

APPENDIX 8.7
PHASE 1 REPORT



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Phase I Environmental Assessment of the Nestlé UK Ltd Facility in Hayes, Middlesex

Prepared for

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Project Number GCU0124020

September 2013

Project Title: Phase I Environmental Assessment of the Nestlé UK Ltd Facility in Hayes, Middlesex

Project No: GCU0124020

Report Ref: Final Report



Status: Final

Client: Nestlé UK Ltd

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Document Production / Approval Record (final documents only)

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EXECUTIVE SUMMARY

This Phase I environmental assessment of the Nestlé facility in Hayes had the overall aim to identify potential issues of historical or current land use, in particular on but also potentially adjacent to the subject site, that could have led to a material impact on soil or groundwater quality. In addition consideration has been given to the presence of hazardous substances at the site that could materially impact site decommissioning, demolition and/or sale, specifically associated with asbestos containing materials (ACM), possible PCBs and refrigerants.

The Nestlé Hayes facility comprises an area of around 12 hectares. It currently has a main production building, other newer production related buildings, a raw material (green bean) warehouse, other product processing and packaging buildings such as OOH and Eden, conventional and waste coffee grounds fuelled boilers, a former amenities block, plus security building and car-parking. The site is a coffee manufacturing site with some chocolate production until 2005. Decaffeination of coffee is reported to have never taken place at the site. The early Ordnance Survey plans for the area show the site to have been initially developed after 1920.

The land to the south of the site is residential, with a history of industrial land use to the west, north and east.

The site appears to be underlain by an important shallow sand and gravel unit, beneath which there will be London Clay bedrock. This is classified as a Principal Aquifer which is reported to also have high vulnerability due to being so close to surface. This shallow geological system should protect groundwater at depth, expected to be within the Chalk (another Principal Aquifer). It is anticipated that shallow groundwater flow will be to the east or south towards the local river and/or ultimately towards the River Thames. There could be flow beneath the canal, but groundwater is not expected to discharge to this surface water body.

This study has identified a number of potential site-specific, localised actual or potential contamination sources of ground or groundwater contamination for which intrusive investigations are recommended so that a corrective action plan and cost estimate can be developed, as needed, for the redevelopment scenarios that could be undertaken at the site. These main source areas potentially comprise:

- *Potentially contaminated Made Ground (generally)*
- *Former underground fuel lines from bulk storage to the boiler house and other buildings*
- *Known fuel (diesel and heavy fuel oil) losses that happened in the past (one led to a prosecution by the EA)*
- *Possible remaining mercury contaminated soils below the boiler house (discovered previously during development)*
- *Use of hydrocarbons and chlorinated solvents in engineering work shops (no production use)*
- *Losses of ACM to ground and apparent mixing with the shallow soil profile, specifically in the Undercroft area and associated deep service conduits*

In summary, it is apparent that the potential exists for there to be some ground gas, shallow soil and possibly groundwater contamination associated with the previous use of the site and possibly also adjacent land use (most notably former land use to the north of the canal). The potential need for corrective action, and the costing of the associated environmental liability, should be based on the results of a Phase II intrusive investigation and risk assessment. In the event of a relatively low sensitivity commercial or industrial development, it is possible that some or all of these source areas may not represent a significant risk that drives the need for corrective action beyond a clean cap on landscaped areas. However, should a more sensitive end use such as residential housing, perhaps as part of a mixed use development, be adopted then more extensive remedial works may be expected to be required.

The main areas requiring investigation to better quantify potential soil and groundwater liability at the site include (1) the northwest and northern boundary area where hydrocarbon bulk storage, documented hydrocarbon losses, previous underground transfer lines were located, and other hazardous chemical and waste storage is situated; (2) boiler house area (reported hydrocarbon and mercury contamination related); (3) areas of former, expected small scale, chlorinated solvent storage and use, including solvent waste storage and disposal; (4) boundary areas where contamination migration from off-site could have taken place and (5) asbestos impregnated soils below the Main Building and elsewhere.

It is believed that any Phase II site investigation work should be done to two phases. Firstly an assessment of whether groundwater within the Principal sand and gravel aquifer is impacted could be done early as it could be completed without disruption to site operations. It would provide the big picture understanding of whether a significant groundwater liability exists at the site. At the same time groundwater quality in the on-site abstraction well would be investigated further and sampled for a range of site relevant inorganic and organic compounds. The canal would also be inspected and possibly sampled.

