



Campus West

Ground Investigation

Report

A115249



Welwyn Hatfield Borough Council

March 2020



Prepared on behalf of WYG Group Limited

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Executive Summary

Site Location and Description	<p>The site is centred on NGR TL 23630 and covers an area of approximately 2.30Ha near the centre of Welwyn Garden City, northwest of the Parkway and The Campus roads. It includes a hardstand Public carpark and the Welwyn Garden City Central Library surrounded by soft landscaping.</p>
Geology	<p>Ground investigation confirmed the following geological sequence anticipated from published information:</p> <p>Made Ground (variable soils): Up to 1.4m thick.</p> <p>Lowestoft Formation (comprising variable superficial deposits): 2.20 to 11.70m thick.</p> <p>Localised Thanet Sand Formation (comprising variable superficial deposits): >4.80m thick.</p> <p>White Chalk (Grade Dm and Grade Dc): to the full depth of the investigation (25.00m bgl).</p> <p>Evidence of 'Swallow holes' (zones of metastability and voiding associated with chalk dissolution) have been identified locally approximately 170m southeast.</p>
Hydrogeology	<p>The superficial deposits have been classified as a Secondary Aquifer (Undifferentiated).</p> <p>The White Chalk has been classified as a Principal Aquifer.</p> <p>No groundwater was encountered.</p>
Hydrology	<p>Unnamed streams running through an area of woodland 0.80km northwest of the site.</p> <p>Two lakes and the River Lea present in Stanborough Park, 2.40km south of the site.</p>
Site History	<p>19th Century: The Site was occupied by woodland running adjacent to existing railway line.</p> <p>1920-1940: Workmen's Camp, Laundry, Sawmills and a rail siding on site.</p> <p>1960-Present: The site was redeveloped into Campus West by 1972 and attained its current layout by 1993 with residential and business development to the west and east, Campus ground to the south and the former rail corridor to the north.</p>
UXO	<p>Risk maps show the site to be at Low risk of UXO, potential industrial targets beyond northwest of the site deemed Moderate risk.</p>
Licensing Records	<p>Discharge Consents: One within 500m.</p> <p>Prosecutions Relating to Controlled Waters: None recorded.</p>

Licensing Records Continued

Pollution Prevention and Controls: Dry Cleaners 337m southeast dated November 2011.

Pollution Incidents: None within 500m.

Water Abstractions: One within 500m.

BGS Recorded Mineral Site: None within 500m.

Hazardous Substances: None within 500m.

Landfill & Waste Management: Waste treatment or disposal site 403m east of site.

Contemporary Trade Directory Entries & Fuel Stations (within 500m): Cleaning Services, Computer Manufacturers, Air Conditioning & Refrigeration, Building Services, Mechanic Services.

Ground Investigation

The ground investigation completed by WYG during December 2019 comprised the following:

- Service clearance and GPS
- 2No. Cable Percussive and 9No. Window Sample Boreholes up to 25m bgl with sampling and Standard Penetration Testing (SPTs)
- Geotechnical and Geo-environmental laboratory assessment;
- Installation of standpipe monitoring installations;
- 3No. ground gas monitoring and water sampling monitoring visits.

Geo-Environmental Risk Assessment

Based on the updated conceptual model of source, pathway and receptor linkages, the following risk levels established have been identified:

- Current site users – **Low** (Low to Moderate in areas of landscaping)
- Future site users – **Low** (Low to Moderate in areas of landscaping)
- Construction Site Workers – **Low** (on implementation of CDM)
- Adjacent site users – **Low** (Moderate during ground works)
- Groundwater (underlying aquifers) – **Moderate**
- Surface water (watercourse on site) – **Low to Moderate**
- Structures / Services – **Low** (Moderate in mobile groundwater)
- Soft Landscaping - **Low**

Land Gas

The site has been assessed to be CS2 (Low Risk).

Geotechnical Risks and Recommendations

Conventional shallow foundations bearing onto the Lowestoft Formation are considered a viable foundation solution in most areas for lighter loads (**up to 140kN/m²**). The above factors may influence the type of foundation type and piled foundations may need to be considered.

For heavier structural loads, or where factors impact on the viability of shallow foundations, piled foundations may need to be considered. Piled foundations will need to be constructed cognisant of local conditions, and critically the variable surface depth and characteristics of the White Chalk associated with the high risk of solution features.

Ground improvement will be required to support ground bearing floor slabs. **CBR** Values ranging between **1 to 10%** are considered for near surface soils. A design Sulfate Class of ACEC 1s DS-1 is recommended.

1.0 INTRODUCTION

1.1 Instruction

WYG Environment (WYG) were commissioned by Welwyn Hatfield Borough Council (WHBC) to undertake a ground investigation and assessment at the Campus West site, located near the centre of Welwyn Garden City.

Instructions to proceed were provided in a Purchase Order dated October 2019 (RSE2152595).

1.2 Objective

The ground investigation was initially scoped by Conisbee and further developed by WYG using the findings of the Desk Based Assessment (report ref WGC Campus West DTS V1). The overarching objective was to provide preliminary information relating to the ground conditions, potential ground contamination and geotechnical constraints at the site in relation to the redevelopment of the site to accommodate more carparking facilities.

This report details the ground investigation undertaken, provides a factual record of the conditions encountered, and further develops the conceptual ground model to inform a detailed review of the geo-environmental and geotechnical constraints posed to site development.

1.3 Proposed Development

At the time of compilation of this report (during January 2020), the scheme was at concept stage, the details of which were not available, however it was understood that proposals included the development of a decked, two-storey carpark in the existing carpark area with retention of the existing buildings and landscaped areas.

1.4 Scope

A desk-based assessment undertaken by WYG in November 2019¹ collated publicly available information to enable a review of the risks associated with ground conditions with potential to impact upon the redevelopment of the site for combined residential / commercial use. This information was used to refine the proposed intrusive investigations and the following report covers the following scope of work.

- A geotechnical and ground contamination assessment discussing the results of the investigation cognisant of the desk-based assessment, not only concerning potential on-site geotechnical engineering and contamination conditions/constraints, but also an overview of the potential for migration of contamination onto the site, or off-site to local receptors.
- A geotechnical and ground contamination intrusive investigation.
- Interpretation of the data collected in order to refine the Conceptual Site Model (CSM) and to undertake qualitative risk assessment of potentially complete pollutant linkages in accordance with current guidance.
- Development of an outline geotechnical model with discussion of characteristic geotechnical parameters.
- Provision of geotechnical recommendations pertaining to potential development constraints and management options.

1.5 Terms and Conditions

This report has been prepared for the client, Welwyn Garden City, in accordance with the terms and conditions of this contract, prepared in line with the proposal (ref rt 30Sept19 fpIV5), and is subject to the report conditions included as Appendix A.

The recommendations and opinions expressed within this report are based on the information provided and other sources of readily available information. Where reference has been made to other reports or information provided by the client, or

¹ WGC Town Centre DTS Report V1 (October 2019)

from other Third party sources, such data has been reviewed in good faith and it has been assumed that their contents are correct, as it is impractical to fully validate this data. WYG is unable to guarantee any Third-Party Information.

2.0 SITE INFORMATION

2.1 Site Location

The Site covers an area of approximately 2.3Ha near the centre of Welwyn Garden City and is defined by Digswell Road which forms the east boundary, a former rail corridor forming the north boundary, and The Campus (Road) forming the south boundary.

The Site is centred on National Grid Reference TL 23630 13392 and the nearest postcode is AL8 6BX.

A site location plan is provided as Figure 1 of this report.

2.2 Site Description

The Site is broadly rectangular in plan, with straight north, east and west boundaries, and a curved south boundary defined by The Campus.

At the time of the investigation (during October to December 2019) the east side of the site was occupied by the Campus West Arts & Conference Centre and the Welwyn Garden City Central Library. Hardstand parking for approximately 250 cars was located on the west side of the site adjoining the access road connecting to The Campus.

The perimeter of the Site is defined by landscaped areas with mature trees. The landscaping is broken along the south boundary by the access road and pedestrian entrance into the Art Centre.

The Campus West Arts & Conference Centre and the Welwyn Garden City Central Library buildings are flat roofed brick, circa 1980 buildings up to five storeys high occupying approximately 1/3 of the site footprint.

2.3 Surrounding Area

Land use beyond the Site boundary is summarised in Table 2.1.

Table 2.1 Surrounding Land Uses

	Description
North	<p>The north boundary is defined by a former rail corridor (National Route 12) which is now a public footpath within the original rail cutting residing at approximately 3m below the site level. The corridor is densely vegetated with both mature and semi-mature trees growing along the embankments and crest immediately adjacent to the site.</p> <p>Predominantly residential areas of detached and semi-detached houses with associated gardens lie beyond the former rail corridor to the north.</p>
East	<p>Digswell Road forms the east boundary with Welwyn Garden City Theatre and Oaklands College, and a car park further east.</p>
South	<p>The Campus (road) forms the south boundary and encloses a public park further to the south. Welwyn Garden City offices are situated further to the south of the park on the south side of Bridge Road, forming the boundary of the southwest corner of the site.</p>
West	<p>The west boundary of the site is separated from a residential development by a hedgerow. The development comprises four storey blocks of flats and associated landscaped areas</p>

3.0 ENVIRONMENTAL SETTING

3.1 Geology

Information regarding the underlying geology has been obtained from the British Geological Survey (BGS) online GIS database which indicates the Site to be underlain by the following geological sequence.

3.1.1 Made Ground

Although not indicated on published BGS maps, Made Ground is anticipated to be present. Fill materials are likely to underly hardstand areas, and the Site's historic development may have resulted in disturbance to shallow soils, or importation of soils. It is also considered possible that remnant substructures from former developments may exist in localised areas of the site.

3.1.2 Superficial Geology

BGS Geoindex online mapping (1:50,000 scale) indicates that the Site is underlain by the superficial Lowestoft Formation, described by the BGS lexicon of named rock units as "an extensive sheet of chalky till, together with outwash sands and gravels, silts and clays".

3.1.3 Solid Geology

The Lewes Nodular and Seaford Chalk Formations (undifferentiated) are indicated to underlie the superficial deposits.

The Lewes Nodular Chalk Formation is described in the BGS lexicon as "hard to very hard chalk with interbedded soft to medium chinks and marls. Nodular chinks are typically lumpy and iron-stained."

The Seaford Chalk Formation is described as "firm white chalk with nodular and tabular flint seams".

Together these units form part of the White Chalk Sub-Group and are herein referred to as the White Chalk.

Immediately to the north of the Site the Lambeth Group is indicated to overlie the White Chalk. It is possible that this unit may encroach across the north boundary of

the site. The BGS lexicon describes the Lambeth Group as “vertically and laterally variable sequences mainly of clay, some silty or sandy, with some sands and gravels, minor limestones and lignites and occasional sandstone and conglomerate”.

3.1.4 BGS Borehole Records

The BGS online database show no boreholes located on site. Boreholes located near to the Site have been reviewed and the conditions encountered are summarised in Table 3.1.

Table 3.1 Summary of Historical Borehole Records

BH Ref.	Distance and Direction	Strata *	Depth (m bgl)	Groundwater (m bgl)	Description**
TL21/122	150m N	London Clay Formation	5	No information	No further description given
		Seaford Chalk	36		No further description given
		Lewes Nodular Chalk	70		No further description given
TL21SW/93	240m SE	Topsoil	0.46	Dry	No further description given
		Lowestoft Formation	6.55		Firm brown sandy clay with stones at top, becoming gravel and sand further down and stiff brown clay with stones at base
TL21SW/15	290m E	Anthropogenic Ground**	0.50	28.6	Fill: Reinforced concrete (0.2m) resting on gravel and concrete rubble
		Lowestoft Formation	10.0		Orangish brown clays, sands and gravels, becoming silty with depth. Cobbles up to 125mm at base
		Undifferentiated Chalk	15.0		Clayey, friable and rubbly Chalk. Reworked at top with lenses of variable chalky brown clay with small fragments of stiff brown clay. Becomes rubbly and blocky with orange patches and flint with depth

* Interpretation based on description. ** Soil description extracted from the borehole record

3.2 Risk Assessment of Chalk

Chalk has a high calcium carbonate content, the susceptibility of which to dissolution by water, particularly where pH is low, can lead to the zones of differential and exaggerated weathering of the chalk surface, often presenting as a well-developed weathered horizon of 'Chalk Head'.

Weathering typically exploits zones of weakness within the chalk (e.g. well-developed joints and bedding plains), and therefore the Chalk Head can be variable both in-terms of its thickness and its geotechnical properties. In addition, zones of metastability associated with deep weathering, often described as dissolution features, can in some circumstances include deeply unstable soils and voids / roofed cavities.

The Envirocheck report also lists the coordinates of two 'Natural cavities' which are approximately 250m to the SW of the site.

These features are listed as 'sinkholes' and further information was requested Stantec (formerly Peter Brett Associates (PBA)) who have confirmed that WHBC kept a record of any natural cavity features discovered during development in the 1900s. The location of these features was recorded and marked on a map provided to PBA by WHBC dated 22nd February 1983.

The map shows "swallow holes" that were often found during road, sewer and housing construction in areas where the Glacial Gravels overlay the Chalk at approximately 10-14m bgl. Additionally, it was noted that some of the encountered features had been induced as a result of the construction works.

It was later noted that further clarification was sought on the terminology used within the reports and hence the type of solution feature has since been reclassified as a 'sinkhole' instead of a 'swallow hole'.

Further hazards identified in The Envirocheck Report also identifies the possibility of mining and mineral Sites around the area, possibly related to chalk mining, although none are recorded to occur within 250m of the site, there is considered to be potential for historic deneholes (shallow small-scale mining features).

The likelihood of the chalk being affected by dissolution processes is influenced by several factors including the nature of the cover deposits, the depth of groundwater, and the local topography, and the anticipated site conditions can be qualitatively assessed following methods outlined by C.N. Edmunds (2001)^{ref 2}.

Following the desk-based risk assessment method², the Site is classified to have a **High Risk** of metastability and voiding associated with chalk dissolution. This is primarily driven by the presence of the overlying Lowestoft Formation diamicton and the potential encroachment of Tertiary Deposits (Lambeth Group) in the north of the site which can lower the pH and concentrate groundwater flows potentially accelerating the dissolution of the underlying chalk. The risk assessment is presented in Appendix C.

3.3 Ground Stability Hazards

Table 3.2 provides a summary of ground stability hazards identified from the BGS database. The BGS database designates Ground Stability Hazard risk ratings to spatial areas based on the local geology and soil type as reported within the Envirocheck. These ratings are assigned to areas based on the local geology and soil type identified in regional geographic information systems, and do not necessarily consider hazards relating to localised topography and local variations in ground conditions.

The high risk indicated for ground dissolution is associated with the White Chalk which is susceptible to dissolution, as discussed in detail in Section 3.2.

The Envirocheck Report also identifies the possibility of mining and mineral sites around the area, possibly related to chalk mining, although none are recorded within 250m of the site, there is considered to be potential for historic deneholes (shallow small-scale mining features).

In summary, considering the confirmed presence of local features and the conditions presented by the anticipated ground model, a **High** ground stability risk is identified.

Table 3.2 Ground Stability Hazards

² C.N. Edmunds (2001) – Predicting natural cavities in chalk: in 'Land Surface Evaluation for Engineering Practice' British geological Society Special Publication 18.

Ground Stability Hazard	Risk
Collapsible Ground	Very Low
Compressible Ground	No Hazard
Ground Dissolution	High
Landslide Ground Stability	Very Low
Running Sand Stability	Very Low
Shrinking or Swelling Clay	Moderate

3.4 Unexploded Ordnance Risk

Risk maps show that the Site is located within an area considered to be at **Low risk** of having potential buried UXO, although it is noted that there were potential industrial targets adjacent to the northwest of the Town Centre site boundary (ZeticaUXO, 2019).

3.5 Radon

The Site is noted as being in a Lower probability radon area, which is defined by less than 1% of homes being estimated to be at or above the Action Level, according to the British Geological Survey.

3.6 Nitrite Vulnerability

The Envirocheck Report (2019) identifies the Site to be in a Nitrite Vulnerable zone, defined as areas of land that drain into nitrate polluted waters, or waters which could become polluted by nitrates.

3.7 Hydrogeology

3.7.1 Aquifer Classification

The Environment Agency has classified the superficial deposits of the Lowestoft Formation as a Secondary Undifferentiated Aquifer. This classification is given in cases where it has not been possible to attribute either category A or B to a rock type.

The bedrock geology of the White Chalk has been classified as a Principal Aquifer. This classification is defined as layers of rock or drift deposits that have high intergranular and/or fracture permeability and provide a high level of water storage. They may support the public potable water supply and/or base flow on a strategic scale.

3.7.2 Groundwater Source Protection Zone

The Site is located within a Groundwater Source Protection Zone III defined by the EA as the area around a supply source within which all the groundwater ends up at the abstraction point.

3.7.3 Licensed Groundwater Abstractions

No water abstraction permits have been identified within 250m of the site. The nearest water abstraction permit exists 474m east of the site, relating to Rank Xerox Ltd, which allows a daily rate of 2991m³ of groundwater to be abstracted daily for industrial processing. No expiry date has been provided.

3.8 Hydrology

3.8.1 Surface Water Features

The nearest surface water feature is a stream located approximately 180m to the east of the site flowing east to west along the southern boundary of an area of residential properties. This stream is culverted below the pedestrian access leading into the Town Centre from Gresley Close. The eastern extent of the culvert, and the interface with any former railway drainage systems located north of the site and following the route of the stream, was not confirmed.

Unnamed streams also flow through wooded areas located 0.50km northwest of the Site.

Further to the south of the Site, two lakes are located in Stanborough Park in close proximity to the River Lea approximately 2.40km from the Site boundary.

3.8.2 Flood Risk

The Site is indicated to be within an area designated as Flood Zone 1, which is defined as an area having a less than 1 in 1,000 annual probability of river or sea flooding.

4.0 SITE HISTORY

4.1 Introduction

The historical development of the Site and surrounding area has been assessed using information available from historical Ordnance Survey (OS) maps dating from 1884 to 2019 provided with the Envirocheck Report (Appendix B).

4.2 Summary of Site History

4.2.1 On-site

The earliest available historical map extract, published in 1884, shows the Site to be part of the Sherrardspark Wood and is located immediately south of the Dunstable Branch railway. The wood was then cleared during the period from 1920 to 1940 prior to the establishment of a sawmill and joinery on the Site. These developments were serviced by a rail siding feeding into the northern area of the Site and included workmen's cottages in the southeast. The Site was redeveloped to accommodate the library and Campus West buildings in 1973.

Google Earth Satellite Images / Aerial Photography dating back to 2002 show that the Site has remained largely unchanged through this period to the present date (January 2020).

4.2.2 Off-site

The areas around the site originated as fields and farmland. Some areas have been developed into residential dwellings, whilst other areas have been used for industry purposes, including factories, builders' yards and brick works. These have since been redeveloped, and now largely feature more commercial and residential uses.

4.3 Historical Site Uses

Table 4.1 provides a detailed account of the review of available OS mapping coverage for the site and general area dating back to 1884. The commentary is generally limited to locations within 500m of the site boundaries unless it is considered that activities beyond that range could potentially have an impact on the site.

Table 4.1 Historical Site Review

Map Date & Scale	Within Site Boundary	Surrounding Area
<p>1878 (1:2,500)</p> <p>1884 (1:10,560)</p> <p>1898 (1:2,500)</p> <p>1899 (1:10,560)</p>	<p>The earliest map from 1878 shows the site to be occupied almost entirely with woodland. The woodland is largely unbroken with some tracks marked running through it, and a larger track/road to the south. The northern edge of the site borders a railway line ('Dunstable Branch') constructed within a cutting.</p> <p>The 1884 and 1899 1:10 560 maps show that the woodland is part of the 'Sherrardspark Wood'.</p>	<p>The sites north boundary comprises the Dunstable Branch railway with a pedestrian crossing leading into woodland north of the railway.</p> <p>The area to the northeast and to the south is largely open fields with a few buildings in the southwest.</p> <p>Farms are shown to the northeast and south.</p>
<p>1923 (1:2,500)</p> <p>1925 (1:10,560)</p>	<p>The woodland has mostly been cleared, 'Saw Mills' are indicated in the southwest, and a 'Workmen's Camp' and 'Laundry' is indicated in the southeast.</p> <p>A railway siding connecting with the Dunstable line to the west runs into the site from the west.</p>	<p>A 'Brick Works' is shown to the northwest, a 'Post Office' to the south and various 'Banks' and 'Council Offices' to the southeast. An 'Electric Power Station' is present to the southeast of the site along with 'Playing fields' and a tennis ground are shown.</p> <p>Residential development roads are shown to the southwest and west.</p> <p>An area of the original woodland to the west of the site is now labelled as the 'Reddings Plantation'. A reservoir is now indicated to the north.</p>
<p>1938 (1:2,500)</p> <p>1939 (1:10,560)</p>	<p>The Saw Mill is now marked as a 'Joinery Works', with new buildings present in the west of the site.</p>	<p>Digwell Road is shown in its present-day location forming the east boundary of the site and continuing across the railway Dunstable Line (railway) on an overbridge.</p> <p>Further residential development, roads and a school are indicated to the north of the site.</p> <p>Several developments are shown to the south and southeast of the site, including one labelled as a 'Theatre'.</p> <p>Industrial development is shown in the wider areas around the site, including a 'Plastic Powder Works' and 'Sewage Works' to the northeast, an 'Iron Foundry' to the east, and a 'Pumping Station' to the southwest. The electric Power Station is no longer indicated.</p>

Map Date & Scale	Within Site Boundary	Surrounding Area
1950 (1:10,560)	No changes indicated.	Further development comprising new streets of houses is shown to the southwest, southeast and north.
1960 (1:10,000) 1961-1985 (1:1,250) 1966 (1:10,000) 1969 (1:1,250)	The buildings formerly associated with the Joinery Works are no longer shown. The 1961-1985 (1:1,250) map shows the "Campus West" development (built in 1973) in the east of the site.	The joinery works is now labelled as a 'Builder's Yard'. New developments are indicated to the east across from Digswell Road which is the Mid-Herts College of Further Education and a nearby library. 'Allotment Gardens' and tennis courts are indicated to the northeast. Further development is indicated to the southeast including roads, car parks, the theatre is now labelled as a 'Cinema'. Expansion of road running over the railway line to the southeast of the site. New road constructed by 1966, to the east of the railway line, running approximately N-S.
1972 (1:2,500) 1976 (1:10,000)	Campus West is not shown on the 1972 (1:2,500) map. The site is shown to be clear of development with wooded areas and footpaths. Campus West is shown on the 1976 (1:10,000) map with open car parking in the west and the site has more or less attained its present-day layout.	The 1976 (1:2,500) shows significant residential development of the open fields and farmland to the northeast. Further development and expansion of the local road and rail network together with further residential development is shown. Continued development has occurred to the southeast of the site, creating a higher density of buildings. The reservoirs to the northwest of the site appear to have been expanded.
1989 (1:10,000) 1992 (1:1,250) 1993 (1:1,250)	No changes indicated.	Much of the industrial development to the northeast is no longer shown. Further residential and commercial / retail development is shown in the wider area, with only minor changes to previously developed areas. Some changes to the buildings to the southeast of the site are shown, whilst a 'Dismantled Railway' is shown to the west.

Map Date & Scale	Within Site Boundary	Surrounding Area
1999 (1:10,000)	No changes indicated.	Further developments in the area formerly occupied by factories to the northeast us indicated.
2019 (1:10,000)	No changes indicated and the site is shown in its present-day layout.	No changes indicated and the surrounds are shown in their present-day layout.

5.0 LICENSING RECORDS

5.1 Discharge Consents

The Envirocheck Report, provided in full in Appendix B, provides a record of licences, consents, permits applicable to potentially contaminative activities in the Site vicinity. The following summary is generally limited to locations within 500m of the Site boundaries unless it is considered that installations or activities beyond that range could potentially have an impact on the site or be affected by the redevelopment of the Site.

5.2 Discharge Consents

A single discharge consent has been identified within 500m of the Site relating to Cbx (making of computers and electronics) 475m east of the Site, permitted in October 1991 and revoked in March 1996.

5.3 Prosecutions Relating to Controlled Waters

No records of any prosecutions relating to the pollution of controlled waters have been identified within 1km of the Site.

5.4 Pollution Prevention and Controls

A single Local Authority Pollution Prevention and Control measures is in place within 500m of the Site. It relates to Welwyn Dry Cleaners, 337m SE permitted from 1st November 2011.

5.5 Pollution Incidents

No incidents of pollution into controlled waters or substantiated pollution incident register entries recorded within 500m of the Site.

5.6 Water Abstractions

A single water abstraction permit has been identified within 500m of the Site. This is operated by Rank Xerox Ltd at a distance of 474m east, under licence

29/38/02/0074. It is reported that 2991m³ of groundwater is extracted daily. Both the authorised start date and end date have not been supplied.

5.7 BGS Recorded Mineral Site

There are no recorded BGS Mineral Sites within 500m of the Site.

5.8 Hazardous Substances

There are no Control of Major Accident Hazards Sites (COMAH) or Notification of Installations Handling Hazardous Substances (NIHHS) sites within 500m.

5.9 Landfill & Waste Management

Hertfordshire County Council has supplied landfill data for a location within the bounds of the Site, although no further details have been provided. WHBC does not have any landfill data to supply.

There are two records of licenced waste management facilities within 1km of the Site as summarised in Table 5.1.

Table 5.1 Summary of Licensed Waste Management Facilities within 1km of The Site

Operator	Type	Location	Permit No.	Issue Date	Expiry Date
WGC Metals Ltd	Vehicle depollution factory	850m E	102412	February 2011	Not supplied
WHBC	Special waste transfer station	961m E	80190	May 1999	Not supplied

A registered landfill site is present within 1km of the site, as summarised in Table 5.2.

Table 5.2 Summary of Registered Landfill Sites located within 1km of The Site

Operator	Type	Location	Permit No.	Issue Date	Expiry Date
Polycell Products Ltd	Landfilling (soakaway) of aqueous effluent and effluent treatment sludge – up to 10,000 tonnes per year	689m SE	79/078	June 1979	Not supplied

There are four records of recorded waste treatment or disposal sites within 1km of the Site as summarised in Table 5.3.

Table 5.3 Registered Waste Treatment or Disposal Sites within 1km of the site

Operator	Type	Distance from site boundary	Permit No.	Issue Date	Expiry Date
Rank Xerox Ltd	Treatment of acids, alkalis, flammable solvents, industrial effluent sludge, metasilicate solution, oil/water mixtures, toxic/poisonous wastes, waste solvents and contaminated water at an input rate between 10,000 and 25,000 tonnes per year	403m E	82/134 (preceded by 78/042)	May 1984	Not supplied
Polycell Products Ltd	Storage of aqueous effluent waste	885m SE	79/078	June 1979	Not supplied
British Lead Mills	Lead scrapyards with allowed input rate between 25,000 and 75,000 tonnes/a	889m SE	92/302	January 1993	Not supplied
Roche Products Ltd	Drummed storage of chlorinated and unchlorinated solvents (A and B) – max input less than 10,000 tonnes/a	966m SE	86/203	June 1986	Not supplied

5.10 Contemporary Trade Directory Entries & Fuel Stations

The Envirocheck Report provides details of industrial and commercial land uses that are considered to be potentially contaminative within the vicinity of the site.

An abundance of records has been found, relating to historical retail, commercial and light industrial land use which also includes fuel stations. A selection of records considered most relevant, which may aid in giving an impression of typical historic and present-day land use within 500m of the site, are presented in Table 5.4. No active directory entries were found within 100m of the site, although three active entries have been identified within 500m of the site are presented in Table 5.4.

Table 5.4 Contemporary Trade Directory Entries

Name	Distance and Direction from Site (m)	Classification	Status
Done and Dusted	73 NW	Cleaning Services - Domestic	Inactive
I B M (UK) Ltd	88 S	Computer Manufacturers	Inactive
Alpha Air Conditioning	296 NE	Air Conditioning /Refrigeration	Active
United Carpet Cleaning Masters	296 S	Carpet, Curtain and Upholstery Cleaners	Inactive
Mixamate Holdings Ltd	306 S	Concrete Ready Mixed	Inactive
R & R Cleaning Services	355 W	Commercial Cleaning Services	Active
Sketchley Retail Ltd	377 SE	Dry Cleaners	Inactive
Supasnaps	377 SE	Photographic Processors	Inactive
London Boys Scrap Yards	384 SE	Car Breakers & Dismantlers	Inactive
Scrap Car Now Today	396 SE	Car Breakers & Dismantlers	Inactive
Advanced Diagnostic	408 SE	Scientific Apparatus & Instruments - Manufacturers	Inactive
Amalgamated Chartered	408 SE	Commercial Cleaning Services	Inactive
Snappy Snaps	438 SE	Photographic Processors	Inactive
Welwyn Garden City Ltd	482 S	Car Body Repairs	Inactive
Mr Mop Office Cleaning	495 SW	Commercial Cleaning Services	Active

One fuel station has been recorded within 500m of the Site. This relates to the now obsolete Central Garage, located 430m south of the Site.

Two further fuel stations have been identified within 1km of the site, one relating to the Tesco Head Office, 820m northeast and the open Mfg Eastbridge 917m southeast.

6.0 GROUND INVESTIGATION

6.1 Summary of Scope

Ground investigation works were undertaken between the 1st November and 3rd December 2019. The completed investigation consisted of the following scope of work.

- Service clearance using Ground Penetrating Radar and CAT Scanning and surveying using GPS of all exploratory locations.
- Hand excavated inspection pits to a depth of 1.20m bgl at all exploratory hole locations.
- 2No. Cable Percussive Boreholes to depths of 20.00m bgl (BH7) and 25.00m bgl (BH8) with Standard Penetration Testing (SPTs) and recovery of disturbed and undisturbed samples.
- 9No. Windowless sample Boreholes to depths ranging between 3.00 and 6.45m bgl with Standard Penetration Testing (SPTs) and recovery of disturbed samples.
- Installation of 50mm diameter dual-purpose Groundwater and ground gas standpipe monitoring installations; and
- 3No. ground gas monitoring and water sampling monitoring visits.

Exploratory hole locations are indicated on Figure A115249 LDN-N-02-Exploratory Hole Location Plan.

Factual information relating to the work is provided in Appendix D to I.

Standards employed during the investigation were in general accordance with BS5930:2015.

6.2 Summary of Ground Conditions

The encountered ground conditions compared well to those anticipated from published geological maps, and in summary comprised Made Ground, Superficial Deposits, localised Thanet Sand Formation and the White Chalk in deepening succession.

A summary of strata depths and thicknesses is provided in Table 6.1. Detailed soil descriptions provided on the Engineering Logs included in Appendix D.

Table 6.1 Summary of Strata Depths and Thicknesses

Location	Topsoil / Surface Hardstanding		Made Ground		Lowestoft Formation		Thanet Sand Formation		White Chalk	
	From (m bgl)	Thickness (m)	From (m bgl)	Thickness (m)	From (m bgl)	Thickness (m)	From (m bgl)	Thickness (m)	From (m bgl)	Thickness (m)
BH07	GL	0.20	0.20	1.30	1.50	11.70	Not Present		>13.00	7.00
BH08	GL	0.20	0.20	0.50	0.70	15.80	Not Present		>16.30	8.70
WS10	GL	0.27	0.27	0.32	1.26	0.95	2.21	>4.79	Not Encountered	
WS11	GL	0.29	0.29	1.00	1.29	>6.00	Not Encountered			
WS12	Not Present		0.00	1.26	1.26	>2.60	Not Encountered			
WS13	GL	0.05	0.05	1.35	1.4	>5.60	Not Encountered			
WS14	0.00	0.05	0.05	0.24	0.24	2.20	2.64	>2.36	Not Encountered	
WS15	0.00	0.11	0.11	0.27	0.38	3.00	3.00	>1.00	Not Encountered	
WS16	0.00	0.30	0.30	0.86	1.16	2.38	3.54	>3.40	Not Encountered	
WS17	0.00	0.19	Not Present		0.19	2.61	2.80	>3.65	Not Encountered	
WS18	GL	0.20	0.20	1.00	1.20	>3.00	Not Encountered			

6.3 Topsoil / Surface Hard Standing

Topsoil was encountered from ground level in most of the exploratory holes undertaken within areas of soft landscaping. The Topsoil varied in thickness between 0.05 and 0.30m and typically comprised dark brown sandy gravelly clay with rootlets.

Surface hard standing was encountered at ground level in all exploratory holes drilled through the car park and comprised a 0.05 to 0.20m thick layer of bitumen bound macadam (asphalt). In the west of the site (BH07 and WS11) the asphalt overlay a localised 0.08m to 0.22m thick layer of concrete. The surfacing was noted to be in relatively good condition with no excessive cracking or wear noted.

6.4 Made Ground

With the exception of WS17 (located in the north of the site), which encountered Superficial Deposits below the Topsoil layer, the Made Ground was encountered in all exploratory hole locations.

The deposit was variable in composition and comprised a 0.32 to 1.30m thick layer of both predominantly coarse and predominantly fine soils.

With the exception of a fragment of fused ash encountered in the northeast of the carpark area, no significant visual or olfactory signs of contamination were identified.

6.4.1 Made Ground - Coarse

Predominantly coarse soils present below the surface hardstanding in the carpark area comprised a 0.20 to 0.50m thick layer of compacted sandy flint and limestone gravel with occasional brick fragments, which is considered typical of Type 1 road stone subbase layer. WS10 and WS11 (in the NW of the site) encountered a deeper 0.31m to 0.58m thick layer of coarse soils below surface concrete. These soils were variable in composition and comprised brick fill and gravelly sand layers with glass and fused ash fragments.

6.4.2 Made Ground - Fine

Predominantly fine soils were encountered below the coarse Made Ground at depths ranging between 0.20 and 0.60m bgl in the carpark, and where present, below the topsoil at depths ranging between 0.05 and 0.30m bgl in the landscaped areas.

These fine soils varied in thickness between 0.40 and 1.26m and typically comprised yellowish/orangish brown to dark brown sandy gravelly clay. Gravel comprised flints and chalk with brick and concrete fragments. Anthropogenic materials (suggestive of Made Ground) were not encountered in BH07 and WS18, however signs of disturbance were noted, including the presence of chalk gravel, and therefore these soils have been classified as Made ground.

6.5 Superficial Deposits - Lowestoft Formation

Superficial Deposits (the Lowestoft Formation) were encountered below the Made Ground at depths of between 0.19 and 1.50m bgl in all the locations that penetrated the Made Ground. The deposit ranged in thickness between 0.95 and 15.80m bgl and the full thickness was not established in four locations (WS11, WS12, WS13 and WS18). However it was confirmed to be typically significantly thinner in the northeast of the site where the deposits were underlain by the Thanet Sand Formation.

The deposit was variable in composition and typically comprised an upper predominantly fine soil horizon over a lower predominantly coarse soil horizon.

6.5.1 Lowestoft Formation – Fine

The upper predominantly fine Lowestoft Formation soil horizon was confirmed to be between 7.80 and 8.80m thick in BH07 and BH08 in the west of the site respectively.

The deposit typically comprised firm to stiff (and locally soft at shallow levels), orangish brown / grey brown and reddish brown sandy gravelly clay. Gravel comprised sub-angular to rounded, fine to coarse flint and chalk.

6.5.2 Lowestoft Formation – Coarse

Predominantly coarse soils were encountered as both discrete horizons occurring at shallow levels within the fine soils, and as a lower and more substantial soil horizon which was encountered at deeper levels within the cable percussive boreholes.

The shallow, discrete coarse soil horizons typically comprised sandy gravels with subordinate flint gravel occurring within or overlying the predominantly fine soils in WS10, WS13, WS14 and WS17 measuring up to 1m thick. Gravels consisted of angular to rounded, fine to coarse and occasionally cobble size flint.

The depth of these units varied between each location and are therefore assumed to represent discontinuous lenses of sands / gravels within the predominantly fine soils.

The deeper cable percussive boreholes (BH7 and BH8) encountered a 1.6 to 6.8m thick layer of coarse soil overlying the White Chalk. It is considered likely that these lower deposits are closely associated with the underlying White Chalk, potentially forming from extensive weathering and wash out of fines at the surface of the chalk, the variable thickness of which are representative of the typical karstic chalk surface.

These deeper soils comprised reddish brown sand / gravel and sandy gravel. Gravels comprised fine to coarse, angular to rounded flints, with the occasional nodular flint cobbles.

6.6 Lambeth Group - Thanet Sand Formation

Published BGS geological mapping shows encroachment of the Thanet Sand Formation (Lambeth Group) close to the north east site boundary. Localised soils resembling the Thanet Sand Formation in terms of composition were encountered in five locations (WS10, WS14, WS15, WS16 and WS17) within the north and eastern portion of the site at depths ranging from 2.21 to 3.54m bgl.

All exploratory locations progressed into the Thanet Sand Formation were terminated within this unit. The composition of this formation comprised yellowish/orangish brown clayey fine sand or very sandy clay with occasional gravel lenses.

6.7 White Chalk

The White Chalk was encountered in BH07 and BH08 at a depth of 13.00m bgl (87.75mAOD) and 16.30m bgl (82.75m AOD). The deposit persisted to the maximum depth of the investigation (25m bgl) and consequently the full thickness of the deposit was not established.

From the engineer's descriptions the borehole arisings have been described as creamy white structureless chalk composed of slightly gravely sandy silt. Gravel comprised weak fine to coarse chalk fragments with frequent black specks.

The weathering grade of the chalk, as defined in CIRIA C574³, was rendered difficult to determine due to the high level of disturbance of samples recovered during cable percussive drilling. However, based on tentative correlations with SPT N (see Section 7.7), and the materials recovered, it is considered likely that the chalk comprises Grade Dm (matrix dominated) structureless chalk.

6.8 Groundwater

Groundwater was not encountered in any of the exploratory holes during the ground investigation.

6.9 Standard Penetration Testing (SPTs)

SPTs were undertaken in all cable percussion boreholes and window samples. The results are presented on the exploratory hole logs included in Appendix D.

6.10 Falling Head Tests

Falling head tests were not carried out within the exploratory holes during the ground investigation. The rationale supporting the decision to omit falling head tests from the scope was based on the amount of water introduced to the boreholes during drilling. Between 100 and 200 litres of clean water was introduced into each borehole to facilitate drilling through the Lowestoft Formation and this water would fully permeate within 120 seconds. Based on this rapid permeation, indicative permeable characteristics can be assumed across the range of soil strata

³ CIRIA C574 Engineering in Chalk

encountered, although it should be noted that shallow fine soils may have reduced permeability.

6.11 Monitoring

Dual Purpose land gas and groundwater monitoring standpipes were installed within some Windowless sample boreholes WS10, WS11, WS14, WS16, WS18 and in both Cable Percussion boreholes (BH07 and BH08). Installations were constructed using slotted 50mm diameter HDPE standpipe with 325micron filter wrap and 10mm pea-shingle surround. Response zone depths were designed upon the completion of each borehole and are summarised in Table 6.2.

Three return monitoring visits were carried out during the period December 2019 to January 2020.

Groundwater depths recorded during each visit are summarised in Table 6.2 and a detailed record of ground water monitoring is included in Appendix E.

Table 6.2 Summary of Borehole Installation Depths and Groundwater Monitoring

Location ID	Response Top (m bgl)	Response Base (m bgl)	Water Depth Round 1 06.12.2019 (m bgl)	Water Depth Round 2 13.12.2019 (m bgl)	Water Depth Round 3 20.12.2019 (m bgl)
WS10	1.00	2.00	Dry	Dry	Dry
WS11	1.00	3.00	Dry	Dry	Dry
WS14	1.00	3.00	Dry	Dry	2.72
WS16	1.00	6.00	Dry	Dry	Dry
WS18	1.00	6.00	Dry	Dry	Dry
BH07	13.50	19.50	18.53	18.54	18.84
BH08	10.00	16.00	Dry	15.93	15.87

Table 6.3 Summary of Measured Land Gas & Vapour Concentrations

Date of Monitoring	Methane Concentration (% by Vol.)			Carbon Dioxide Concentration (% by Vol.)			Carbon Monoxide Concentration (ppm)			Atmospheric Pressure Trend
	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	
06/12/2019	0.10	<0.01	0.03	9.00	4.00	6.21	7.00	<1	1.43	Falling
13/12/2019	0.20	0.10	0.11	11.6	3.00	6.85	4.00	<1	0.71	Rising
20/12/2019	0.30	0.30	0.30	10.4	2.60	2.34	2.00	<1	0.29	Falling

Land gases including methane, carbon dioxide, oxygen, carbon monoxide and hydrogen sulphide were measured during three monitoring rounds using a GA5000 infra-red land gas analyser. All land gas monitoring results to date are presented in Appendix E and summarised in Table 6.3.

Atmospheric pressure ranged between 969 to 997 mbar during the monitoring rounds which were generally conducted during falling pressure on the first monitoring visit (6th December 2019), rising pressure on the second monitoring visit (13th December 2019) and falling pressure on the third monitoring visit (07th January 2020).

6.12 Geotechnical Laboratory Analysis

Laboratory geotechnical testing was scheduled by WYG and carried out by PSL in accordance with their UKAS accreditation as summarised in Table 6.4. Results and laboratory test certificates are provided in Appendix G.

Table 6.4 Summary of Laboratory Geotechnical Testing

Test	Standard	No.
Moisture Content	BS1377: Part 2: Clause 3.2: 1990	15
Liquid and Plastic Limits of soil	BS1377: Part 2: Clauses 4.4, 5.3 & 5.4: 1990	11
Particle Size Distribution	BS1377: Part 2: Clause 9.2: 1990	9
Dry Density and Saturation Moisture Content	BS1377: Part 2: Clause 7.3: 1990	2

Quick Undrained Triaxial	BS1377: Part 2: Clause 8.1: 1990	9
Point Load	ISRM: 2007	0*
pH /SO ₄	BRE SD1	4
Chemical Testing	Standard	No.
BRE SD1 Suite	BRE SD1, BS1377: Part 3: 1990	4
Organic Matter Content	BS 1377-3:1990	3

* Samples were found unsuitable to carry out testing

6.13 Chemical Laboratory Analysis

The environmental chemistry of the soil samples was investigated by specialist chemical analysis of selected samples, scheduled by WYG, and carried out by ALS Laboratories (ALS) as summarised in Table 6.5.

The suite of testing undertaken was selected to address contaminants commonly occurring on brown field sites and light industrial historical activities.

ALS are an approved supplier in accordance with the requirements of WYG quality system and are themselves UKAS and MCERTS accredited for a range of chemical analyses.

Samples were submitted to the laboratory in six batches during the investigation works. Results and laboratory test certificates are provided in Appendix G.

Table 6.5 Summary of Laboratory Environmental Testing

Test Suite	Determinants	No. Scheduled
WYG Soil Suite B	Arsenic, Boron Cadmium, Chromium (total & hexavalent), Copper, Lead, Mercury, Nickel, Selenium, Zinc, Cyanide (free & total), PAH by GCMS, Total Organic Carbon, pH and Asbestos (screen), Phenols by HPLC and BTEX, TPH CWG.	12

7.0 GROUND MODEL AND GEOTECHNICAL PARAMETERS

7.1 Summary Ground Model

In summary, the following sequence of strata is characteristic of the overall site ground model;

- 1.5m thick Hard Standing / Topsoil / Made Ground;
- Variable thickness of Fine Superficial Deposits;
- Variable thickness of Coarse Superficial Deposits;
- Localised Thanet Sand Formation (North East areas of the Site);
- >15m thick Structureless Grade Dm White Chalk.

No groundwater was encountered during the investigation.

Full descriptions of the soils encountered are provided on the engineering logs with commentary provided in Section 6.0.

7.2 Soil Properties

The ranges of the various soil properties measured via in situ and laboratory testing are summarised in the following sections. Where characteristic values are provided, these are reasonably conservative estimates of a measured or assessed property, usually based on the lower quartile or average value that may be used to represent the overall behaviour of the material.

7.3 Made Ground

The Made Ground was variable and comprised both predominantly coarse and fine soils. A coarse 0.20 to 0.50m thick subbase layer was typically present below the hardstanding carpark areas. However, these were underlain by 0.20 to 0.60m of disturbed fine soils which occurred from ground level in the landscaped areas. In general, there was no other obvious lateral or vertical continuity across the site in terms of composition and these soils are therefore deemed to be uncharacterisable.

7.4 Fine Superficial Deposits (Lowestoft Formation)

Particle size distribution (PSD) testing undertaken on a selection of samples of fine Superficial Deposits has confirmed the engineer's description of the soils as

predominantly fine (clay and silt) with occasional horizons of predominantly coarse soils as indicated on the engineering logs (Appendix D). A summary of PSD tests is provided in Table 7.1.

Table 7.1 Summary of Particle Size Distribution Testing Fine Superficial Deposits

Range Min – Max (%)			
Clay/Silt	Sand	Gravel	Cobbles
74 - 89	10 - 18	0 - 8	0

Atterberg limits, including estimates of material properties ^{ref 4} obtained using published correlations were determined on 11 samples of Fine Superficial Deposits as summarised in Table 7.2.

Table 7.2 Summary of laboratory test results for the Fine Superficial Deposits

	Range (min-max)	Average	Lower quartile	Upper quartile	Characteristic
Moisture Content (%)	15 - 30	19.62	17.5	21	17
Liquid Limit (LL)	34 - 44	39.09	37	42	37
Plastic Limit (PL)	17 - 25	19.55	18	21	18
Plasticity Index (PI)	11 - 23	19.55	19	22	19
Modified PI (PI')	8.2 – 21.56	17.11	16.56	19.8	16
$\phi' (^{\circ})^*$	22.3 - 26.1	23.4	23.5	22.6	23

The characteristic properties indicated in Table 7.2 correspond to fine soils of intermediate plasticity and low volume change potential.

⁴ Based on correlations provided in BS8002: 2015 Code of Practice for Earth Retaining Structures

The range of SPT N obtained from the Fine Superficial Deposits is plotted against depth in Figure 3 and this chart demonstrates a clear increase in both SPT N derived undrained shear strength (Cu)^{ref 5} and laboratory determined Cu with depth.

It is noted that the ground conditions were not conducive to the recovery of undisturbed samples and quick undrained assessment of remoulded samples has been undertaken in their absence. Therefore, laboratory determined CU is likely to be conservative, and the weighting apportioned to laboratory Cu in the derivation of characteristic Cu parameters has been reduced.

A best fit linear relationship has therefore been used to derive characteristic Cu as indicated in Table 7.3.

Table 7.3 Summary of SPT N and Cu - Fine Superficial Deposits

	No. of results	Range (min-max)	Average	Lower Quartile	Characteristic Cu vs depth
SPT N x 4.5 (kPa)	51	30 - >250	107.15	63	Depth(m)/0.0309
Cu (kPa)	9	44-165	92	68	

7.5 Coarse Superficial Deposits (Lowestoft Formation)

Particle size distribution (PSD) testing undertaken on a selection of samples of Coarse Superficial Deposits has confirmed the engineer's description of the soils as predominantly coarse (sand and flint gravel) with occasional horizons of predominantly fine soils as indicated on the engineering logs (Appendix D). A summary of PSD tests is provided in Table 7.4.

Table 7.4 Summary of Particle Size Distribution Testing Coarse Superficial Deposits

Range Min – Max (%)			
Clay/Silt	Sand	Gravel	Cobbles
0 - 37	12 - 80	8 - 69	0

⁵ Stroud and Butler, The Standard Penetration Test and the Engineering Properties of Glacial Materials, 1975

The range and variation of SPT N obtained from Coarse Superficial Deposits is summarised in Table 7.5. The lower SPT N values recorded in the deeper levels of this horizon often correspond to the boundary between the Lowestoft Formation and the highly weathered White Chalk. These lower values have therefore not been considered in the characterisation of these soils, which overall, based on correlation with SPT N, are medium dense to dense. However this contrast zone helps to illustrate the significant change of parameters occurring at this boundary. Table 7.5 also includes characteristic estimates of the angle of shearing resistance (ϕ) based on the correlation by Peck, Hanson and Thornburn ^{ref 6.}

Table 7.5 SPT N values Coarse Superficial Deposits

	No. of results	SPT N Range (min-max)	SPT N Average	SPT N Lower Quartile	Characteristic Value*
SPT N	9	19 - >50	40.44	31.5	31
ϕ (°) ⁷		32.8 - >41.0	38.8	36.5	36

7.6 Thanet Sand Formation

Particle size distribution (PSD) testing undertaken on two samples of the Thanet Sand Formation has confirmed the engineer's description of variable soils comprising predominantly coarse (clayey sand) in WS10 and fine (sandy clay). A summary of PSD tests is provided in Table 7.6.

Table 7.6 Summary of Particle Size Distribution Testing Thanet Sand Formation

Min – Max (%)			
Clay/Silt	Sand	Gravel	Cobbles
12 - 87	13 - 80	0 - 8	0

The range and variation of SPT N and derived characteristics of both fine and coarse Thanet Sand Formation soils is summarised in Table 7.7. SPT N values correlations

⁶ Foundation Engineering, 2nd Edition. Ralph B. **Peck**, Walter E. **Hanson**, Thomas H. **Thornburn**. 1974

and laboratory determined Cu have compared well with the engineer's description of dense to very dense coarse soils and stiff consistency fine soils.

Table 7.7 SPT N values Thanet Sand Formation

	No. of results	SPT N Range (min-max)	SPT N Average	SPT N Lower Quartile	Characteristic Value*
SPT N	17	14 - >50	34.11	26.5	26
ϕ (°) ⁷		31.3 - >41.0	37.2	35.1	35
Cu		Based on $Cu = SPT\ N * 5$			175kPa

Classification testing undertaken on a single sample of the fine Thanet Sand Formation determined the following; LL 42%, PL 20%, PI 22% and PI' 20.60 indicated intermediate plasticity soil of a medium volume change potential.

7.7 White Chalk

The cable percussive boreholes have confirmed that the depth to the White Chalk varies within 60m between 13.00m bgl (87.75mAOD) in BH07 and 16.30m bgl (82.75m AOD). This emphasises the stratum's undulating profile which is considered typical of the White Chalk. This profile is also associated with variable degrees of weathering to variable depths and therefore a detailed characterisation of the White Chalk is hindered by this limited preliminary scope of work.

Given the parameters of the overlying coarse soils which display a typically high relative density, and the relatively low strength of the chalk, this variable depth will need to be a key consideration for the ground model and the development of the design of deep sub structures such as piles

From inspection of the recovered highly disturbed soils the White chalk was confirmed to be relatively uniform in composition (Section 6.7). The general absence of flint is considered important in characterisation as flint horizons can exaggerate SPT N values obtained within a weak chalk matrix. Table 7.8 summarises the range of SPT N values obtained from the White Chalk and it is emphasised that no obvious vertical trend in SPT N value was discernible.

Table 7.8 Summary of SPT N White Chalk

	No. of results	Range (min-max)	Average	Lower Quartile	Characteristic Value*
SPT N	11	4 – 18	11.37	9	9

Point load index (on recovered chalk gravel), intact dry density and saturation moisture content were determined on 2 samples of White Chalk as summarised in Table 7.9.

Table 7.9. Summary of Laboratory Assessment - White Chalk

	Range (min-max)	Average	Characteristic value
Moisture Content (%)	27 - 32	29.5	29
Dry Density (Mg/m ³)	1.46 – 1.51	1.49	1.49
Saturated Moisture Content (%)	29 -31	30	30

From the in-situ testing, laboratory assessment and engineers' descriptions the chalk grade, in accordance with CIRIA C574 is confirmed to be low density Grade Dm throughout the depths investigated.

7.8 Concrete Classification

Chemical tests were undertaken on 10 representative samples from the top 6.00m to determine corresponding Design Sulfate Class (DS), as defined in BRE SD1^{ref 7} and the Aggressive Chemical Environment for Concrete (ACEC) is summarised in Table 7.10.

⁷ BRE Special Digest I Concrete in aggressive ground (SD1: 2005)

Table 7.10 Summary of Chemical Analysis

Range (min – max)			
Acid Soluble Sulfate as % SO ₄	Aqueous Extract Sulfate as mg/l SO ₄	pH	Total Sulfur %
0.0195– 0.0327	9.3 – 55.1	4.58 - 7.8	0.0032-0.0131

The Design Sulfate class is well within the range of DS1 and the pH range of corresponds to an ACEC class within the AC-1s range which would assume a static water condition.

It is noted that the groundwater levels where beyond the depth investigated, however deeper proposed sub structures such as piles may need to consider conditions below the groundwater table where low pH conditions in mobile groundwater would need to be reviewed in line with BRE SD1.

8.0 CONCEPTUAL SITE MODEL AND QUALITATIVE RISK ASSESSMENT

8.1 Introduction

Under the current UK environmental legislation (Environment Act 1995, Water Resources Act 1994, Environmental Protection Act 1990 (as amended), Health and Safety at Work Act 1994, Town and Country Planning Act 1990 and Building Regulations 1985), land is defined as contaminated if there is a significant 'pollutant linkage'. This requires evidence of the presence of a contaminant "source", a "pathway" through which contaminants could travel, and a "receptor" that could be harmed by the contaminant. In addition, the type of receptor and any harm must meet the descriptions of significant harm given in the statutory guidance. A site where a contaminant is causing, or is likely to cause, significant pollution of controlled waters also constitutes contaminated land.

This section of the report presents a Conceptual Site Model (CSM), which includes a qualitative assessment of environmental risks associated with each of the pollutant linkages identified. The tabulated and illustrated CSM is provided in Appendix C.

The qualitative risk assessment is achieved by classifying the likely significance or severity of the risk and the probability of the risk actually occurring, to determine an overall risk for that particular pollutant linkage. The assessment has been undertaken with cognisance of:

- The nature, volume and extent of any identified contamination source;
- The potential pathways;
- Identified primary receptors; and
- Due regard to the current site status and potential future site redevelopment.

8.2 Ground Contamination Tier 1 Screening Assessment

The objective of the Tier 1 Screening Assessment presented herein is to identify the chemical constituents analysed which might potentially pose unacceptable levels of risk to sensitive on-site and off-site receptors. Measured concentrations in soil have been compared with various sets of Tier 1 Screening Values (TSVs). Where measured concentrations exceed these levels, this does not necessarily indicate a

requirement for remediation; it can however, be the trigger for the undertaking of a more detailed quantitative assessment in accordance with the current UK tiered risk assessment framework.

8.2.1 Human Health

Soils

In March 2014, DEFRA published the 'C4SLs' within the 'Policy Companion Document: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination' (SP1010). The purpose of the C4SLs is to identify a concentration in soil indicative of Category 4 status as defined by Part 2a Statutory Guidance⁸ on the definition of contaminated land. In September 2014, further clarification was published in a letter from Lord DeMauley to Local Authorities instructing them to use C4SLs in planning. Where available C4SLs have been used as the preferred choice of screening criteria.

For those constituents where no C4SL has been published by the EA / DEFRA, WYG have screened soil against Suitable for Use Levels (S4ULs)⁹.

For the purposes of this risk assessment human health criteria for soils applicable to a residential end use have been used in order to screen the site data. This is considered conservative in the context of the proposed carpark area, which will retain a hardstand barrier between potential source and human receptors, however it is considered appropriate where continued use of landscaped and soft verge areas will present exposure pathways to the public.

A number of TSVs are dependent on the Soil Organic Matter (SOM) content, and as such TSVs are typically calculated for a SOM of 1%, 2.5% and 6%. SOM of 1.57% was calculated for samples taken from the topsoil and a mean SOM of 0.72% was calculated for samples taken in superficial deposits. For this reason, GACs corresponding to a SOM of 1% have been used for the screening of the samples.

⁸ Published by DEFRA in 2012 the guidance defines four categories of Category 4 is considered the least contaminated; "there is no risk or that the level of risk posed is low"

⁹ Nathaniel C.P., McCaffrey, C., Gillet, A.G., Ogden R.C., and Nathaniel, J.F. 2015. *The LQM/CIEH S4ULs for Human Health Risk Assessment*

8.2.2 Tier 1 – Soil Screening

12No. soil samples obtained from the near surface materials on site were submitted for chemical laboratory analysis. Full copies of laboratory certificates for all soil analysis are included as Appendix H and these results have been screened against the values detailed in Table 8.1.

Based on the proposed end land use for the development the most appropriate screening criteria defined as Residential without plant uptake and a 1% Soil Organic Matter content.

Table 8.1 below summarises the determinands present in the soil samples which exceed their respective screening criteria.

Table 8.1 Soil Screening Results

Contaminant	Units	GAC	No. Samples	No. > GAC	Exceedance Concentration	Location and depth (m bgl) of exceedance
pH		<5, >9	17	4	4.58 4.89 4.91 4.73	WS10 (1.2) WS11 (0.7e) WS17 (0.2-0.3) WS18 (0.7)
Beryllium	mg/kg	1.7	17	1	1.83	WS11 (0.7)
No further exceedances to GAC						

8.2.3 Asbestos Screening

12No. samples were analysed for the presence of asbestos comprising samples from a range of depths. Potential Asbestos Containing Materials (ACMs) were not identified in any sample.

8.2.4 Controlled Waters Reference Criteria

The superficial geology is classified by the Environment Agency (EA) as a Secondary Undifferentiated Aquifer whilst the underlying bedrock is defined as a Principal Aquifer. The nearest groundwater abstraction permit exists 474m east of the site,

relating to Rank Xerox Ltd, allowing abstraction for industrial processing. The site is located within a groundwater Source Protection Zone III.

Groundwater was not encountered during the investigation and therefore no groundwater samples were collected and submitted for laboratory analysis. It is also noted that soil screening confirmed limited evidence of contamination sources within the soils overlying the aquifer (Section 8.2.1), and therefore no further laboratory assessment of the potential for mobilisation of any contamination encountered (e.g. via leachate assessment) has been undertaken.

9.0 GROUND GAS ASSESSMENT

9.1 Introduction

Three return visits to the site were made on the 06th December 2019, 13th December 2019 and 07th January 2020 to undertake land gas monitoring.

A full factual record of the monitoring visits is presented in Section 6.11 and Appendix E.

9.2 Potential Sources

Based on the information obtained as part of the desk study assessment and the findings of the site investigation three potential sources of soil gas have been identified on the site and in the surrounding areas.

As such the potential sources of soil gas are considered to be:

- Made Ground;
- And the underlying White Chalk outgassing via dissolution processes.

9.3 Data Summary

Table 9.1 summarises the minimum and maximum soil gas concentrations and flows obtained during the three monitoring visits. Using the CIRIA C665 guidance on Ground Gas the greatest flow rate and greatest concentrations of ground gases are combined to reflect a worst-case scenario. The ranges of concentrations at each location do not necessarily correspond to the same monitoring date but represent the maximum readings across the monitoring programme to allow an assessment the gas concentrations on a worst case scenario basis.

Table 9.1 Summary of Maximum Monitored Ground Gas Concentrations

Location	Atmos- pheric Pressure (m bar)	Max CH ₄ (peak) (% vol)	Max CO ₂ (peak) (% vol)	Min O ₂ (steady) (% vol)	Max CO (steady) (ppm)	Max H ₂ S (steady) (ppm)	Max BH flow (peak) (l/h)
WS10	1012	0.3	7.6	13.2	<1	<1	0.2
WS11	1012	0.3	9.6	3.3	<1	<1	0.2
WS14	1012	0.3	11.6	9.7	<1	<1	0.4
WS16	1014	0.3	7.6	17.5	<1	<1	0.3
WS18	1012	0.3	7.8	15.0	<1	<1	0.3
BH07	1011	0.3	6.2	3.9	4.0	<1	0.7
BH08	1012	0.3	6.3	13.6	7.0	0.0	-1.3

9.4 Ground Gas Risk Assessment Methodology

The key reference documents which have been used to undertake the semi-quantitative land gas assessment presented in this report are as follows;

- BS 8485 (2015) Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings; and
- CIRIA C665 (2007) Assessing risks posed by hazardous ground gases to buildings.

These documents provide a framework for assessment of land gas risk to buildings/structures with a range of foundation designs. The collected data has been used for the purposes of undertaking a semi-quantitative assessment in accordance with BS8485 methodology, a worst-case assessment has been undertaken with the peak soil gas concentrations recorded during all the monitoring visits used in conjunction with the maximum flow rate.

The calculation used to calculate the borehole hazardous gas flow rate for the site, together with the relevant definition of units, is as follows:

$$\begin{array}{lclcl}
 \textbf{GSV} & = & \textbf{flow rate} & \times & \textbf{gas concentration} \\
 \textbf{Q}_{hg} & = & \textbf{q} & \times & \textbf{C}_{hg} \\
 \text{(litres of gas/hr)} & & \text{(litres per hour)} & & \text{(volume/100)}
 \end{array}$$

9.5 Ground Gas Risk Assessment

Based on the maximum flow recorded of 1.3 l/h and the maximum concentrations of methane and carbon dioxide recorded during the soil gas monitoring the following Hazardous Gas Flow Rates have been calculated (Table 9.2).

Table 9.2 GSV Calculation

Type	Maximum Concentration (%)	Maximum Flow Rate (l/hr)	Q _{hg} (l/hr)	Characteristic Situation
Methane	0.3	1.3	0.0039	CS1 (Very Low Risk)
Carbon Dioxide	11.6	1.3	0.1508	CS2 (Low Risk)

Based on this initial risk assessment the site is considered to be representative of Characteristic Situation 2 (Low Risk).

9.6 Summary

Ground gas monitoring indicates the presence of elevated concentrations of carbon dioxide, up to a maximum concentration of 11.6% v/v. Only minimal flow rates have been recorded (-1.3 l/hr).

Elevated CO₂ levels were also recorded in the deep installation within the White Chalk (BH07) suggesting that the White Chalk is a CO₂ source and that high levels recorded at shallower levels within Made Ground have a natural origin, which is also suggestive of a hydraulic continuity between these materials.

The resultant GSV calculations indicate the site is representative of Characteristic Situation 2, and therefore in the event that buildings are proposed within the development, ground gas protection measures in line with the CS2 classification are likely to be required.

10.0 CONCEPTUAL SITE MODEL

10.1 Introduction

A preliminary conceptual site model (CSM) and qualitative risk assessment was provided as part of the WYG Desk Study Report¹⁰. Updates to the CSM and risk assessment of potential contamination linkages to receptors made based on the intrusive site investigation works, monitoring and laboratory assessment are discussed as follows.

10.2 Summary of Potential Ground Contamination Risk

Based on the review of the available information and ground investigation results, the following potential sources have been identified pertaining to the site.

10.2.1 On-site Sources

The only confirmed source of onsite contamination is the Made Ground within which a single minor exceedance of beryllium was encountered (WS11) and soils have been established to be slightly acidic in localised area of the site. The soils generally showed limited significant visual / olfactory evidence of contamination.

Low pH occurred in 4No. locations but is not considered to present a significant risk to human health as it is only marginally below the general acceptance criteria. After prolonged contact with soils the slightly acidic conditions could cause skin irritation, and the low pH has also been considered in the context of the aggressive chemical conditions for concrete (Section 7.8).

The slight exceedance of Beryllium presents a potential risk in the form of contact, ingestion and primarily dust exposure, which although considered low given the marginal exceedance, does raise the potential of further and more significant localised contamination occurring. It is also noted that although exploratory holes were positioned along the route of the rail siding indicated on historic maps (WS10 and WS18), there was no obvious evidence of the remnants of the railway

¹⁰ WGC Campus West DTS V1 (November 2019)

encountered. Further investigation would be required to confidently confirm the presence / absence of any localised impact from historic activities.

10.2.2 Off-site Sources

Offsite sources can influence on-site soil and groundwater quality in addition to ground gases affecting the site, *if a viable pathway is present*. Potential contaminative sources offsite include the following:

- The adjacent major roads which run next to the site have the potential to have impacted the ground through the introduction of imported soil, or for soils/waters to have been directly impacted from spills on the road.
- The adjacent railway line which historically used asbestos in buildings and infrastructure, imported soils, and fused ash removed from furnaces which can include heavy metals and hydrocarbons.
- Other off-site sources of contamination include the electric power station identified to the southeast of the site, the industrial units to the northeast, the sewage works to the east, and the brick works to the northwest which are all associated with a wide range of contaminants.
- Numerous recorded waste facilities in the areas surrounding the site.

The absence of obvious significant visual / olfactory evidence of contamination during the investigation and the limited exceedance of GAC during tier 1 screening for contaminants typically associated with the above suggests limited potential for impact to the site from the above sources.

10.3 Risk Pathways

Key environmental pathways and exposure routes by which potentially contaminative substances can reach environmental and human health receptors are considered to be:

- Lateral and vertical transport of potentially mobile contaminants as dissolved phase (i.e. leaching through unsaturated strata or lateral transport through advective groundwater flow and/or diffusion which can be facilitated via service ducts and drainage infrastructure).

- Lateral/vertical transport of liquid products (i.e. under gravity via path of least resistance);
- Lateral and vertical migration of gases/vapours via advective flow or through diffusion;
- Atmospheric transport (and potential inhalation) of airborne dusts, vapours and fibres;
- Surface run-off;
- Chemical attack from aggressive contaminants;
- Dermal contact and ingestion of soil and soil derived dust; and
- Plant uptake.

10.4 Receptors

The following are considered to be sensitive receptors:

Human Health Receptors:

- Current Site Users ;
- Construction Workers;
- Future Site Users;
- Adjacent land Users (commercial, residential, industrial);
- Groundwater (Principal and Secondary Aquifers);
- Surface waters (including a stream located 180m E of the site);
- Building materials (concrete foundations and potable water pipes); and
- Soft Landscaping (areas of planting – trees and shrubs).

Appendix C sets out the Qualitative Risk Assessment methodology used to determine the risks levels discussed as follows and summarised in Table C.4 (Appendix C).

10.4.1 Current Site Users

The site currently comprises public and commercial buildings, roads, pavements, car parks with associated managed soft landscaped areas. Much of the site is covered with hardstanding providing a barrier to contact with the underlying Made

Ground. Pathways for direct contact with Made Ground exist in the soft landscaped areas. Therefore, a **Low** (unlikely and mild consequence event) risk has been identified on site from the limited Made Ground source. This is locally upgraded to **Low to Moderate** in areas of managed soft landscaping.

10.4.2 Future Site Users

Although detailed development plans are not available at the time of this assessment, likely proposed Future site users could include car park users and pedestrians in the paved and landscaped areas residents, managed soft landscaping and workers. Only limited potential for areas of contaminated Made Ground and historic contaminant sources have been identified, and it was found that there were elevated levels of CO₂ in the ground from ground gas assessments. This, however, is expected to be from the underlying chalk rather than anthropogenic sources (see Section 9).

Following intrusive investigation and monitoring, no significant sources of contamination have been identified underlying the site and it is appropriate to reduce the risk rating from Moderate in the preliminary assessment, to **Low** (unlikely and mild consequence event) with the assumption that much of the hard stand covering is likely to remain. This is locally upgraded to **Low to Moderate** in areas of managed soft landscaping and this risk can be managed through the importation of adequate Topsoil in landscaped areas. Additionally, the remaining factors of concern, such as the elevated CO₂ levels have been assumed to be mitigated through appropriate design of the proposed car park to current standards of ventilation to deal with exhaust fumes, which will also deal with landgases.

10.4.3 Construction Site Workers

Limited evidence of contamination sources associated with Made Ground and historic industrial activity has been identified on site, however residual risks would still require mitigation during groundworks, where contractors have the potential to be exposed to contaminated soils (including potential asbestos).

Potential exposure to contamination could occur through dermal contact, inhalation and ingestion of soil / dust / fibres (e.g. dermal contact with low pH soils and inhalation of Beryllium dust). Construction workers (including groundworks

contractors) are also potentially at risk of exposure to ground gases, and the potential for hazardous accumulation of gases within excavations should be considered. No significant sources of contamination were identified during the site investigation and the monitoring rounds only identified elevated concentrations of CO₂ which may be occurring naturally as a result of chalk dissolution in the ground.

Any potential exposure to contamination by groundworkers at the site is likely to be of relatively short duration and exposure can be mitigated through implementation of controls, e.g. the implementation of a Construction Environmental Management Plan, including Personal Protective Equipment (including gloves). As a result of these factors, it is considered appropriate to reduce the risk rating to **Low to Moderate**.

10.4.4 Adjacent Land Users

Immediately adjacent land use is primarily residential (west), commercial (east) with landscaped / wooded areas to the north and south. Based on the limited potential for transportation pathways to be present, the risk posed by the site to adjacent land users is considered to be **Low** (unlikely probability of medium consequence event).

The depth, flow direction and baseline condition of the ground water has not been established, however residual risks are largely mitigated by the anticipated depth of the groundwater (>20m bgl), and the presence of a fine soil layer which limits hydraulic continuity. These conditions are likely to continue beyond the site boundary into the immediate surrounds, limiting the risk of exposure.

Note that potential risk of harm to health is perceived as rising to **Moderate** during any future groundworks undertaken as part of site redevelopment due to the potential for dust generation and transport of contaminants as windblown dusts (e.g. Beryllium) / fibres particularly if extensive groundworks are required. It should be possible however to mitigate against these risks by development and implementation of appropriate working strategies and employing relatively basic mitigation measures (dust suppression, stockpile management, boundary monitoring).

10.4.5 Groundwater

Referring specifically to the Superficial Deposits and White Chalk, the Site overlies Secondary A and Principal Aquifers within a Source Protection Zone. These aquifers were identified as sensitive receptors and were therefore considered to be key targets of the scoped intrusive investigations. However, the groundwater proved to be below the limits of the investigation (greater than 25m bgl) and therefore the chemical quality could not be assessed to confirm its quality and whether there has been any historic impact from mobilised contamination.

Notwithstanding the above, only limited potential for contamination sources has been identified by laboratory analysis of the soil samples, and this potential is confined to the Made Ground. Furthermore, pathways to the underlying aquifers are limited by the presence of a layer of low permeability Superficial Deposits and the extent of the separation layer between the Made Ground and the aquifers.

Therefore, the residual risk is considered to be **Moderate** (Unlikely but of a severe consequence). This conservative classification is cognisant of the groundwater depth which was beyond the scoped depth of the investigation, preventing the recovery of groundwater samples and associated laboratory assessment which has resulted in a relatively high degree of uncertainty.

10.4.6 Surface Water

It has not been confirmed whether the nearest surface water feature (located 180m E of the site) is covered, i.e. within a culvert or closed drainage system or remains an open watercourse. Either way, due to the fall in level between the Site and the railway cutting to the north, and the potential connectivity between the carpark storm drain infrastructure and the local watercourses, the risk to surface waters is considered to be **Low to Moderate** (Likely and medium consequence event) and is largely dependent on a well maintained and adequate drainage interceptor system to contain flows of storm water potentially picking up fuel / oil spills and dust washed from the hardstand areas of the carpark.

10.4.7 Building Materials and Services

Building materials in the form of concrete, such as foundations, and services such as potable water pipes may be subject to chemical attack and degradation from

contaminants within near surface soils (aggressive ground), although this is considered unlikely due to the limited evidence of contamination encountered. Characteristic parameters for concrete design are discussed further in Section 12.7.

The risk to building materials is therefore considered to be **Low to Moderate** (low likelihood of a mild consequence event) based on slightly acidic soil conditions having the potential to degrade services.

10.4.8 Soft Landscaping

Trees and shrubs may be affected by phytotoxic contaminants within near surface soils, however there is considered to be limited potential for contaminant sources to be present at the site, and no obvious visual signs of stress to vegetation was noted. Therefore, the risk to soft landscaping across most of the site is considered to be **Low** (low probability of a mild consequence event), providing phytotoxicity of soils is considered for future planting and a suitable growing medium / topsoil is provided where required.

11.0 GEOTECHNICAL CONSIDERATIONS

11.1 Proposed Development

At the time of compilation of this report (during January 2020), the scheme was at concept stage, the details of which were not available, however it was understood that proposals included the development of a decked, two-storey carpark in the existing carpark area with retention of the existing buildings and landscaped areas.

11.2 Chalk Dissolution Features

A key consideration for the selection of foundation types adopted for future large-scale development relates to the potential for weathering features within the White Chalk which could affect the stability of the soils underlying foundations.

A risk assessment indicates that the site has a High risk of chalk dissolution feature related metastability and subsidence (Section 3.2).

With respect to the ground conditions encountered during the investigation, the depth to the surface of the chalk has been confirmed to be of variable depth and in excess of 13.0m bgl in some areas. This variable depth is considered typical of karstic type environments where possible dissolution features, characterised by bedrock depressions, have been identified by the limited deeper investigation information.

CIRIA C574 draws attention to the fact that dissolution of the chalk can cause zones of metastability within the chalk and the overlying superficial deposits, particularly when concentrated groundwater flows are also present.

It is however noted that groundwater was not encountered during the investigation and although the White Chalk surface was variable and displayed variable geotechnical properties, this variance and potential voiding was confined to deeper levels within the chalk itself and the overlying superficial deposits where confirmed to provide a cover of at least 10m of soils which displayed relatively consistent geotechnical properties across the site.

On this basis, when considering conventional shallow foundations, the risks posed by chalk solution metastability are reduced. However it is recommended that conservative parameters (lower bound values) are taken into consideration for the

White Chalk for deeper substructures such as piles (discussed in Section 12.4), and that further local investigation is undertaken to confirm the anticipated conditions to appropriate depths to provide information for detailed design of specific structures.

11.3 Conventional Spread Foundations

Given the discussion presented in Section 11.2, the adoption of conventional spread foundations (e.g. pad or strip foundations) are likely to be viable for smaller scale structures and light broadly distributed loads.

Due to potential variability in composition and consistency of the Topsoil and Made Ground it is anticipated that these soils, if loaded, may give rise to unpredictable and unacceptable total and differential settlements. It is therefore recommended that foundations pass through the Made Ground and bear onto the underlying Superficial Deposits.

In consideration of allowable bearing pressures alone, calculations based on the Brinch Hansen method ^{ref 11} have estimated that a net allowable bearing capacity (NBC) of the order of **140kN/m²** would limit settlement to less than 25mm and could be achieved for a 2m wide strip foundations bearing at a depth of 1.50m bgl within the Lowestoft Formation.

It is noted that this calculation has adopted the conservative parameters of the lower consistency fine soils encountered in the landscaped areas of the site (where characteristic $C_u = 50\text{kN/m}^2$). Higher NBCs are potentially achievable at deeper levels where consistencies typically increase, or in localised areas of the Site where predominantly coarse soils are more prevalent at shallow depth.

It is also noted that the fine Superficial Deposits were determined to be of low volume change potential. Therefore, developments planned within the vicinity of existing trees (or areas of planned tree planting) need consider the recommendations in the document NHBC Chapter 4.2 ^{ref 12} which details the foundation depth required to avoid the zone of influence of various tree types.

¹¹ Brinch Hansen (1970) Referenced in Foundation Design and Construction *M.J. Tomlinson (2001)*

¹² Chapter 4.2 'Building near trees' - NHBC Standards 2011

11.4 Piled Foundations

Piled foundations will be required to support more extensive developments where foundation loads are too high for the adoption of conventional shallow foundations. A choice of pile type of various lengths and diameters can be designed to bear into the strata encountered beneath the site. However general site conditions, environs and proximity to adjacent extant structures and foundations are all influential in choice of piling system.

In consideration of the prevailing conditions and the anticipated scale of the scheme, Continuous Flight Auger (CFA) piles are likely to provide a practical and cost-effective solution due to limited generation of arisings and relatively quick installation. It is noted that certain practical constraints apply, for example when considering the incorporation of pile reinforcement or geothermal exchange systems, and pile emplacement in ground with potential obstructions.

There is also the risk of collapse or necking of the pile bore should the flights be withdrawn and the hole left unsupported (most notably within the coarse Lowestoft Formation and weathered White Chalk). For these reasons it is recommended that a competent and experienced specialist piling contractor undertakes all piling works, adopting appropriate controls and that their advice should be sought at the earliest opportunity.

To provide an indicative assessment of pile capacities for the purposes of this illustrative exercise, variations in strata thickness have been averaged in a simplified model of ground conditions and characteristics as indicated in Table 11.1.

Table 11.1 Ground Model and Parameters used for Preliminary Pile Assessment

Stratum	Made Ground	Lowestoft Formation		White Chalk (Grade Dm)
		Fine	Coarse	
Thickness (m)	2.0	7.0	5.0	10
SPT N	-	20	30	<25
N_q	-	-	60	-
N_c	-	9	-	-
Cu (kN/m²)	-	90	-	-
Q Base (kN/m²)	-	-	-	600
γ (kN/m³)	17	19	19	18
α	-	0.45	-	0.45
β	-	-	0.30	

N_q, N_c: Bearing capacity factors, Cu: Undrained shear strength, γ bulk density, α: adhesion, β : shaft friction coefficient value, Q base: limited to recommended CIRIA values (Chalk only)

It is anticipated that seasonal variations in groundwater levels may occur but that these variations would not be of sufficient magnitude to cause significant short-term effective stress variations. The ground model has consequently assumed an equilibrated groundwater table below the assessment depth.

The competency of the soil profile used for these calculations is based on in situ testing, principally SPTs, where estimation of undrained shear strengths (Cu) of the encountered fine soils have been calculated using the empirical correlation $Cu \text{ (kN/m}^2\text{)} = 5 \times \text{SPT N}$, and the results of direct laboratory determination of shear strength by undrained triaxial compression tests conducted on samples of fine soils.

An adhesion factor (α) of 0.45 has been adopted for the fine soils and chalk and is considered constant and independent of the weathering grade of the chalk.

A key factor influencing the pile capacity is the variable depth of the chalk, and the associated parameters of this stratum will need to be considered in pile capacity assessments at deeper levels, particularly when considering the end bearing contribution to the pile capacity assessment.

CIRIA C574 ^{ref 13} recommends that the unfactored allowable unit area base resistance is restricted to between 600 kN/m² and 800 kN/m² for low density chalk, i.e. where SPT N values are generally less than 25. Based on the low N values determined during the investigation, this limiting parameter applies universally across the site to the maximum depth investigated, and therefore, a value of 600kN/m² has been used for this indicative assessment.

It has been assumed that little or no positive skin friction will be obtained from the Made Ground.

Service capacities for a range of possible founding depths and pile dimensions have been calculated for CFA piles as outlined below in Table 11.2.

Table 11.2 Ground Model and Parameters used for Preliminary Pile Assessment

Base Strata	Pile Embedment Length (m)	Pile Diameter (m)		
		0.30	0.45	0.60
		Service Capacities (kN)	Service Capacities (kN)	Service Capacities (kN)
Lowestoft Fm - Coarse	10.0	370	750	1250
White Chalk	15.0	310	500	730
White Chalk	20.0	490	790	1110

FOS Applied : 1.5 QShaft, 3.5 QBase

Table 11.2 demonstrates that the contribution to the factored shaft capacity from the upper levels of the pile installed through the superficial deposits may not compensate for the potential loss of factored base contribution for piles embedded at deeper levels into the White Chalk.

This results in a 'punch through' effect which leads to initially lower capacities for piles installed into the chalk. In normal circumstances and depending on the dimension and axial load on the pile, a superficial cover depth of at least 5m below

¹³ CIRIA C574: Engineering in Chalk (CIRIA Lord et. al 2002)

the base of the pile would be required to safely ignore the factored and potentially reduced contribution to the base capacity from the underlying chalk.

11.5 Floor Slabs

Ground bearing floor slabs will be susceptible to differential settlements induced by the variable Made Ground and seasonal volume changes which are potentially above typical design tolerance levels. Therefore, based on the current assessment of risk for such features, it is recommended that consideration is given to suspended floor slabs until further development footprint specific testing is undertaken and the risk rating reviewed.

Should the risk of such features be reduced following further localised, structure specific investigation or remedial ground improvement work, floor slabs constructed to bear directly onto the Superficial Deposits and possibly the Made Ground could be considered providing that soils are checked for consistency at formation level.

Owing to the silt content, ground bearing floor slabs for unheated or open structures should be considered to be frost susceptible near to ground level and should therefore incorporate a 300mm layer of compacted granular material to mitigate the potential for damage due to frost heave during extended periods of freezing conditions.

11.6 Pavements

Based on the assessment of available data and with reference to the Design Manual For Roads and Bridges ^{ref 14} indicative CBR values are likely to be variable across the site and will be influenced by the presence by the existing areas of hardstanding and subbase.

Within the existing carpark area, a CBR of greater than 10% might be considered viable within the coarse Made Ground (subbase). However, consideration will also need to be given to the variable composition and thickness of these soils, as there is a risk of localised areas of significantly lower CBR introduced by localised pockets of fine or loose soils.

¹⁴ Highways Design 25/94 Volume 7 Section 2 Table 2.1

A reduced CBR of 1% to 2% will need to be adopted for predominantly fine soils in peripheral landscaped areas of the site.

Ultimately, the risk of local variance is considered to be high and therefore CBR design values will need to be confirmed from in-situ testing along the routes of proposed pavements, with arrangements for stripping and replacement with compacted engineered fill where required in place during earthworks.

11.7 Chemical Attack on Buried Concrete

In summary it is recommended that DS-1 ACEC 1s classification concrete is used for the construction of substructures.

This classification assumes a static groundwater condition as it is considered unlikely that building materials will come into contact with significant groundwater. It is noted however that the groundwater levels were beyond the depth investigated, and deeper proposed sub structures such as piles may therefore need to consider conditions below the groundwater table where potentially low pH conditions in mobile groundwater would need to be reviewed in line with BRE SD1.

11.8 Temporary Works

Shallow excavations remained stable during the investigation, however, owing to the variability of the shallow soils, there is potential for excavations to be unstable. It is therefore likely that temporary excavations will require battering back during excavation, and in line with good working practices, man entry into excavations greater than 1.2m deep should only be carried out where shoring is in place.

Shallow groundwater was not encountered during the investigation; however, it is anticipated given the nature of shallow depth material, that there is a high potential for perched water ingress particularly after prolonged periods of precipitation and dewatering may therefore be a requirement. It is recommended that dewatering is undertaken in accordance with the guidelines of CIRIA C515 Groundwater control – Design and Practice.

12.0 CONCLUSIONS

12.1 Risk Assessment Summary

Geoenvironmental

Based on the conceptual site model and qualitative assessment of pollutant linkages discussed in Section 10 the following risk levels have been assigned. These risks relate to future long-term use of the site and temporary risks during redevelopment activities. The risk levels have been assigned without consideration of remediation / risk management activities:

- Current Site Users – **Low** (Low to Moderate in areas of landscaping)
- Future Users – **Low** (Low to Moderate in areas of landscaping)
- Construction Site Workers – **Low** (on implementation of CDM)
- Adjacent Site Users – **Low** (Moderate during ground works)
- Groundwater – **Moderate**
- Surface Waters – **Low to Moderate**
- On-site buildings and services – **Low** (Moderate in mobile groundwater conditions)
- Soft Landscaping – **Low**

It should be noted that where a range of risks were identified in relation to a receptor, a worst-case scenario has been adopted. In summary, the overall risk to the human health of present and future site users and environmental receptors in terms of ground contamination present by this site is considered to be **Low** as a result of the limited contamination encountered and the range of potential contaminant sources, both on and off the defined site.

The most significant residual risk is associated with the underlying aquifer, and regulators may need further information to review this risk at planning stage. Further intrusive investigations may therefore be required to establish the baseline condition and any potential impact from the Made Ground and leachable contaminants to the aquifer, particularly if piled foundations are considered which could create additional pathways from the Made Ground.

Ground gas risks will be mitigated through adherence to CIRIA guidance and the general venting typical of this kind of development, however further consideration may be required where enclosed spaces are proposed.

Geotechnical

It is understood that a two-storey decked carpark development is proposed and the loads and load configuration have not been confirmed at this stage.

