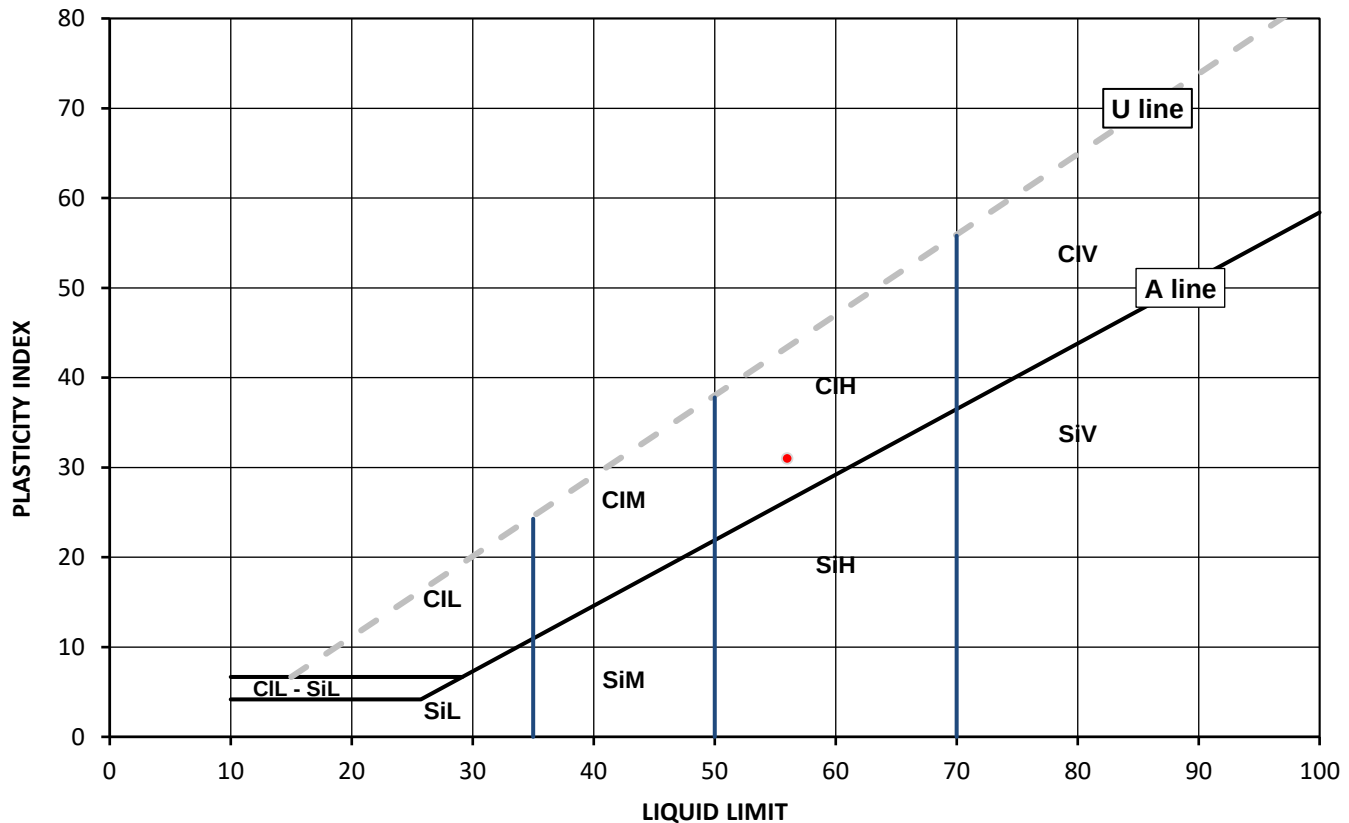
Test Results:

Laboratory Reference: 1655127
Hole No.: WS106
Sample Reference: Not Given
Soil Description: Brown slightly sandy CLAY

Depth Top [m]: 2.80
Depth Base [m]: 3.00
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
29	56	25	31	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Cl	Clay	Plasticity	Liquid Limit
Si	Silt	L	below 35
		M	35 to 50
		H	50 to 70
		V	exceeding 70
		O	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Tested in Accordance with:

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

Client Reference: A11463
Job Number: 20-36302
Date Sampled: 13/10/2020
Date Received: 19/10/2020
Date Tested: 23/10/2020
Sampled By: Client - RD/GR

Client: OMNIA Environmental Consulting
Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

Contact: Richard Durrant
Site Address: Former Tree Tops Nursery, Fair Oak

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W]	Water Content [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m															
1655123	TP101	Not Given	1.00	1.50	B	Brown sandy very clayey SILT	Atterberg 4 Point	22		100	47	20	27						
1655126	TP102	Not Given	0.50	1.00	B	Brown slightly sandy CLAY	Atterberg 4 Point	26		100	54	24	30						
1655124	TP103	Not Given	2.60	2.80	B	Brownish grey slightly gravelly very sandy very clayey SILT	Atterberg 4 Point	17		100	49	20	29						
1655125	TP104	Not Given	2.00	2.50	B	Brownish grey slightly sandy CLAY	Atterberg 4 Point	28		100	54	24	30						
1655127	WS106	Not Given	2.80	3.00	D	Brown slightly sandy CLAY	Atterberg 4 Point	29		100	56	25	31						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with: BS 1377-2: 1990

Client: OMNIA Environmental Consulting
Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

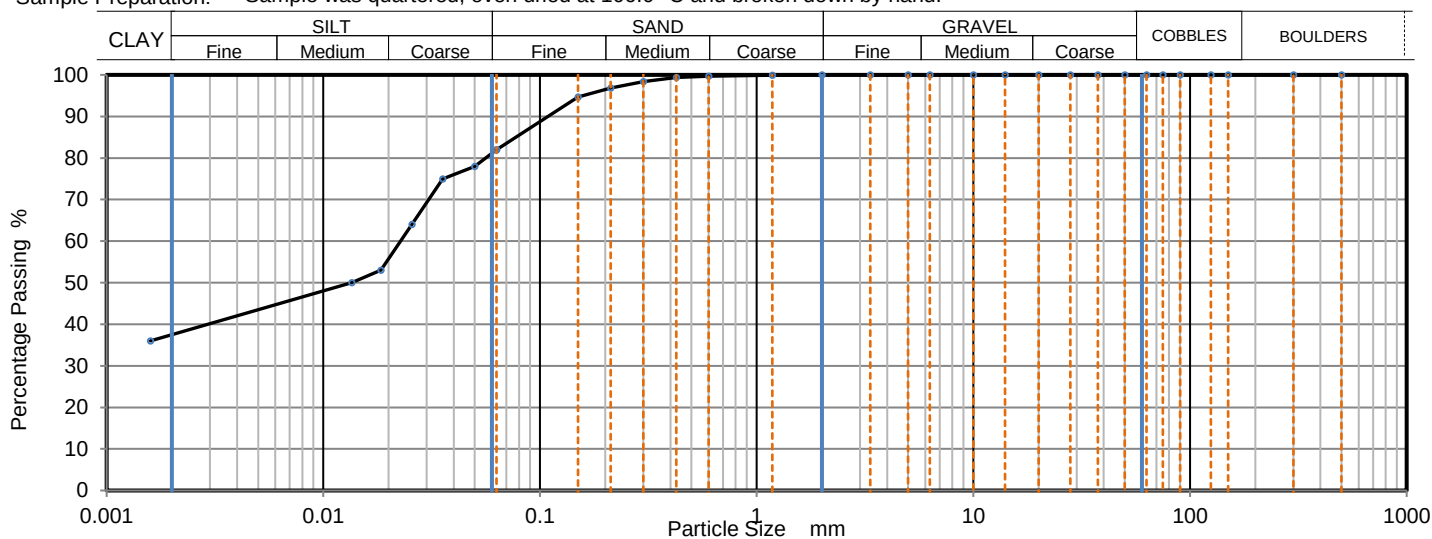
Client Reference: A11463
Job Number: 20-36302
Date Sampled: 13/10/2020
Date Received: 19/10/2020
Date Tested: 23/10/2020
Sampled By: Client - RD/GR

Contact: Richard Durrant
Site Address: Former Tree Tops Nursery, Fair Oak
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1655123
Hole No.: TP101
Sample Reference: Not Given
Sample Description: Brown sandy very clayey SILT
Sample Preparation: Sample was quartered, oven dried at 106.0 °C and broken down by hand.

Depth Top [m]: 1.00
Depth Base [m]: 1.50
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0630	82
300	100	0.0500	78
150	100	0.0356	75
125	100	0.0256	64
90	100	0.0184	53
75	100	0.0135	50
63	100	0.0106	36
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100	Particle density (assumed) 2.65 Mg/m ³	
2	100		
1.18	100		
0.6	100		
0.425	99		
0.3	98		
0.212	97		
0.15	95		
0.063	82		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	18.30
Silt	44.70
Clay	37.00

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 14.19
Curvature Coefficient	

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

Signed:

Szczepan Bielatowicz

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with: BS 1377-2: 1990

Client: OMNIA Environmental Consulting
Client Address: 3-6 The Quarterdeck, Port Solent,
Portsmouth, PO6 4TP

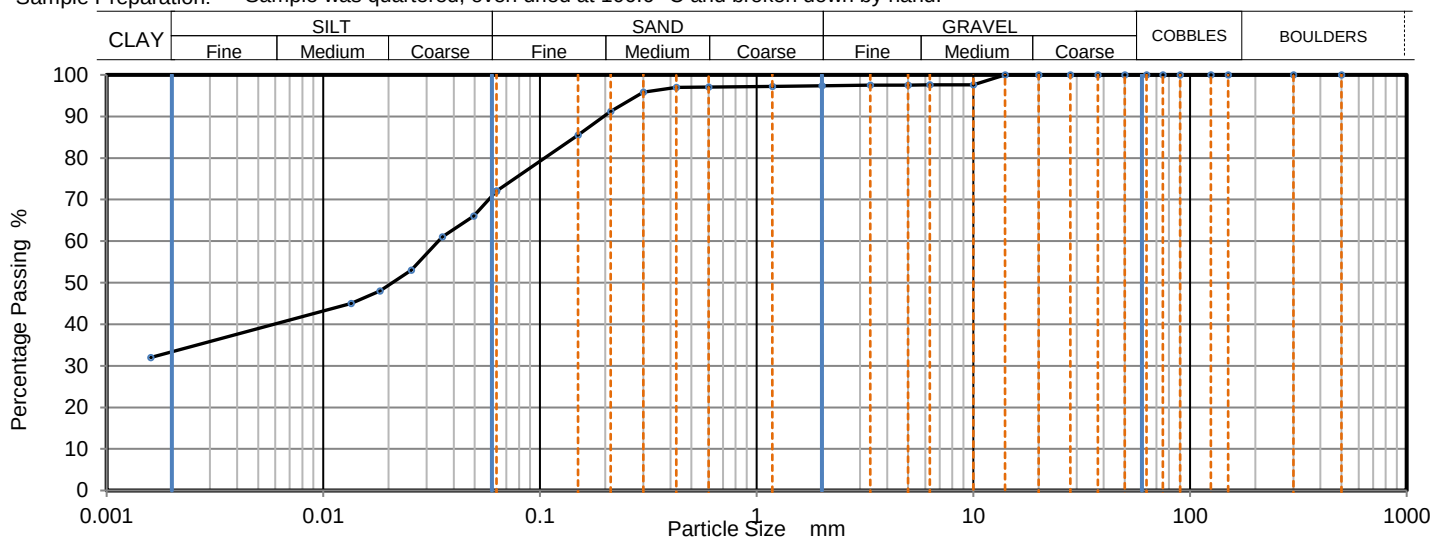
Client Reference: A11463
Job Number: 20-36302
Date Sampled: 13/10/2020
Date Received: 19/10/2020
Date Tested: 23/10/2020
Sampled By: Client - RD/GR

Contact: Richard Durrant
Site Address: Former Tree Tops Nursery, Fair Oak
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1655124
Hole No.: TP103
Sample Reference: Not Given
Sample Description: Brownish grey slightly gravelly very sandy very clayey SILT
Sample Preparation: Sample was quartered, oven dried at 106.6 °C and broken down by hand.