The second phase of intrusive work would be expected to be focused on a targeted soil (and possible some local, additional groundwater) sampling of both known former contamination issues associated with hydrocarbons and mercury, as well as unknowns such as hazardous chemical or waste (including solvent) storage and use areas and Made Ground quality. It will be informed by the groundwater investigation. This may be expected to require work inside certain buildings. The scope may be expected to require about a week of window sampling, with perhaps 25-30 shallow soil sampling boreholes drilled to a nominal depth of 2-3m. A second groundwater monitoring round would be completed at this time. The data assessment and reporting exercise linked to this is expected to have to support IPPC license surrender requirements as well as be supportive of planning related needs linked to land use change.

There are a lot of asbestos containing materials (ACM) at the site, related to buildings and infrastructure (such as pipe insulation, insulation board, tiles and grout, and roof sheeting) and pipework fittings and gaskets. The Undercroft area (and deep utility conduits below the Main Building) and the former amenities block are reported to be of particular concern. It is expected that Bardon Environmental will be contracted directly by Nestlé to undertake a 2014 survey, including a full pre-demolition survey. This is definitely needed if the site is to be demolished pre-sale but probably can only be done once the site has closed given the intrusive nature of such a survey. It is understood that Nestlé Hayes already has a budget provision for such a full survey to take place in 2014 (Bardon has quoted), however if needed Geosyntec can work with Bardon to assess this in more detail as part of a Phase II activity. The proposed detailed survey should serve to quantify this more accurately and ensure the cost implication of addressing such issues will be known.

LIMITATION

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Unless otherwise stated in this Report, the assessments made assume that the site and facilities will continue to be used for their current purpose without significant change. The conclusions and recommendations contained in this Report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested. Information obtained from third parties has not been independently verified by Geosyntec Consultants Ltd, unless otherwise stated in the Report.

Where assessments of works or costs required to reduce or mitigate any environmental liability identified in this Report are made, such assessments are based upon the information available at the time and may be subject to further investigations or information which may become available. It is therefore possible that cost estimates, where provided, may vary outside stated ranges. Where assessments of works or costs necessary to achieve compliance have been made these are based upon measures which, in Geosyntec Consultants Ltd.'s experience could normally be negotiated with the relevant authorities under present legislation and enforcement practice, assuming a pro-active and reasonable approach by site management.

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1 GENERAL INTRODUCTION

1.1 Introduction

Geosyntec Consultants (“Geosyntec”) was retained to conduct a Phase I Environmental Assessment at the Nestlé UK Ltd site located at North Hyde Gardens, Hayes, Middlesex, UB3 4RF. This work has been undertaken in accordance with our proposal (reference 130707/JDWW).

This report is intended to provide data for prospective purchasers of the subject property and also help inform the management team involved with site rationalisation and closure. The study has focussed on the potential for residual liability issues to be present, associated with past and/or present operations at the site, including immediately neighbouring sites. These can be expected to be predominantly associated with the possibility of residual soil and/or groundwater contamination.

1.2 Project Background

Site operations are expected to cease entirely in late 2014. The future use of the facility is uncertain at this stage although it is understood that the options currently being included in the sale documentation include ongoing manufacturing, food retail or residential development. The site location is illustrated on Figure 1 (site location map) and Figure 2 (aerial photo). A more detailed site location plan is provided as Figure 3.

For Nestlé to optimize their returns from a sale of the land, it will be necessary to minimise the uncertainty faced by a purchaser in relation to potential land and groundwater contamination issues. As a result they have identified the need for an initial appraisal of, in particular, the potential for soil and groundwater contamination at the site in support of the sale process.

Geosyntec Consultants Ltd (Geosyntec) have been commissioned to undertake this initial Phase I study to collate and assess readily available information so that the likely presence, potential type, extent and magnitude of ground contamination issues can be assessed. In the event that potentially significant ground contamination issues are identified, the necessity for, outline scope and costs of an intrusive soil and groundwater sampling and analysis plan are to be identified.

In addition the report considers certain building/infrastructure aspects that could represent a significant environmental liability, linked to the presence of asbestos containing material (ACM), and the potential presence of PCB oils in on-site electrical equipment and refrigerants in cooling systems.