Based on the encountered conditions key geotechnical risks are summarised as follows:

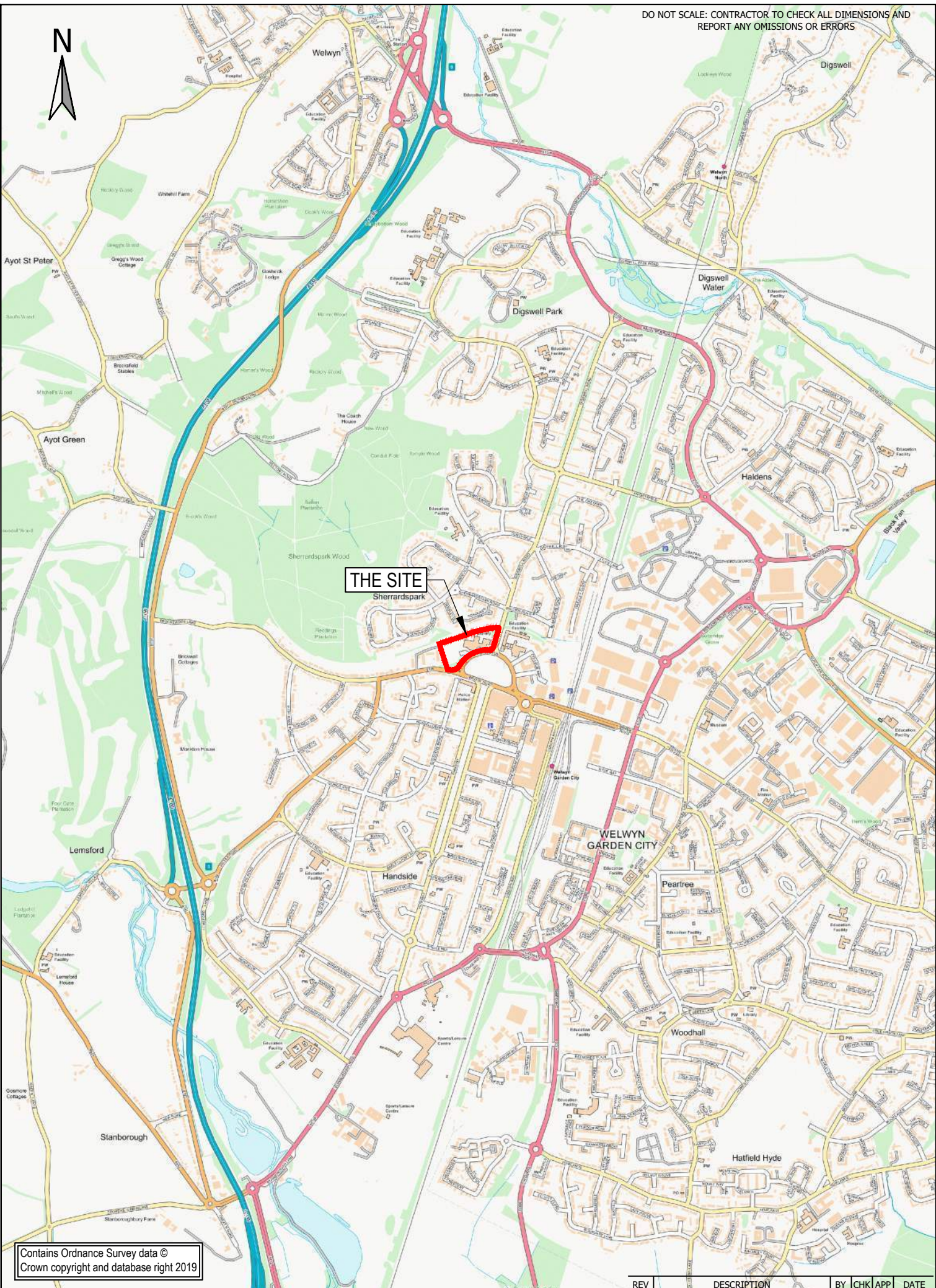
- Metastability (chalk solution features) – **High**
- Variable soils (Made Ground/ Superficial Deposits) – **Low to Medium**
- Remnant Substructures (hard spots and voids) – **Medium**
- Shrinkable soils (near to existing / proposed trees) – **Medium**

Depending on the type of structure and load distribution, the investigation has shown that near surface soils may have sufficient bearing capacity for use of traditional shallow foundations. However, where structural loads are beyond the capacity of conventional shallow foundations constructed to bear upon near surface soils, piled foundations may need to be considered. Piled capacities will be dependent on localised conditions, most notably the depth and characteristics of the underlying chalk, and further local investigation may be required to inform detailed design of piles at specific locations.

Figures

Figure 1 – Site Location Plan

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND
REPORT ANY OMISSIONS OR ERRORS



THE SITE
Sherrardspark

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REV	DESCRIPTION	BY	CHK	APP	DATE
-----	-------------	----	-----	-----	------

11th FLOOR
1 ANGEL COURT
LONDON
EC2R 7HJ

TEL: +44 (0)20 7250 7500
e-mail: london@wyg.com



Client:
**WELWYN HATFIELD BOROUGH
COUNCIL**

Project: A115249
WGC TOWN CENTRE

Drawing Title:
SITE LOCATION PLAN

Scale @ A4 1:20,000	Drawn CM	Date 03.12.19	Checked	Date	Approved	Date
Project No. A115249	Office LDN	Type N	Drawing No. 02	Revision		

Figure 2 – Site Investigation Layout Plan



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REPORT ANY OMISSIONS OR ERRORS

KEY



SITE BOUNDARY?



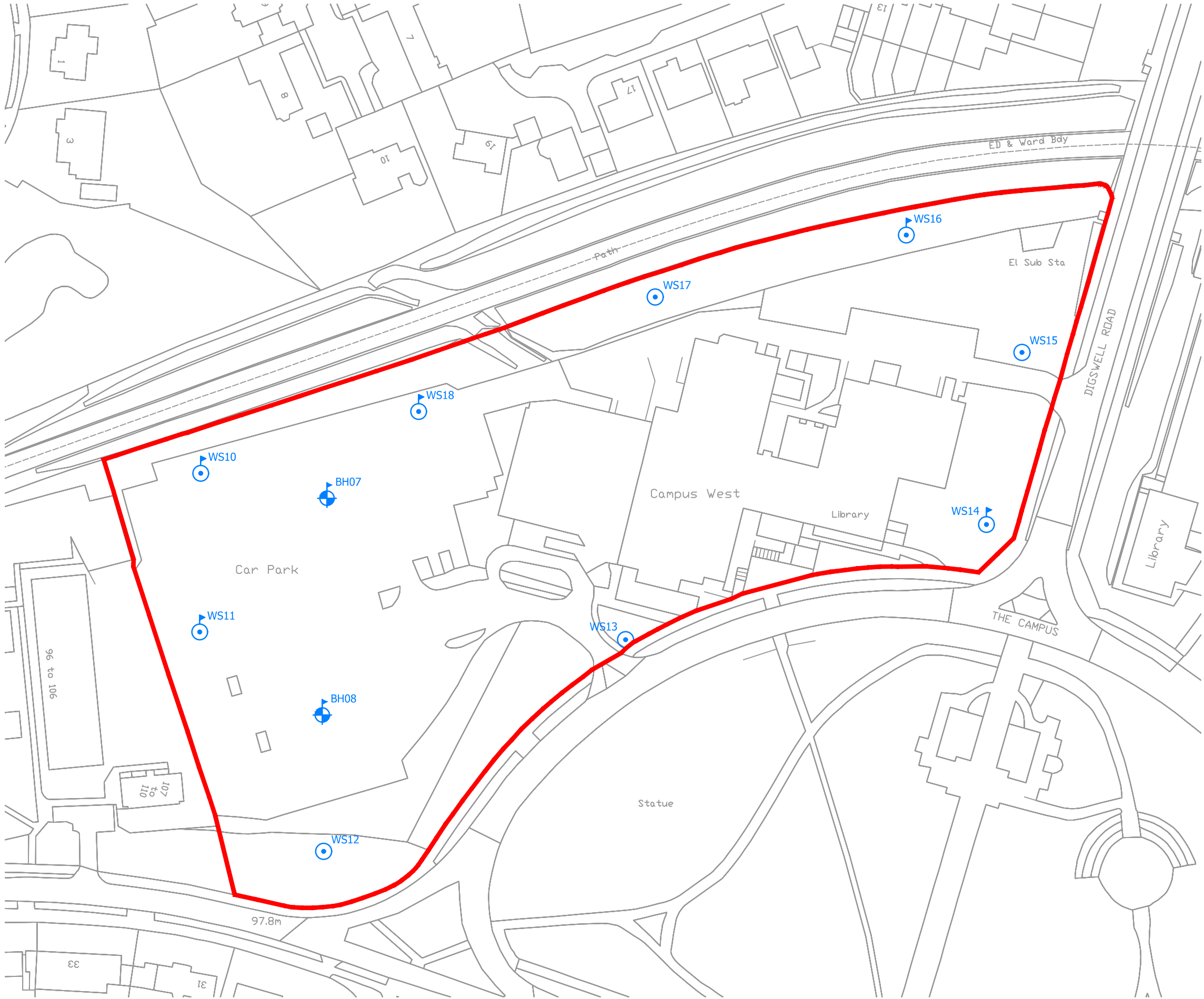
CABLE PERCUSSION
BOREHOLE



WINDOW SAMPLE



MONITORING
INSTALLATION



0 10 20 30 40 50m
SCALE 1:1000

REV	DESCRIPTION	BY	CHK	APP	DATE
-----	-------------	----	-----	-----	------

Client:
WELWYN HATFIELD BOROUGH COUNCIL

11th FLOOR
1 ANGEL COURT
LONDON
EC2R 7HJ

TEL: +44 (0)20 7250 7500
e-mail: london@wyg.com



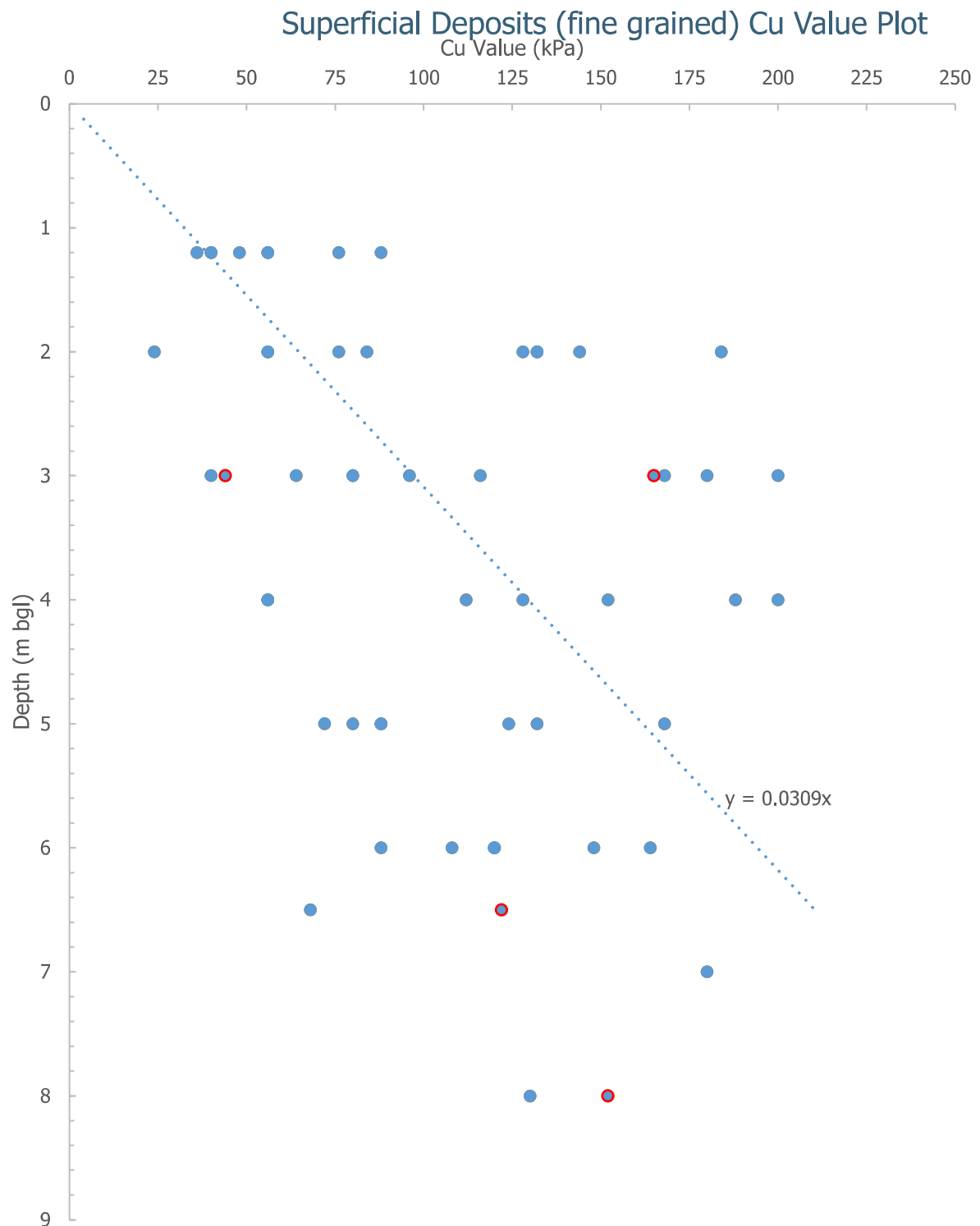
Project: A115249
WGC CAMPUS WEST

Drawing Title:
EXPLORTORY HOLE LOCATION PLAN

Scale @ A3 1:1,000	Drawn CM	Date 17.01.20	Checked Date	Approved Date
Project No. A115249	Office LDN	Type N	Drawing No. CW/02	Revision

Figure 3 – Shear Strength and SPT N Value Plot

Figure 3 – SPT N and Cu Values – Superficial Deposits
(Fine Grained)



Note:

- Cu calculated from quick undrained laboratory assessment
- Cu based on correlation by Stroud and Buttler

Appendices

Appendix A - Report Conditions

APPENDIX A - REPORT CONDITIONS

GROUND INVESTIGATION

This report is produced solely for the benefit of Welwyn Garden City and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

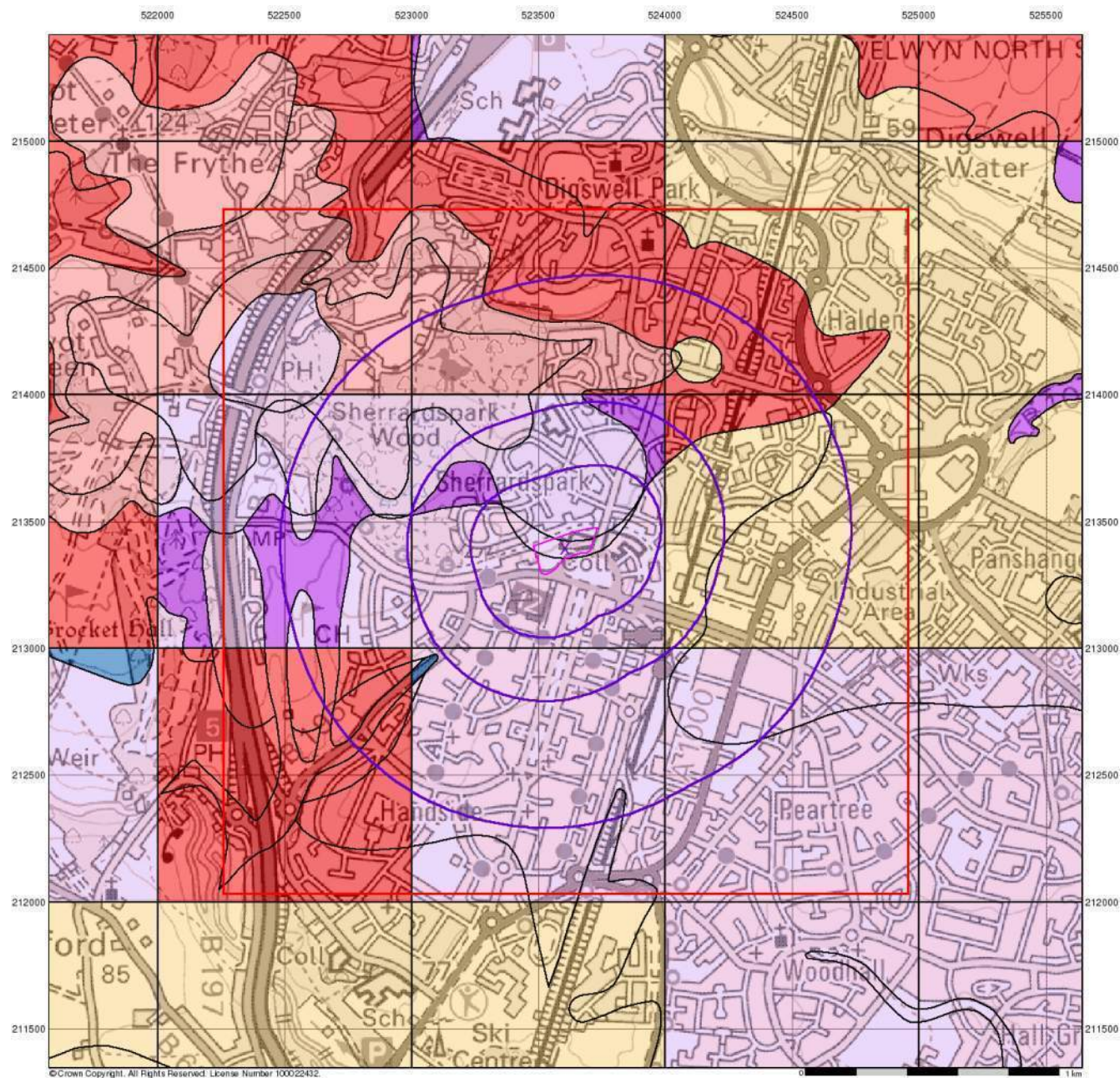
This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categorical assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYG. In time improved practices or amended legislation may necessitate a re-assessment.

The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.






Appendix B – Envirocheck Report



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Groundwater Vulnerability

General

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


Agency and Hydrological

Bedrock Aquifers

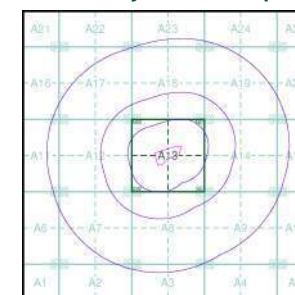
- | | | | |
|---|---|---|---|
|  | High Vulnerability, Principal Aquifer |  | High Vulnerability, Principal Aquifer |
|  | High Vulnerability, Secondary Aquifer |  | High Vulnerability, Secondary Aquifer |
|  | Medium Vulnerability, Principal Aquifer |  | Medium Vulnerability, Principal Aquifer |
| 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

Superficial Aquifers

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

- Unproductive Aquifer
 Soluble Rock

Site Sensitivity Context Map - Slice A



Order Details

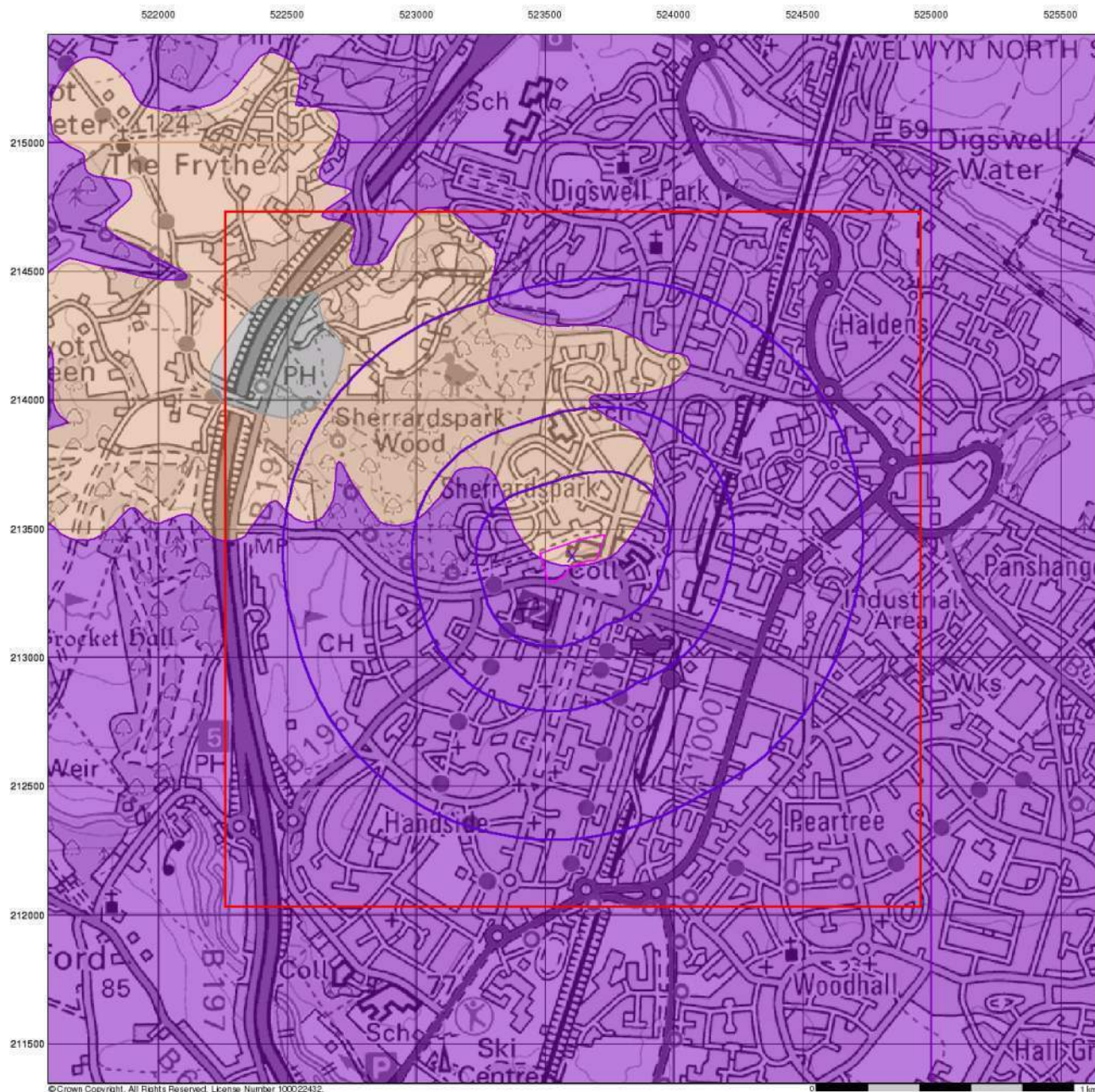
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Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 1000

Site Details

Site at, Welwyn Garden City, Hertfordshire

Landmark
INFORMATION GROUP

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



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0 1 km

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Bedrock Aquifer Designation

General

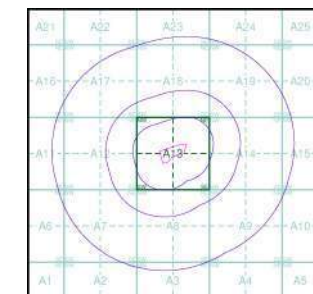
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A



Order Details

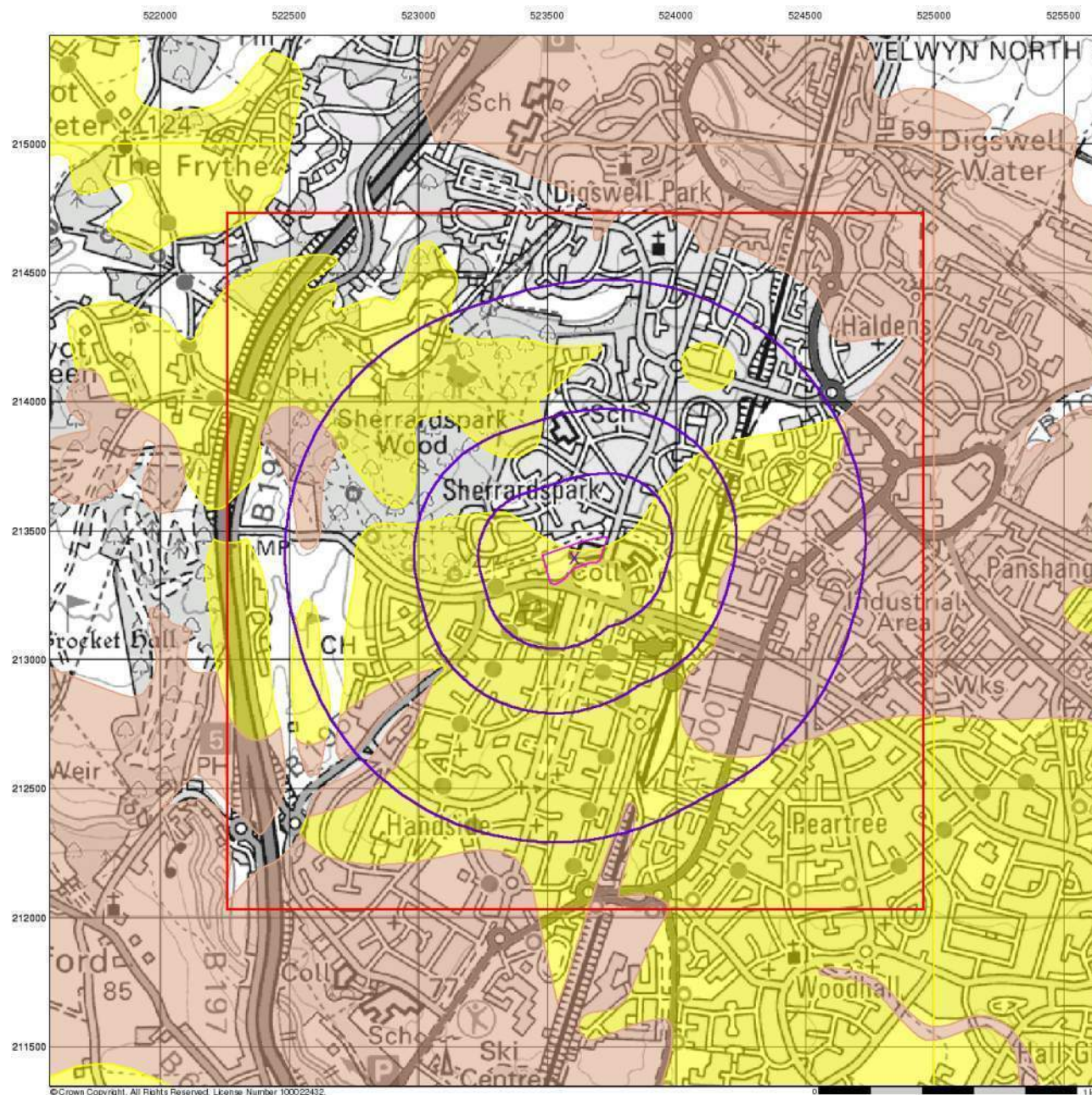
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 National Grid Reference: 523600, 213390
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 Site Area (Ha): 2.31
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Superficial Aquifer Designation

General

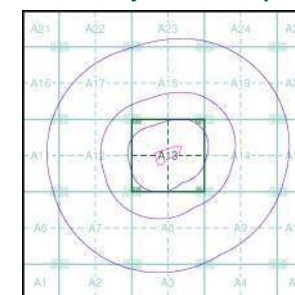
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  Specified Buffer(s)
  Bearing Reference Point
 Slice
 Map ID

Agency and Hydrological

Geological Classes

-  Principal Aquifer
-  Secondary A Aquifer
-  Secondary B Aquifer
-  Secondary Undifferentiated
-  Unproductive Strata
-  Unknown
-  Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A



Order Details

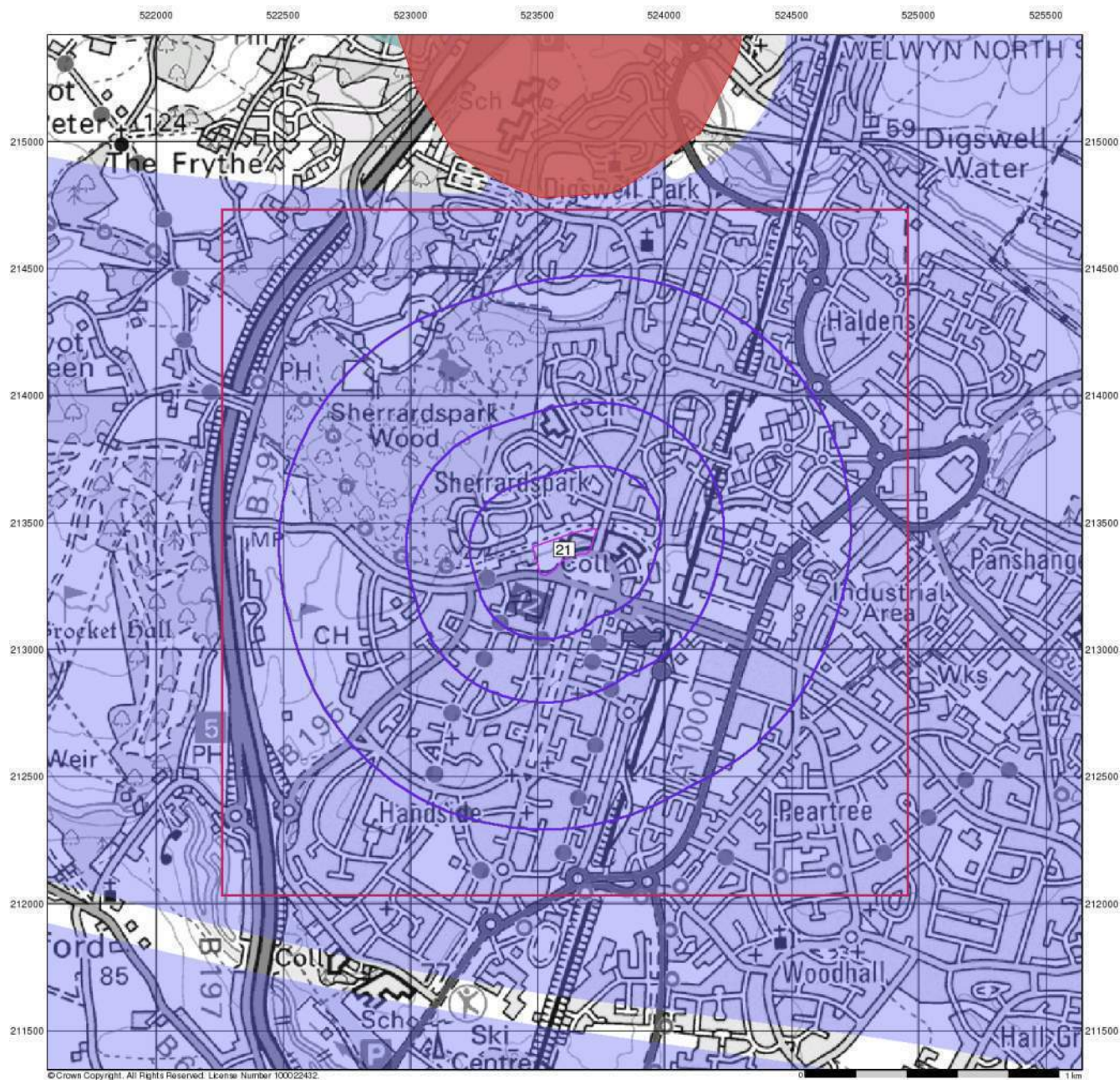
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National Grid Reference: 523600, 213390
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Source Protection Zones

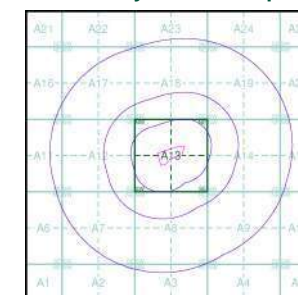
General

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

Agency and Hydrological

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

Site Sensitivity Context Map - Slice A



Order Details

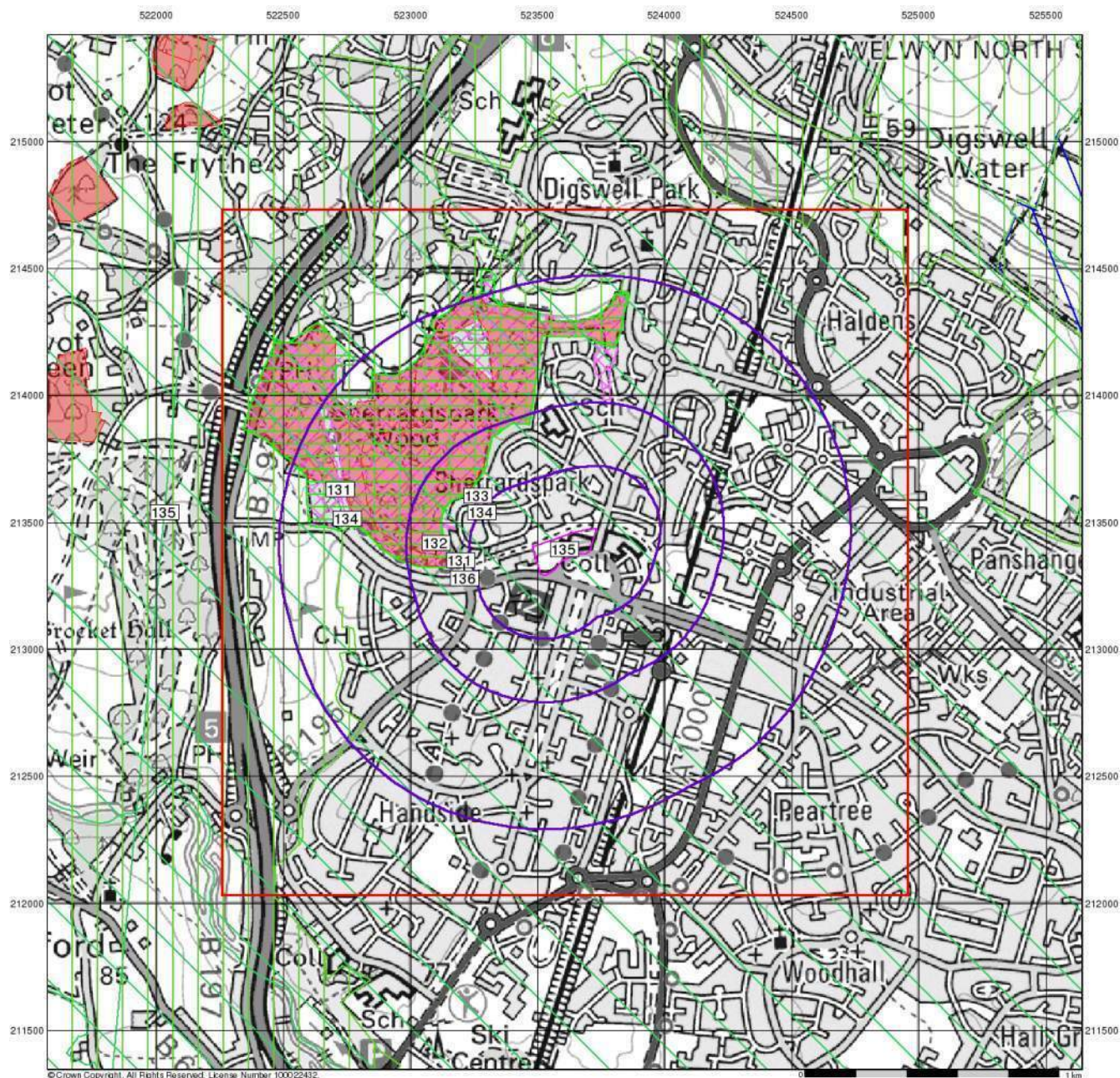
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 National Grid Reference: 523600, 213390
 Slice: A
 Site Area (Ha): 2.31
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Sensitive Land Uses

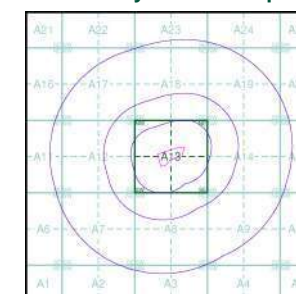
General

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

Sensitive Land Uses

- Ancient Woodland
- Area of Adopted Green Belt
- Area of Unadopted Green Belt
- Area of Outstanding Natural Beauty
- Environmentally Sensitive Area
- Forest Park
- Local Nature Reserve
- Marine Nature Reserve
- National Nature Reserve
- N National Park
- Nitrate Sensitive Area
- Nitrate Vulnerable Zone
- Ramsar Site
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area
- World Heritage Sites

Site Sensitivity Context Map - Slice A



Order Details

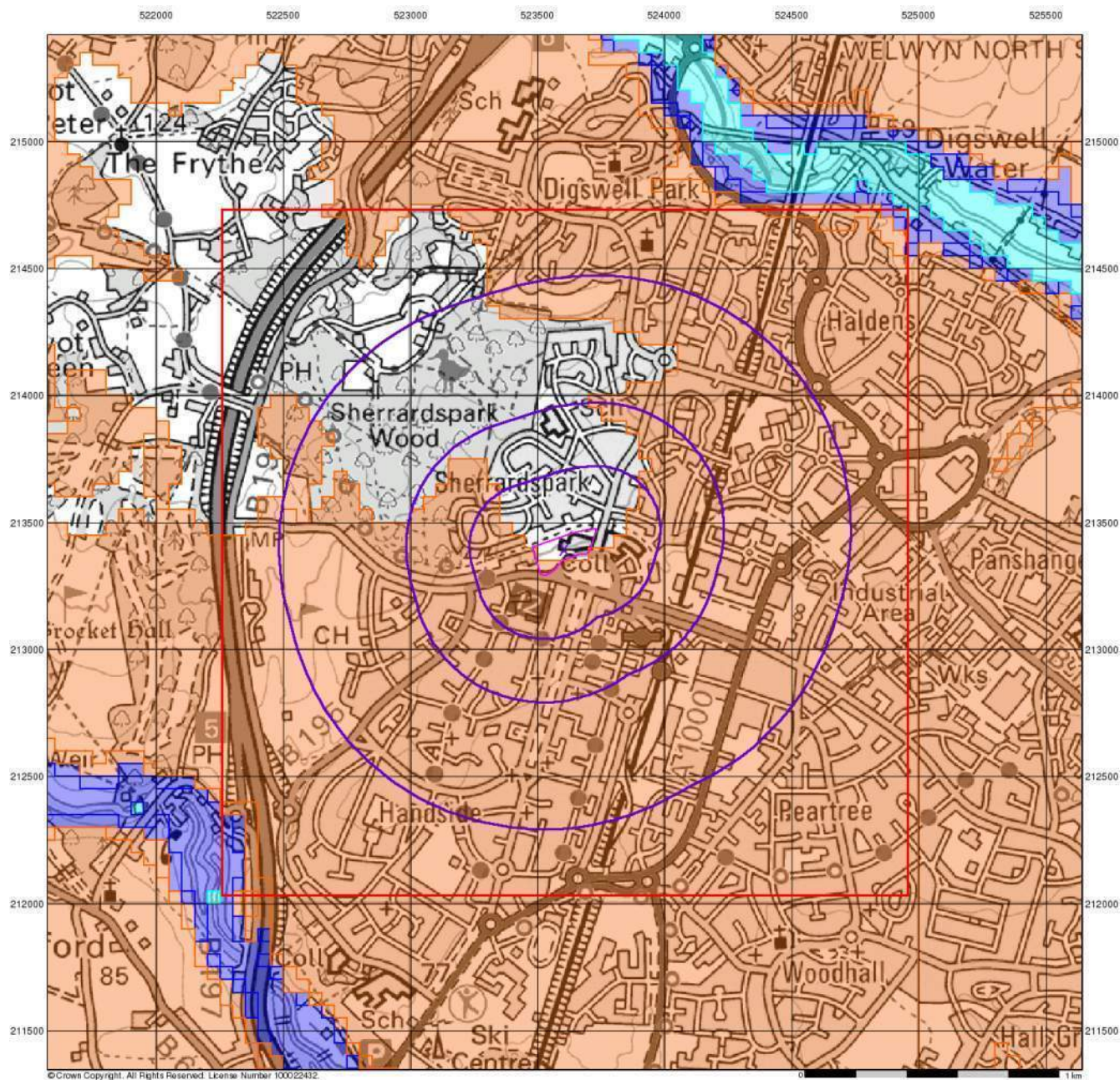
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 National Grid Reference: 523600, 213390
 Slice: A
 Site Area (Ha): 2.31
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BGS Flood GFS Data

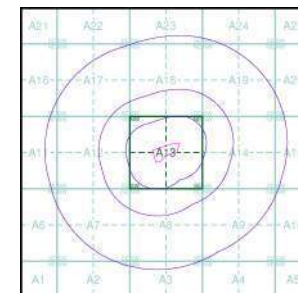
General

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

Agency and Hydrological (Flood)

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice A



Order Details

Order Number: 219955306_1_1
 Customer Ref: A115249 WGC Campus West
 National Grid Reference: 523600, 213390
 Slice: A
 Site Area (Ha): 2.31
 Search Buffer (m): 1000

Site Details

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Datasheet

Order Details:

Order Number:

219955306_1_1

Customer Reference:

A115249 WGC Campus West

National Grid Reference:

523600, 213390

Slice:

A

Site Area (Ha):

2.31

Search Buffer (m):

1000

Site Details:

Site at

Welwyn Garden City

Hertfordshire

Client Details:

Mr D Perera

WYG Environment Planning Transport Ltd

1 Angel Court

London

EC2R 7HJ

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	18
Hazardous Substances	22
Geological	23
Industrial Land Use	29
Sensitive Land Use	43
Data Currency	44
Data Suppliers	49
Useful Contacts	50

Introduction

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

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Report Version v53.0

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1	Yes			n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1			1	
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls	pg 1				7
Integrated Pollution Prevention And Control	pg 2				8
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 4			1	4
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 4		Yes		
Pollution Incidents to Controlled Waters	pg 4				3
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances	pg 5				20
River Quality					
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register					
Water Abstractions	pg 8			1	7 (*9)
Water Industry Act Referrals	pg 13				2
Groundwater Vulnerability Map	pg 13	Yes	n/a	n/a	n/a
Groundwater Vulnerability - Soluble Rock Risk	pg 13	1	n/a	n/a	n/a
Bedrock Aquifer Designations	pg 13	Yes	n/a	n/a	n/a
Superficial Aquifer Designations	pg 14	Yes	n/a	n/a	n/a
Source Protection Zones	pg 14	1			
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
OS Water Network Lines	pg 14		3	5	19

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)	pg 18				2
Local Authority Landfill Coverage	pg 18	2	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Registered Landfill Sites	pg 18				1
Registered Waste Transfer Sites	pg 19				1
Registered Waste Treatment or Disposal Sites	pg 19			2	3
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)	pg 22				2
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)	pg 22				1
Planning Hazardous Substance Consents	pg 22				1
Planning Hazardous Substance Enforcements					
Geological					
BGS 1:625,000 Solid Geology	pg 23	Yes	n/a	n/a	n/a
BGS Recorded Mineral Sites	pg 23				3
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities	pg 23				1
Natural Cavities	pg 23		1	2	20
Non Coal Mining Areas of Great Britain	pg 27	Yes		n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 27	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards	pg 27	Yes	Yes	n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 27	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 27	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 27	Yes		n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Industrial Land Use					
Contemporary Trade Directory Entries	pg 29		2	21	121
Fuel Station Entries	pg 42			1	2
Gas Pipelines					
Underground Electrical Cables					
Sensitive Land Use					
Ancient Woodland	pg 43			2	
Areas of Adopted Green Belt	pg 43			1	
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves	pg 43		1		
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 43	1			
Ramsar Sites					
Sites of Special Scientific Interest	pg 43			1	
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13SW (S)	0	1	523605 213350
1	Discharge Consents Operator: Cbx Property Type: MAKING OF COMPUTERS/ELECTRONICS/OPTICAL PRODUCTS Location: Rank Xerox Ltd, Bessemer Road, Welwyn Garden City, Hertfordshire Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: CNTW.1270 Permit Version: 1 Effective Date: 30th October 1991 Issued Date: 30th October 1991 Revocation Date: 31st March 1996 Discharge Type: Miscellaneous Discharges - Mine / Groundwater As Raised Discharge Environment: Land/Soakaway Receiving Water: Chalk Status: Consent expired Positional Accuracy: Located by supplier to within 100m	A14NW (E)	475	2	524200 213395
2	Integrated Pollution Controls Name: British Lead Mills Ltd Location: Peartree Lane, WELWYN GARDEN CITY, Hertfordshire, AL7 3UB Authority: Environment Agency, Thames Region Permit Reference: BD1601 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 2.2 A (E) Non-ferrous Metal processes within the Metal Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	A9NE (SE)	890	2	524458 212910
2	Integrated Pollution Controls Name: British Lead Mills Ltd Location: Peartree Lane, WELWYN GARDEN CITY, Hertfordshire, AL7 3UB Authority: Environment Agency, Thames Region Permit Reference: AR7009 Dated: 15th September 1995 Process Type: IPC application for process that was regulated by HMIP for air releases under previous legislation Description: 2.2 A (E) Non-ferrous Metal processes within the Metal Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	A9NE (SE)	890	2	524458 212910
2	Integrated Pollution Controls Name: British Lead Mills Ltd Location: Peartree Lane, WELWYN GARDEN CITY, Hertfordshire, AL7 3UB Authority: Environment Agency, Thames Region Permit Reference: AW7371 Dated: 31st July 2001 Process Type: IPC minor (non-substantial) variation to previous variation Description: 2.2 A (E) Non-ferrous Metal processes within the Metal Industry Status: Revoked - Now IPPC Positional Accuracy: Automatically positioned to the address	A9NE (SE)	897	2	524463 212905
3	Integrated Pollution Controls Name: Roche Products Ltd Location: 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AX Authority: Environment Agency, Thames Region Permit Reference: AJ9776 Dated: 14th February 1994 Process Type: IPC new application Description: 4.2 A (D) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	A9SW (SE)	920	2	524068 212536
3	Integrated Pollution Controls Name: Roche Products Ltd Location: 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AX Authority: Environment Agency, Thames Region Permit Reference: BG4844 Dated: 29th February 2000 Process Type: IPC major (substantial) variation Description: 4.2 A (D) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation revoked Positional Accuracy: Manually positioned to the road within the address or location	A9SW (SE)	922	2	524073 212536

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
3	Integrated Pollution Controls Name: Roche Products Ltd Location: 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AY Authority: Environment Agency, Thames Region Permit Reference: AX5668 Dated: 17th December 1996 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (D) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Application has met the requirements for authorisation (but not yet authorised) Positional Accuracy: Manually positioned to the road within the address or location	A9SW (SE)	924	2	524068 212531
3	Integrated Pollution Controls Name: Roche Products Ltd Location: 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3SP Authority: Environment Agency, Thames Region Permit Reference: BC6241 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.2 A (D) Manufacture and use of Organic Chemicals within the Chemical Industry Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	A9SW (SE)	927	2	524073 212531
4	Integrated Pollution Prevention And Control Name: H J Enthoven Limited Location: British Lead Mills Epr/BI8317ik, Peartree Lane, WELWYN GARDEN CITY, Hertfordshire, AL7 3UB Authority: Environment Agency - South East Region, North East Thames Area Permit Reference: XP3235JX Original Permit Ref: BI8317ik Effective Date: 29th January 2018 Status: Effective Application Type: Variation App. Sub Type: Standard Positional Accuracy: Automatically positioned to the address Activity Code: 2.2 A(1) (B) (I) Activity Description: Non-Ferrous Metals; Melting With Capacity Greater Than 4T/D Lead/Cadmium Or 20T/D Others Primary Activity: Y	A9NE (SE)	890	2	524458 212910
4	Integrated Pollution Prevention And Control Name: British Lead Mills Ltd Location: Wgc Lead Recovery Process, Peartree Lane, WELWYN GARDEN CITY, Hertfordshire, AL7 3UB Authority: Environment Agency - South East Region, North East Thames Area Permit Reference: PP3138CR Original Permit Ref: BI8317ik Effective Date: 15th October 2012 Status: Superseded By Variation Application Type: Variation App. Sub Type: Simple Standard Variation Positional Accuracy: Automatically positioned to the address Activity Code: 2.2 A(1) (B) (I) Activity Description: Non-Ferrous Metals; Melting With Capacity Greater Than 4T/D Lead/Cadmium Or 20T/D Others Primary Activity: Y	A9NE (SE)	890	2	524458 212910
4	Integrated Pollution Prevention And Control Name: British Lead Mills Ltd Location: Wgc Lead Recovery Process, Peartree Lane, WELWYN GARDEN CITY, Hertfordshire, AL7 3UB Authority: Environment Agency - South East Region, North East Thames Area Permit Reference: SP3034UX Original Permit Ref: BI8317ik Effective Date: 27th March 2008 Status: Superseded By Variation Application Type: Variation App. Sub Type: Simple Standard Variation Positional Accuracy: Automatically positioned to the address Activity Code: 2.2 A(1) (B) (I) Activity Description: Non-Ferrous Metals; Melting With Capacity Greater Than 4T/D Lead/Cadmium Or 20T/D Others Primary Activity: Y	A9NE (SE)	890	2	524458 212910

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
4	Integrated Pollution Prevention And Control Name: British Lead Mills Ltd Location: Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UB Authority: Environment Agency, Thames Region Permit Reference: SP3034UX Original Permit Ref: BI8317ik Effective Date: 27th March 2008 Status: Effective Application Type: Variation App. Sub Type: Simple Standard Variation Positional Accuracy: Automatically positioned to the address Activity Code: 2.2 A(1) (B) (I) Activity Description: Non-Ferrous Metals; Melting With Capacity Greater Than 4T/D Lead/Cadmium Or 20T/D Others Primary Activity: Y	A9NE (SE)	890	2	524458 212910
4	Integrated Pollution Prevention And Control Name: British Lead Mills Ltd Location: Wgc Lead Recovery Process, Peartree Lane, WELWYN GARDEN CITY, Hertfordshire, AL7 3UB Authority: Environment Agency - South East Region, North East Thames Area Permit Reference: BX4739IA Original Permit Ref: BI8317ik Effective Date: 23rd June 2004 Status: Superseded By Variation Application Type: Variation App. Sub Type: Standard Positional Accuracy: Automatically positioned to the address Activity Code: 2.2 A(1) (B) (I) Activity Description: Non-Ferrous Metals; Melting With Capacity Greater Than 4T/D Lead/Cadmium Or 20T/D Others Primary Activity: Y	A9NE (SE)	890	2	524458 212910
4	Integrated Pollution Prevention And Control Name: British Lead Mills Ltd Location: Wgc Lead Recovery Process, Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UB Authority: Environment Agency, Thames Region Permit Reference: Bx4739ia Original Permit Ref: BI8317ik Effective Date: 23rd June 2004 Status: Superseded By Variation Application Type: Variation App. Sub Type: Standard Positional Accuracy: Automatically positioned to the address Activity Code: 2.2 A(1) (B) (I) Activity Description: Non-Ferrous Metals; Melting With Capacity Greater Than 4T/D Lead/Cadmium Or 20T/D Others Primary Activity: Y	A9NE (SE)	890	2	524458 212910
4	Integrated Pollution Prevention And Control Name: British Lead Mills Ltd Location: Wgc Lead Recovery Process, Peartree Lane, WELWYN GARDEN CITY, Hertfordshire, AL7 3UB Authority: Environment Agency - South East Region, North East Thames Area Permit Reference: BL8317IK Original Permit Ref: BI8317ik Effective Date: 20th December 2002 Status: Superseded By Variation Application Type: Application App. Sub Type: New Positional Accuracy: Automatically positioned to the address Activity Code: 2.2 A(1) (D) (I) Activity Description: Non-Ferrous Metals; Producing Etc Lead And Alloys With Release To Air Primary Activity: Y	A9NE (SE)	890	2	524458 212910
4	Integrated Pollution Prevention And Control Name: British Lead Mills Ltd Location: Wgc Lead Recovery Process, Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UB Authority: Environment Agency, Thames Region Permit Reference: BI8317ik Original Permit Ref: BI8317ik Effective Date: 20th December 2002 Status: Superseded By Variation Application Type: Application App. Sub Type: New Positional Accuracy: Automatically positioned to the address Activity Code: 2.2 A(1) (D) (I) Activity Description: Non-Ferrous Metals; Producing Etc Lead And Alloys With Release To Air Primary Activity: Y	A9NE (SE)	890	2	524458 212910

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
5	Local Authority Pollution Prevention and Controls Name: Welwyn Dry Cleaners Location: 37 Wigmores North, Welwyn Garden City, AL10 9rq Authority: Welwyn Hatfield District Council, Environmental Health Department Permit Reference: Not Supplied Dated: 1st November 2011 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning Status: Permitted Positional Accuracy: Manually positioned to the address or location	A8NE (SE)	337	3	523766 213041
6	Local Authority Pollution Prevention and Controls Name: Johnson The Cleaners Location: 43 Fretherne Road, Welwyn Garden City, AL8 6ny Authority: Welwyn Hatfield District Council, Environmental Health Department Permit Reference: Not Supplied Dated: Not Supplied Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning Status: Permitted Positional Accuracy: Manually positioned to the address or location	A8NE (S)	526	3	523820 212849
7	Local Authority Pollution Prevention and Controls Name: Tesco Stores Ltd Location: Cirrus Building, Shire Park, Welwyn Garden City, Hertfordshire, AL7 1AB Authority: Welwyn Hatfield District Council, Environmental Health Department Permit Reference: LN000315 Dated: 1st June 2001 Process Type: Local Authority Air Pollution Control Description: PG1/14 Petrol filling station Status: Authorised Positional Accuracy: Manually positioned to the address or location	A19SE (E)	729	3	524415 213727
8	Local Authority Pollution Prevention and Controls Name: Mark Tempest Autocentre Location: Unit 1 Garden Court, Welwyn Garden City, AL7 1bh Authority: Welwyn Hatfield District Council, Environmental Health Department Permit Reference: Not Supplied Dated: 1st January 2012 Process Type: Local Authority Pollution Prevention and Control Description: PG1/1Waste oil burners, less than 0.4MW net rated thermal input Status: Permitted Positional Accuracy: Manually positioned to the address or location	A9NE (SE)	912	3	524516 212966
8	Local Authority Pollution Prevention and Controls Name: Eastbridge Service Station Location: Bridge Road East, Welwyn Garden City, Herts, AL7 1LE Authority: Welwyn Hatfield District Council, Environmental Health Department Permit Reference: LN000311 Dated: 1st December 1998 Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station Status: Permitted Positional Accuracy: Manually positioned to the address or location	A9NE (SE)	917	3	524513 212950
	Nearest Surface Water Feature	A13NE (E)	183	-	523910 213429
9	Pollution Incidents to Controlled Waters Property Type: Not Given Location: WELWYN GARDEN CITY Authority: Environment Agency, Thames Region Pollutant: Chemicals - Unknown Note: Confirmed As A Pollution Incident Incident Date: 7th April 1992 Incident Reference: NE920175 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14NE (E)	769	2	524500 213500

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
10	Pollution Incidents to Controlled Waters Property Type: Not Given Location: WELWYN GARDEN CITY Authority: Environment Agency, Thames Region Pollutant: Chemicals - Unknown Note: Confirmed As A Pollution Incident Incident Date: 5th January 1991 Incident Reference: NE910004 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A14SE (E)	843	2	524500 213100
11	Pollution Incidents to Controlled Waters Property Type: Not Given Location: WELWYN GARDEN CITY Authority: Environment Agency, Thames Region Pollutant: Miscellaneous - Unknown Note: Confirmed As A Pollution Incident Incident Date: 19th April 1989 Incident Reference: NE890176 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A14SE (E)	885	2	524600 213300
12	Registered Radioactive Substances Name: University Of Hertfordshire Location: Biopark Hertfordshire Limited, University Of Hertfordshire, Broadwater Road, Welwyn Garden City, AL7 3ax Authority: Environment Agency, Thames Region Permit Reference: TB3130DM Dated: Not Supplied Process Type: Not Supplied Description: Not Supplied Status: Application has been determined by the EA Positional Accuracy: Automatically positioned to the address	A9SW (S)	882	2	523949 212514
12	Registered Radioactive Substances Name: Antisoma Research Ltd Location: Biopark Hertfordshire, Broadwater Road,, WELWYN GARDEN CITY, Hertfordshire, AL7 3AX Authority: Environment Agency, Thames Region Permit Reference: CE3230 Dated: 10th May 2010 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA Status: Authorisation either revoked or cancelled Positional Accuracy: Automatically positioned to the address	A9SW (S)	896	2	523946 212497
12	Registered Radioactive Substances Name: Heptares Therapeutics Ltd Location: Biopark Hertfordshire, Broadwater Road,, WELWYN GARDEN CITY, Hertfordshire, AL7 3AX Authority: Environment Agency, Thames Region Permit Reference: CD6683 Dated: 3rd June 2009 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under the Act of an open source which is also the subject of an authorisation Status: Authorisation either revoked or cancelled Positional Accuracy: Automatically positioned to the address	A9SW (S)	896	2	523946 212497
12	Registered Radioactive Substances Name: Heptares Therapeutics Ltd Location: Biopark Hertfordshire, Broadwater Road,, WELWYN GARDEN CITY, Hertfordshire, AL7 3AX Authority: Environment Agency, Thames Region Permit Reference: CD1550 Dated: 24th November 2008 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA Status: Authorisation either revoked or cancelled Positional Accuracy: Automatically positioned to the address	A9SW (S)	896	2	523946 212497

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
12	Registered Radioactive Substances Name: Heptares Therapeutics Ltd Location: Biopark Hertfordshire, Broadwater Road,, WELWYN GARDEN CITY, Hertfordshire, AL7 3AX Authority: Environment Agency, Thames Region Permit Reference: CD1568 Dated: 24th November 2008 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Registration under the Act of an open source which is also the subject of an authorisation Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Automatically positioned to the address	A9SW (S)	896	2	523946 212497
13	Registered Radioactive Substances Name: Roche Products Ltd Location: 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AY Authority: Environment Agency, Thames Region Permit Reference: BG2558 Dated: 20th April 2000 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Substantial variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the address or location	A9SW (SE)	902	2	524168 212610
13	Registered Radioactive Substances Name: Roche Products Ltd Location: 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AY Authority: Environment Agency, Thames Region Permit Reference: BG2507 Dated: 20th April 2000 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under the Act of an open source which is also the subject of an authorisation Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the address or location	A9SW (SE)	906	2	524168 212605
14	Registered Radioactive Substances Name: Roche Products Ltd Location: Unit 6, Falcon Way, Shire Park, Welwyn Garden City, Hertfordshire, AL7 1TW Authority: Environment Agency, Thames Region Permit Reference: CA4285 Dated: 28th November 2006 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA Status: Authorisation either revoked or cancelled Positional Accuracy: Automatically positioned to the address	A15NW (E)	926	2	524646 213622
14	Registered Radioactive Substances Name: Roche Products Ltd Location: Unit 6, Falcon Way, Shire Park, Welwyn Garden City, Hertfordshire, AL7 1TW Authority: Environment Agency, Thames Region Permit Reference: CA4293 Dated: 28th November 2006 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Registration under the Act of an open source which is also the subject of an authorisation Status: Authorisation either revoked or cancelled Positional Accuracy: Automatically positioned to the address	A15NW (E)	926	2	524646 213622
15	Registered Radioactive Substances Name: Roche Products Ltd Location: 40 Broadwater Road ,, Welwyn Garden City, Hertfordshire, AL7 3ay Authority: Environment Agency, Thames Region Permit Reference: Bq2081 Dated: 14th February 2002 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	A9SW (SE)	956	2	524170 212548

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
15	Registered Radioactive Substances Name: Roche Products Ltd Location: 40 Broadwater Road ,,, Welwyn Garden City, Hertfordshire, AL7 3ay Authority: Environment Agency, Thames Region Permit Reference: Bm9149 Dated: 14th February 2002 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Minor variation to a registration under the Act of an open source which is also the subject of an authorisation Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the road within the address or location	A9SW (SE)	960	2	524167 212541
15	Registered Radioactive Substances Name: Roche Products Ltd Location: 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AY Authority: Environment Agency, Thames Region Permit Reference: Bs5924 Dated: 19th September 2002 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Substantial variation to a registration under the Act of an open source which is also the subject of an authorisation Status: Authorisation either revoked or cancelled Positional Accuracy: Manually positioned to the road within the address or location	A9SW (SE)	981	2	524158 212512
15	Registered Radioactive Substances Name: Roche Products Ltd Location: 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AY Authority: Environment Agency, Thames Region Permit Reference: Bs5908 Dated: 19th September 2002 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Initial variation to an authorisation under RSA Status: Authorisation either revoked or cancelled Positional Accuracy: Manually positioned to the road within the address or location	A9SW (SE)	981	2	524158 212512
16	Registered Radioactive Substances Name: Roche Products Ltd Location: 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AX Authority: Environment Agency, Thames Region Permit Reference: AU2123 Dated: 9th January 1996 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Unknown	A9SW (SE)	959	2	524095 212505
16	Registered Radioactive Substances Name: Roche Products Ltd Location: 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AY Authority: Environment Agency, Thames Region Permit Reference: BA4841 Dated: 26th March 1998 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Minor variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Manually positioned to the address or location	A9SW (SE)	961	2	524100 212505
16	Registered Radioactive Substances Name: Roche Products Ltd Location: P O Box 8, 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AY Authority: Environment Agency, Thames Region Permit Reference: AE5217 Dated: 31st March 1991 Process Type: Registration under S7 RSA for the keeping and use of Radioactive materials (was RSA60 S1) Description: Registration under the Act of an open source which is also the subject of an authorisation Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Unknown	A9SW (SE)	966	2	524100 212500

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
16	Registered Radioactive Substances Name: Roche Products Ltd Location: P O Box 8, 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AY Authority: Environment Agency, Thames Region Permit Reference: AE5209 Dated: 31st March 1991 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Unknown	A9SW (SE)	968	2	524105 212500
16	Registered Radioactive Substances Name: Roche Products Ltd Location: P O Box 8, 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AY Authority: Environment Agency, Thames Region Permit Reference: AM8628 Dated: 18th July 1994 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Substantial variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Unknown	A9SW (SE)	971	2	524100 212495
16	Registered Radioactive Substances Name: Roche Products Ltd Location: P O Box 8, 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AY Authority: Environment Agency, Thames Region Permit Reference: AA5762 Dated: 29th June 1992 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Substantial variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Unknown	A9SW (SE)	973	2	524105 212495
16	Registered Radioactive Substances Name: Roche Products Ltd Location: P O Box 8, 40 Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AY Authority: Environment Agency, Thames Region Permit Reference: BB8729 Dated: 28th October 1998 Process Type: Authorisation under S13 RSA for the disposal of Radioactive waste (was RSA60 S7) Description: Substantial variation to authorisation under RSA Status: Authorisation superseded by a substantial or non substantial variation Positional Accuracy: Unknown	A9SW (SE)	975	2	524100 212490
17	Water Abstractions Operator: Rank Xerox Ltd Licence Number: 29/38/02/0074 Permit Version: Not Supplied Location: Bessemer Road Authority: Environment Agency, Thames Region Abstraction: Industrial Processing (Miscellaneous) Abstraction Type: Not Supplied Source: Groundwater Daily Rate (m3): 2991 Yearly Rate (m3): 0 Details: Chalk (Undifferentiated); Status: Revoked; Lapsed Or Cancelled Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A14NW (E)	474	2	524200 213400

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
18	Water Abstractions Operator: Welwyn Garden City Golf Club Ltd Licence Number: 29/38/01/0107 Permit Version: 1 Location: Welwyn Garden City Gc - Borehole Authority: Environment Agency, Thames Region Abstraction: Golf Courses: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Welwyn Garden City Golf Club, Hertfordshire Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 1st January 2009 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A12NW (W)	762	2	522720 213430
18	Water Abstractions Operator: Welwyn Garden City Golf Club Ltd Licence Number: 29/38/01/0101 Permit Version: 1 Location: Welwyn Garden City Gc Borehole Authority: Environment Agency, Thames Region Abstraction: Golf Courses: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Welwyn Garden City Golf Club Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 1st December 2003 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A12NW (W)	762	2	522720 213430
18	Water Abstractions Operator: Welwyn Garden City Golf Club Ltd Licence Number: 29/38/01/0093 Permit Version: 100 Location: Welwyn Garden City Gc Borehole Authority: Environment Agency, Thames Region Abstraction: Golf Courses: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 118 Yearly Rate (m3): 9895 Details: Welwyn Garden City Golf Club Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 16th October 1998 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A12NW (W)	762	2	522720 213430
19	Water Abstractions Operator: George Wimpey Uk Limited Licence Number: 29/38/02/0007 Permit Version: 102 Location: Broadwater Road, Welwyn Garden City - 2 Boreholes Grouped Authority: Environment Agency, Thames Region Abstraction: Chemicals: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Broadwater Road, Welwyn Garden City, Herts Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 7th February 2007 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A9SW (SE)	918	2	524000 212500

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
19	Water Abstractions Operator: Roche Products Limited Licence Number: 29/38/02/0007 Permit Version: 101 Location: Broadwater Road, Welwyn Garden City - 2 Boreholes Grouped Authority: Environment Agency, Thames Region Abstraction: Chemicals: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Broadwater Road, Welwyn Garden City, Herts Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 26th August 2005 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A9SW (SE)	918	2	524000 212500
19	Water Abstractions Operator: Roche Products Limited Licence Number: 29/38/02/0007 Permit Version: 100 Location: Broadwater Road, Welwyn Garden City - 2 Boreholes Grouped Authority: Environment Agency, Thames Region Abstraction: Chemicals: Process Water Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 1364 Yearly Rate (m3): 318220 Details: Broadwater Road, Welwyn Garden City, Herts Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 9th August 1996 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A9SW (SE)	918	2	524000 212500
19	Water Abstractions Operator: Roche Products Ltd Licence Number: 29/38/02/0001 Permit Version: Not Supplied Location: Broadwater Road - No 2 Borehole Authority: Environment Agency, Thames Region Abstraction: Cooling Abstraction Type: Not Supplied Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): 340950 Details: Chalk (Undifferentiated); Licence Status: Revoked; Lapsed Or Cancelled Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A9SW (SE)	922	2	524000 212495
	Water Abstractions Operator: Three Valleys Water Plc Licence Number: 29/38/02/0084 Permit Version: 1 Location: Digswell Pumping Station At Point C (6 Boreholes) Authority: Environment Agency, Thames Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st January 2007 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(N)	1836	2	523900 215300

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Three Valleys Water Plc Licence Number: 29/38/02/0073 Permit Version: 100 Location: Digswell Pumping Station 'C' Authority: Environment Agency, Thames Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 20457 Yearly Rate (m3): 6196198 Details: Chalk (Undifferentiated) Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 22nd July 1991 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(N)	1836	2	523900 215300
	Water Abstractions Operator: Finesse Leisure Partnership Licence Number: 29/38/01/0065 Permit Version: 101 Location: River Lee-Tributary-Watercress Beds, Lemsford Nature Reserve Authority: Environment Agency, Thames Region Abstraction: Amenity: Lake And Pond Throughflow Abstraction Type: Water may be abstracted from a single point Source: Surface Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: North Lake At Stanborough Park, Wgc Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 19th January 2004 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A1SE (SW)	1857	2	522310 211880
	Water Abstractions Operator: Affinity Water Limited Licence Number: 29/38/02/0046 Permit Version: 102 Location: Digswell Pumping Station - Point 'C' Authority: Environment Agency, Thames Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 14th November 2012 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(N)	1902	2	523960 215360
	Water Abstractions Operator: Affinity Water Limited Licence Number: 29/38/02/0089 Permit Version: 3 Location: Digswell Pumping Station - Point 'C' Authority: Environment Agency, Thames Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 14th November 2012 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(N)	1902	2	523960 215360

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Veolia Water Central Limited Licence Number: 29/38/02/0046 Permit Version: 101 Location: Digswell Pumping Station - Point 'C' Authority: Environment Agency, Thames Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 20th July 2009 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(N)	1902	2	523960 215360
	Water Abstractions Operator: Veolia Water Central Limited Licence Number: 29/38/02/0089 Permit Version: 2 Location: Digswell Pumping Station - Point 'C' Authority: Environment Agency, Thames Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 20th July 2009 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(N)	1902	2	523960 215360
	Water Abstractions Operator: Three Valleys Water Plc Licence Number: 29/38/02/0089 Permit Version: 1 Location: Digswell Pumping Station - Point 'C' Authority: Environment Agency, Thames Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 20th May 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(N)	1902	2	523960 215360
	Water Abstractions Operator: Three Valleys Water Plc Licence Number: 29/38/02/0046 Permit Version: 100 Location: Digswell Pumping Station - Point 'C' Authority: Environment Agency, Thames Region Abstraction: Public Water Supply: Potable Water Supply - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 11365 Yearly Rate (m3): Not Supplied Details: Annual Abstraction Total Aggregated To Another Licence For Quantity Purposes. Chalk (Undifferentiate) Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 20th September 1966 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(N)	1902	2	523960 215360

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
20	Water Industry Act Referrals Name: Allen Coding Systems Location: ALLEN CODING SYSTEMS, 5-6 LITTLE MUNDELLS, 5-6 LITTLE MUNDELLS, WELWYN GARDEN CITY, HERTFORDSHIRE, AL7 1LD Authority: Environment Agency, Thames Region Permit Reference: CB1338 Dated: 1st February 2007 Process Type: Permissions or amendments to discharge under the Water Industry Act 1991 Description: Processes which result in the discharge of Special Category effluents under The Trade Effluents (Prescribed Processes and Substances) Regulations Status: Application cancelled Positional Accuracy: Automatically positioned to the address	A15NW (E)	993	2	524724 213508
20	Water Industry Act Referrals Name: Allen Coding Machines Ltd Location: ALLEN CODING MACHINES LTD, 5-6 LITTLE MUNDELLS, 5-6 LITTLE MUNDELLS, WELWYN GARDEN CITY, HERTFORDSHIRE, AL7 1LD Authority: Environment Agency, Thames Region Permit Reference: AF2361 Dated: 27th April 1992 Process Type: Permissions or amendments to discharge under the Water Industry Act 1991 Description: Processes which result in the discharge of Special Category effluents under The Trade Effluents (Prescribed Processes and Substances) Regulations Status: Application cancelled Positional Accuracy: Automatically positioned to the address	A15NW (E)	993	2	524724 213508
	Groundwater Vulnerability Map Combined Classification: Secondary Superficial Aquifer - Medium Vulnerability Combined Vulnerability: Medium Combined Aquifer: Productive Bedrock Aquifer, Productive Superficial Aquifer Pollutant Speed: Intermediate Bedrock Flow: Well Connected Fractures Dilution: <300 mm/year Baseflow Index: 40-70% Superficial Patchiness: <90% Superficial Thickness: 3-10m Superficial Recharge: Low	A13NW (SE)	0	4	523605 213393
	Groundwater Vulnerability Map Combined Classification: Secondary Superficial Aquifer - Medium Vulnerability Combined Vulnerability: Medium Combined Aquifer: Productive Bedrock Aquifer, Productive Superficial Aquifer Pollutant Speed: Intermediate Bedrock Flow: Well Connected Fractures Dilution: <300 mm/year Baseflow Index: 40-70% Superficial Patchiness: <90% Superficial Thickness: 3-10m Superficial Recharge: Low	A13SW (S)	0	4	523604 213354
	Groundwater Vulnerability Map Combined Classification: Secondary Bedrock Aquifer - Medium Vulnerability Combined Vulnerability: Medium Combined Aquifer: Productive Bedrock Aquifer, No Superficial Aquifer Pollutant Speed: Intermediate Bedrock Flow: Well Connected Fractures Dilution: <300 mm/year Baseflow Index: 40-70% Superficial Patchiness: <90% Superficial Thickness: 3-10m Superficial Recharge: Low	A13NE (N)	0	4	523608 213422
	Groundwater Vulnerability - Soluble Rock Risk Classification: Very Significant Risk - High Possibility	A13NW (SE)	0	4	523605 213393
	Bedrock Aquifer Designations Aquifer Designation: Principal Aquifer	A13SW (S)	0	4	523604 213354

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - A	A13NW (SE)	0	4	523605 213393
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - Undifferentiated	A13NW (SE)	0	4	523605 213393
21	Source Protection Zones Name: Not Supplied Source: Environment Agency, Head Office Reference: Not Supplied Type: Zone III (Total Catchment): The total area needed to support the discharge from the protected groundwater source.	A13NW (SE)	0	2	523605 213393
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				
22	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 24.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NE (E)	183	5	523910 213429
23	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A13NE (E)	207	5	523933 213426
24	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 19.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A14NW (E)	243	5	523969 213420
25	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 31.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A14NW (E)	262	5	523988 213416
26	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 19.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A14NW (E)	298	5	524023 213412
27	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 20.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A14NW (E)	331	5	524057 213411

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
28	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 46.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	462	5	523184 213757
29	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 40.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	499	5	523160 213786
30	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 79.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	536	5	523133 213811
31	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 88.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	612	5	523094 213877
32	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 138.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	612	5	523094 213877
33	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 59.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	692	5	523019 213919
34	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 134.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SE (NW)	692	5	523019 213919
35	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 45.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A12NW (W)	823	5	522712 213696
36	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 186.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SW (W)	850	5	522700 213739

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
37	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 9.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A9SW (SE)	860	5	524027 212584
38	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 2.7 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A9SW (SE)	866	5	524036 212581
39	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 13.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A9SW (SE)	868	5	524039 212580
40	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 7.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SW (NW)	872	5	522763 213899
41	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 28.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SW (NW)	872	5	522763 213899
42	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 3.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A9SW (SE)	877	5	524052 212576
43	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 24.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A9SW (SE)	879	5	524055 212575
44	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 55.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SW (NW)	880	5	522773 213925
45	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 90.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A17SW (NW)	880	5	522773 213925

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
46	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 7.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A9SW (SE)	978	5	524110 212492
47	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 9.7 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A9SW (SE)	983	5	524116 212489
48	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 8.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1	A9SW (SE)	989	5	524126 212486

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
49	Licensed Waste Management Facilities (Locations) Licence Number: 102412 Location: Bridgefields, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1RX Operator Name: W G C Metals Ltd Operator Location: Not Supplied Authority: Environment Agency - Thames Region, North East Area Site Category: Vehicle depollution facility Licence Status: Expired Issued: 21st February 2011 Last Modified: Not Supplied Expires: 6th July 2018 Suspended: Not Supplied Revoked: Not Supplied Surrendered: Not Supplied IPPC Reference: Not Supplied Positional Accuracy: Located by supplier to within 10m	A14SE (E)	850	2	524550 213245
50	Licensed Waste Management Facilities (Locations) Licence Number: 80190 Location: Tewin Rd Depot, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BD Operator Name: Welwyn Hatfield District Council Operator Location: Not Supplied Authority: Environment Agency - Thames Region, North East Area Site Category: Special Waste Transfer Stations Licence Status: Modified Issued: 20th May 1999 Last Modified: 1st September 2015 Expires: Not Supplied Suspended: Not Supplied Revoked: Not Supplied Surrendered: Not Supplied IPPC Reference: Not Supplied Positional Accuracy: Located by supplier to within 10m	A15NW (E)	961	2	524691 213414
	Local Authority Landfill Coverage Name: Hertfordshire County Council - Has supplied landfill data		0	6	523605 213393
	Local Authority Landfill Coverage Name: Welwyn Hatfield Council - Has no landfill data to supply		0	3	523605 213393
51	Registered Landfill Sites Licence Holder: Polycell Products Ltd Licence Reference: 79/078 Site Location: 30 Broadwater Road, Welwyn Garden City, Hertfordshire Licence Easting: Not Supplied Licence Northing: Not Supplied Operator Location: As Site Address Authority: Environment Agency - Thames Region, North East Area Site Category: Landfill - Soak away Max Input Rate: Very Small (Less than 10,000 tonnes per year) Waste Source: Waste produced/controlled by licence holder Restrictions: Status: Site exempt from licenceExempt Dated: 19th June 1979 Preceded By: Not Given Licence: Superseded By: 79/078 Licence: Positional Accuracy: Positioned by the supplier Boundary Accuracy: Good Authorised Waste: Aqueous Effluent Waste Industrial Effluent Treatment Sludge	A9NW (SE)	689	2	524084 212808

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
52	Registered Waste Transfer Sites Licence Holder: Welwyn Hatfield District Council Licence Reference: WML80190 Site Location: Tewin Road Depot, Tewin Road, WELWYN GARDEN CITY, Hertfordshire, AL7 1BD Operator Location: Council Offices, The Campus, WELWYN GARDEN CITY, Hertfordshire, AL8 6AE Authority: Environment Agency - Thames Region, North East Area Site Category: Transfer Max Input Rate: Small (Equal to or greater than 10,000 and less than 25,000 tonnes per year) Waste Source: No known restriction on source of waste Restrictions: Licence Status: Operational as far as is knownOperational Dated: 20th May 1999 Preceded By: Not Given Licence: Superseded By: Not Given Licence: Positional Accuracy: Positioned by the supplier Boundary Quality: Good Authorised Waste: Bonded Asbestos Household, Commercial & Industrial Waste (As In S75 Epa 1990) - Comprising Lwra Cat Bii General Scrap Metal Waste Lwra Cat. Bi General Non-Putrescible Waste Maximum Storage In Licence Maximum Waste Permitted By Licence Prohibited Waste: Leather Processing Waste Liquid Wastes Metal Swarf/Dusts/Particulates Poisonous, Noxious, Polluting Wastes Pulverised Fuel Ash/Vanadium Contaminated Ash Sludge Wastes Special Waste (As In Epa 1990:S62 Of 1996 Regs) Not Otherwise Specified Toxic Metal Slags Waste Not Otherwise Specified	A14NE (E)	868	2	524598 213418
53	Registered Waste Treatment or Disposal Sites Licence Holder: Rank Xerox Ltd Licence Reference: 82/134 Site Location: Bessemer Road, WELWYN GARDEN CITY, Hertfordshire, AL7 1HE Operator Location: PO Box 17 Bessemer Road, WELWYN GARDEN CITY, Hertfordshire, AL7 1HE Authority: Environment Agency - Thames Region, North East Area Site Category: Transfer - with treatment Max Input Rate: Small (Equal to or greater than 10,000 and less than 25,000 tonnes per year) Waste Source: Waste produced/controlled by licence holder Restrictions: Licence Status: Site exempt from licenceExempt Dated: 24th May 1984 Preceded By: 78/042 Licence: Superseded By: Not Given Licence: Positional Accuracy: Positioned by the supplier Boundary Quality: Good Authorised Waste: Acids Alkalies Flammable Solvents Industrial Effluent Treatment Sludge Metasilicate Solution Oil/Water Mixtures Toxic/Poisonous Wastes Waste Solvents Water (Contaminated) Prohibited Waste: Polluting Wastes	A14SW (E)	403	2	524091 213260

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
54	Registered Waste Treatment or Disposal Sites Licence Holder: Rank Xerox Ltd Licence Reference: 78/042 Site Location: Bessemer Road, WELWYN GARDEN CITY, Hertfordshire, AL7 1HE Operator Location: As Site Address Authority: Environment Agency - Thames Region, North East Area Site Category: Treatment - Chemical Max Input Rate: Undefined Waste Source: Waste produced/controlled by licence holder Restrictions: Licence Status: Licence lapsed/cancelled/defunct/not applicable/surrenderedCancelled Dated: 8th December 1978 Preceded By: Not Given Licence: Superseded By: 82/134 Licence: Positional Accuracy: Positioned by the supplier Boundary Quality: Good Authorised Waste: Acids Alkalies Controlled Wastes N.O.S Cutting.Oil/Water Inflammable Solvents Non Flammable Solvents Toxic/Poisonous Wastes Waste Solvents Environment Agency Waste N.O.S must give specific authorisation for this waste to be acceptedWaste requires prior approval	A14SW (E)	403	2	524110 213329
55	Registered Waste Treatment or Disposal Sites Licence Holder: Polycell Products Ltd Licence Reference: 79/078 Site Location: 30 Broadwater Road, Welwyn Garden City, Hertfordshire Operator Location: As Site Address Authority: Environment Agency - Thames Region, North East Area Site Category: Storage Max Input Rate: Undefined Waste Source: Waste produced/controlled by licence holder Restrictions: Licence Status: Site exempt from licenceExempt Dated: 19th June 1979 Preceded By: 79/078 Licence: Superseded By: Not Given Licence: Positional Accuracy: Manually positioned to the road within the address or location Boundary Quality: Not Supplied Authorised Waste: Aqueous Effluent Waste	A9SW (SE)	885	2	524200 212650
56	Registered Waste Treatment or Disposal Sites Licence Holder: British Lead Mills Licence Reference: 92/302 Site Location: Peartree Lane, WELWYN GARDEN CITY, Hertfordshire, AL7 3UB Operator Location: As Site Address Authority: Environment Agency - Thames Region, North East Area Site Category: Scrapyard Max Input Rate: Medium (Equal to or greater than 25,000 and less than 75,000 tonnes per year) Waste Source: No known restriction on source of waste Restrictions: Licence Status: Licence lapsed/cancelled/defunct/not applicable/surrenderedCancelled Dated: 1st January 1993 Preceded By: Not Given Licence: Superseded By: Not Given Licence: Positional Accuracy: Manually positioned to the address or location Boundary Quality: Not Supplied Authorised Waste: Scrap Lead Prohibited Waste: Waste N.O.S.	A9NE (SE)	889	2	524450 212900

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
57	Registered Waste Treatment or Disposal Sites Licence Holder: Roche Products Ltd Licence Reference: 86/203 Site Location: 40 Broadwater Road, Welwyn Garden City, Hertfordshire Operator Location: As Site Address Authority: Environment Agency - Thames Region, North East Area Site Category: Storage - Drummed storage Max Input Rate: Very Small (Less than 10,000 tonnes per year) Waste Source: Waste produced/controlled by licence holder Restrictions: Licence Status: Licence lapsed/cancelled/defunct/not applicable/surrenderedCancelled Dated: 1st June 1986 Preceded By: Not Given Licence: Superseded By: Not Given Licence: Positional Accuracy: Manually positioned to the address or location Boundary Quality: Not Supplied Authorised Waste: Solvents - Chlorinated & Unchlor. A Solvents - Chlorinated & Unchlor. B Prohibited Waste: Liable To Cause Environmental Hazards Poisonous, Noxious And Polluting N.O.S	A9SW (SE)	966	2	524100 212500

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
58	Control of Major Accident Hazards Sites (COMAH) Name: National Grid Gas Plc Location: Welwyn Garden City Holder Station, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BD Reference: Not Supplied Type: Lower Tier Status: Active Positional Accuracy: Manually positioned to the address or location	A14SE (E)	851	7	524534 213184
59	Control of Major Accident Hazards Sites (COMAH) Name: Transco Plc Location: Welwyn Garden City Holder Station, Tewin Road, WELWYN GARDEN CITY, Hertfordshire, AL7 1BD Reference: 1023635 Type: Lower Tier Status: Active Positional Accuracy: Manually positioned to the address or location	A14SE (E)	916	7	524595 213160
60	Notification of Installations Handling Hazardous Substances (NIHHS) Name: Transco Location: Welwyn Garden City Holder Station (M20), Tewin Road, WELWYN GARDEN CITY, Hertfordshire Status: Not Active Positional Accuracy: Manually positioned to the address or location	A14SE (E)	860	7	524535 213152
61	Planning Hazardous Substance Consents Name: Bg Transco Plc Location: Welwyn Garden Holder Station, Tewin Road, Welwyn Garden City, Herts, AL7 Authority: Welwyn Hatfield District Council Application Ref: N6/2000/0752/Hs Hazardous: Liquefied extremely flammable gas (including LPG) and natural gas (whether liquefied or not) Substance: liquefied or not Maximum Quantity: 0 Application date: 31st May 2000 Decision: New application granted conditionally Positional Accuracy: Manually positioned to the address or location	A14SE (E)	861	8	524528 213125