Depth Top [m]: 2.60
Depth Base [m]: 2.80
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0630	72
300	100	0.0494	66
150	100	0.0354	61
125	100	0.0255	53
90	100	0.0183	48
75	100	0.0134	45
63	100	0.0016	32
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	98		
6.3	98		
5	98		
3.35	98	Particle density (assumed) 2.65 Mg/m3	
2	97		
1.18	97		
0.6	97		
0.425	97		
0.3	96		
0.212	91		
0.15	86		
0.063	72		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	2.60
Sand	25.50
Silt	38.60
Clay	33.30

Grading Analysis	
D100	mm 14
D60	mm 0.0337
D30	mm
D10	mm
Uniformity Coefficient	> 21.06
Curvature Coefficient	

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

Signed:

Szczepan Bielatowicz

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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4041



Environmental Science

Richard Durrant

Omnia Environmental Consulting
3-6 The Quarterdeck
Port Solent
Portsmouth
PO6 4TP

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

e: richard.durrant@omnia-consulting.co.uk

Analytical Report Number : 20-36307

Project / Site name:	Former Tree Tops Nursery, Fair Oak	Samples received on:	19/10/2020
Your job number:	A11463	Samples instructed on/ Analysis started on:	19/10/2020
Your order number:		Analysis completed by:	29/10/2020
Report Issue Number:	1	Report issued on:	29/10/2020
Samples Analysed:	5 soil samples		

Signed:

Will Fardon
Technical Reviewer (CS Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



Analytical Report Number: 20-36307

Project / Site name: Former Tree Tops Nursery, Fair Oak

Lab Sample Number				1655144	1655145	1655146	1655147
Sample Reference				TP101	TP103	TP104	TP102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00-1.50	2.60-2.80	2.00-2.50	0.50-1.00
Date Sampled				13/10/2020	13/10/2020	13/10/2020	13/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	18	16	22	17
Total mass of sample received	kg	0.001	NONE	0.7	0.7	0.7	0.7

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.2	6.7	5.5	6.3
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	8.4	8.4	28	12
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0042	0.0042	0.014	0.0058
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	4.2	4.2	14.2	5.8

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 20-36307

Project / Site name: Former Tree Tops Nursery, Fair Oak

Lab Sample Number				1655148
Sample Reference				WS106
Sample Number				None Supplied
Depth (m)				2.80-3.00
Date Sampled				13/10/2020
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	N/A	NONE	19
Total mass of sample received	kg	0.001	NONE	0.7

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.6
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	31
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.016
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	15.5

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 20-36307

Project / Site name: Former Tree Tops Nursery, Fair Oak

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1655144	TP101	None Supplied	1.00-1.50	Light brown sandy clay.
1655145	TP103	None Supplied	2.60-2.80	Light brown sandy clay.
1655146	TP104	None Supplied	2.00-2.50	Light brown sandy clay.
1655147	TP102	None Supplied	0.50-1.00	Light brown sandy clay.
1655148	WS106	None Supplied	2.80-3.00	Light brown sandy clay.



Analytical Report Number : 20-36307

Project / Site name: Former Tree Tops Nursery, Fair Oak

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

APPENDIX IX

SOAKAWAY TESTING CERTIFICATES

Site Name:	Treetops Nursery
Site Reference:	A11463
Test Date:	13/10/2020



Trial Pit Identification:	TP102
Trial Pit Length (m):	2.20
Trial Pit Width (m):	0.65
Trial Pit Depth (m):	2.30
Groundwater Level (m bgl):	2.20

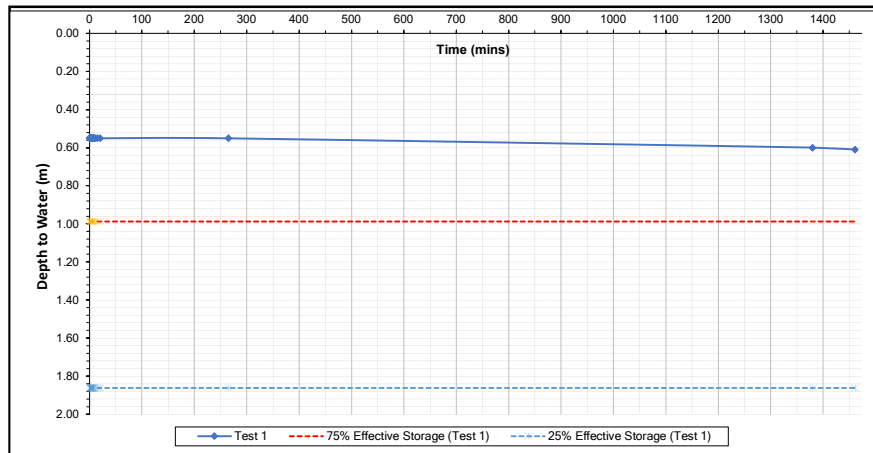
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
GL-0.50m bgl: Topsoil, 0.50-2.30m bgl: Firm sandy CLAY (Wittering Formation)

Test Parameters	TEST 1	
Effective Storage Depth (m):	Time (min)	Depth (m)
1.75	0.00	0.55
	0.25	0.55
75% Effective Storage Depth (m):	0.50	0.55
	0.75	0.55
1.31	1.00	0.55
(i.e. Depth Below Ground Level) (m):	1.50	0.55
	2.00	0.55
0.99	2.50	0.55
25% Effective Storage Depth (m):	3.00	0.55
	3.50	0.55
0.44	4.00	0.55
(i.e. Depth Below Ground Level) (m):	4.50	0.55
	5.00	0.55
1.86	6.00	0.55
Effective Storage Depth Across 75% - 25% (m):	7.00	0.55
	8.00	0.55
0.88	9.00	0.55
Time to Fall to 75% Effective Depth (min):	10.00	0.55
	15.00	0.55
N/A	20.00	0.55
Time to Fall to 25% Effective Depth (min):	265.00	0.55
	1380.00	0.60
N/A	1461.00	0.61
Vp75%-25% (m3):		
1.25		
As50% (m2):		
6.42		
Tp75%-25% (mins):		
N/A		

DESIGN SOIL INFILTRATION RATE, f (m/s):	N/A
---	-----

Comments:
NOTE: During a duration of 24hours the required 25% effective intercept failed to be reached. Therefore the test is considered not to have been unsuccessful.



Site Engineer:	Date:
G.Larcombe	13/10/2020

Checked and Approved By:	Date:
A.King	11/11/2020

Location
TP102

Site Name:	Treetops Nursery
Site Reference:	A11463
Test Date:	13/10/2020



Trial Pit Identification:	TP102
Trial Pit Length (m):	2.40
Trial Pit Width (m):	0.60
Trial Pit Depth (m):	2.80
Groundwater Level (m bgl):	

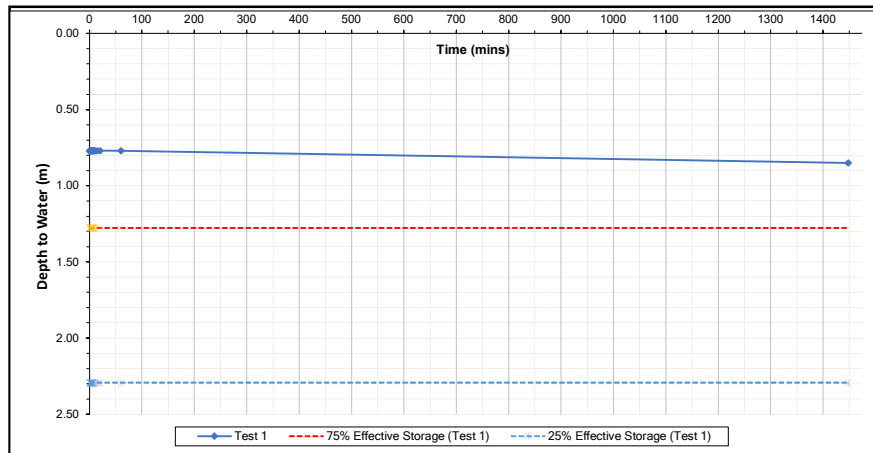
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
GL-0.50m bgl: Topsoil, 0.50-2.60m bgl: Firm sandy CLAY (Wittering Formation), 2.60-2.80m bgl: Firm to stiff slightly gravelly CLAY (Wittering Formation)

Test Parameters	TEST 1	
Effective Storage Depth (m):	Time (min)	Depth (m)
2.03	0.00	0.77
	0.25	0.77
75% Effective Storage Depth (m):	0.50	0.77
	0.75	0.77
1.52	1.00	0.77
(i.e. Depth Below Ground Level) (m):	1.50	0.77
	2.00	0.77
1.28	2.50	0.77
25% Effective Storage Depth (m):	3.00	0.77
	3.50	0.77
0.51	4.00	0.77
(i.e. Depth Below Ground Level) (m):	4.50	0.77
	5.00	0.77
2.29	6.00	0.77
Effective Storage Depth Across 75% - 25% (m):	7.00	0.77
	8.00	0.77
1.02	9.00	0.77
Time to Fall to 75% Effective Depth (min):	10.00	0.77
	15.00	0.77
N/A	20.00	0.77
Time to Fall to 25% Effective Depth (min):	60.00	0.77
	1448.00	0.85
N/A		
Vp75%-25% (m3):		
1.46		
As50% (m2):		
7.53		
Tp75%-25% (mins):		
N/A		

DESIGN SOIL INFILTRATION RATE, f (m/s):	N/A
---	-----

Comments:
NOTE: During a duration of 24hours the required 25% effective intercept failed to be reached. Therefore the test is considered not to have been unsuccessful.