1.3 Objectives

The specific objectives of this study were to:

- Provide a description of historical land use and site operations associated with potentially hazardous materials;
- Identify areas where potentially hazardous materials are known or are suspected to have been released through spillages or leaks;

- Collate relevant information from which it will be possible to produce a conceptual understanding of potential contamination migration pathways and receptors for the site;
- Identify where currently available data is likely to be adequate for an assessment to be made of the need for and costs of remedial works to render the site suitable for future development options currently under consideration. Where the data to make these assessments is currently incomplete or absent, then the outline scope and cost of follow-up investigations will be identified;
- Assess other aspects of the sites condition which may materially affect the costs for redeveloping the site, in particular the presence of asbestos within the building structures.

The activities which were undertaken to meet these objectives are described below

1.4 Scope of Works

The scope of works completed for this Phase 1 study included:

- Procurement of environmental database information (Landmark Envirocheck report) for the site and its surrounds including a set of historical Ordnance Survey plans and geological maps;
- Undertaking a review of the database information and historical maps to identify the potential for sources of ground contamination from apparent current and past land use that could adversely affect the subject site;
- Review of site supplied documentation with regard to manufacturing processes occurring within the facility to provide guidance on possible contaminants present. Collation of information to identify areas where potentially hazardous materials are known or are suspected to have been released through spillages or leaks. Company records and anecdotal evidence from site staff was sought to provide this (during site audit);
- Review of available drawings showing underground structures and services;
- Review of information regarding the location and condition of Asbestos Containing Materials (ACMs) within the fabric of the site buildings;
- Undertaking a site visit to interview key site personnel and inspect the subject site area for visual or olfactory indications of contamination.

The site visit was undertaken by Dr. Marcus Ford of Geosyntec on 27th August 2013. During the site audit key information was obtained from a number of people as follows:

- Steve Pavier (Coffee manufacturing manager)
- Mark Gregory (Engineer)
- Dave Aylmer (SHE Manager)
- Graham Why (long serving engineer)

Steve Pavier and Mark Gregory provided the bulk of the information and answers to the audit questions, bringing in other Nestlé staff as needed. Nigel Hickey was also a key point of contact during the process, although he was on holiday during the week of the audit.

The results of this study are presented in the following sections.

2 SITE SETTING

2.1 Site & Surrounding Land Use

The Nestlé Hayes site location is illustrated in Figure 1 and 2. It is at National Grid Reference 510100 179190. It appears to be just over 12 hectares in size. The M4 motorway is approximately 1km to the south of the site (closest to Junction 3). The northern end of the Heathrow airport complex is located about 2km to the south of the site.

The site is located off North Hyde Gardens which is a road that marks the eastern boundary of the subject site, continuing north across the canal to the Bulls Bridge industrial area. The site is approximately bounded by Nestles Avenue to the south, the Grand Union canal to the north, Network railway line to the northwest and a small industrial estate to the west. There is industrial land use to the north, east and immediately west.

Hayes town centre is approximately 1km to the north. There is a large residential community immediately south of the site on the opposite side of Nestles Avenue. The industrial units on the west side of the site were quite small and included some light engineering and garage related activities.

The topography of the area is generally flat lying between about 25-30 mAOD. There is a small river located about 200m east of the site. This flows north to south and is expected to ultimately discharge to the River Thames located of the order of 10km to the southwest. The site does not appear to be at risk of flooding from the local watercourse (Flood Map included in Appendix A).

The main factory buildings occupy the majority of the site with loading and parking areas along the eastern and south-eastern side and the main external raw materials and waste storage areas at the northern (north-western) end of the site. In summary the following main buildings are present on-site (refer to Figure 3):

- Main Building – former roasting and drying plants; chocolate factory
- NW corner of Main Building – Boiler House & CGCP (Coffee Grounds Combustion Plant)
- Green Bean Warehouse
- Eden Building (filling and packaging)
- Roaster & R Plant buildings
- Out Of Home (OOH) Building
- Former Amenities Building
- Security Gate House

The land immediately northeast of the site, beyond the canal (Bulls Bridge area), and to the east beyond the main road (A312) appears to have been originally used for landfilling. The landfill immediately northeast was licensed to the London Borough of Ealing for inert, commercial and household waste, but was completed in 1936 (last waste input date). The site to the east seems to have had a last waste input data of 31st December 1949, but was for inert, industrial, commercial, household and special waste. The license holder was not supplied.