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Lambeth Group	A13NW (N)	0	1	523598 213456
	BGS 1:625,000 Solid Geology Description: White Chalk Subgroup	A13NW (SE)	0	1	523605 213393
62	BGS Recorded Mineral Sites Site Name: Digswell Lodge Farm Chalk Pit Location: Welwyn Garden City, Hertfordshire Source: British Geological Survey, National Geoscience Information Service Reference: 168859 Type: Opencast Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A19SW (NE)	572	1	524046 213950
63	BGS Recorded Mineral Sites Site Name: Sherrardspark Wood Chalk Pit Location: Welwyn Garden City, Hertfordshire Source: British Geological Survey, National Geoscience Information Service Reference: 168858 Type: Opencast Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A12NW (W)	718	1	522764 213438
64	BGS Recorded Mineral Sites Site Name: Digswell Chalk Pit Location: Digswell, Welwyn Garden City, Hertfordshire Source: British Geological Survey, National Geoscience Information Service Reference: 168905 Type: Opencast Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A18NE (N)	908	1	523786 214378
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Man-Made Mining Cavities Easting: 524000 Northing: 214000 Distance: 592 Quadrant Reference: A19 Quadrant Reference: SW Bearing Ref: NE Cavity Type: Chalk Mining-Details Unknown Commodity: Chalk Solid Geology Detail: Chalk Group Superficial Geology: No Details Detail:	A19SW (NE)	592	9	524000 214000
	Natural Cavities Easting: 523830 Northing: 213260 Distance: 176 Quadrant Reference: A13 Quadrant Reference: SE Bearing Ref: SE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Till and morainic drift Detail:	A13SE (SE)	176	9	523830 213260

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Natural Cavities Easting: 523890 Northing: 213120 Distance: 322 Quadrant Reference: A13 Quadrant Reference: SE Bearing Ref: SE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Till and morainic drift Detail:	A13SE (SE)	322	9	523890 213120
	Natural Cavities Easting: 523910 Northing: 213100 Distance: 350 Quadrant Reference: A13 Quadrant Reference: SE Bearing Ref: SE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Till and morainic drift Detail:	A13SE (SE)	350	9	523910 213100
	Natural Cavities Easting: 523860 Northing: 213980 Distance: 524 Quadrant Reference: A18 Quadrant Reference: SE Bearing Ref: NE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group, Lambeth Group Superficial Geology: No Details Detail:	A18SE (NE)	524	9	523860 213980
	Natural Cavities Easting: 523840 Northing: 212770 Distance: 604 Quadrant Reference: A8 Quadrant Reference: NE Bearing Ref: S Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Till and morainic drift Detail:	A8NE (S)	604	9	523840 212770
	Natural Cavities Easting: 523900 Northing: 212800 Distance: 610 Quadrant Reference: A8 Quadrant Reference: NE Bearing Ref: SE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Till and morainic drift Detail:	A8NE (SE)	610	9	523900 212800
	Natural Cavities Easting: 523530 Northing: 214070 Distance: 621 Quadrant Reference: A18 Quadrant Reference: NW Bearing Ref: N Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group, Lambeth Group Superficial Geology: Glacial Till and morainic drift Detail:	A18NW (N)	621	9	523530 214070
	Natural Cavities Easting: 523800 Northing: 212700 Distance: 650 Quadrant Reference: A8 Quadrant Reference: SE Bearing Ref: S Cavity Type: Solution Pipe Solid Geology Detail: Chalk Group Superficial Geology: Glacial Till and morainic drift Detail:	A8SE (S)	650	9	523800 212700

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Natural Cavities Easting: 524060 Northing: 214040 Distance: 656 Quadrant Reference: A19 Quadrant Reference: SW Bearing Ref: NE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Till and morainic drift Detail:	A19SW (NE)	656	9	524060 214040
	Natural Cavities Easting: 522800 Northing: 213400 Distance: 681 Quadrant Reference: A12 Quadrant Reference: NW Bearing Ref: W Cavity Type: Solution Pipe x 3 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Till and morainic drift Detail:	A12NW (W)	681	9	522800 213400
	Natural Cavities Easting: 523510 Northing: 214140 Distance: 694 Quadrant Reference: A18 Quadrant Reference: NW Bearing Ref: N Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group, Lambeth Group Superficial Geology: Glacial Till and morainic drift Detail:	A18NW (N)	694	9	523510 214140
	Natural Cavities Easting: 524320 Northing: 212960 Distance: 747 Quadrant Reference: A9 Quadrant Reference: NE Bearing Ref: SE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Sand & Gravel Detail:	A9NE (SE)	747	9	524320 212960
	Natural Cavities Easting: 523000 Northing: 212700 Distance: 785 Quadrant Reference: A7 Quadrant Reference: SE Bearing Ref: SW Cavity Type: Solution Pipe Solid Geology Detail: Chalk Group Superficial Geology: Brickearth/head, Glacial sand Detail:	A7SE (SW)	785	9	523000 212700
	Natural Cavities Easting: 524300 Northing: 212850 Distance: 800 Quadrant Reference: A9 Quadrant Reference: NE Bearing Ref: SE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Till and morainic drift Detail:	A9NE (SE)	800	9	524300 212850
	Natural Cavities Easting: 524260 Northing: 212750 Distance: 843 Quadrant Reference: A9 Quadrant Reference: NW Bearing Ref: SE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Sand & Gravel Detail:	A9NW (SE)	843	9	524260 212750

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Natural Cavities Easting: 522900 Northing: 212700 Distance: 853 Quadrant Reference: A7 Quadrant Reference: SW Bearing Ref: SW Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial sand, River terrace deposits Detail:	A7SW (SW)	853	9	522900 212700
	Natural Cavities Easting: 524240 Northing: 212660 Distance: 900 Quadrant Reference: A9 Quadrant Reference: SW Bearing Ref: SE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Sand & Gravel, Glacial Till and morainic drift Detail:	A9SW (SE)	900	9	524240 212660
	Natural Cavities Easting: 523010 Northing: 212520 Distance: 924 Quadrant Reference: A7 Quadrant Reference: SE Bearing Ref: SW Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Till and morainic drift Detail:	A7SE (SW)	924	9	523010 212520
	Natural Cavities Easting: 524210 Northing: 212590 Distance: 941 Quadrant Reference: A9 Quadrant Reference: SW Bearing Ref: SE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Sand & Gravel Detail:	A9SW (SE)	941	9	524210 212590
	Natural Cavities Easting: 524660 Northing: 213300 Distance: 944 Quadrant Reference: A15 Quadrant Reference: SW Bearing Ref: E Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Sand & Gravel Detail:	A15SW (E)	944	9	524660 213300
	Natural Cavities Easting: 524630 Northing: 213160 Distance: 950 Quadrant Reference: A15 Quadrant Reference: SW Bearing Ref: E Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Sand & Gravel Detail:	A15SW (E)	950	9	524630 213160
	Natural Cavities Easting: 524280 Northing: 212600 Distance: 972 Quadrant Reference: A9 Quadrant Reference: SW Bearing Ref: SE Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Sand & Gravel Detail:	A9SW (SE)	972	9	524280 212600

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Natural Cavities Easting: 523770 Northing: 214460 Distance: 989 Quadrant Reference: A23 Quadrant Reference: SE Bearing Ref: N Cavity Type: Sinkhole x 1 Solid Geology Detail: Chalk Group Superficial Geology: Glacial Sand & Gravel Detail:	A23SE (N)	989	9	523770 214460
	Non Coal Mining Areas of Great Britain Risk: Highly Unlikely Source: British Geological Survey, National Geoscience Information Service	A13NW (SE)	0	1	523605 213393
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A13SW (S)	0	1	523604 213354
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (SE)	0	1	523605 213393
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (SE)	0	1	523605 213393
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	0	1	523617 213329
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (SE)	0	1	523605 213393
	Potential for Ground Dissolution Stability Hazards Hazard Potential: High Source: British Geological Survey, National Geoscience Information Service	A13SW (S)	0	1	523604 213354
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	44	1	523632 213275
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (S)	53	1	523552 213230
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SW (W)	158	1	523339 213328
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	183	1	523596 213634
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (SE)	0	1	523605 213393
	Potential for Landslide Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (NW)	202	1	523358 213563
	Potential for Landslide Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	222	1	523909 213605
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (SE)	0	1	523605 213393
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (NW)	202	1	523358 213563
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	222	1	523909 213605
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SW (S)	0	1	523604 213354

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NW (SE)	0	1	523605 213393
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (NW)	202	1	523358 213563
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	222	1	523909 213605
	Radon Potential - Radon Affected Areas Affected Area: The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). Source: British Geological Survey, National Geoscience Information Service	A13NW (SE)	0	1	523605 213393
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13NW (SE)	0	1	523605 213393

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
65	Contemporary Trade Directory Entries Name: Done & Dusted Location: 8, Densley Close, Welwyn Garden City, Hertfordshire, AL8 7JX Classification: Cleaning Services - Domestic Status: Inactive Positional Accuracy: Automatically positioned to the address	A13NW (NW)	73	-	523522 213495
66	Contemporary Trade Directory Entries Name: I B M (Uk) Ltd Location: Rosanne House, Bridge Road, Welwyn Garden City, Hertfordshire, AL8 6UB Classification: Computer Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	A13SW (S)	88	-	523601 213228
67	Contemporary Trade Directory Entries Name: Alpha Air Conditioning Uk Ltd Location: 61, Blakemere Road, Welwyn Garden City, Hertfordshire, AL8 7PQ Classification: Air Conditioning & Refrigeration Contractors Status: Active Positional Accuracy: Automatically positioned to the address	A13NE (NE)	296	-	523906 213711
68	Contemporary Trade Directory Entries Name: United Carpet Cleaning Masters Location: 9, Howardsgate, Welwyn Garden City, Hertfordshire, AL8 6AW Classification: Carpet, Curtain & Upholstery Cleaners Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (S)	296	-	523685 213037
68	Contemporary Trade Directory Entries Name: Mixamate Holdings Ltd Location: Telephone Exchange, Wigmores, Welwyn Garden City, Hertfordshire, AL8 6PH Classification: Concrete & Mortar Ready Mixed Status: Inactive Positional Accuracy: Automatically positioned to the address	A13SE (S)	306	-	523723 213047
69	Contemporary Trade Directory Entries Name: R & R Cleaning Services Location: 8, Brockswood Lane, Welwyn Garden City, Hertfordshire, AL8 7BG Classification: Commercial Cleaning Services Status: Active Positional Accuracy: Automatically positioned to the address	A12SE (W)	355	-	523152 213260
70	Contemporary Trade Directory Entries Name: Sketchley Retail Ltd Location: 30, Stonehills, Welwyn Garden City, Hertfordshire, AL8 6PD Classification: Dry Cleaners Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (SE)	377	-	523813 213018
70	Contemporary Trade Directory Entries Name: Supasnaps Location: 30 Stonehills, Welwyn Garden City, Hertfordshire, AL8 6PD Classification: Photographic Processors Status: Inactive Positional Accuracy: Manually positioned to the address or location	A8NE (SE)	377	-	523812 213018
70	Contemporary Trade Directory Entries Name: London Boys Scrap Yards In Welwyn Garden City Location: 39b, Howardsgate, Welwyn Garden City, Hertfordshire, AL8 6AP Classification: Car Breakers & Dismantlers Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (SE)	384	-	523780 212992
70	Contemporary Trade Directory Entries Name: Scrap Car Now Today Cash Welwyn Garden City Location: Howardsgate, Welwyn Garden City, Hertfordshire, al8 6ap Classification: Car Breakers & Dismantlers Status: Inactive Positional Accuracy: Manually positioned within the geographical locality	A8NE (SE)	396	-	523792 212987
70	Contemporary Trade Directory Entries Name: Advanced Diagnostic Systems Ltd Location: 19/21, Stonehills House, Stonehills, Welwyn Garden City, Hertfordshire, AL8 6NL Classification: Scientific Apparatus & Instruments - Manufacturers Status: Inactive Positional Accuracy: Manually positioned to the address or location	A8NE (SE)	408	-	523848 212998

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
70	Contemporary Trade Directory Entries Name: Amalgamated Chartered Surveyors Location: 51, Stonehills House, Stonehills, Welwyn Garden City, Hertfordshire, AL8 6NH Classification: Commercial Cleaning Services Status: Inactive Positional Accuracy: Manually positioned to the address or location	A8NE (SE)	408	-	523848 212998
71	Contemporary Trade Directory Entries Name: Snappy Snaps Location: 59, Howardsgate, Welwyn Garden City, Hertfordshire, AL8 6BB Classification: Photographic Processors Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (SE)	438	-	523864 212972
72	Contemporary Trade Directory Entries Name: Welwyn Garden City Ltd Location: Churchfield House, Guessens Road, Welwyn Garden City, Hertfordshire, AL8 6RJ Classification: Car Body Repairs Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NW (S)	482	-	523451 212817
73	Contemporary Trade Directory Entries Name: Mr Mop Office Cleaning Services Location: 74, Handside Lane, Welwyn Garden City, Hertfordshire, AL8 6SJ Classification: Commercial Cleaning Services Status: Active Positional Accuracy: Automatically positioned to the address	A7NE (SW)	495	-	523211 212902
73	Contemporary Trade Directory Entries Name: All Clear Pest Control Location: 69, Handside Lane, Welwyn Garden City, Hertfordshire, AL8 6SH Classification: Pest & Vermin Control Status: Inactive Positional Accuracy: Automatically positioned to the address	A7NE (SW)	513	-	523235 212864
73	Contemporary Trade Directory Entries Name: Acorn French Polishing Location: 69, Handside Lane, WELWYN GARDEN CITY, Hertfordshire, AL8 6SH Classification: French Polishing Status: Active Positional Accuracy: Automatically positioned to the address	A7NE (SW)	513	-	523235 212864
73	Contemporary Trade Directory Entries Name: Acorn French Polishing Location: 69, Handside Lane, Welwyn Garden City, Hertfordshire, AL8 6SH Classification: Paint & Varnish Stripping Status: Inactive Positional Accuracy: Automatically positioned to the address	A7NE (SW)	513	-	523235 212864
74	Contemporary Trade Directory Entries Name: Photo Imaging Centre Location: 44, Fretherne Road, Welwyn Garden City, Hertfordshire, AL8 6NU Classification: Photographic Processors Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (S)	496	-	523775 212859
74	Contemporary Trade Directory Entries Name: Cypress Semiconductor Location: Gate House, Fretherne Road, Welwyn Garden City, Hertfordshire, AL8 6RD Classification: Electronic Component Manufacturers & Distributors Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (S)	505	-	523821 212873
74	Contemporary Trade Directory Entries Name: Johnsons Cleaners Location: 43, Fretherne Road, Welwyn Garden City, AL8 6NS Classification: Dry Cleaners Status: Active Positional Accuracy: Automatically positioned to the address	A8NE (S)	520	-	523811 212851
75	Contemporary Trade Directory Entries Name: Shopmobility Location: Unit 53a, The Howard Centre, Howardsgate, Welwyn Garden City, Hertfordshire, AL8 6HA Classification: Disability Equipment - Manufacturers & Suppliers Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (SE)	500	-	523898 212920

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
75	Contemporary Trade Directory Entries Name: The Curtain Co Location: Unit 45, The Howard Centre, Howardsgate, Welwyn Garden City, Hertfordshire, AL8 6HA Classification: Blinds, Awnings & Canopies Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (SE)	500	-	523898 212920
75	Contemporary Trade Directory Entries Name: Bonusprint Location: Unit 30, The Howard Centre, Howardsgate, Welwyn Garden City, Hertfordshire, AL8 6HA Classification: Photographic Processors Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (SE)	500	-	523898 212920
75	Contemporary Trade Directory Entries Name: Kall Kwik Location: 36b, Howardsgate, Welwyn Garden City, Hertfordshire, AL8 6BJ Classification: Printers Status: Active Positional Accuracy: Automatically positioned to the address	A8NE (SE)	500	-	523898 212920
75	Contemporary Trade Directory Entries Name: Shopmobility Location: Unit 53A, The Howard Centre, Howardsgate, Welwyn Garden City, Hertfordshire, AL8 6HA Classification: Disability Equipment - Manufacturers & Suppliers Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (SE)	500	-	523898 212920
75	Contemporary Trade Directory Entries Name: Prontaprint Location: 18, Howardsgate, Welwyn Garden City, Hertfordshire, AL8 6BQ Classification: Copying & Duplicating Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (SE)	500	-	523898 212920
75	Contemporary Trade Directory Entries Name: Sovereign Bus & Coach Co Location: Welwyn Garden City Bus Station, Howard Centre, Welwyn Garden City, Hertfordshire, AL8 6ER Classification: Bus & Coach Operators & Stations Status: Inactive Positional Accuracy: Manually positioned to the address or location	A8NE (SE)	500	-	523898 212920
76	Contemporary Trade Directory Entries Name: Funnybones Location: Centra Park, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1HW Classification: Distribution Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SW (E)	518	-	524228 213326
76	Contemporary Trade Directory Entries Name: Grace Foods Location: Centra Park, Bessemer Road, Welwyn Garden City, AL7 1HW Classification: Distribution Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SW (E)	518	-	524228 213326
76	Contemporary Trade Directory Entries Name: Grace Foods Location: Centra Park, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1HW Classification: Distribution Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SW (E)	518	-	524228 213326
76	Contemporary Trade Directory Entries Name: Luvata Welwyn Garden Location: Centrapark, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1HT Classification: Brass & Copper Manufacturers & Suppliers Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SW (E)	518	-	524228 213326
77	Contemporary Trade Directory Entries Name: Hexacath (UK) Ltd Location: 7, Church Road, Welwyn Garden City, Hertfordshire, AL8 6NT Classification: Medical Equipment Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (S)	558	-	523714 212767

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
77	Contemporary Trade Directory Entries Name: Tristar Motor Group Plc Location: 7, Church Road, Welwyn Garden City, Hertfordshire, AL8 6NT Classification: Car Dealers Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NE (S)	558	-	523714 212767
78	Contemporary Trade Directory Entries Name: Pakex Uk Plc Location: Unit 1, Prime Point, Bessemer Road, Welwyn Garden City, AL7 1FE Classification: Polythene & Plastic Sheeting Supplies Status: Active Positional Accuracy: Automatically positioned to the address	A14SW (E)	564	-	524255 213249
78	Contemporary Trade Directory Entries Name: Howdens Joinery Location: Unit 1, Prime Point, Bessemer Road, Welwyn Garden City, AL7 1FE Classification: Joinery Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SW (E)	564	-	524255 213249
78	Contemporary Trade Directory Entries Name: Howdens Ltd Location: Unit 1, Prime Point, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1FE Classification: Builders' Merchants Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SW (E)	565	-	524255 213245
79	Contemporary Trade Directory Entries Name: Travis Perkins Plc Location: Unit 9 Bessemer Road Business Park, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1GF Classification: Builders' Merchants Status: Active Positional Accuracy: Automatically positioned to the address	A14SW (SE)	569	-	524219 213139
80	Contemporary Trade Directory Entries Name: K J Taplin Location: 79, Guessens Road, Welwyn Garden City, Hertfordshire, AL8 6RE Classification: Car Engine Tuning & Diagnostic Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A8NW (S)	569	-	523392 212740
81	Contemporary Trade Directory Entries Name: Lafarge Aggregates Ltd Location: Unit 4, Shires Park, Falcon Way, Welwyn Garden City, Hertfordshire, AL7 1TW Classification: Sand, Gravel & Other Aggregates Status: Inactive Positional Accuracy: Automatically positioned to the address	A14NW (E)	569	-	524267 213664
81	Contemporary Trade Directory Entries Name: Lafarge Readymix Location: Unit 4, Falcon Way, Shire Park, Welwyn Garden City, Hertfordshire, AL7 1TW Classification: Concrete & Mortar Ready Mixed Status: Inactive Positional Accuracy: Automatically positioned to the address	A14NW (E)	569	-	524267 213664
82	Contemporary Trade Directory Entries Name: Print Resources Location: 58, Brockwood Lane, WELWYN GARDEN CITY, Hertfordshire, AL8 7BG Classification: Printers Status: Active Positional Accuracy: Automatically positioned to the address	A12SW (W)	607	-	522878 213338
83	Contemporary Trade Directory Entries Name: Impex Freight Location: Unit 2, Falcon Gate, Falcon Way, Shire Park, Welwyn Garden City, AL7 1TW Classification: Freight Forwarders Status: Active Positional Accuracy: Automatically positioned to the address	A14NE (E)	611	-	524335 213566
84	Contemporary Trade Directory Entries Name: Heritage & Archive Location: The Vineyard, Welwyn Garden City, Hertfordshire, AL8 7PU Classification: Photo & Digital Imaging Bureaus Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A19SW (NE)	636	-	524051 214022

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
85	Contemporary Trade Directory Entries Name: Wickes Location: 1, Bessemer Road, Welwyn Garden City, AL7 1GF Classification: Builders' Merchants Status: Active Positional Accuracy: Manually positioned to the address or location	A14SW (SE)	644	-	524279 213092
86	Contemporary Trade Directory Entries Name: Webuyanyelectronics.Com Location: 137, Guessens Road, WELWYN GARDEN CITY, Hertfordshire, AL8 6RR Classification: Electrical Goods Sales, Manufacturers & Wholesalers Status: Inactive Positional Accuracy: Automatically positioned to the address	A7NE (SW)	648	-	523181 212738
87	Contemporary Trade Directory Entries Name: Barco Sales Ltd Location: Unit 15d, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1HU Classification: Distribution Services Status: Active Positional Accuracy: Automatically positioned to the address	A14SE (E)	648	-	524334 213219
88	Contemporary Trade Directory Entries Name: S A S Machine Co Ltd Location: Orion House, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1HH Classification: Machinery - Industrial & Commercial Status: Active Positional Accuracy: Automatically positioned to the address	A14NE (E)	652	-	524383 213451
89	Contemporary Trade Directory Entries Name: Cereal Partners Location: 2 Albany Place, 28, Bridge Road East, Welwyn Garden City, AL7 1RR Classification: Food Products - Manufacturers Status: Active Positional Accuracy: Automatically positioned to the address	A9NW (SE)	652	-	524207 212968
90	Contemporary Trade Directory Entries Name: Grace Foods Uk Ltd Location: Centra Park, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1HT Classification: Frozen Food Processors & Distributors Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SE (E)	660	-	524363 213280
90	Contemporary Trade Directory Entries Name: Enco Products Ltd Location: Centra Park, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1HT Classification: Distribution Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SE (E)	660	-	524363 213280
91	Contemporary Trade Directory Entries Name: A & M Services Location: 63, Pentley Park, Welwyn Garden City, Hertfordshire, AL8 7SF Classification: Domestic Appliances - Servicing, Repairs & Parts Status: Inactive Positional Accuracy: Automatically positioned to the address	A18NW (N)	682	-	523545 214135
92	Contemporary Trade Directory Entries Name: Clinical Hypnosis Location: 28, The Cloisters, Welwyn Garden City, Hertfordshire, AL8 6DX Classification: Engineers - General Status: Inactive Positional Accuracy: Automatically positioned to the address	A8SW (S)	687	-	523554 212607
93	Contemporary Trade Directory Entries Name: Inspace Mechanical & Electrical Location: 43, Longcroft Lane, Welwyn Garden City, Hertfordshire, AL8 6EB Classification: Air Conditioning & Refrigeration Contractors Status: Active Positional Accuracy: Automatically positioned to the address	A8SE (S)	754	-	523733 212567
94	Contemporary Trade Directory Entries Name: Pc Disposals Location: Bessemer House, Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1HJ Classification: Waste Disposal Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SE (E)	757	-	524407 213097

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
95	Contemporary Trade Directory Entries Name: Welwyn Lighting Designs Ltd Location: Aquarius House, Bessemer Road, Welwyn Garden City, AL7 1HH Classification: Lighting Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SE (E)	767	-	524455 213212
96	Contemporary Trade Directory Entries Name: Kwik Fit Location: Unit A, Bridge Park, 27, Bridge Road East, Welwyn Garden City, AL7 1JE Classification: Tyre Dealers Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	784	-	524407 213034
96	Contemporary Trade Directory Entries Name: Kwik-Fit Location: Unit A, Bridge Park, 27, Bridge Road East, Welwyn Garden City, Hertfordshire, AL7 1JE Classification: Tyre Dealers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	784	-	524407 213034
96	Contemporary Trade Directory Entries Name: Halfords Autocentre Location: Unit B, Bridge Park, 27, Bridge Road East, Welwyn Garden City, AL7 1JE Classification: Garage Services Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	802	-	524423 213025
97	Contemporary Trade Directory Entries Name: Moorlands Motor Company Location: 17 Broadwater Rd, Welwyn Garden City, Hertfordshire, AL7 3BQ Classification: Car Dealers - Used Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A9NW (SE)	807	-	524236 212777
97	Contemporary Trade Directory Entries Name: Supertyres Location: 13-15 Broadwater Rd, Welwyn Garden City, Hertfordshire, AL7 3BQ Classification: Mot Testing Centres Status: Inactive Positional Accuracy: Manually positioned to the address or location	A9NW (SE)	814	-	524280 212808
97	Contemporary Trade Directory Entries Name: Super Tyres Motorist Centre Location: 17, Broadwater Road, Welwyn Garden City, Hertfordshire, AL7 3BQ Classification: Tyre Dealers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NW (SE)	839	-	524272 212766
97	Contemporary Trade Directory Entries Name: Supertyres Mot Ltd Location: 17, Broadwater Road, Welwyn Garden City, Hertfordshire, AL7 3BQ Classification: Mot Testing Centres Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NW (SE)	839	-	524272 212766
97	Contemporary Trade Directory Entries Name: Adams Autocare Location: Unit 10 Broad Court, Broadwater Road, Welwyn Garden City, Hertfordshire, AL7 3BQ Classification: Garage Services Status: Active Positional Accuracy: Manually positioned within the geographical locality	A9NW (SE)	843	-	524258 212748
97	Contemporary Trade Directory Entries Name: Pod Drinks Plc Location: 21a, Broadwater Road, Welwyn Garden City, AL7 3BQ Classification: Vending Machine Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NW (SE)	859	-	524261 212730
98	Contemporary Trade Directory Entries Name: Continental Data Graphics Ltd Location: Albany Place, Hyde Way, Welwyn Garden City, AL7 3BT Classification: Engineers - General Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	814	-	524351 212890

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
98	Contemporary Trade Directory Entries Name: Continental Data Graphics Ltd Location: Albany Place, Hyde Way, Welwyn Garden City, AL7 3BT Classification: Engineers - General Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	814	-	524351 212890
98	Contemporary Trade Directory Entries Name: Cephalon Location: Albany Place, Hyde Way, Welwyn Garden City, Hertfordshire, AL7 3BT Classification: Pharmaceutical Manufacturers & Distributors Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	814	-	524352 212890
99	Contemporary Trade Directory Entries Name: Tracy'S French Polishing Location: 26, Bridge Road East, Welwyn Garden City, Hertfordshire, AL7 1HL Classification: French Polishing Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	822	-	524408 212958
99	Contemporary Trade Directory Entries Name: Scrap Cars Vans Caravans Buyer Location: 26, Bridge Road East, Welwyn Garden City, AL7 1HL Classification: Car Breakers & Dismantlers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	824	-	524406 212952
99	Contemporary Trade Directory Entries Name: Alan Tracy Ltd Location: 26, Bridge Road East, Welwyn Garden City, AL7 1HL Classification: French Polishing Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	824	-	524406 212952
99	Contemporary Trade Directory Entries Name: Uk Pest Solutions Ltd Location: Albany Chambers, 26 Bridge Road East, Welwyn Garden City, Hertfordshire, AL7 1HL Classification: Fumigation Services Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	824	-	524406 212952
99	Contemporary Trade Directory Entries Name: Elan Graphic Solutions Ltd Location: 26, Bridge Road East, Welwyn Garden City, Hertfordshire, AL7 1HL Classification: Printing Engineering Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	826	-	524413 212957
99	Contemporary Trade Directory Entries Name: Atford Location: 26, Bridge Road East, Welwyn Garden City, Hertfordshire, AL7 1HL Classification: Engine Manufacturers & Distributors Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	826	-	524413 212957
100	Contemporary Trade Directory Entries Name: Just Tyres Location: Unit E-F, Bridge Park, 27, Bridge Road East, Welwyn Garden City, Hertfordshire, AL7 1JE Classification: Tyre Dealers Status: Inactive Positional Accuracy: Automatically positioned in the proximity of the address	A9NE (SE)	826	-	524446 213017
100	Contemporary Trade Directory Entries Name: National Tyres & Autocare Location: Unit 2c Bridge Park, 27 Bridge Road East, Welwyn Garden City, Hertfordshire, AL7 1JE Classification: Tyre Dealers Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	830	-	524446 213010
100	Contemporary Trade Directory Entries Name: Welwyn Merx Ltd Location: Unit 6, Tewin Road Business Centre, Garden Court, Welwyn Garden City, AL7 1BH Classification: Garage Services Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	867	-	524477 212988

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
100	Contemporary Trade Directory Entries Name: Babyland Location: Unit 6, Tewin Road Business Centre, Garden Court, Welwyn Garden City, Hertfordshire, AL7 1BH Classification: Children & Babywear - Manufacturers & Wholesalers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	868	-	524478 212988
100	Contemporary Trade Directory Entries Name: Village Electrics Location: Unit 6, Tewin Road Business Centre, Garden Court, Welwyn Garden City, Hertfordshire, AL7 1BH Classification: Electrical Engineers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	868	-	524478 212988
100	Contemporary Trade Directory Entries Name: Mech-Tech Autos Ltd Location: Unit 9 Tewin Road Business Centre, Garden Court, Welwyn Garden City, Hertfordshire, AL7 1BH Classification: Garage Services Status: Active Positional Accuracy: Manually positioned within the geographical locality	A9NE (SE)	874	-	524499 213016
100	Contemporary Trade Directory Entries Name: Auto Wiz Location: Unit 4, Tewin Road Business Centre, Garden Court, Welwyn Garden City, Hertfordshire, AL7 1BH Classification: Car Body Repairs Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	885	-	524493 212979
100	Contemporary Trade Directory Entries Name: Masterfit Auto Services & Repairs Location: Unit 3, Tewin Road Business Centre, Garden Court, Welwyn Garden City, AL7 1BH Classification: Tyre Repairs & Retreading Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	896	-	524502 212973
100	Contemporary Trade Directory Entries Name: Esso Location: Bridge Road East, Welwyn Garden City, Hertfordshire, AL7 1LE Classification: Petrol Filling Stations - 24 Hour Status: Active Positional Accuracy: Manually positioned to the address or location	A9NE (SE)	904	-	524502 212956
100	Contemporary Trade Directory Entries Name: Mark Tempest Autocentre Ltd Location: Unit 1-2, Tewin Road Business Centre, Garden Court, Welwyn Garden City, AL7 1BH Classification: Garage Services Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	913	-	524517 212965
101	Contemporary Trade Directory Entries Name: E C Motors Location: Broadwater Rd, Welwyn Garden City, Hertfordshire, AL7 3BQ Classification: Garage Services Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A9NW (SE)	829	-	524225 212738
102	Contemporary Trade Directory Entries Name: John Grundy Motoring Services Location: 1, Pippens, Welwyn Garden City, Hertfordshire, AL8 7AB Classification: Garage Services Status: Active Positional Accuracy: Automatically positioned to the address	A19NW (NE)	845	-	524132 214216
103	Contemporary Trade Directory Entries Name: Auto Gallery Location: 1, Greenfield, Welwyn Garden City, Hertfordshire, AL8 7HW Classification: Car Dealers Status: Inactive Positional Accuracy: Automatically positioned to the address	A19NW (N)	867	-	523945 214313
104	Contemporary Trade Directory Entries Name: Lemsford Metal Products 1982 Ltd Location: 24, Hyde Way, Welwyn Garden City, Hertfordshire, AL7 3UQ Classification: Sheet Metal Work Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	869	-	524322 212773

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
104	Contemporary Trade Directory Entries Name: Cleamax Engineering Ltd Location: 24, Hyde Way, Welwyn Garden City, Hertfordshire, AL7 3UQ Classification: Machinery - Industrial & Commercial Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	869	-	524322 212773
104	Contemporary Trade Directory Entries Name: F R E S C H Location: 26-28, Hyde Way, Welwyn Garden City, AL7 3UQ Classification: Recycling Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	905	-	524370 212770
105	Contemporary Trade Directory Entries Name: Cleaners Welwyn Garden City Location: 82, Longcroft Lane, Welwyn Garden City, Hertfordshire, AL8 6EJ Classification: Carpet, Curtain & Upholstery Cleaners Status: Inactive Positional Accuracy: Automatically positioned to the address	A8SE (S)	873	-	523647 212428
106	Contemporary Trade Directory Entries Name: L J Whiteman & Son Location: 27a, Hyde Way, Welwyn Garden City, Hertfordshire, AL7 3UQ Classification: Garage Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	878	-	524407 212858
106	Contemporary Trade Directory Entries Name: L J Whiteman & Son Welwyn Test Centre Location: 27a, Hyde Way, Welwyn Garden City, AL7 3UQ Classification: Mot Testing Centres Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	878	-	524407 212858
106	Contemporary Trade Directory Entries Name: Imedco Location: 27, Hyde Way, Welwyn Garden City, Hertfordshire, AL7 3UQ Classification: Medical Equipment Manufacturers Status: Active Positional Accuracy: Automatically positioned to the address	A9NE (SE)	891	-	524406 212835
106	Contemporary Trade Directory Entries Name: Imedco Ltd Location: 27, Hyde Way, Welwyn Garden City, Hertfordshire, AL7 3UQ Classification: Medical Equipment Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	891	-	524406 212835
106	Contemporary Trade Directory Entries Name: A1m Car Services Ltd Location: 29, Hyde Way, Welwyn Garden City, Hertfordshire, AL7 3UQ Classification: Garage Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	905	-	524410 212817
107	Contemporary Trade Directory Entries Name: Ats Euromaster Ltd Location: 17, Tewin Road, WELWYN GARDEN CITY, Hertfordshire, AL7 1BD Classification: Tyre Dealers Status: Active Positional Accuracy: Automatically positioned to the address	A14SE (E)	879	-	524528 213072
107	Contemporary Trade Directory Entries Name: W.G.C Non Ferrous Metals Location: 17, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BD Classification: Non-Ferrous Metals Status: Inactive Positional Accuracy: Manually positioned to the address or location	A14SE (E)	879	-	524528 213072
107	Contemporary Trade Directory Entries Name: Duo Cars Location: Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BD Classification: Car Dealers - Used Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SE (E)	899	-	524554 213084
107	Contemporary Trade Directory Entries Name: Welwyn Car Centre Location: Tewin Rd, Welwyn Garden City, Hertfordshire, AL7 1BD Classification: Car Dealers - Used Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A14SE (E)	919	-	524568 213064

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
108	Contemporary Trade Directory Entries Name: Essen Bioscience Ltd Location: Bio-Park, Broadwater Road, Welwyn Garden City, AL7 3AX Classification: Laboratory Equipment, Instruments & Supplies Status: Inactive Positional Accuracy: Automatically positioned to the address	A9SW (S)	882	-	523949 212514
108	Contemporary Trade Directory Entries Name: Biopark Hertfordshire Location: Broadwater Road, Welwyn Garden City, Hertfordshire, AL7 3AX Classification: Laboratories Status: Inactive Positional Accuracy: Automatically positioned to the address	A9SW (S)	896	-	523946 212497
108	Contemporary Trade Directory Entries Name: Biopark Location: Broadwater Road, Welwyn Garden City, Hertfordshire, AL7 3AX Classification: Laboratories Status: Active Positional Accuracy: Automatically positioned to the address	A9SW (S)	896	-	523946 212497
108	Contemporary Trade Directory Entries Name: Temag Pharma Ltd Location: Broadwater Road, Welwyn Garden City, Hertfordshire, AL7 3AX Classification: Pharmaceutical Manufacturers & Distributors Status: Inactive Positional Accuracy: Automatically positioned to the address	A9SW (S)	896	-	523946 212497
108	Contemporary Trade Directory Entries Name: C N Bio Innovations Location: Bio-Park, Broadwater Road, WELWYN GARDEN CITY, Hertfordshire, AL7 3AX Classification: Scientific Apparatus & Instruments - Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9SW (S)	896	-	523946 212497
109	Contemporary Trade Directory Entries Name: Bounty Location: 29, Broadwater Road, Welwyn Garden City, AL7 3BQ Classification: Distribution Services Status: Active Positional Accuracy: Automatically positioned to the address	A9SW (SE)	888	-	524243 212678
109	Contemporary Trade Directory Entries Name: Ecri Institute Europe Location: 29, Broadwater Road, Welwyn Garden City, AL7 3BQ Classification: Medical Equipment Manufacturers Status: Active Positional Accuracy: Automatically positioned to the address	A9SW (SE)	899	-	524248 212667
110	Contemporary Trade Directory Entries Name: British Lead Mills Location: Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UB Classification: Metal Industries - Primary Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	890	-	524458 212910
111	Contemporary Trade Directory Entries Name: Roche Products Ltd Location: 40 Broadwater Rd, Welwyn Garden City, Hertfordshire, AL7 3AY Classification: Pharmaceutical Manufacturers & Distributors Status: Inactive Positional Accuracy: Automatically positioned to the address	A9SW (SE)	892	-	524110 212588
112	Contemporary Trade Directory Entries Name: Supertyres Motorists Centre Ltd Location: 23a, Broadwater Road, Welwyn Garden City, AL7 3BQ Classification: Tyre Dealers Status: Active Positional Accuracy: Automatically positioned to the address	A9SE (SE)	905	-	524298 212701
112	Contemporary Trade Directory Entries Name: Ridge Engineering Co Ltd Location: 23a Broadwater Rd, Welwyn Garden City, Hertfordshire, AL7 3AU Classification: Electrical Engineers Status: Inactive Positional Accuracy: Manually positioned to the address or location	A9SE (SE)	905	-	524298 212700

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
112	Contemporary Trade Directory Entries Name: Supertyres Motorists Centre Location: Newton House, 23a, Broadwater Road, Welwyn Garden City, Hertfordshire, AL7 3BQ Classification: Tyre Dealers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9SE (SE)	905	-	524298 212701
113	Contemporary Trade Directory Entries Name: R S B Uk Ltd Location: Bridgefields, Welwyn Garden City, Hertfordshire, AL7 1RX Classification: Road Haulage Services Status: Active Positional Accuracy: Automatically positioned to the address	A14SE (E)	916	-	524617 213238
114	Contemporary Trade Directory Entries Name: Esso Location: Bridge Road East, Welwyn Garden City, AL7 1LE Classification: Petrol Filling Stations Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	916	-	524512 212950
114	Contemporary Trade Directory Entries Name: Esso Location: Bridge Road East, Welwyn Garden City, Hertfordshire, AL7 1LE Classification: Petrol Filling Stations Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	917	-	524514 212951
115	Contemporary Trade Directory Entries Name: Computa Tune Location: 13, Haymeads, Welwyn Garden City, Hertfordshire, AL8 7AD Classification: Car Engine Tuning & Diagnostic Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A19NW (NE)	917	-	524111 214307
116	Contemporary Trade Directory Entries Name: Bioshine Cleaning Services Location: 5, The Links, Welwyn Garden City, Hertfordshire, AL8 7DS Classification: Cleaning Services - Domestic Status: Active Positional Accuracy: Automatically positioned to the address	A7SW (SW)	918	-	522834 212675
117	Contemporary Trade Directory Entries Name: Drake Electronics Ltd Location: 26-28, Hyde Way, Welwyn Garden City, Hertfordshire, AL7 3UQ Classification: Radio Communication Equipment Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	923	-	524367 212740
117	Contemporary Trade Directory Entries Name: Presswork Location: Unit 23-24, Peartree Farm, Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UW Classification: Printers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9SE (SE)	931	-	524338 212702
117	Contemporary Trade Directory Entries Name: Prompt Fire Protection Location: Unit 25, Peartree Farm, Peartree Lane, Welwyn Garden City, AL7 3UW Classification: Firefighting Equipment Status: Active Positional Accuracy: Automatically positioned to the address	A9SE (SE)	940	-	524348 212698
117	Contemporary Trade Directory Entries Name: Jj Engineering (Uk) Ltd Location: Unit 19/20, Peartree Farm, Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UW Classification: Precision Engineers Status: Inactive Positional Accuracy: Manually positioned to the address or location	A9SE (SE)	943	-	524331 212679
117	Contemporary Trade Directory Entries Name: A C Precision Location: Unit 26, Peartree Farm, Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UW Classification: Precision Engineers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9SE (SE)	947	-	524355 212696

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
117	Contemporary Trade Directory Entries Name: Peartree Clutch & Engine Centre Location: 1 Peartree Farm, Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UW Classification: Garage Services Status: Active Positional Accuracy: Automatically positioned to the address	A9SE (SE)	982	-	524390 212680
117	Contemporary Trade Directory Entries Name: G V A Engineering Co Ltd Location: Unit 1, Peartree Farm, Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UW Classification: Precision Engineers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9SE (SE)	984	-	524392 212680
117	Contemporary Trade Directory Entries Name: Peartree Welding Centre Location: Unit 2, Peartree Farm, Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UW Classification: Car Body Repairs Status: Inactive Positional Accuracy: Automatically positioned to the address	A9SE (SE)	990	-	524398 212678
118	Contemporary Trade Directory Entries Name: Chestminster Ltd Location: Bridgefields, Welwyn Garden City, Hertfordshire, AL7 1RX Classification: Road Haulage Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A15SW (E)	937	-	524655 213313
119	Contemporary Trade Directory Entries Name: Digitimer Ltd Location: 37, Hyde Way, Welwyn Garden City, Hertfordshire, AL7 3BE Classification: Medical Instruments - Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	A9NE (SE)	952	-	524456 212799
120	Contemporary Trade Directory Entries Name: Jardak Location: 14, Tewin Road, Welwyn Garden City, AL7 1BW Classification: Commercial Cleaning Services Status: Active Positional Accuracy: Automatically positioned to the address	A15SW (E)	957	-	524621 213103
120	Contemporary Trade Directory Entries Name: Direct Janitorial Solutions Ltd Location: 14, Tewin Road, Welwyn Garden City, AL7 1BW Classification: Cleaning Materials & Equipment Status: Active Positional Accuracy: Automatically positioned to the address	A15SW (E)	957	-	524621 213103
120	Contemporary Trade Directory Entries Name: Jardak Services Location: 14, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BW Classification: Commercial Cleaning Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A15SW (E)	961	-	524624 213100
120	Contemporary Trade Directory Entries Name: Hertfordshire Community Nhs Trust Location: Unit 1a Port Road Howard Court, 14 Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BW Classification: Hospitals Status: Active Positional Accuracy: Automatically positioned to the address	A15SW (E)	961	-	524624 213100
120	Contemporary Trade Directory Entries Name: Shindengen (Uk) Ltd Location: 12, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BW Classification: Electronic Component Manufacturers & Distributors Status: Inactive Positional Accuracy: Automatically positioned to the address	A15SW (E)	968	-	524627 213085
120	Contemporary Trade Directory Entries Name: L G A Finishing Ltd Location: Unit 20 Tewin Court, Welwyn Garden City, Hertfordshire, AL7 1AU Classification: Packaging Materials Manufacturers & Suppliers Status: Active Positional Accuracy: Manually positioned to the address or location	A15SW (E)	976	-	524650 213135

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
120	Contemporary Trade Directory Entries Name: Amerco Electrical Distributors Ltd Location: 18, Tewin Court, Welwyn Garden City, Hertfordshire, AL7 1AU Classification: Electrical Goods Sales, Manufacturers & Wholesalers Status: Inactive Positional Accuracy: Automatically positioned to the address	A15SW (E)	999	-	524667 213107
121	Contemporary Trade Directory Entries Name: Best Choice 4 U Ltd Location: 177, Knightsfield, Welwyn Garden City, AL8 7QG Classification: Commercial Cleaning Services Status: Active Positional Accuracy: Automatically positioned to the address	A23SE (N)	964	-	523840 214430
122	Contemporary Trade Directory Entries Name: Premier Electrical Services Location: 3, Applecroft Road, WELWYN GARDEN CITY, Hertfordshire, AL8 6JZ Classification: Washing Machines - Servicing & Repairs Status: Active Positional Accuracy: Automatically positioned to the address	A7SE (SW)	966	-	523035 212455
123	Contemporary Trade Directory Entries Name: Vosper Thornycroft Controls Ltd Location: 8, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BW Classification: Control Panel Manufacturers Status: Inactive Positional Accuracy: Automatically positioned in the proximity of the address	A15SW (E)	967	-	524621 213068
123	Contemporary Trade Directory Entries Name: Hamamatsu Photonics (Uk) Ltd Location: 10, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BW Classification: Electronic Component Manufacturers & Distributors Status: Inactive Positional Accuracy: Automatically positioned to the address	A14SE (E)	967	-	524614 213051
124	Contemporary Trade Directory Entries Name: Dansi Express Deliveries Ltd Location: 43, Lodgefield, Welwyn Garden City, Hertfordshire, AL7 1SD Classification: Road Haulage Services Status: Inactive Positional Accuracy: Automatically positioned to the address	A19NE (NE)	974	-	524426 214155
125	Contemporary Trade Directory Entries Name: British Premium Meats Location: 32 Hyde Way, Welwyn Garden City, Hertfordshire, AL7 3UQ Classification: Meat - Wholesale Status: Inactive Positional Accuracy: Manually positioned to the address or location	A9NE (SE)	980	-	524444 212741
125	Contemporary Trade Directory Entries Name: Tecmed Ltd Location: 32a Hyde Way, Welwyn Garden City, Hertfordshire, AL7 3AW Classification: Medical Instruments - Manufacturers Status: Inactive Positional Accuracy: Manually positioned to the address or location	A9NE (SE)	999	-	524442 212710
126	Contemporary Trade Directory Entries Name: Flowline Manufacturing Location: 58, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BD Classification: Flow Measurement Systems - Manufacturers Status: Inactive Positional Accuracy: Automatically positioned to the address	A15SW (E)	994	-	524698 213238
126	Contemporary Trade Directory Entries Name: Hallgrove Garage Location: 4, Tewin Court, Welwyn Garden City, AL7 1AU Classification: Garage Services Status: Active Positional Accuracy: Automatically positioned to the address	A15SW (E)	995	-	524688 213198
127	Contemporary Trade Directory Entries Name: Jack O'Neill Location: Unit 3, Peartree Farm, Peartree Lane, Welwyn Garden City, Hertfordshire, AL7 3UW Classification: Domestic Appliances - Servicing, Repairs & Parts Status: Inactive Positional Accuracy: Automatically positioned to the address	A9SE (SE)	996	-	524405 212675

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
128	Fuel Station Entries Name: Central Garage Location: Church Road , , Welwyn Garden City, Hertfordshire, AL8 6PW Brand: OBSOLETE Premises Type: Not Applicable Status: Obsolete Positional Accuracy: Automatically positioned to the address	A8NE (S)	430	-	523659 212883
129	Fuel Station Entries Name: Tesco Head Office Welwyn Automat Location: Kestrel Way (Tesco Ho) , Shire Park , Welwyn Garden City, Hertfordshire, AL7 1GA Brand: Tesco Premises Type: Hypermarket Status: Non-Retail Positional Accuracy: Manually positioned to the road within the address or location	A19SE (NE)	820	-	524479 213810
130	Fuel Station Entries Name: Mfg Eastbridge Location: Bridge Road East , , Welwyn Garden City, Hertfordshire, AL7 1LE Brand: ESSO Premises Type: Petrol Station Status: Open Positional Accuracy: Manually positioned to the address or location	A9NE (SE)	917	-	524514 212951

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
131	Ancient Woodland Name: Sherrardspark Woods Reference: 1116056 Area(m²): 566977.51 Type: Ancient and Semi-Natural Woodland	A12SE (W)	292	10	523195 213349
132	Ancient Woodland Name: Sherrardspark Woods Reference: 1116056 Area(m²): 95111.25 Type: Plantation on Ancient Woodland	A12SE (W)	384	10	523099 213376
133	Areas of Adopted Green Belt Authority: Welwyn Hatfield District Council Plan Name: Welwyn Hatfield Local Plan Status: Adopted Plan Date: 15th April 2005	A12NE (NW)	295	8	523264 213603
134	Local Nature Reserves Name: Sherrardspark Wood Multiple Area: Y Area (m2): 731961.94 Source: Natural England Designation Date: 1st January 1998	A13NW (NW)	245	10	523280 213544
135	Nitrate Vulnerable Zones Name: Lee Nvz Description: Surface Water Source: Environment Agency, Head Office	A13NW (SE)	0	4	523605 213393
136	Sites of Special Scientific Interest Name: Sherrardspark Wood Multiple Areas: N Total Area (m2): 743104.83 Source: Natural England Reference: 1000271 Designation Details: Local Nature Reserve Designation Date: 1st February 1986 Date Type: Notified Designation Details: Site Of Special Scientific Interest Designation Date: 1st February 1986 Date Type: Notified	A12SE (W)	279	10	523211 213333

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices Welwyn Hatfield District Council - Environmental Health Department St Albans City & District Council - Environmental Health Department East Hertfordshire District Council - Environmental Health Department North Hertfordshire District Council - Environmental Health Department	August 2013 February 2015 January 2013 October 2014	Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update
Discharge Consents Environment Agency - Thames Region	July 2019	Quarterly
Enforcement and Prohibition Notices Environment Agency - Thames Region	March 2013	Annual Rolling Update
Integrated Pollution Controls Environment Agency - Thames Region	October 2008	Variable
Integrated Pollution Prevention And Control Environment Agency - South East Region - North East Thames Area Environment Agency - Thames Region	July 2019 July 2019	Quarterly Quarterly
Local Authority Integrated Pollution Prevention And Control East Hertfordshire District Council - Environmental Health Department Welwyn Hatfield District Council - Environmental Health Department St Albans City & District Council - Environmental Health Department North Hertfordshire District Council - Environmental Health Department	January 2014 May 2012 May 2014 September 2014	Variable Variable Variable Variable
Local Authority Pollution Prevention and Controls East Hertfordshire District Council - Environmental Health Department Welwyn Hatfield District Council - Environmental Health Department St Albans City & District Council - Environmental Health Department North Hertfordshire District Council - Environmental Health Department	January 2014 May 2012 May 2014 September 2014	Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update
Local Authority Pollution Prevention and Control Enforcements East Hertfordshire District Council - Environmental Health Department Welwyn Hatfield District Council - Environmental Health Department St Albans City & District Council - Environmental Health Department North Hertfordshire District Council - Environmental Health Department	January 2014 May 2012 May 2014 September 2014	Variable Variable Variable Variable
Nearest Surface Water Feature Ordnance Survey	January 2019	
Pollution Incidents to Controlled Waters Environment Agency - Thames Region	September 1999	Not Applicable
Prosecutions Relating to Authorised Processes Environment Agency - Thames Region	March 2013	Annual Rolling Update
Prosecutions Relating to Controlled Waters Environment Agency - Thames Region	March 2013	Annual Rolling Update
Registered Radioactive Substances Environment Agency - Thames Region	June 2016	
River Quality Environment Agency - Head Office	November 2001	Not Applicable
River Quality Biology Sampling Points Environment Agency - Head Office	July 2012	Annually
River Quality Chemistry Sampling Points Environment Agency - Head Office	July 2012	Annually
Substantiated Pollution Incident Register Environment Agency - South East Region - North East Thames Area Environment Agency - Thames Region - North East Area	July 2019 July 2019	Quarterly Quarterly
Water Abstractions Environment Agency - Thames Region	July 2019	Quarterly
Water Industry Act Referrals Environment Agency - Thames Region	October 2017	Quarterly

Agency & Hydrological	Version	Update Cycle
Groundwater Vulnerability Map Environment Agency - Head Office	June 2018	Annually
Groundwater Vulnerability - Soluble Rock Risk Environment Agency - Head Office	June 2018	Annually
Bedrock Aquifer Designations Environment Agency - Head Office	January 2018	Annually
Superficial Aquifer Designations Environment Agency - Head Office	January 2018	Annually
Source Protection Zones Environment Agency - Head Office	July 2019	Quarterly
Extreme Flooding from Rivers or Sea without Defences Environment Agency - Head Office	August 2019	Quarterly
Flooding from Rivers or Sea without Defences Environment Agency - Head Office	August 2019	Quarterly
Areas Benefiting from Flood Defences Environment Agency - Head Office	August 2019	Quarterly
Flood Water Storage Areas Environment Agency - Head Office	August 2019	Quarterly
Flood Defences Environment Agency - Head Office	August 2019	Quarterly
OS Water Network Lines Ordnance Survey	April 2019	Quarterly
BGS Groundwater Flooding Susceptibility British Geological Survey - National Geoscience Information Service	May 2013	Annually

Waste	Version	Update Cycle
BGS Recorded Landfill Sites British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Historical Landfill Sites Environment Agency - Head Office	July 2019	Quarterly
Integrated Pollution Control Registered Waste Sites Environment Agency - Thames Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries) Environment Agency - South East Region - North East Thames Area Environment Agency - Thames Region - North East Area	July 2018 July 2018	Quarterly Quarterly
Licensed Waste Management Facilities (Locations) Environment Agency - South East Region - North East Thames Area Environment Agency - Thames Region - North East Area	July 2019 July 2019	Quarterly Quarterly
Local Authority Landfill Coverage East Hertfordshire District Council - Environmental Health Department Hertfordshire County Council - Spatial Planning and Economy Unit North Hertfordshire District Council - Environmental Health Department St Albans City & District Council - Environmental Health Department Welwyn Hatfield District Council - Environmental Health Department	May 2000 May 2000 May 2000 May 2000 May 2000	Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable
Local Authority Recorded Landfill Sites East Hertfordshire District Council - Environmental Health Department Hertfordshire County Council - Spatial Planning and Economy Unit North Hertfordshire District Council - Environmental Health Department St Albans City & District Council - Environmental Health Department Welwyn Hatfield District Council - Environmental Health Department	May 2000 May 2000 May 2000 May 2000 May 2000	Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable
Registered Landfill Sites Environment Agency - Thames Region - North East Area	March 2003	Not Applicable
Registered Waste Transfer Sites Environment Agency - Thames Region - North East Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites Environment Agency - Thames Region - North East Area	June 2015	Not Applicable
Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH) Health and Safety Executive	April 2018	Bi-Annually
Explosive Sites Health and Safety Executive	March 2017	Annually
Notification of Installations Handling Hazardous Substances (NIHHS) Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements East Hertfordshire District Council Hertfordshire County Council - Spatial Planning and Economy Unit North Hertfordshire District Council St Albans City & District Council Welwyn Hatfield District Council	April 2015 February 2016 February 2016 February 2016 February 2016	Variable Variable Variable Variable Variable
Planning Hazardous Substance Consents East Hertfordshire District Council Hertfordshire County Council - Spatial Planning and Economy Unit North Hertfordshire District Council St Albans City & District Council Welwyn Hatfield District Council	April 2015 February 2016 February 2016 February 2016 February 2016	Variable Variable Variable Variable Variable

Geological	Version	Update Cycle
BGS 1:625,000 Solid Geology British Geological Survey - National Geoscience Information Service	January 2009	Not Applicable
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	April 2019	Bi-Annually
CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	Not Applicable
Coal Mining Affected Areas The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	July 2011	Annually
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	July 2011	Annually
Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	July 2019	Quarterly
Fuel Station Entries Catalist Ltd - Experian	September 2019	Quarterly
Gas Pipelines National Grid	July 2014	
Underground Electrical Cables National Grid	December 2015	

Sensitive Land Use	Version	Update Cycle
Ancient Woodland Natural England	August 2018	Bi-Annually
Areas of Adopted Green Belt East Hertfordshire District Council North Hertfordshire District Council St Albans City & District Council Welwyn Hatfield District Council	March 2019 March 2019 March 2019 March 2019	As notified As notified As notified As notified
Areas of Unadopted Green Belt East Hertfordshire District Council North Hertfordshire District Council St Albans City & District Council Welwyn Hatfield District Council	March 2019 March 2019 March 2019 March 2019	As notified As notified As notified As notified
Areas of Outstanding Natural Beauty Natural England	June 2019	Bi-Annually
Environmentally Sensitive Areas Natural England	January 2017	
Forest Parks Forestry Commission	April 1997	Not Applicable
Local Nature Reserves Natural England	March 2019	Bi-Annually
Marine Nature Reserves Natural England	July 2019	Bi-Annually
National Nature Reserves Natural England	July 2019	Bi-Annually
National Parks Natural England	April 2017	Bi-Annually
Nitrate Vulnerable Zones Environment Agency - Head Office Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	December 2017 October 2015	Bi-Annually
Ramsar Sites Natural England	April 2019	Bi-Annually
Sites of Special Scientific Interest Natural England	March 2019	Bi-Annually
Special Areas of Conservation Natural England	June 2019	Bi-Annually
Special Protection Areas Natural England	April 2019	Bi-Annually

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	 British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL
Centre for Ecology and Hydrology	 Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL
Natural Resources Wales	
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Peter Brett Associates	

Contact	Name and Address	Contact Details
1	British Geological Survey - Enquiry Service British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	Environment Agency - National Customer Contact Centre (NCCC) PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
3	Welwyn Hatfield District Council - Environmental Health Department Council Offices, Campus East, Welwyn Garden City, Hertfordshire, AL8 6AE	Telephone: 01707 357000 Fax: 01707 375490 Website: www.welhat.gov.uk
4	Environment Agency - Head Office Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
5	Ordnance Survey Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 03456 05 05 05 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.gov.uk
6	Hertfordshire County Council - Spatial Planning and Economy Unit County Hall, Hertford, Hertfordshire, SG13 8DN	Telephone: 01992 556266 Fax: 01992 556015 Email: spatialplanning@hertfordshire.gov.uk Website: www.hertsdirect.org
7	Health and Safety Executive 5S.2 Redgrave Court, Merton Road, Bootle, L20 7HS	Website: www.hse.gov.uk
8	Welwyn Hatfield District Council Council Offices, Campus East, Welwyn Garden City, Hertfordshire, AL8 6AE	Telephone: 01707 357000 Fax: 01707 375490 Website: www.welhat.gov.uk
9	Peter Brett Associates Caversham Bridge House, Waterman Place, Reading, Berkshire, RG1 8DN	Telephone: 0118 950 0761 Fax: 0118 959 7498 Email: reading@pba.co.uk Website: www.pba.co.uk
10	Natural England County Hall, Spetchley Road, Worcester, WR5 2NP	Telephone: 0300 060 3900 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
11	East Hertfordshire District Council Wallfields, Pegs Lane, Hertford, Hertfordshire, SG13 8EQ	Telephone: 01279 655261 Fax: 01992 552280 Website: www.eastherts.gov.uk
-	Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	Landmark Information Group Limited Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

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

Ordnance Survey Plan 1:10,000

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Scrub
	Bracken		Heath
	Marsh		Reeds
	Building		Glasshouse
	Sloping Masonry		Pylon
	Cutting		Embankment
	Road Under		Road Over
	Level Crossing		Foot Bridge
	Standard Gauge Multiple Track		Standard Gauge Single Track
	Siding, Tramway or Mineral Line		Narrow Gauge
	Geographical County		Administrative County, County Borough or County of City
	Municipal Borough, Urban or Rural District, Burgh or District Council		Borough, Burgh or County Constituency
	Civil Parish		
	BP, BS Boundary Post or Stone		Police Station
	Church		Post Office
	Club House		Public Convenience
	Fire Engine Station		Public House
	Foot Bridge		Signal Box
	Fountain		Spring
	Guide Post		Telephone Call Box
	Mile Post		Telephone Call Post
	Mile Stone		Well

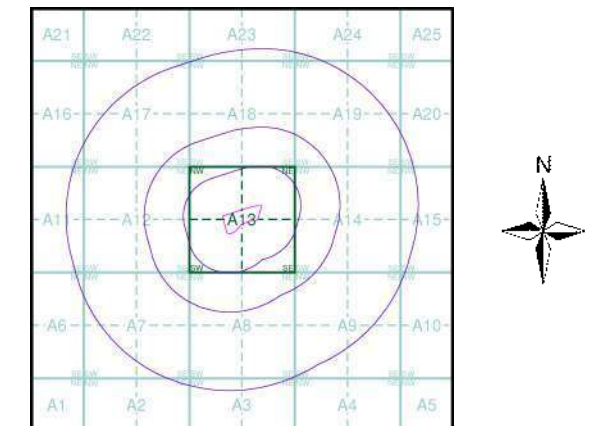
1:10,000 Raster Mapping

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

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Hertfordshire	1:10,560	1884	2
Hertfordshire	1:10,560	1899	3
Hertfordshire	1:10,560	1925	4
Hertfordshire	1:10,560	1939	5
Hertfordshire	1:10,560	1950	6
Ordnance Survey Plan	1:10,000	1960	7
Ordnance Survey Plan	1:10,000	1966	8
Ordnance Survey Plan	1:10,000	1976	9
Ordnance Survey Plan	1:10,000	1989	10
10K Raster Mapping	1:10,000	1999	11
Street View	Variable		12

Historical Map - Slice A

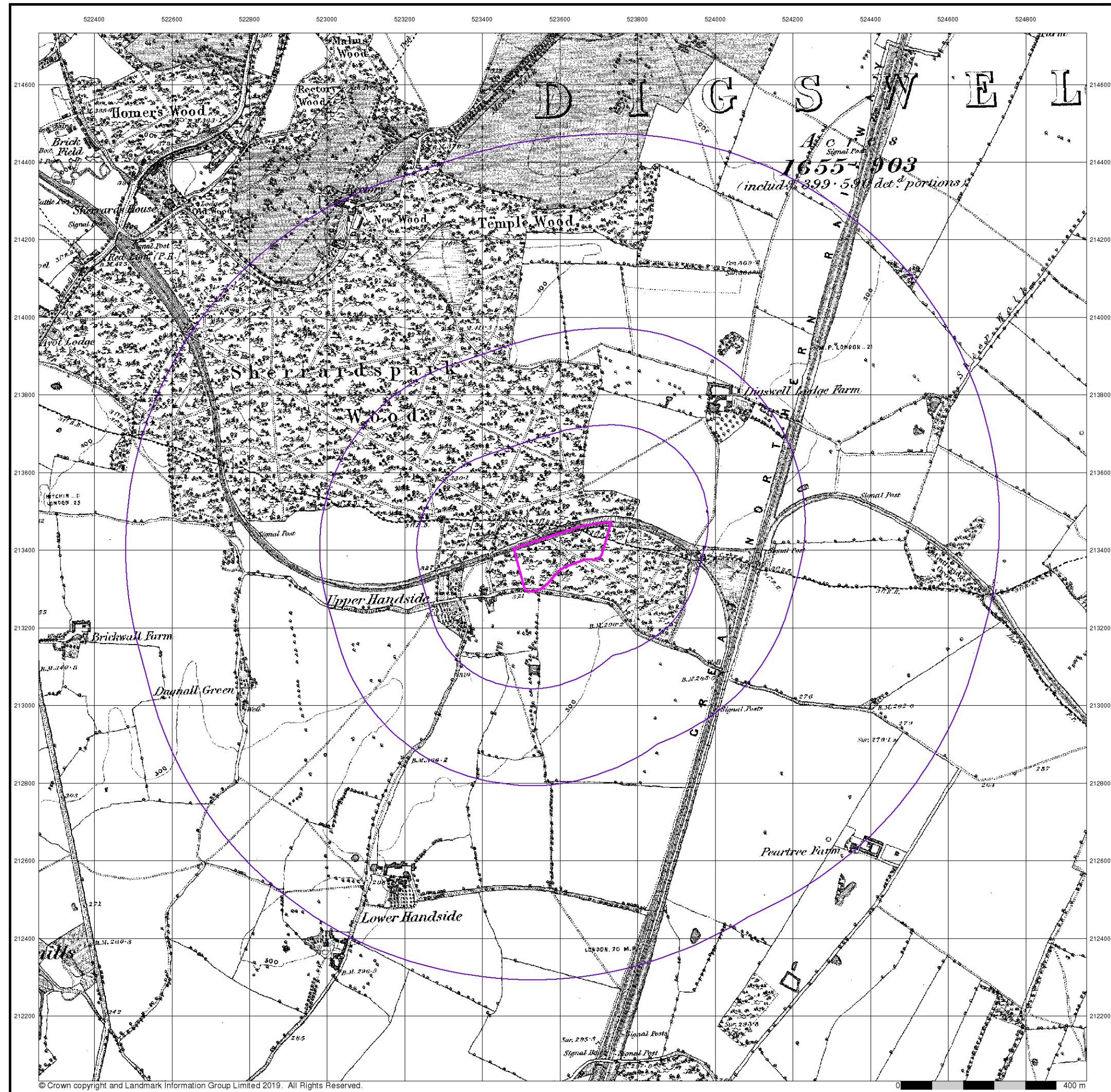


Order Details

Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 1000

Site Details

Site at, Welwyn Garden City, Hertfordshire



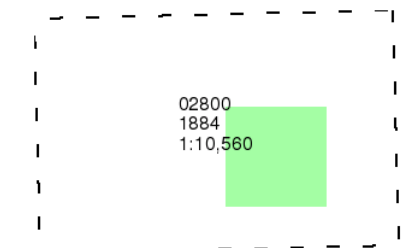
Hertfordshire

Published 1884

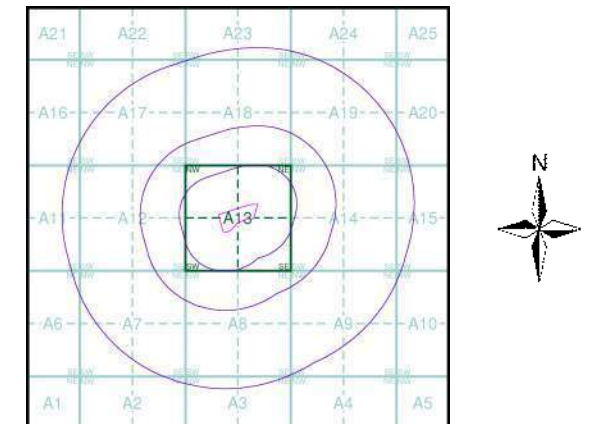
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A

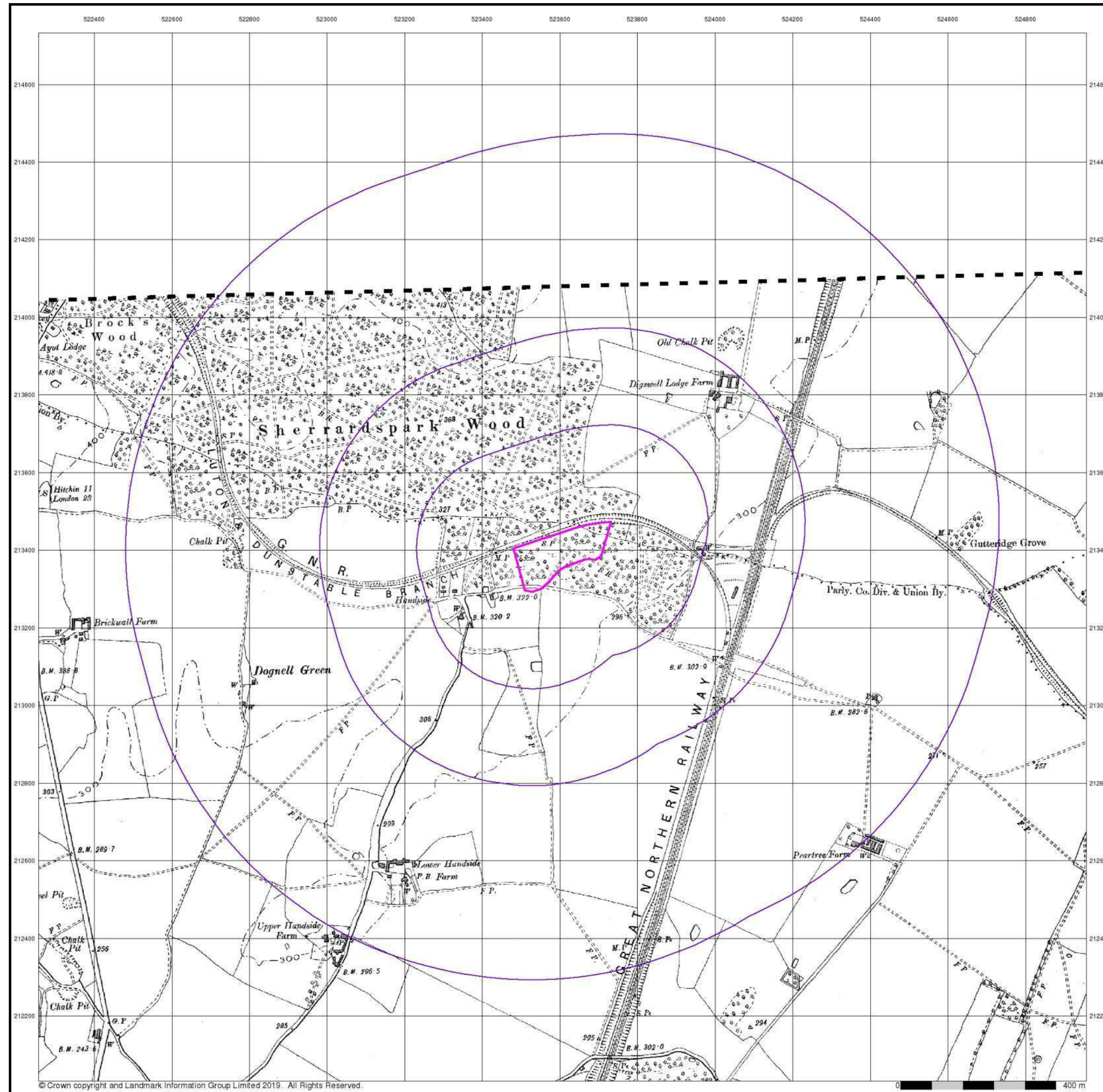


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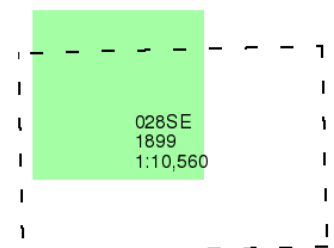
Hertfordshire

Published 1899

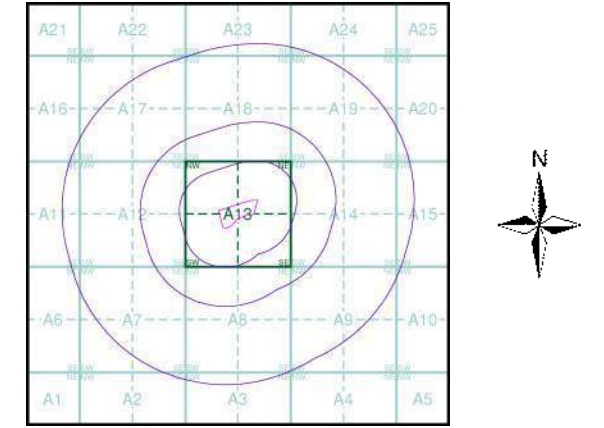
Source map scale - 1:10,560

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

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Historical Map - Slice A



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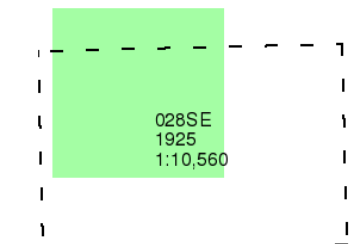
Hertfordshire

Published 1925

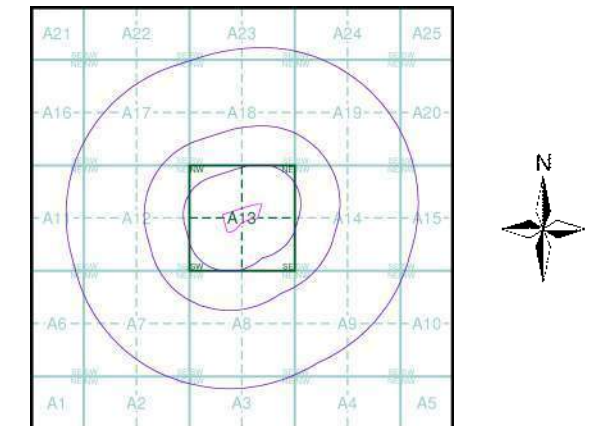
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps.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

Map Name(s) and Date(s)



Historical Map - Slice A



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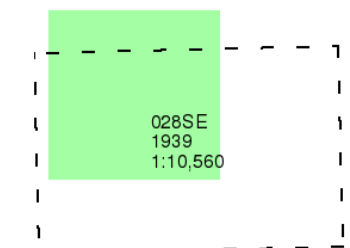
Hertfordshire

Published 1939

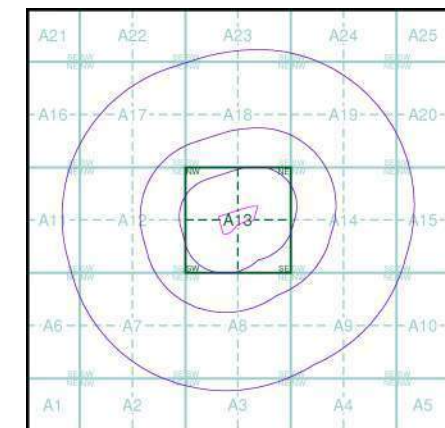
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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

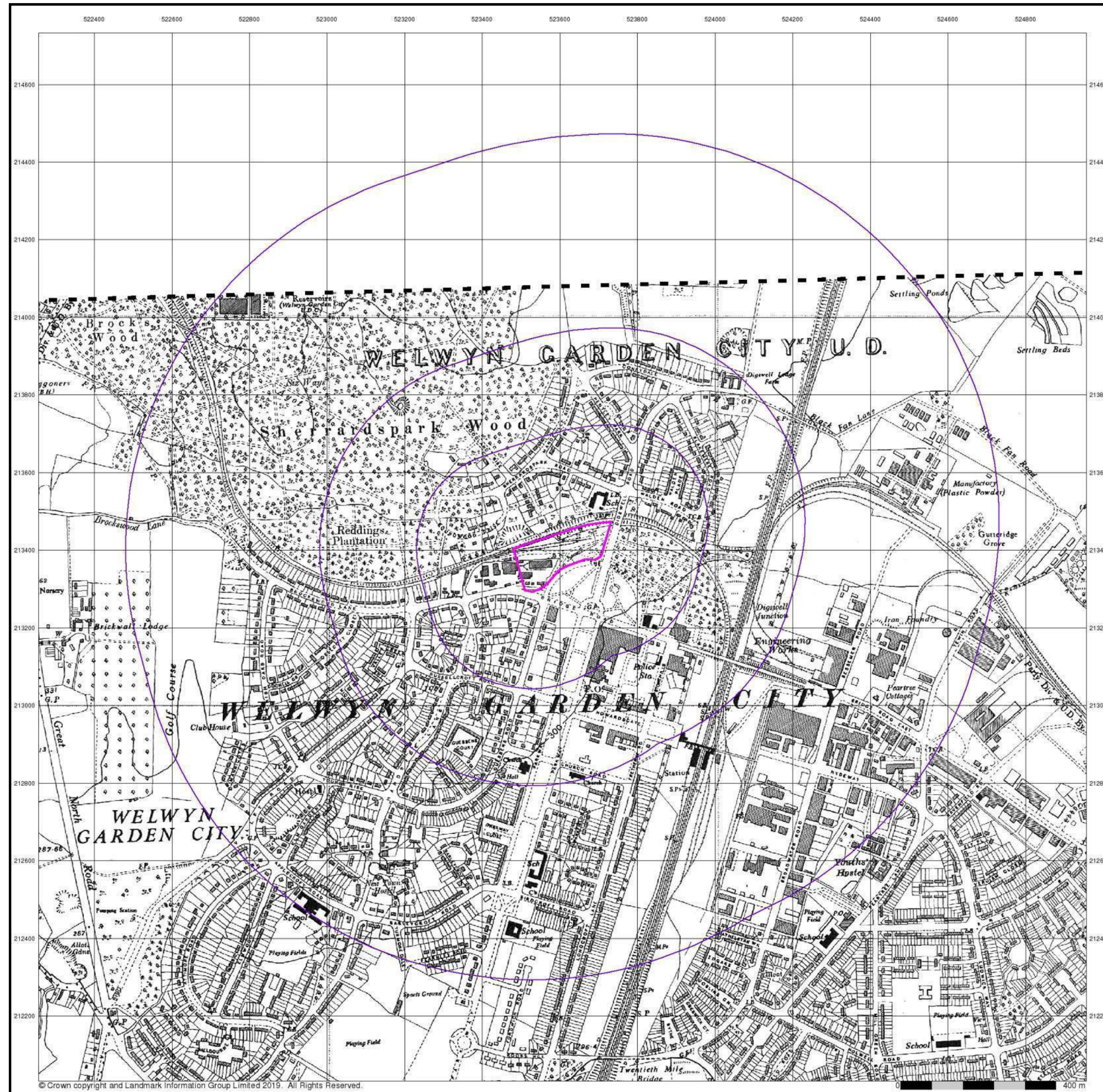
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National Grid Reference: 523600, 213390
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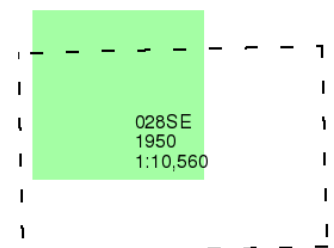
Hertfordshire

Published 1950

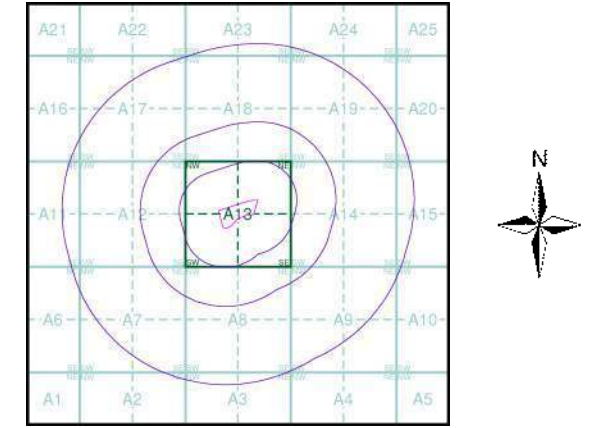
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 219955306_1_1
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Site Details

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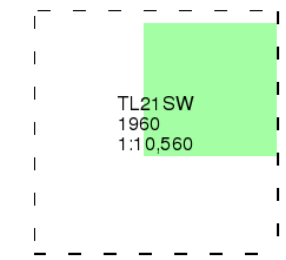
Ordnance Survey Plan

Published 1960

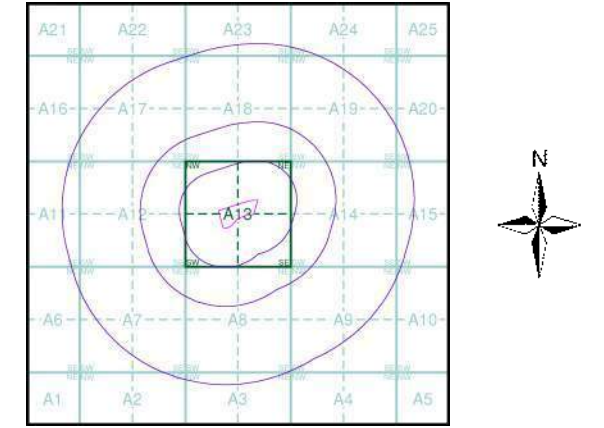
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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details	
Order Number:	219955306_1_1
Customer Ref:	A115249 WGC Campus West
National Grid Reference:	523600, 213390
Slice:	A
Site Area (Ha):	2.31
Search Buffer (m):	1000

Site Details

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Ordnance Survey Plan

Published 1966

Source map scale - 1:10,000

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Map Name(s) and Date(s)

TL21SW

1966

1:10,560

Historical Map - Slice A

Order Details

Order Number:	219955306_1_1
Customer Ref:	A115249 WGC Campus West
National Grid Reference:	523600, 213390
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Site Area (Ha):	2.31
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Site Details

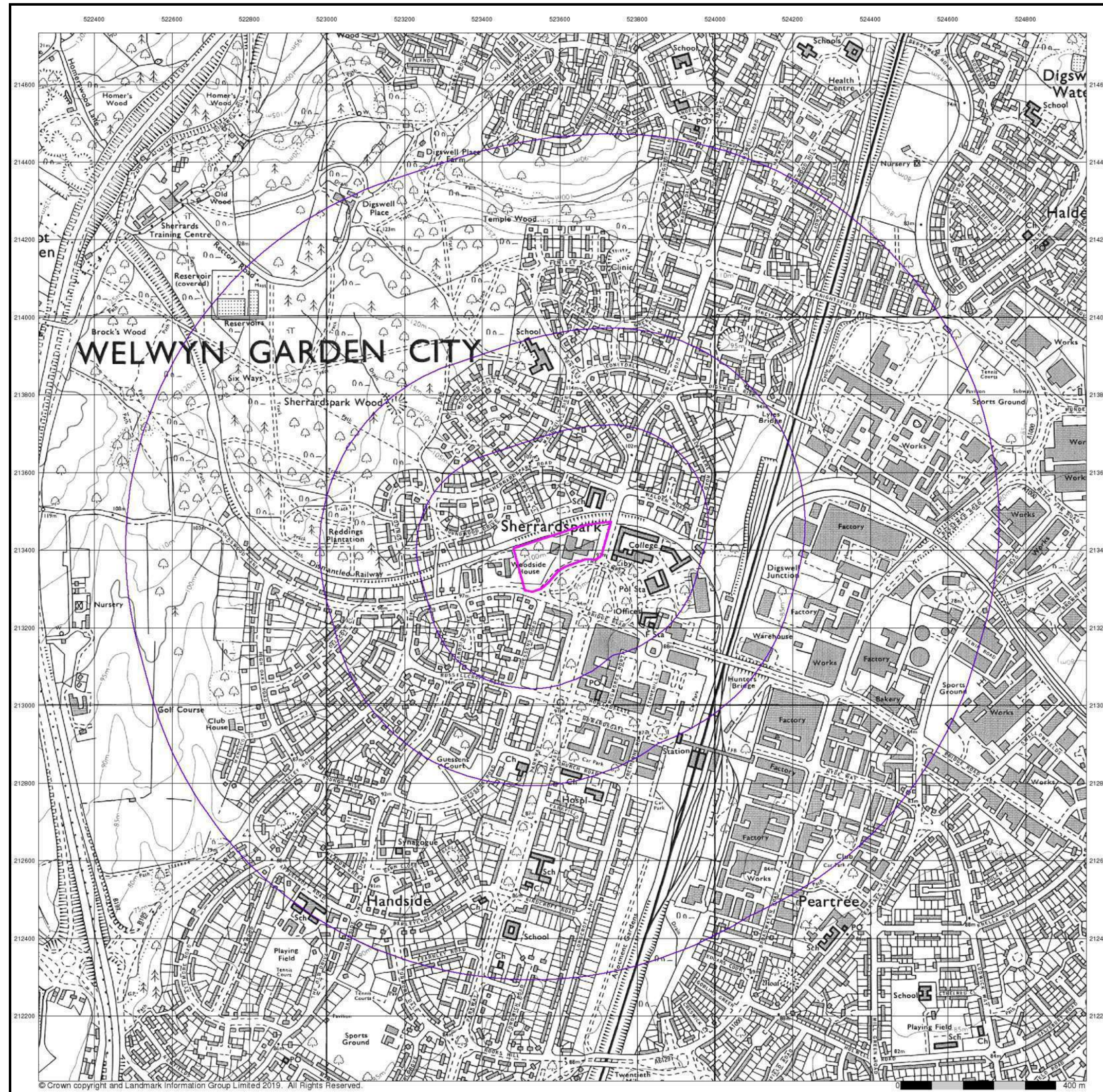
Site at, Welwyn Garden City, Hertfordshire

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A Landmark Information Group Service v50.0 02-Oct-2019 Page 8 of 12



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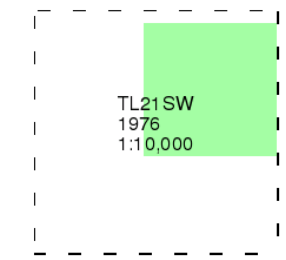
Ordnance Survey Plan