Site Engineer:	Date:
G.Larcombe	13/10/2020

Checked and Approved By:	Date:
A.King	11/11/2020

Location
TP102

Site Name:	Treetops Nursery
Site Reference:	A11463
Test Date:	13/10/2020



Trial Pit Identification:	TP101
Trial Pit Length (m):	2.50
Trial Pit Width (m):	0.60
Trial Pit Depth (m):	1.90
Groundwater Level (m bgl):	

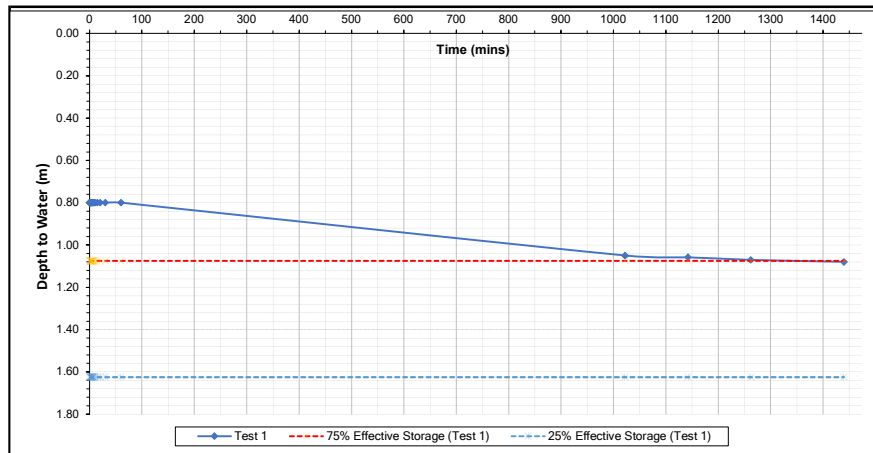
SOIL INFILTRATION RATE TEST
See BRE DG365, Soakaway Design (2016).

Geology Description:
GL-0.50m bgl: Topsoil, 0.50-1.90m bgl: Firm sandy CLAY (Wittering Formation)

Test Parameters	TEST 1	
Effective Storage Depth (m):	Time (min)	Depth (m)
1.10	0.00	0.80
	0.25	0.80
75% Effective Storage Depth (m):	0.50	0.80
	0.75	0.80
0.83	1.00	0.80
(i.e. Depth Below Ground Level) (m):	1.50	0.80
	2.00	0.80
1.08	2.50	0.80
25% Effective Storage Depth (m):	3.00	0.80
	3.50	0.80
0.28	4.00	0.80
(i.e. Depth Below Ground Level) (m):	4.50	0.80
	5.00	0.80
1.63	6.00	0.80
Effective Storage Depth Across 75% - 25% (m):	7.00	0.80
	8.00	0.80
0.55	9.00	0.80
Time to Fall to 75% Effective Depth (min):	10.00	0.80
	15.00	0.80
1262	20.00	0.80
Time to Fall to 25% Effective Depth (min):	30.00	0.80
	60.00	0.80
N/A	1022.00	1.05
Vp75%-25% (m3):	1142.00	1.06
	1262.00	1.07
	1440.00	1.08
As50% (m2):		
4.91		
Tp75%-25% (mins):		
N/A		

DESIGN SOIL INFILTRATION RATE, f (m/s):	N/A
---	-----

Comments:
NOTE: During a duration of 24hours the required 25% effective intercept failed to be reached. Therefore the test is considered not to have been unsuccessful.



Site Engineer:	Date:
G.Larcombe	13/10/2020

Checked and Approved By:	Date:
A.King	11/11/2020

Location
TP101

APPENDIX X
HISTORIC MAPS

Site Details:

ALLINGTON NURSERY,
ALLINGTON NURSERY,
ALLINGTON LANE, FAIR OAK,
SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: County Series

Map date: 1869

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1869
Revised 1869
Edition N/A
Copyright N/A
Levelled N/A

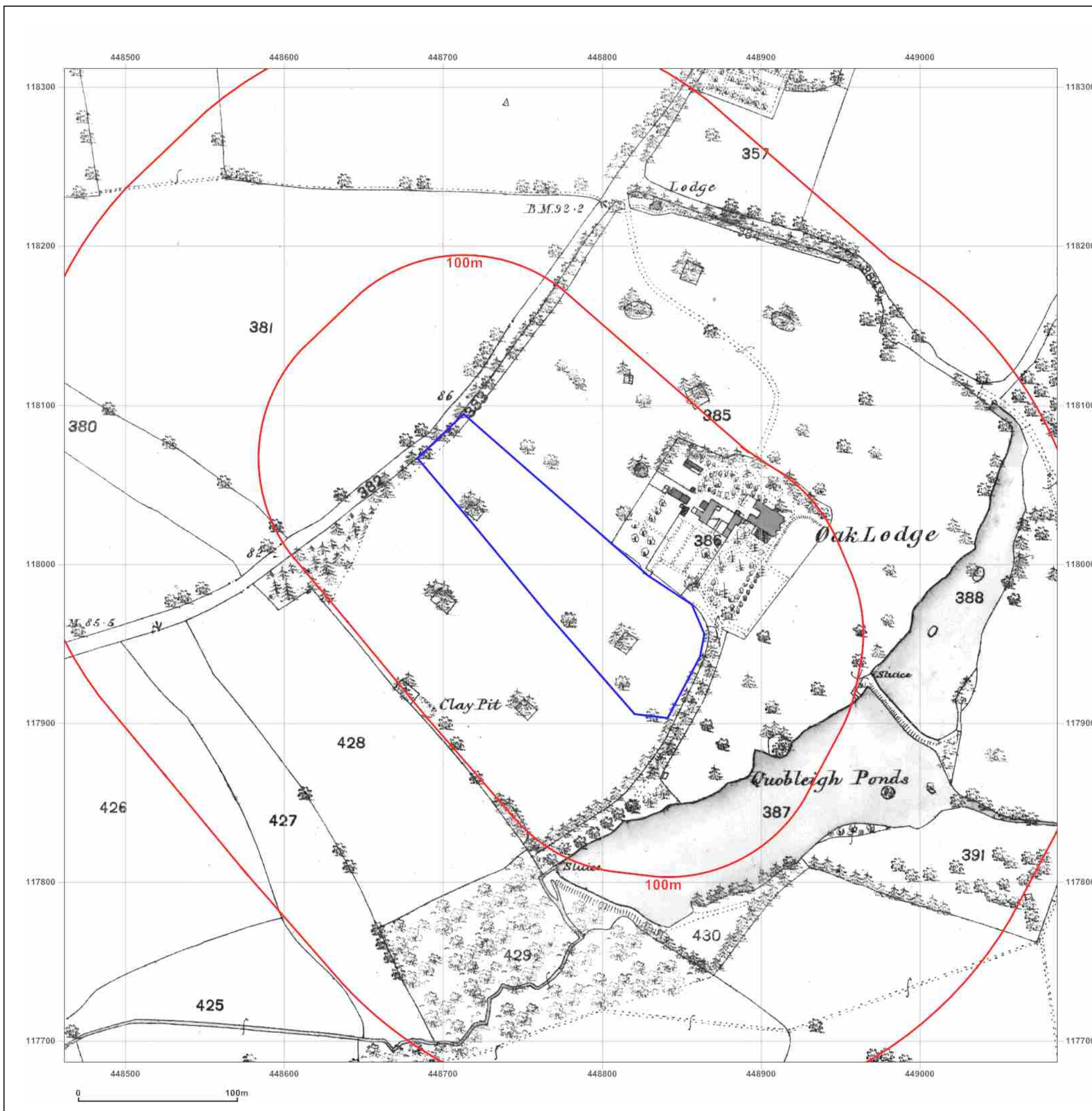


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Production date: 06 November 2020

Map legend available at:
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Site Details:

ALLINGTON NURSERY,
ALLINGTON NURSERY,
ALLINGTON LANE, FAIR OAK,
SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: County Series

Map date: 1869

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1869
Revised 1869
Edition N/A
Copyright N/A
Levelled N/A

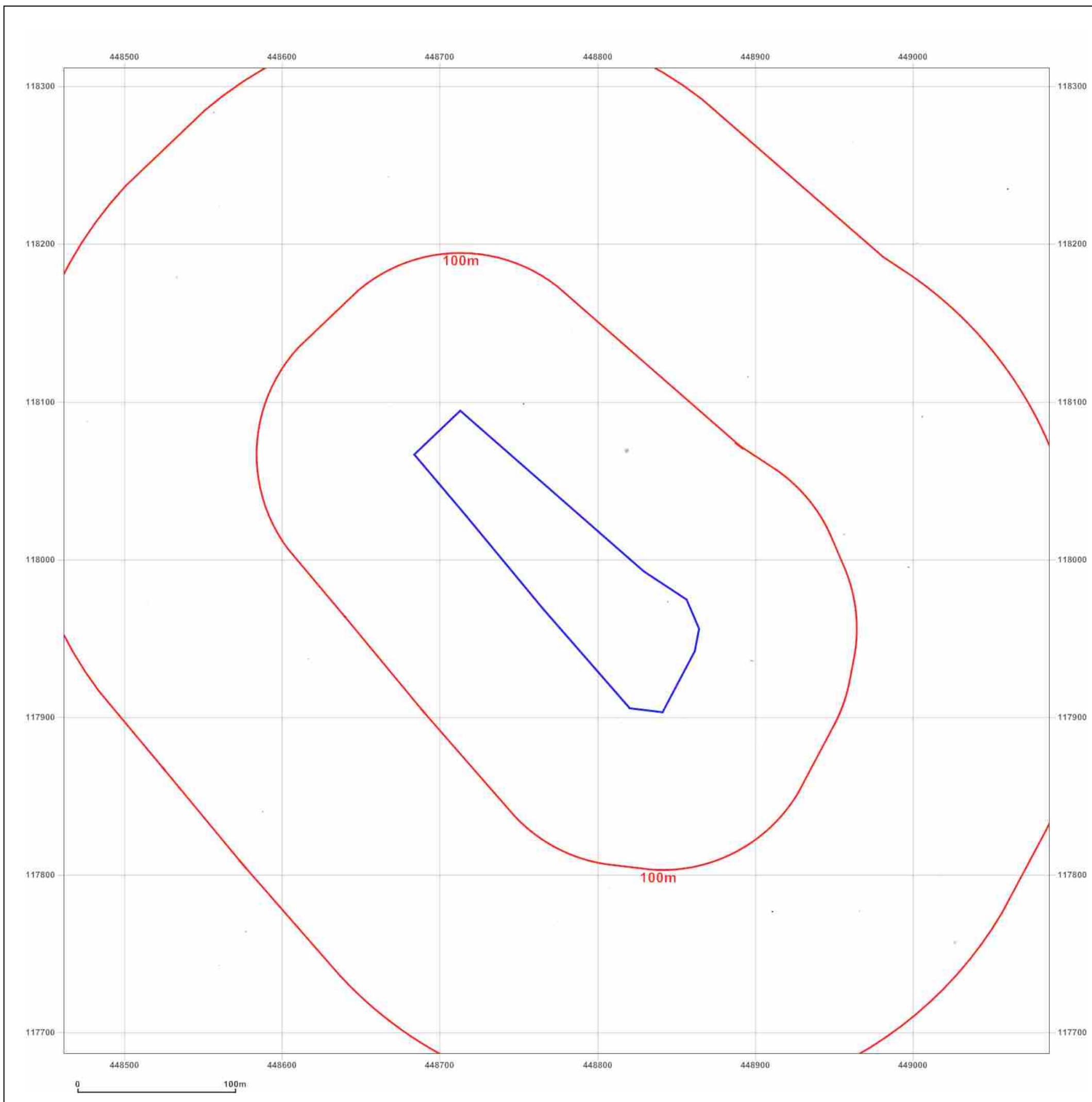


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Site Details:

ALLINGTON NURSERY,
ALLINGTON NURSERY,
ALLINGTON LANE, FAIR OAK,
SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: County Series

Map date: 1896

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1896
Revised 1896
Edition N/A
Copyright N/A
Levelled N/A

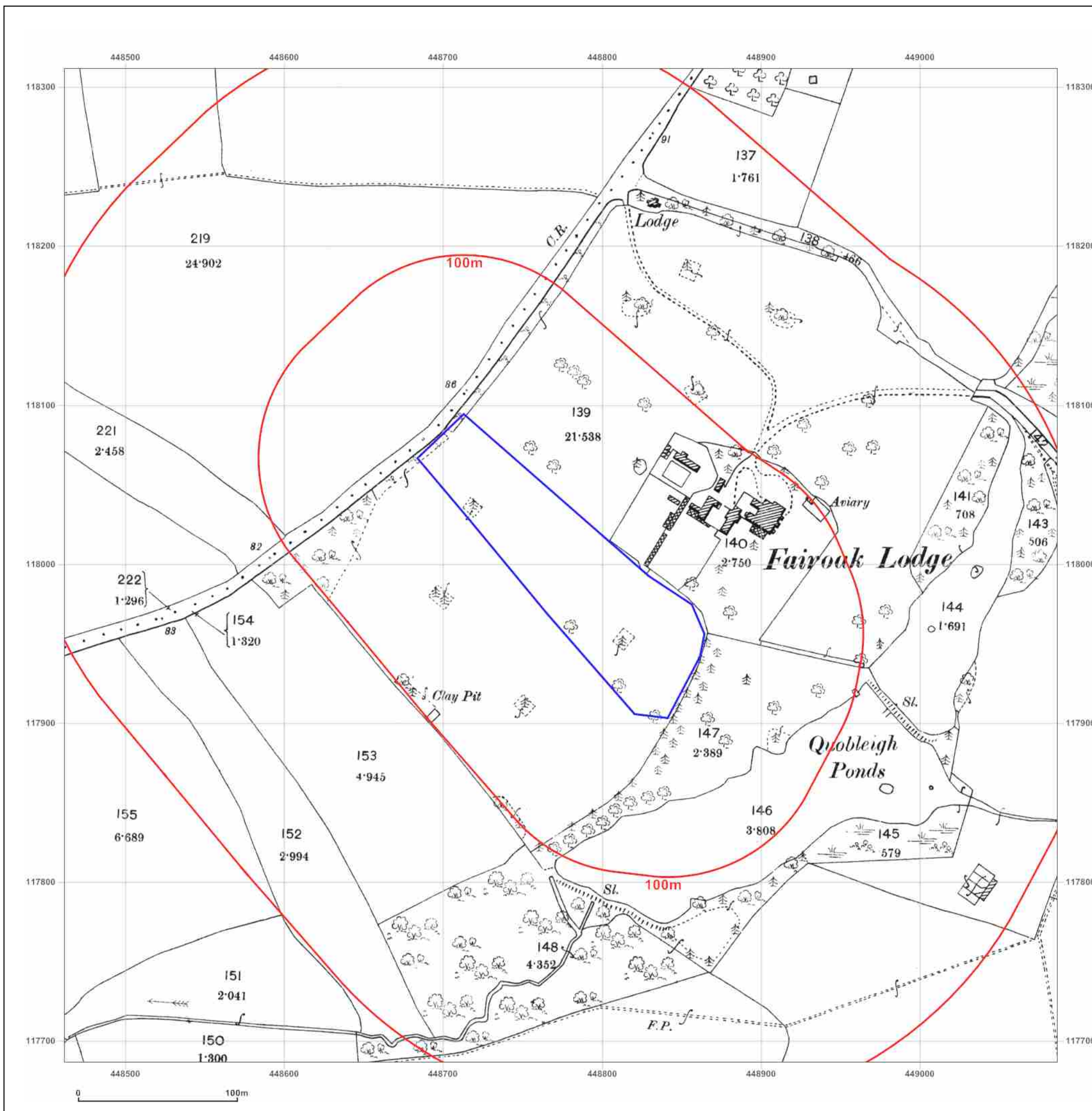


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Site Details:

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ALLINGTON NURSERY,
ALLINGTON LANE, FAIR OAK,
SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: County Series

Map date: 1909

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1909
Revised 1909
Edition N/A
Copyright N/A
Levelled N/A

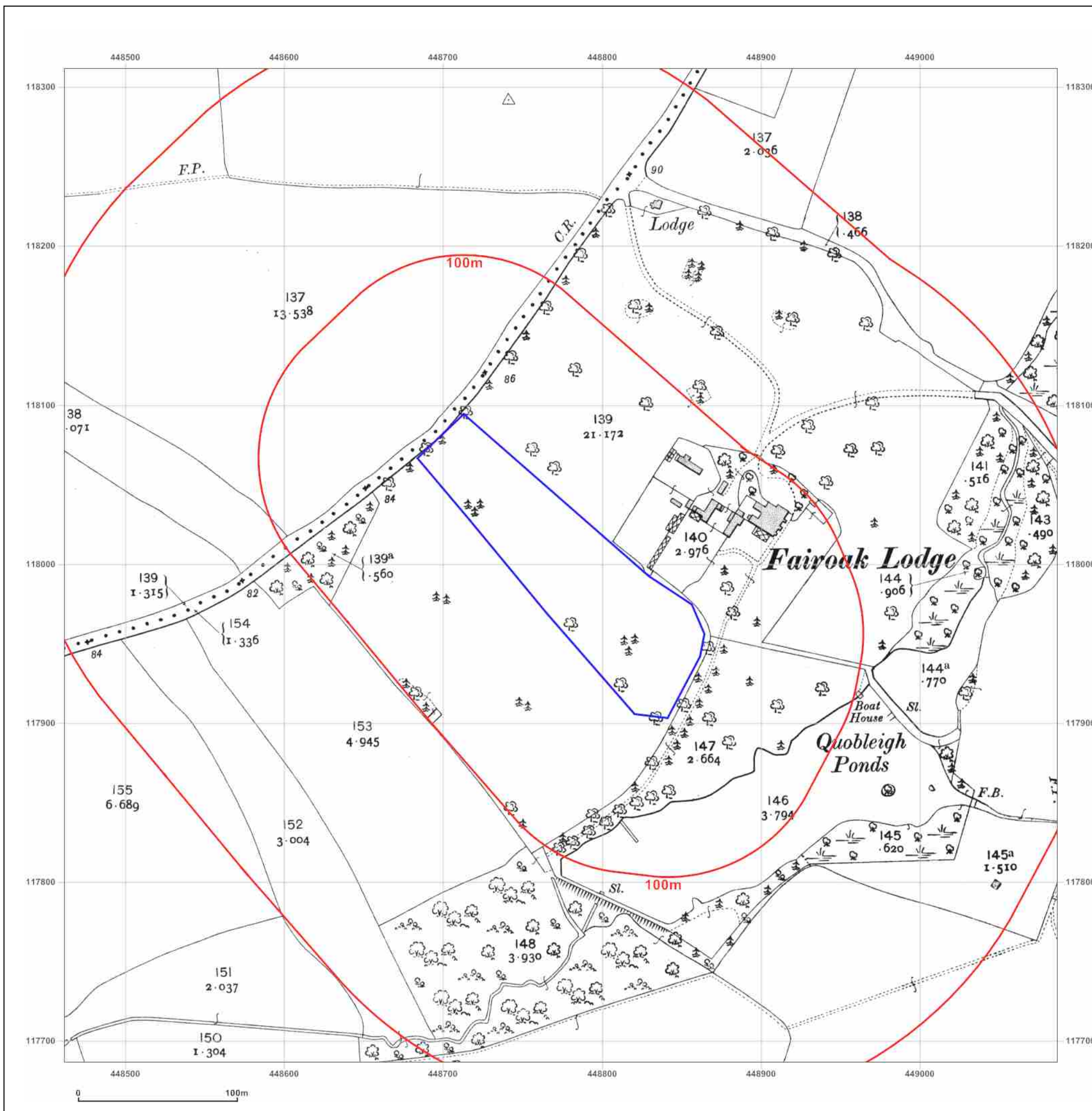


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Site Details:

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ALLINGTON NURSERY,
ALLINGTON LANE, FAIR OAK,
SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: County Series

Map date: 1937

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1937
Revised 1937
Edition N/A
Copyright N/A
Levelled N/A