2.2 Geological & Hydrogeological Setting

Geological information for the site and its surrounds has been gathered by reference to the geological map for the area (BGS Solid & Drift Sheet 269), coupled with Envirocheck summary information (included as Appendix A). These sources plus professional judgement indicate the site will be underlain by the following sequence of strata:

- **Made Ground:** The artificial ground and landslip plan suggest the site area is underlain by what is termed Worked Ground (areas where the ground has been cut away such as road cuttings). There is the potential for a degree of cut and fill to have been undertaken to produce the elevated levels observed at the site. The origin and composition of any imported material used to effect this is unknown;
- **Superficial Geology:** The site area including a tract of land running ENE to WNW is reportedly underlain by sand and gravel deposits (Lynch Hill Gravel Member of Wolstonian age) – refer to Appendix A. Further north and south, and also including a small area immediately east of the site extending to and beyond the stream the lithology is reported to be silt and clay (Langley Silt Member). To the south of the site area the Taplow Gravel Formation is located. The OS Map for the area highlights the presence of a number of gravel works and pits to the south of the Hayes urban area;
- **Bedrock:** Bedrock beneath the site is indicated to comprise London Clay formation, a clay dominated sequence of clay, silt and sometimes sand of Eocene age. The London Clay is classified as unproductive. At depth below the London Clay is expected to be Chalk (Principal Aquifer).

With respect to groundwater, the site does not appear to lie within a Source Protection Zone (SPZ) for potable water supplies, however the Environment Agency have defined the site as being underlain by a Principal Aquifer (major aquifer) comprising all sand and gravel units in the area. Whilst the sand and gravels are relatively thin and shallow they are laterally extensive and high permeability and certainly capable of supporting small to medium size abstractions, as well as providing base flow to surface waters such as the local stream and the River Thames. Because the sand and gravel is so close to surface it is classified as having high groundwater vulnerability over a wide area, including beneath the site (vulnerable to pollution).

The site has two abstraction wells, one in use and the second never commissioned (reported to have insufficient water). The main abstraction well location is located centrally at the northern end of the main building (indicated on Figure 3). Envirocheck data (Borehole Map slice A at the end of Appendix A) suggests there are 5 boreholes onsite with depth >30m on BGS records. One may be coincident with the in-use on-site abstraction well. The

Environment Agency (EA) has two licensed water abstractions listed for the Nestlé site. These are thought to be for the active and inactive wells on-site. The main licence is listed for groundwater abstraction for use as a boiler feed and evaporative cooling. Daily and yearly abstraction rates have not been supplied in this data (but site data has been made available – see Section 4.3).

There are two other groundwater abstraction licenses in relatively close proximity to the site (600-700m distant, one to the west and one to the east. These licenses are held by Thorn EMI Electronics Ltd and USC Europe UK Ltd also for boiler or cooling purposes. There appear to be one additional licenced well on the same “Apexes Works site” as USC Europe but 825m to the east of the subject site.

2.3 Soil & Groundwater Quality Information

Nestlé has provided some information on the on-site abstraction well. No borehole or well construction logs have been supplied for the active site abstraction well (not thought to be available). Groundwater quality data for the abstraction well “Borehole” sample have been provided. This is for a range of inorganic parameters. No data is provided (nor thought to be available) with respect to potential organic substances such as chlorinated solvents or petroleum hydrocarbons. 2010 inorganic results for the borehole water can be summarised as follows (mg/l unless otherwise stated):

- Electrical conductivity (EC) of about 1,100 µS/cm and about pH8
- Calcium (11); Magnesium (8) and Alkalinity as CaCO₃ (290) seem erroneous (expect more Ca and Mg unless ion exchange in aquifer a key factor)
- Sulphate (114) and nitrate (<1)
- Sodium (194) and Chloride (73)
- Iron (1.5), Manganese (0.1) and Aluminium (1.9)
- Copper (0.1) and Zinc (0.3)

3 SITE HISTORY

3.1 Introduction

The operational history of the site, with respect to coffee (and presumably chocolate) manufacture, appears to have been fairly consistent, albeit with some incremental growth and movement of specific activities and production elements, over time.

There was reported to be anecdotal evidence that the site was used in both wars for production or perhaps the storage of munitions.