Published 1976

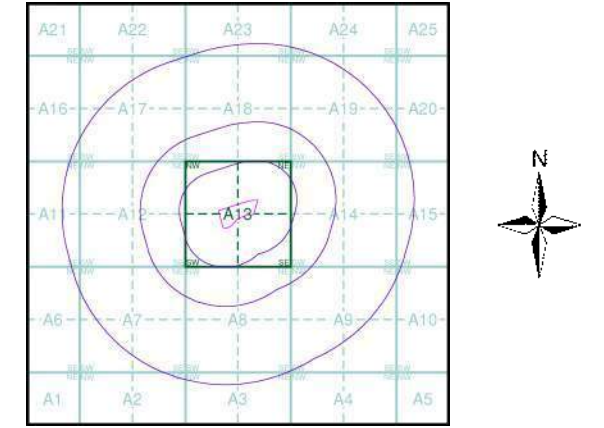
Source map scale - 1:10,000

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

Map Name(s) and Date(s)

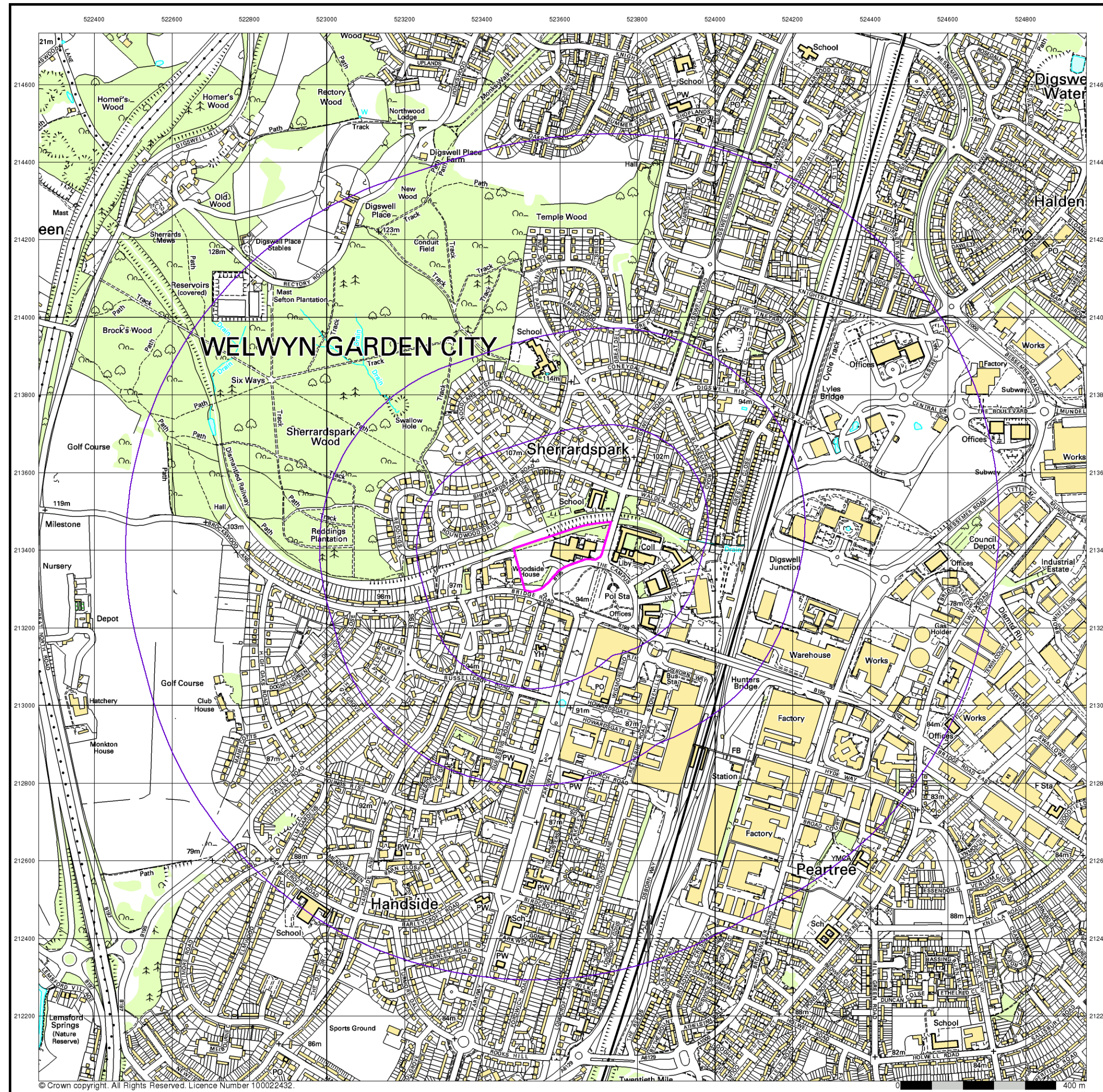


Historical Map - Slice A



Order Details	
Order Number:	219955306_1_1
Customer Ref:	A115249 WGC Campus West
National Grid Reference:	523600, 213390
Slice:	A
Site Area (Ha):	2.31
Search Buffer (m):	1000

Site Details
Site at, Welwyn Garden City, Hertfordshire



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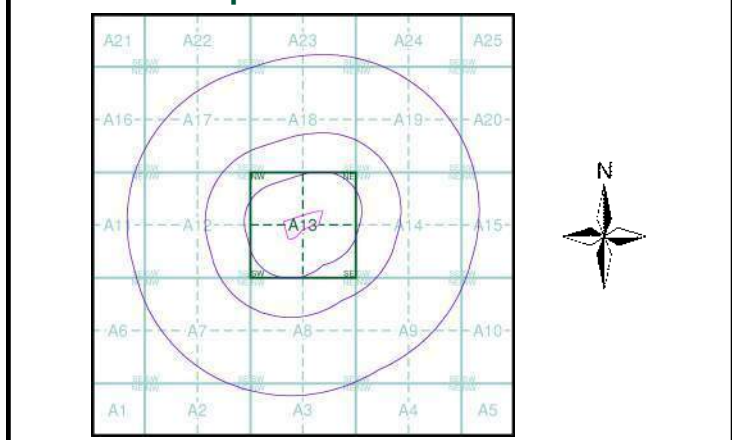
10k Raster Mapping
Published 1999
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

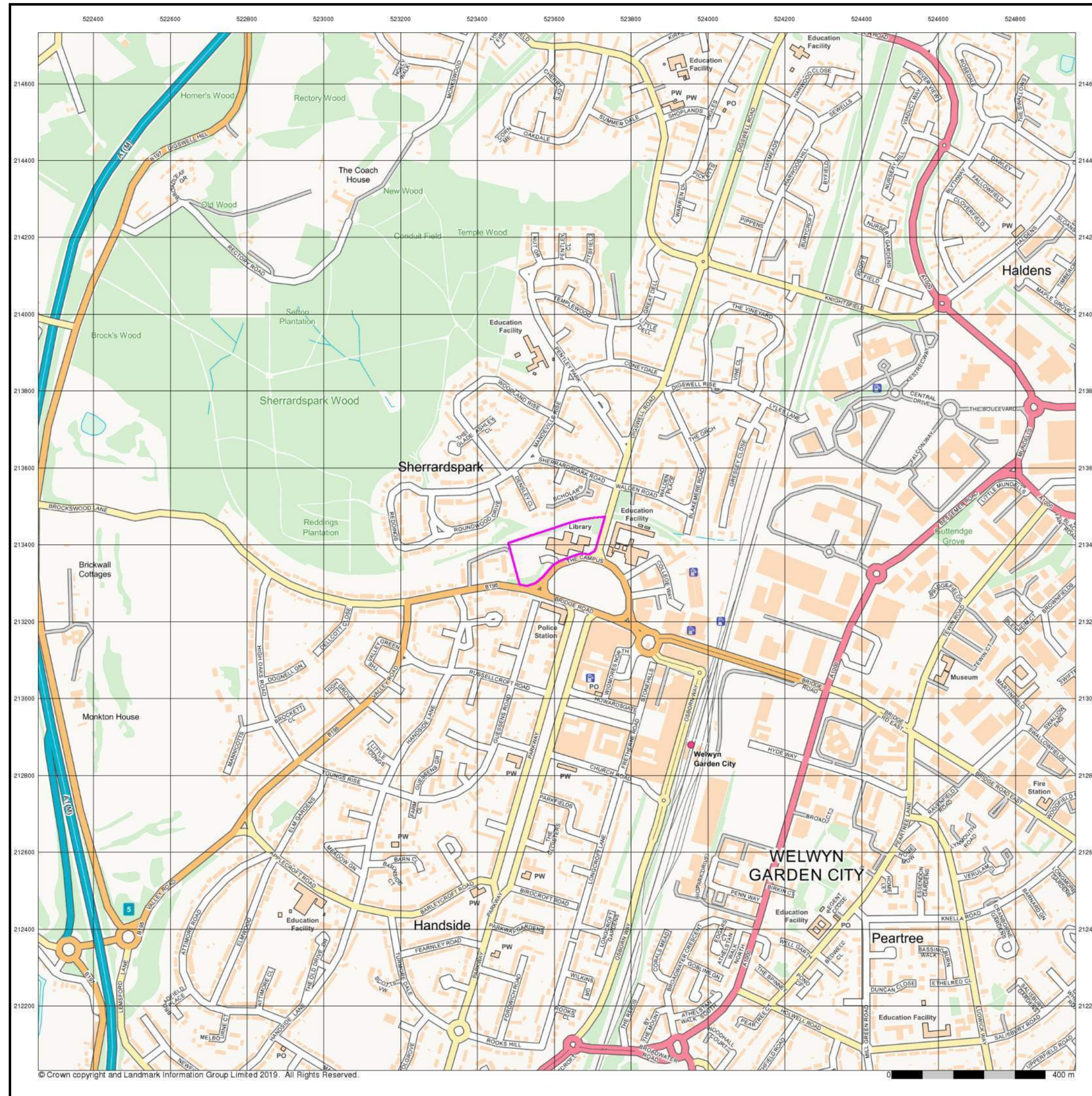


Historical Map - Slice A



Order Details
Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 1000

Site Details
Site at, Welwyn Garden City, Hertfordshire



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Street View

Published 2019

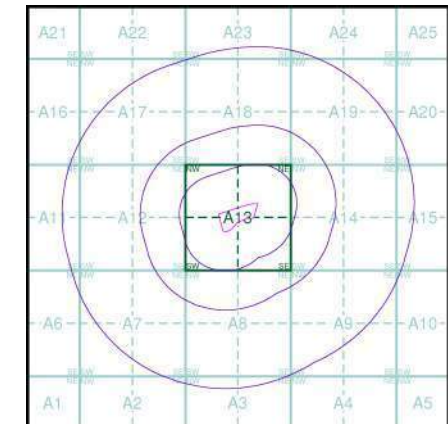
Source map scale - 1:10,000

Street View is a street-level map for the whole of Great Britain produced by the Ordnance Survey. These maps are provided at a nominal scale of 1:10,000

Map Name(s) and Date(s)



Street View Map - Slice A



Order Details

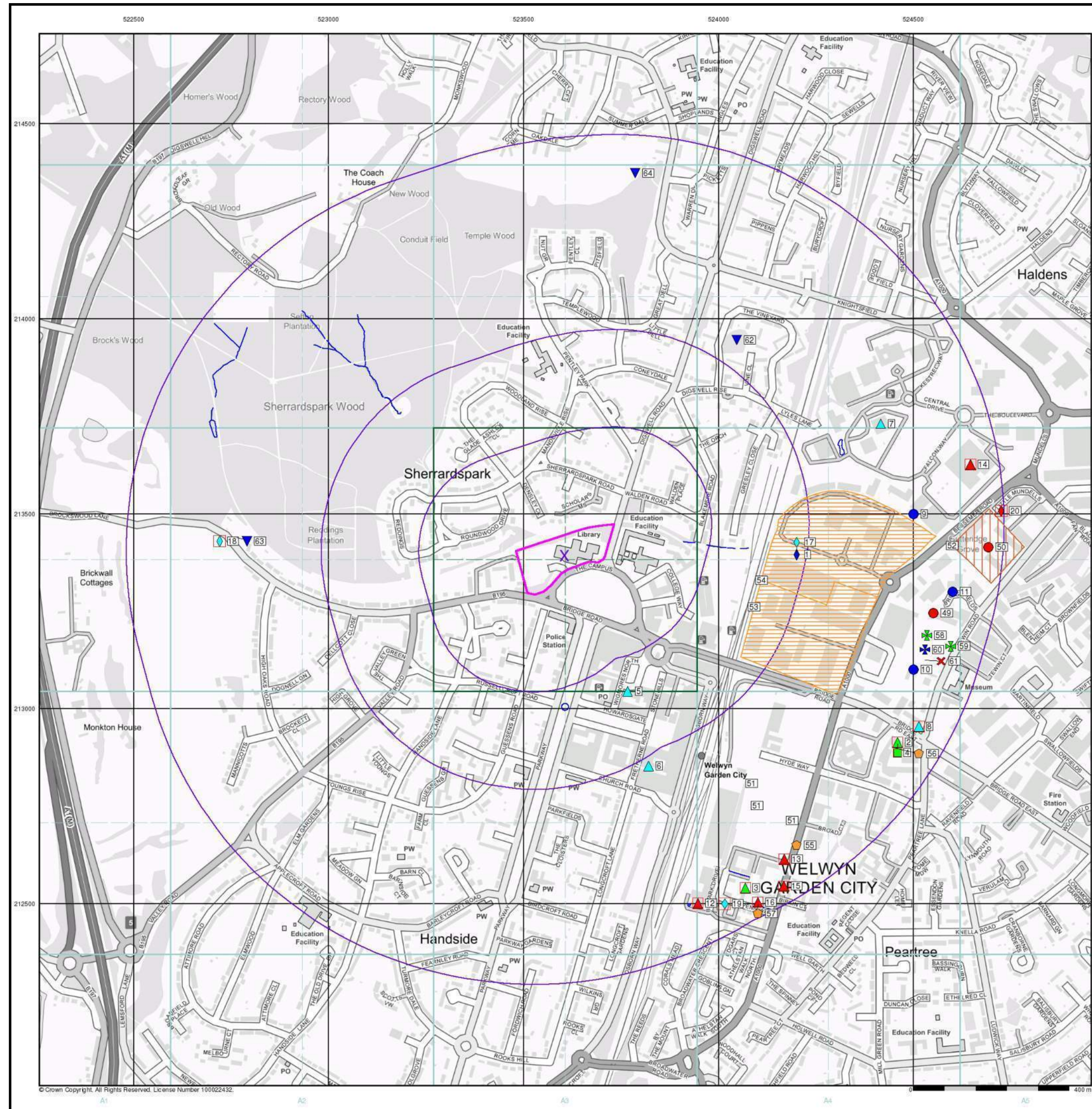
Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 1000

Site Details

Site at, Welwyn Garden City, Hertfordshire

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



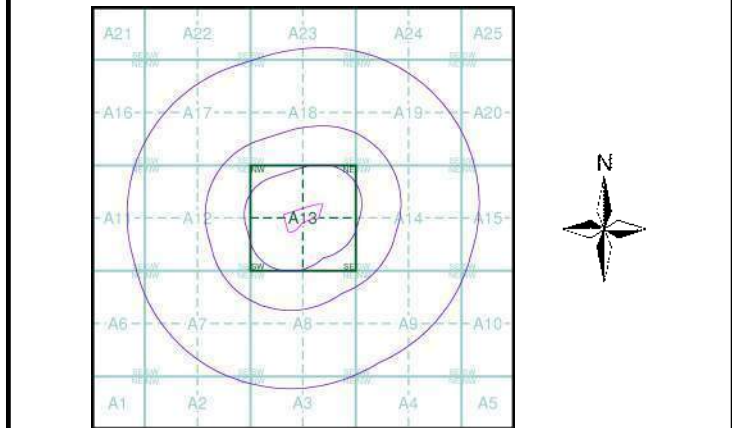
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Envirocheck®

LANDMARK INFORMATION GROUP®

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

Site Sensitivity Map - Slice A



Order Details
Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 1000

Site Details
Site at, Welwyn Garden City, Hertfordshire

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Industrial Land Use Map

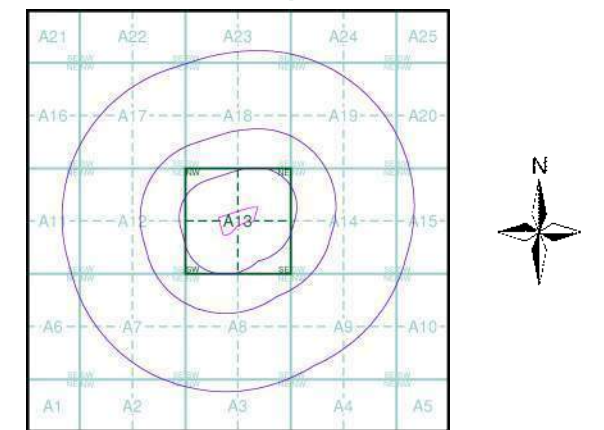
General

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

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- Gas Pipeline
- Underground Electrical Cables

Industrial Land Use Map - Slice A



Order Details

Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 1000

Site Details

Site at, Welwyn Garden City, Hertfordshire



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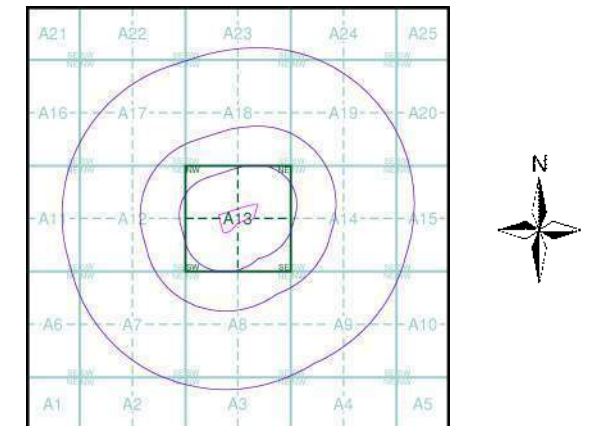
General

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

Agency and Hydrological (Flood)

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

Flood Map - Slice A



Order Details

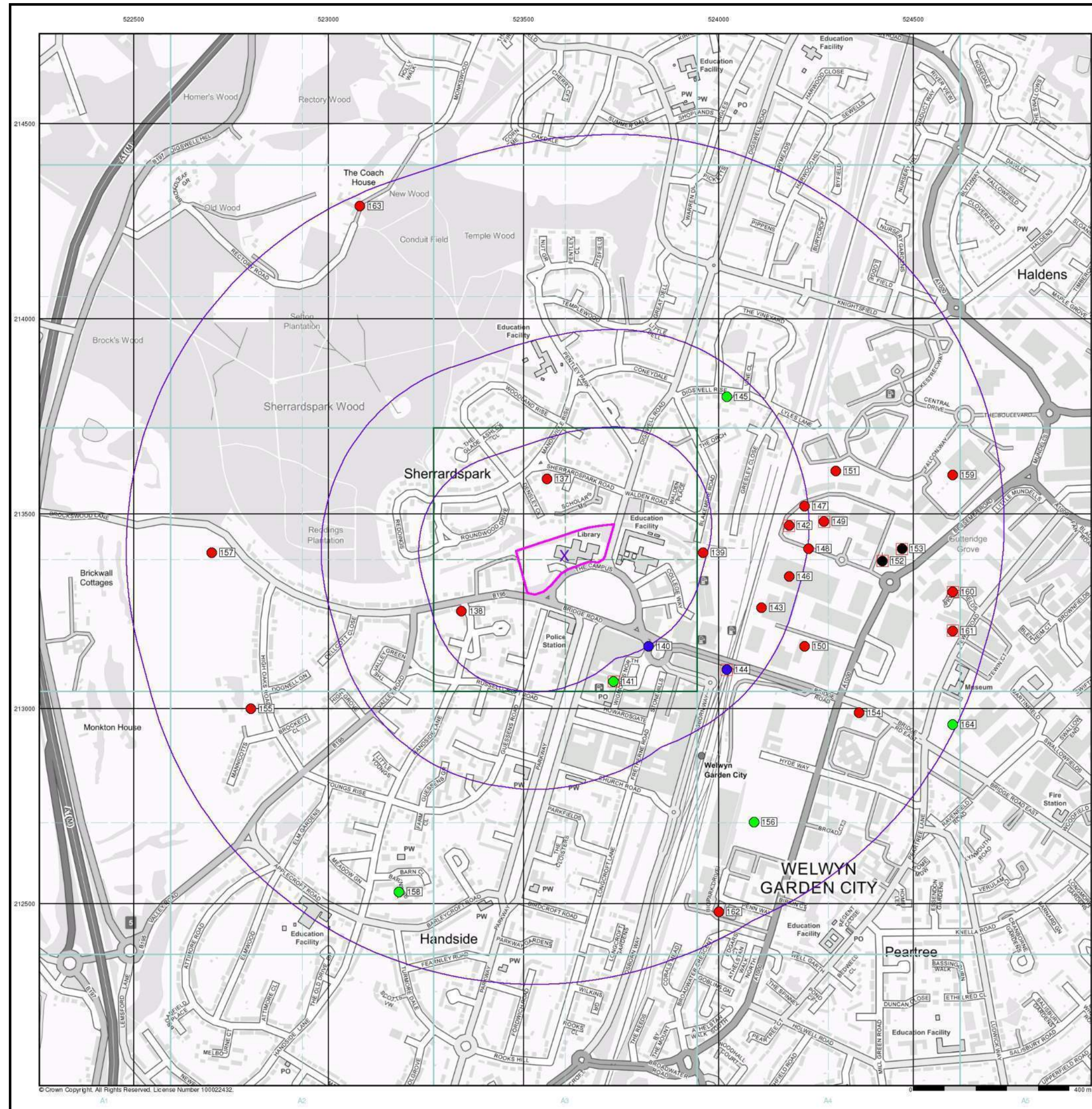
Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 1000

Site Details

Site at, Welwyn Garden City, Hertfordshire

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Fax: 0844 844 9951
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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

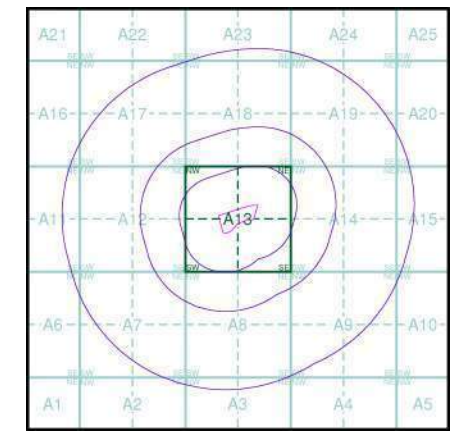
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A

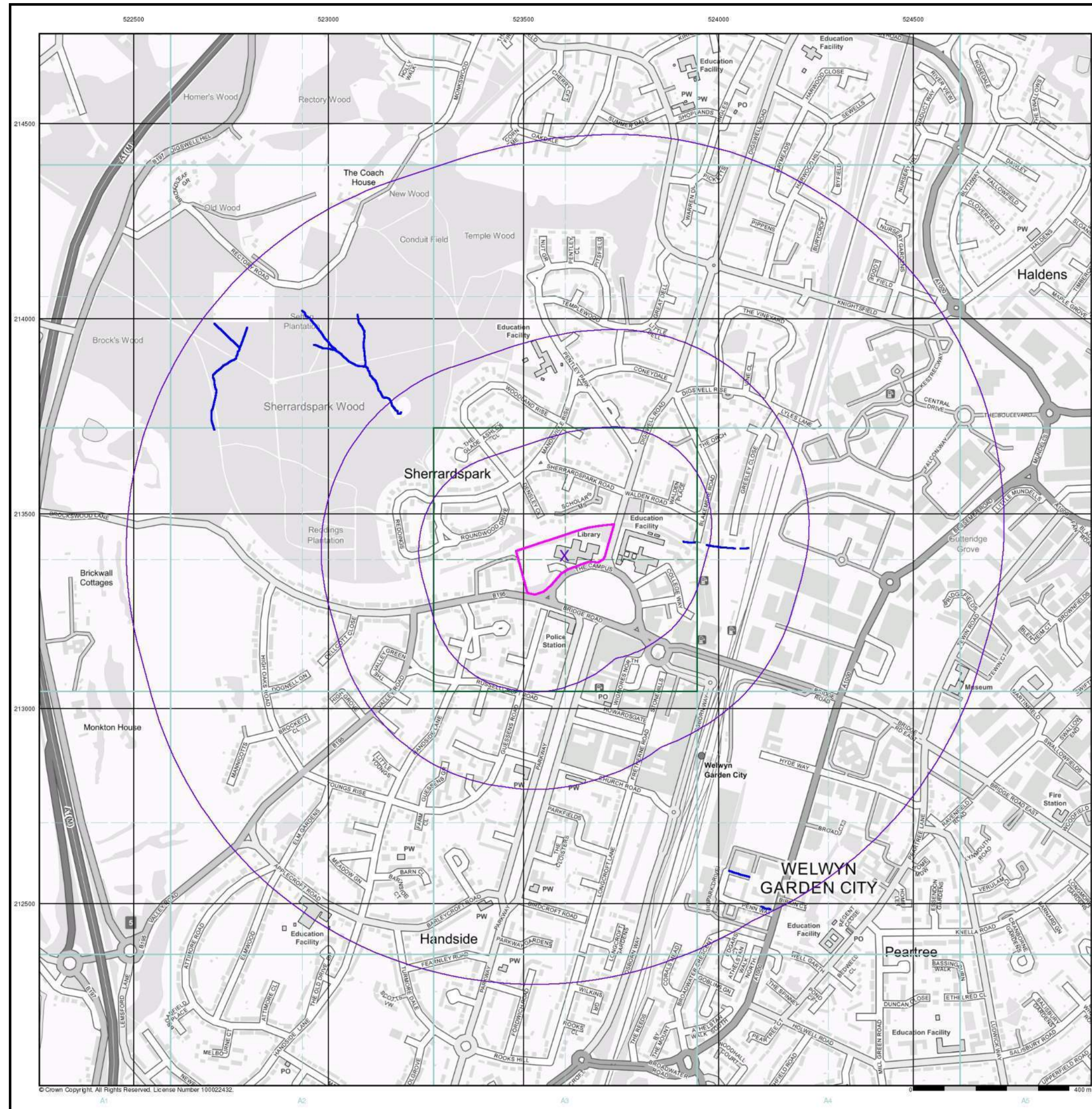


Order Details

Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 1000

Site Details

Site at, Welwyn Garden City, Hertfordshire



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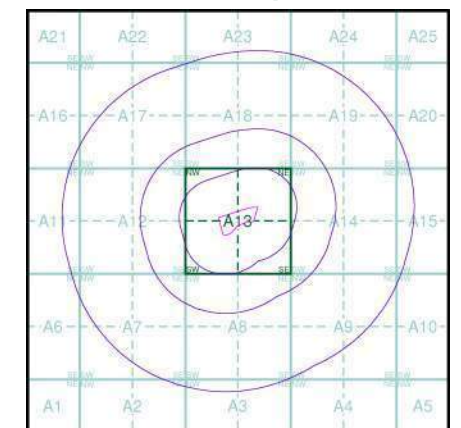
General

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

OS Water Network Data

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

OS Water Network Map - Slice A



Order Details

Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 1000

Site Details

Site at, Welwyn Garden City, Hertfordshire

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Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



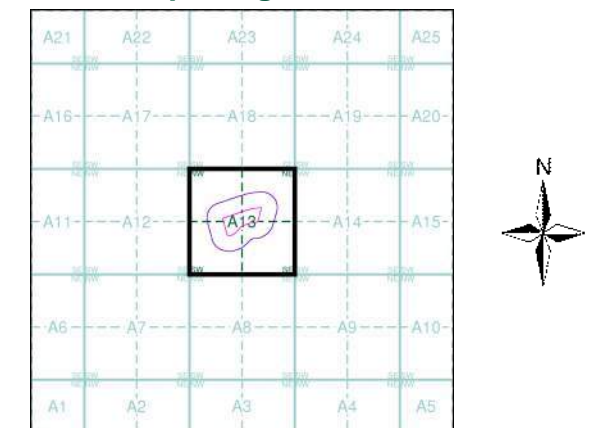
Large-Scale National Grid Data 1:2,500 and 1:1,250



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Hertfordshire	1:2,500	1878	2
Hertfordshire	1:2,500	1898	3
Hertfordshire	1:2,500	1923	4
Hertfordshire	1:2,500	1938	5
Ordnance Survey Plan	1:1,250	1961	6
Additional SIMs	1:1,250	1961 - 1985	7
Ordnance Survey Plan	1:1,250	1969	8
Ordnance Survey Plan	1:2,500	1972	9
Additional SIMs	1:1,250	1992	10
Large-Scale National Grid Data	1:1,250	1993	11

Historical Map - Segment A13

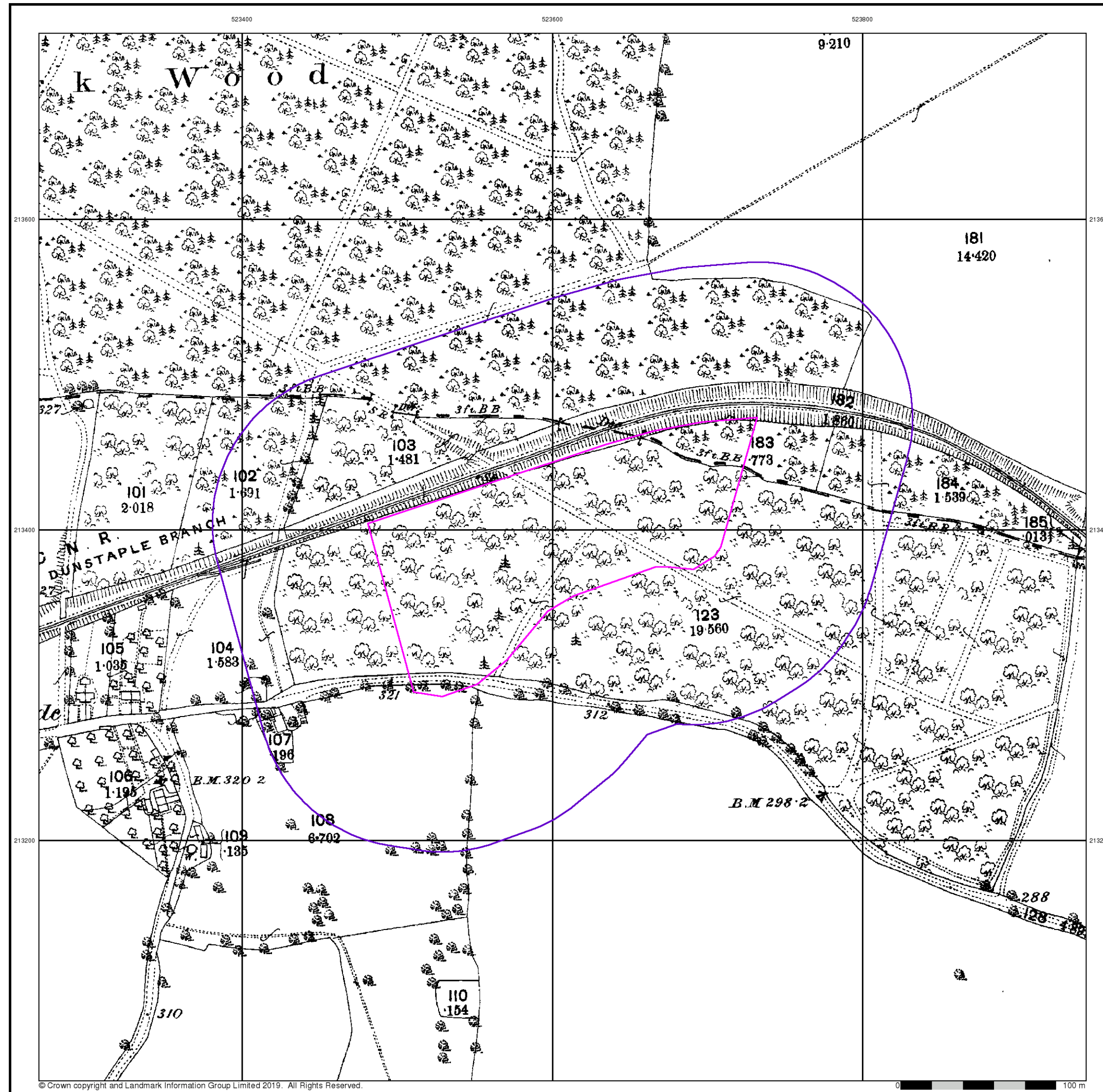


Order Details

Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 100

Site Details

Site at, Welwyn Garden City, Hertfordshire



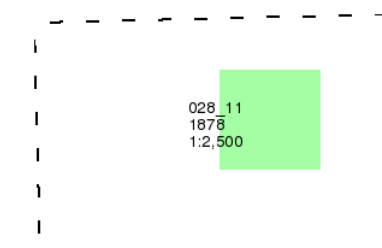
Hertfordshire

Published 1878

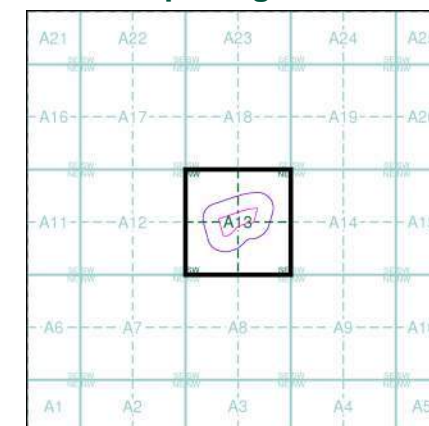
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13

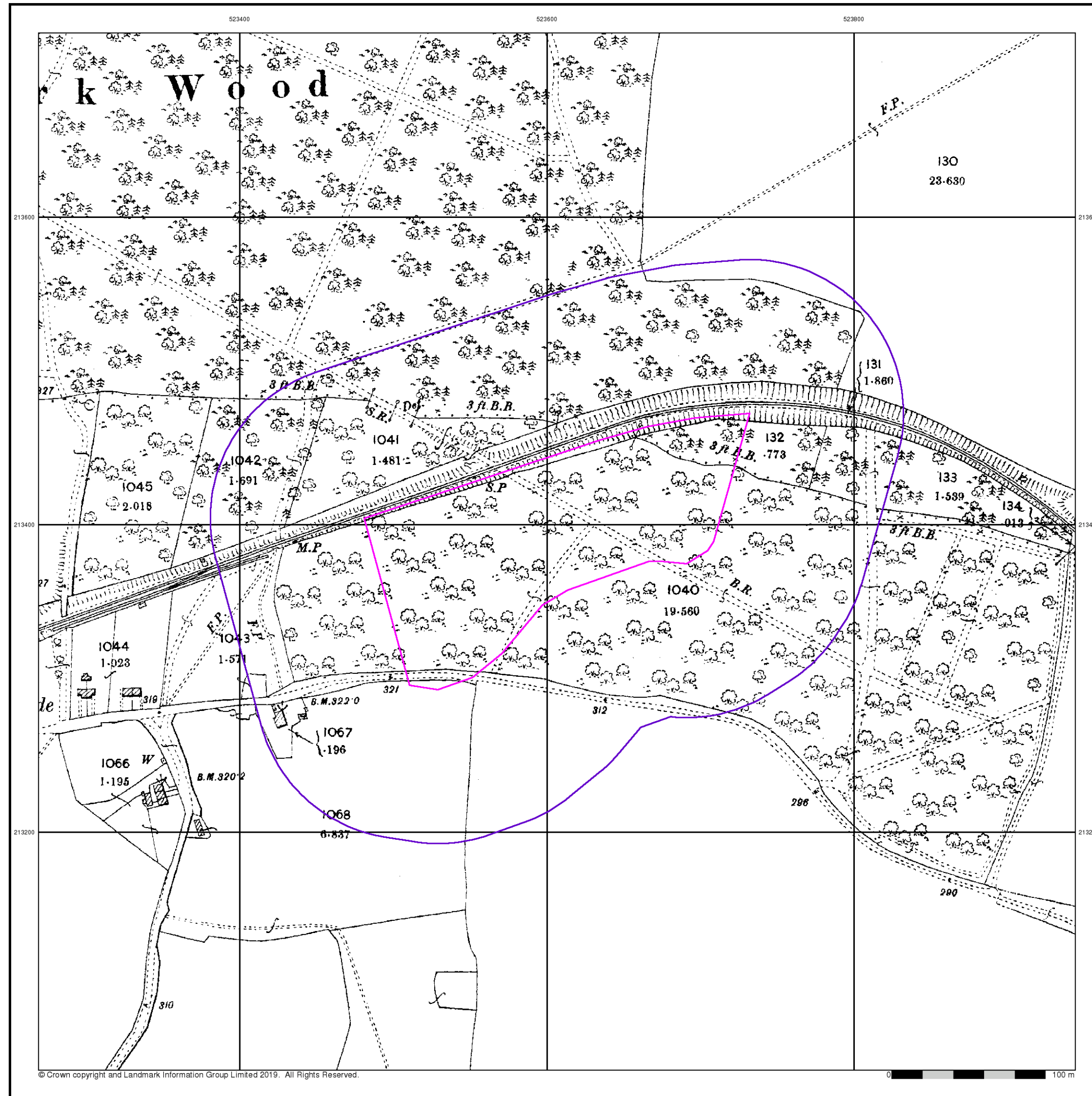


Order Details

Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 100

Site Details

Site at, Welwyn Garden City, Hertfordshire



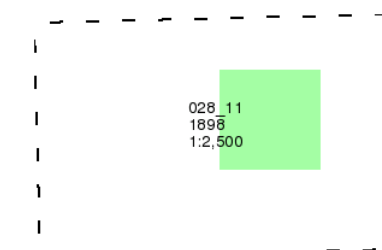
Hertfordshire

Published 1898

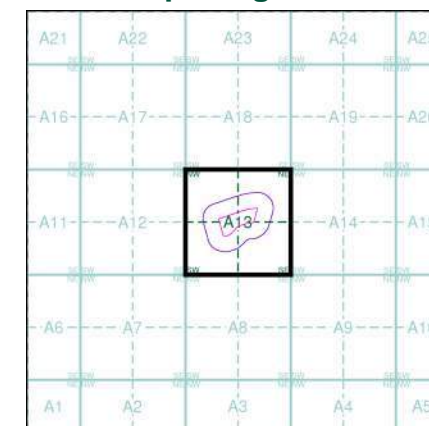
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 100

Site Details

Site at, Welwyn Garden City, Hertfordshire

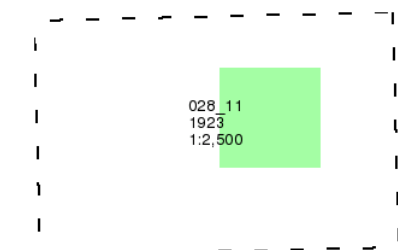
Hertfordshire

Published 1923

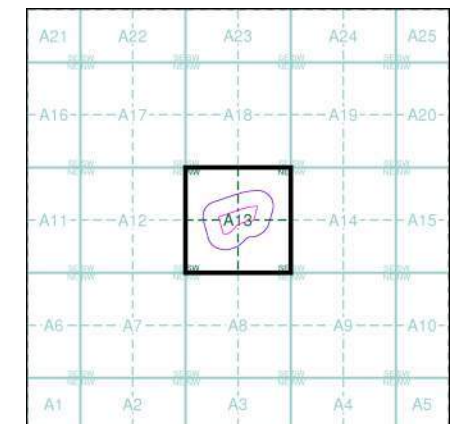
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13

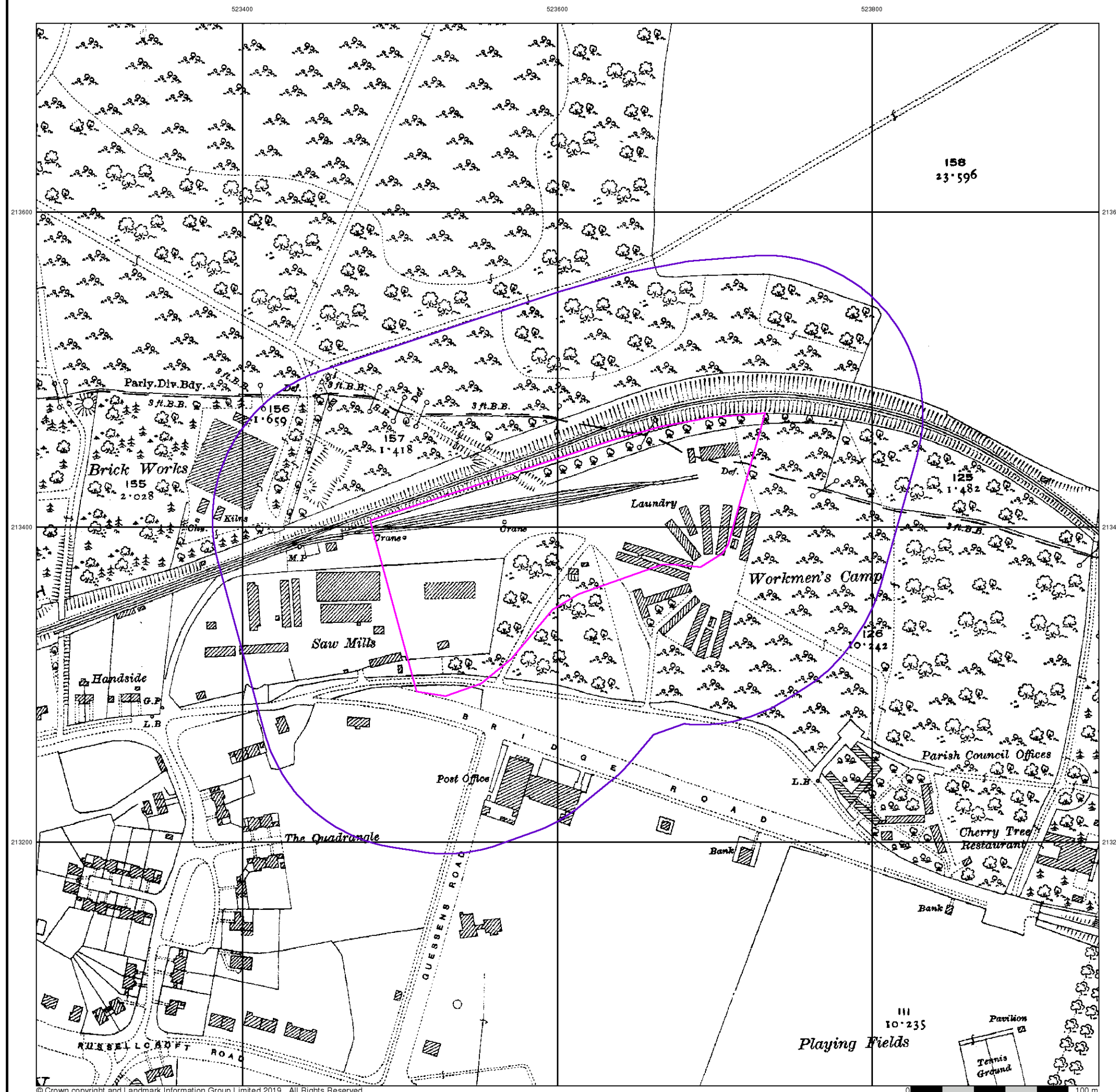


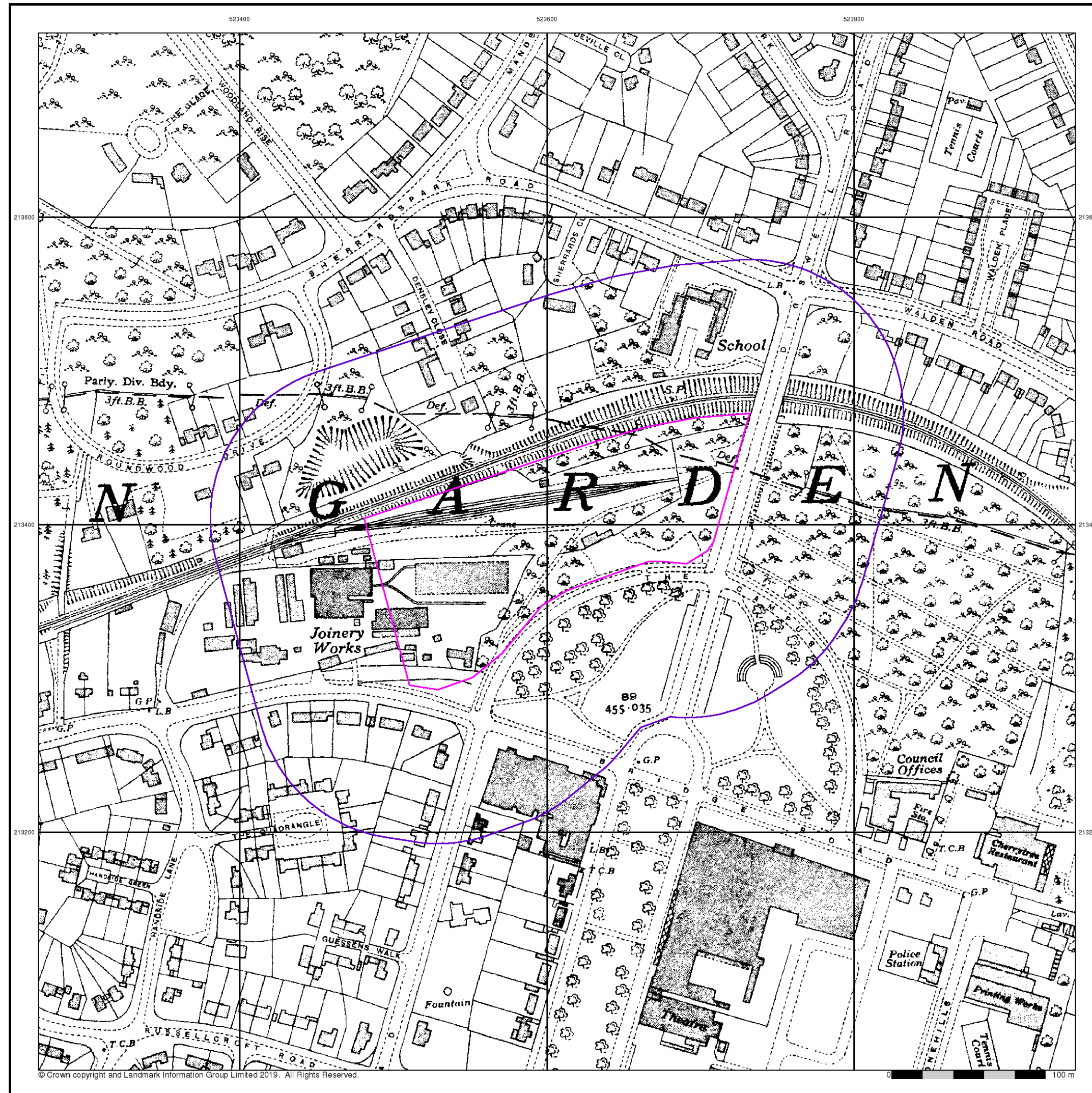
Order Details

Order Number: 219955306_1_1
 Customer Ref: A115249 WGC Campus West
 National Grid Reference: 523600, 213390
 Slice: A
 Site Area (Ha): 2.31
 Search Buffer (m): 100

Site Details

Site at, Welwyn Garden City, Hertfordshire





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Hertfordshire

Published 1938

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

028_11

1938

1:2,500

Historical Map - Segment A13

A21A22A23A24A25

A16A17A18A19A20

A11A12A13A14A15

A6A7A8A9A10

A1A2A3A4A5

N

Order Details

Order Number:	219955306_1_1
Customer Ref:	A115249 WGC Campus West
National Grid Reference:	523600, 213390
Slice:	A
Site Area (Ha):	2.31
Search Buffer (m):	100

Site Details

Site at, Welwyn Garden City, Hertfordshire



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Ordnance Survey Plan

Published 1961

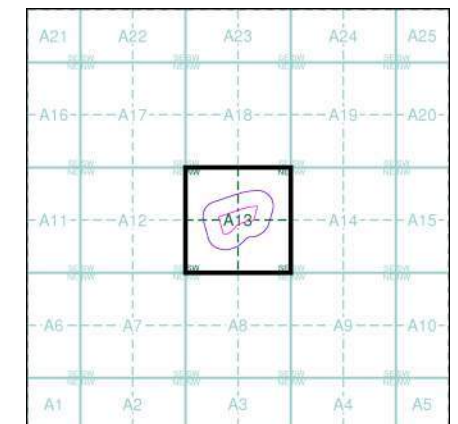
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

TL2313NW 1961 1:1,250	TL2313NE 1961 1:1,250
TL2313SW 1961 1:1,250	

Historical Map - Segment A13



Order Details

Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 100

Site Details

Site at, Welwyn Garden City, Hertfordshire



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Additional SIMs

Published 1961 - 1985

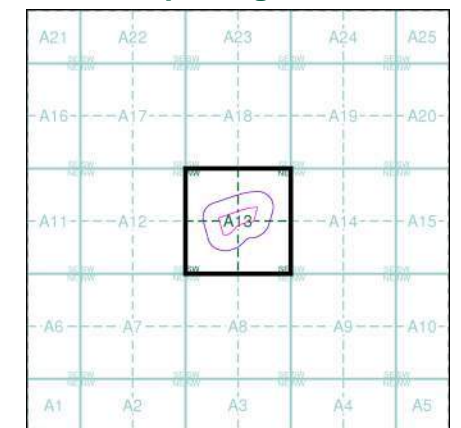
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

TL2313NW 1961 1:1,250	TL2313NE 1961 1:1,250
TL2313SW 1961 1:1,250	TL2313SE 1985 1:1,250

Historical Map - Segment A13



Order Details

Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 100

Site Details

Site at, Welwyn Garden City, Hertfordshire



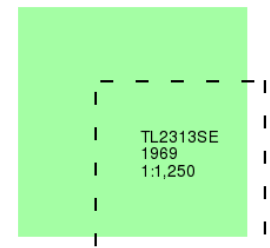
Ordnance Survey Plan

Published 1969

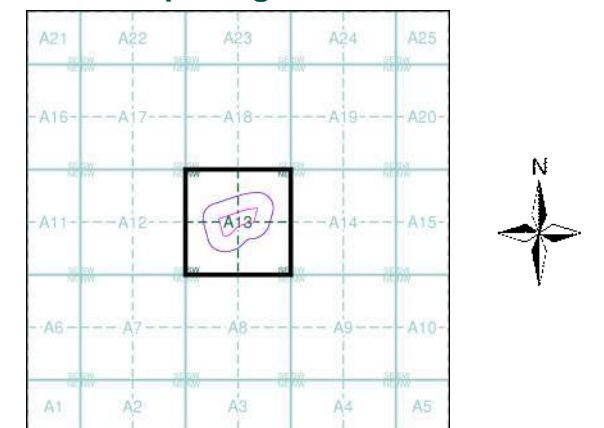
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 100

Site Details

Site at, Welwyn Garden City, Hertfordshire



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Ordnance Survey Plan

Published 1972

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

TL2313
1972
1:2,500

Historical Map - Segment A13

A21A22A23A24A25
A16A17A18A19A20
A11A12A13A14A15
A6A7A8A9A10
A1A2A3A4A5

Order Details

Order Number:	219955306_1_1
Customer Ref:	A115249 WGC Campus West
National Grid Reference:	523600, 213390
Slice:	A
Site Area (Ha):	2.31
Search Buffer (m):	100

Site Details

Site at, Welwyn Garden City, Hertfordshire



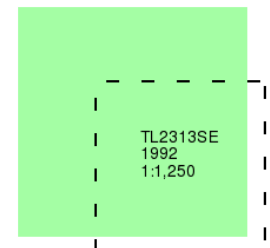
Additional SIMs

Published 1992

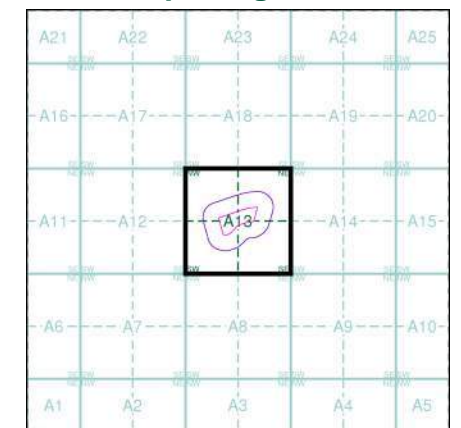
Source map scale - 1:1,250

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

Map Name(s) and Date(s)



Historical Map - Segment A13

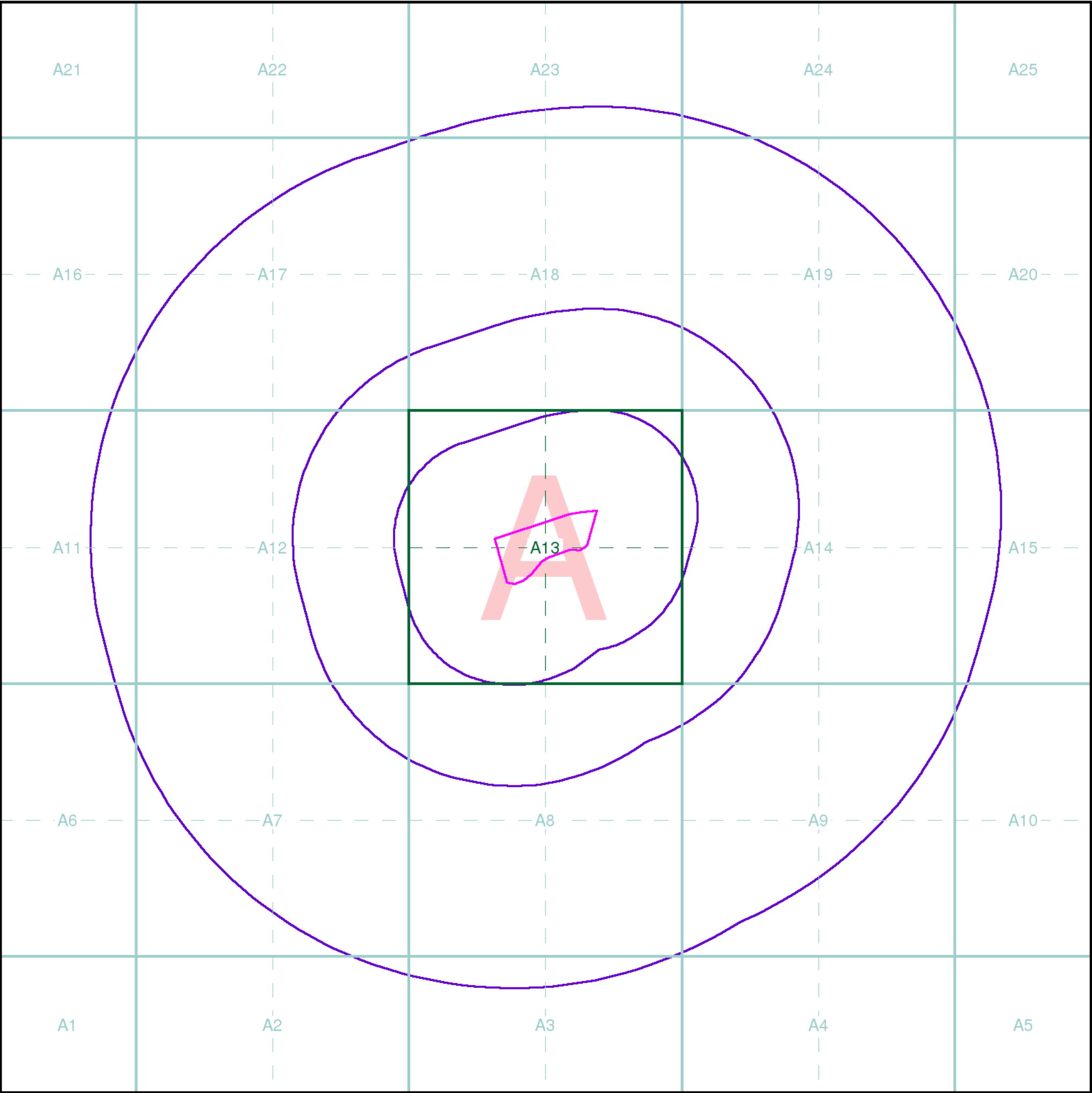


Order Details

Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Slice: A
Site Area (Ha): 2.31
Search Buffer (m): 100

Site Details

Site at, Welwyn Garden City, Hertfordshire



Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:



Envirocheck reports are compiled from 136 different sources of data.

Client Details
Mr D Perera, WYG Environment Planning Transport Ltd, 1 Angel Court, London, EC2R 7HJ

Order Details
Order Number: 219955306_1_1
Customer Ref: A115249 WGC Campus West
National Grid Reference: 523600, 213390
Site Area (Ha): 2.31
Search Buffer (m): 1000

Site Details
Site at, Welwyn Garden City, Hertfordshire

Full Terms and Conditions can be found on the following link:
<http://www.landmarkinfo.co.uk/Terms/Show/515>

Appendix C – Qualitative Risk Assessment Methodology

This qualitative risk assessment has been undertaken in accordance with CIRIA C552: Contaminated Land Risk Assessment, A Guide to Good Practice (Rudland et al., 2001). The CIRIA C552 risk categories and the assessment methodology are detailed below.

Table C.1 Definition of Magnitude of Consequence

Category	Definition
Severe	Acute risks to human health, catastrophic damage to buildings/property, major pollution of controlled waters.
Medium	Chronic risk to human health, pollution of sensitive controlled waters, significant effects on sensitive ecosystems or species, significant damage to buildings or structures.
Mild	Pollution of non sensitive waters, minor damage to buildings or structures.
Minor	Requirement for protective equipment during site works to mitigate health effects, damage to non sensitive ecosystems or species.

The likelihood of an event (probability) takes into account both the presence of the hazard and target and the integrity of the pathway and has been assessed based on the categories given in Table 5.2 below.

Table C.2 Definition of Probability of Exposure

Category	Definition
High Likelihood	Pollutant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor.
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term.
Low Likelihood	Pollutant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable.

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the matrix presented in Table E.3 below, in order to give a level of risk for each potential hazard.

Table C.3 Definition of Magnitude of Consequence

		Potential Severity			
		Severe	Medium	Mild	Minor
Probability of Risk	High Likelihood	Very High	High	Moderate	Low/Moderate
	Likely	High	Moderate	Low/Moderate	Low
	Low Likelihood	Moderate	Low/Moderate	Low	Very Low
	Unlikely	Low/Moderate	Low	Very Low	Very Low

The risk assessment is presented in Table C.4.

Table C.4 Qualitative Risk Assessment

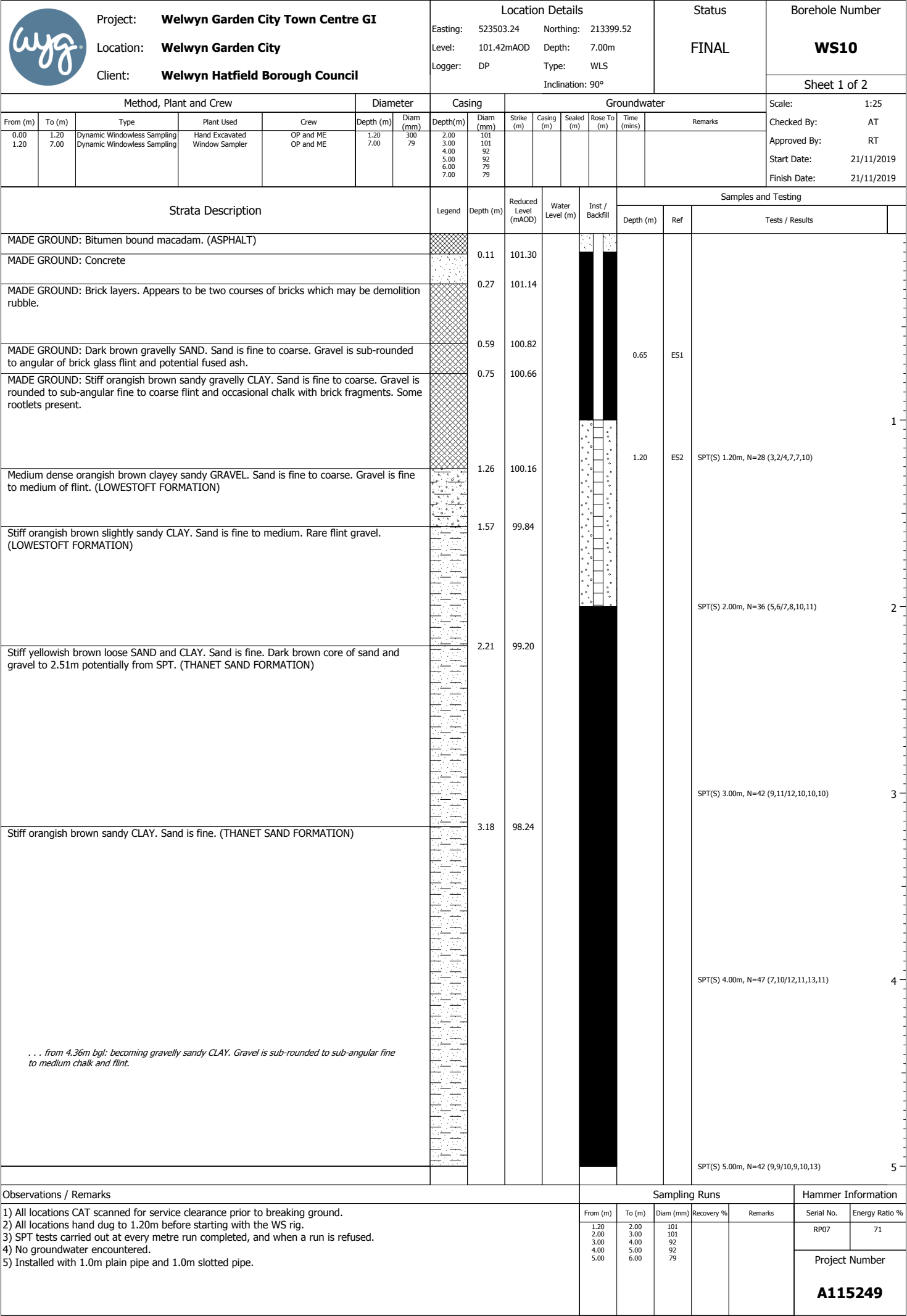
Source		Pollutant	Pathway	Receptor	Likelihood of Occurrence	Associated Hazard (Severity)	Risk
On -Site	Made ground associated with historic site use and industry (PAOC 1)	Metals, asbestos, inorganics, hydrocarbons, PAH, and TPH	Direct dermal contact or ingestion, migration and inhalation of dust/gases / vapours	Current & Future Site Users, Construction Workers	Low Likelihood Limited contamination encountered, Hardstanding covers most of the site, limiting potential for exposure to underlying made ground. CDM implementation during construction phase mitigates risk to construction workers.	Medium	Low/ Moderate
			Lateral and vertical migration in groundwater	Groundwater in Superficial Deposits	Likely Groundwater if present is likely to be mobile with leaching potential and the site lies within a Source Protection Zone III. A groundwater abstraction is located within 250m of the site. However, limited potential contamination sources have been identified.	Medium	Moderate
				Groundwater in Bedrock Geology			


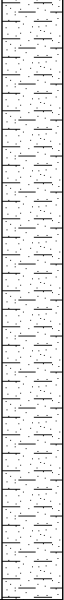
Source		Pollutant	Pathway	Receptor	Likelihood of Occurrence	Associated Hazard (Severity)	Risk
			Surface water runoff	Surface Waters and Adjacent Land	Unlikely Hardstanding covering reduces the pathway between the Made Ground and surface water run-off. Assumes well-constructed and maintained drainage system.	Medium	Low to Moderate
On -Site	Current site use including car park and vehicle usage	Metals, inorganics, PAH, TPH, Solvents, Hydrocarbons	Surface water runoff	Adjacent Land	Likely Car park in use during period where car emissions contained greater levels of lead etc. High mobility of fuel and oil leaks. Car parks potential targets for fly-tipping, introducing new hazards. Risks are removed via a well-constructed and maintained drainage system with interceptors and there has been no evidence to suggest that this is not the case.	Medium	Low

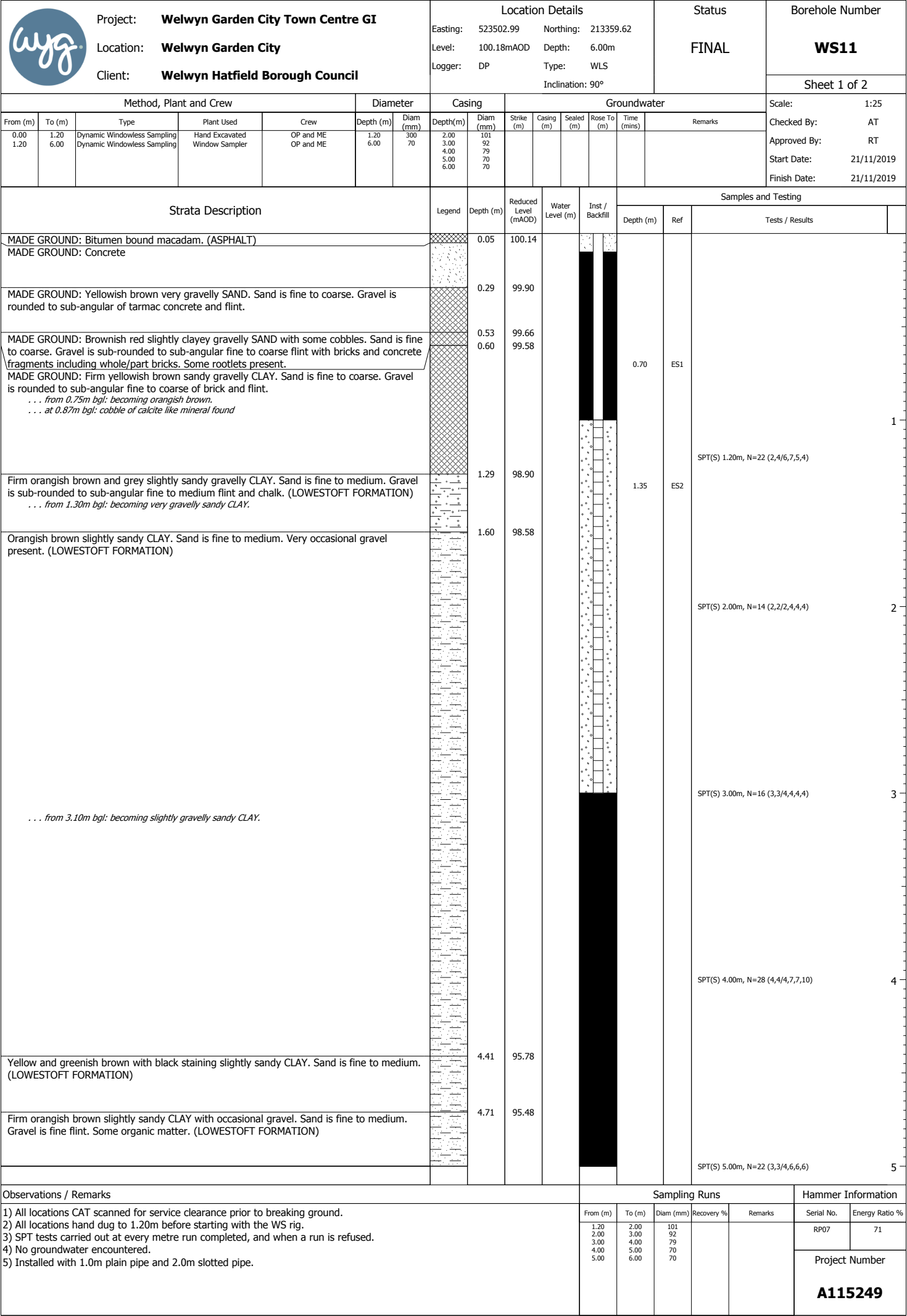
Source		Pollutant	Pathway	Receptor	Likelihood of Occurrence	Associated Hazard (Severity)	Risk
On - site	Leaks and spills from vehicles and previous industry	Metals, inorganics, PAH, TPH, Solvents, hydrocarbons	Direct dermal contact or ingestion, migration and inhalation of dust/gases/ vapours	Current & Future Site Users	Unlikely Hardstanding covers most of the site, limiting potential for exposure.	Medium	Low
			Vertical migration downwards via leaching	Groundwater in Superficial Deposits Groundwater in Bedrock Geology	Risks are removed via a well-constructed and maintained drainage system with interceptors and there has been no evidence to suggest that this is not the case.		
			Lateral and vertical migration in groundwater	Groundwater in Superficial Deposits	Unlikely Hardstanding covers most of the site, limiting potential for exposure.	Medium	Low
				Groundwater in Bedrock Geology	The site is in Source Protection Zone III and no groundwater abstractions present within 250m of the site.		
			Surface water runoff	Adjacent Land	Likely High surface runoff is anticipated as a result of the large amount of hardstanding covering the site.	Minor	Low

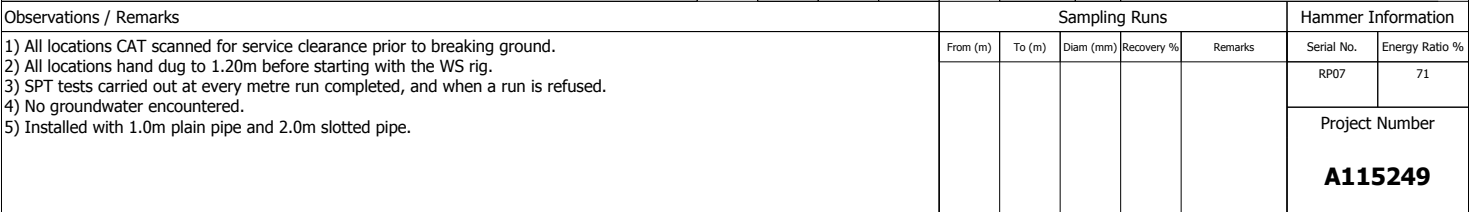
Source		Pollutant	Pathway	Receptor	Likelihood of Occurrence	Associated Hazard (Severity)	Risk
Off - Site	Adjacent land uses, including the railway line and major roads	Metals, inorganics, PAH, TPH, hydrocarbon, asbestos and clinker	Surface water runoff	Adjacent Land	<p>Low</p> <p>Relatively inert and small-scale contamination from adjacent sources. Construction and expansion of railway in a period where contaminants such as asbestos and clinker were widespread.</p>	Minor	Low

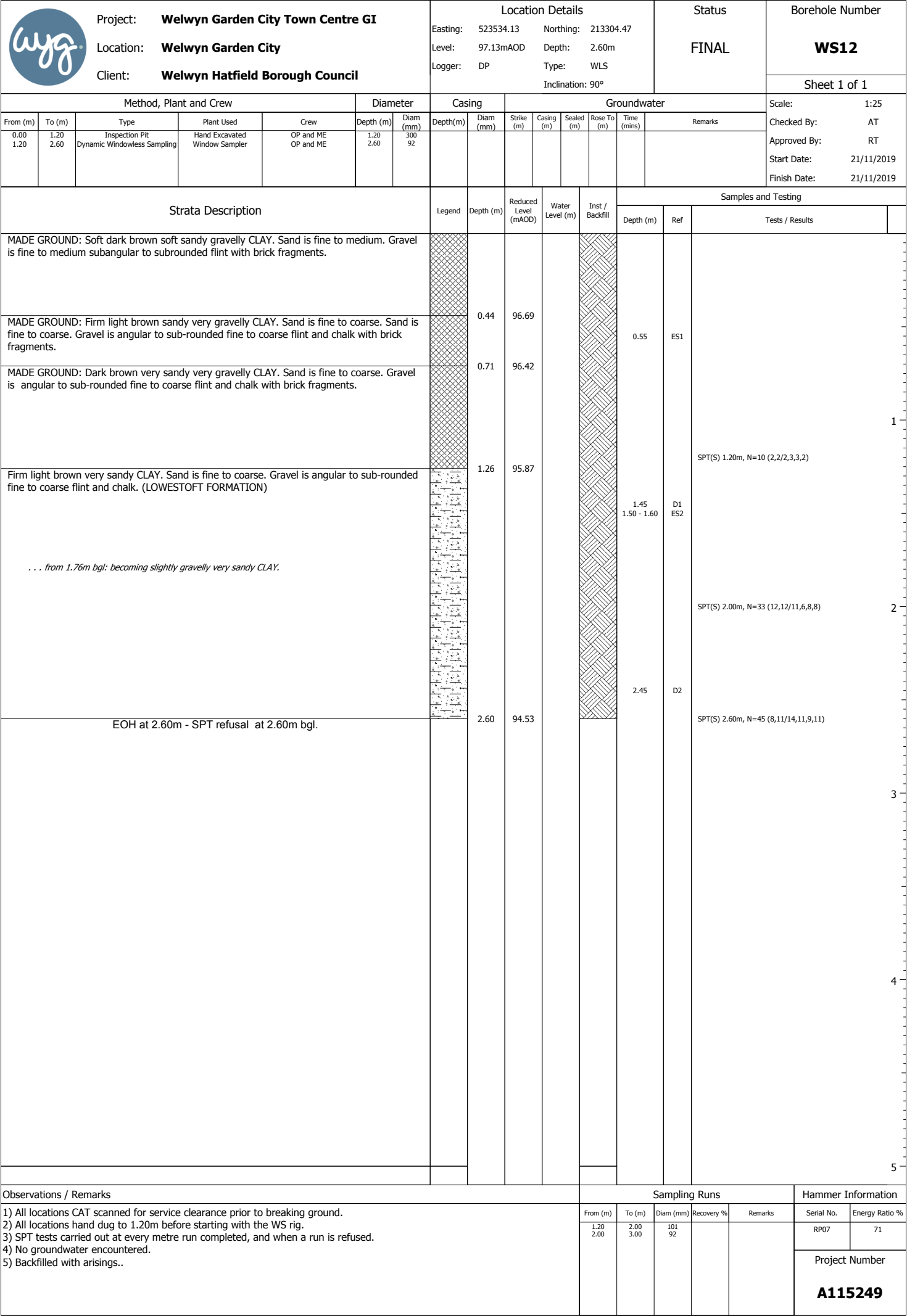
Appendix D – Exploratory Hole Logs




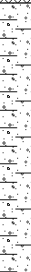

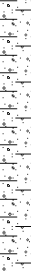


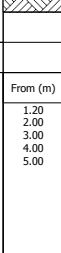


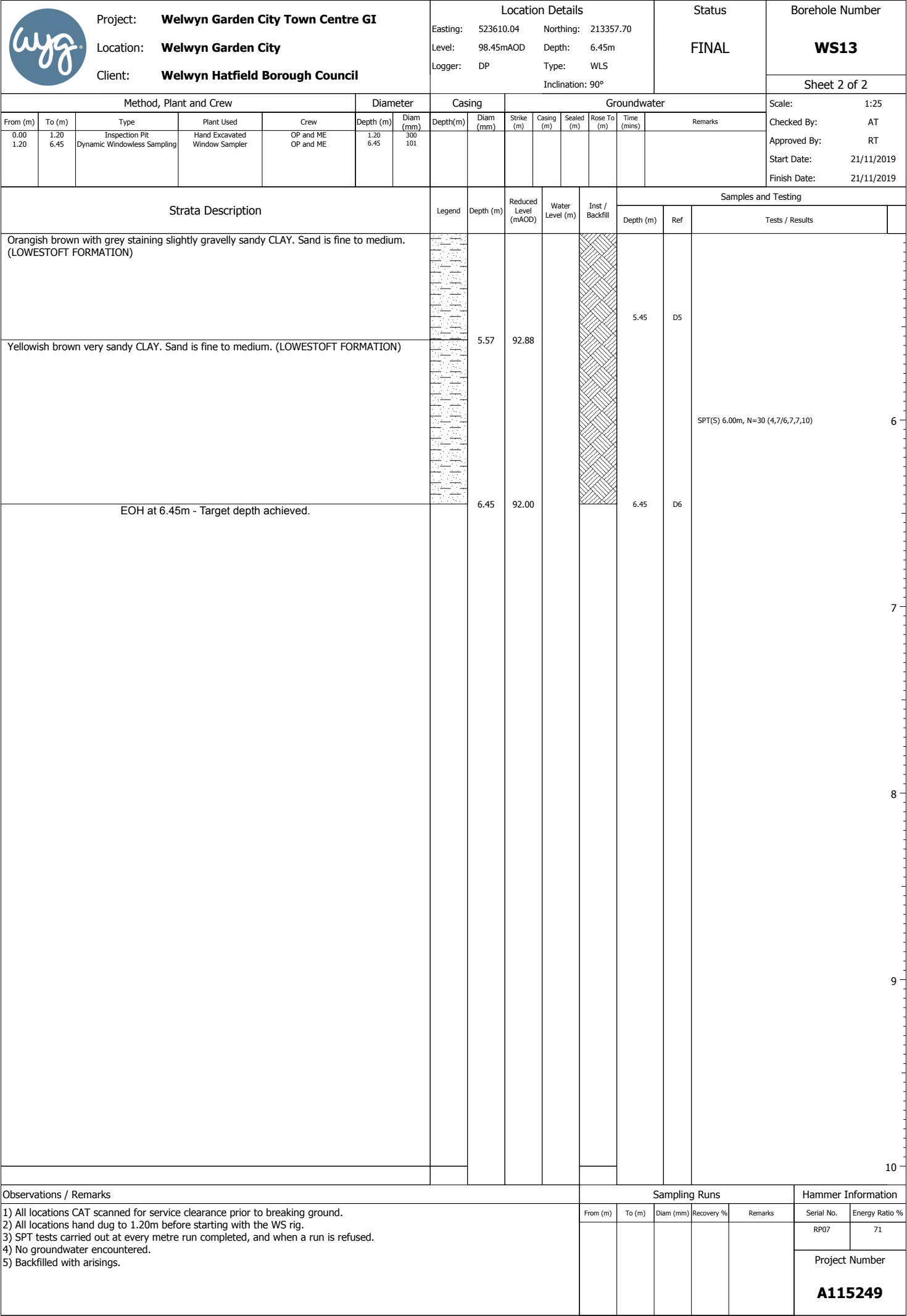
		Project: Welwyn Garden City Town Centre GI		Location Details				Status		Borehole Number							
		Location: Welwyn Garden City		Easting: 523503.24 Northing: 213399.52 Level: 101.42mAOD Depth: 7.00m Logger: DP Type: WLS Inclination: 90°				FINAL		WS10							
		Client: Welwyn Hatfield Borough Council								Sheet 2 of 2							
Method, Plant and Crew					Diameter		Casing		Groundwater				Scale: 1:25				
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: AT		
0.00 1.20	1.20 7.00	Dynamic Windowless Sampling Dynamic Windowless Sampling	Hand Excavated Window Sampler	OP and ME OP and ME	1.20 7.00	300 79	2.00 3.00 4.00 5.00 6.00 7.00	101 101 92 92 79 79							Approved By: RT		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing				Start Date: 21/11/2019	
												Depth (m)	Ref	Tests / Results		Finish Date: 21/11/2019	
Stiff orangish brown sandy CLAY. Sand is fine. (THANET SAND FORMATION) ... from 5.00m bgl: becoming sandy CLAY.								7.00	94.42						SPT(S) 6.00m, N=41 (9,9/10,10,10,11)	6	
															SPT(S) 7.00m, N=45 (66,8/9,11,11,14)	7	
EOH at 7.00m - Target depth achieved.																8	
																	9
																	10
Observations / Remarks										Sampling Runs				Hammer Information			
1) All locations CAT scanned for service clearance prior to breaking ground. 2) All locations hand dug to 1.20m before starting with the WS rig. 3) SPT tests carried out at every metre run completed, and when a run is refused. 4) No groundwater encountered. 5) Installed with 1.0m plain pipe and 1.0m slotted pipe.										From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %	
										6.00	7.00	79			RP07	71	
																Project Number	
						A115249											








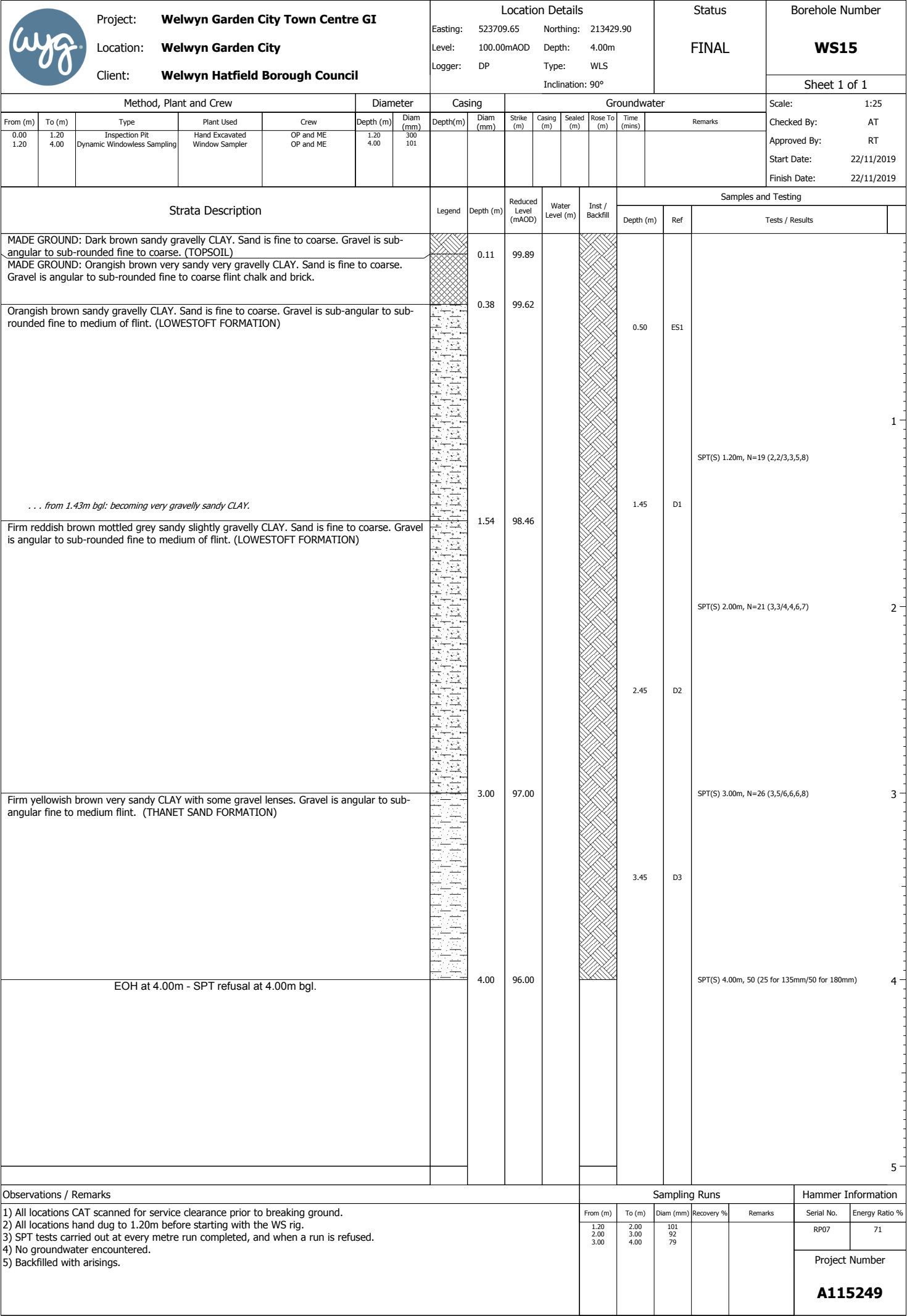


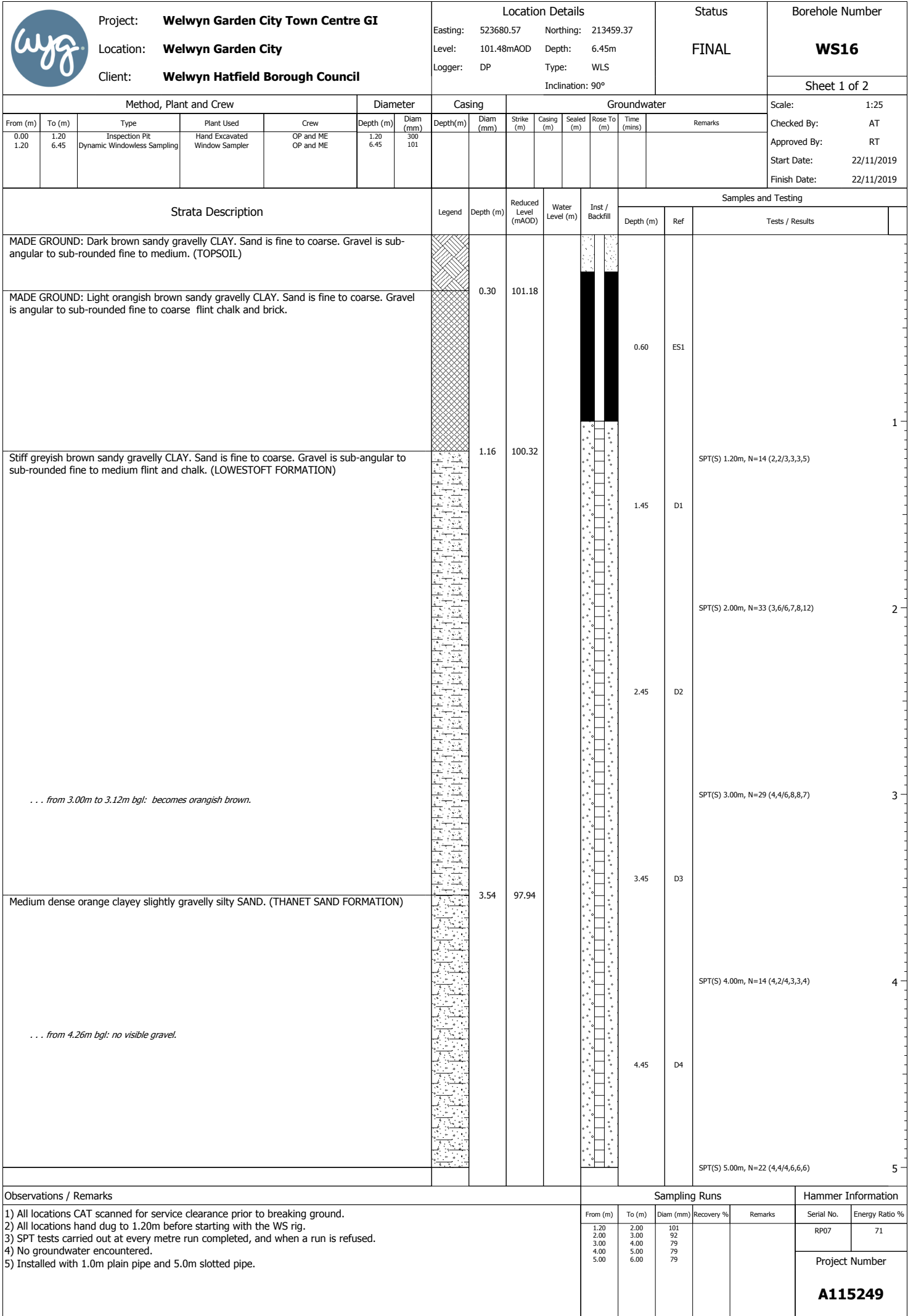
<div></div> <div>Project: Welwyn Garden City Town Centre GI Location: Welwyn Garden City Client: Welwyn Hatfield Borough Council</div>						Location Details						Status FINAL		Borehole Number WS13				
						Easting: 523610.04 Northing: 213357.70 Level: 98.45mAOD Depth: 6.45m Logger: DP Type: WLS Inclination: 90°								Sheet 1 of 2				
						Method, Plant and Crew					Diameter		Casing		Groundwater			
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By:	AT		
0.00 1.20	1.20 6.45	Inspection Pit Dynamic Windowless Sampling	Hand Excavated Window Sampler	OP and ME OP and ME	1.20 6.45	300 101									Approved By:	RT		
															Start Date:	21/11/2019		
															Finish Date:	21/11/2019		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing						
												Depth (m)	Ref	Tests / Results				
TOPSOIL: Grass over topsoil.								0.05	98.40			0.75	ES1	SPT(S) 1.20m, N=10 (2,1/2,2,2,4)				
MADE GROUND: Soft dark brown sandy gravelly CLAY with occasional cobble of concrete. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse flint.																		
MADE GROUND: Firm orangish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-rounded fine to medium flint and chalk with brick fragments.																		
Orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to medium. (LOWESTOFT FORMATION)								1.40	97.05			1.45	D1	SPT(S) 2.00m, N=6 (1,1/1,2,1,2)				
								2.45	D2									
												SPT(S) 3.00m, N=10 (2,2/2,2,2,4)						
Orangish brown clayey SAND. Sand is fine to medium. (LOWESTOFT FORMATION)								4.20	94.25			3.45	D3	SPT(S) 4.00m, N=12 (2,2/3,2,3,4)				
																	4.45	D4
Orangish brown with grey staining slightly gravelly sandy CLAY. Sand is fine to medium. (LOWESTOFT FORMATION)								4.45	94.00			4.45	D4	SPT(S) 5.00m, N=20 (2,2/4,4,5,7)				
Observations / Remarks											Sampling Runs				Hammer Information			
1) All locations CAT scanned for service clearance prior to breaking ground. 2) All locations hand dug to 1.20m before starting with the WS rig. 3) SPT tests carried out at every metre run completed, and when a run is refused. 4) No groundwater encountered. 5) Backfilled with arisings.											From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %	
											1.20	2.00	101			RP07	71	
											2.00	3.00	92					
											3.00	4.00	79					
											4.00	5.00	70					
											5.00	6.00	70					
															Project Number			
															A115249			



<div></div> <div>Project: Welwyn Garden City Town Centre GI Location: Welwyn Garden City Client: Welwyn Hatfield Borough Council</div>						Location Details						Status FINAL		Borehole Number WS14				
						Easting: 523700.74 Northing: 213386.63 Level: 98.31mAOD Depth: 5.45m Logger: DP Type: WLS Inclination: 90°								Sheet 1 of 2				
						Method, Plant and Crew					Diameter		Casing		Groundwater			
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: AT	Approved By: RT	Start Date: 22/11/2019	Finish Date: 22/11/2019
0.00	1.20	Inspection Pit Dynamic Windowless Sampling	Hand Excavated Window Sampler	OP and ME	1.20 5.45	300 101												
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing						
												Depth (m)	Ref	Tests / Results				
TOPSOIL: Grass over topsoil.								0.05	98.26									
MADE GROUND: Dark brown very sandy very gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded flint and chalk with brick fragments.								0.24	98.07				0.45	ES1				
Yellowish brown clayey very sandy GRAVEL. Sand is fine to coarse. Gravel is angular to rounded fine to coarse flint. Some rootlets. (LOWESTOFT FORMATION)								0.60	97.71									
Firm orangish brown brown very sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-rounded fine to coarse flint chalk and brick. (LOWESTOFT FORMATION)								1.09	97.22				1.45	D1				
Firm orangish brown and grey sandy CLAY. Sand is fine to medium. (LOWESTOFT FORMATION)								2.64	95.67				2.45	D2	SPT(S) 2.00m, N=19 (2,3/3,5,5,6)			
Medium dense brownish yellow clayey SAND. Sand is fine to medium. (THANET SAND FORMATION)													3.45	D3	SPT(S) 3.00m, N=24 (4,4/4,5,7,8)			
... from 3.41m bgl: becoming yellowish brown.													4.45	D4	SPT(S) 4.00m, N=32 (4,6/8,8,8,8)			
... from 4.00m bgl: becoming slightly gravelly sandy CLAY.															SPT(S) 5.00m, N=31 (4,5/6,8,8,9)			
Observations / Remarks												Sampling Runs				Hammer Information		
1) All locations CAT scanned for service clearance prior to breaking ground. 2) All locations hand dug to 1.20m before starting with the WS rig. 3) SPT tests carried out at every metre run completed, and when a run is refused. 4) No groundwater encountered. 5) Installed with 1.0m plain pipe and 2.0m slotted pipe.												From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
												1.20	2.00	101			RP07	71
												2.00	3.00	92				
												3.00	4.00	79				
												4.00	5.00	70				
												Project Number A115249						

		Project: Welwyn Garden City Town Centre GI		Location Details						Status		Borehole Number				
		Location: Welwyn Garden City		Easting: 523700.74 Northing: 213386.63 Level: 98.31mAOD Depth: 5.45m Logger: DP Type: WLS Inclination: 90°						FINAL		WS14				
		Client: Welwyn Hatfield Borough Council										Sheet 2 of 2				
Method, Plant and Crew					Diameter		Casing		Groundwater						Scale: 1:25	
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: AT	
0.00 1.20	1.20 5.45	Inspection Pit Dynamic Windowless Sampling	Hand Excavated Window Sampler	OP and ME	1.20 5.45	300 101									Approved By: RT	
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing				
												Depth (m)	Ref	Tests / Results		
Medium dense brownish yellow clayey SAND. Sand is fine to medium. (THANET SAND FORMATION)								5.45	92.86				5.45	D5		
EOH at 5.45m - Target depth achieved.																
Observations / Remarks										Sampling Runs				Hammer Information		
1) All locations CAT scanned for service clearance prior to breaking ground. 2) All locations hand dug to 1.20m before starting with the WS rig. 3) SPT tests carried out at every metre run completed, and when a run is refused. 4) No groundwater encountered. 5) Installed with 1.0m plain pipe and 2.0m slotted pipe.										From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
															RP07	71
																Project Number
						A115249										







Location Details			
Easting:	523680.57	Northing:	213459.37
Level:	101.48mAOD	Depth:	6.45m
Logger:	DP	Type:	WLS
		Inclination:	90°

Status

FINAL

Borehole Number

WS16

Sheet 2 of 2

Method, Plant and Crew					Diameter		Casing		Groundwater						Scale:	1:25
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By:	AT
0.00	1.20	Inspection Pit	Hand Excavated	OP and ME	1.20	300									Approved By:	RT
1.20	6.45	Dynamic Windowless Sampling	Window Sampler	OP and ME	6.45	101									Start Date:	22/11/2019
															Finish Date:	22/11/2019


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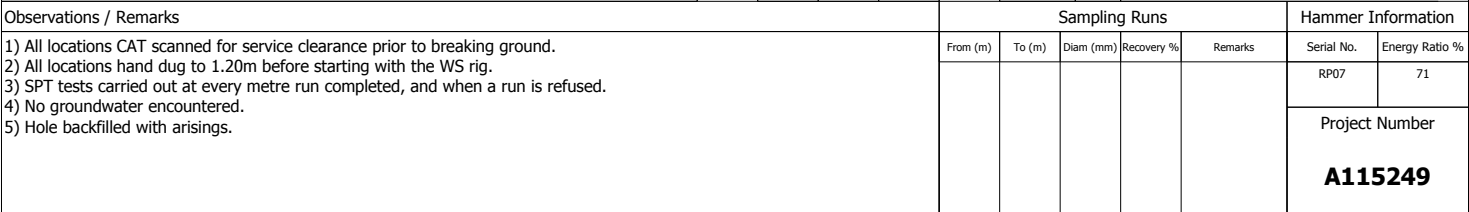
- 1) All locations CAT scanned for service clearance prior to breaking ground.
- 2) All locations hand dug to 1.20m before starting with the WS rig.
- 3) SPT tests carried out at every metre run completed, and when a run is refused.
- 4) No groundwater encountered.
- 5) Installed with 1.0m plain pipe and 5.0m slotted pipe.