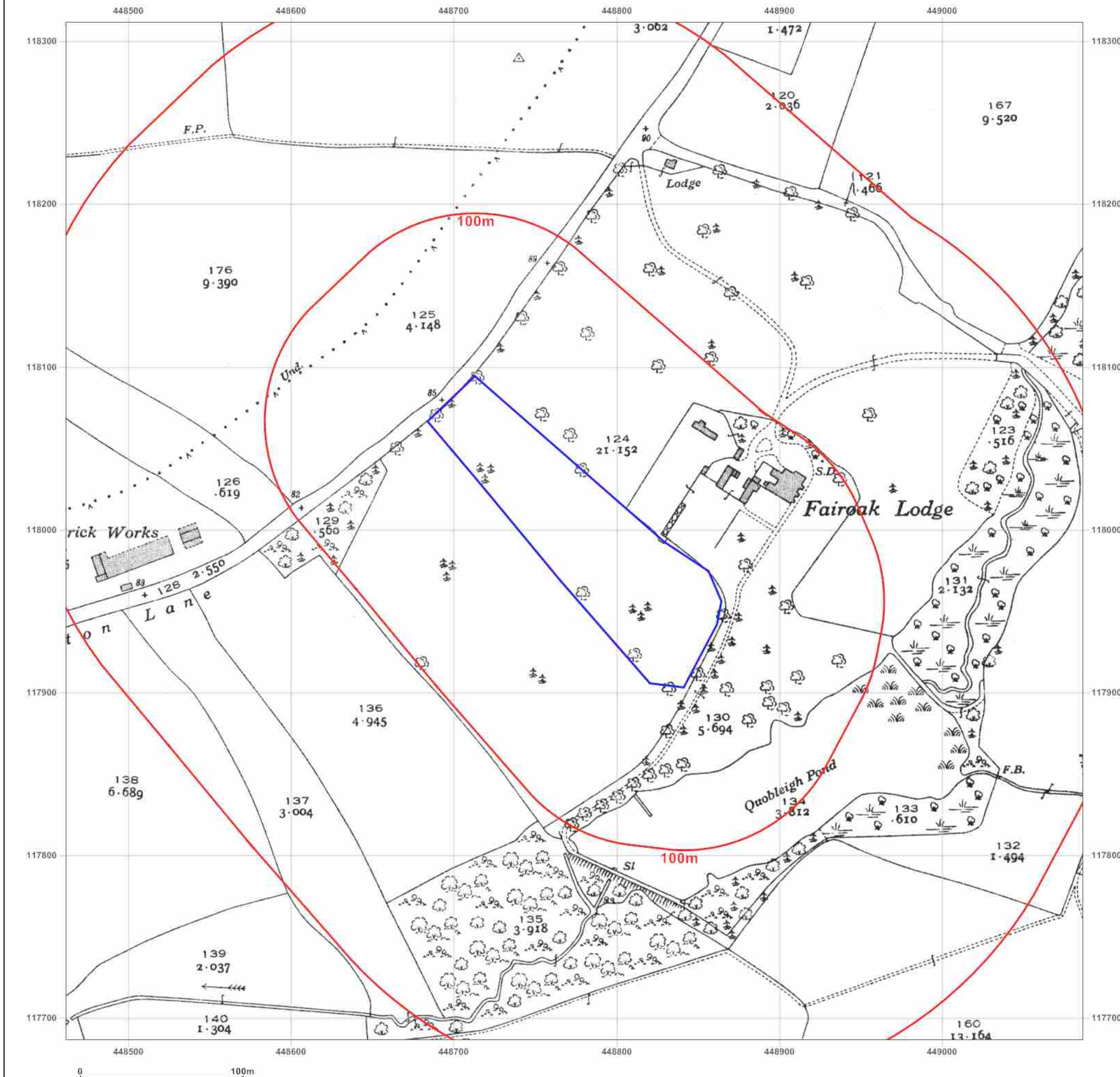


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Site Details:

ALLINGTON NURSERY,
ALLINGTON NURSERY,
ALLINGTON LANE, FAIR OAK,
SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: National Grid

Map date: 1962

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1962
Revised 1962
Edition N/A
Copyright 1963
Levelled 1959

Surveyed 1962
Revised 1962
Edition N/A
Copyright 1964
Levelled 1959

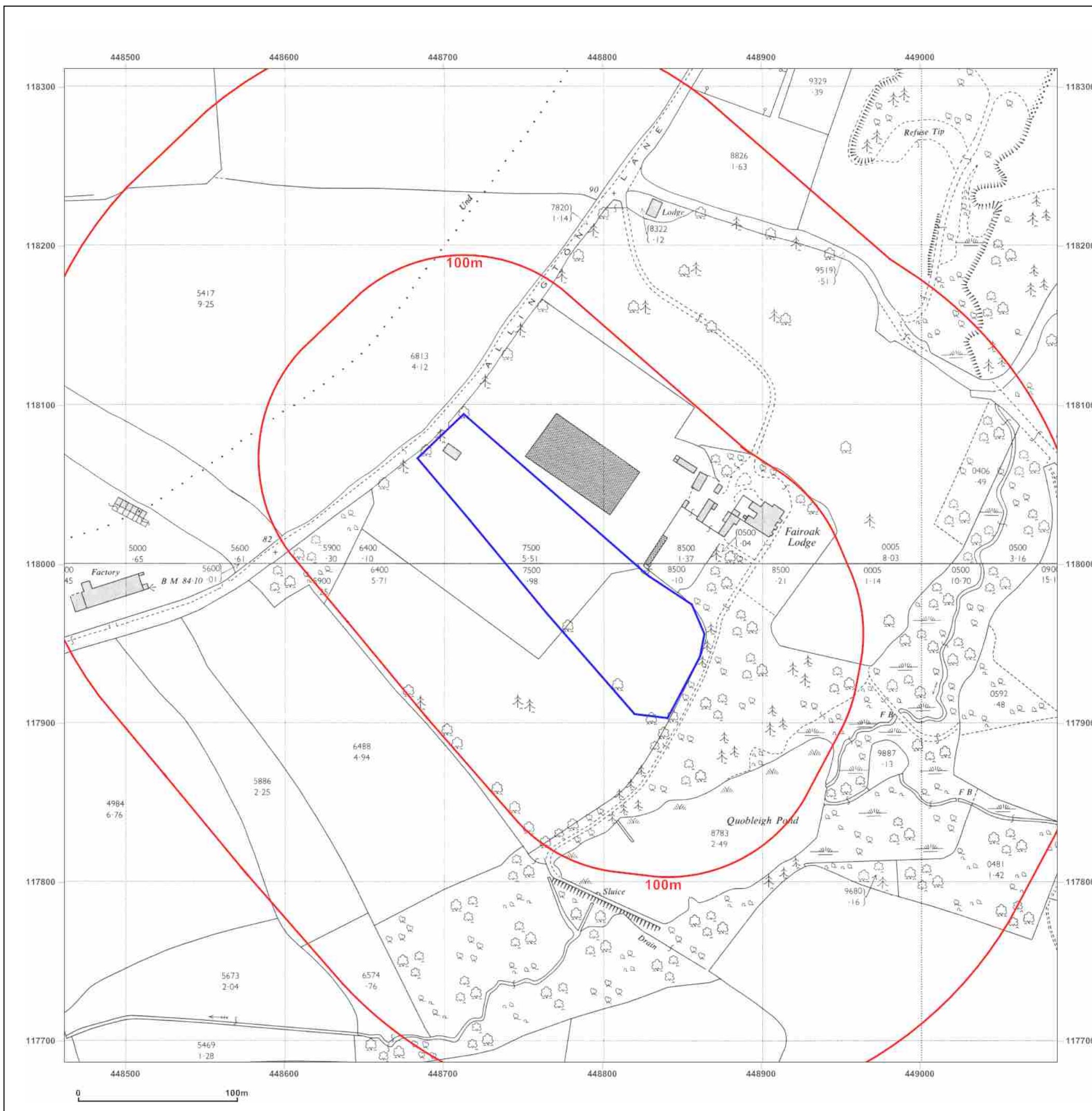


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ALLINGTON NURSERY,
ALLINGTON LANE, FAIR OAK,
SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: National Grid

Map date: 1964-1967

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1967
Revised 1967
Edition N/A
Copyright 1968
Levelled 1959

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

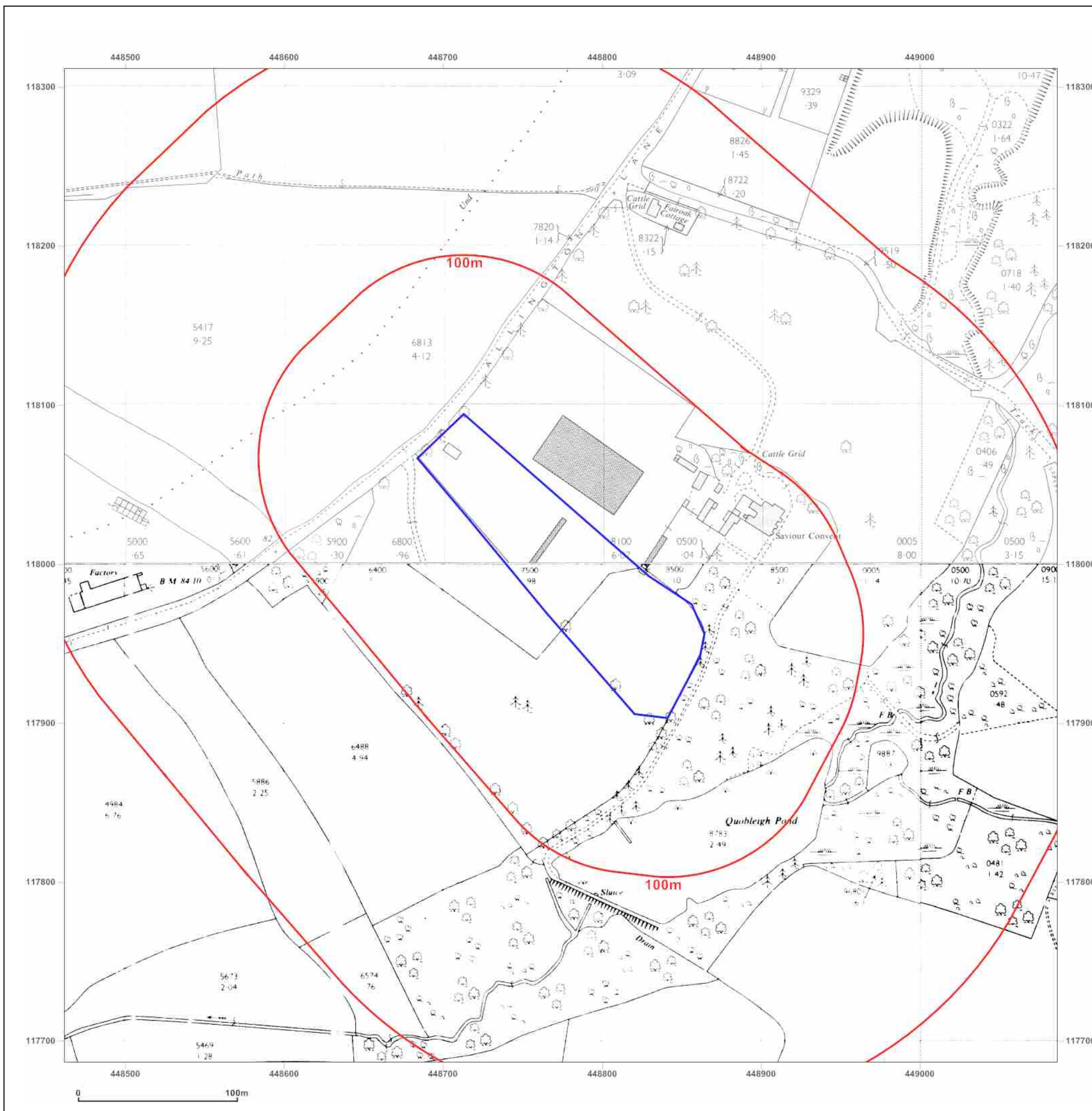


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Site Details:

ALLINGTON NURSERY,
ALLINGTON NURSERY,
ALLINGTON LANE, FAIR OAK,
SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: National Grid