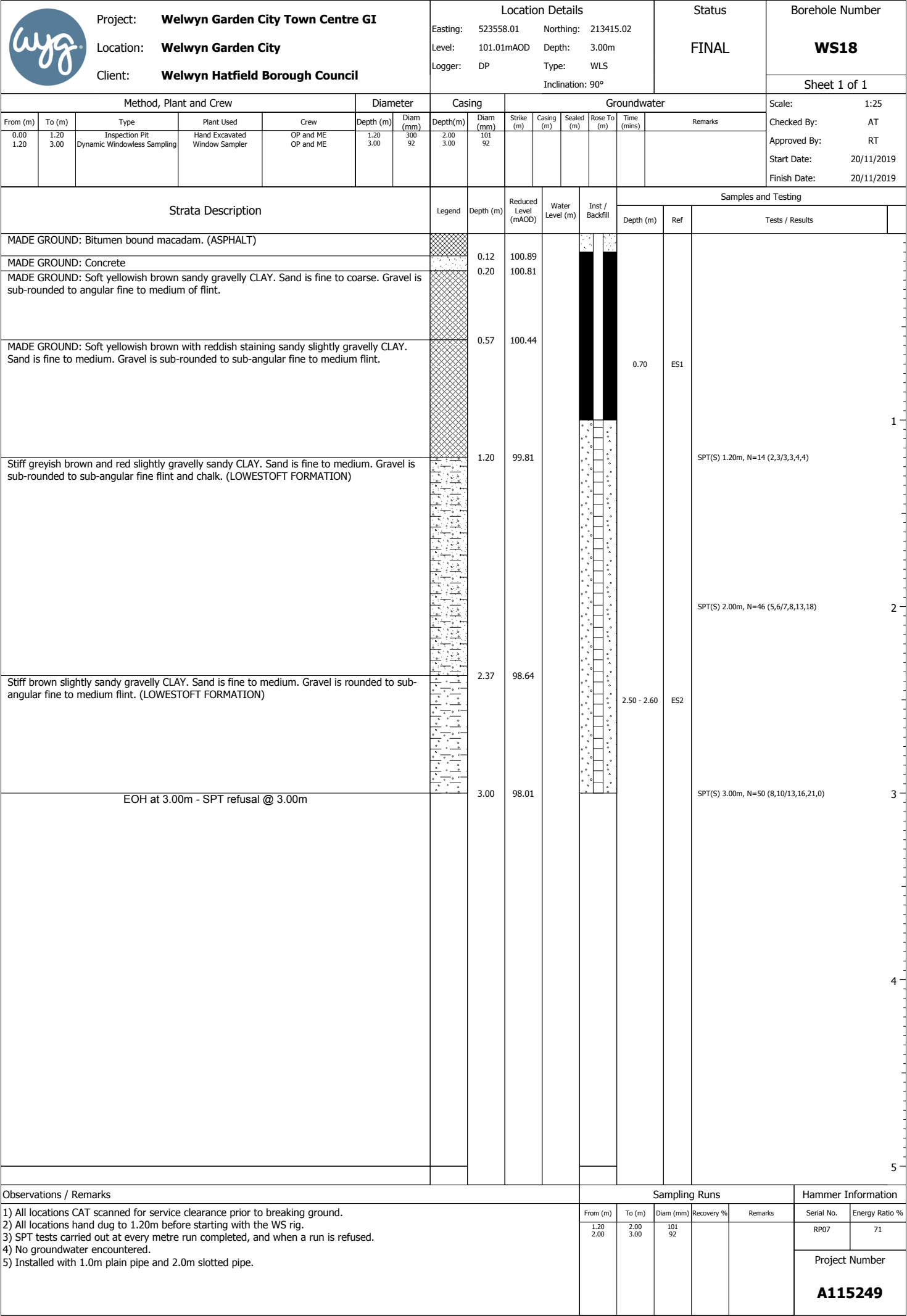
Sampling Runs

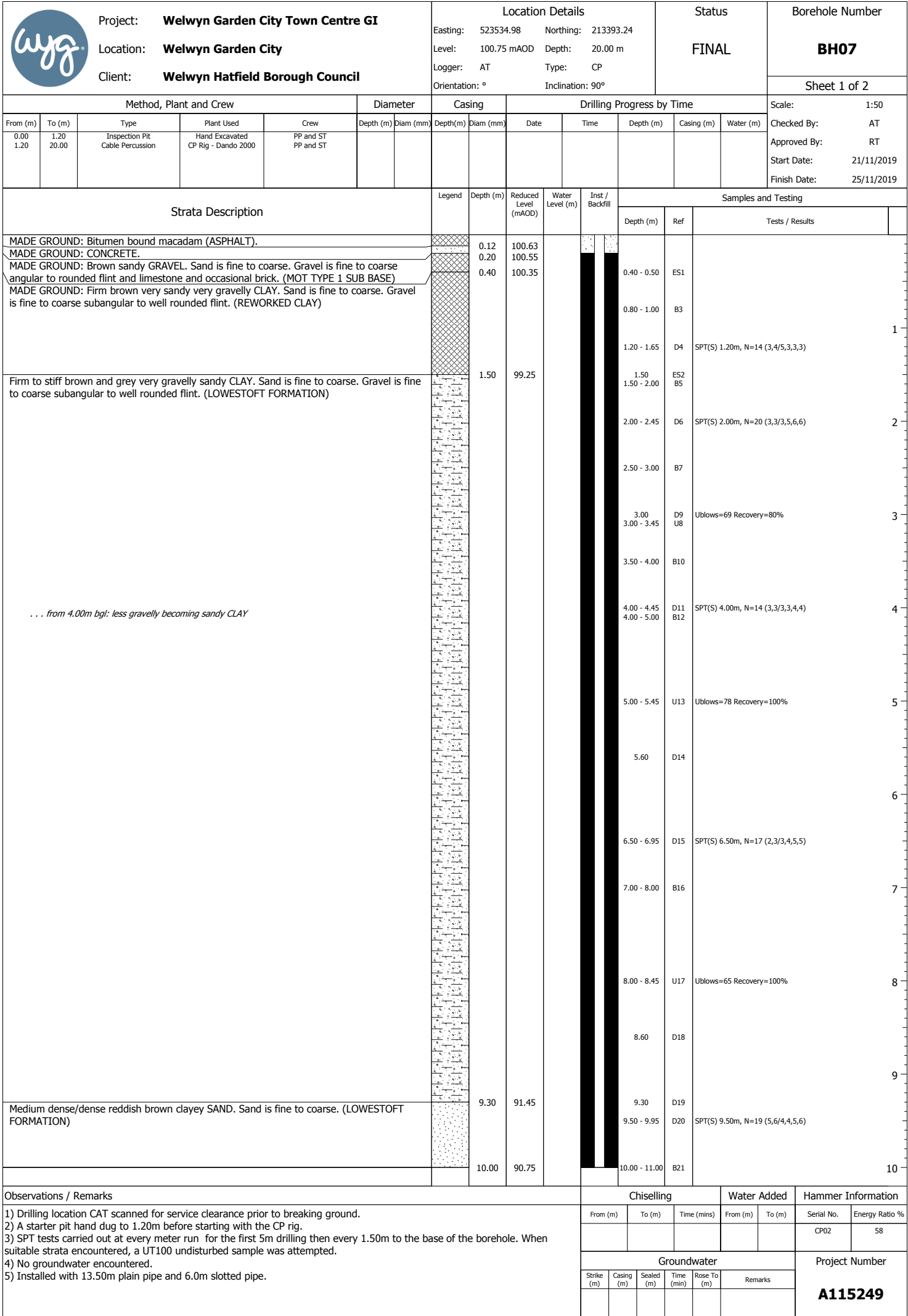
Hammer Information



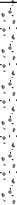
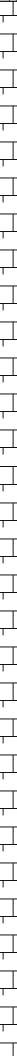
From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
					RP07	71
					Project Number A115249	



















		Project: Welwyn Garden City Town Centre GI				Location Details				Status		Borehole Number					
		Location: Welwyn Garden City				Easting: 523617.49 Northing: 213443.81				FINAL		WS17					
		Client: Welwyn Hatfield Borough Council				Level: 100.95mAOD Depth: 6.45m Logger: DP Type: WLS Inclination: 90°											
Method, Plant and Crew						Diameter		Casing		Groundwater				Scale: 1:25			
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: AT		
0.00 1.20	1.20 6.45	Inspection Pit Window Sampler	Hand Excavated Window Sampler	OP and ME OP and ME	1.20 6.45	300 101									Approved By: RT		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
												Depth (m)	Ref	Tests / Results			
MADE GROUND: Dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse. (TOPSOIL) ... from 0.1m bgl: abundant rootlets.								0.19	100.76				0.20 - 0.30	ES1	SPT(S) 1.20m, N=9 (2,2/2,2,3,2)	1	
Soft dark light brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-rounded fine to coarse flint. (LOWESTOFT FORMATION)								0.52	100.43				0.90 - 1.00	ES2			
Yellowish brown clayey gravelly SAND. Sand is fine to medium. Gravel is angular to sub-rounded fine to medium. (LOWESTOFT FORMATION)								1.00	99.95				1.45	D1			
Stiff brown mottled red sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to medium flint. (LOWESTOFT FORMATION)								2.80	98.15				2.80 - 3.00	ES3			
Medium dense to dense orangish brown clayey SAND. Sand is fine to medium. (THANET SAND FORMATION)													3.45	D3	SPT(S) 3.00m, N=29 (4,6/5,6,8,10)	3	
													4.45	D4	SPT(S) 4.00m, N=38 (5,7/6,10,10,10)	4	
																SPT(S) 5.00m, N=33 (5,7/6,8,9,10)	5
Observations / Remarks										Sampling Runs				Hammer Information			
1) All locations CAT scanned for service clearance prior to breaking ground. 2) All locations hand dug to 1.20m before starting with the WS rig. 3) SPT tests carried out at every metre run completed, and when a run is refused. 4) No groundwater encountered. 5) Hole backfilled with arisings.										From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %	
										1.20	2.00	101			RP07	71	
										2.00	3.00	92					
										3.00	4.00	79					
										4.00	5.00	70					
										5.00	6.00	70			Project Number		
																A115249	








		Project: Welwyn Garden City Town Centre GI				Location Details				Status		Borehole Number				
		Location: Welwyn Garden City				Easting: 523534.98 Northing: 213393.24 Level: 100.75 mAOD Depth: 20.00 m Logger: AT Type: CP Orientation: ° Inclination: 90°				FINAL		BH07				
		Client: Welwyn Hatfield Borough Council										Sheet 2 of 2				
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale: 1:50		
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:	AT	
0.00 1.20	1.20 20.00	Inspection Pit Cable Percussion	Hand Excavated CP Rig - Dando 2000	PP and ST PP and ST										Approved By:	RT	
														Start Date:	21/11/2019	
														Finish Date:	25/11/2019	
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing				
												Depth (m)	Ref	Tests / Results		
Stiff brown gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to well rounded flint and occasional chalk. (LOWESTOFT FORMATION)													11.00 - 11.40	D22	SPT(S) 11.00m, 50 (5,6/50 for 295mm)	11
Dense brown/orangish brown SAND/GRAVEL. Sand is fine to coarse. Gravel is fine to coarse subangular to well rounded flint. Occasional cobble of flint (well rounded). (LOWESTOFT FORMATION)								11.40	89.35				12.00	D23		12
													12.50 - 13.00	B24	SPT(C) 12.50m, 50 (8,16/50 for 275mm)	
Structureless CHALK recovered as creamy white, slightly gravelly sandy SILT. Gravel is very weak, white with frequent black specks and rounded chalk. (Grade Dm) (WHITE CHALK)								13.00	87.75				13.00 - 14.00	B25		13
													14.00 14.00 - 14.45	ES33 D26	SPT(S) 14.00m, N=12 (3,2/2,3,3,4)	14
													15.50 - 15.95	D27	SPT(S) 15.50m, N=16 (3,3/3,3,6,4)	15
													16.00 - 17.00	B28		16
													17.00 - 17.45	D29	SPT(S) 17.00m, N=14 (2,2/2,3,4,5)	17
													18.50 - 18.95	D30	SPT(S) 18.50m, N=4 (2,1/1,1,1,1)	18
... Between 18.00m to 19.00m bgl very soft chalk.													19.00 - 20.00	B31		19
													20.00 - 20.45	D32	SPT(S) 20.00m, N=11 (1,3/3,2,2,4)	20
EOH at 20.00m - Target depth achieved.								20.00	80.75							
Observations / Remarks										Chiselling			Water Added		Hammer Information	
										From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %
															CP02	58
							Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	A115249			

		Project: Welwyn Garden City Town Centre GI				Location Details				Status		Borehole Number					
		Location: Welwyn Garden City				Easting: 523533.81 Northing: 213338.76 Level: 99.05 mAOD Depth: 25.00 m Logger: AT Type: CP Orientation: ° Inclination: 90°				FINAL		BH08					
		Client: Welwyn Hatfield Borough Council										Sheet 1 of 3					
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale: 1:50			
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:	AT		
0.00 1.20	1.20 25.00	Inspection Pit Cable Percussion	Hand Excavated CP Rig - Dando 2000	PP and ST PP and ST	16.50 25.00	200 150	16.50 25.00	200 150				-		Approved By:	RT		
														Start Date:	18/11/2019		
														Finish Date:	20/11/2019		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
												Depth (m)	Ref	Tests / Results			
MADE GROUND: Bitumen bound macadam (ASPHALT)								0.20	98.85				0.30	ES1	SPT(S) 1.20m, N=12 (1,2/2,2,3,5)		
MADE GROUND: Brown sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse angular to rounded flint and limestone. (MOT TYPE 1 SUB BASE)								0.70	98.35				0.80 - 1.20	B3			
Soft to firm brown and grey very gravelly very sandy CLAY with pockets of grey sand. (LOWESTOFT FORMATION)												1.20	ES2				
												1.20 - 1.65	D4				
												1.50 - 2.00	B5				
												2.00	D7				
												2.00 - 2.45	U6				
Firm to stiff reddish brown mottled grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded to well rounded flint. (LOWESTOFT FORMATION) ... from 5.00m bgl: becoming sandy CLAY												2.50 - 3.00	B8				
												3.00 - 3.45	D9				
												3.50 - 4.00	B10				
												4.00 - 4.45	U11				
												4.50 - 5.00	B13				
												4.60	D12				
												5.00 - 5.45	D14				
												5.50 - 6.00	B15				
												6.00	D16				
												6.50 - 6.95	U17				
Stiff brown and grey sandy CLAY. (LOWESTOFT FORMATION)												7.10	D18				
												7.50 - 8.00	B19				
												8.00 - 8.45	D20				
Stiff light brown very sandy CLAY. Sand is fine to medium. (LOWESTOFT FORMATION)												8.60 - 9.50	B21				
												9.50 - 9.95	D22				
Dense reddish brown slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to medium subrounded to well rounded flint. (LOWESTOFT FORMATION)												9.50 - 9.95	D22				
												10.00 - 11.00	B23				
Observations / Remarks											Chiselling		Water Added		Hammer Information		
1) Drilling location CAT scanned for service clearance prior to breaking ground. 2) A starter pit hand dug to 1.20m before starting with the CP rig. 3) SPT tests carried out at every meter run for the first 5m drilling then every 1.50m to the base of the borehole. When suitable strata encountered, a UT100 undisturbed sample was attempted. 4) No groundwater encountered. 5) Installed with 10.0m plain pipe and 6.0m slotted pipe.											From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %
														1.50 9.50	3.50 16.50	CP02	58
											Groundwater						Project Number
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	A115249											

		Project: Welwyn Garden City Town Centre GI				Location Details				Status		Borehole Number					
		Location: Welwyn Garden City				Easting: 523533.81 Northing: 213338.76				FINAL		BH08					
		Client: Welwyn Hatfield Borough Council				Level: 99.05 mAOD Depth: 25.00 m											
						Logger: AT Type: CP											
						Orientation: ° Inclination: 90°						Sheet 2 of 3					
Method, Plant and Crew						Diameter		Casing		Drilling Progress by Time							
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Scale:	1:50		
0.00 1.20	1.20 25.00	Inspection Pit Cable Percussion	Hand Excavated CP Rig - Dando 2000	PP and ST PP and ST	16.50 25.00	200 150	16.50 25.00	200 150						Checked By:	AT		
														Approved By:	RT		
														Start Date:	18/11/2019		
														Finish Date:	20/11/2019		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
												Depth (m)	Ref	Tests / Results			
Dense reddish brown slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to medium subrounded to well rounded flint. (LOWESTOFT FORMATION)								11.45	87.60			11.00 - 11.45	D24	SPT(S) 11.00m, N=37 (13,11/5,6,7,19)		11	
												11.50 - 12.50	B25				
Dense brown gravelly silty SAND. Sand is fine to coarse. Gravel is fine to medium subangular to well rounded flint. (LOWESTOFT FORMATION)												12.50 - 12.90	D26	SPT(S) 12.50m, 50 (10,12/50 for 265mm)			
												13.00 - 14.00	B27				
... From 11.30m to 11.40m bgl band of brown clay.																	
... from 14.00m bgl: becoming sandy GRAVEL.														SPT(C) 14.00m, 50 (25 for 75mm/22,15,13,)		14	
												14.50 - 15.00	B28				
												15.00	D29				
												15.50 - 16.00	B30	SPT(C) 15.50m, 50 (25 for 125mm/50 for 255mm)			
												16.00	D31				
Structureless CHALK recovered as creamy white, slightly gravelly sandy SILT. Gravel is very weak, white with frequent black specks and rounded chalk. (Grade Dm) (WHITE CHALK)								16.30	82.75			16.30 - 17.00	B32				
												17.00 - 17.45	D33	SPT(S) 17.00m, N=18 (4,2/3,3,5,7)		17	
												17.50 - 18.50	B34				
												17.50 - 18.50	ES44				
												18.50 - 18.95	D35	SPT(S) 18.50m, N=9 (2,3/1,2,2,4)			
												19.00 - 20.00	B36				
												20.00 - 20.45	D37	SPT(S) 20.00m, N=13 (2,3/2,2,3,6)		20	
Observations / Remarks											Chiselling		Water Added		Hammer Information		
1) Drilling location CAT scanned for service clearance prior to breaking ground. 2) A starter pit hand dug to 1.20m before starting with the CP rig. 3) SPT tests carried out at every meter run for the first 5m drilling then every 1.50m to the base of the borehole. When suitable strata encountered, a UT100 undisturbed sample was attempted. 4) No groundwater encountered. 5) Installed with 10.0m plain pipe and 6.0m slotted pipe.											From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %
																CP02	58
											Groundwater						
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks		A115249										



Appendix E – Monitoring Results

WYG GEO-ENVIRONMENT



Email: enviro.leeds@wyg.com

GROUND GAS MONITORING RECORD SHEET

Client: Welwyn Hatfield Borough Council						Job No: A115249					Instruments Used: Portable Gas Analyser GA5000							
Project Name: WGC GI						Date: 06/12/2019					Make / Model : GA5000							
Weather: Overcast, some showers						Monitored By: AT and DP					Serial Number: GS02043 GeoTech							
Exploratory Hole No.	Peak ¹		Time to reach steady concentration (secs)	Steady ²					Flow Rate Peak (L/hr)	Time to reach steady flow (secs)	Flow Rate Steady (L/hr)	Relative pressure (mb)	Atmospheric Pressure (mbar)	Water Depth (m bgl)	Base Depth (m bgl)	Ground Level (mAOD)	Water Level (mAOD)	Remarks
	CH ₄	CO ₂		CH ₄	CO ₂	O ₂	H ₂ S ³	CO ³										
	(% vol)	(% vol)		(% vol)	(% vol)	(% vol)	(ppm)	(ppm)										
WS10	<0.1	7.0	15	<0.1	7.0	13.7	<1	<1	0	60	0	-0.02	997	dry	2.0			dry at 2.0m bgl
WS11	<0.1	5.0	20	<0.1	5.0	3.3	<1	<1	-0.1	55	0	-0.2	995	dry	3.0			dry at 3.06m bgl
WS14	0.1	9.0	25	0.1	9.0	11.3	<1	<1	0.4	60	0.2	0.03	994	dry	3.0			dry at 2.82m bgl
WS16	<0.1	7.6	65	<0.1	4.0	17.5	<1	<1	0.3	65	0.2	0.04	994	dry	6.0			dry at 5.95m bgl
WS18	<0.1	6.5	35	<0.1	6.5	15.5	<1	<1	0.1	45	0	4.14	997	dry	3.0			dry at 3.02m bgl
BH07	<0.1	4.3	20	<0.1	4.3	14.3	3.0	-0.1	0.2	65	0.1	0.05	997	18.53	19.4			insufficient water for sampling
BH08	0.1	6.3	20	0.1	6.3	13.6	<1	7.0	1.1	60	1.1	-0.20	995	dry	16.1			dry at 15.84m bgl

Ambient Gas Levels:

	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	H ₂ S (%)	CO (%)	PID ppm	Atmos (mbar)	
Before Monitoring	0.1	0.1	21.3	<1	<1		997	at 08:11 am
After Monitoring	0.1	<0.1	21.6	<1	<1		994	at 14:55 pm
Before Monitoring								
After Monitoring								

- 1 The peak reading is the maximum recorded level during a monitoring event.
- 2 The steady reading is the level which remained constant after approximately 1 minute.
- 3 Recorded values are calculated from the Ambient Gas readings (live zero)

WYG GEO-ENVIRONMENT



Email: enviro.leeds@wyg.com

GROUND GAS MONITORING RECORD SHEET

Client: Welwyn Hatfield Borough Council						Job No: A115249					Instruments Used: Portable Gas Analyser GA5000									
Project Name: WGC GI						Date: 13/12/2019					Make / Model : GA5000									
Weather: Overcast						Monitored By: AT and DP					Serial Number: GS02043 GeoTech									
Exploratory Hole No.	Peak ¹		Time to reach steady concentration (secs)	Steady ²					Flow Rate Peak (L/hr)	Time to reach steady flow (secs)	Flow Rate Steady (L/hr)	Relative pressure (mb)	Atmospheric Pressure (mbar)	Water Depth (m bgl)	Base Depth (m bgl)	Ground Level (mAOD)	Water Level (mAOD)	Remarks		
	CH ₄	CO ₂		CH ₄	CO ₂	O ₂	H ₂ S ³	CO ³												
	(% vol)	(% vol)		(% vol)	(% vol)	(% vol)	(ppm)	(ppm)												
WS10	0.1	7.6	20	0.1	7.6	13.2	<1	<1	0.1	55	0.2	11.64	971	dry	2.0			dry at 1.87m bgl		
WS11	0.1	9.6	25	0.1	9.6	3.4	<1	<1	0.3	50	0.2	3.13	971	dry	3.0			dry at 3.06m bgl		
WS14	0.1	11.6	25	0.1	11.6	9.7	<1	<1	0.3	55	0.3	2.57	971	dry	3.0			dry at 2.81m bgl		
WS16	0.1	3.1	55	0.1	3.0	19.6	<1	<1	0.3	60	0.2	14.19	971	dry	6.0			dry at 5.95m bgl. Flow steadily rising		
WS18	0.1	7.8	45	0.1	7.1	15.0	<1	<1	0.2	50	0.3	13.24	971	dry	3.0			dry at 3.04m bgl		
BH07	0.2	6.3	25	0.1	6.2	3.9	<1	4.0	0.2	70	-1	13.46	972	18.54	19.4			insufficient water for sampling		
BH08	0.1	6.2	30	0.1	6.2	14.0	<1	<1	-1.3	75	-1.3	3.15	971	15.93	16.1			base at 16.07m bgl - insufficient water for sampling		

Ambient Gas Levels:

	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	H ₂ S (%)	CO (%)	PID ppm	Atmos (mbar)	
Before Monitoring	0.1	0.1	21.5	0.0	0.0		970	at 08:01 am
After Monitoring	0.1	0.1	21.2	0.0	0.0		972	at 13:35 pm
Before Monitoring								
After Monitoring								

- 1 The peak reading is the maximum recorded level during a monitoring event.
- 2 The steady reading is the level which remained constant after approximately 1 minute.
- 3 Recorded values are calculated from the Ambient Gas readings (live zero)

WYG GEO-ENVIRONMENT



Email: enviro.leeds@wyg.com

GROUND GAS MONITORING RECORD SHEET

Client: Welwyn Hatfield Borough Council						Job No: A115249					Instruments Used: Portable Gas Analyser GA5000									
Project Name: WGC GI						Date: 07/01/2020					Make / Model : GA5000									
Weather: Overcast						Monitored By: AT and DP					Serial Number: GS02043 GeoTech									
Exploratory Hole No.	Peak ¹		Time to reach steady concentration (secs)	Steady ²					Flow Rate Peak (L/hr)	Time to reach steady flow (secs)	Flow Rate Steady (L/hr)	Relative pressure (mb)	Atmospheric Pressure (mbar)	Water Depth (m bgl)	Base Depth (m bgl)	Ground Level (mAOD)	Water Level (mAOD)	Remarks		
	CH ₄	CO ₂		CH ₄	CO ₂	O ₂	H ₂ S ³	CO ³												
	(% vol)	(% vol)		(% vol)	(% vol)	(% vol)	(ppm)	(ppm)												
WS10	0.3	6.3	30	0.3	6.3	16.2	<1	<1	0.2	45	0.2	13.22	1012	dry	2.0			dry at 1.88m bgl		
WS11	0.3	7.9	50	0.3	7.8	4.6	<1	<1	0.1	40	0.1	4.07	1012	dry	3.0			dry at 3.06m bgl		
WS14	0.3	10.4	60	0.3	10.3	12.0	<1	<1	0.1	30	0.1	4.07	1012	2.72	3.0			base at 2.82m bgl - insufficient water to sample		
WS16	0.3	3.0	75	0.3	2.6	18.6	<1	<1	0.2	30	0.2	14.73	1014	dry	6.0			dry at 5.94m bgl		
WS18	0.3	2.6	65	0.3	2.6	18.6	<1	<1	0.2	25	0.2	14.42	1012	dry	3.0			dry at 3.02m bgl		
BH07	0.3	4.3	35	0.3	4.3	8.7	<1	2.0	0.7	45	0.7	5.1	1011	18.84	19.4			insufficient water for sampling		
BH08	0.3	3.3	30	0.3	3.3	16.6	<1	<1	0.7	35	0.7	4.05	1012	15.87	16.1			base at 16.07m bgl - insufficient water for sampling		

Ambient Gas Levels:

	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	H ₂ S (%)	CO (%)	PID ppm	Atmos (mbar)
Before Monitoring	<0.1	0.1	20.9	<1	<1		1015
After Monitoring	0.1	<0.1	20.6	<1	<1		1012
Before Monitoring							
After Monitoring							

- 1 The peak reading is the maximum recorded level during a monitoring event.
2 The steady reading is the level which remained constant after approximately 1 minute.
3 Recorded values are calculated from the Ambient Gas readings (live zero)

Appendix F – Photographic Plates



Plate 1

Setting up at the hole location

WYG Environment
11th Floor,
One Angel Court,
London
EC2R 7HJ

Tel: 020 7250 7500

Environmental Consultancy
Ground Technologies & Investigation



Project :-
Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019



Plate 2

WS10 - 1.00 to 2.00 m bgl



Plate 3

WS10 - 2.00 to 3.00 m bgl

WYG Environment
11th Floor,
One Angel Court,
London
EC2R 7HJ

Tel: 020 7250 7500

Environmental Consultancy
Ground Technologies & Investigation



Project :-

Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019



Plate 4

WS10 - 3.00 to 4.00 m bgl



Plate 5

WS10- 4.00 to 5.00m bgl

WYG Environment
11th Floor,
One Angel Court,
London
EC2R 7HJ

Tel: 020 7250 7500

Environmental Consultancy
Ground Technologies & Investigation



Project :-

Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019



Plate 6

WS10- 5.00 to 6.00m bgl



Plate 7

WS10 -6.00 to 7.00m bgl

WYG Environment
11th Floor,
One Angel Court,
London
EC2R 7HJ

Tel: 020 7250 7500

Environmental Consultancy
Ground Technologies & Investigation



Project :-

Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019

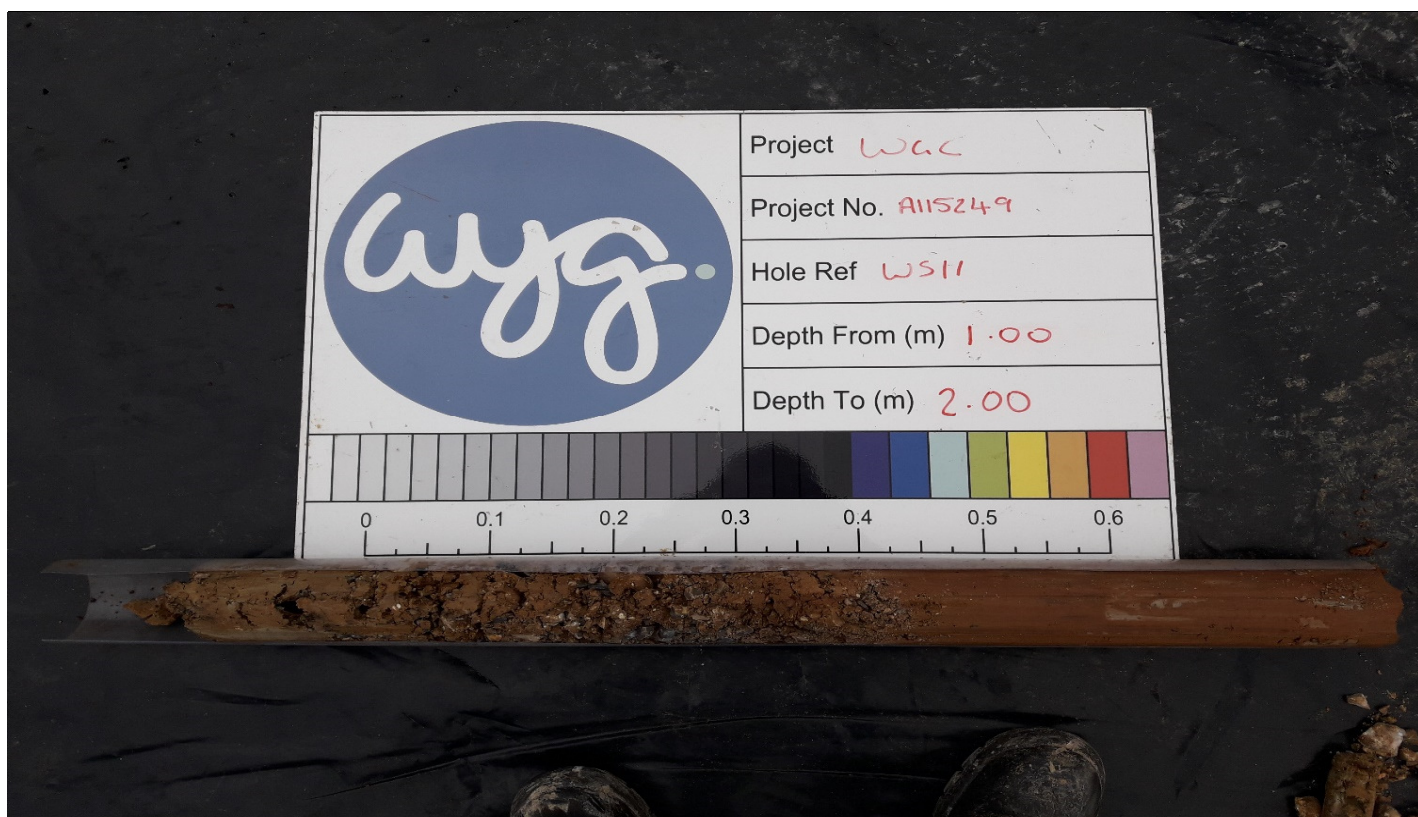


Plate 8

WS11 - 1.00 to 2.00m bgl



Plate 9

WS11 - 2.00 to 3.00m bgl

WYG Environment
11th Floor,
One Angel Court,
London
EC2R 7HJ

Tel: 020 7250 7500

Environmental Consultancy
Ground Technologies & Investigation



Project :-

Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019



Plate 10

WS11 - 4.00 to 5.00m bgl



Plate 11

WS11 - 5.00 to 6.00m bgl

WYG Environment
11th Floor,
One Angel Court,
London
EC2R 7HJ

Tel: 020 7250 7500

Environmental Consultancy
Ground Technologies & Investigation



Project :-
Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019



Plate 12

WS11 - Reinstated



Plate 13

WS12 - 1.00 to 2.00m bgl

WYG Environment
11th Floor,
One Angel Court,
London
EC2R 7HJ

Tel: 020 7250 7500

Environmental Consultancy
Ground Technologies & Investigation



Project :-

Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019



Plate 14

WS12 - 2.00 to 2.60m bgl



Plate 15

WS13 - 1.00 to 2.00m bgl



Project :-

Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Environmental Consultancy
Ground Technologies & Investigation

Project No.: A115249

Date : November 2019



Plate 16

WS13 - 3.00 to 4.00m bgl



Plate 17

WS13 - 5.00 to 6.00m bgl



Environmental Consultancy
Ground Technologies & Investigation

Project :-
Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019

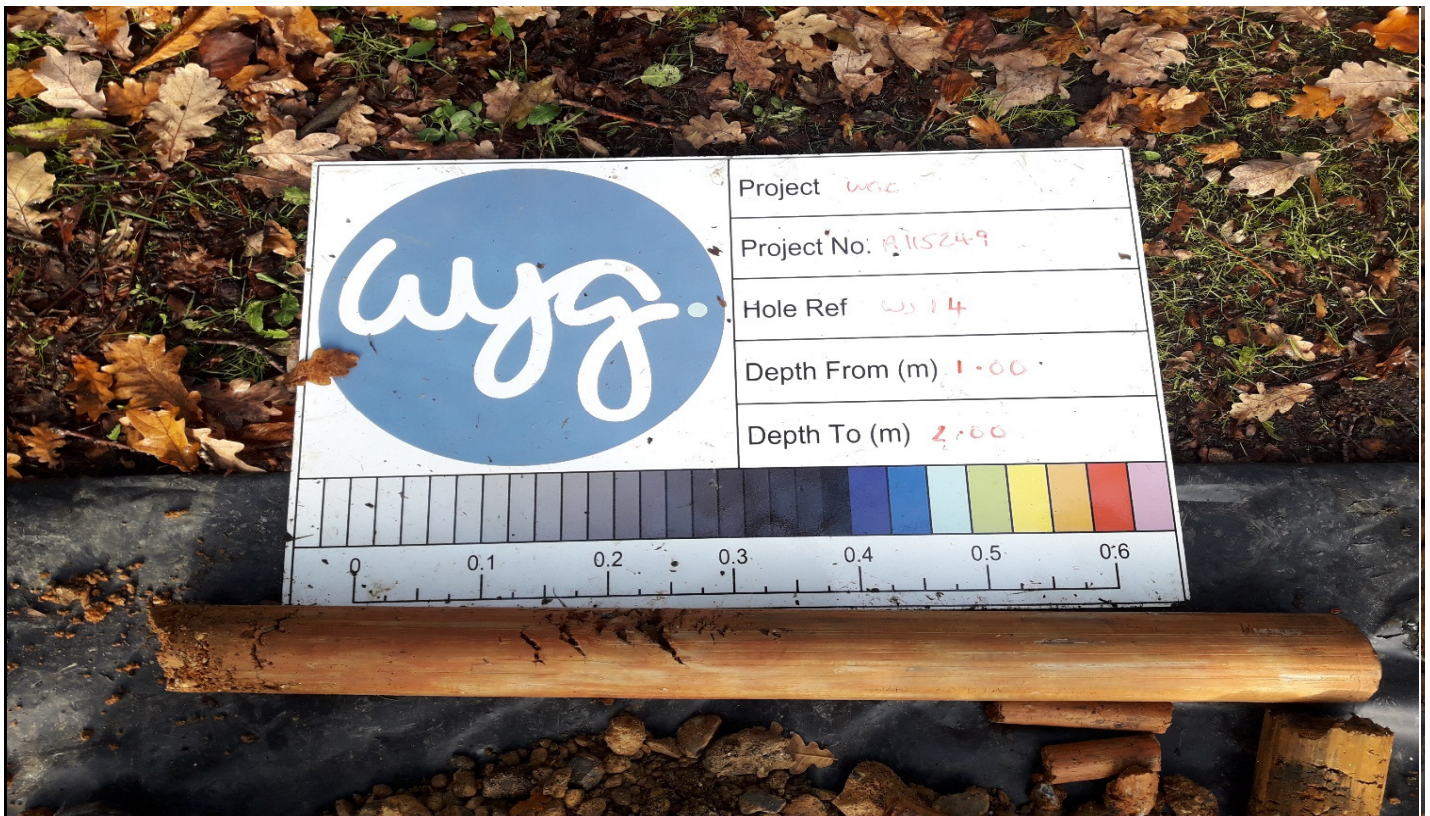


Plate 18

WS14 - 1.00 to 2.0m bgl

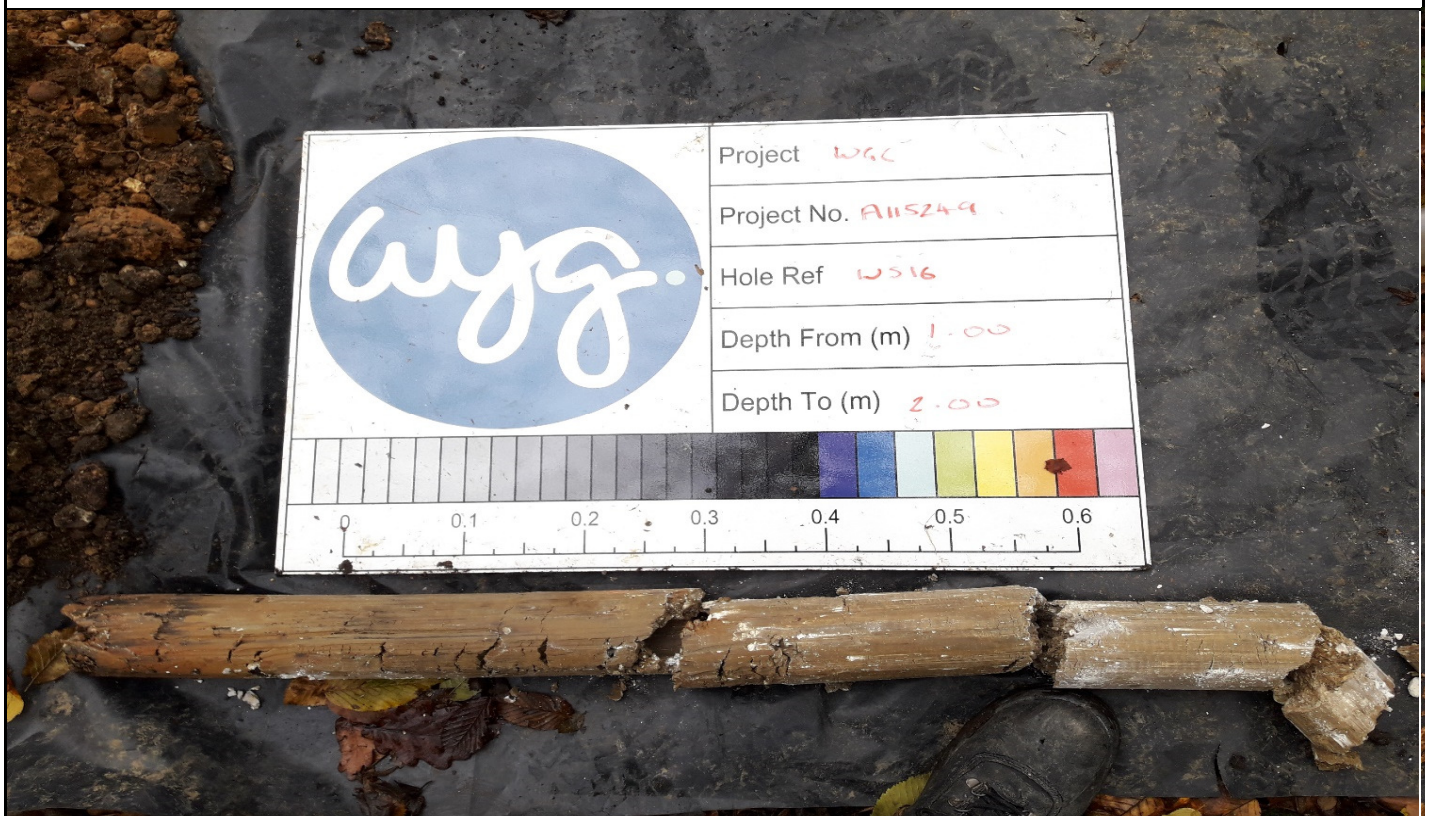


Plate 19

WS16 - 1.00 to 2.00m bgl



**Environmental Consultancy
Ground Technologies & Investigation**

**Project :-
Welwyn Garden City - Campus West GI**

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019



Plate 20

WS16 - 3.00 to 4.00m bgl



Plate 21

WS16 - 5.00 to 6.00m bgl



Environmental Consultancy
Ground Technologies & Investigation

Project :-
Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019



Plate 22

WS16- Reinstated



Plate 23

WS18 - 1.00 to 2.00m bgl



Project :-
Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019

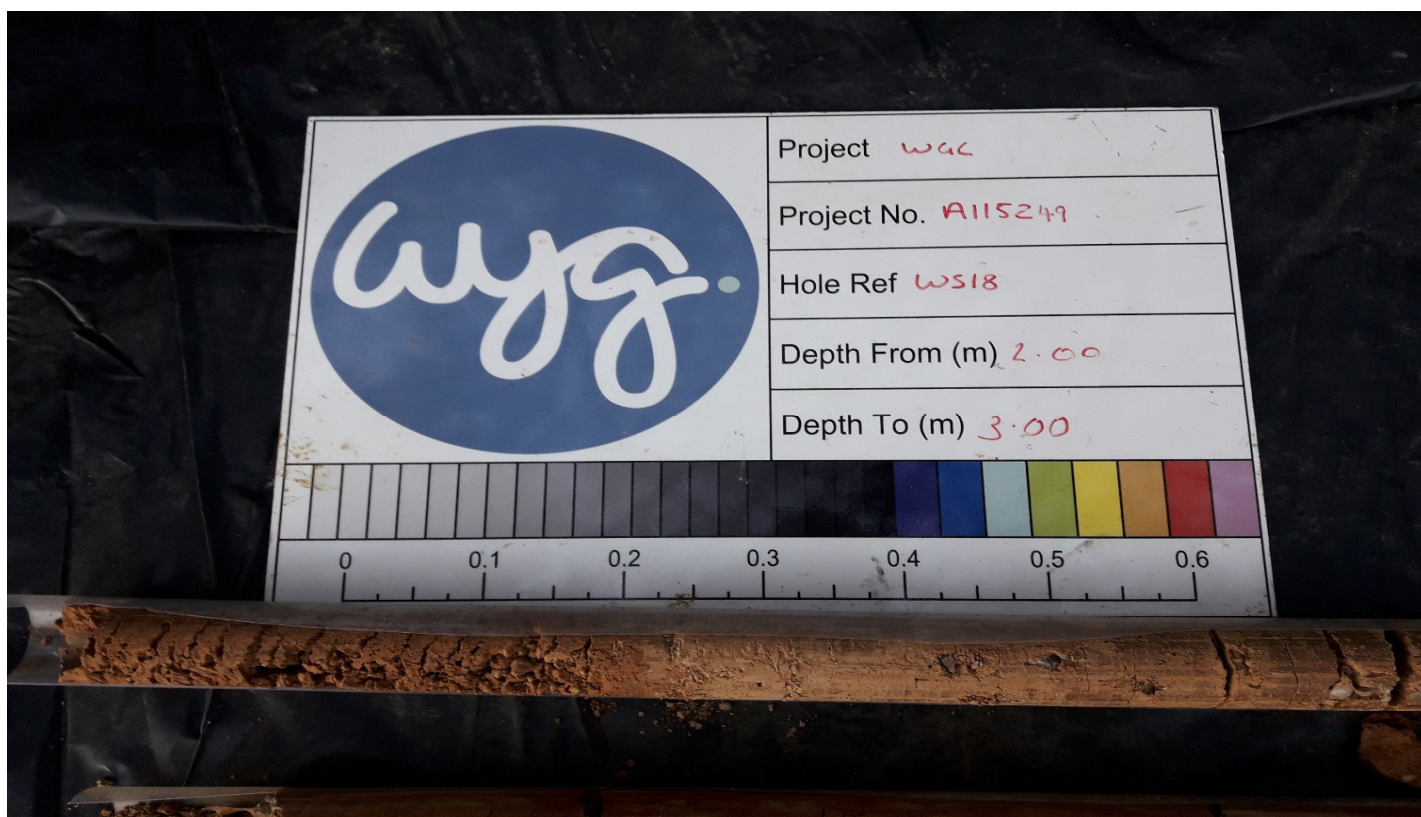


Plate 24

WS18 - 2.00 to 3.00m bgl



Plate 25

WS18- Reinstated

WYG Environment
5th Floor, Longcross Court
47 Newport Road
Cardiff
CF24 0AD

Tel: 029 20 829200
Fax: 029 20 455321
E-mail enviro.cardiff@wyg.com
Environmental Consultancy
Ground Technologies & Investigation



Project :-
Welwyn Garden City - Campus West GI

Client: Welwyn Hatfield Borough Council

Project No.: A115249

Date : November 2019

Appendix G

Environmental Lab Certificates and Screening Data



Unit 7-8 Hawarden Business Park

Manor Road (off Manor Lane)

Hawarden

Deeside

CH5 3US

Tel: (01244) 528700

Fax: (01244) 528701

email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

Post Certification Report

WYG Geo-Environment
11th Floor
1 Angel Court
London
Middlesex
EC2R 7HJ
Attention: Richard Tonge

Date:	31/01/2020	Location:	Welwyn Garden City - Campus West
Customer:	WYG Geo-Environment	No. Of Samples Received:	12
Your Reference:	A115249	Samples Scheduled:	12

Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



Post Certification Report

Customer : WYG Geo-Environment

Client Reference : A115249

Location : Welwyn Garden City

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21199661	WS11	ES2	0.70	21/11/2019
21199663	WS11	ES3	5.50	21/11/2019
21199655	WS18	ES1	0.70	20/11/2019

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21311716	BH08		17.50 - 18.50	
21311726	WS10 ES2		1.20 - 1.20	21/11/2019
21311727	WS12 ES1		0.55 - 0.55	21/11/2019
21311728	WS12 ES2		1.50 - 1.60	21/11/2019
21311730	WS13 ES1		0.75	22/11/2019
21311731	WS14 ES1		0.45	22/11/2019
21311732	WS15 ES1		0.50	22/11/2019
21311733	WS16 ES1		0.60	22/11/2019
21311734	WS17 ES1		0.20 - 0.30	22/11/2019

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of $(5\pm3)^{\circ}\text{C}$.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of $(5\pm3)^{\circ}\text{C}$ for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



Location : Welwyn Garden City

X Test

N No Determination Possible

[illegible]



Location : Welwyn Garden City

[illegible]



Location : Welwyn Garden City

[illegible]

Post Certification Report

Customer :	WYG Geo-Environment		
Client Reference :	A115249	Location :	Welwyn Garden City

[illegible]



Location : Welwyn Garden City

[illegible]



Location : Welwyn Garden City

[illegible]



Post Certification Report

Customer : WYG Geo-Environment

Client Reference : A115249

Location : Welwyn Garden City

Extractable Petroleum Hydrocarbons (EPH) By GC-FID EPH (DRO) (C10-C40)

Sample No	Customer Sample Ref.	Depth	Matrix (mg/kg)	EPH	Interpretation
21215068	WS18 SOLID1	0.70	SOLID	<35.0	No interpretation possible
21211106	WS11 SOLID2	0.70	SOLID	<35.0	No interpretation possible
21210907	WS11 SOLID3	5.50	SOLID	<35.0	No interpretation possible
Sample No	Customer Sample Ref.	Depth	Matrix (mg/kg)	EPH	Interpretation
21385680	BH08	17.50- 18.50	SOLID	<35.0	No interpretation possible
21385452	WS10 ES2	1.20- 1.20	SOLID	<35.0	No interpretation possible
21385372	WS12 ES1	0.55- 0.55	SOLID	<35.0	No interpretation possible
21385526	WS12 ES2	1.50- 1.60	SOLID	<35.0	No interpretation possible
21385753	WS13 ES1	0.75	SOLID	<35.0	No interpretation possible
21385797	WS14 ES1	0.45	SOLID	<35.0	No interpretation possible
21385851	WS15 ES1	0.50	SOLID	<35.0	No interpretation possible
21385811	WS16 ES1	0.60	SOLID	<35.0	No interpretation possible
21385686	WS17 ES1	0.20- 0.30	SOLID	42.5	No interpretation possible

Extractable Petroleum Hydrocarbons (formally Diesel Range Organics) :- Any compound extractable in n-hexane within the carbon range C10-C40, includes Aliphatic (Min Oil), Aromatic (PAHs) and naturally occurring compounds.



Post Certification Report

Customer : WYG Geo-Environment

Client Reference : A115249

Location : Welwyn Garden City

Asbestos Identification Asbestos Identification - Soil

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&*\$@ Sample deviation (see appendix)

Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH08 NS Z 17.50 - 18.50 SOLID 17/12/2019 13:45:30 191207-48 21,311,716 TM048	20/12/19 Andrzej Ferfecki	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS10 ES2 NS Z 1.20 - 1.20 SOLID 21/11/2019 00:00:00 17/12/2019 12:38:19 191207-48 21,311,726 TM048	20/12/19 Christian Hallam	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS11 ES 2 0.70 SOLID 21/11/2019 00:00:00 23/11/2019 09:21:22 191122-41 21,199,661 TM048	27/11/2019 James Richards	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS11 ES 3 5.50 SOLID 21/11/2019 00:00:00 23/11/2019 09:24:05 191122-41 21,199,663 TM048	27/11/2019 James Richards	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS12 ES1 NS Z 0.55 - 0.55 SOLID 21/11/2019 00:00:00 17/12/2019 12:34:21 191207-48 21,311,727 TM048	19/12/19 Christian Hallam	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected



Post Certification Report

Customer : WYG Geo-Environment

Client Reference : A115249

Location : Welwyn Garden City

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS12 ES2 NS Z 1.50 - 1.60 SOLID 21/11/2019 00:00:00 17/12/2019 12:58:05 191207-48 21,311,728 TM048	20/12/19	Christian Hallam	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS13 ES1 NS Z 0.75 SOLID 22/11/2019 00:00:00 17/12/2019 12:43:59 191207-48 21,311,730 TM048	20/12/19	Christian Hallam	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS14 ES1 NS Z 0.45 SOLID 22/11/2019 00:00:00 17/12/2019 12:53:19 191207-48 21,311,731 TM048	19/12/19	Christian Hallam	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS15 ES1 NS Z 0.50 SOLID 22/11/2019 00:00:00 17/12/2019 12:39:45 191207-48 21,311,732 TM048	19/12/19	Christian Hallam	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS16 ES1 NS Z 0.60 SOLID 22/11/2019 00:00:00 17/12/2019 12:50:26 191207-48 21,311,733 TM048	20/12/19	Christian Hallam	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS17 ES1 NS Z 0.20 - 0.30 SOLID 22/11/2019 00:00:00 17/12/2019 13:36:16 191207-48 21,311,734 TM048	20/12/2019	Barbara Urbanek-Walsh	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected



Post Certification Report

Customer : WYG Geo-Environment

Client Reference : A115249

Location : Welwyn Garden City

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Customer Sample Ref.	WS18 ES 1	27/11/2019	James Richards	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Depth (m)	0.70										
Sample Type	SOLID										
Date Sampled	20/11/2019 00:00:00										
Date Received	23/11/2019 09:44:32										
SDG	191122-41										
Original Sample	21,199,655										
Method Number	TM048										



Post Certification Report

Customer : WYG Geo-Environment

Client Reference : A115249

Location : Welwyn Garden City

Table of Results - Appendix

REPORT KEY

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10⁻⁷

NDP NFD	No Determination Possible No Fibres Detected	# PFD	ISO 17025 Accredited Possible Fibres Detected	* »	Subcontracted Test Result previously reported (Incremental reports only)	M EC	MCERTS Accredited Equivalent Carbon (Aromatics C8-C35)
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Note: Method detection limits are not always achievable due to various circumstances beyond our control

Method No	Reference	Description
ASB PREP		
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM062 (S)	National Grid Property Holdings Methods for the Collection Determination of Phenols in Soils by HPLC & Analysis of Samples from National Grid Sites version 1 Sec 3.9	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM304	HSE Contract research Report no 83/1996	Asbestos Quantification in Soil: Fibres identified by morphology only

Method No	Reference	Description
ASB PREP		
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM062 (S)	National Grid Property Holdings Methods for the Collection Determination of Phenols in Soils by HPLC & Analysis of Samples from National Grid Sites version 1 Sec 3.9	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM304	HSE Contract research Report no 83/1996	Asbestos Quantification in Soil: Fibres identified by morphology only

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249

Location : Welwyn Garden City

Test Completion Dates

Lab Sample No(s)	21311716	21199661	21199663	21199655	21311726	21311727	21311728	21311730	21311731	21311732
Customer Sample Ref.	BH08	WS11	WS11	WS18	WS10 ES2	WS12 ES1	WS12 ES2	WS13 ES1	WS14 ES1	WS15 ES1
AGS Ref.		ES2	ES3	ES1						
Depth	17.50 - 18.50	0.70	5.50	0.70	1.20 - 1.20	0.55 - 0.55	1.50 - 1.60	0.75	0.45	0.50
Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Asbestos ID in Solid Samples	20-Dec-2019	27-Nov-2019	27-Nov-2019	27-Nov-2019	20-Dec-2019	19-Dec-2019	20-Dec-2019	20-Dec-2019	19-Dec-2019	19-Dec-2019
Boron Water Soluble	19-Dec-2019	28-Nov-2019	28-Nov-2019	28-Nov-2019	19-Dec-2019	19-Dec-2019	19-Dec-2019	19-Dec-2019	19-Dec-2019	19-Dec-2019
Chromium III	20-Dec-2019	28-Nov-2019	28-Nov-2019	28-Nov-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019
Cyanide Comp/Free/Total/Thiocyanate	19-Dec-2019	27-Nov-2019	27-Nov-2019	27-Nov-2019	19-Dec-2019	19-Dec-2019	19-Dec-2019	19-Dec-2019	19-Dec-2019	19-Dec-2019
EPH by FID	19-Dec-2019	27-Nov-2019	27-Nov-2019	27-Nov-2019	19-Dec-2019	19-Dec-2019	19-Dec-2019	21-Dec-2019	19-Dec-2019	19-Dec-2019
GRO by GC-FID (S)	18-Dec-2019	26-Nov-2019	27-Nov-2019	26-Nov-2019	18-Dec-2019	18-Dec-2019	18-Dec-2019	18-Dec-2019	18-Dec-2019	18-Dec-2019
Hexavalent Chromium (s)	20-Dec-2019	28-Nov-2019	28-Nov-2019	28-Nov-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019
Metals in solid samples by OES	20-Dec-2019	28-Nov-2019	28-Nov-2019	29-Nov-2019	20-Dec-2019	20-Dec-2019	23-Dec-2019	20-Dec-2019	20-Dec-2019	23-Dec-2019
PAH by GCMS	19-Dec-2019	28-Nov-2019	28-Nov-2019	28-Nov-2019	19-Dec-2019	19-Dec-2019	19-Dec-2019	27-Dec-2019	19-Dec-2019	19-Dec-2019
pH	23-Dec-2019	29-Nov-2019	29-Nov-2019	29-Nov-2019	23-Dec-2019	23-Dec-2019	23-Dec-2019	24-Dec-2019	24-Dec-2019	23-Dec-2019
Phenols by HPLC (S)	19-Dec-2019	27-Nov-2019	27-Nov-2019	27-Nov-2019	20-Dec-2019	21-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	19-Dec-2019
Sample description	17-Dec-2019	23-Nov-2019	23-Nov-2019	23-Nov-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019
Total Organic Carbon	20-Dec-2019	27-Nov-2019	26-Nov-2019	27-Nov-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019
VOC MS (S)	18-Dec-2019	27-Nov-2019	27-Nov-2019	26-Nov-2019	18-Dec-2019	18-Dec-2019	18-Dec-2019	18-Dec-2019	18-Dec-2019	18-Dec-2019

Lab Sample No(s)	21311733	21311734
Customer Sample Ref.	WS16 ES1	WS17 ES1
AGS Ref.		
Depth	0.60	0.20 - 0.30
Type	SOLID	SOLID
Asbestos ID in Solid Samples	20-Dec-2019	20-Dec-2019
Boron Water Soluble	19-Dec-2019	19-Dec-2019
Chromium III	20-Dec-2019	20-Dec-2019
Cyanide Comp/Free/Total/Thiocyanate	19-Dec-2019	19-Dec-2019
EPH by FID	19-Dec-2019	19-Dec-2019
GRO by GC-FID (S)	18-Dec-2019	18-Dec-2019
Hexavalent Chromium (s)	20-Dec-2019	20-Dec-2019
Metals in solid samples by OES	20-Dec-2019	23-Dec-2019
PAH by GCMS	19-Dec-2019	19-Dec-2019
pH	23-Dec-2019	24-Dec-2019
Phenols by HPLC (S)	20-Dec-2019	21-Dec-2019
Sample description	17-Dec-2019	17-Dec-2019
Total Organic Carbon	20-Dec-2019	20-Dec-2019
VOC MS (S)	18-Dec-2019	

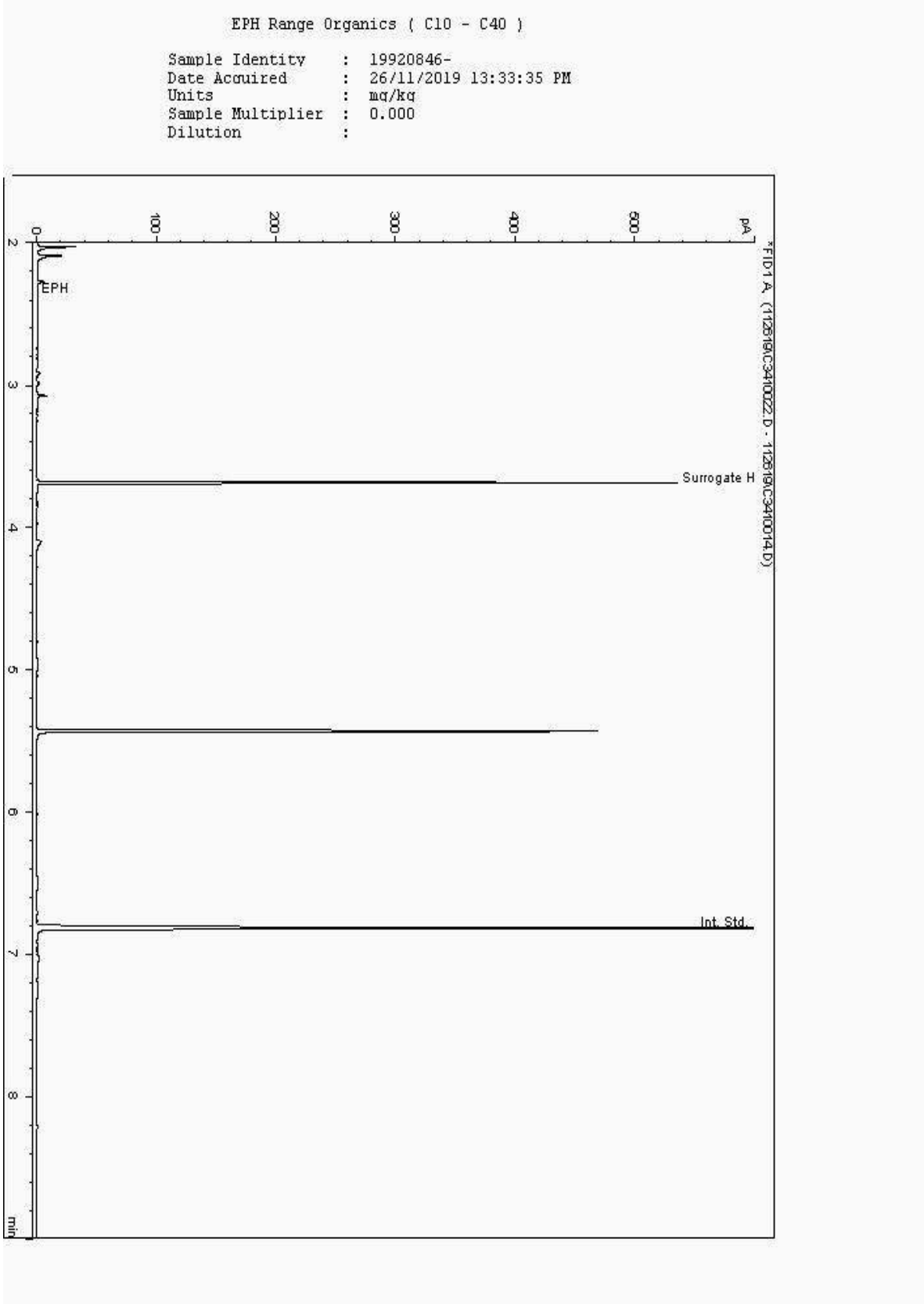


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID Sample No : 21,210,907 Depth : 5.50
21210907 Sample ID : WS11



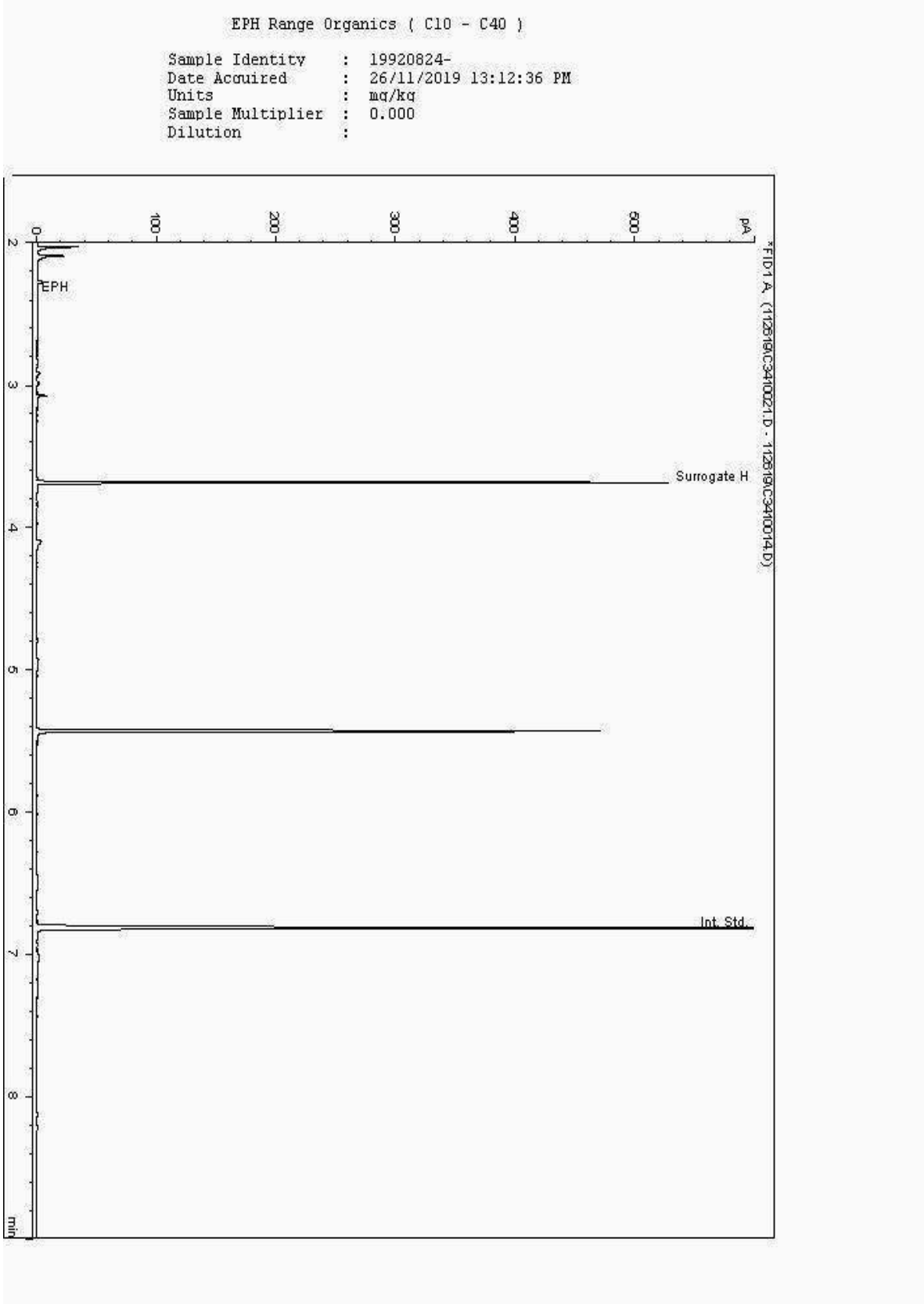


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID Sample No : 21,211,106 Depth : 0.70
21211106 Sample ID : WS11





Post Certification Report

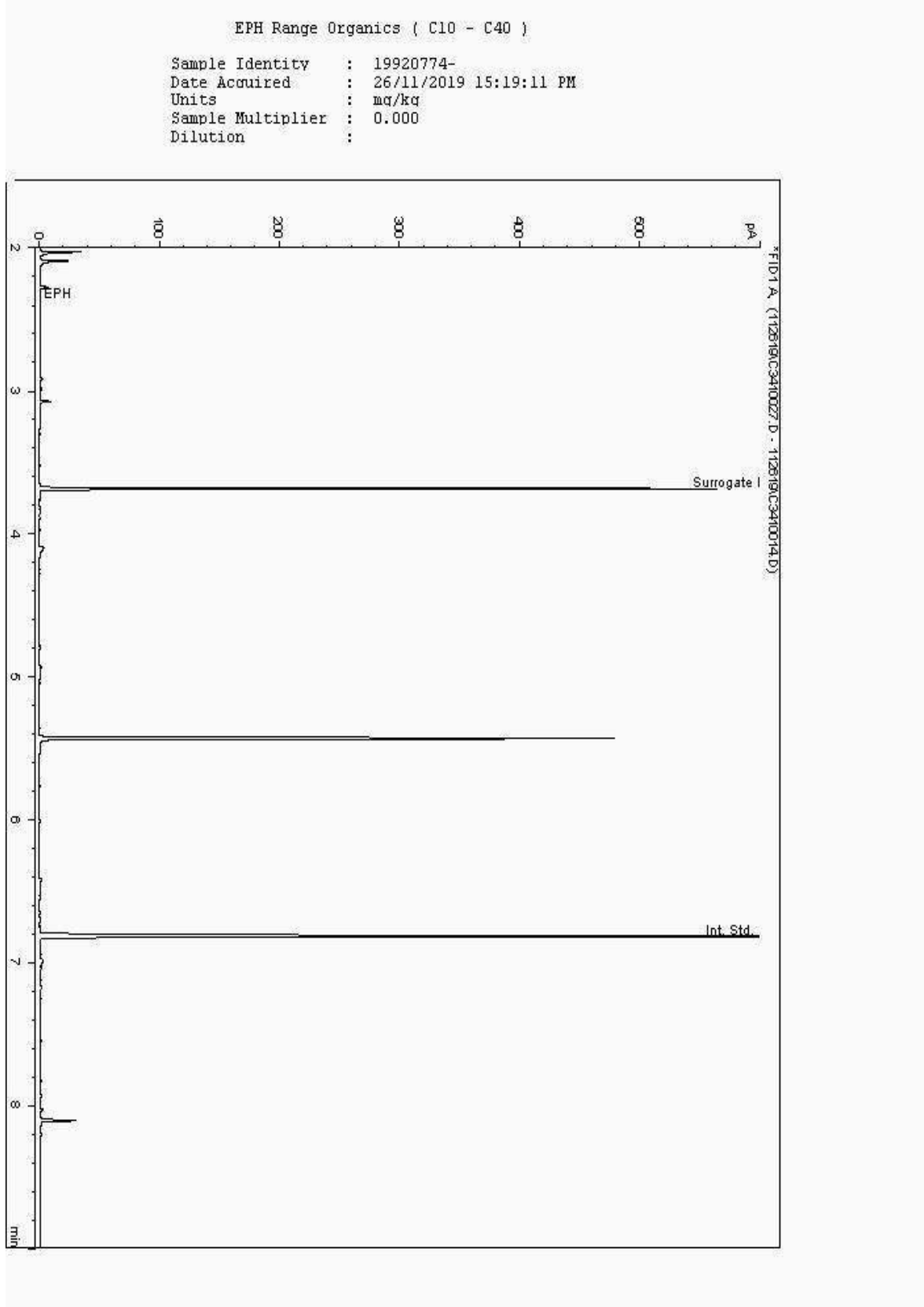
Customer : WYG Geo-Environment
Client Reference : A115249

Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID
21215068

Sample No : 21,215,068 Depth : 0.70
Sample ID : WS18



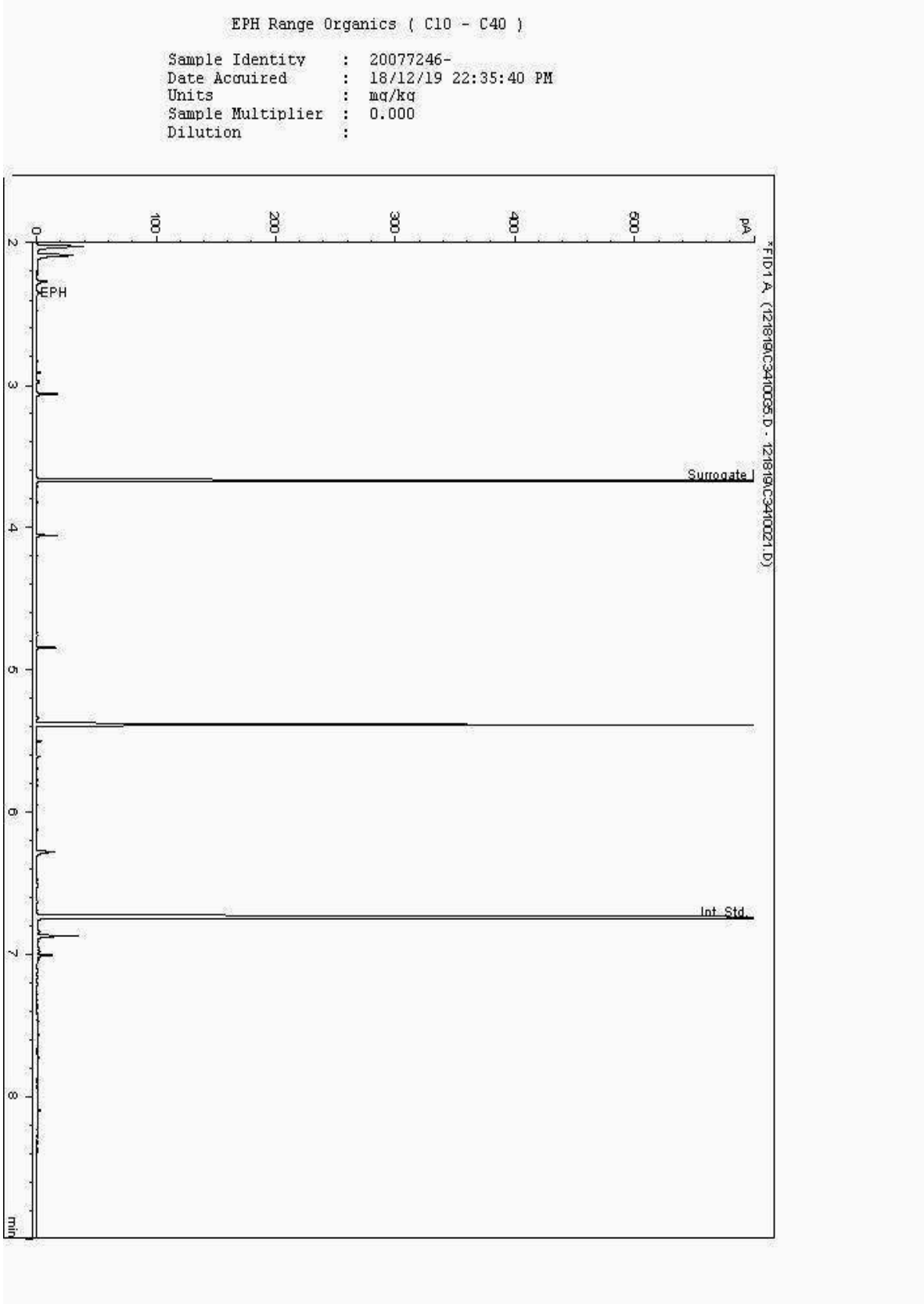


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID Sample No : 21,385,372 Depth : 0.55 - 0.55
21385372 Sample ID : WS12 ES1



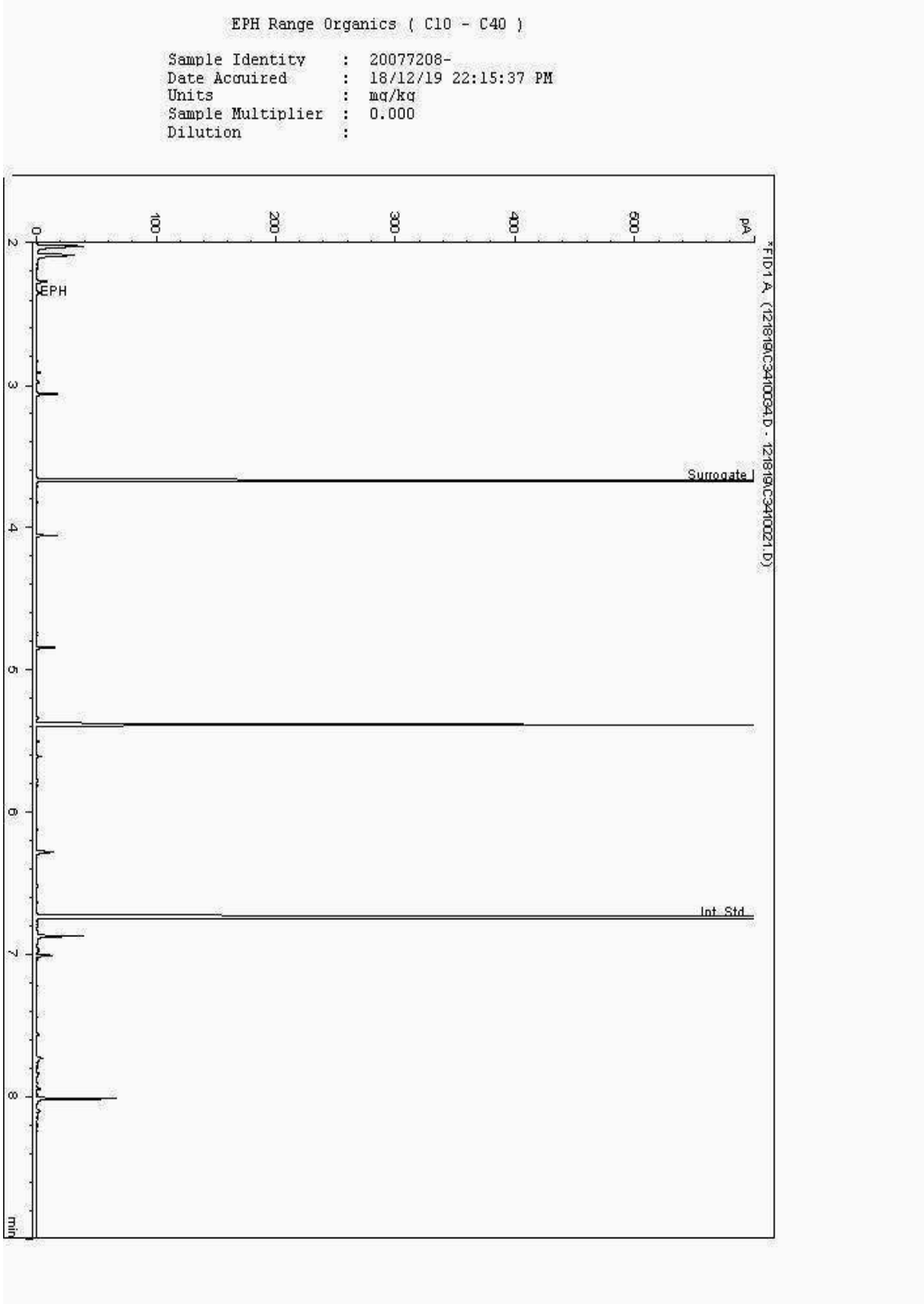


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID Sample No : 21,385,452 Depth : 1.20 - 1.20
21385452 Sample ID : WS10 ES2



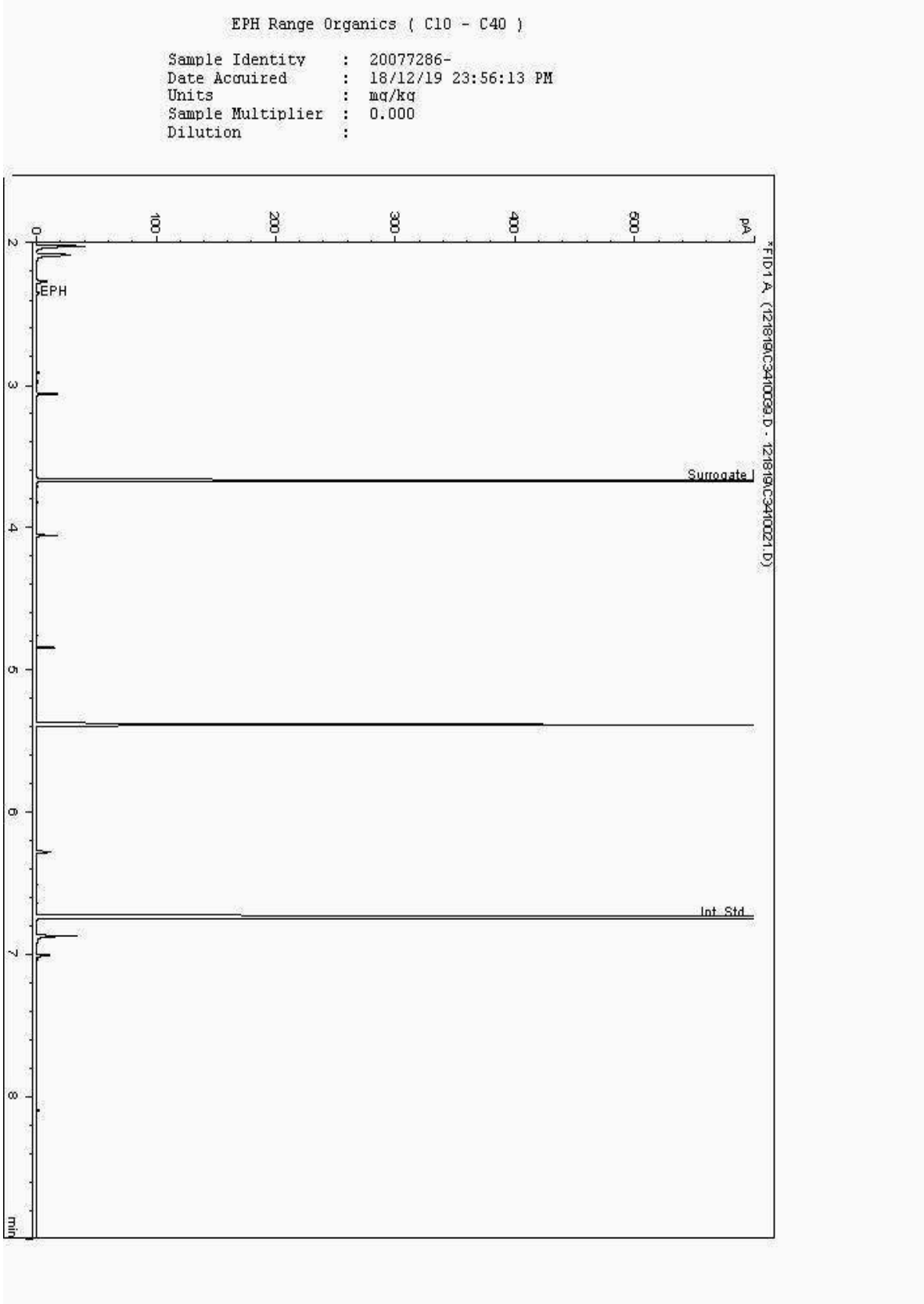


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID Sample No : 21,385,526 Depth : 1.50 - 1.60
21385526 Sample ID : WS12 ES2



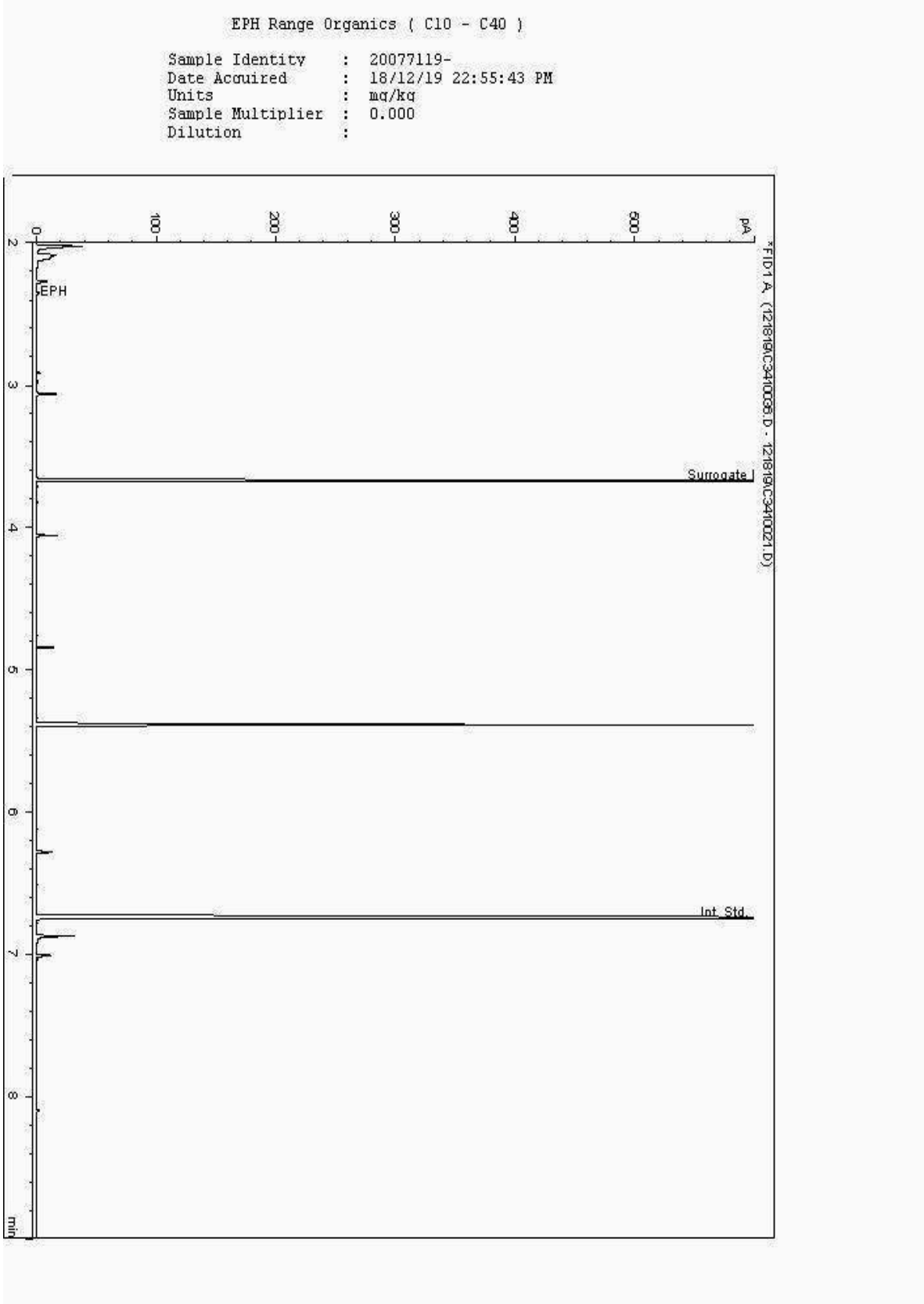


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID Sample No : 21,385,680 Depth : 17.50 - 18.50
21385680 Sample ID : BH08





Post Certification Report

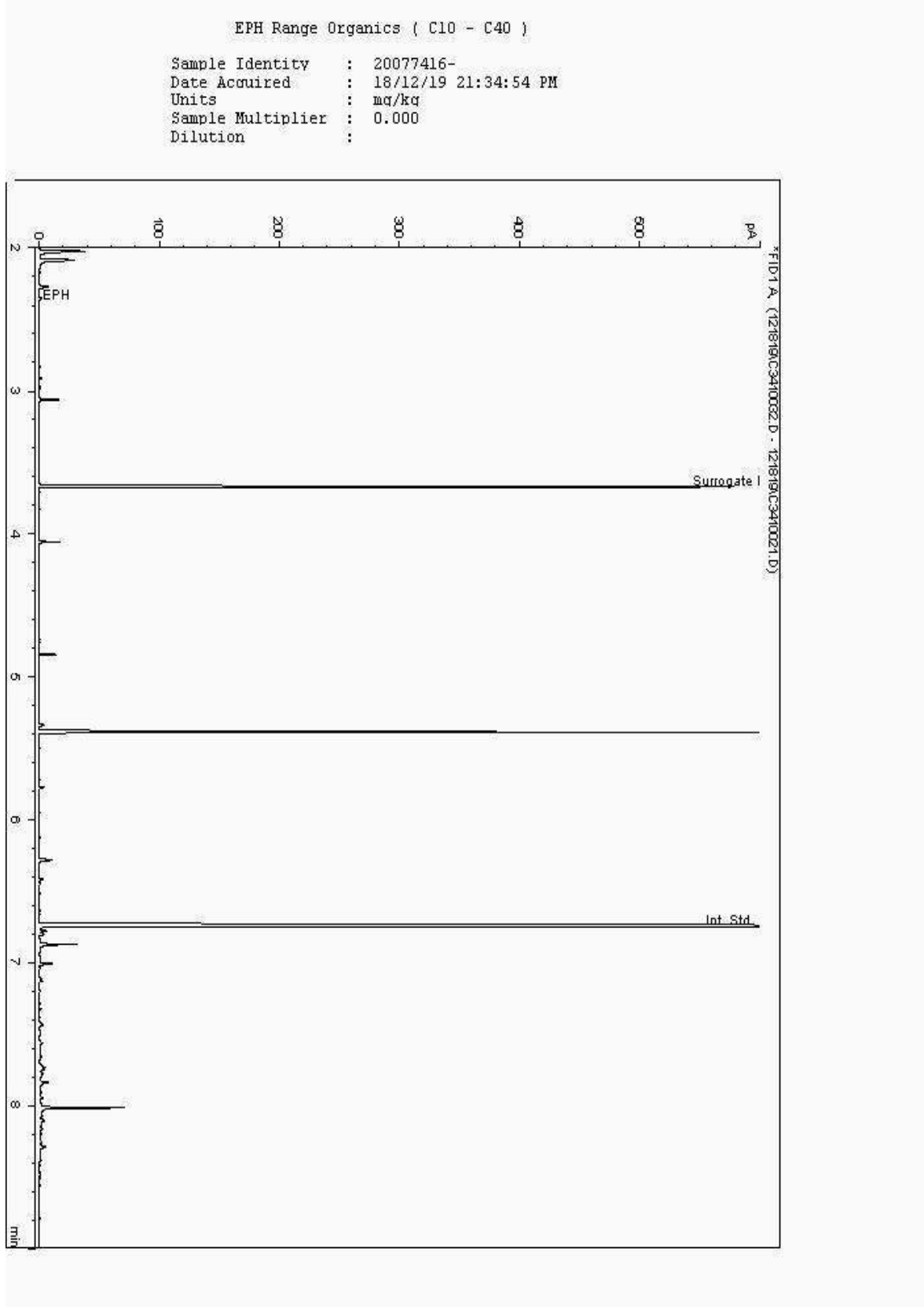
Customer : WYG Geo-Environment
Client Reference : A115249

Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID
21385686

Sample No : 21,385,686
Depth : 0.20 - 0.30
Sample ID : WS17 ES1



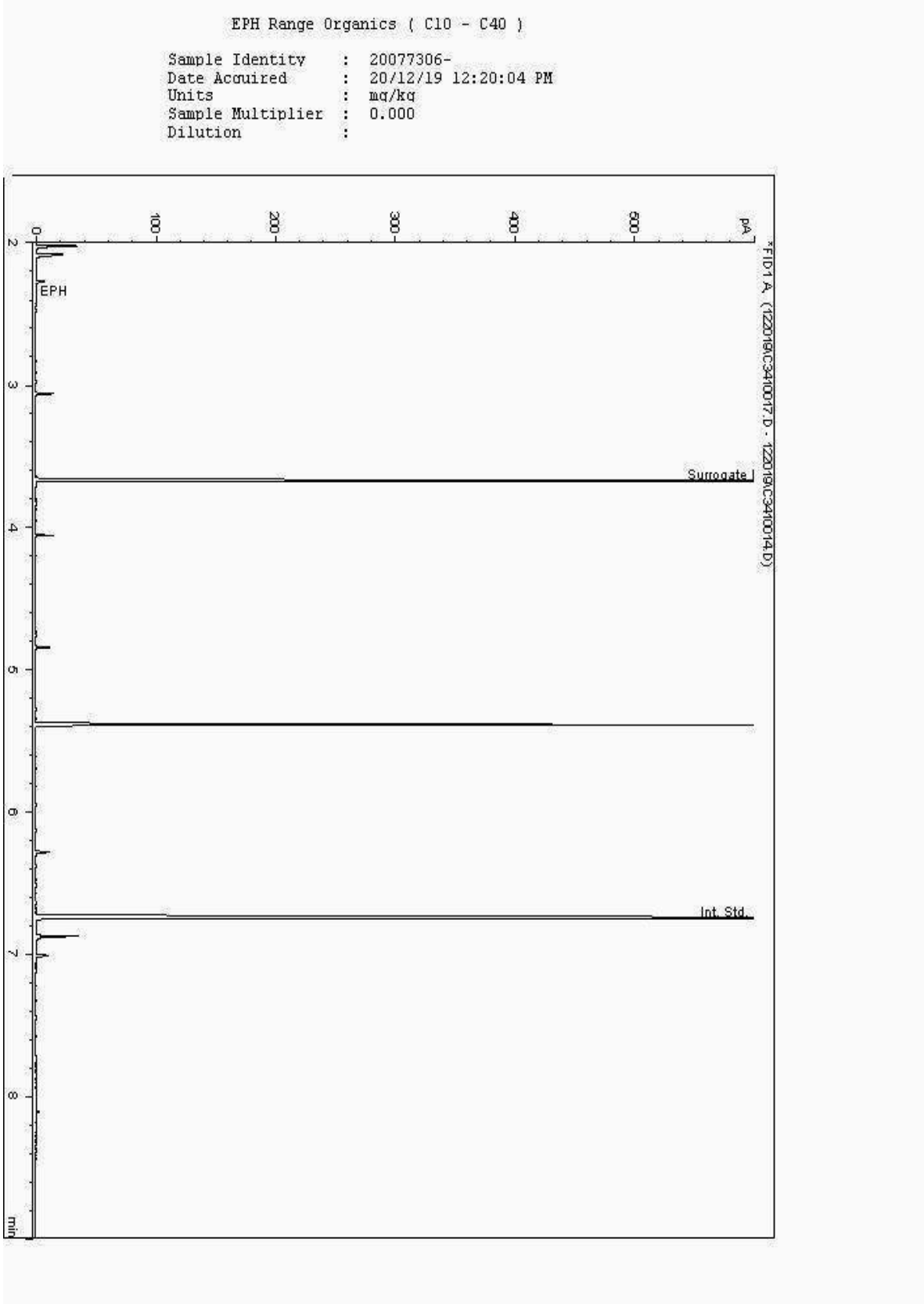


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID Sample No : 21,385,753 Depth : 0.75
21385753 Sample ID : WS13 ES1





Post Certification Report

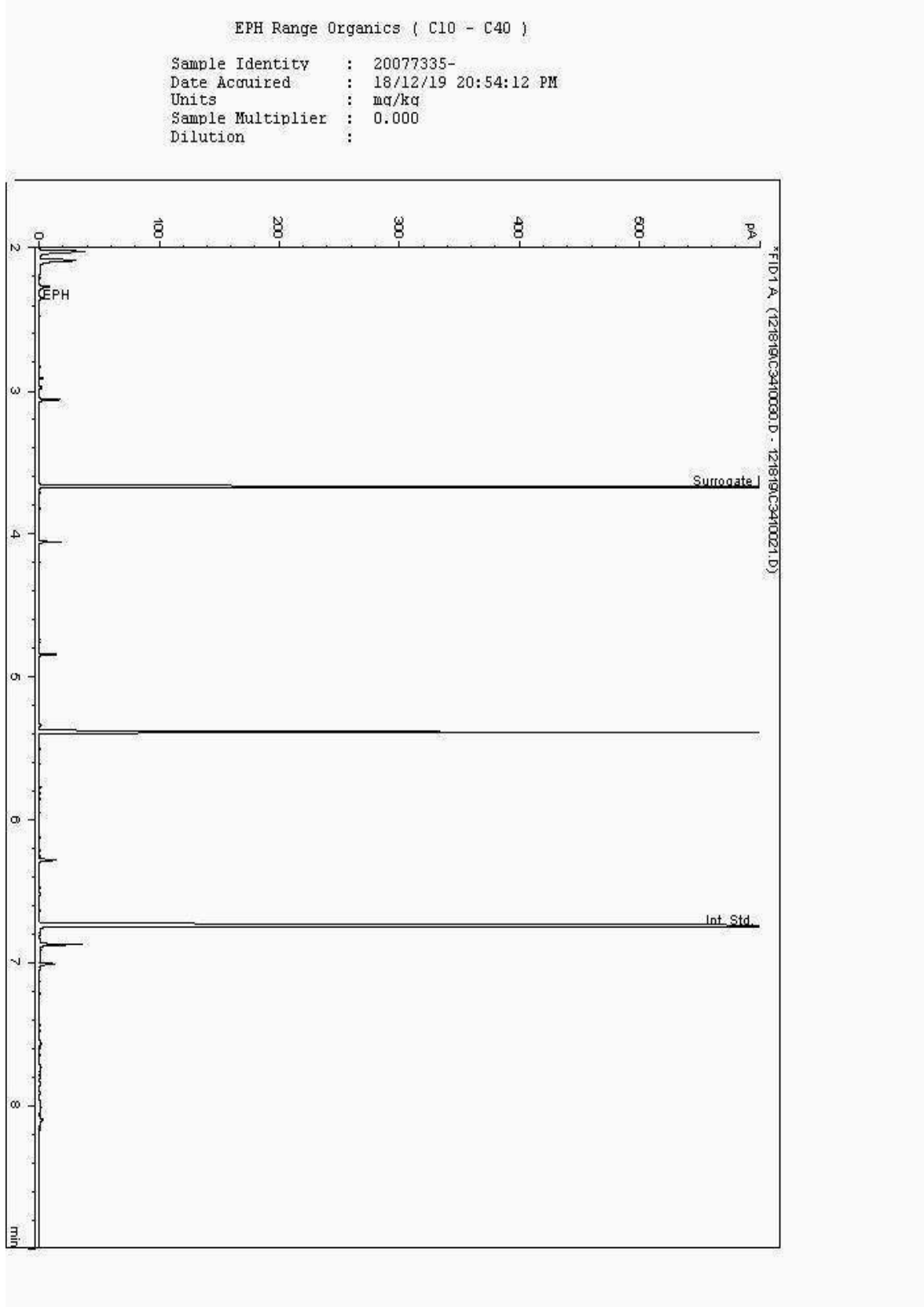
Customer : WYG Geo-Environment
Client Reference : A115249

Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID
21385797

Sample No : 21,385,797 Depth : 0.45
Sample ID : WS14 ES1





Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249

Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID

Sample No :

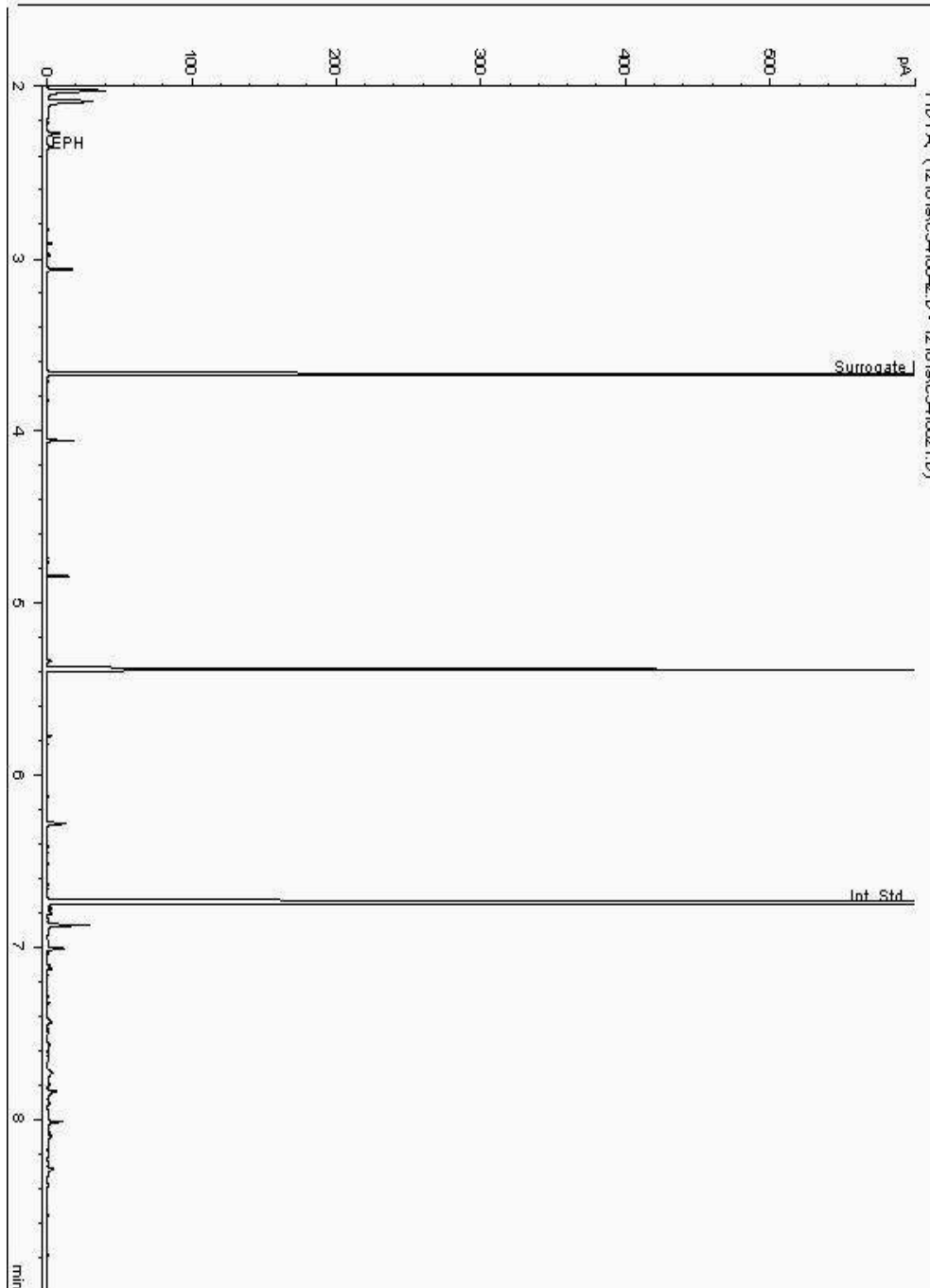
21,385,811 Depth : 0.60

21385811

Sample ID : WS16 ES1

EPH Range Organics (C10 - C40)

Sample Identity : 20077396-
Date Acquired : 19/12/19 00:56:52 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :



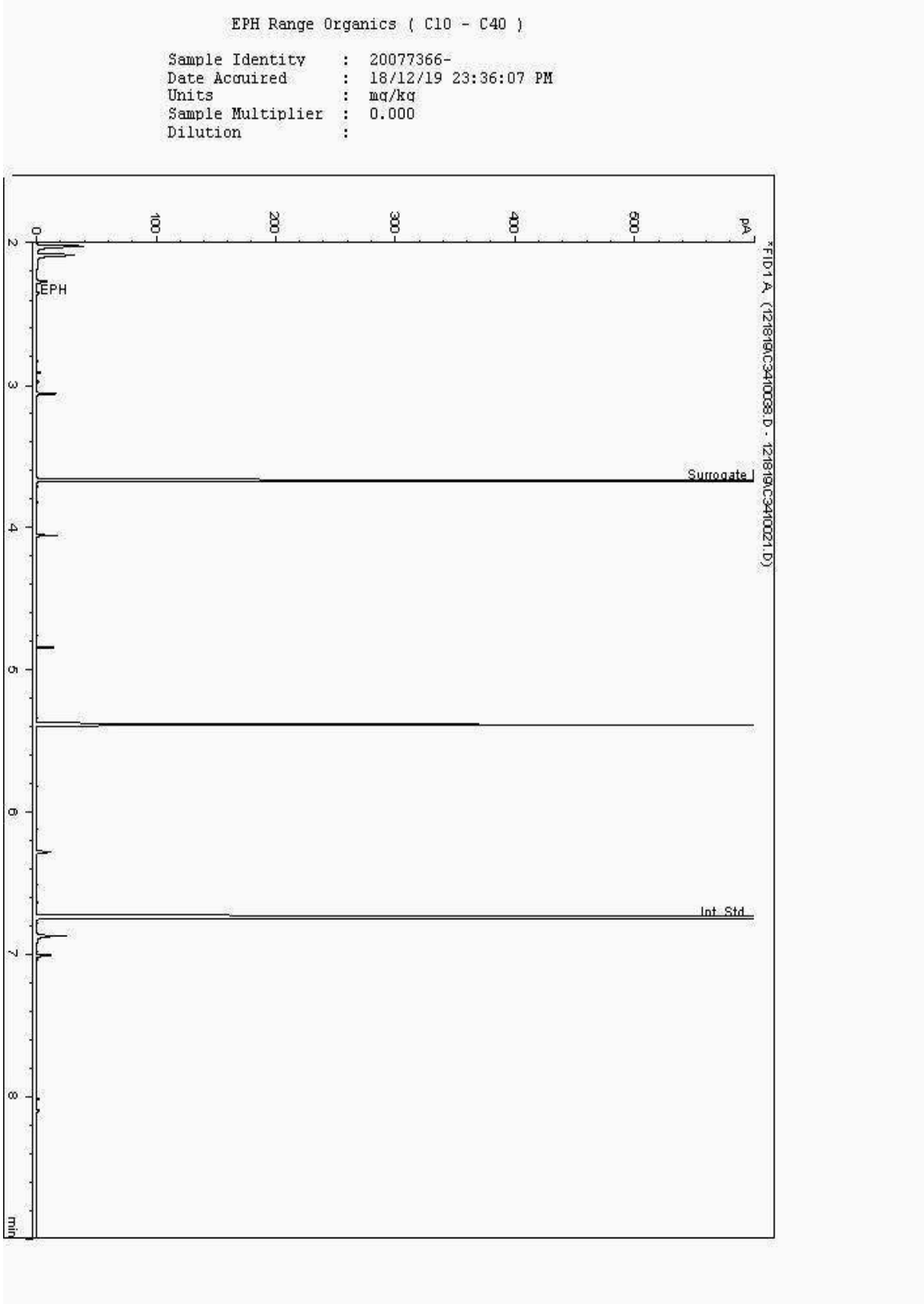


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: EPH by FID Sample No : 21,385,851 Depth : 0.50
21385851 Sample ID : WS15 ES1



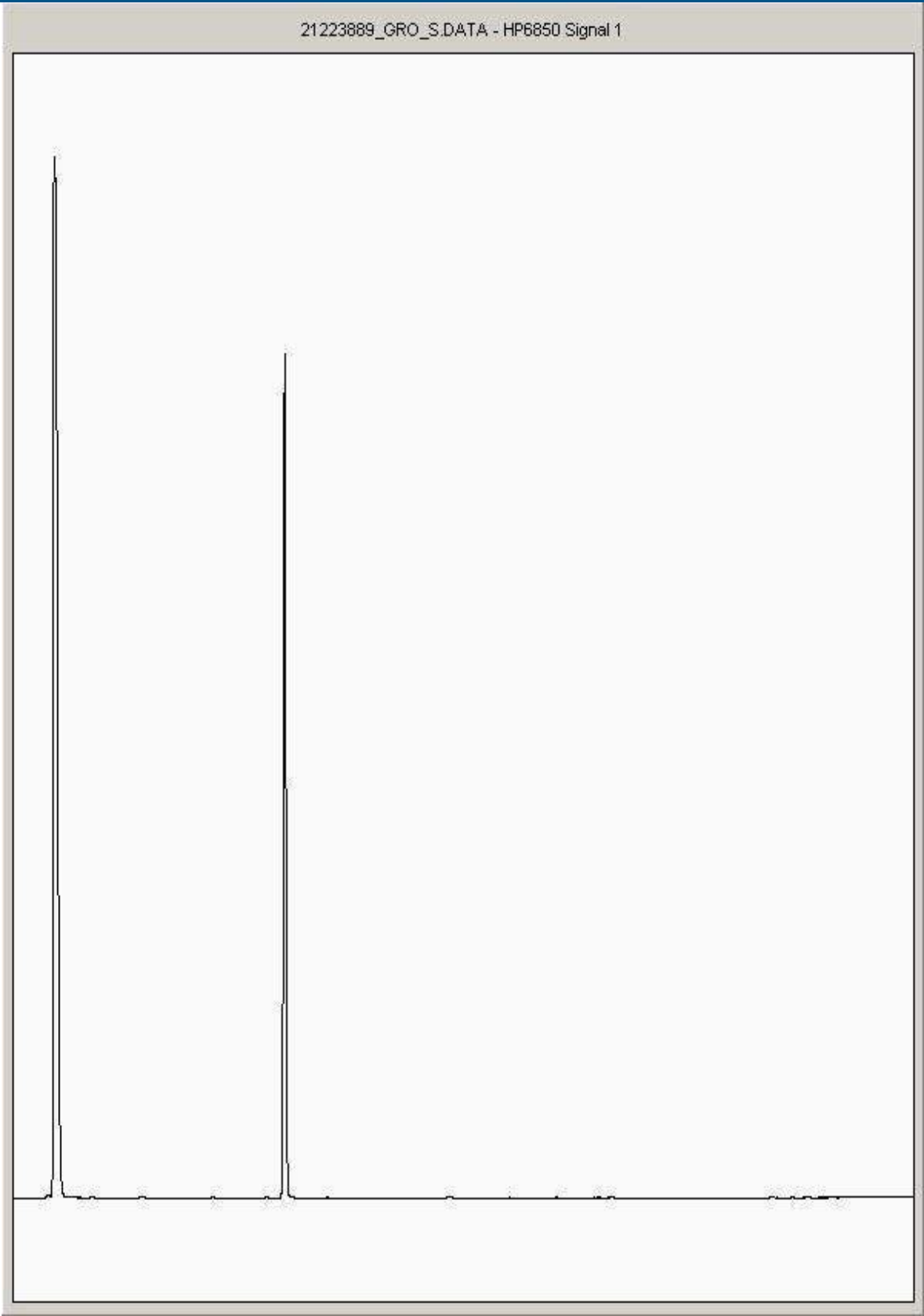


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: GRO by GC-FID (S) Sample No : 21,223,889 Depth : 5.50
21223889 Sample ID : WS11



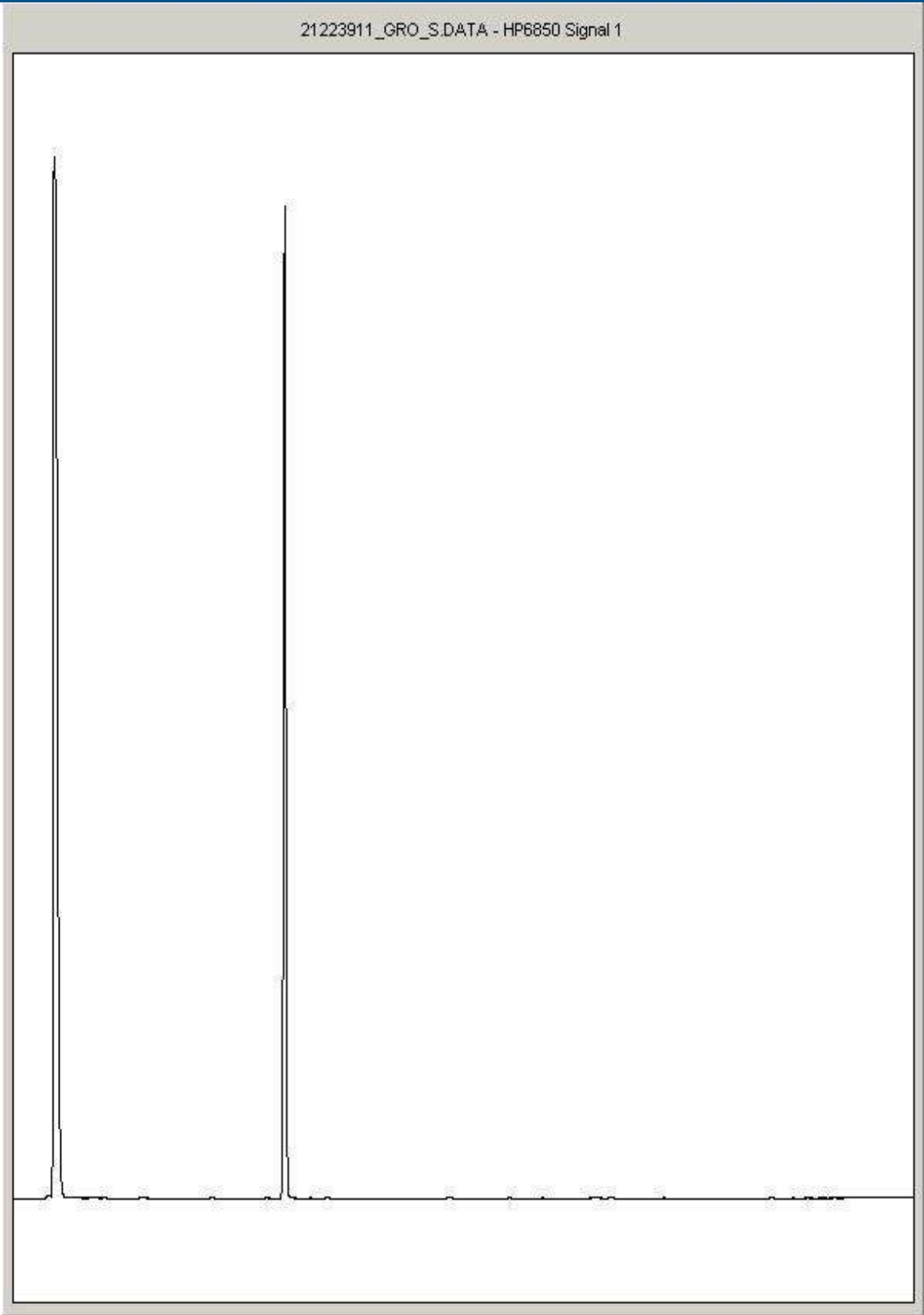


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 **Location :** Welwyn Garden City

Chromatogram

Analysis: GRO by GC-FID (S) **Sample No :** 21,223,911 **Depth :** 0.70
Sample ID : WS11



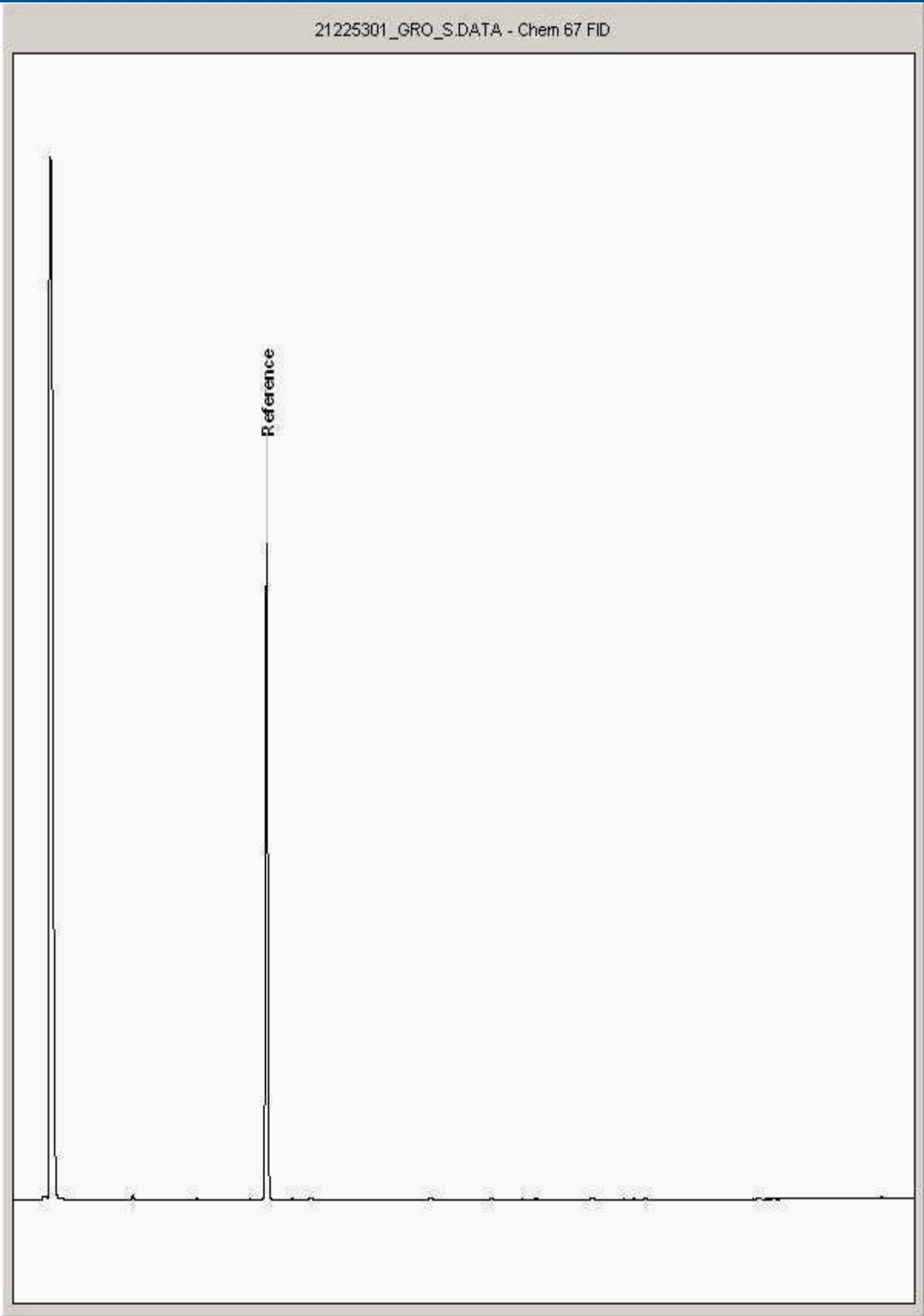


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: GRO by GC-FID (S) Sample No : 21,225,301 Depth : 0.70
21225301 Sample ID : WS18



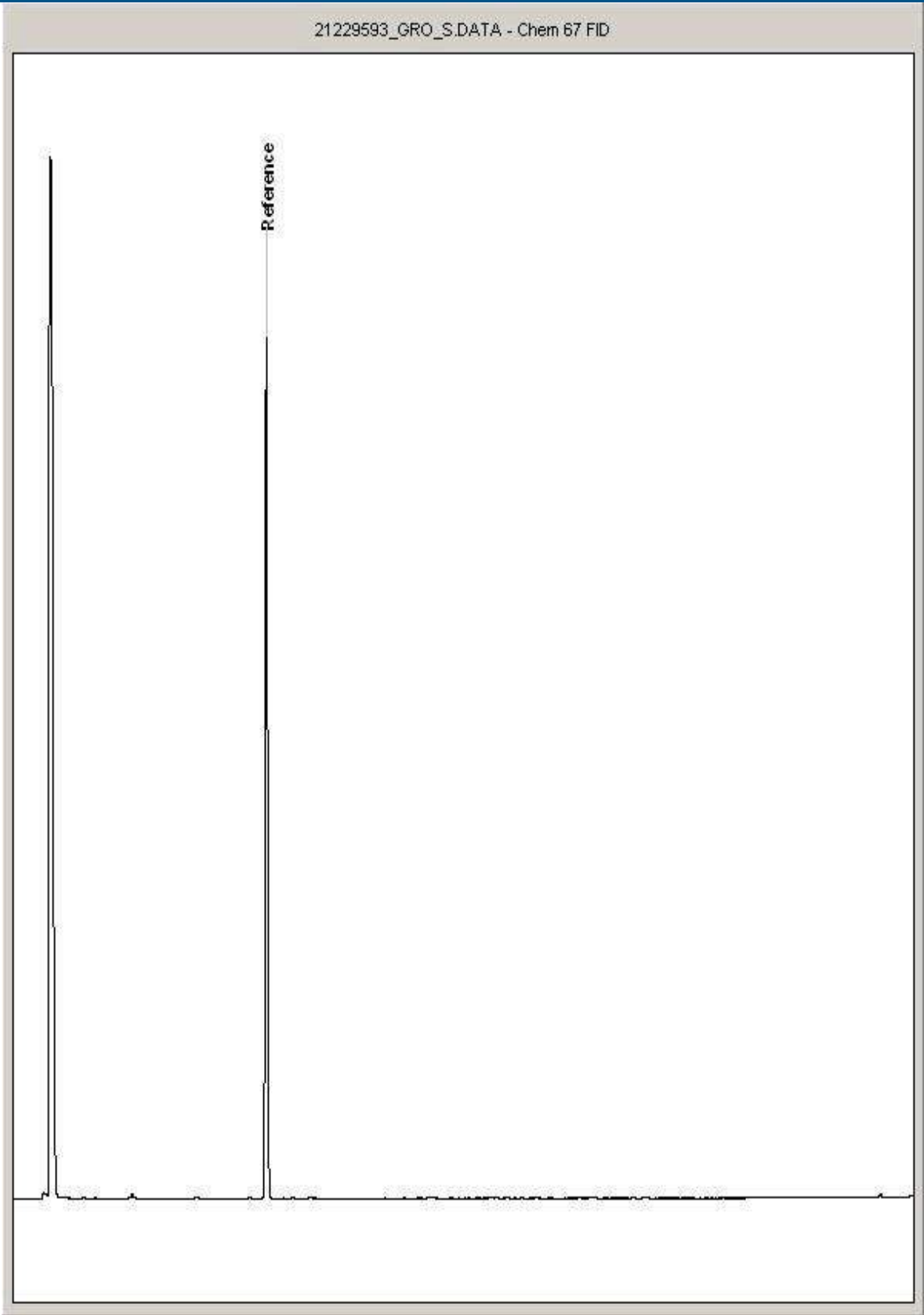


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: GRO by GC-FID (S) Sample No : 21,229,593 Depth : 5.50
21229593 Sample ID : WS11



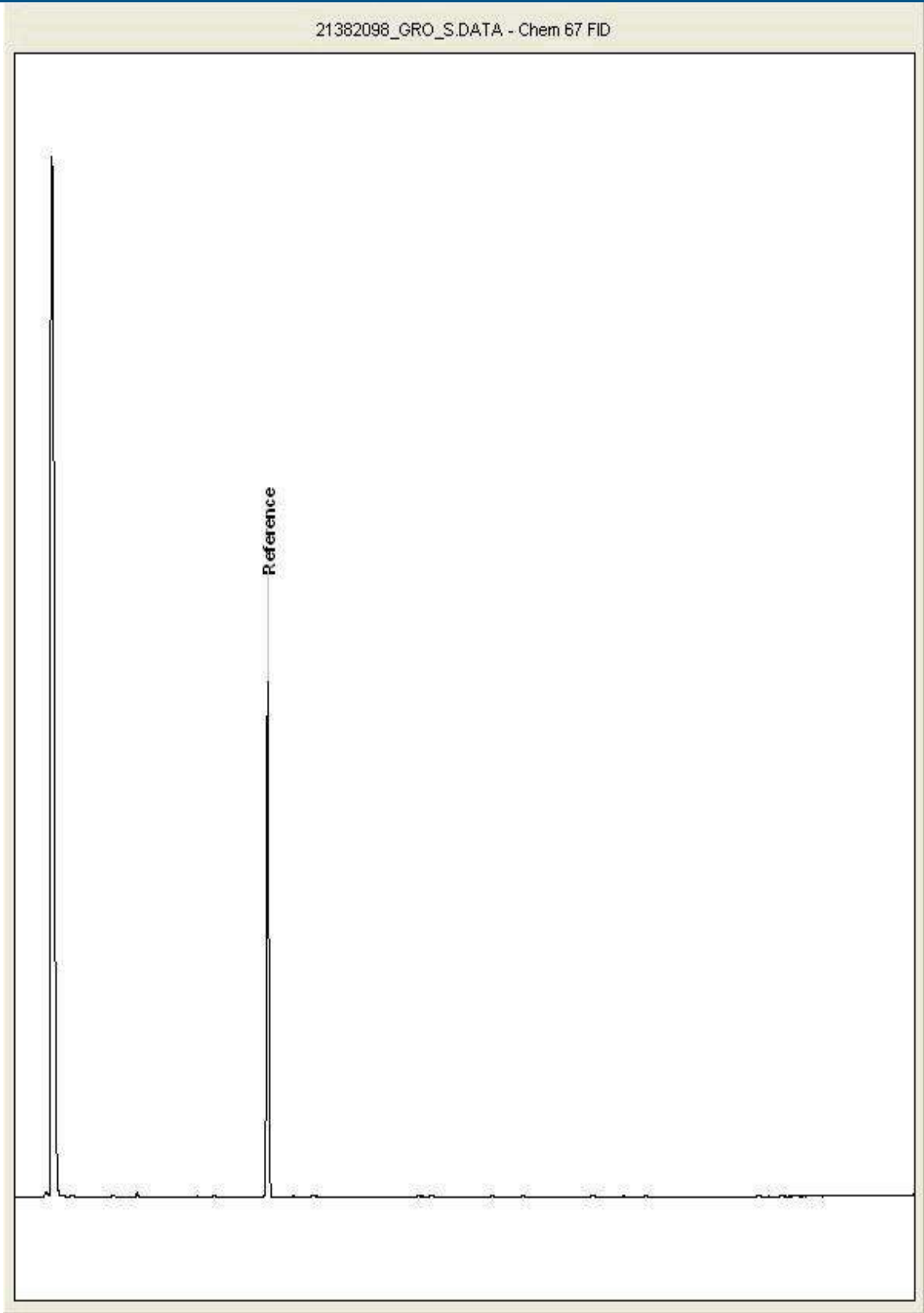


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: GRO by GC-FID (S) Sample No : 21,382,098 Depth : 0.20 - 0.30
21382098 Sample ID : WS17 ES1



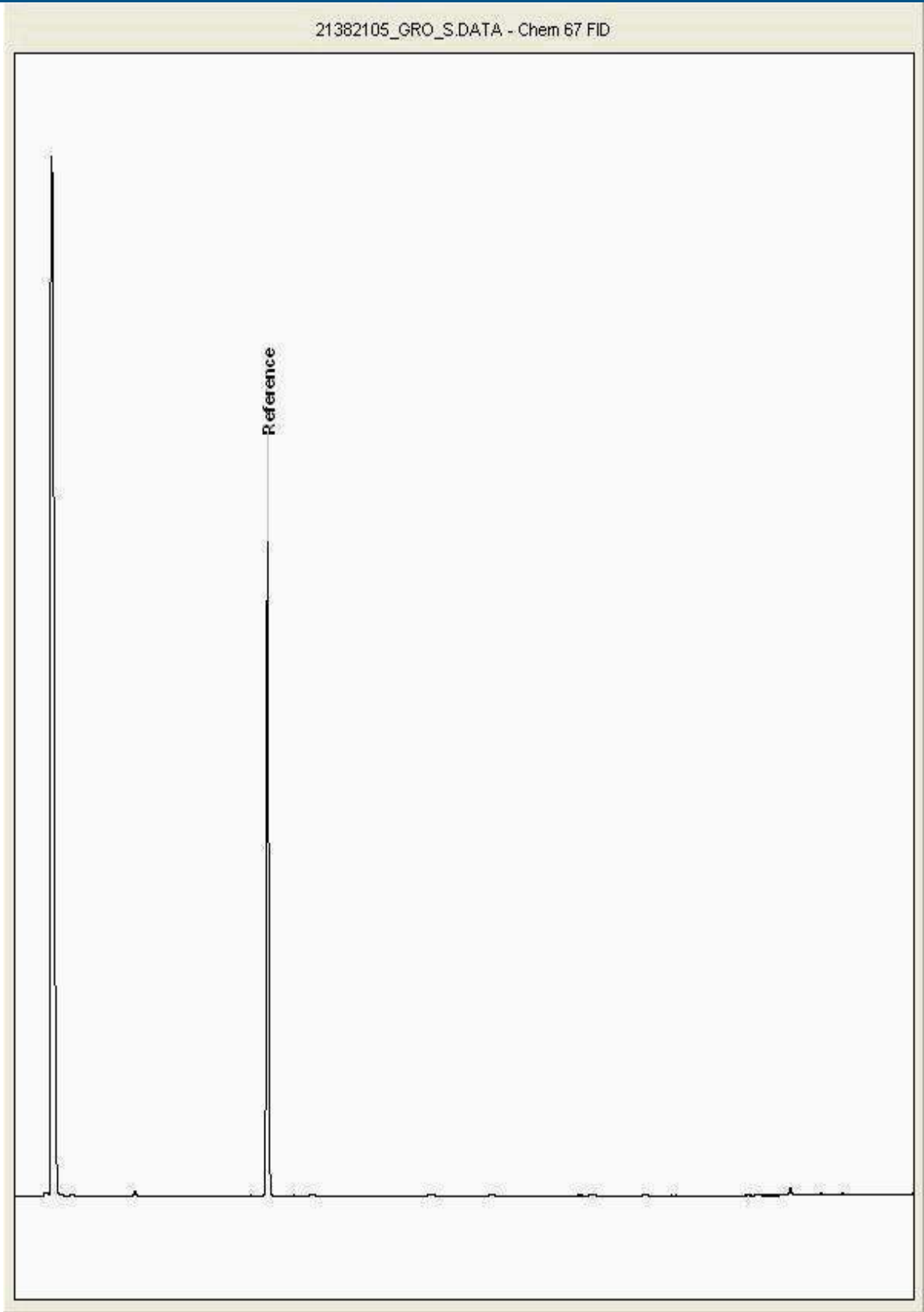


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: GRO by GC-FID (S) Sample No : 21,382,105 Depth : 0.75
21382105 Sample ID : WS13 ES1



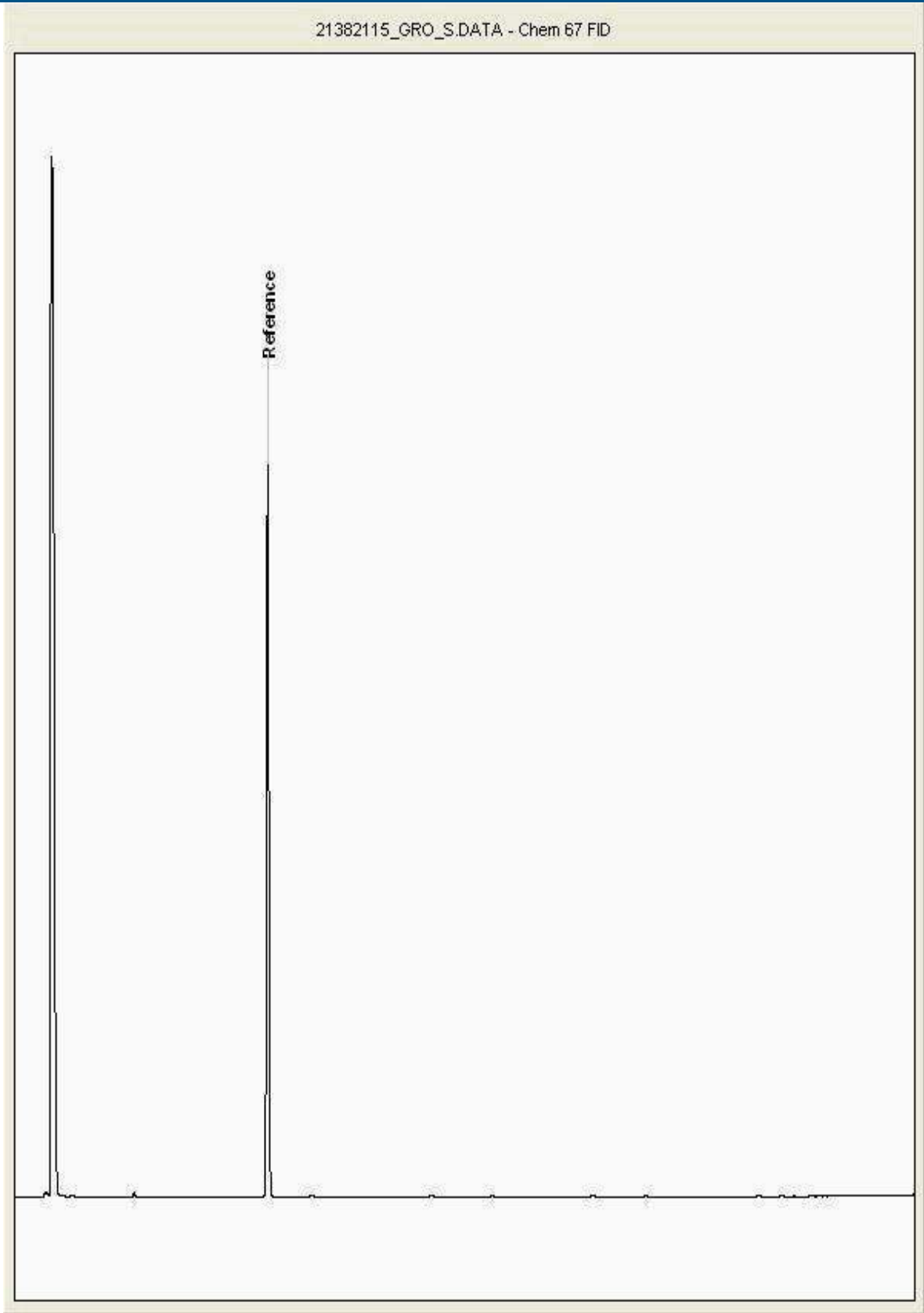


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: GRO by GC-FID (S) Sample No : 21,382,115 Depth :0.50
21382115 Sample ID : WS15 ES1



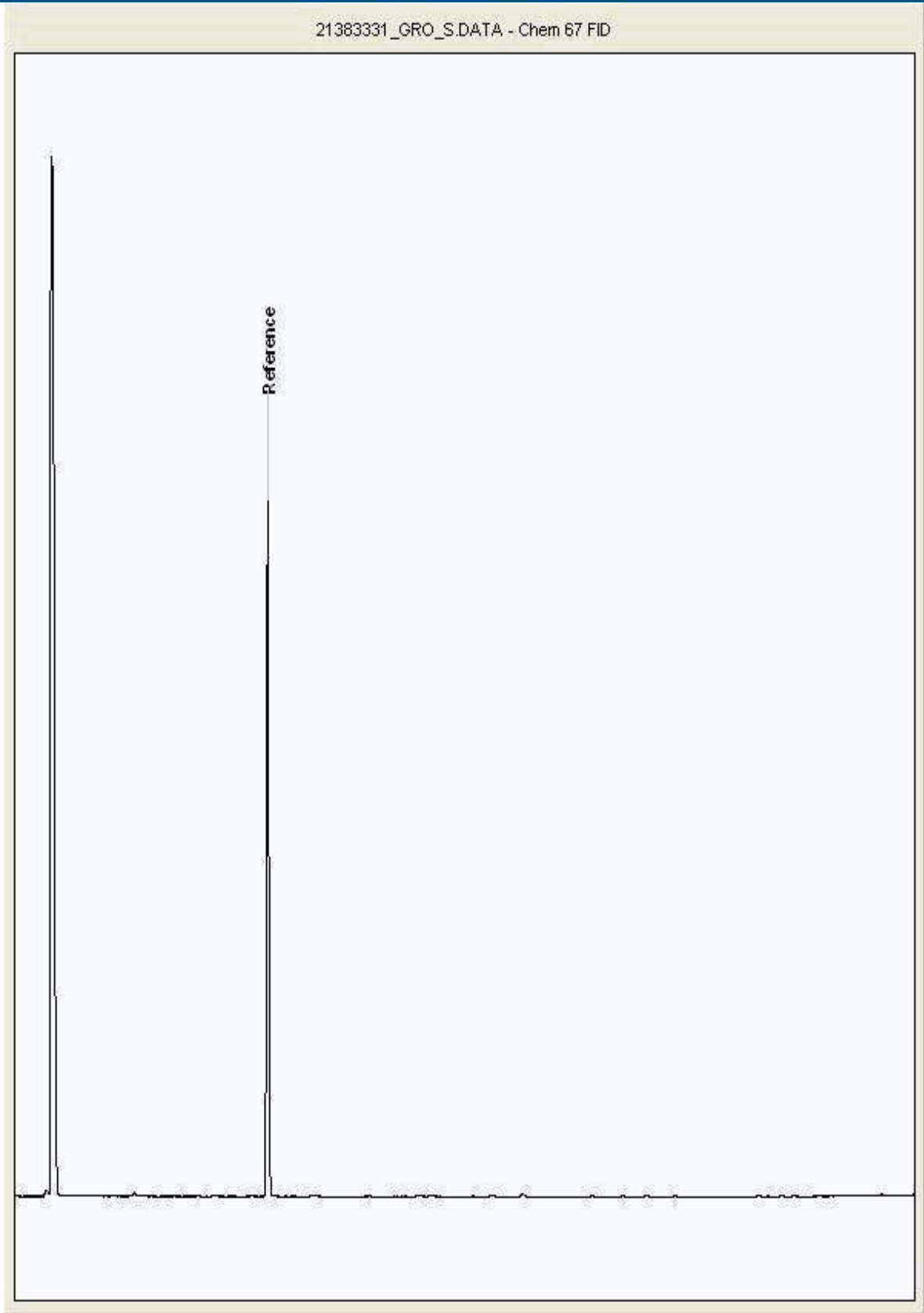


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: GRO by GC-FID (S) Sample No : 21,383,331 Depth : 0.60
21383331 Sample ID : WS16 ES1



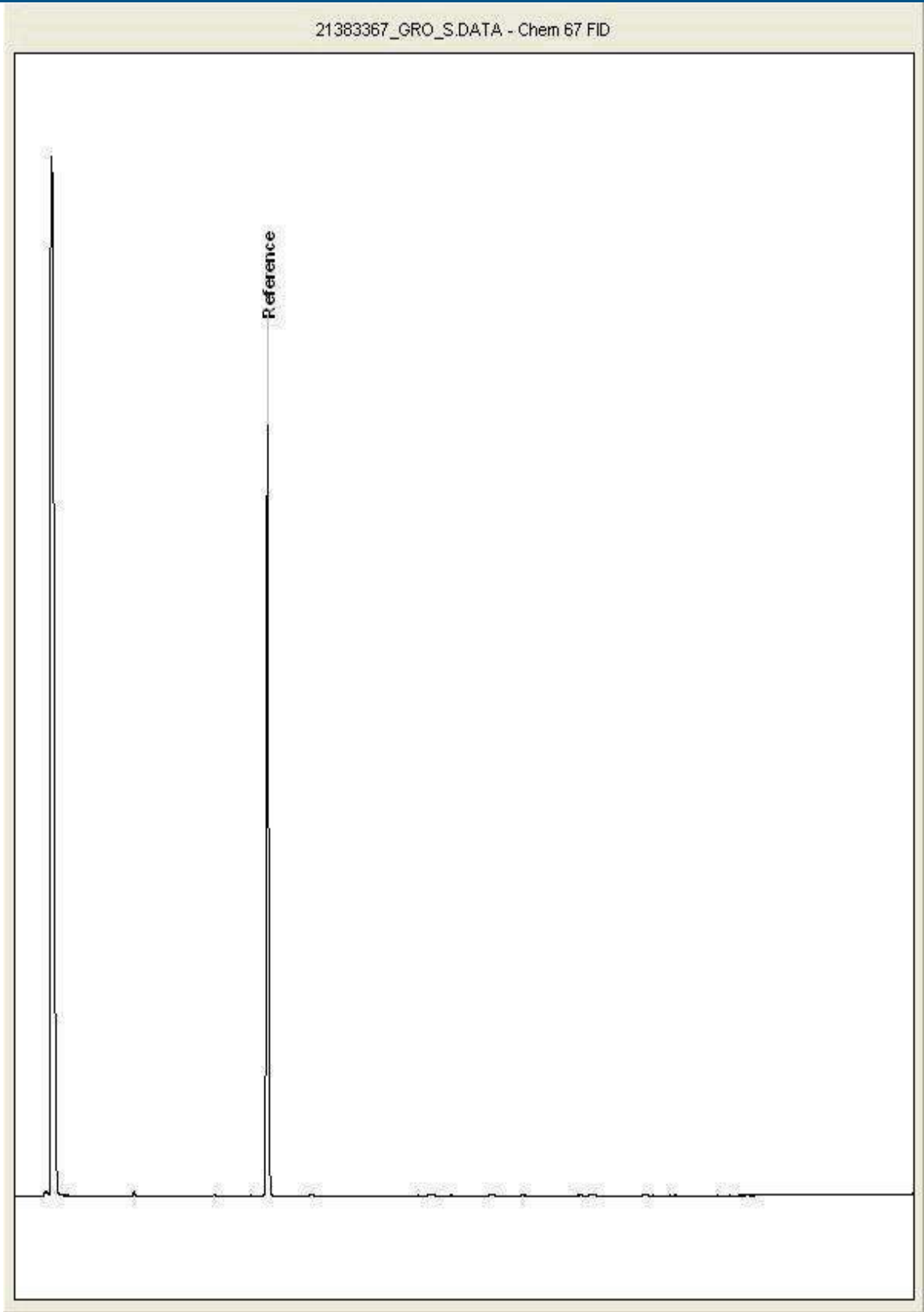


Post Certification Report

Customer :	WYG Geo-Environment	Location :	Welwyn Garden City
Client Reference :	A115249		

Chromatogram

Analysis: GRO by GC-FID (S)	Sample No :	21,383,367	Depth :17.50 - 18.50
21383367	Sample ID :	BH08	



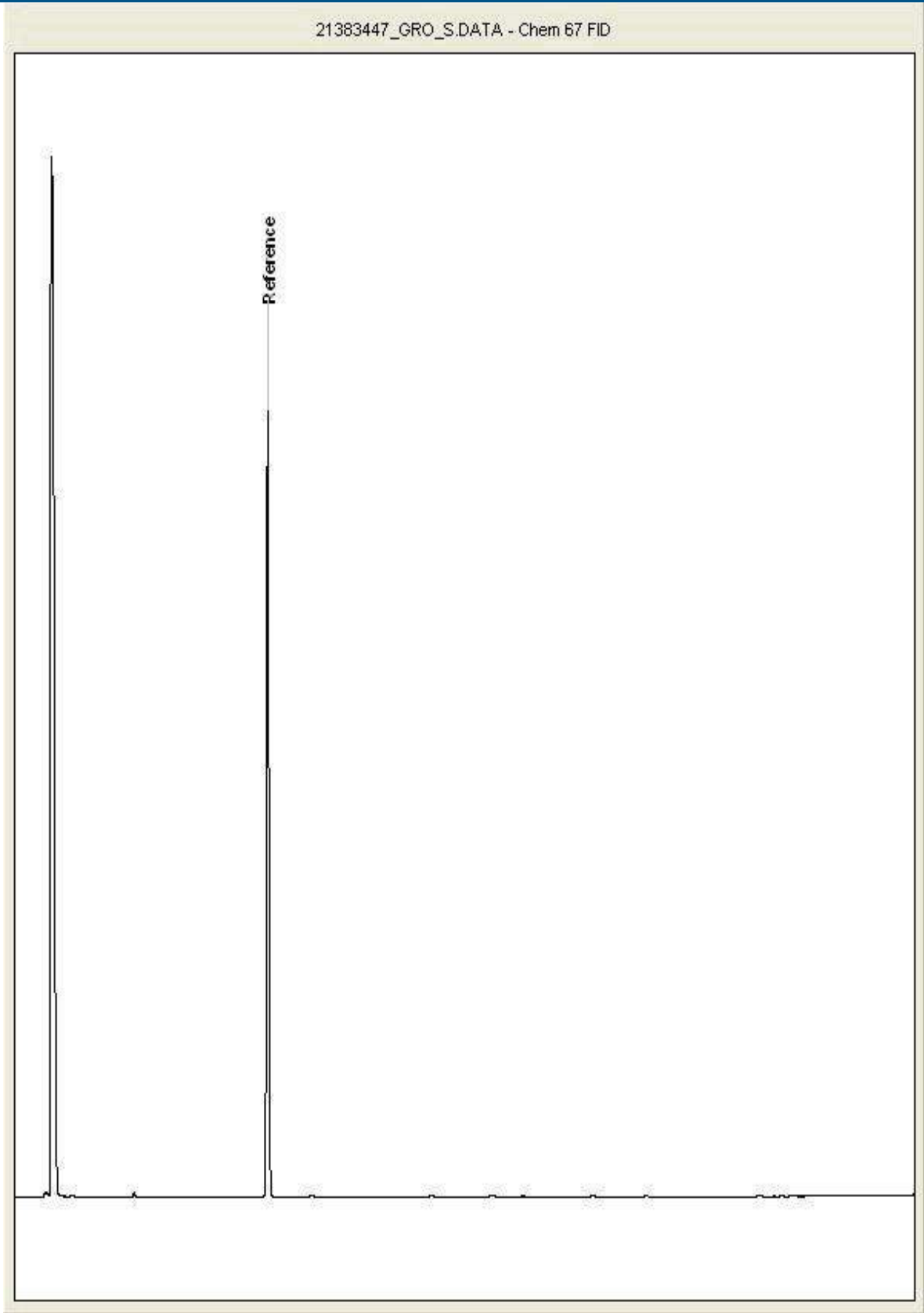


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: GRO by GC-FID (S) Sample No : 21,383,447 Depth :0.45
21383447 Sample ID : WS14 ES1



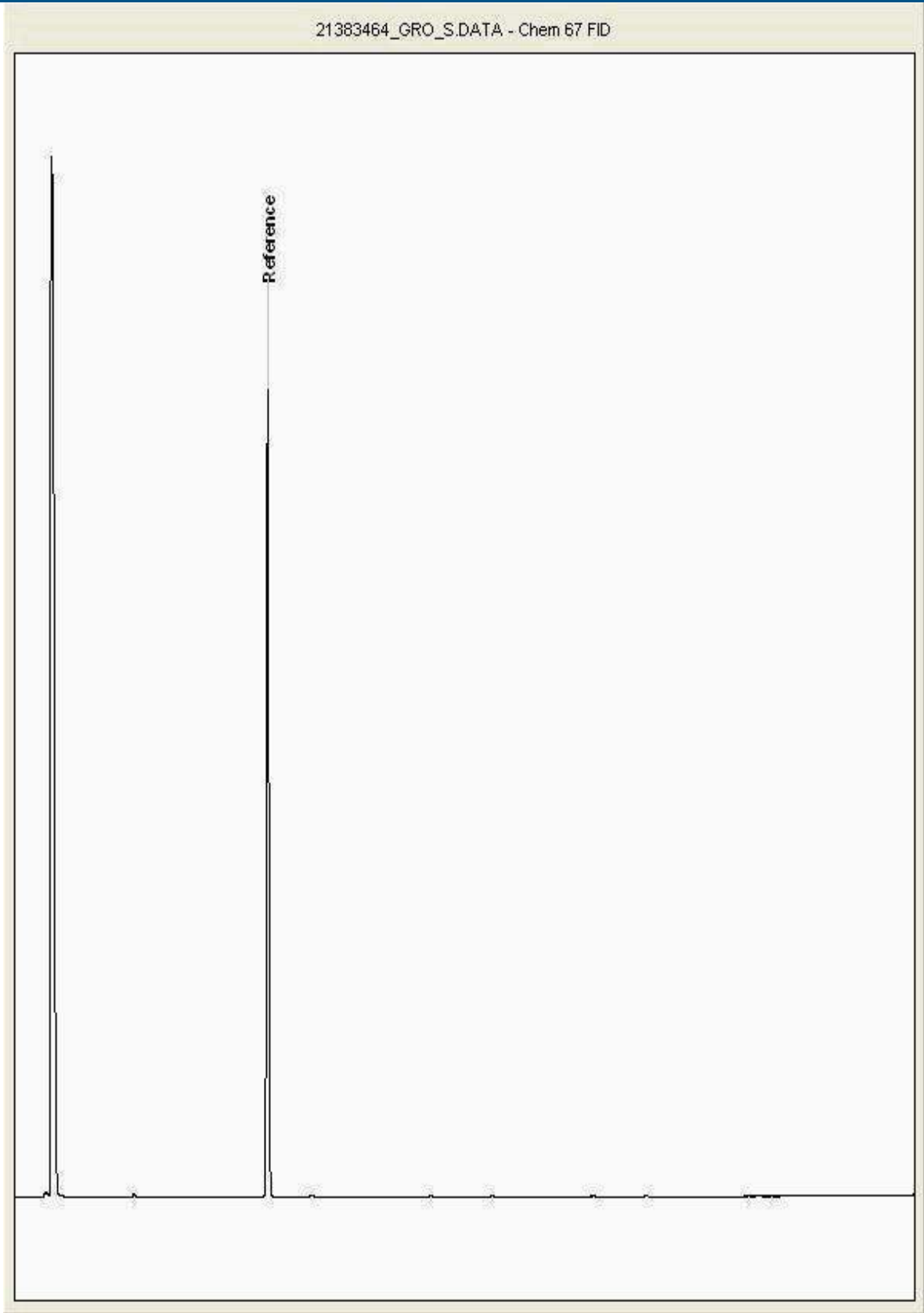


Post Certification Report

Customer :	WYG Geo-Environment	Location :	Welwyn Garden City
Client Reference :	A115249		

Chromatogram

Analysis: GRO by GC-FID (S)	Sample No :	21,383,464	Depth : 1.50 - 1.60
21383464	Sample ID : WS12 ES2		



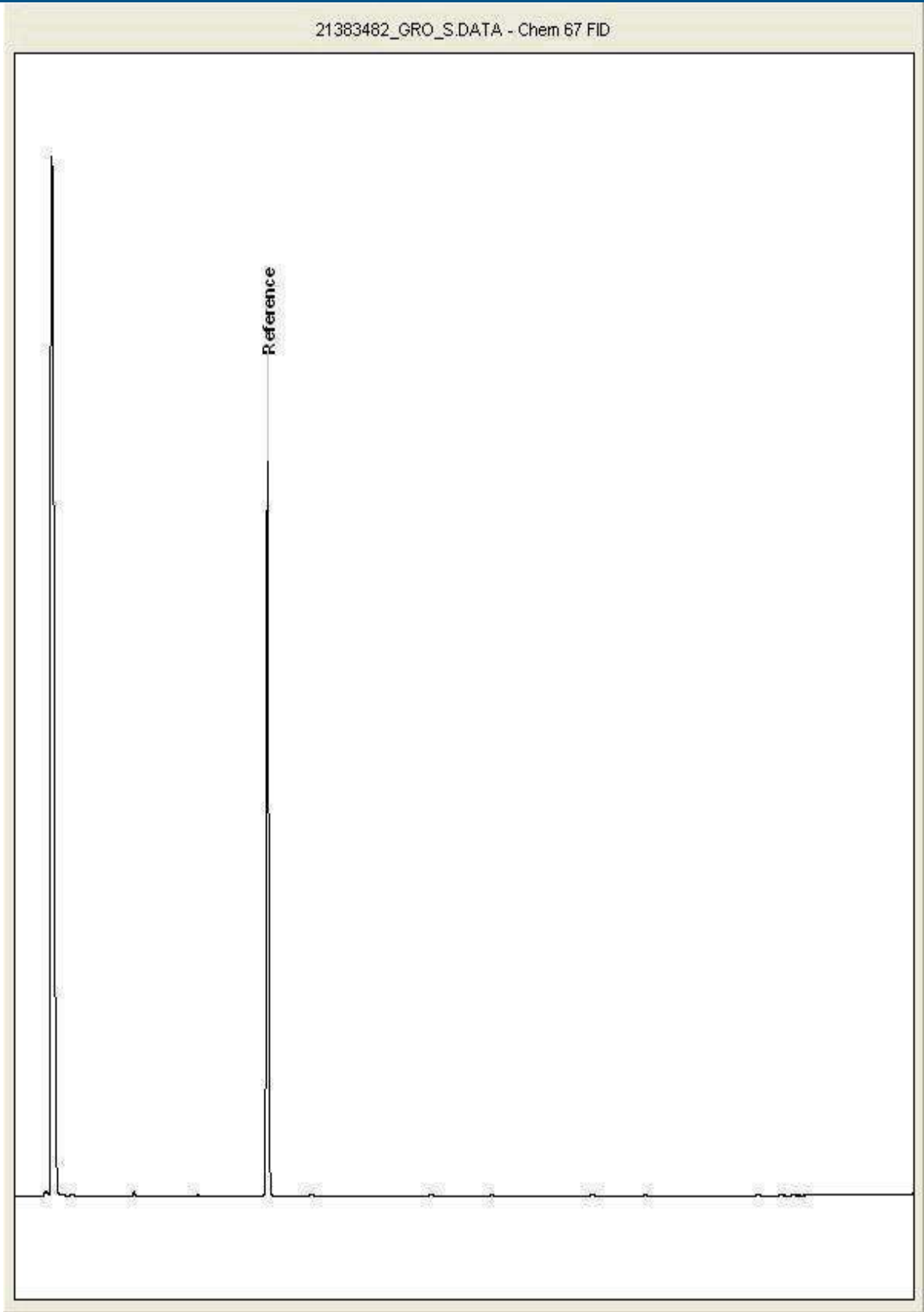


Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249 Location : Welwyn Garden City

Chromatogram

Analysis: GRO by GC-FID (S) Sample No : 21,383,482 Depth : 0.55 - 0.55
21383482 Sample ID : WS12 ES1



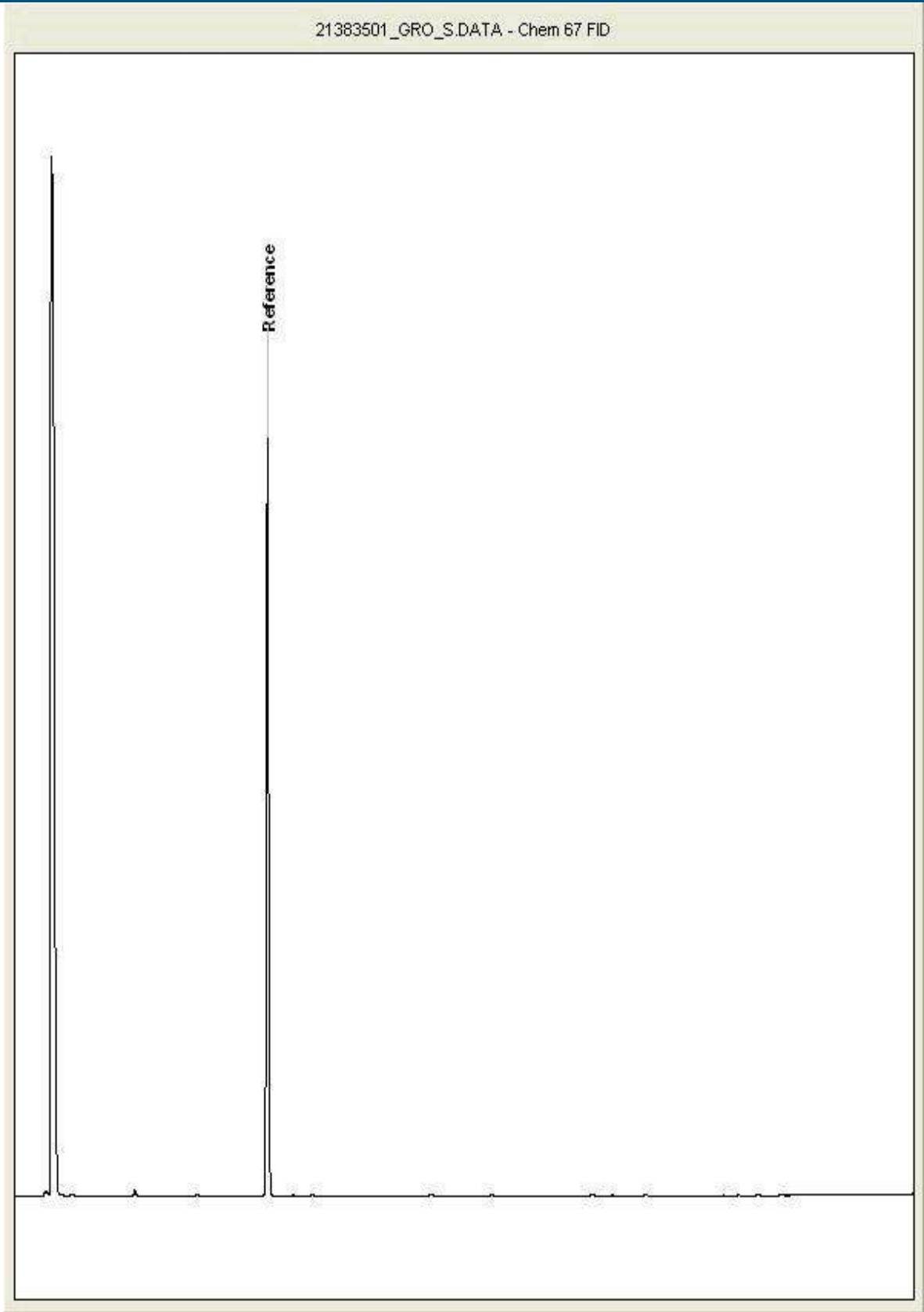


Post Certification Report

Customer :	WYG Geo-Environment	Location :	Welwyn Garden City
Client Reference :	A115249		

Chromatogram

Analysis: GRO by GC-FID (S)	Sample No :	21,383,501	Depth : 1.20 - 1.20
21383501	Sample ID :	WS10 ES2	





Post Certification Report

Customer : WYG Geo-Environment
Client Reference : A115249

Location : Welwyn Garden City

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	.
Fibrous Anthophyllite	.
Fibrous Tremolite	.