Map date: 1974-1975

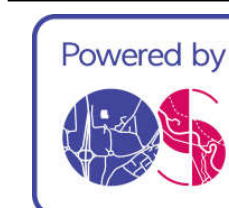
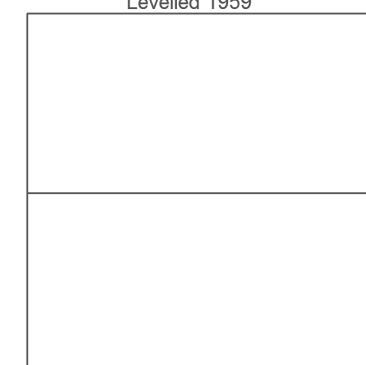
Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1973
Revised 1973
Edition N/A
Copyright 1974
Levelled 1959

Surveyed 1974
Revised 1974
Edition N/A
Copyright 1975
Levelled 1959

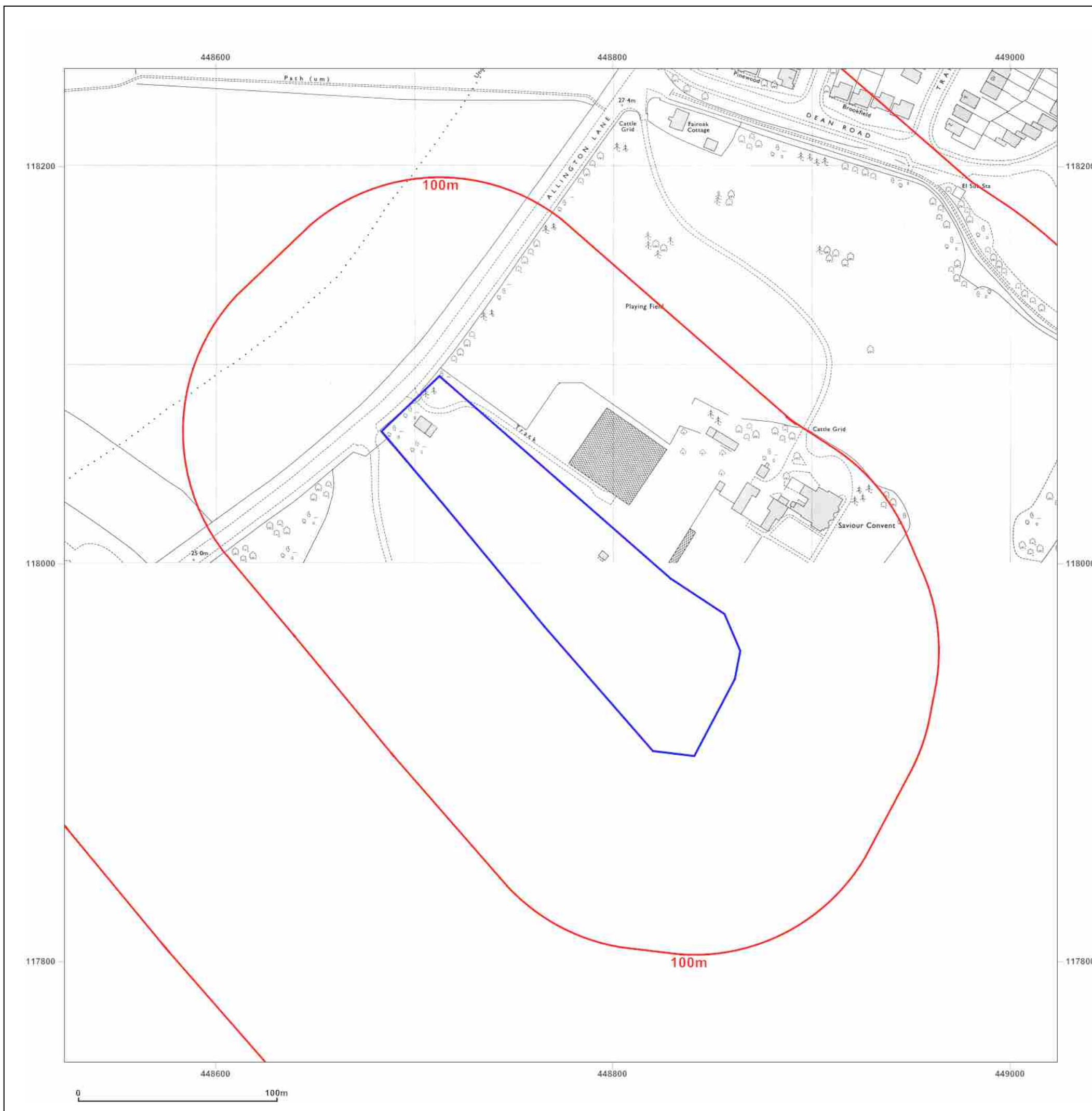


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ALLINGTON NURSERY,
ALLINGTON LANE, FAIR OAK,
SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: National Grid

Map date: 1981-1986

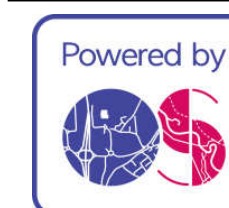
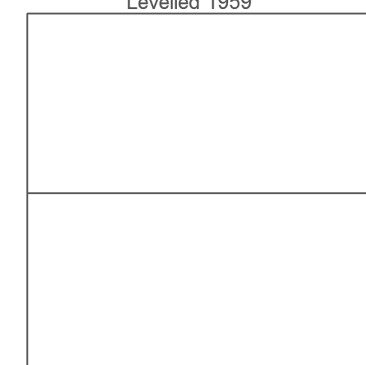
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Printed at: 1:2,000



Surveyed 1959
Revised 1986
Edition N/A
Copyright 1986
Levelled 1959

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1981
Levelled 1959

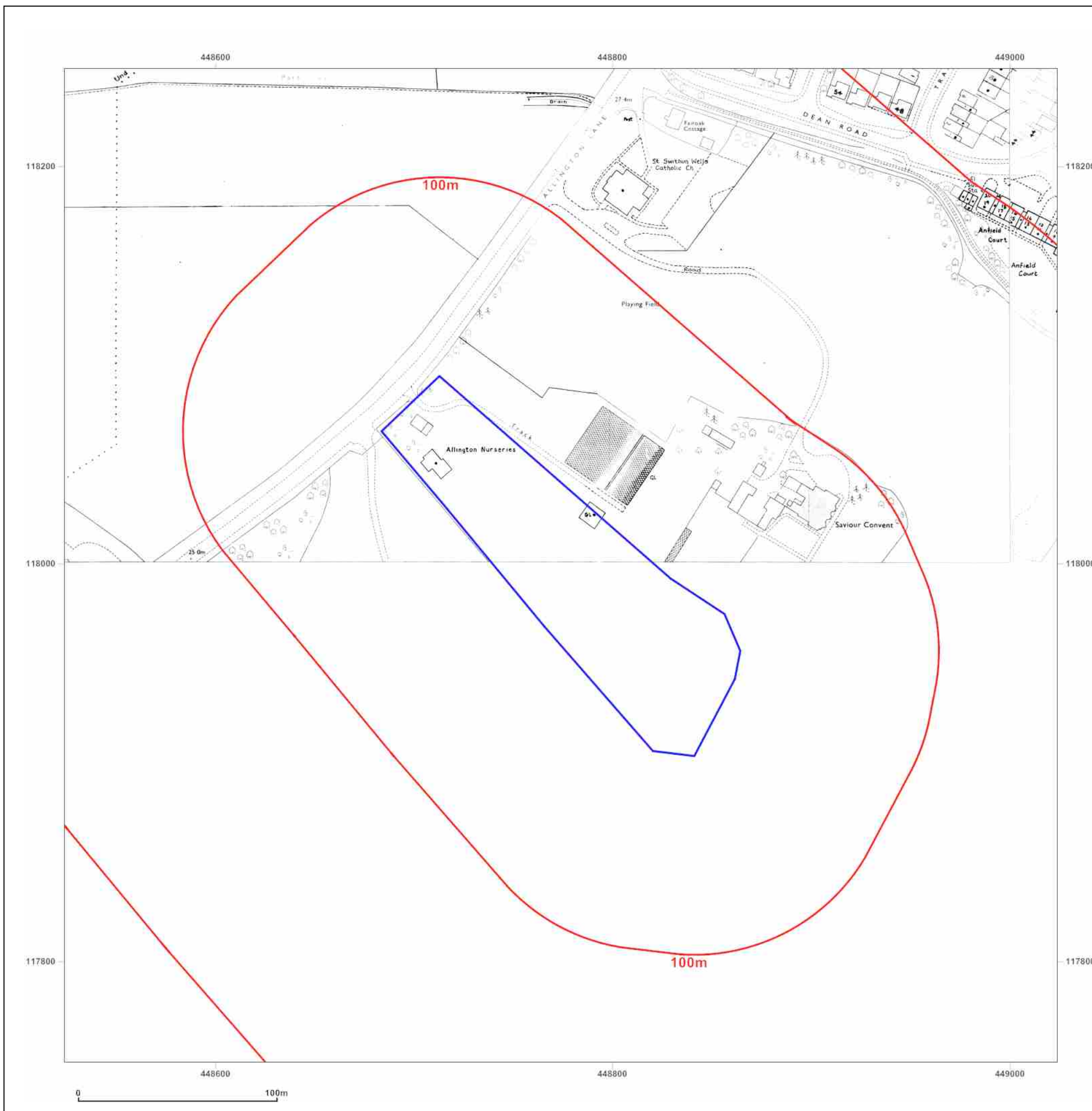


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SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: National Grid

Map date: 1985-1990

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised N/A
Edition N/A
Copyright 1990
Levelled 1959

Surveyed 1959
Revised 1985
Edition N/A
Copyright 1985
Levelled 1959

Surveyed 1989
Revised 1989
Edition N/A
Copyright 1989
Levelled N/A

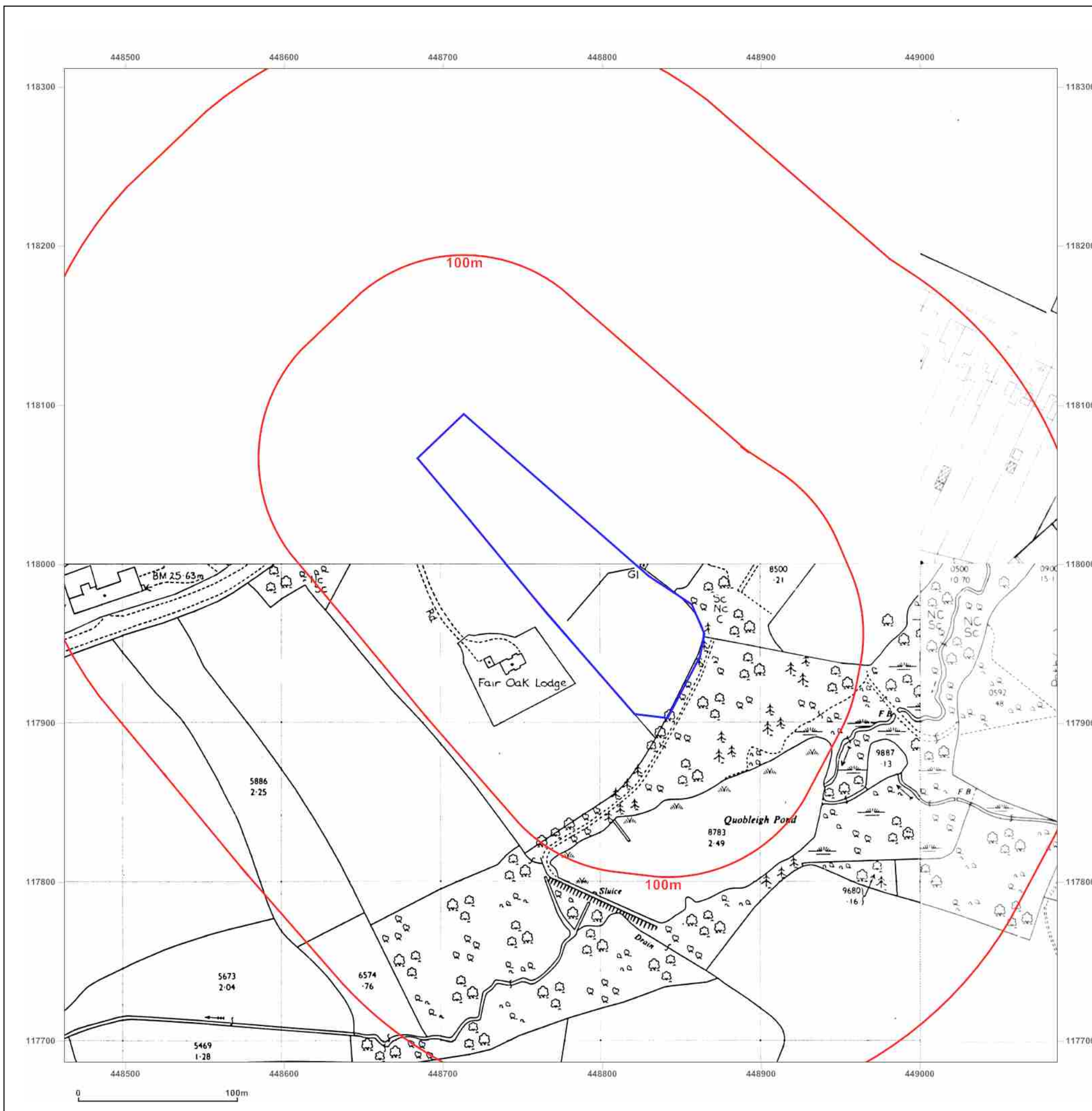


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SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: National Grid

Map date: 1992

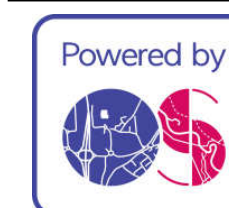
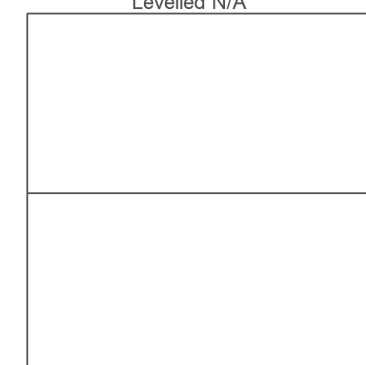
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Printed at: 1:2,000



Surveyed 1992
Revised N/A
Edition N/A
Copyright 1992
Levelled N/A

Surveyed 1992
Revised N/A
Edition N/A
Copyright 1992
Levelled N/A

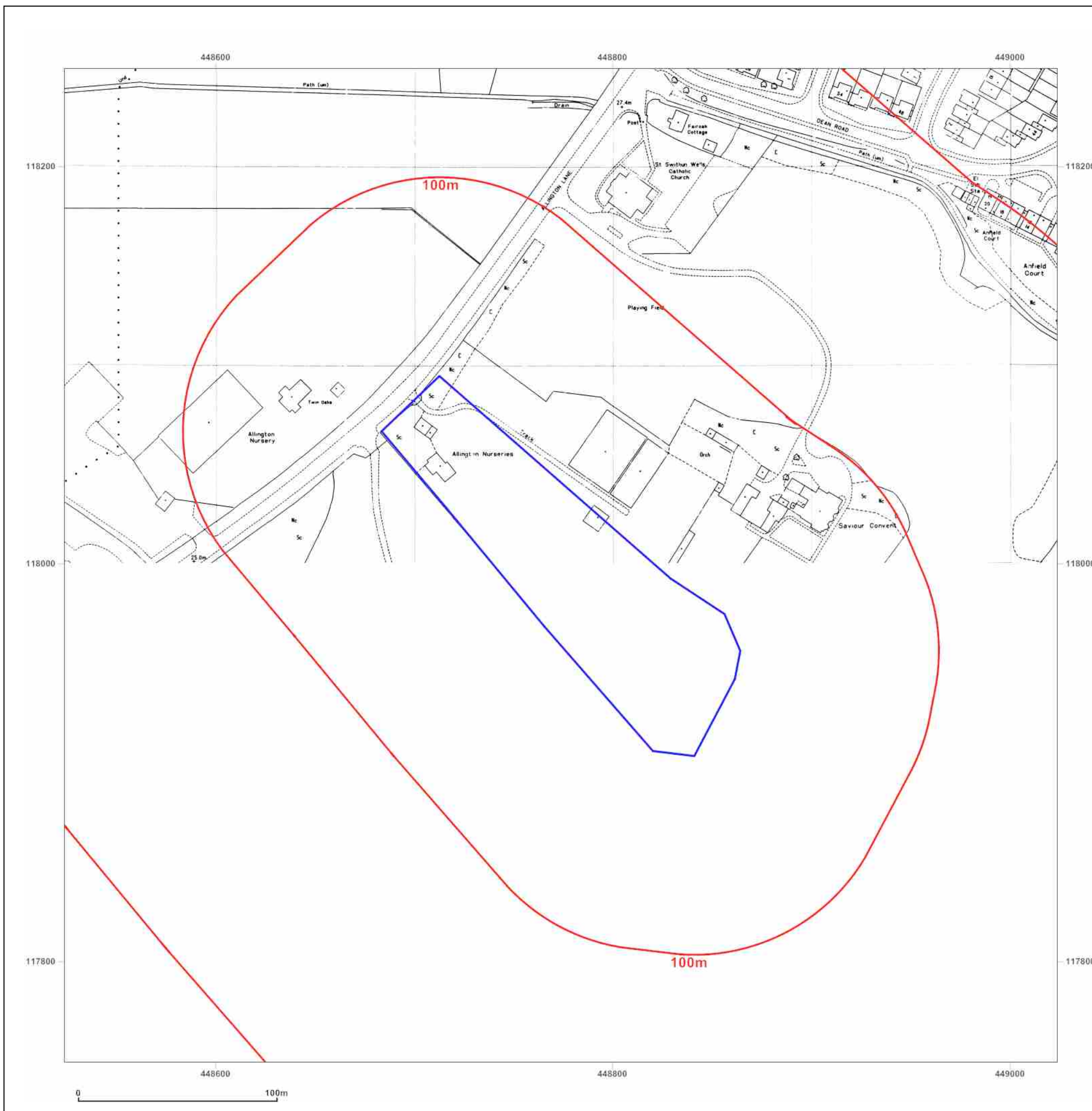


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ALLINGTON LANE, FAIR OAK,
SO50 7DD

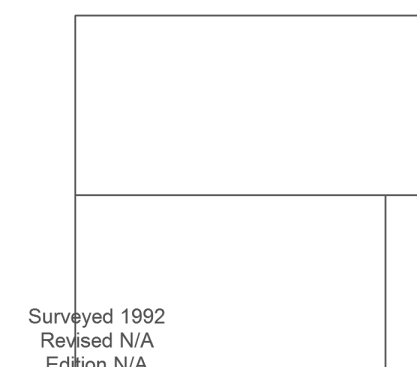
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Grid Ref: 448774, 117999

Map Name: National Grid

Map date: 1992

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1992
Revised N/A
Edition N/A
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Levelled N/A

Surveyed 1992
Revised N/A
Edition N/A
Copyright 1992
Levelled N/A

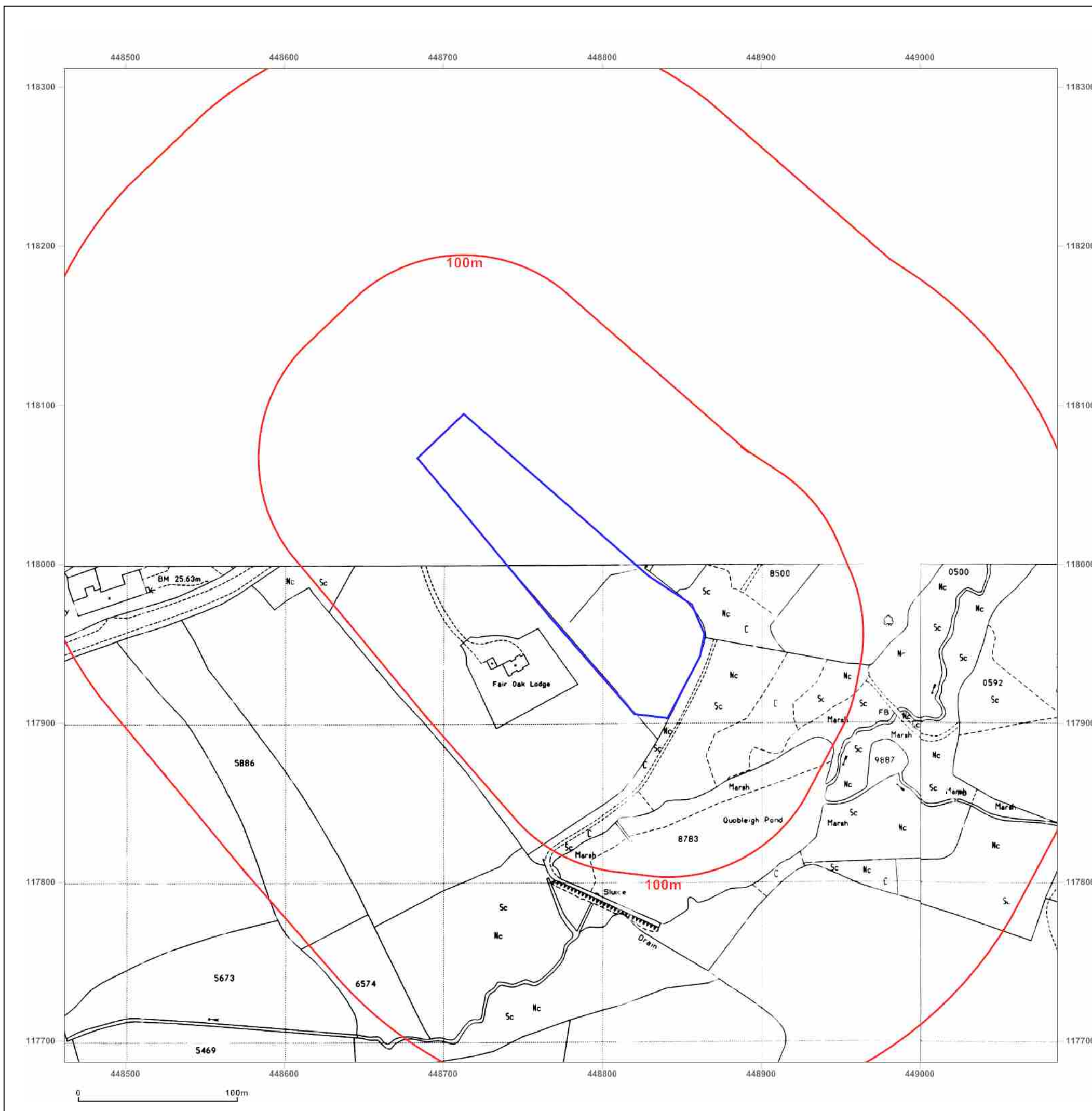


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ALLINGTON LANE, FAIR OAK,
SO50 7DD

Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: National Grid

Map date: 1992-1994

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1994 Revised 1994 Edition N/A Copyright N/A Levelled N/A	Surveyed 1961 Revised 1961 Edition N/A Copyright 1992 Levelled N/A
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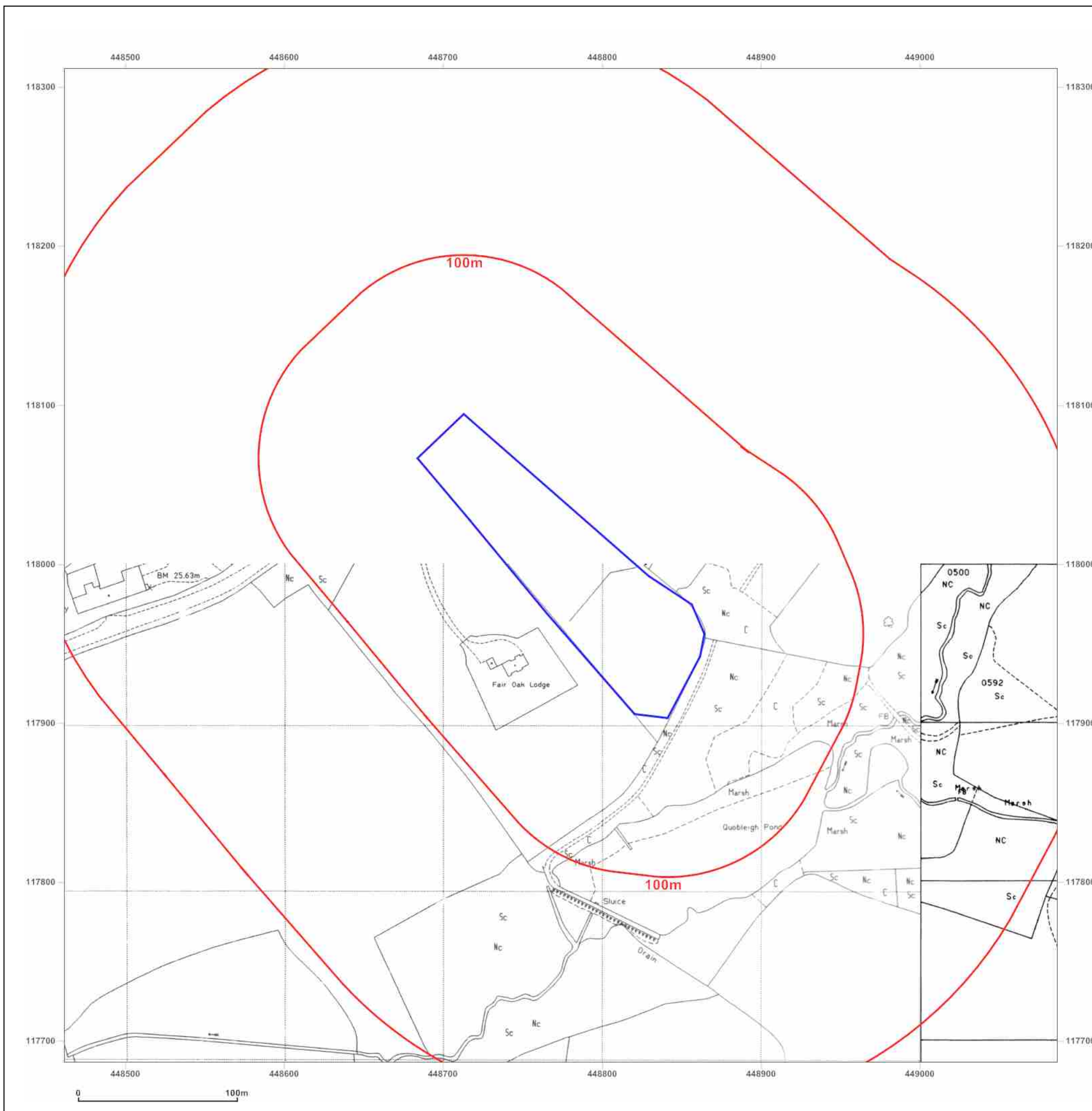


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SO50 7DD

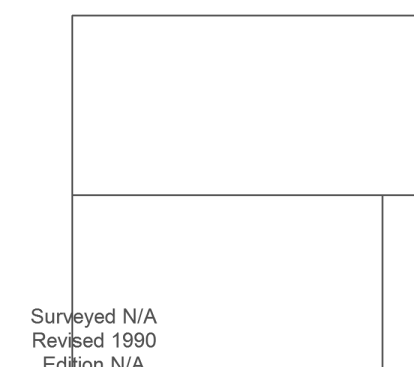
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Grid Ref: 448774, 117999

Map Name: National Grid

Map date: 1994

Scale: 1:2,500

Printed at: 1:2,500



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Revised 1990
Edition N/A
Copyright 1994
Levelled N/A

Surveyed 1994
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

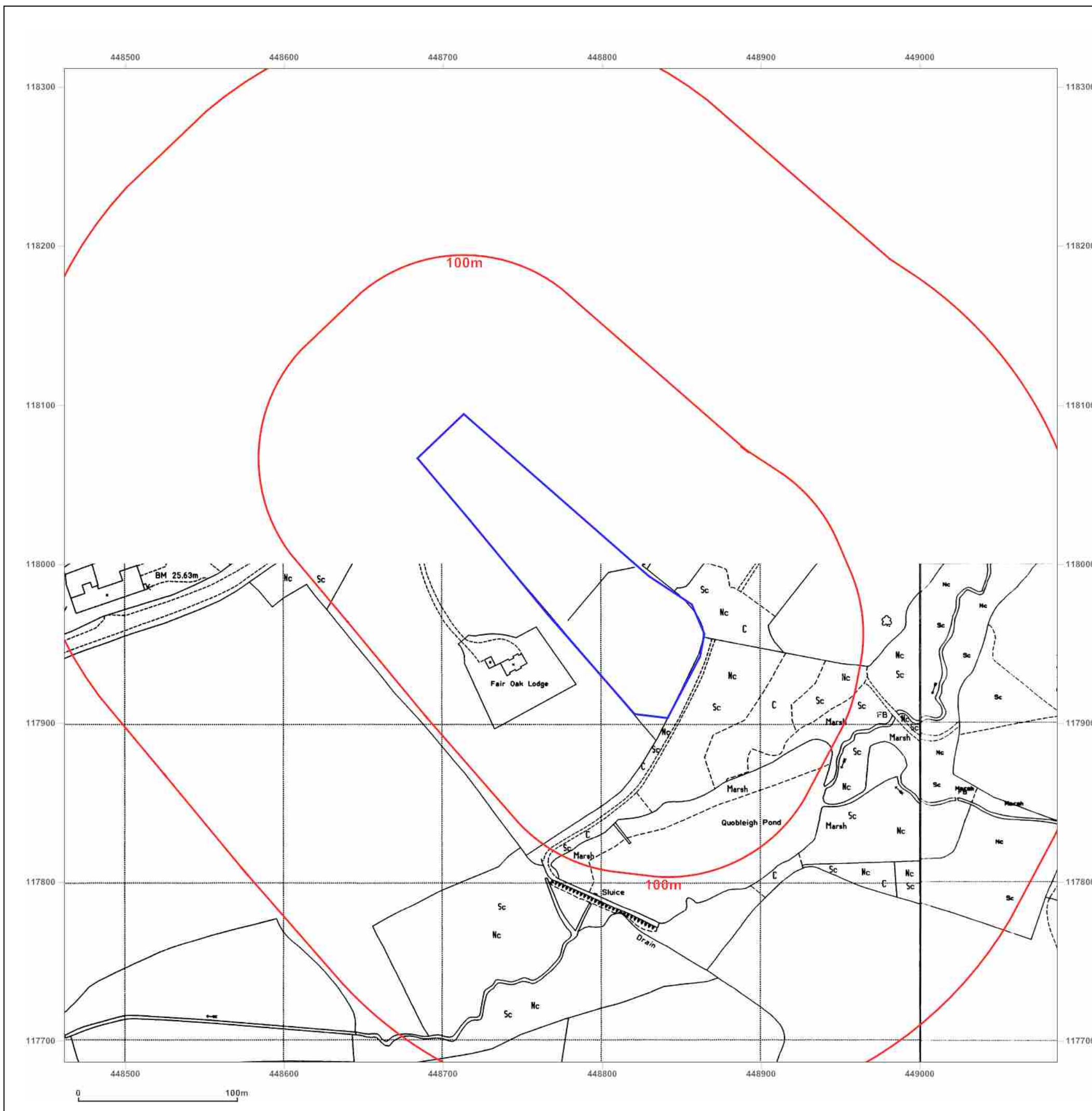


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SO50 7DD

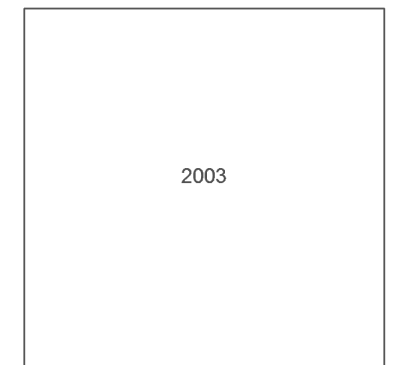
Client Ref: 975
Report Ref: GS-7230899
Grid Ref: 448774, 117999

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250



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