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than:

- Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Tier 1 - Soil Screening Values (TSVs)

Sample Identity	England and Wales (mg/kg) where		WS10 ES2	WS12 ES1	WS12 ES2	WS13 ES1	WS14 ES1	WS15 ES1	WS16 ES1	WS17 ES1	BH08	WS11	WS11	WS18
Depth (m bgl)	Soil Organic Matter <1%		1.20-1.20	0.55-0.55	1.50-1.60	0.75-	0.45-	0.50-	0.60-	0.20-0.30	17.50-18.50	0.70-	5.50-	0.70-
Reference	Screen Value											2	3	1
Sample Date	Units	Residential (without plant uptake)	21/11/2019	21/11/2019	21/11/2019	22/11/2019	22/11/2019	22/11/2019	22/11/2019	22/11/2019		21/11/2019	21/11/2019	20/11/2019
pH		<5, >9	4.58	8.34	8.54	8.12	7.76	8.12	5.46	4.91	8.78	4.89	5.76	4.73
Asbestos	%	Presence	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present
HEAVY METALS/METALLOIDS														
Arsenic	mg/kg	40	16	10.2	21	17.2	9.14	8.56	9.69	8.23	2.37	18.4	9.56	11.7
Cadmium	mg/kg	150	0.368	0.313	0.661	0.537	0.213	0.268	0.244	0.269	0.211	<0.02	<0.02	<0.02
Chromium (III)	mg/kg	910	39.8	12.2	18.3	32.1	19.7	12.6	18.1	11.2	1.64	37.8	18.3	26.1
Chromium (VI)	mg/kg	21	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<1.2	<0.6	<0.6	<0.6	<0.6
Lead	mg/kg	310	14.1	19.4	13.8	21.9	11.5	15.8	17.9	42.8	1.68	16.8	6.95	13.7
Mercury (Elemental)	mg/kg	1.2	---	---	---	---	---	---	---	---	---	---	---	---
Mercury (Inorganic)	mg/kg	56	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
Mercury (Methyl)	mg/kg	15	---	---	---	---	---	---	---	---	---	---	---	---
Nickel	mg/kg	180	15.4	16.3	36.8	43.2	8.14	9.81	9.06	6.1	6.4	29.9	16.3	14.1
Selenium	mg/kg	430	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.23	<1	<1
Beryllium	mg/kg	1.7	1.04	0.591	0.894	1.45	0.47	0.409	0.502	0.215	0.122	1.83	1.24	0.962
Boron	mg/kg	11,000	1.03	<1	<1	1.34	<1	<1	<1	<1	<1	1.07	<1	<1
Vanadium	mg/kg	1,200	58.6	26	48.8	56.9	24.2	24	29.1	20.4	3.57	70.2	38.3	52.4
Copper	mg/kg	7,100	19.8	11.3	16.1	20.8	6.99	8.13	10.8	23.3	3.67	20.8	10.5	12.9
Zinc	mg/kg	40,000	53.4	44	72.4	90.7	22	31.8	22.1	21.9	19.1	75.4	34.4	44.6
US EPA PRIORITY PAHs														
Acenaphthene	mg/kg	3,000 (57.0)sol	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008
Acenaphthylene	mg/kg	2,900 (86.1)sol	0.0157	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
Anthracene	mg/kg	31,000 (1.17)vap	0.0301	0.0237	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
Benzo(a)anthracene	mg/kg	11	0.0858	0.108	<0.014	<0.014	0.0462	<0.014	0.0177	0.0202	<0.014	<0.014	<0.014	<0.014
Benzo(b)fluoranthene	mg/kg	3.9	0.0512	0.109	<0.015	<0.015	0.0508	<0.015	0.0224	0.0262	<0.015	<0.015	<0.015	<0.015
Benzo(k)fluoranthene	mg/kg	110	0.0188	0.0536	<0.014	<0.014	0.0237	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
Benzo(g,h,i)perylene	mg/kg	360	0.107	0.0924	<0.024	<0.024	0.0568	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024
Benzo(a)pyrene	mg/kg	5.3	0.101	0.116	<0.015	<0.015	0.0533	<0.015	0.0183	0.0207	<0.015	<0.015	<0.015	<0.015
Chrysene	mg/kg	30	0.0678	0.109	<0.01	0.0128	0.0404	<0.01	0.0203	0.0233	<0.01	<0.01	<0.01	<0.01
Di-benzo(a,h)anthracene	mg/kg	0.31	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023
Fluoranthene	mg/kg	1,500	0.119	0.234	<0.017	<0.017	0.106	<0.017	0.0445	0.0558	<0.017	<0.017	<0.017	0.0205
Fluorene	mg/kg	2,800 (30.9)sol	0.0135	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	mg/kg	45	0.0477	0.082	<0.018	<0.018	0.053	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018
Naphthalene	mg/kg	2.3	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Phenanthrene	mg/kg	1,300 (36.0)sol	0.136	0.0909	<0.015	<0.015	0.0334	<0.015	0.0201	0.0249	<0.015	<0.015	<0.015	<0.015
Pyrene	mg/kg	3,700	0.29	0.202	<0.015	0.0193	0.088	<0.015	0.0382	0.0466	<0.015	<0.015	<0.015	0.0194
BTEx														
Benzene	mg/kg	0.89	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.09	<0.009	<0.009	<0.009	<0.009
Toluene	mg/kg	880vap (869)	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.07	<0.007	<0.007	<0.007	<0.007
Ethylbenzene	mg/kg	83	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.04	<0.004	<0.004	<0.004	<0.004
m-Xylene	mg/kg	82	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01
o-Xylene	mg/kg	88	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01
p-Xylene	mg/kg	79	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01
Xylenes (mixed isomers)	mg/kg	79	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01

Additional Tests														
CWG														
GRO TOT (Moisture Corrected)	µg/kg		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
INORGANICS														
Amosite (Brown) Asbestos	No units		Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Analysed By	No units		Christian Hallan	Christian Hallan	Christian Hallan	Christian Hallan	Christian Hallan	Christian Hallan	Christian Hallan	Christian Hallan	para Urbanek-W	Andrzej Ferreck	James Richards	James Richards
Chrysotile (White) Asbestos	No units		Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Colour	No units		Light Brown	Dark Brown	Light Brown	Light Brown	Light Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Cream	Light Brown	Light Brown
Comments	No units		-	-	-	-	-	-	-	-	-	-	-	-
Crocidolite (Blue) Asbestos	No units		Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Cyanide, Easily liberatable (low level)	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Date of Analysis	No units		20/12/19	19/12/19	20/12/19	20/12/19	19/12/19	19/12/19	20/12/19	20/12/2019	20/12/19	27/11/2019	27/11/2019	27/11/2019
Description	No units		Sandy Loam	Sandy Loam	Loamy Sand	Clay Loam	Sandy Loam	Clay Loam	Loamy Sand	Loamy Sand	Loamy Sand	Clay	Clay Loam	Clay Loam
Fibrous Actinolite	No units		Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Fibrous Anthophyllite	No units		Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Fibrous Tremolite	No units		Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Inclusion 1)	No units		Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	None	None	Stones
Inclusion 2)	No units		Vegetation	Vegetation	None	Vegetation	Vegetation	Vegetation	Vegetation	Vegetation	Brick	None	N/A	None
Non-Asbestos Fibre	No units		Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
METALS														
Chromium	mg/kg		39.8	12.2	18.3	32.1	19.7	12.6	18.1	11.2	1.64	37.8	18.3	26.1
ORGANIC														
Fraction Organic Carbon (FOC)	No units		<0.002	0.00425	<0.002	0.00427	0.00265	0.00435	0.00491	0.016	<0.002	<0.002	<0.002	0.00645
PAH														
Acenaphthene-d10 % recovery**	%		105	101	105	81.6	105	102	103	95.2	102	89.5	94.8	96.8
Chrysene-d12 % recovery**	%		84.7	80.1	92.1	68.6	84.4	78.5	76.5	70.2	94.2	93.7	93.8	97
Naphthalene-d8 % recovery**	%		103	93.6	100	84.2	103	97.4	98.9	93.1	99.5	84.4	91.7	94.3
PAH, Total Detected USEPA 16	µg/kg		1080	1220	<118	<118	551	<118	182	218	<118	<118	<118	<118
Perylene-d12 % recovery**	%		87.1	83	92	75	89.2	93.6	76.7	72.4	83.1	89	87.4	93.2
Phenanthrene-d10 % recovery**	%		104	105	105	75.5	111	99	102	93.4	105	96	98.8	102
PHENOLS														
Phenol	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0234	<0.01	<0.01	<0.01	<0.01
PHYSICAL														
istiture Content Ratio (% of as received samp	%		11	8.6	16	19	8	12	8	15	25	20	14	14
TPH														
EPH Range >C10 - C40	mg/kg		<35	<35	<35	<35	<35	<35	<35	42.5	<35	<35	<35	<35
EPH Surrogate % recovery**	%		91.4	86	91.6	80.3	87.9	89.5	81.5	68.8	90	80.2	83.8	88.8
Interpretation	No units		No	No	No	No	No	No	No	No	No	No	No	No
		interpretation possible	interpretation possible	interpretation possible	interpretation possible	interpretation possible	interpretation possible	interpretation possible	interpretation possible	interpretation possible	interpretation possible	interpretation possible	interpretation possible	
VOC														
4-Bromofluorobenzene**	%		94.2	90.2	96.4	90.7	92.4	90.9	76.4	88.3	96.9	96.9	97.3	94.4
Dibromofluoromethane**	%		107	104	107	110	109	114	102	106	103	99	98.8	102
Methyl Tertiary Butyl Ether	µg/kg		<10	<10	<10	<10	<10	<10	<10	<100	<10	<10	<10	<10
Toluene-d8**	%		98.3	98.7	98.9	97.4	97.4	98.2	93.6	97.9	98.8	98.3	95.9	97.2

Appendix H

Geotechnical Laboratory Certificates



LABORATORY REPORT



4043

Contract Number: PSL19/7560

Report Date: 20 January 2020

Client's Reference: A115249

Client Name: WYG London
11th Floor
1 Angel Court
London
EC2R 7HJ

For the attention of: Agim Tafliku

Contract Title: Welwyn Garden City

Date Received: 11/12/2019

Date Commenced: 11/12/2019

Date Completed: 20/1/2020

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

R Gunson
(Director)

S Royle
(Laboratory Manager)

A Watkins
(Director)

S Eyre
(Senior Technician)

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(Quality Manager)

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(Senior Technician)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH01	2	B	1.20	2.00	Brown slightly gravelly sandy CLAY.
BH01	6	B	3.00	4.00	Brown slightly gravelly sandy CLAY.
BH01	15	B	8.00	9.00	Brown gravelly very sandy CLAY.
BH01	25	B	14.00	15.00	Light brown slightly gravelly slightly sandy CLAY gravel is chalk and flint.
BH01	27	B	16.00	17.00	White structureless CHALK.
BH02	2	B	1.20	2.00	White CHALK.
BH02	5	B	3.00	4.00	Brown very gravelly sandy CLAY.
BH02	11	B	6.50	7.50	Brown very sandy GRAVEL.
BH02	14	B	10.00	11.00	Light brown very gravelly slightly sandy CLAY gravel is chalk and flint.
BH02	22	B	16.00	17.00	White structureless CHALK.
BH02	29	B	22.00	23.00	White CHALK.
BH02	37	B	28.00	29.00	White CHALK.
BH03	3	B	2.00	3.00	Brown very gravelly very sandy CLAY.
BH03	4	SD	3.00	3.45	Reddish brown slightly gravelly clayey silty SAND.
BH03	5	B	3.50	4.00	Brown very gravelly very sandy CLAY.
BH03	11	B	7.00	8.00	Brown very gravelly clayey silty SAND.
BH03	19	B	14.00	15.00	White structureless CHALK.
BH03	25	B	19.00	20.00	White structureless CHALK.
BH04	4	B	2.00	3.00	Brown gravelly silty SAND.



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Welwyn Garden City

Contract No:

PSL19/7560

Client Ref:

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH04	11	B	10.00	11.00	Brown very sandy GRAVEL.
BH04	14	B	13.00	14.00	White structureless CHALK.
BH04	16	SD	15.50	15.95	White structureless CHALK.
BH04	23	SD	24.50	24.95	White structureless CHALK.
BH05	3	SD	2.00	2.45	Brown slightly gravelly sandy CLAY.
BH05	6	B	9.00	9.95	Brown very gravelly very sandy CLAY.
BH05	7	SD	9.50	9.95	Brown gravelly slightly sandy CLAY.
BH05	18	B	23.00	24.00	White structureless CHALK.
BH05	19	SD	24.50	24.95	White structureless CHALK.
BH06	2	B	1.20	2.00	Brown gravelly slightly sandy CLAY.
BH06	9	B	5.00	6.00	Brown very gravelly silty SAND.
BH06	11	B	8.00	9.00	Light brown very gravelly sandy CLAY gravel is chalk and flint.
BH06	16	SD	12.50	12.95	White CHALK.
BH06	31	B	23.00	24.00	White CHALK.
BH07	7	D	3.00		Brown very gravelly sandy CLAY.
BH07	6	U	3.00	3.45	Very stiff brown very gravelly sandy CLAY.
BH07	10	B	4.00		Firm brown sandy CLAY.
BH07	11	U	5.00	5.45	Brown sandy CLAY.
BH07	12	D	5.60		Firm brown sandy CLAY.



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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH07	14	B	7.00	8.00	Brown slightly gravelly sandy CLAY.
BH07	15	U	8.00	8.45	Stiff brown slightly gravelly sandy CLAY.
BH07	19	B	10.00	11.00	Firm brown slightly gravelly sandy CLAY.
BH07	20	SD	11.00	11.40	Brown slightly gravelly sandy CLAY.
BH07	29	B	19.00	20.00	White CHALK.
BH08	31	B	1.50	2.00	Brown very gravelly very sandy CLAY.
BH08	4	U	2.00	2.45	Brown very gravelly sandy CLAY.
BH08	8	B	3.50	4.00	Firm brown slightly gravelly sandy CLAY.
BH08	9	U	4.00	4.45	Brown slightly gravelly sandy CLAY.
BH08	12	SD	5.00	5.45	Firm brown sandy CLAY.
BH08	15	U	6.50	6.95	Stiff brown slightly sandy CLAY.
BH08	17	SD	8.00	8.45	Stiff brown sandy CLAY.
BH08	22	B	11.50	12.50	Brown very gravelly silty SAND.
BH08	25	B	14.00	14.50	Brown very sandy GRAVEL.
BH08	33	B	19.00	20.00	White CHALK.
BH08	37	B	22.00	23.00	White structureless CHALK.
WS03	-	-	1.20	2.00	Brown slightly gravelly very sandy CLAY.
WS03	-	-	3.00	4.00	Brown very gravelly SAND.
WS05	-	-	2.00	3.00	Brown gravelly very sandy CLAY.



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Contract No:

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

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Welwyn Garden City

Contract No:

PSL19/7560

Client Ref:

A115249

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m ³ Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH01	2	B	1.20	2.00	21			38	19	19	94	Intermediate plasticity CI.
BH01	15	B	8.00	9.00	16			33	16	17	69	Low plasticity CL.
BH01	27	B	16.00	17.00	33			37	26	11	94	Intermediate plasticity MI.
BH02	5	B	3.00	4.00	19			43	21	22	42	Intermediate plasticity CI.
BH02	22	B	16.00	17.00	29			36	25	11	89	Intermediate plasticity MI.
BH03	4	SD	3.00	3.45	7.7				NP			
BH03	5	B	3.50	4.00	10			32	17	15	52	Low plasticity CL.
BH03	19	B	14.00	15.00	30							
BH03	25	B	19.00	20.00	25			34	24	10	73	Low plasticity ML.
BH04	14	B	13.00	14.00	30							
BH04	16	SD	15.50	15.95	29			34	25	9	78	Low plasticity ML.
BH04	23	SD	24.50	24.95	35			40	26	14	71	Intermediate plasticity MI.
BH05	3	SD	2.00	2.45	20			42	21	21	95	Intermediate plasticity CI.
BH05	7	SD	9.50	9.95	37			72	30	42	81	Very high plasticity CV.
BH05	18	B	23.00	24.00	31			37	25	12	94	Intermediate plasticity MI.
BH05	19	SD	24.50	24.95	31							
BH06	2	B	1.20	2.00	18			62	26	36	84	High plasticity CH.
BH06	9	B	5.00	6.00	9.5				NP			
BH06	31	B	23.00	24.00	29							

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.



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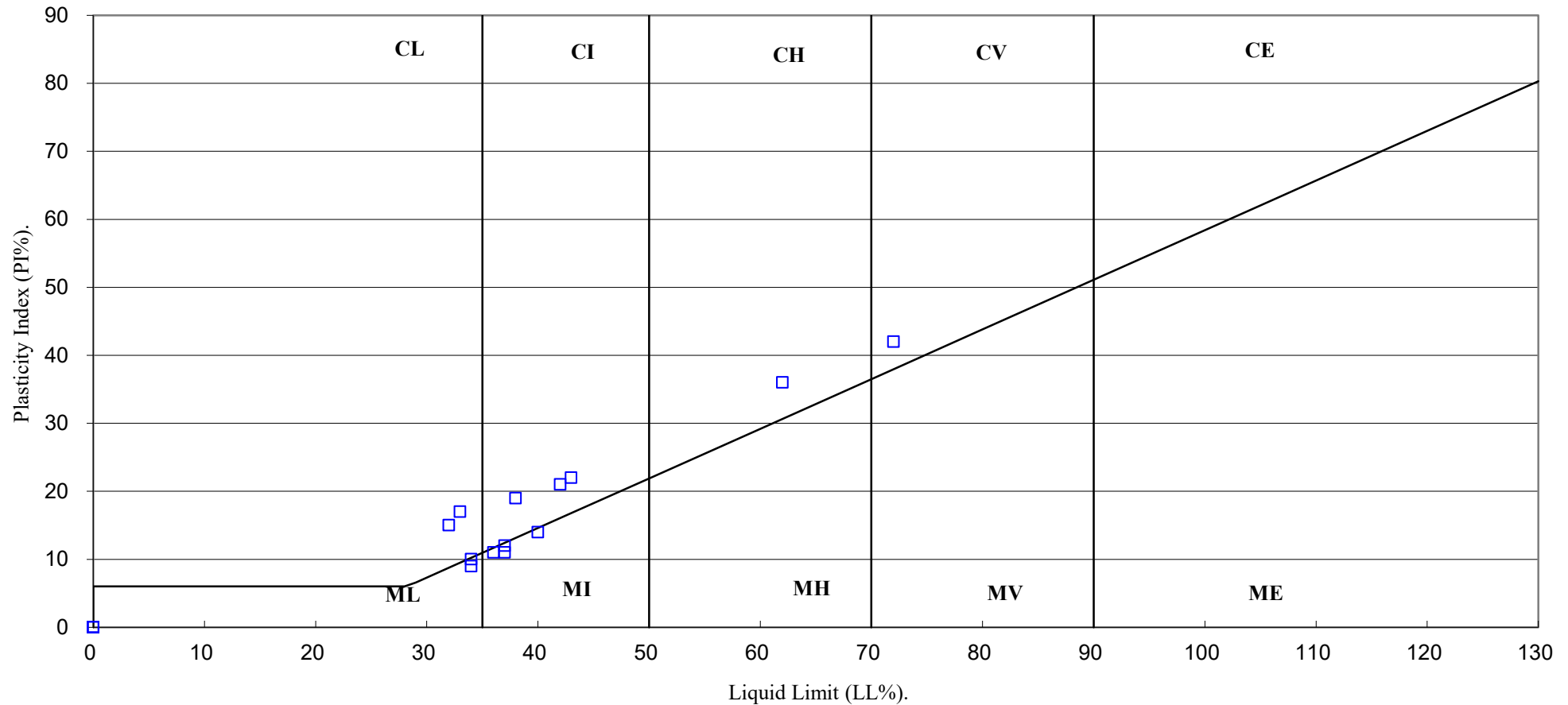
Contract No:

PSL19/7560

Client Ref:

A115249

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



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Contract No:

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Client Ref:

A115249


SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

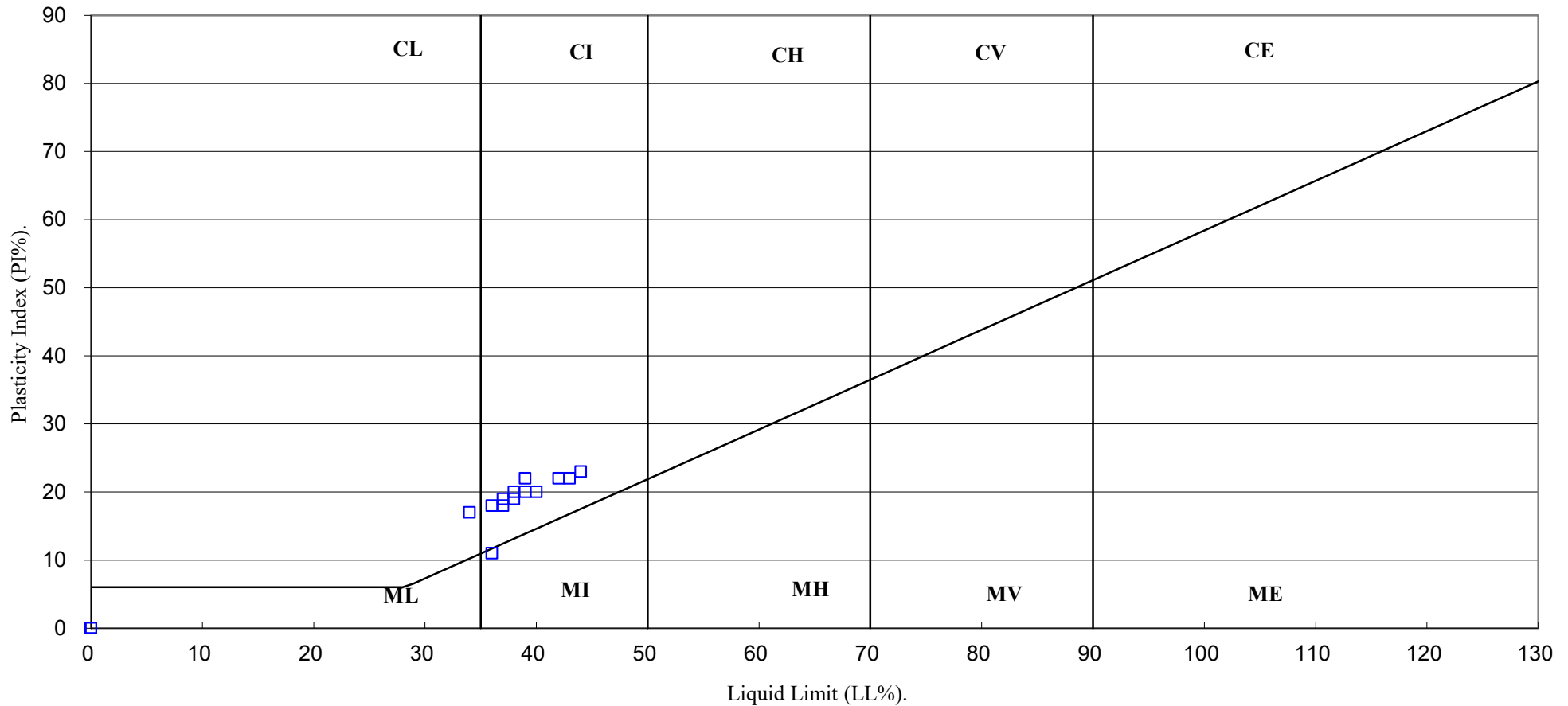
Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m ³ Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH07	7	D	3.00		18			44	21	23	72	Intermediate plasticity CI.
BH07	11	U	5.00	5.45	18			38	19	19	100	Intermediate plasticity CI.
BH07	14	B	7.00	8.00	20			40	20	20	94	Intermediate plasticity CI.
BH07	20	SD	11.00	11.40	16			43	21	22	90	Intermediate plasticity CI.
BH08	31	B	1.50	2.00	15							
BH08	4	U	2.00	2.45	17			39	19	20	41	Intermediate plasticity CI.
BH08	9	U	4.00	4.45	19			37	18	19	95	Intermediate plasticity CI.
BH08	37	B	22.00	23.00	30			36	25	11	94	Intermediate plasticity MI.
WS03	-	-	1.20	2.00	15			36	18	18	90	Intermediate plasticity CI.
WS05	-	-	2.00	3.00	23			37	19	18	82	Intermediate plasticity CI.
WS08	-	-	2.00	2.90	15							
WS11	-	-	3.00	5.00	18			39	17	22	98	Intermediate plasticity CI.
WS12	-	-	2.00	2.60	19			34	17	17	100	Low plasticity CL.
WS13	-	-	5.00	6.00	18							
WS14	-	-	4.00	5.00	22			42	20	22	94	Intermediate plasticity CI.
WS18	-	-	2.00	3.00	25			38	18	20	91	Intermediate plasticity CI.

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

		Welwyn Garden City		Contract No:
				PSL19/7560
				Client Ref:
				A115249

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



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Client Ref:

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SUMMARY OF CHALK TESTS

(BS1377 : PART 2 & 4 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content %	Saturated MC %	Dry Density Mg/m ³	Passing 10mm Sieve %	Chalk Crushing Value CCV	Remarks
BH02	2	B	1.20	2.00	19	26	1.58			
BH02	29	B	22.00	23.00	25	31	1.48			
BH02	37	B	28.00	29.00	32	30	1.49			
BH03	25	B	19.00	20.00	25	27	1.55			
BH04	16	SD	15.50	15.95	29	30	1.49			
BH04	23	SD	24.50	24.95	35	32	1.46			
BH06	16	SD	12.50	12.95	33	29	1.52			
BH07	29	B	19.00	20.00	27	29	1.51			
BH08	33	B	19.00	20.00	32	31	1.47			

* CCV testing is not UKAS accredited

		Welwyn Garden City		Contract No:
				PSL19/7560
				Client Ref:
				A115249

PARTICLE SIZE DISTRIBUTION TEST

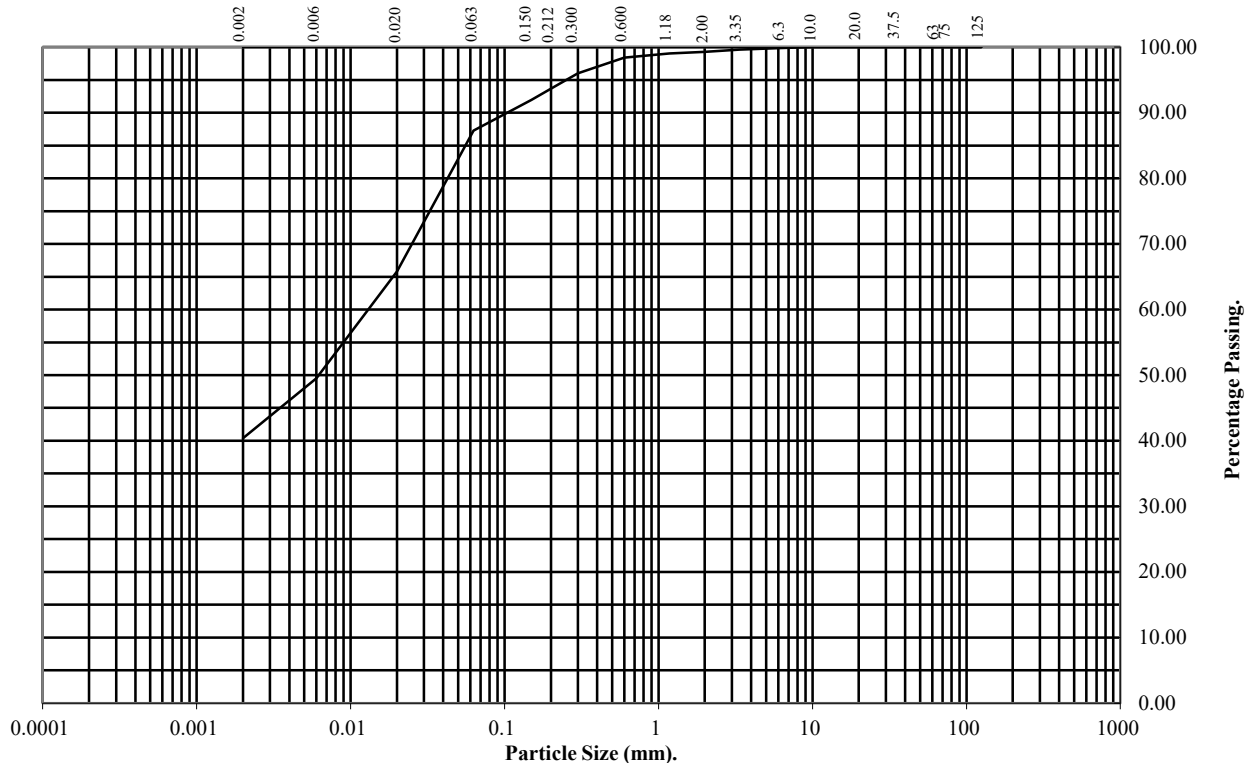
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH01 Top Depth (m): 3.00

Sample Number: 6 Base Depth(m): 4.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	99
0.6	98
0.3	96
0.212	94
0.15	92
0.063	87

Particle Diameter	Percentage Passing
0.02	66
0.006	50
0.002	40

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	12
Silt	47
Clay	40

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

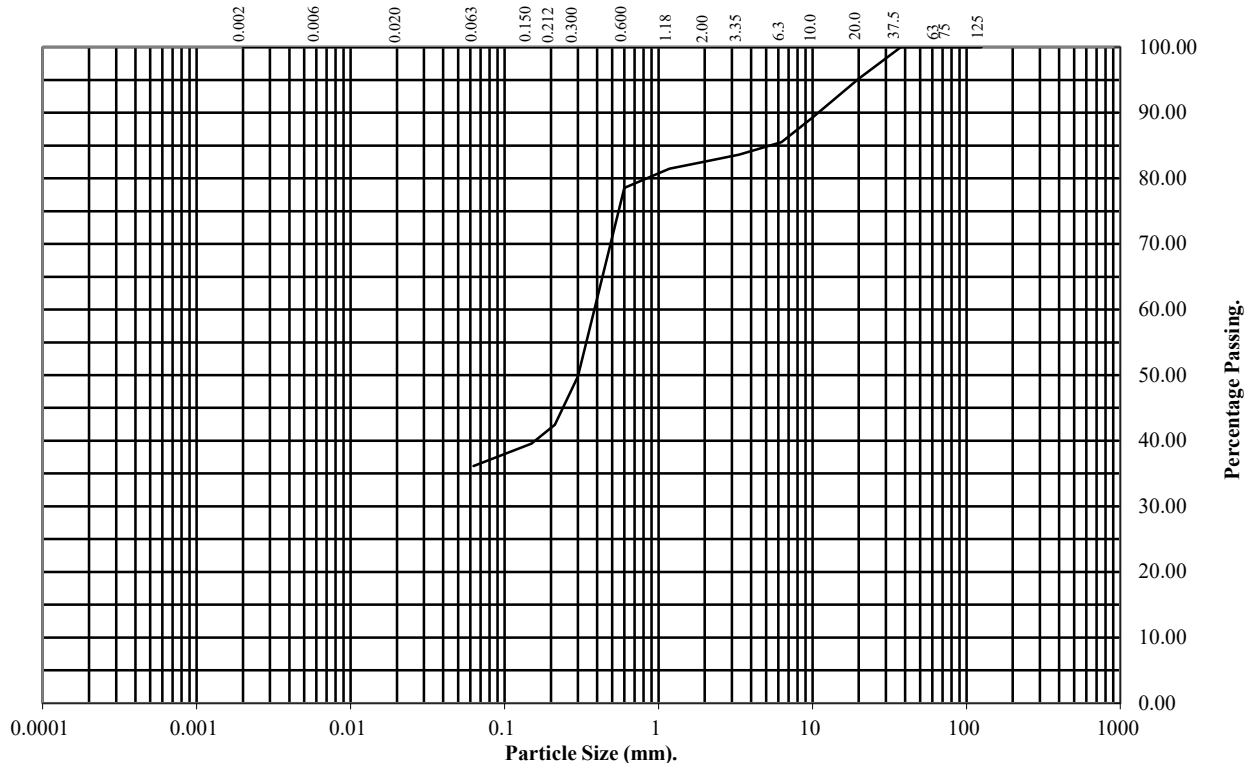
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH01 Top Depth (m): 8.00

Sample Number: 15 Base Depth(m): 9.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	95
10	89
6.3	86
3.35	84
2	83
1.18	81
0.6	79
0.3	50
0.212	42
0.15	40
0.063	36

Soil Fraction	Total Percentage
Cobbles	0
Gravel	17
Sand	47
Silt/Clay	36

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

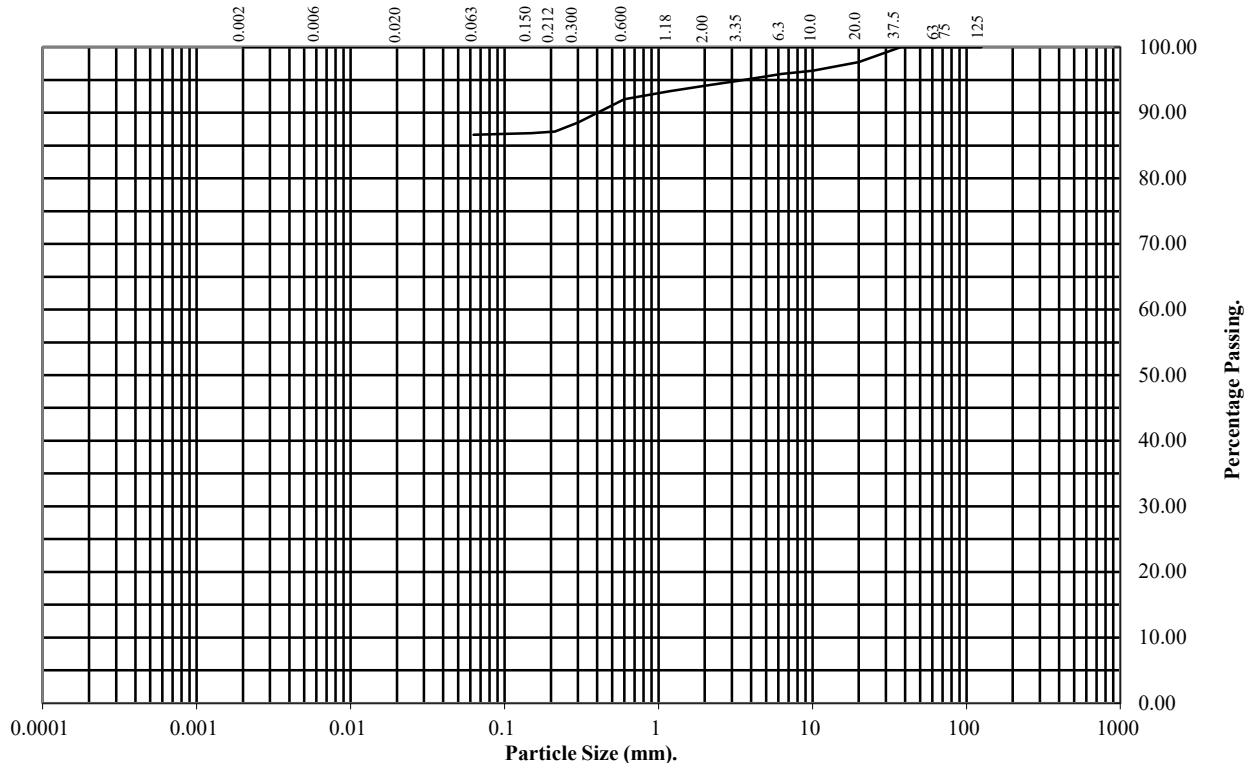
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH01 Top Depth (m): 14.00

Sample Number: 25 Base Depth(m): 15.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	98
10	96
6.3	96
3.35	95
2	94
1.18	93
0.6	92
0.3	89
0.212	87
0.15	87
0.063	87

Soil Fraction	Total Percentage
Cobbles	0
Gravel	6
Sand	7
Silt/Clay	87

Remarks:

See Summary of Soil Descriptions



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Client Ref:
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PARTICLE SIZE DISTRIBUTION TEST

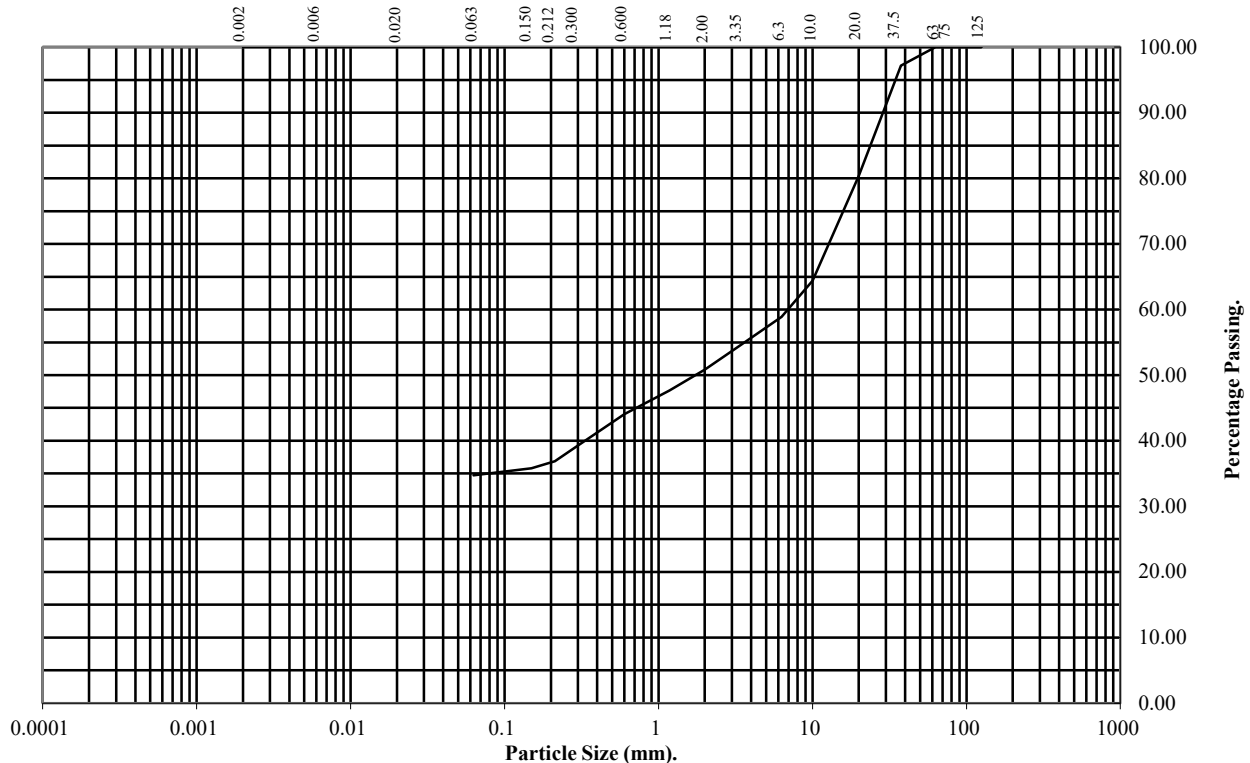
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH02 Top Depth (m): 3.00

Sample Number: 5 Base Depth(m): 4.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	97
20	80
10	64
6.3	59
3.35	54
2	51
1.18	48
0.6	44
0.3	39
0.212	37
0.15	36
0.063	35

Soil Fraction	Total Percentage
Cobbles	0
Gravel	49
Sand	16
Silt/Clay	35

Remarks:
See Summary of Soil Descriptions



Welwyn Garden City

Contract No:
PSL19/7560
Client Ref:
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PARTICLE SIZE DISTRIBUTION TEST

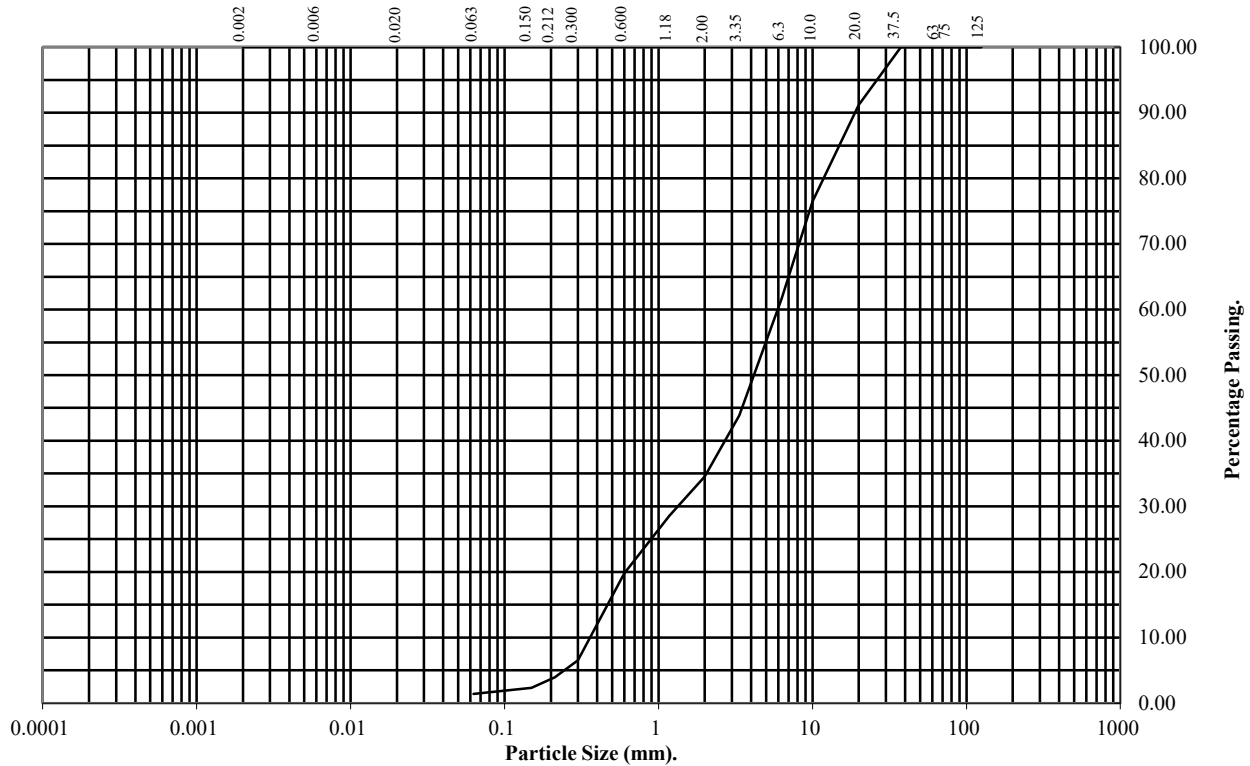
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH02 Top Depth (m): 6.50

Sample Number: 11 Base Depth(m): 7.50

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	91
10	76
6.3	62
3.35	44
2	35
1.18	29
0.6	20
0.3	7
0.212	4
0.15	2
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	65
Sand	34
Silt/Clay	1

Remarks:

See Summary of Soil Descriptions



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Welwyn Garden City

Contract No:
PSL19/7560
Client Ref:
A115249

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

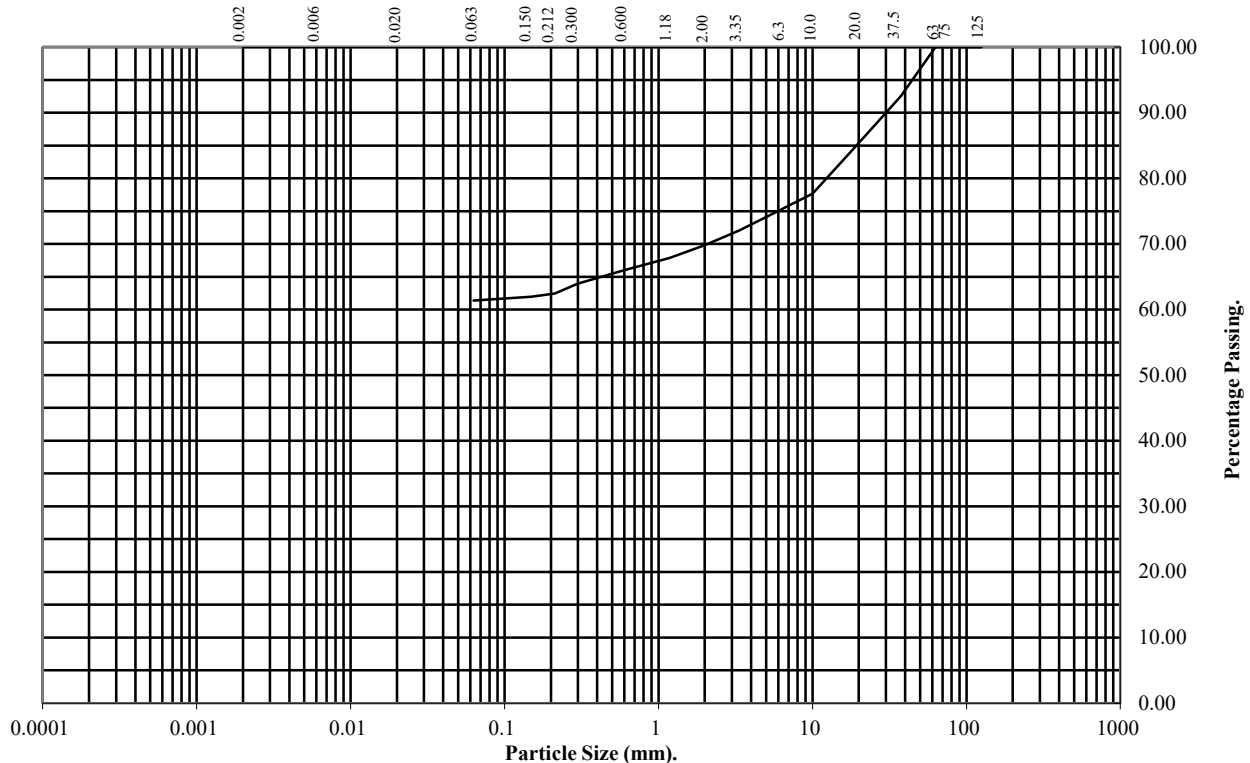
Hole Number: BH02

Top Depth (m): 10.00

Sample Number: 14

Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	93
20	85
10	78
6.3	75
3.35	72
2	70
1.18	68
0.6	66
0.3	64
0.212	62
0.15	62
0.063	61

Soil Fraction	Total Percentage
Cobbles	0
Gravel	30
Sand	9
Silt/Clay	61

Remarks:

See Summary of Soil Descriptions



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Welwyn Garden City

Contract No:

PSL19/7560

Client Ref:

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PARTICLE SIZE DISTRIBUTION TEST

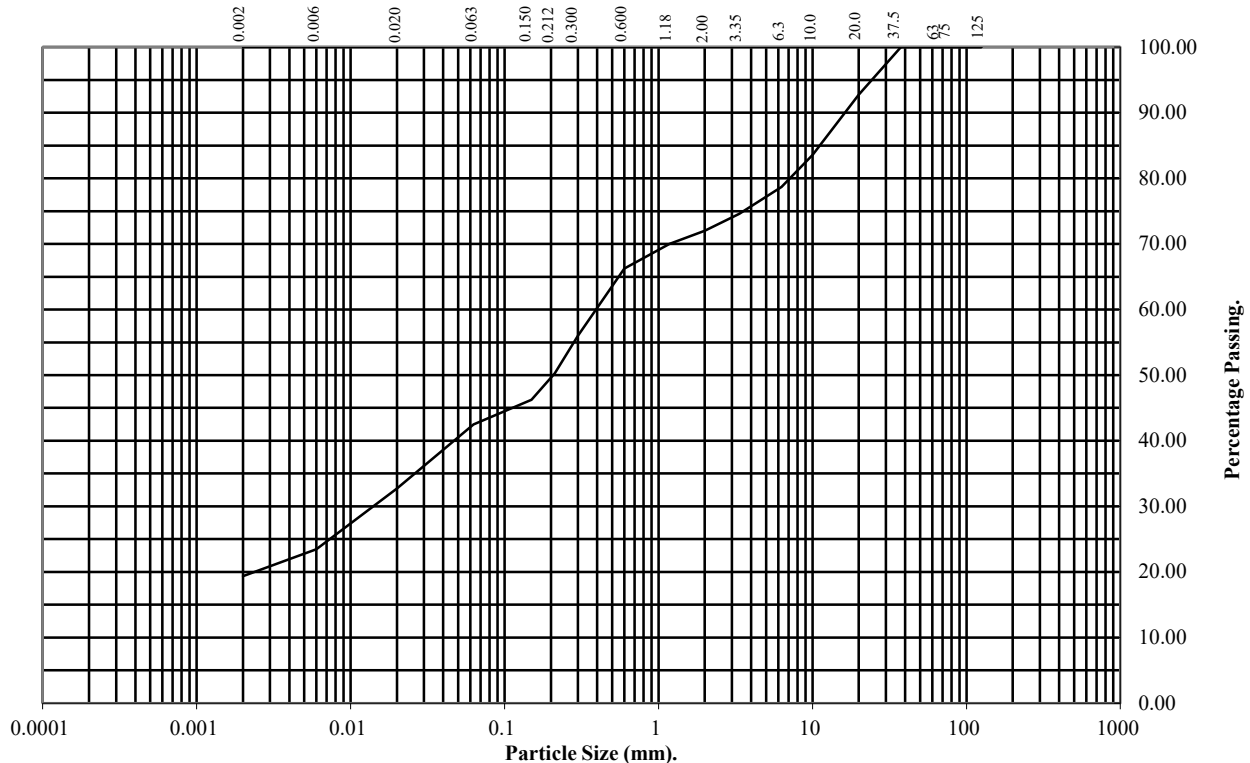
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH03 Top Depth (m): 2.00

Sample Number: 3 Base Depth(m): 3.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	93
10	84
6.3	79
3.35	75
2	72
1.18	70
0.6	66
0.3	56
0.212	50
0.15	46
0.063	42

Particle Diameter	Percentage Passing
0.02	33
0.006	23
0.002	19

Soil Fraction	Total Percentage
Cobbles	0
Gravel	28
Sand	30
Silt	23
Clay	19

Remarks:
See Summary of Soil Descriptions



Welwyn Garden City

Contract No:
PSL19/7560
Client Ref:
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PARTICLE SIZE DISTRIBUTION TEST

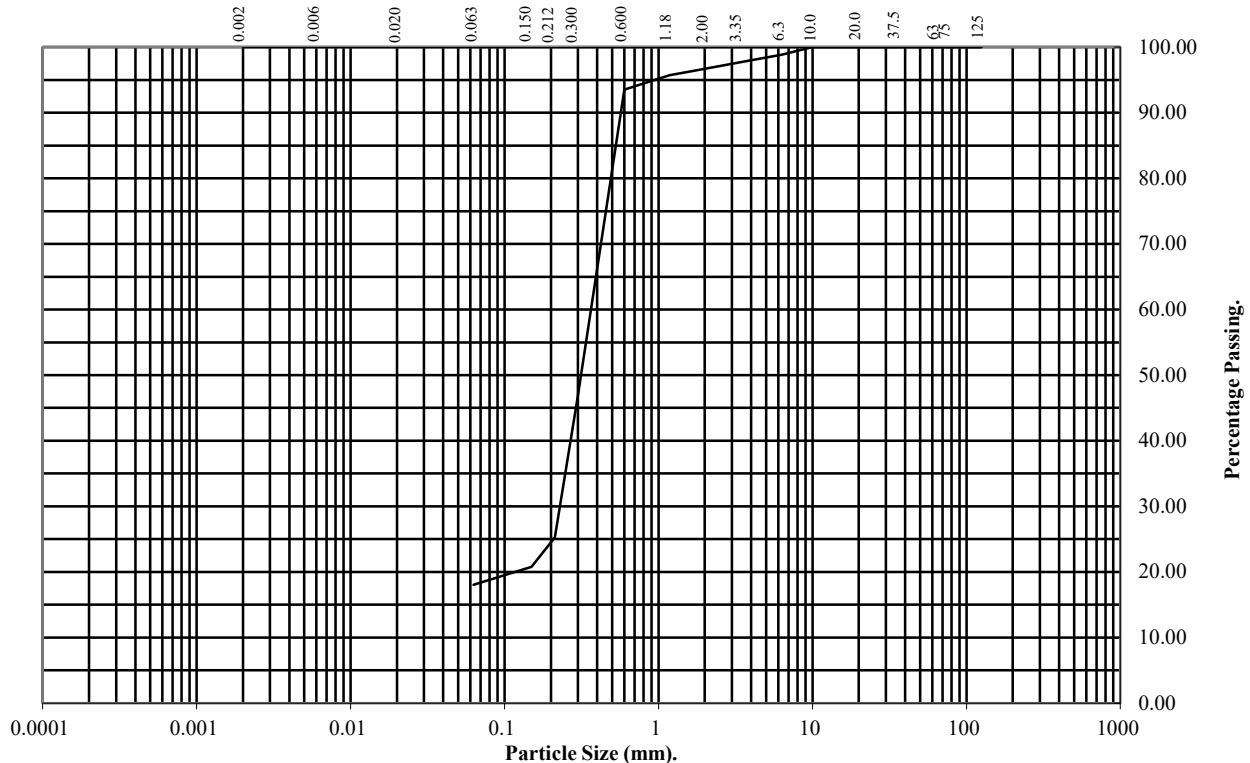
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH03 Top Depth (m): 3.00

Sample Number: 4 Base Depth(m): 3.45

Sample Type: SD



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	98
2	97
1.18	96
0.6	94
0.3	47
0.212	25
0.15	21
0.063	18

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	79
Silt/Clay	18

Remarks:
See Summary of Soil Descriptions



Welwyn Garden City

Contract No:
PSL19/7560
Client Ref:
A115249

PARTICLE SIZE DISTRIBUTION TEST

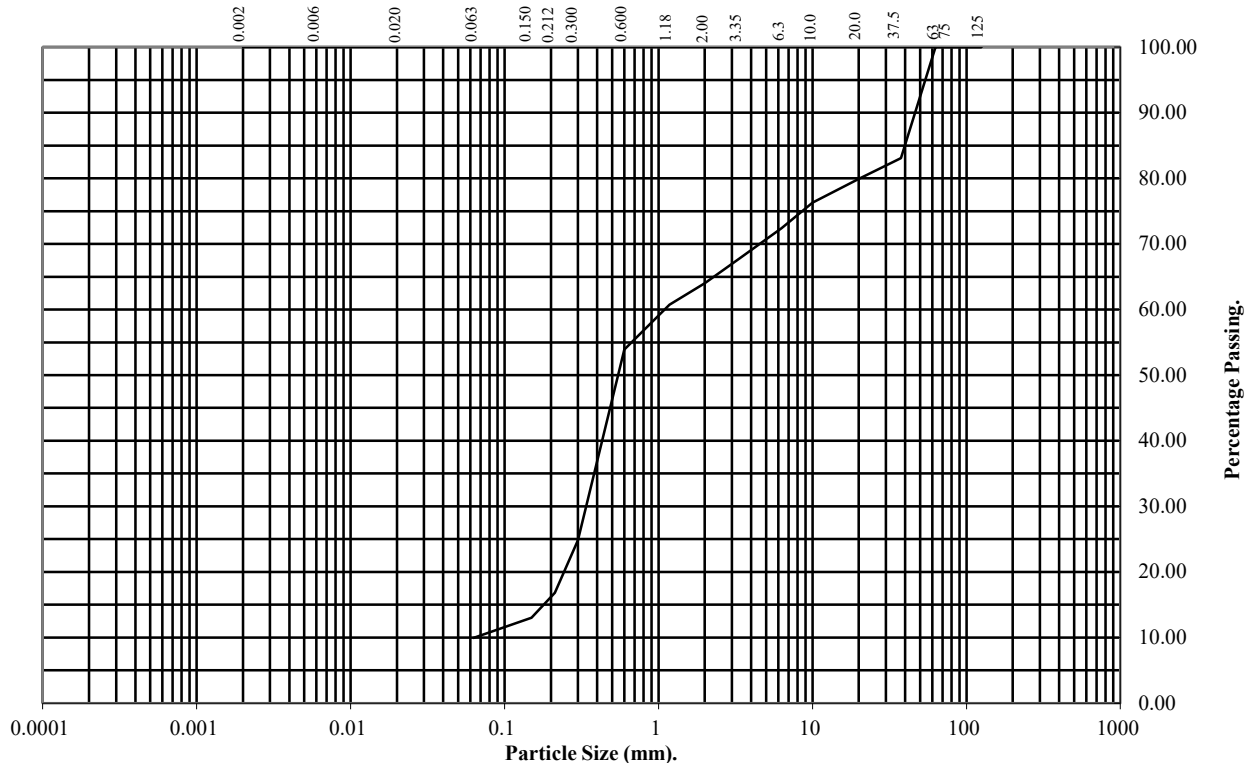
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH03 Top Depth (m): 7.00

Sample Number: 11 Base Depth(m): 8.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	83
20	80
10	76
6.3	72
3.35	68
2	64
1.18	61
0.6	54
0.3	25
0.212	17
0.15	13
0.063	10

Soil Fraction	Total Percentage
Cobbles	0
Gravel	36
Sand	54
Silt/Clay	10

Remarks:

See Summary of Soil Descriptions



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Welwyn Garden City

Contract No:
PSL19/7560
Client Ref:
A115249

PARTICLE SIZE DISTRIBUTION TEST

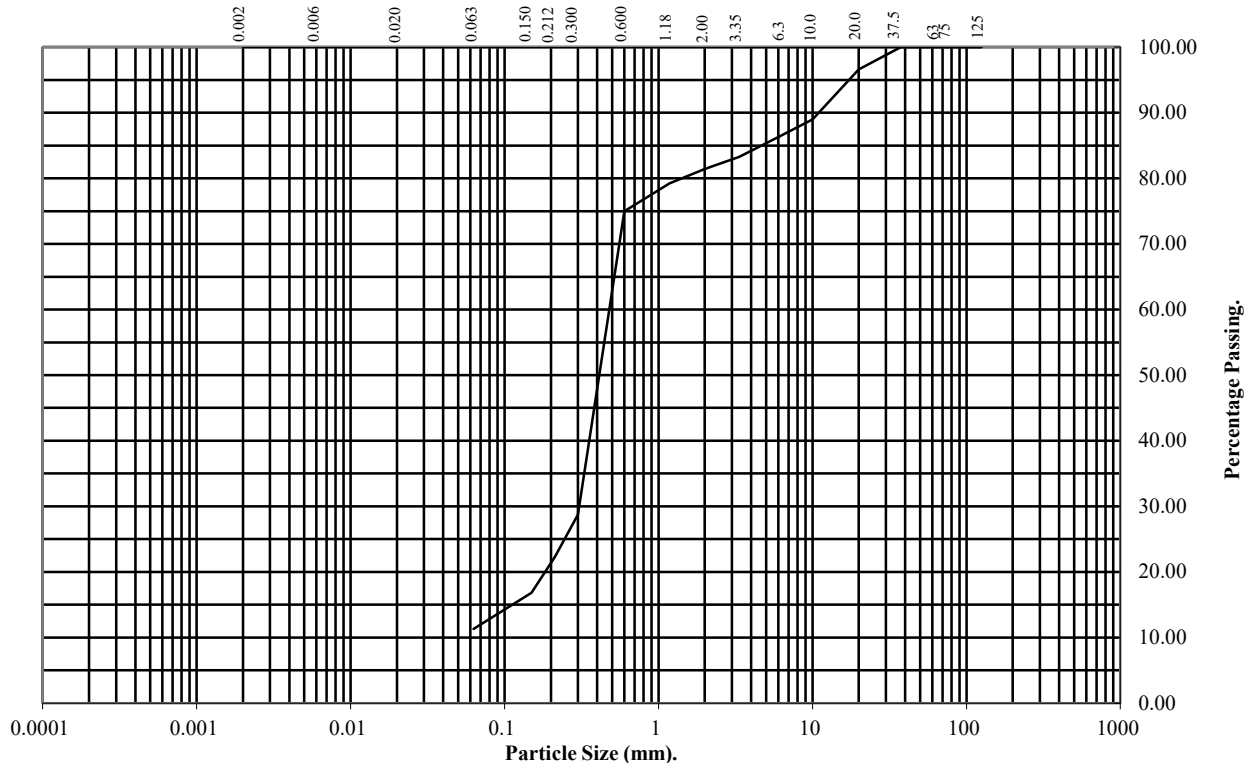
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH04 Top Depth (m): 2.00

Sample Number: 4 Base Depth(m): 3.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	97
10	89
6.3	87
3.35	83
2	81
1.18	79
0.6	75
0.3	29
0.212	22
0.15	17
0.063	11

Soil Fraction	Total Percentage
Cobbles	0
Gravel	19
Sand	70
Silt/Clay	11

Remarks:
See Summary of Soil Descriptions



Welwyn Garden City

Contract No:
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PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

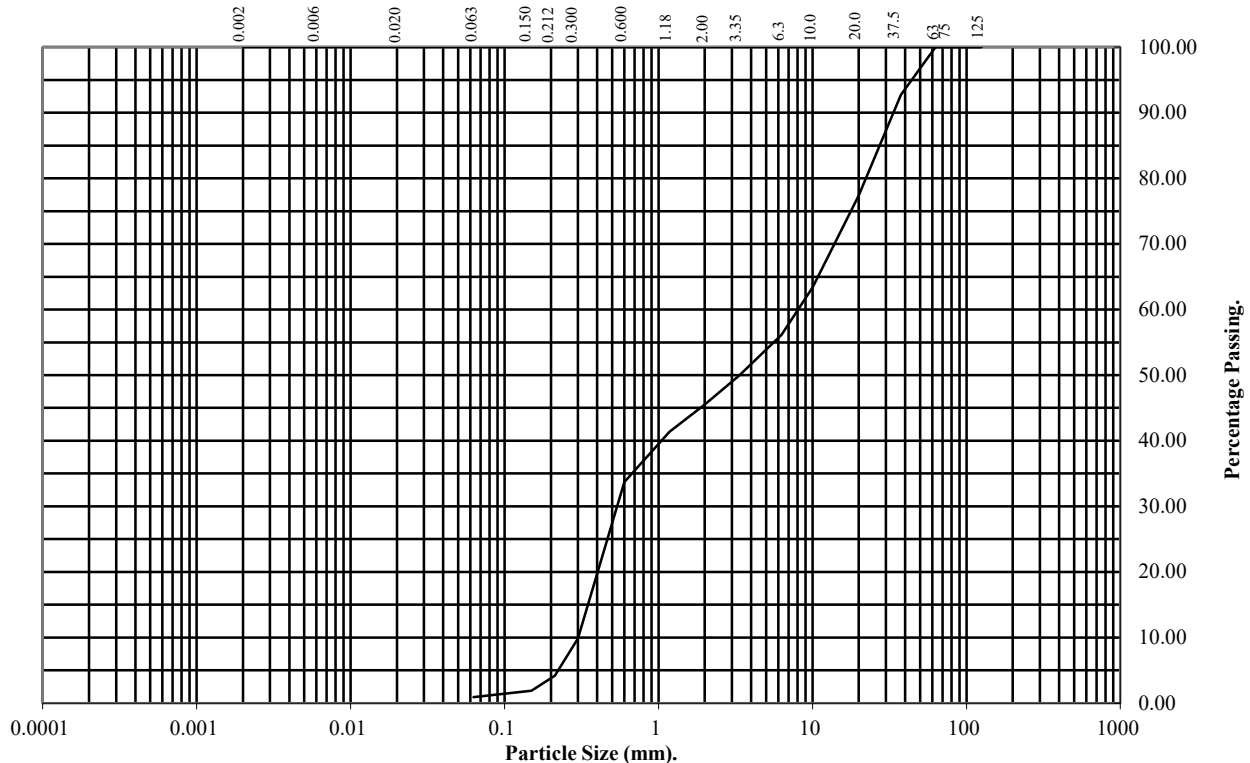
Hole Number: BH04

Top Depth (m): 10.00

Sample Number: 11

Base Depth(m): 11.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	93
20	77
10	63
6.3	56
3.35	50
2	46
1.18	41
0.6	34
0.3	10
0.212	4
0.15	2
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	54
Sand	45
Silt/Clay	1

Remarks:

See Summary of Soil Descriptions



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Client Ref:
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PARTICLE SIZE DISTRIBUTION TEST

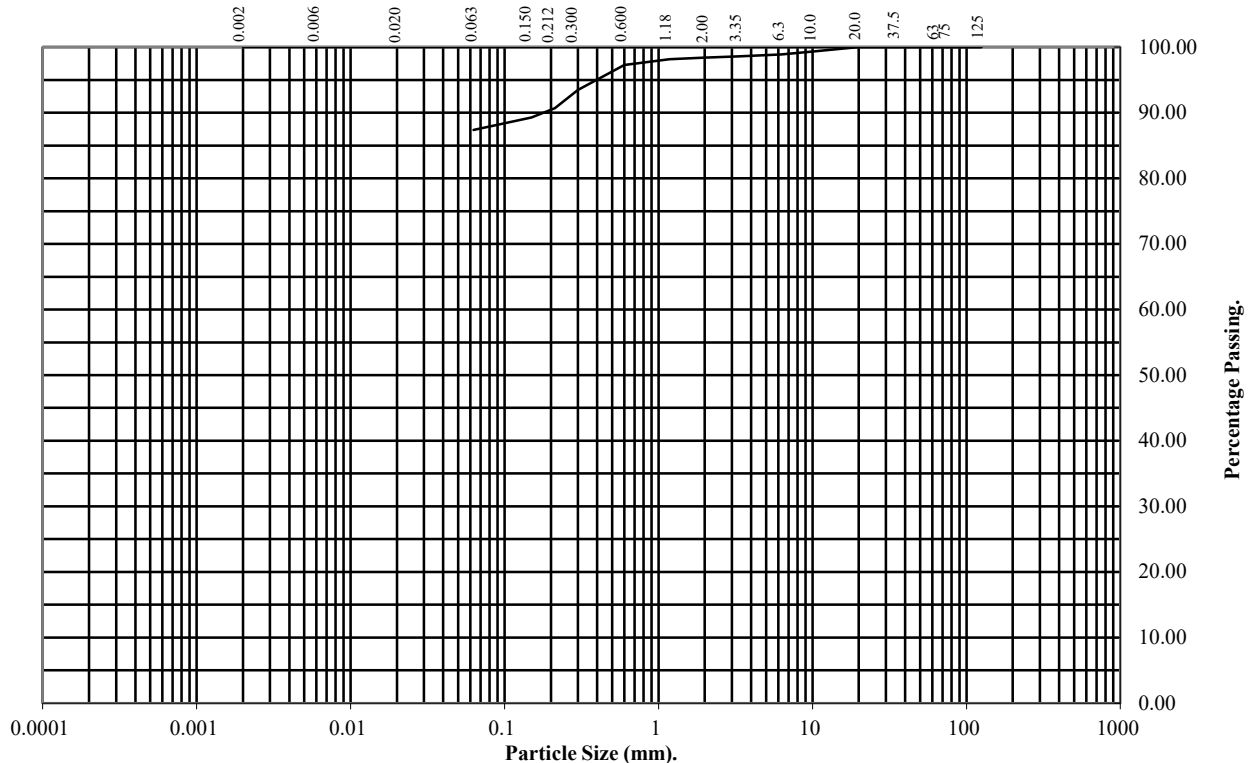
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH05 Top Depth (m): 2.00

Sample Number: 3 Base Depth(m): 2.45

Sample Type: SD



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	99
3.35	99
2	98
1.18	98
0.6	97
0.3	94
0.212	91
0.15	89
0.063	87

Soil Fraction	Total Percentage
Cobbles	0
Gravel	2
Sand	11
Silt/Clay	87

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

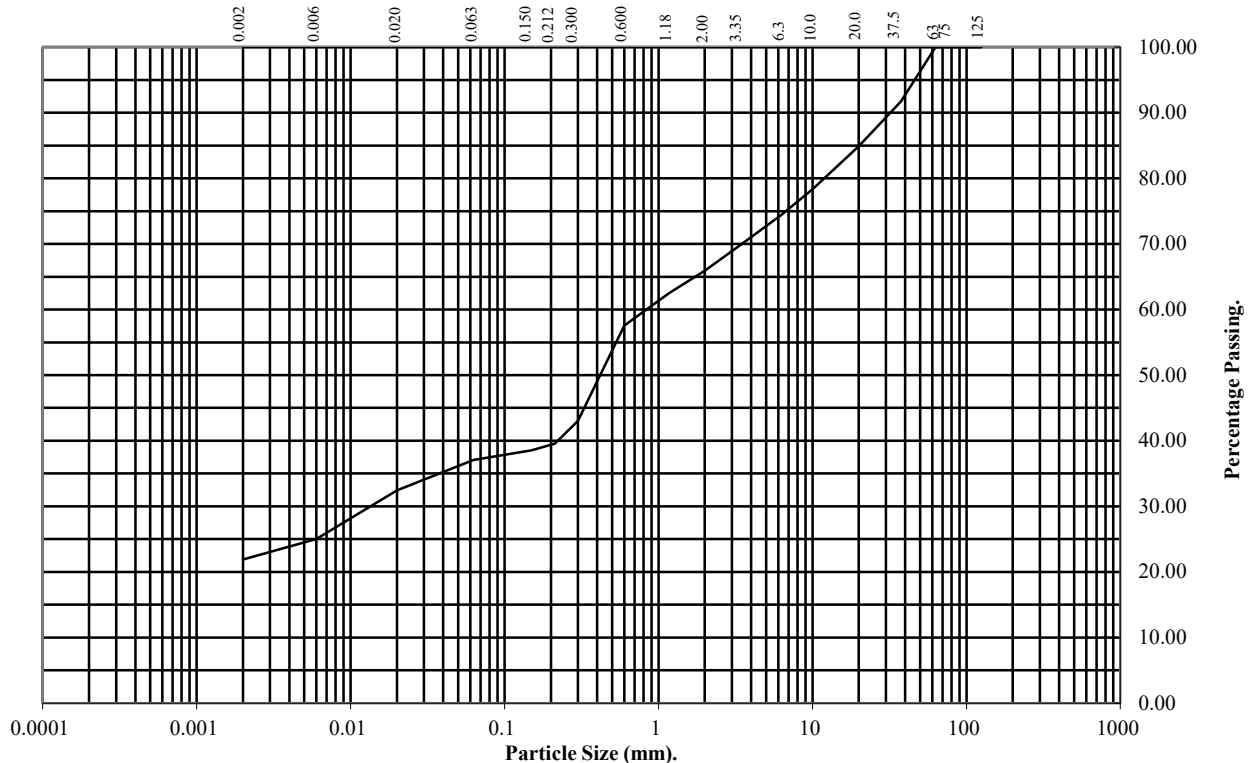
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH05 Top Depth (m): 9.00

Sample Number: 6 Base Depth(m): 9.95

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	92
20	85
10	78
6.3	74
3.35	70
2	66
1.18	63
0.6	58
0.3	43
0.212	40
0.15	39
0.063	37

Particle Diameter	Percentage Passing
0.02	32
0.006	25
0.002	22

Soil Fraction	Total Percentage
Cobbles	0
Gravel	34
Sand	29
Silt	15
Clay	22

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

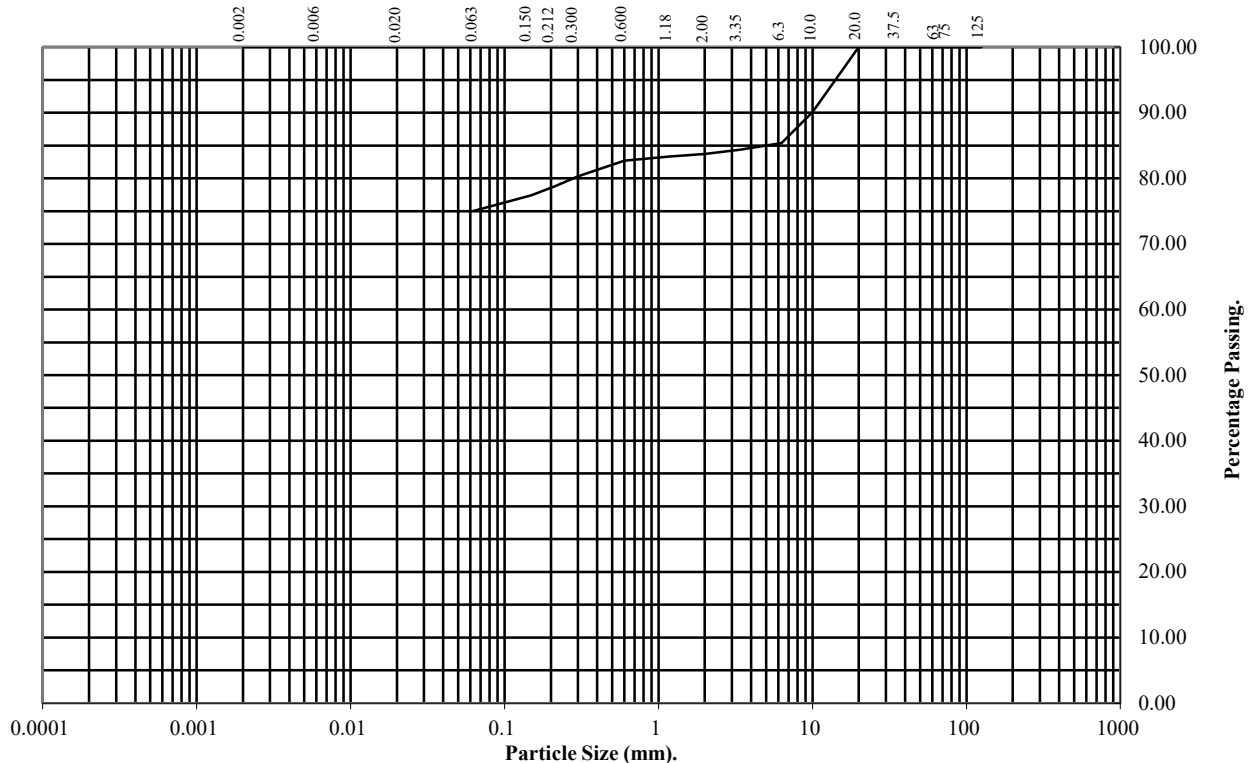
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH05 Top Depth (m): 9.50

Sample Number: 7 Base Depth(m): 9.95

Sample Type: SD



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	90
6.3	85
3.35	84
2	84
1.18	83
0.6	83
0.3	80
0.212	79
0.15	77
0.063	75

Soil Fraction	Total Percentage
Cobbles	0
Gravel	16
Sand	9
Silt/Clay	75

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

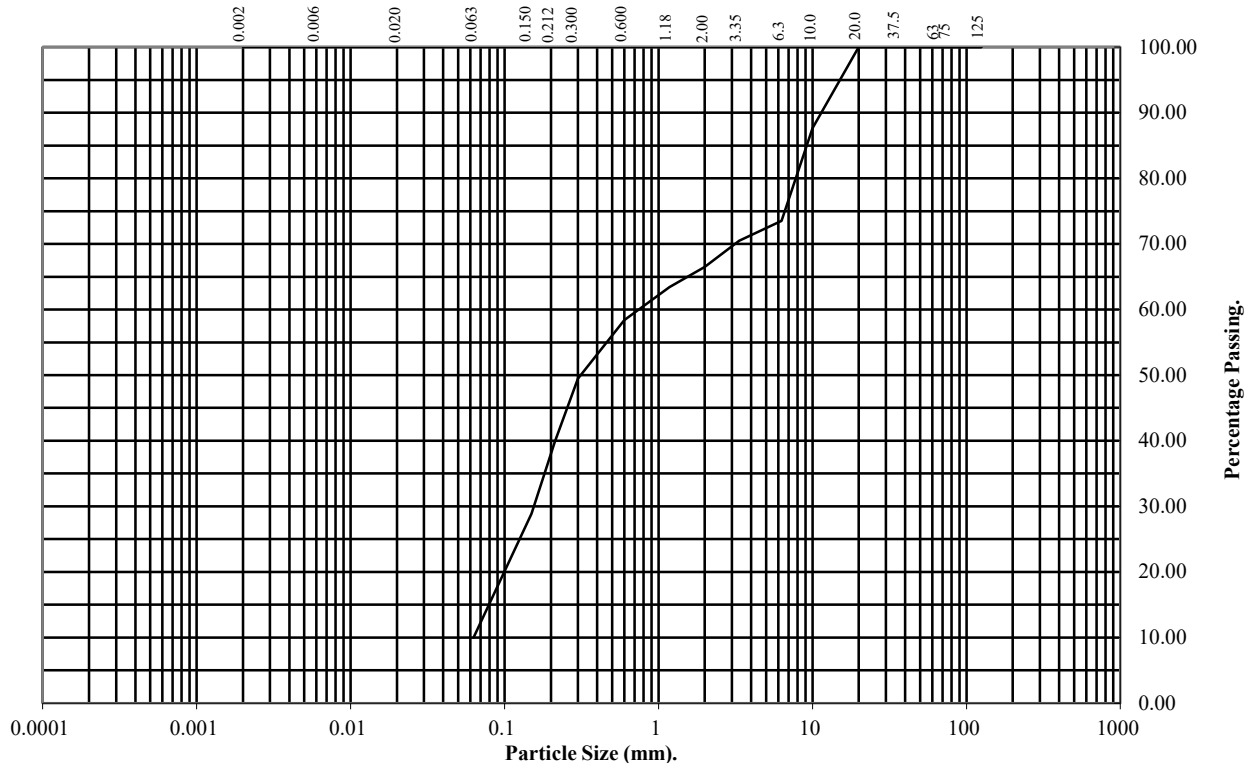
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH06 Top Depth (m): 5.00

Sample Number: 9 Base Depth(m): 6.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	88
6.3	74
3.35	71
2	66
1.18	63
0.6	58
0.3	49
0.212	40
0.15	29
0.063	10

Soil Fraction	Total Percentage
Cobbles	0
Gravel	34
Sand	56
Silt/Clay	10

Remarks:
See Summary of Soil Descriptions



Welwyn Garden City

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PARTICLE SIZE DISTRIBUTION TEST

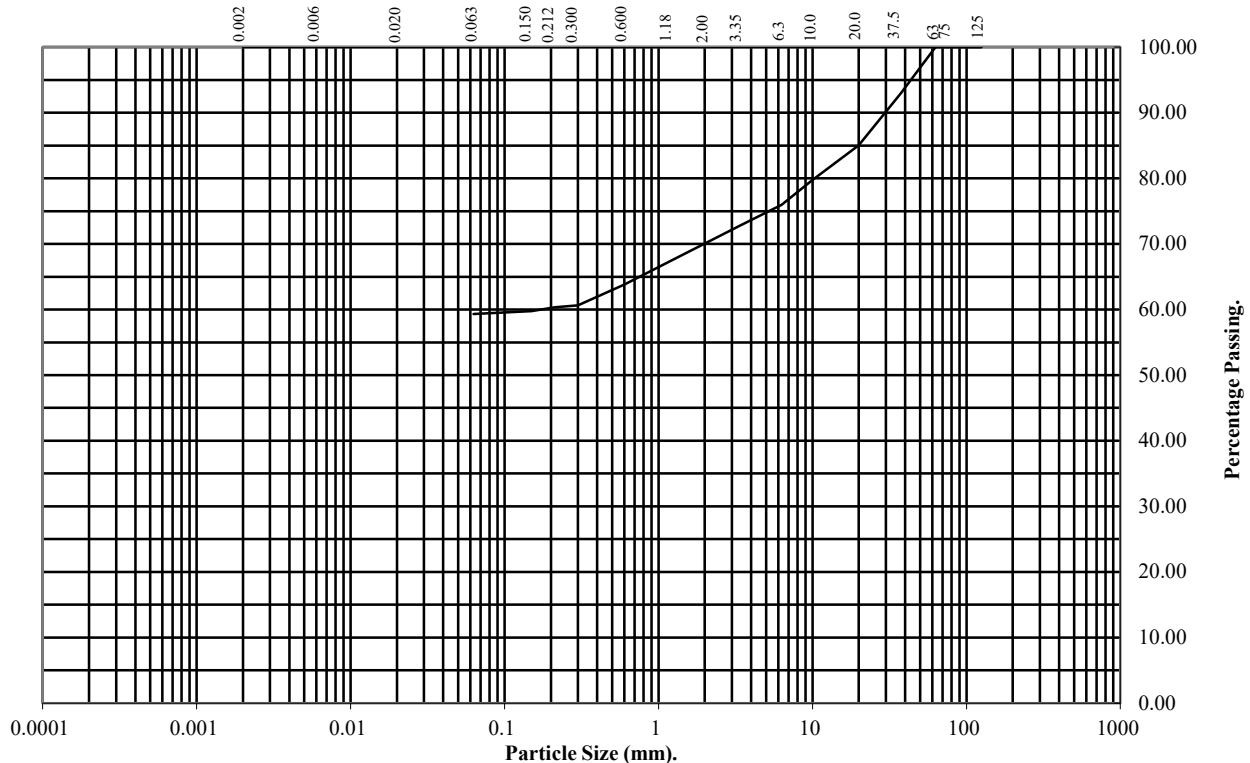
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH06 Top Depth (m): 8.00

Sample Number: 11 Base Depth(m): 9.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	93
20	85
10	80
6.3	76
3.35	73
2	70
1.18	67
0.6	64
0.3	61
0.212	60
0.15	60
0.063	59

Soil Fraction	Total Percentage
Cobbles	0
Gravel	30
Sand	11
Silt/Clay	59

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

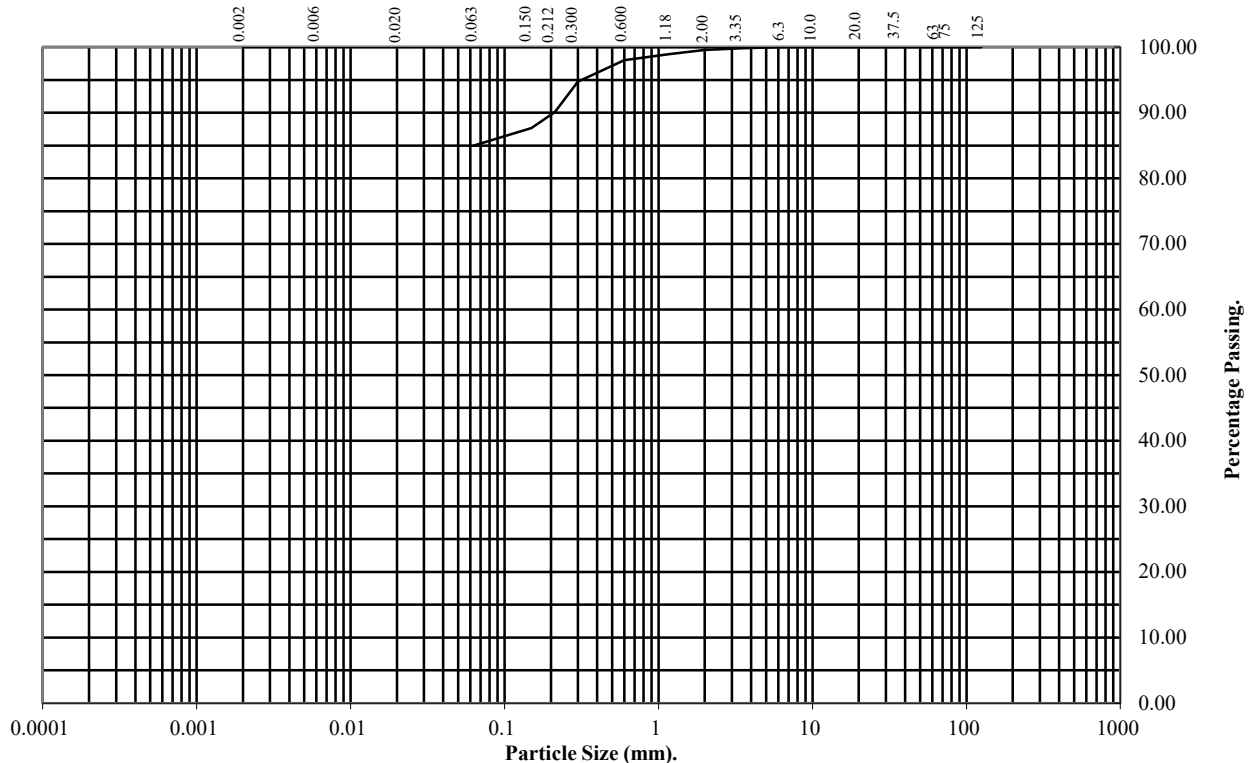
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH07 Top Depth (m): 5.00

Sample Number: 11 Base Depth(m): 5.45

Sample Type: U



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	98
0.3	95
0.212	90
0.15	88
0.063	85

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	15
Silt/Clay	85

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

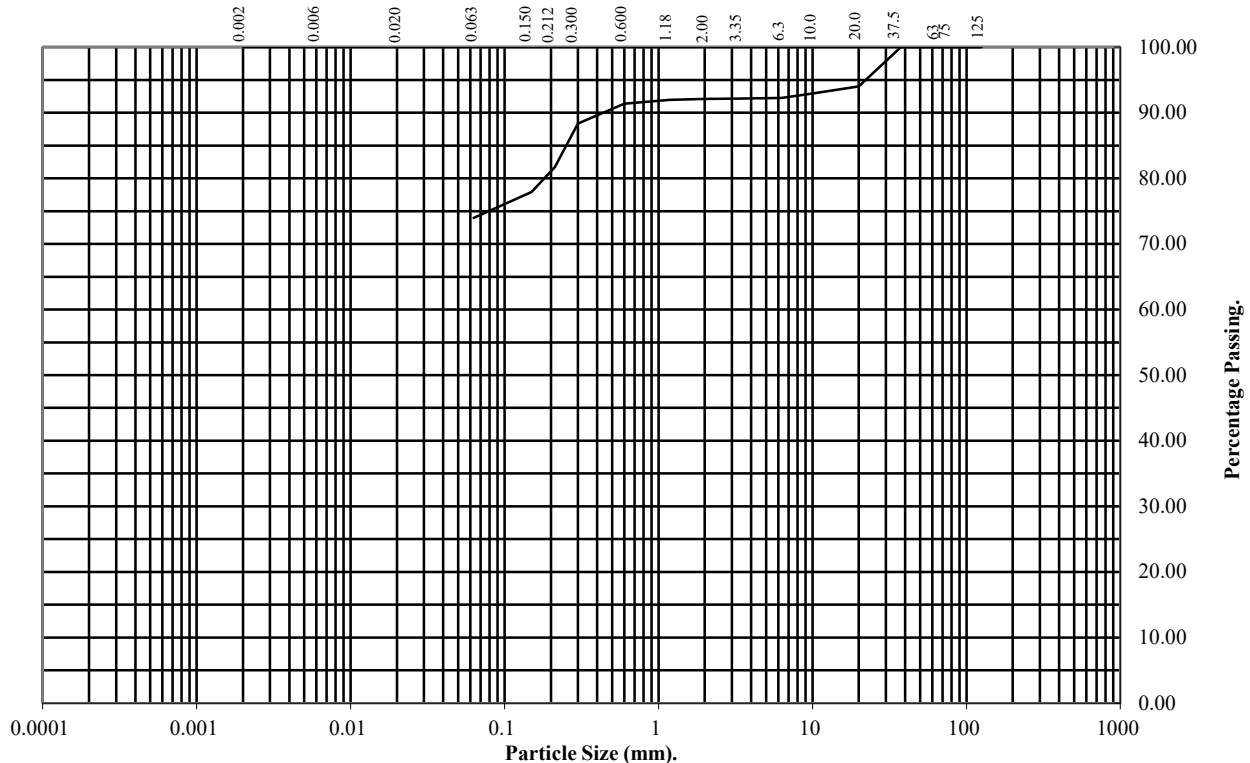
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH07 Top Depth (m): 11.00

Sample Number: 20 Base Depth(m): 11.40

Sample Type: SD



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	94
10	93
6.3	92
3.35	92
2	92
1.18	92
0.6	91
0.3	88
0.212	82
0.15	78
0.063	74

Soil Fraction	Total Percentage
Cobbles	0
Gravel	8
Sand	18
Silt/Clay	74

Remarks:
See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

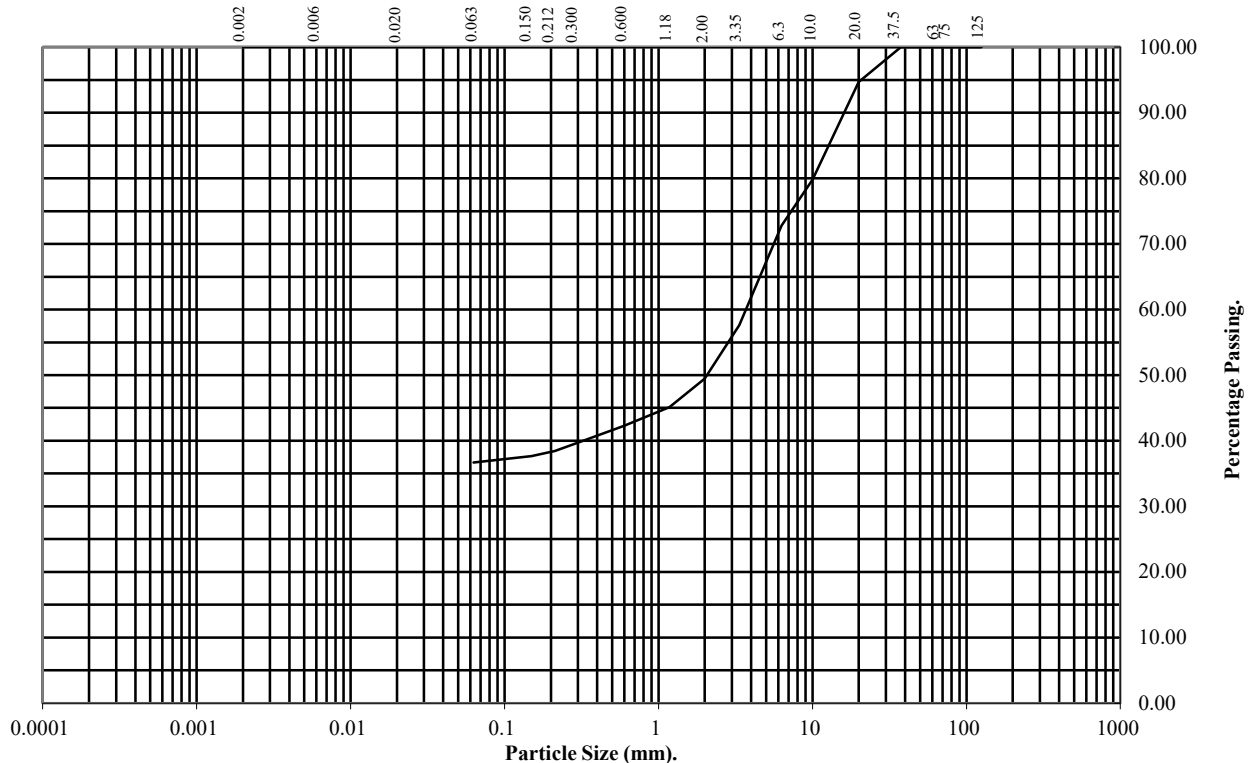
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH08 Top Depth (m): 2.00

Sample Number: 4 Base Depth(m): 2.45

Sample Type: U



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	95
10	80
6.3	73
3.35	58
2	49
1.18	45
0.6	42
0.3	40
0.212	38
0.15	38
0.063	37

Soil Fraction	Total Percentage
Cobbles	0
Gravel	51
Sand	12
Silt/Clay	37

Remarks:
See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

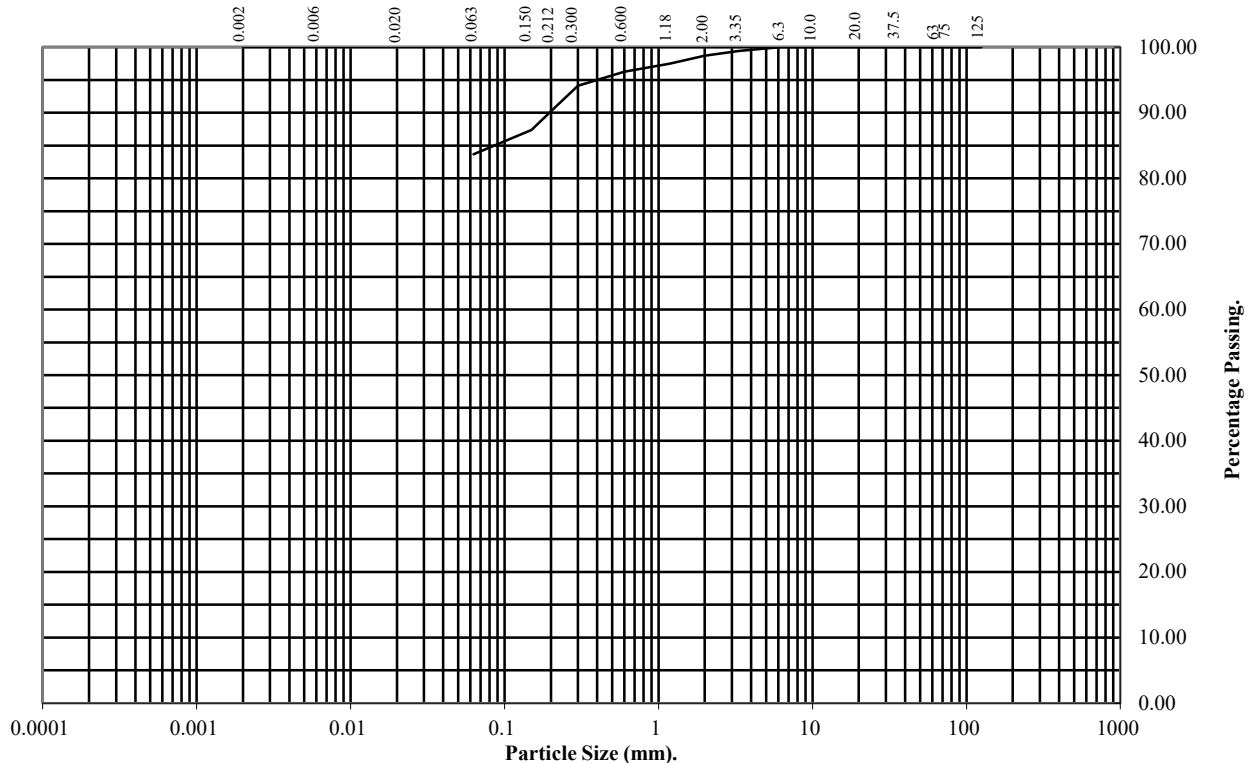
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH08 Top Depth (m): 4.00

Sample Number: 9 Base Depth(m): 4.45

Sample Type: U



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	99
1.18	97
0.6	96
0.3	94
0.212	91
0.15	87
0.063	84

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	15
Silt/Clay	84

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

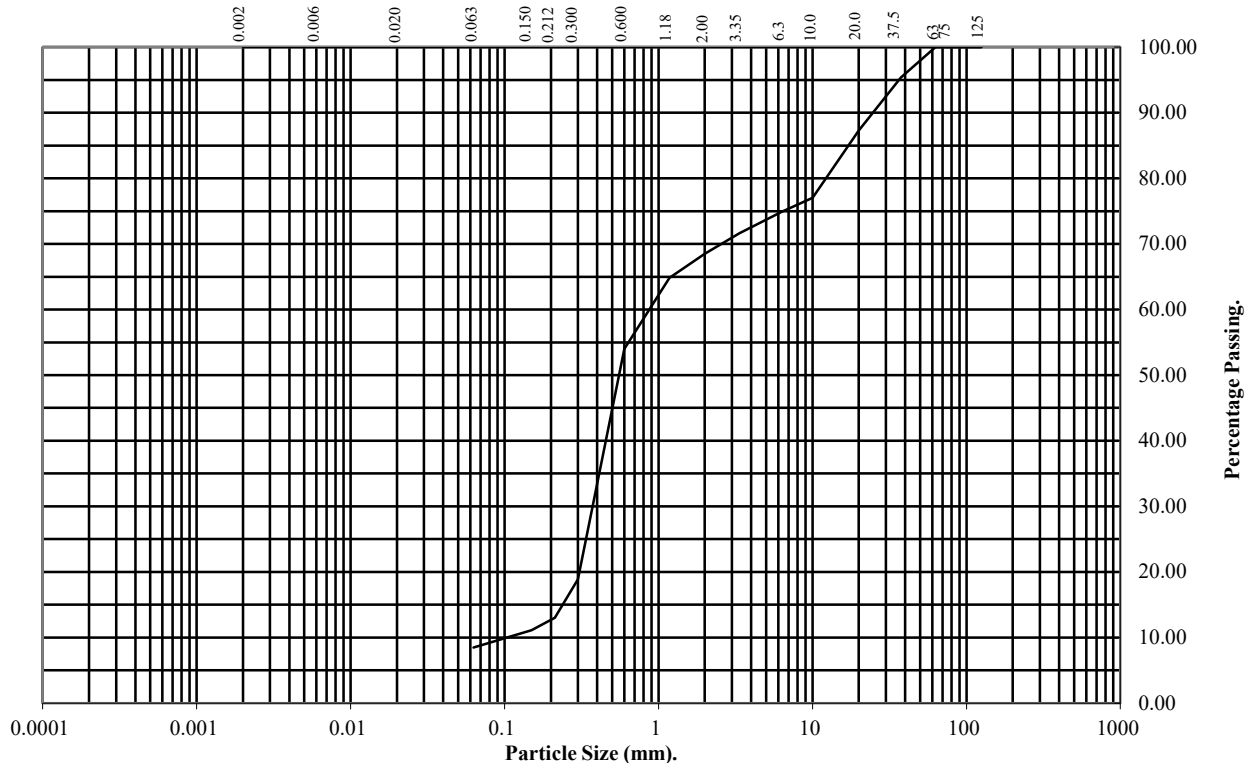
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH08 Top Depth (m): 11.50

Sample Number: 22 Base Depth(m): 12.50

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	95
20	87
10	77
6.3	75
3.35	72
2	68
1.18	65
0.6	54
0.3	19
0.212	13
0.15	11
0.063	8

Soil Fraction	Total Percentage
Cobbles	0
Gravel	32
Sand	60
Silt/Clay	8

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

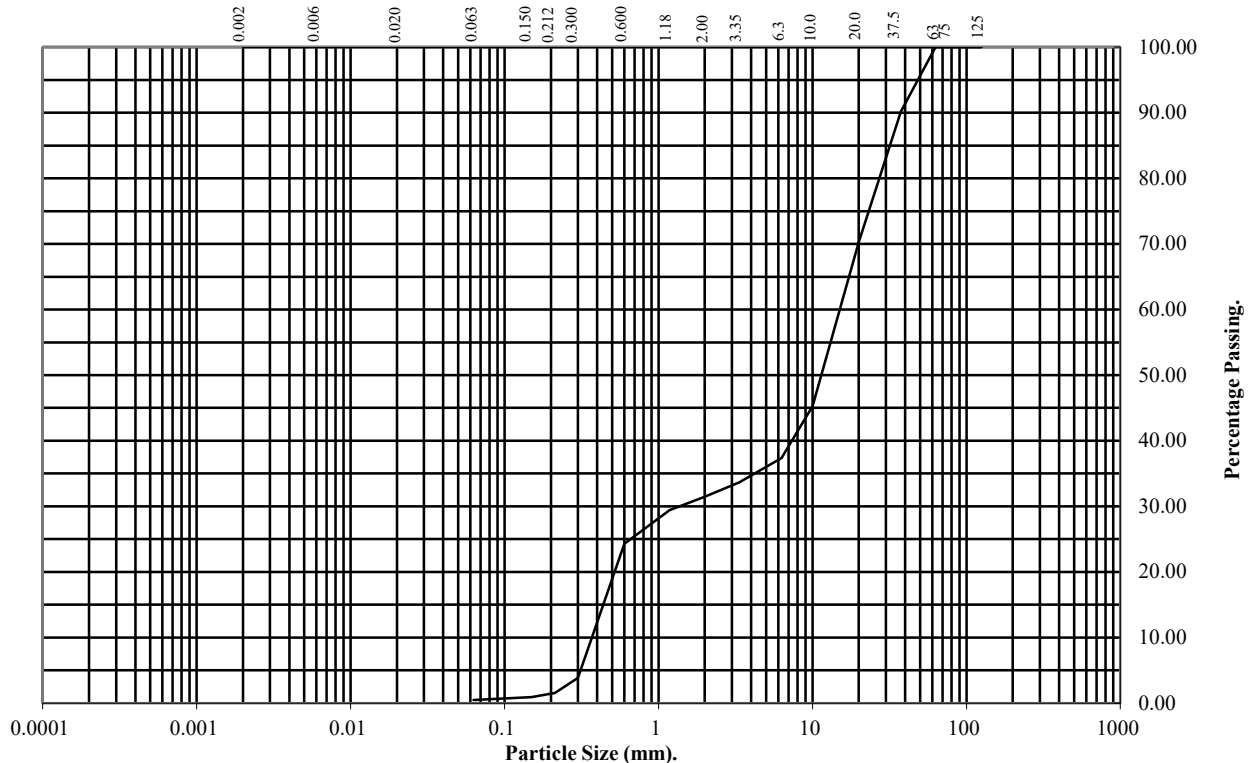
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH08 Top Depth (m): 14.00

Sample Number: 25 Base Depth(m): 14.50

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	90
20	70
10	45
6.3	37
3.35	34
2	31
1.18	29
0.6	24
0.3	4
0.212	2
0.15	1
0.063	0

Soil Fraction	Total Percentage
Cobbles	0
Gravel	69
Sand	31
Silt/Clay	0

Remarks:
See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

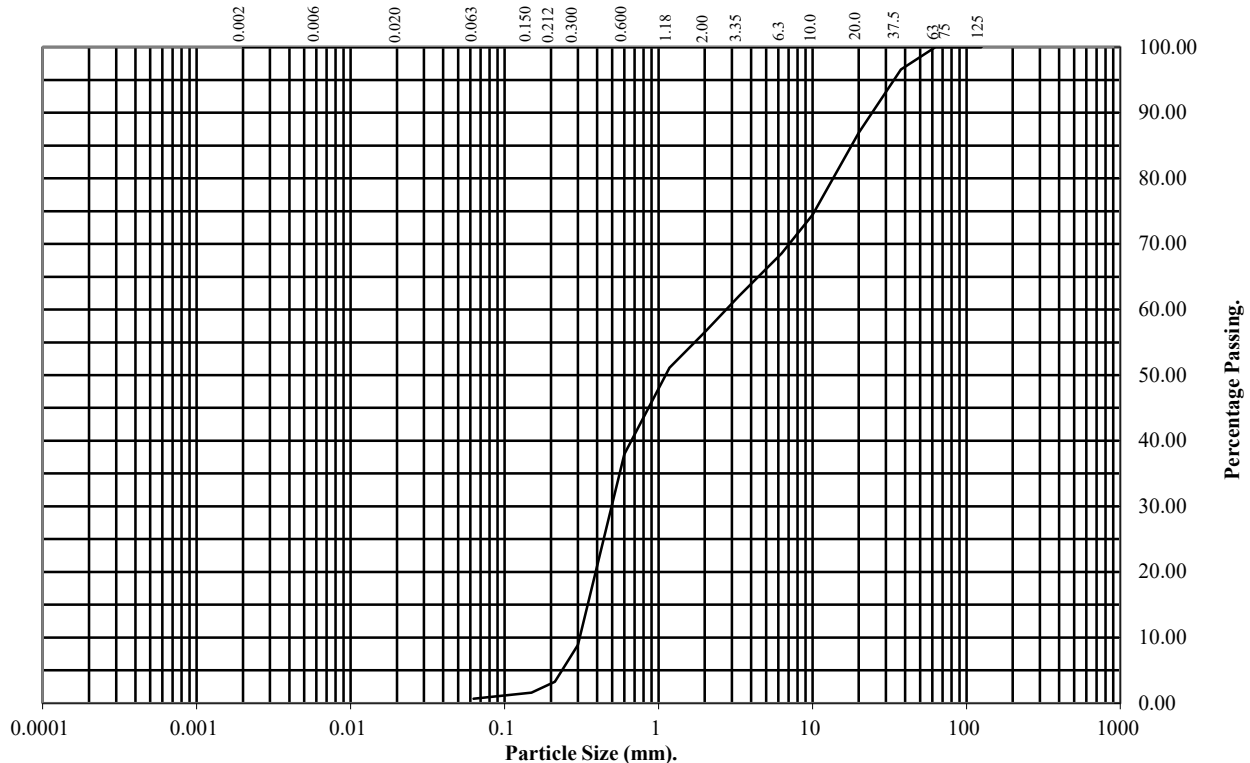
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: WS03 Top Depth (m): 3.00

Sample Number: - Base Depth(m): 4.00

Sample Type: -



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	97
20	87
10	74
6.3	69
3.35	62
2	57
1.18	51
0.6	38
0.3	9
0.212	3
0.15	2
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	43
Sand	56
Silt/Clay	1

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

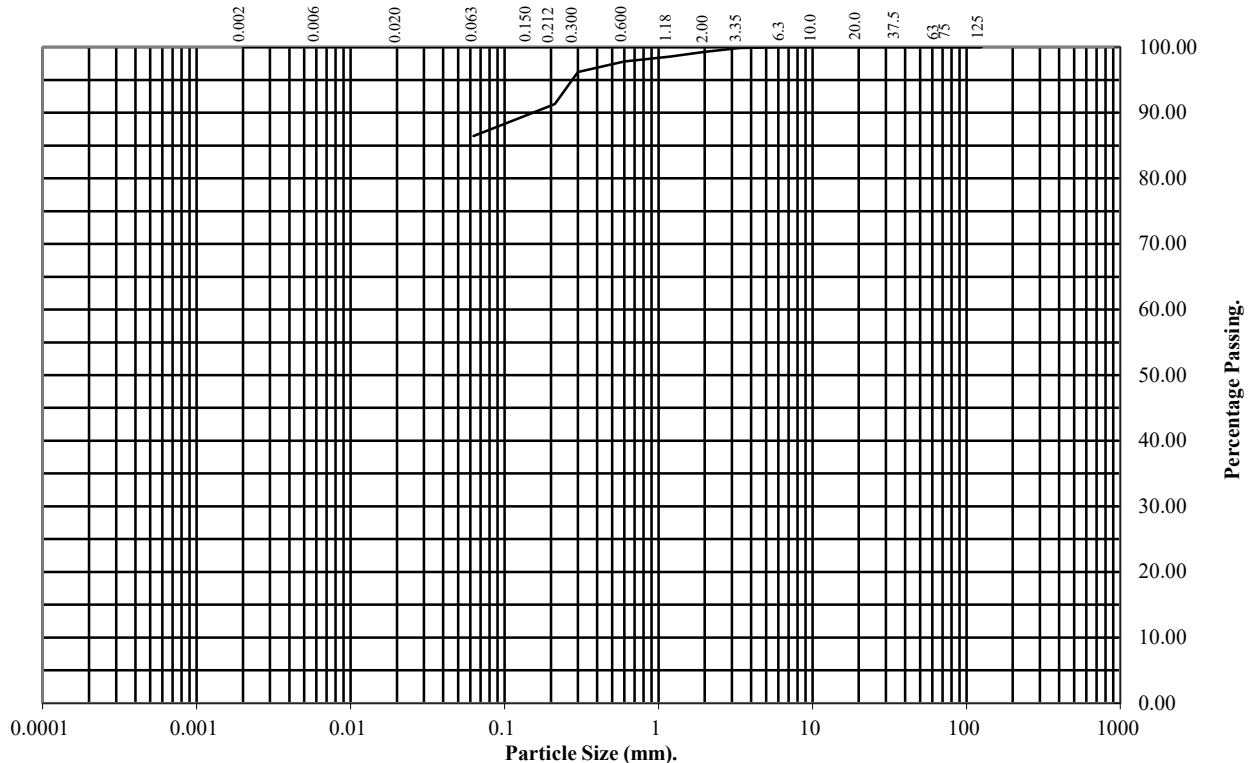
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: WS09 Top Depth (m): 2.00

Sample Number: - Base Depth(m): 3.00

Sample Type: -



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	99
0.6	98
0.3	96
0.212	91
0.15	90
0.063	86

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	13
Silt/Clay	86

Remarks:

See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

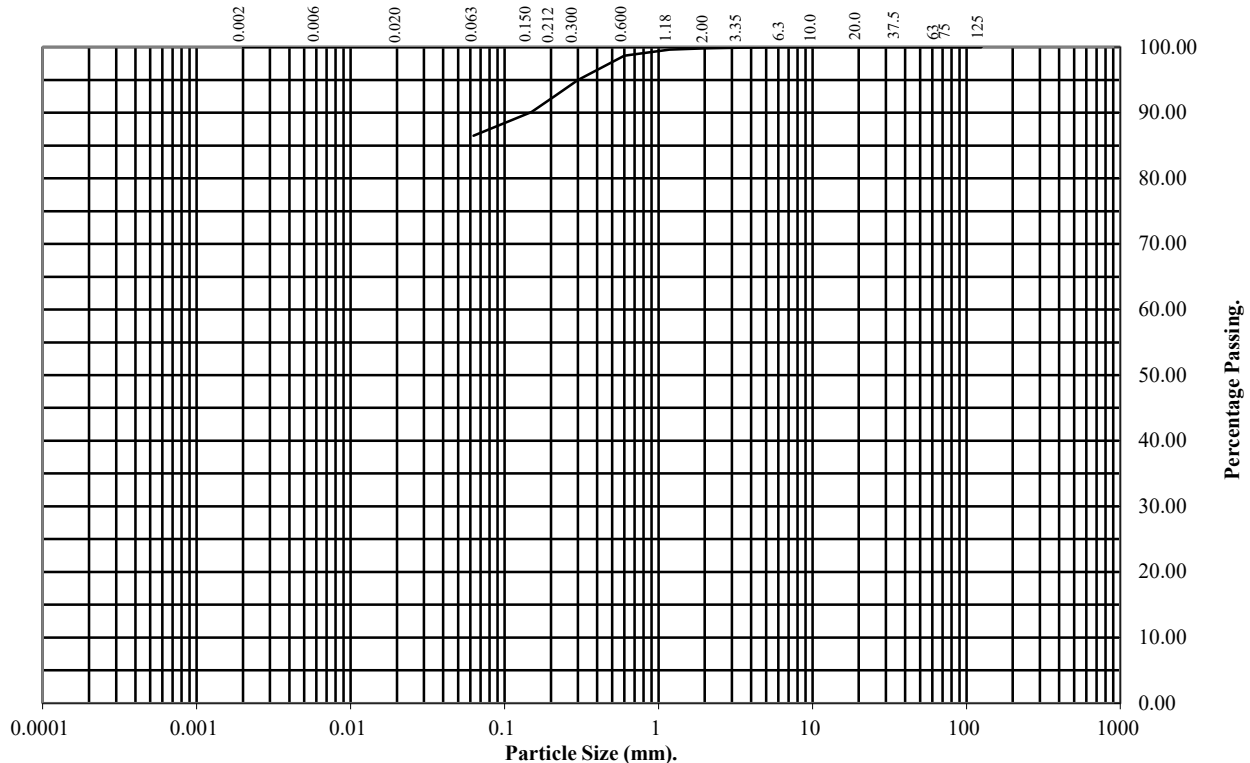
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WS10** Top Depth (m): **6.00**

Sample Number: **-** Base Depth(m): **7.00**

Sample Type: **-**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	99
0.3	95
0.212	93
0.15	90
0.063	87

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	13
Silt/Clay	87

Remarks:
See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

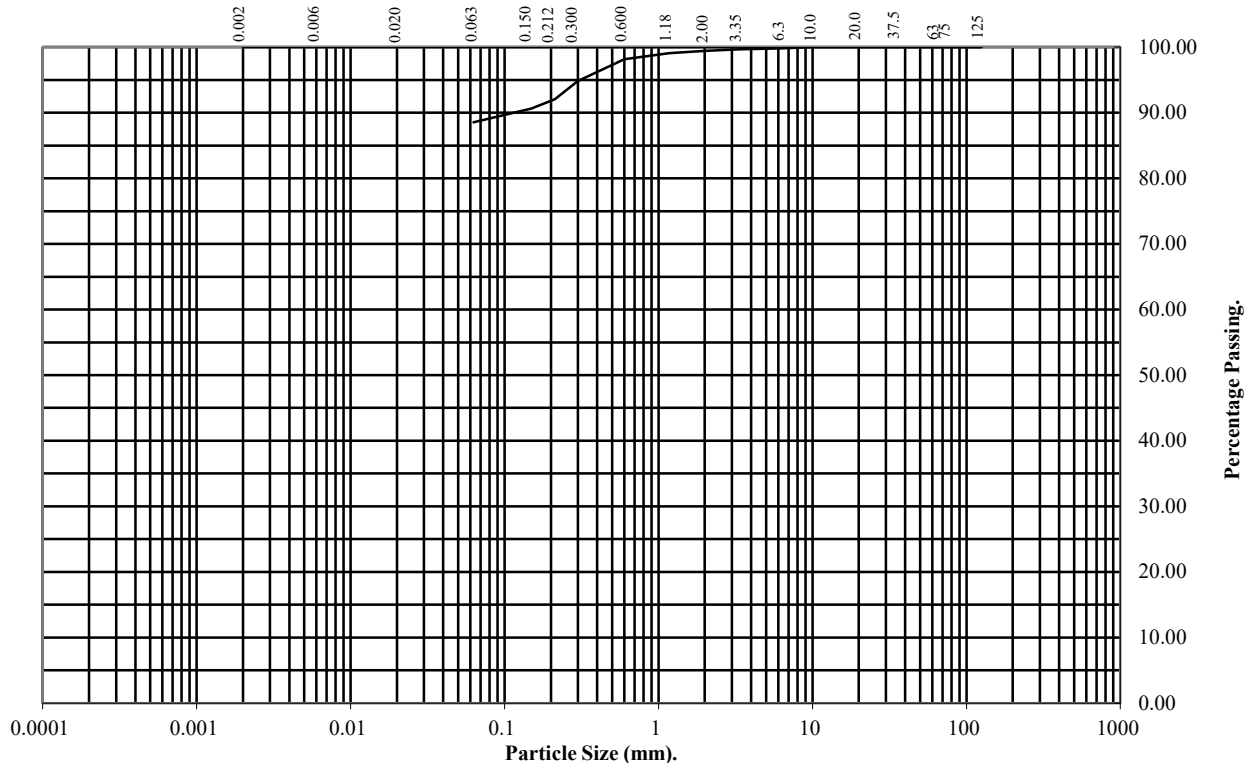
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WS13** Top Depth (m): **5.00**

Sample Number: **-** Base Depth(m): **6.00**

Sample Type: **-**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	99
0.6	98
0.3	95
0.212	92
0.15	91
0.063	89

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	10
Silt/Clay	89

Remarks:
See Summary of Soil Descriptions



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PARTICLE SIZE DISTRIBUTION TEST

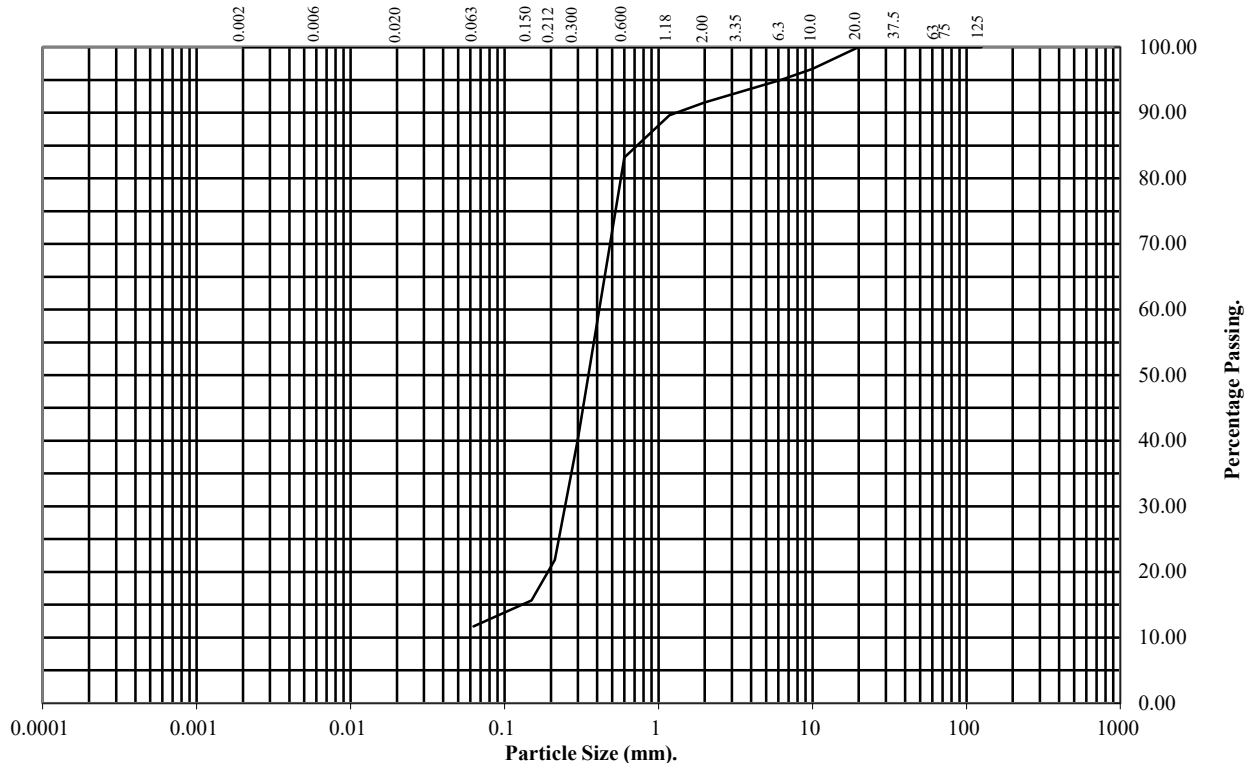
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: WS16 Top Depth (m): 4.00

Sample Number: - Base Depth(m): 5.00

Sample Type: -



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	97
6.3	95
3.35	93
2	92
1.18	90
0.6	83
0.3	40
0.212	22
0.15	16
0.063	12

Soil Fraction	Total Percentage
Cobbles	0
Gravel	8
Sand	80
Silt/Clay	12

Remarks:

See Summary of Soil Descriptions



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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

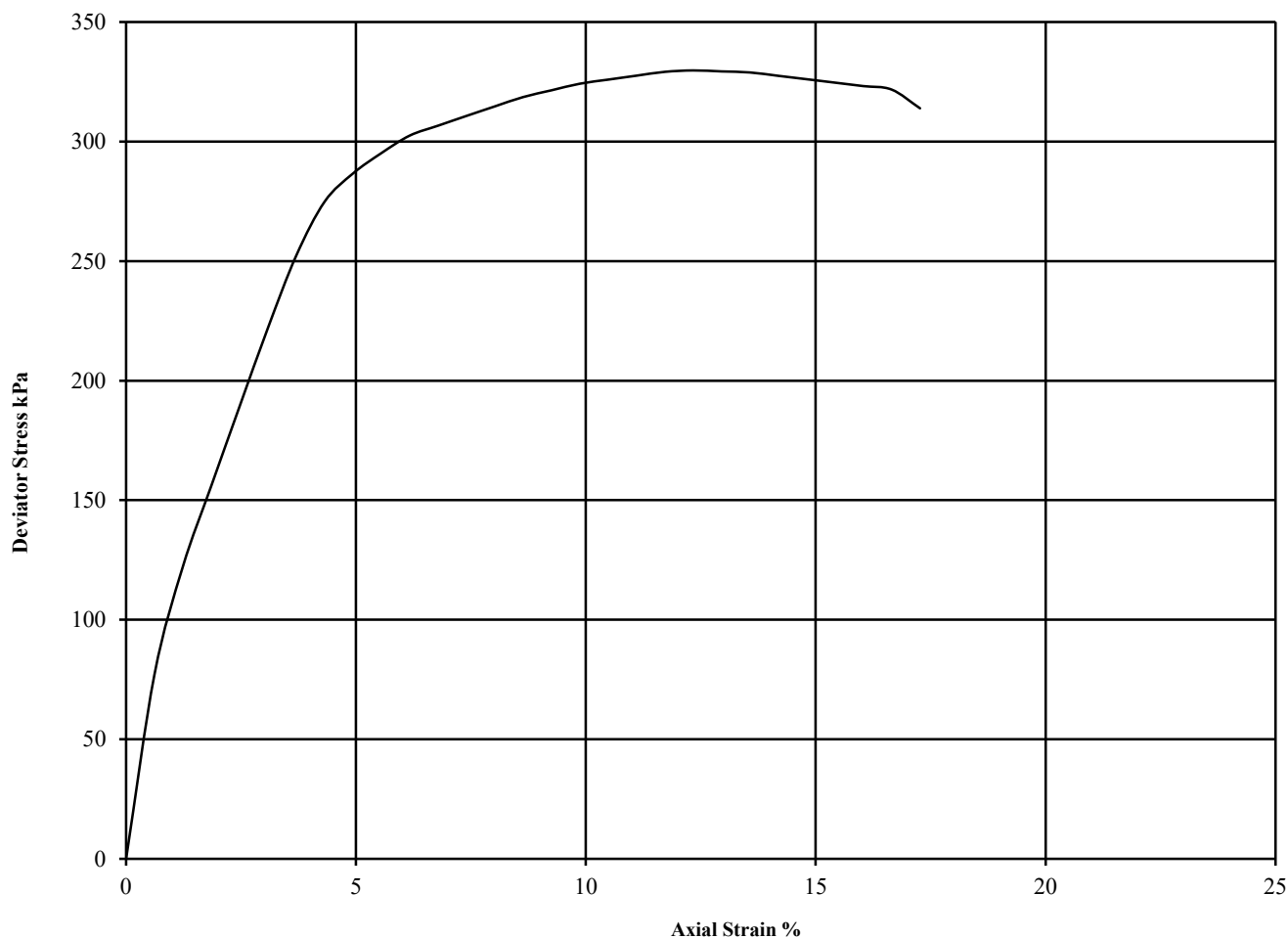
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH07 Top Depth (m): 3.00

Sample Number: 6 Base Depth (m): 3.45

Sample Type U



Diameter (mm):		103	Height (mm):		167	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell	Corr. Max.	Shear	Failure Strain (%)	Mode of Failure	Undisturbed Sample
				Pressure	Deviator	Strength			Sample taken from top of tube
				(kPa)	Stress	Cu			Rate of strain = 2 %/min
				(kPa)	(kPa)				Latex Membrane used 0.2 mm thick,
				θ_3	$(\theta_1-\theta_3)_f$	$^{1/2}(\theta_1-\theta_3)_f$			Correction applied 0.35
1	15	2.11	1.84	60	330	165	12.3	Brittle	See summary of soil descriptions



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Client Ref:

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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

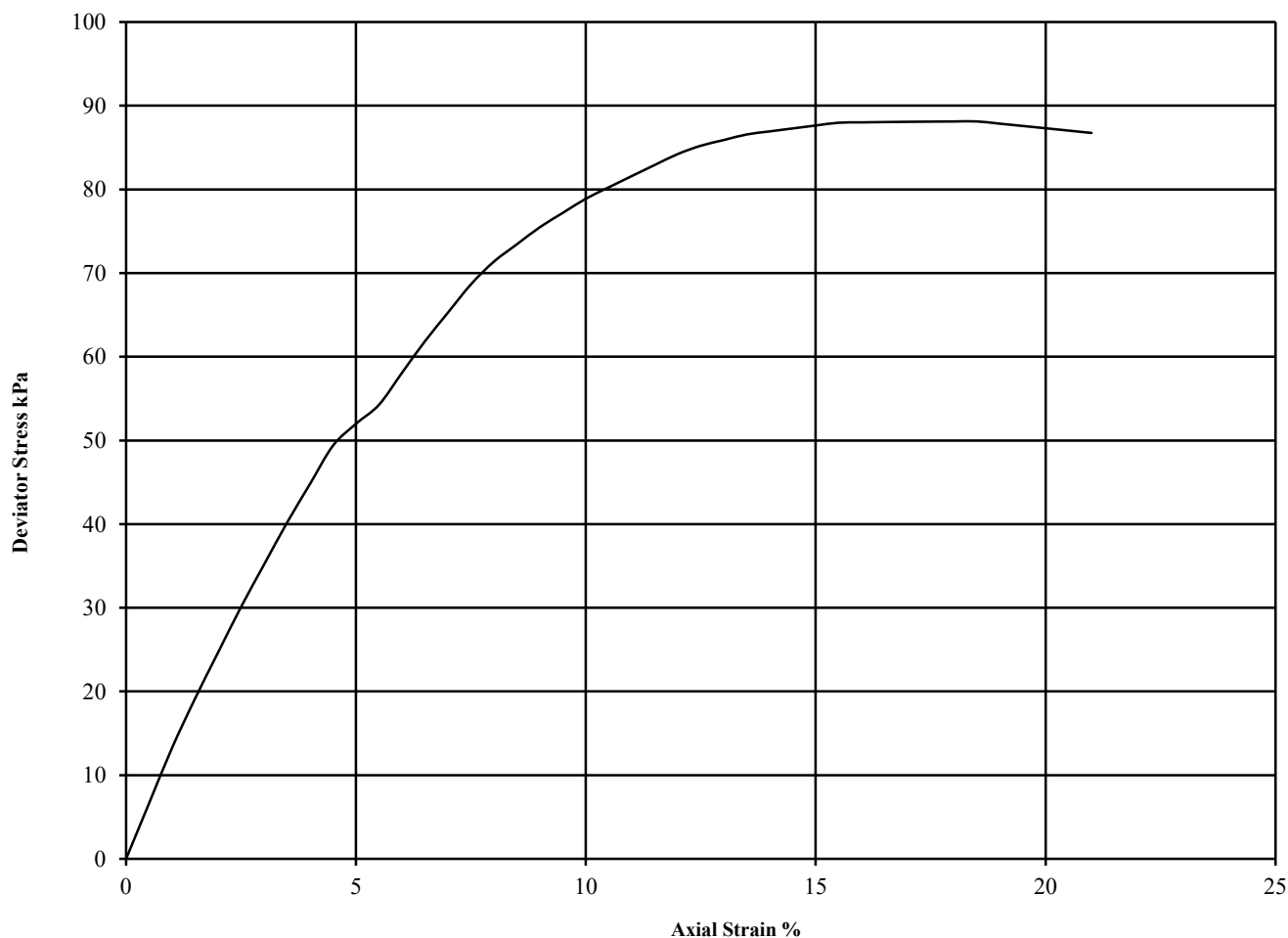
Hole Number: BH07

Top Depth (m): 4.00

Sample Number: 10

Base Depth (m):

Sample Type B



Diameter (mm):		Height (mm):			Test:		UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Disturbed Sample Remoulded with 2.5kg effort Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	22	2.07	1.70	80	88	44	18.5	Plastic	



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Client Ref:

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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

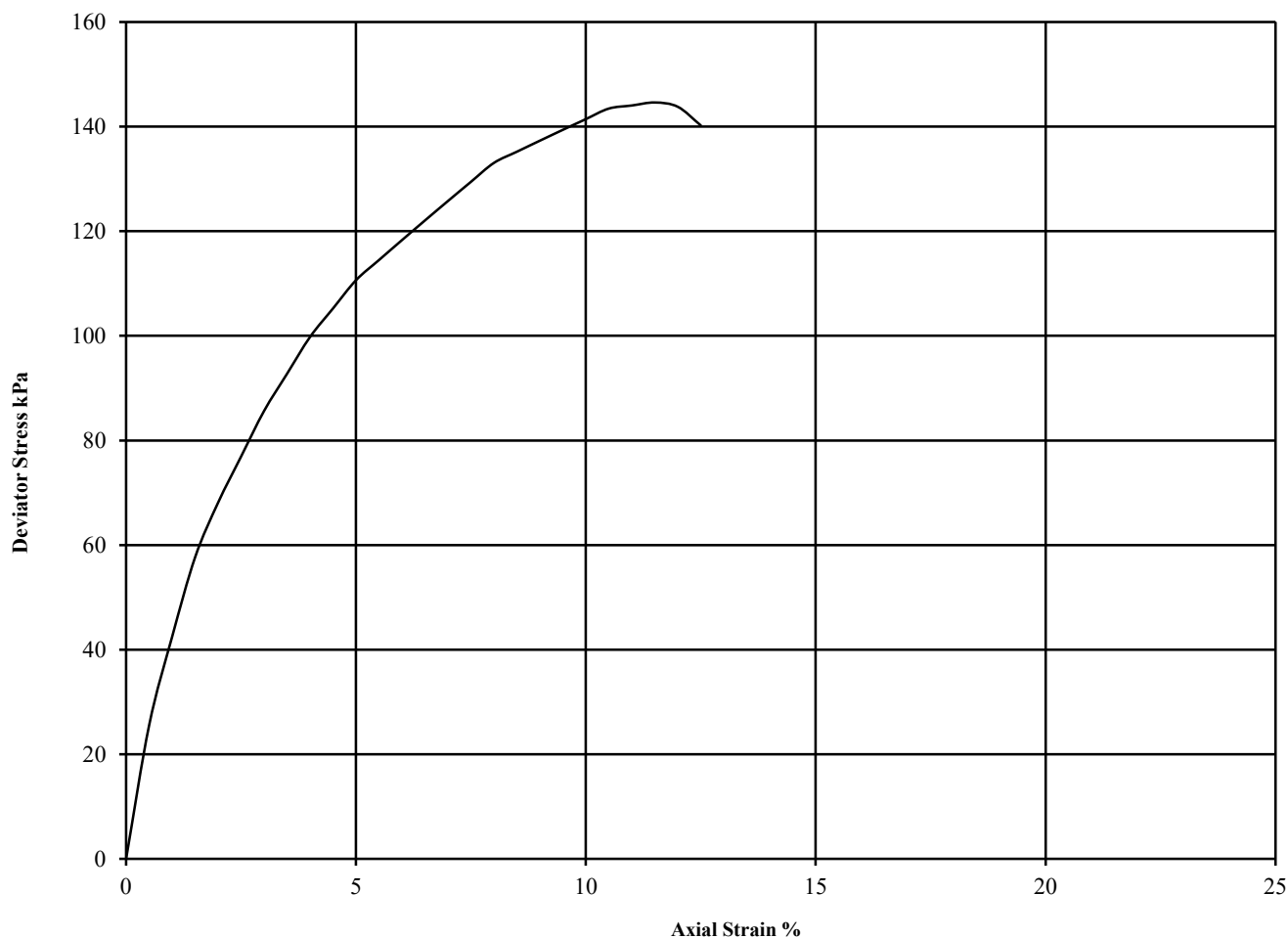
Hole Number: BH07

Top Depth (m): 5.60

Sample Number: 12

Base Depth (m):

Sample Type D



Diameter (mm):		38	Height (mm):		76	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample
									Sample taken from top of tube
									Rate of strain = 2 %/min
									Latex Membrane used 0.2 mm thick,
									Correction applied 0.84
1	18	2.00	1.69	112	145	72	11.5	Brittle	See summary of soil descriptions



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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

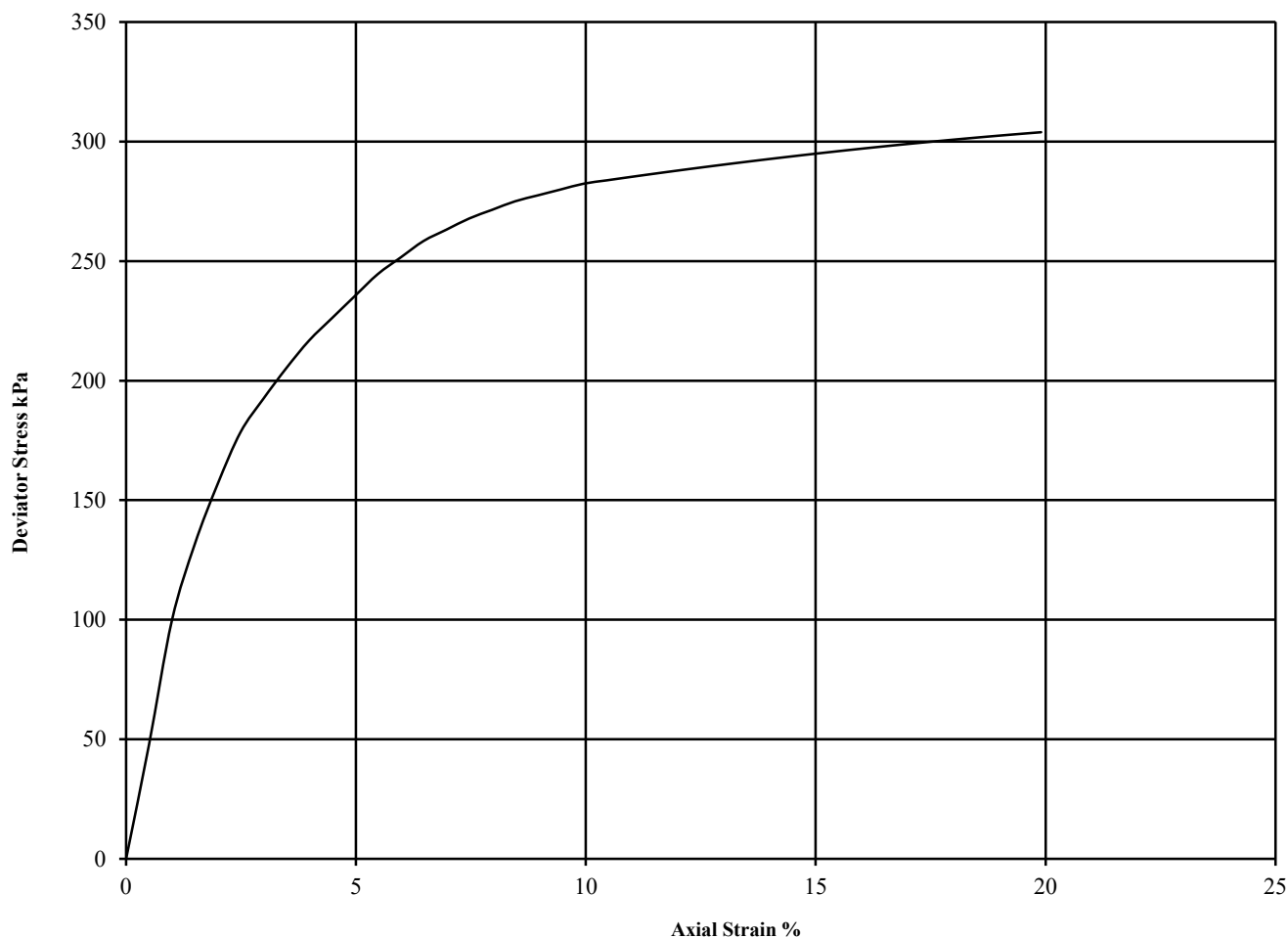
Hole Number: BH07

Top Depth (m): 8.00

Sample Number: 15

Base Depth (m): 8.45

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33 See summary of soil descriptions
1	19	2.05	1.71	160	304	152	19.9	Plastic	



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Client Ref:

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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

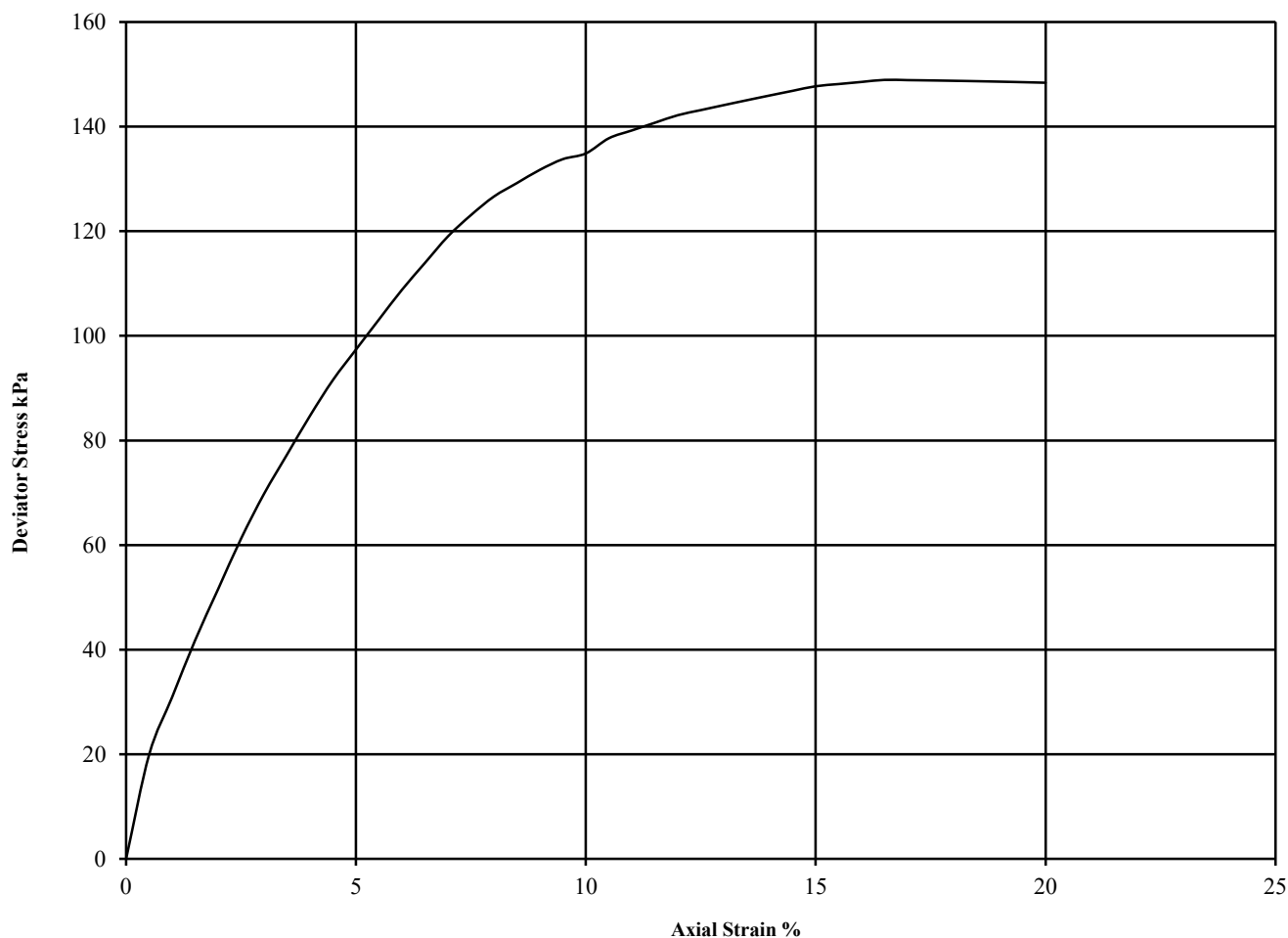
Hole Number: BH07

Top Depth (m): 10.00

Sample Number: 19

Base Depth (m): 11.00

Sample Type B



Diameter (mm):		100	Height (mm):		200	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Disturbed Sample Remoulded with 2.5kg effort Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.35 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	19	2.05	1.72	200	149	74	16.5	Plastic	



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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

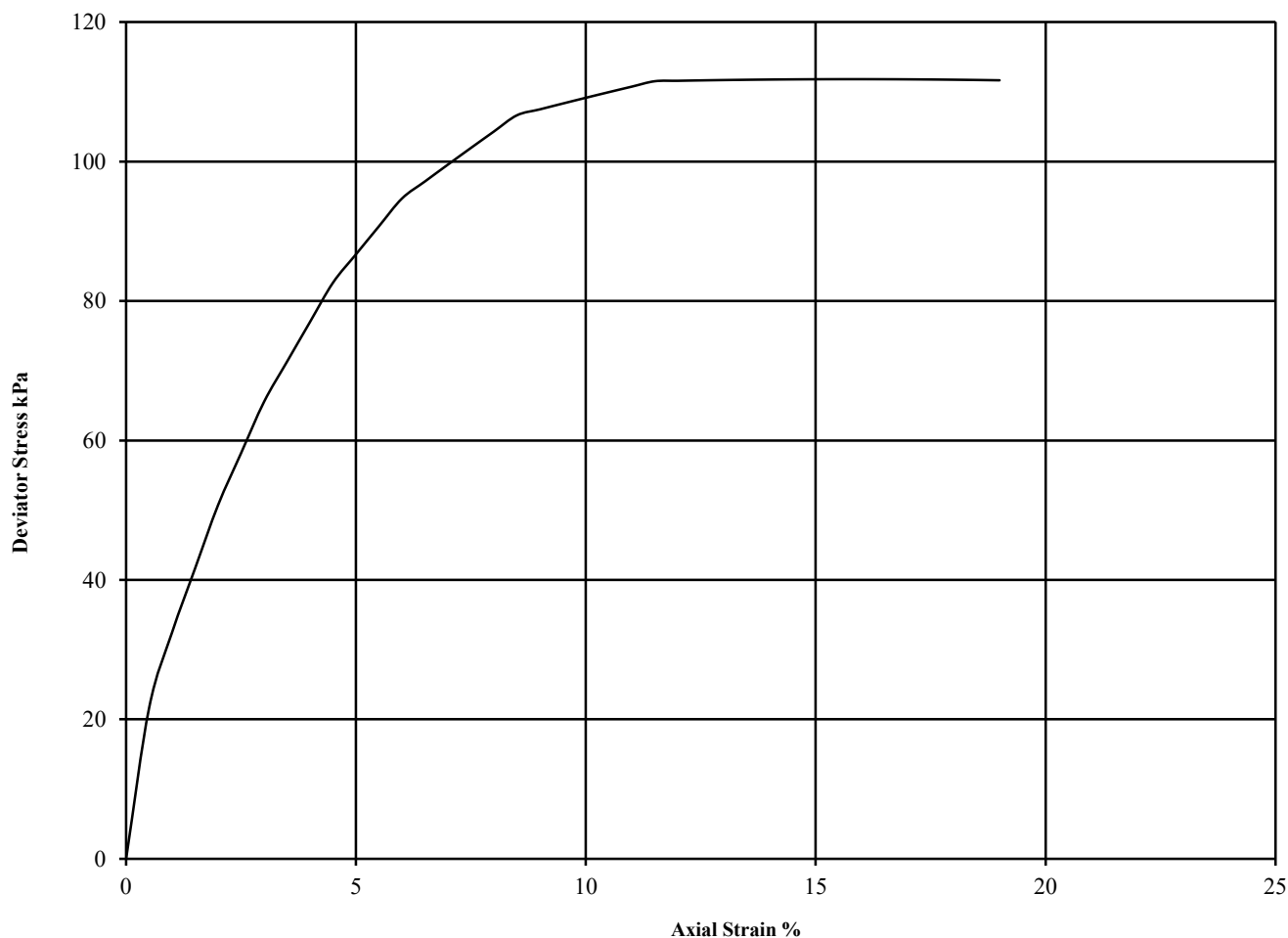
Hole Number: BH08

Top Depth (m): 3.50

Sample Number: 8

Base Depth (m): 4.00

Sample Type B



Diameter (mm):		100		Height (mm):		200	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Disturbed Sample Remoulded with 2.5kg effort Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.35 See summary of soil descriptions	
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$				
1	21	2.01	1.66	80	112	56	16.0	Plastic		



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PSL

Professional Soils Laboratory

Welwyn Garden City

Contract No:

PSL19/7560

Client Ref:

A115249

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

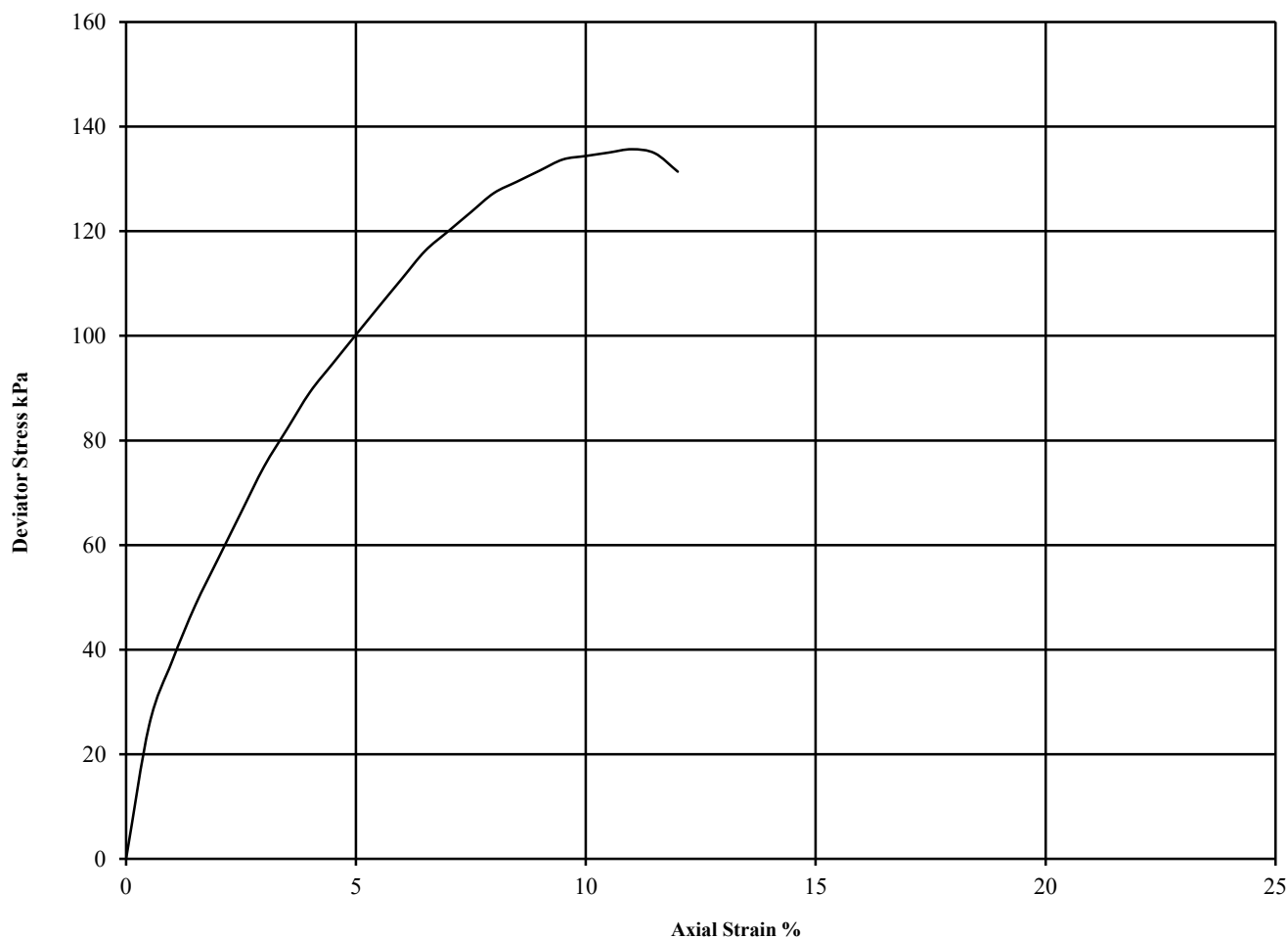
Hole Number: BH08

Top Depth (m): 5.00

Sample Number: 12

Base Depth (m): 5.45

Sample Type SD



Diameter (mm):		38	Height (mm):		76	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample
									Sample taken from top of tube
									Rate of strain = 2 %/min
									Latex Membrane used 0.2 mm thick,
				θ_3	$(\theta_1-\theta_3)_f$	$^{1/2}(\theta_1-\theta_3)_f$			Correction applied 0.84
1	20	1.97	1.65	100	136	68	11.0	Brittle	See summary of soil descriptions



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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

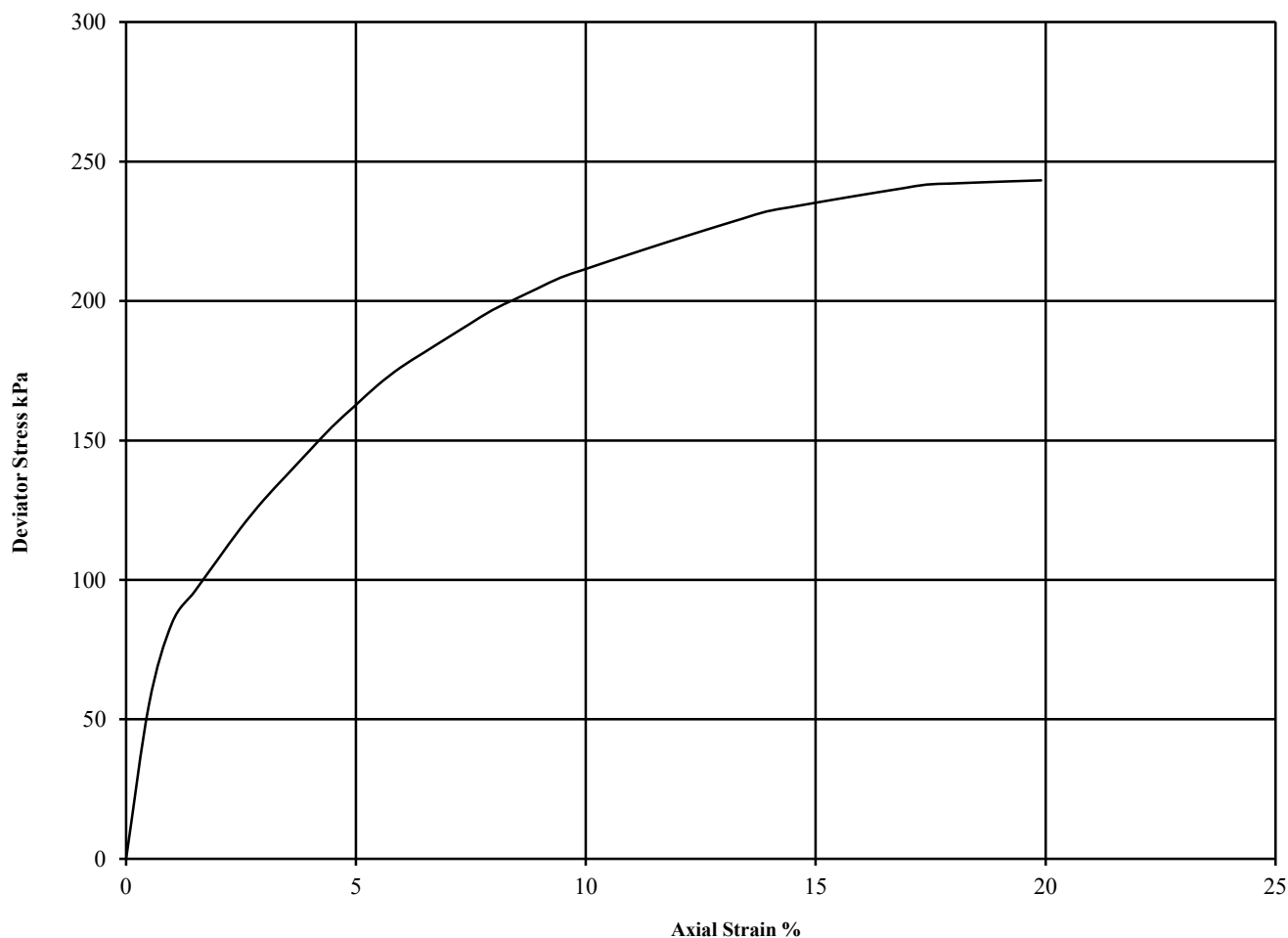
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH08 Top Depth (m): 6.50

Sample Number: 15 Base Depth (m): 6.95

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	20	2.02	1.68	130	243	122	19.9	Brittle	



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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

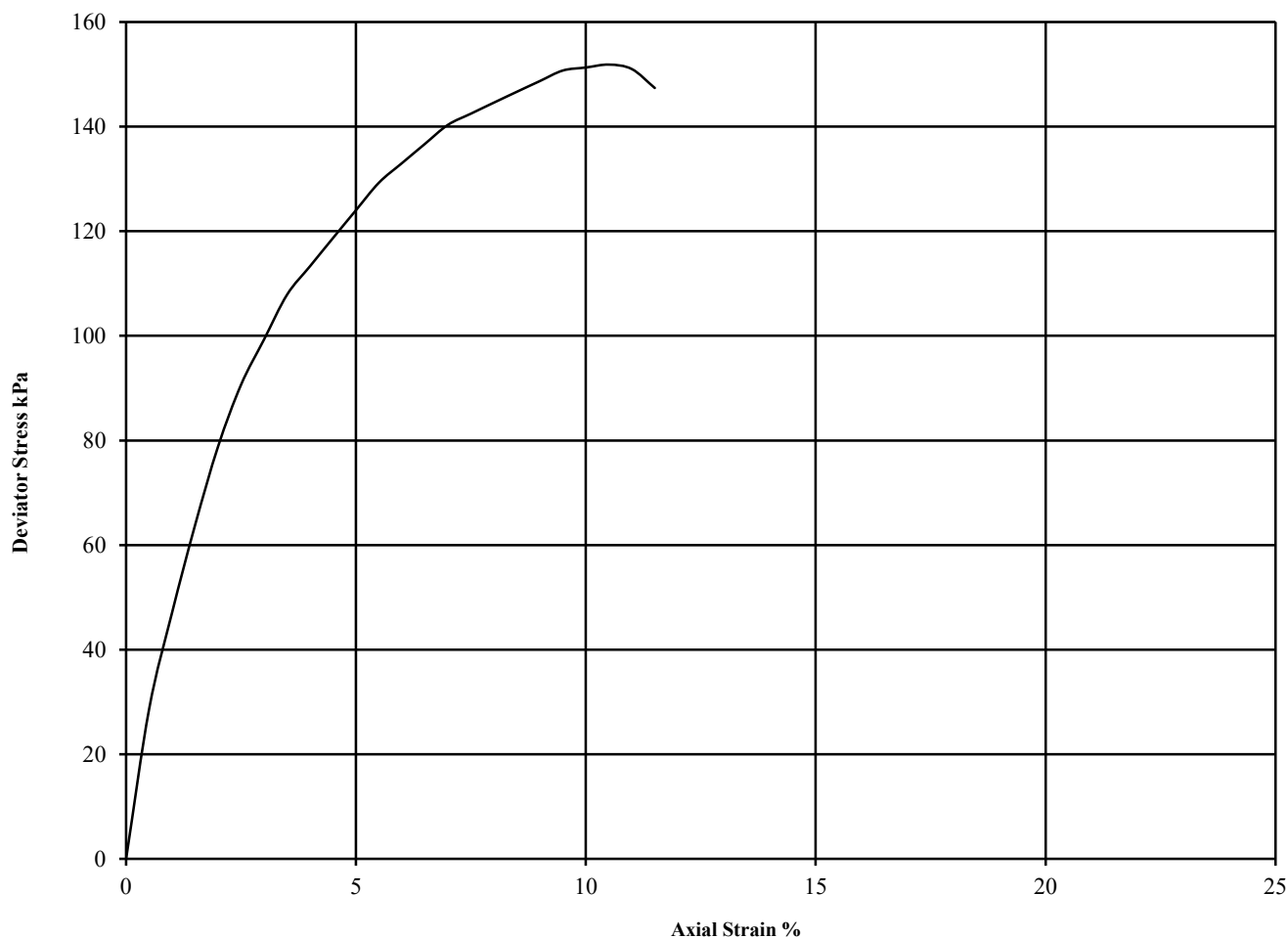
Hole Number: BH08

Top Depth (m): 8.00

Sample Number: 17

Base Depth (m): 8.45

Sample Type SD



Diameter (mm):		38	Height (mm):		76	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.85 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	17	2.03	1.73	160	152	76	10.5	Brittle	



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PSL

Professional Soils Laboratory

Welwyn Garden City

Contract No:

PSL19/7560

Client Ref:

A115249



Certificate of Analysis

Certificate Number 19-25625-1

21-Jan-20

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 19-25625-1

Client Reference PSL19/7560

Order No (not supplied)

Contract Title Welwyn Garden City

Description 23 Soil samples.

Date Received 13-Dec-19

Date Started 13-Dec-19

Date Completed 21-Jan-20

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

Notes This report supersedes 19-25625, extra testing.

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

Approved By

Adam Fenwick
Contracts Manager



Summary of Chemical Analysis Soil Samples

Our Ref 19-25625-1

Client Ref PSL19/7560

Contract Title Welwyn Garden City

Lab No	1613351	1613353	1613355	1613357	1613359	1613361	1617230	1617231	1617232	1617233
Sample ID	BH01	BH01	BH02	BH03	BH04	BH05	BH02	BH03	BH04	BH05
Depth	1.20-2.00	3.00-4.00	3.00-4.00	2.00-3.00	2.00-3.00	2.00-2.45	5.00-5.45	3.00-3.45	3.00-4.00	3.00-3.45
Other ID	2	6	5	3	4	3	8	4	6	4
Sample Type	B	B	B	B	B	D	D	D	B	D
Sampling Date	11/12/19	11/12/19	11/12/19	11/12/19	11/12/19	11/12/19	18/12/19	18/12/19	18/12/19	18/12/19
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units										
Metals													
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l			< 10	< 10	< 10	< 10			< 10	
Inorganics													
pH	DETSC 2008#		pH	7.6	6.4	6.9	5.8	5.6	8.0	6.7	7.3	8.2	6.7
Organic matter	DETSC 2002#	0.1	%			0.7	< 0.1	0.2	0.3			0.2	
Chloride Aqueous Extract	DETSC 2055	1	mg/l			6.1	45	6.8	5.4			4.8	
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l			1.8	2.1	< 1.0	< 1.0			1.1	
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	190	150	63	220	71	44	89	88	12	270
Sulphur as S, Total	DETSC 2320	0.01	%			< 0.01	0.03	0.02	< 0.01			< 0.01	
Sulphate as SO4, Total	DETSC 2321#	0.01	%			0.02	0.08	0.05	0.02			< 0.01	

Summary of Chemical Analysis Soil Samples

Our Ref 19-25625-1

Client Ref PSL19/7560

Contract Title Welwyn Garden City

Lab No	1617234	1617235	1617236	1617237	1617238	1617239	1617240	1617241	1617242	1617243
Sample ID	BH06	BH07	BH07	BH08	BH08	WS08	WS10	WS10	WS12	WS18
Depth	5.00-6.00	3.00	5.00-5.45	2.00-2.45	4.00-4.45	2.00-2.90	2.20-3.00	6.00-7.00	2.00-2.60	2.00-3.00
Other ID	9	7	11	4	9					
Sample Type	B	D	U	U	U	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	18/12/19	18/12/19	18/12/19	18/12/19	18/12/19	18/12/19	18/12/19	18/12/19	18/12/19	18/12/19
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units										
Metals													
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l				< 10		45	< 10			< 10
Inorganics													
pH	DETSC 2008#		pH	8.0	5.6	6.2	6.1	6.2	7.3	7.8		7.5	6.0
Organic matter	DETSC 2002#	0.1	%		0.6						0.1	0.4	
Chloride Aqueous Extract	DETSC 2055	1	mg/l				12		17	7.9			7.0
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l				< 1.0		< 1.0	< 1.0			< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	18	55	< 10	40	36	1400	31		28	26
Sulphur as S, Total	DETSC 2320	0.01	%				0.01		0.16	< 0.01			< 0.01
Sulphate as SO4, Total	DETSC 2321#	0.01	%				0.03		0.47	0.01			0.02

Summary of Chemical Analysis

Soil Samples

Our Ref 19-25625-1

Client Ref PSL19/7560

Contract Title Welwyn Garden City

Lab No	1624270	1624271	1624272
Sample ID	BH01	BH06	BH07
Depth	3.00-4.00	1.20-2.00	4.00-5.00
Other ID			
Sample Type	SOIL	SOIL	SOIL
Sampling Date	14/01/2020	14/01/2020	14/01/2020
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Metals						
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10	< 10	< 10
Inorganics						
pH	DETSC 2008#		pH	6.2	6.2	6.2
Organic matter	DETSC 2002#	0.1	%			
Chloride Aqueous Extract	DETSC 2055	1	mg/l	9.8	11	12
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	< 1.0	< 1.0	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	72	72	78
Sulphur as S, Total	DETSC 2320	0.01	%	0.01	0.01	0.01
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.03	0.03	0.03

Information in Support of the Analytical Results

Our Ref 19-25625-1
 Client Ref PSL19/7560
 Contract Welwyn Garden City

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1613351	BH01 1.20-2.00 SOIL	11/12/19	PT 500ml		
1613352	BH01 2.00-3.00 SOIL	11/12/19	PT 500ml		
1613353	BH01 3.00-4.00 SOIL	11/12/19	PT 500ml		
1613354	BH02 1.20-2.00 SOIL	11/12/19	PT 500ml		
1613355	BH02 3.00-4.00 SOIL	11/12/19	PT 500ml		
1613356	BH03 1.20-2.00 SOIL	11/12/19	PT 500ml		
1613357	BH03 2.00-3.00 SOIL	11/12/19	PT 500ml		
1613358	BH04 1.20-2.00 SOIL	11/12/19	PT 500ml		
1613359	BH04 2.00-3.00 SOIL	11/12/19	PT 500ml		
1613360	BH05 1.20-2.00 SOIL	11/12/19	PT 500ml		
1613361	BH05 2.00-2.45 SOIL	11/12/19	PT 1L		
1613362	BH06 1.20-2.00 SOIL	11/12/19	PT 500ml		
1613363	BH06 3.00-4.00 SOIL	11/12/19	PT 500ml		
1613364	BH07 1.50-2.00 SOIL	11/12/19	PT 500ml		
1613365	BH07 4.00 SOIL	11/12/19	PT 500ml		
1613366	BH08 1.50-2.00 SOIL	11/12/19	PT 500ml		
1613367	BH08 3.50-4.00 SOIL	11/12/19	PT 500ml		
1617230	BH02 5.00-5.45 SOIL	18/12/19	PT 500ml		
1617231	BH03 3.00-3.45 SOIL	18/12/19	PT 500ml		
1617232	BH04 3.00-4.00 SOIL	18/12/19	PT 500ml		
1617233	BH05 3.00-3.45 SOIL	18/12/19	PT 500ml		
1617234	BH06 5.00-6.00 SOIL	18/12/19	PT 500ml		
1617235	BH07 3.00 SOIL	18/12/19	PT 500ml		
1617236	BH07 5.00-5.45 SOIL	18/12/19	PT 500ml		
1617237	BH08 2.00-2.45 SOIL	18/12/19	PT 500ml		
1617238	BH08 4.00-4.45 SOIL	18/12/19	PT 500ml		
1617239	WS08 2.00-2.90 SOIL	18/12/19	PT 500ml		
1617240	WS10 2.20-3.00 SOIL	18/12/19	PT 500ml		
1617241	WS10 6.00-7.00 SOIL	18/12/19	PT 500ml		
1617242	WS12 2.00-2.60 SOIL	18/12/19	PT 500ml		
1617243	WS18 2.00-3.00 SOIL	18/12/19	PT 500ml		
1624270	BH01 3.00-4.00 SOIL	14/01/20	PT 500ml		
1624271	BH06 1.20-2.00 SOIL	14/01/20	PT 500ml		
1624272	BH07 4.00-5.00 SOIL	14/01/20	PT 1L		

Key: P-Plastic T-Tub

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

Information in Support of the Analytical Results

Our Ref 19-25625-1
Client Ref PSL19/7560
Contract Welwyn Garden City

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix I

SPT Hammer Energy Ratios and Calibration Certificates

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: CP02
Test Date: 03/05/2019
Report Date: 08/05/2019
File Name: CP02 .spt
Test Operator: CM

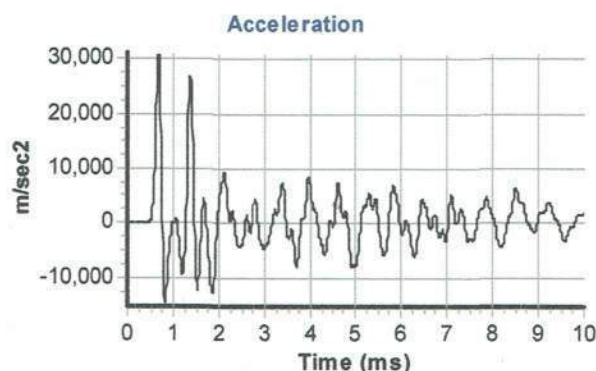
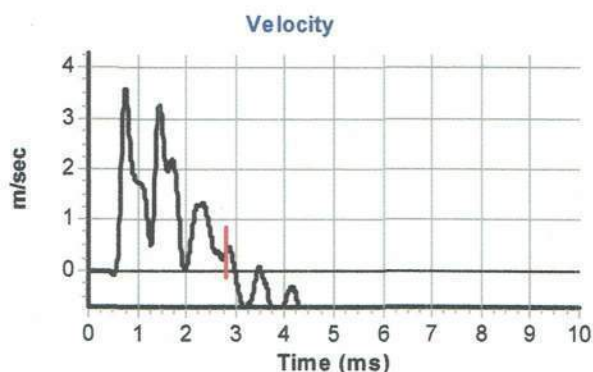
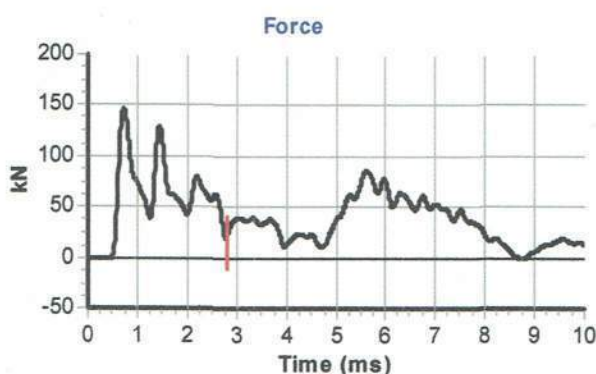
Instrumented Rod Data

Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.5
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location



Calculations

Area of Rod A (mm²): 970
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 273

Energy Ratio E_r (%): **58**

Signed: S. HOWARTH
Title: FITTER

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: RP07
Test Date: 08/07/2019
Report Date: 08/07/2019
File Name: RP07.spt
Test Operator: CM

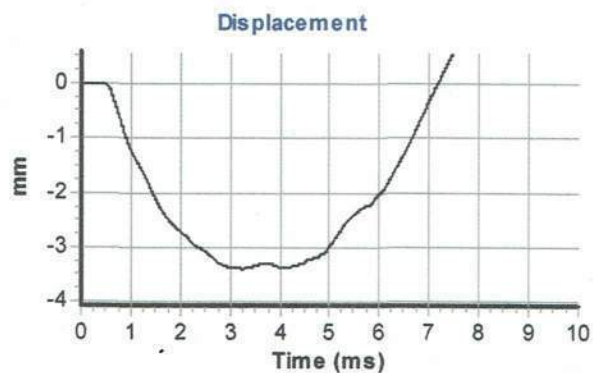
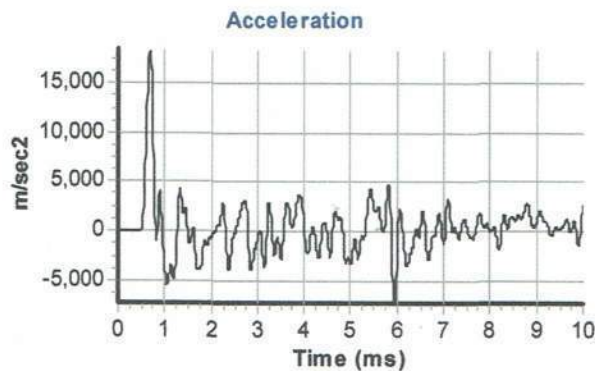
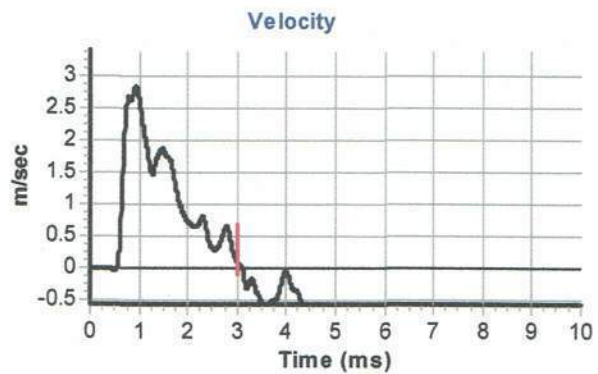
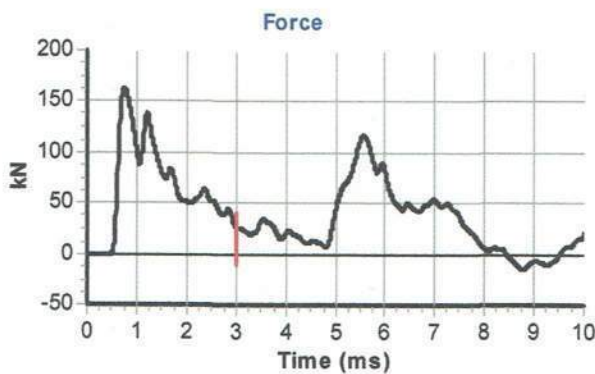
Instrumented Rod Data

Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.5
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location



Calculations

Area of Rod A (mm^2): 970
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 334

Energy Ratio E_r (%): **71**

Signed: C.MCCLUSKEY
Title: FITTER

The recommended calibration interval is 12 months