3.2 Historical Map Review

Historical Ordnance survey maps were obtained as part of the Landmark Group Envirocheck report commissioned for the site. Selected maps are included as Appendix D to

this report. The complete sequence of maps available at various scales includes those for the following dates:

- 1868-69, 1897, 1920, 1932-35, 1938, 1948 at a scale of 1: 10,560;
- 1960, 1965-66, 1970-75, 1985-89, 1990-95, 2006 & 2013 at 1: 10,000;
- 1864, 1895, 1914, 1934, 1946, 1963, 1964, 1972-79, 1977-82, 1991 & 1992-94 at 1: 2,500;

For the 1:2,500 maps, because of the site size, two OS maps were acquired per date to cover the full footprint of the site.

Key features of each map in relation to the site, surrounding land and the potential for contaminative land use are summarized in the following table:

Date	On Site Land Use	Off Site Land Use (within 1.5km)
1868-69	The site was open agricultural land. A 100ft contour is marked as passing through the site (about 30mAOD).	Site is bounded on north side by the canal (directed east-west) and railway line (directed WNW-ESE). Hayes station was shown just to the west. Brick Fields were shown to the north and west, beyond the railway line. A "Clay Mill" was shown directly north of the subject site, beyond the canal and railway line, presumably linked to the brick fields. There were a number of named farms and wells on the land surrounding the site
1897	As above.	On the land immediately to the north of the site, beyond the railway line was a carriage shed associated with Hayes station. The canal had two Bench Marks at approximately 110ft (higher than site). Approximately 150m to the east of the site beyond the canal but south of the E-W railway line was a Creosoting Works, close to the stream (marked as Yeading Brook) that flows approximately north to south to the east of the subject site.
1914 (1:2500)	As above	The creosote works is shown as a network of road like structures, with possible laydown areas for creosoted products between (e.g., railway sleepers).
1920	The layout on site remained similar but with annotation suggesting two areas of the site were planted with trees or orchard.	The off-site area to the northwest, beyond the railway line and Hayes station was much more developed, with engineering works, marble, slate and granite works, Gramophone factories, an Excelsior Refinery and "Mack Partition Works". There was a Pianola piano works immediately north of the site beyond the railway line and canal, with a chair factory immediately WNW of this. The creosoting works was still shown, now only on the east side of the stream. Further east were also new works located on the south side of the railway (some 300m or more distant). Land to the south of the railway line and canal was typically still agricultural/rural at this stage.
1932-35	The subject site was now developed with the current Nestlé main old production building shown. It also included some buildings or structures to the northwest of the main building as well as to its west and southwest. It was called a Cocoa factory at this time.	Near to the site boundary the surrounding land-use had continued to develop. The residential area immediately south was now present. The previous industrial areas to the west, north and east remain and indeed had expanded. There was more residential development in these directions also.

Date	On Site Land Use	Off Site Land Use (within 1.5km)
	<p>The site included part of a large sports ground to the west (suggesting the subject site was either larger, including the whole sports field, or smaller, excluding this area, in the early 1930s).</p>	<p>The Creosote Works to the east remained and there was now a preserved wood factory to the east of this. The 1:2500 map showed the building immediately northeast of the subject site, beyond the canal, as the creosoting works. A spur from the main railway line passes through this area and terminates in a series of railway line terminus points, which may have been for goods transfer (a number of the terminus points appear to have been direct to the canal).</p> <p>A large sewerage works was now located to the northeast of the site.</p> <p>Industrial development to the west included a new aviation works.</p>
1938	Little change from the above	Little change from 1932-35 OS map
1960	<p>Little change, with only small changes to the footprint of the main building (small extension). A building was shown to the southeast of the main building which is understood to have been a site garage.</p>	<p>The land to the north of the railway line had changed little (some more urbanisation but no major new factories or major loss of existing factory premises apparent).</p> <p>The western side of the subject site now appears to be development with small to medium sized industrial units, perhaps similar to that seen currently.</p> <p>The creosoting works is no longer marked to the east of the site although a building marked works still shown.</p> <p>Development of more roads and housing to the south of the subject site, including a school ~0.5km to the south.</p>
1965-66	<p>The main building had been extended to the east and south with a few other smaller buildings shown on its south and southeast side. The 1:2500 map shows some of the buildings on the south side to be linked to the sports ground, which was wholly within the site boundary. These included bowling green and tennis courts.</p>	<p>Similar to 1960. Railway line infrastructure better illustrated, showing the various spurs and terminus points. Some further urban development.</p>
1970-75	<p>Again some more local expansion of the site, with additional building footprint shown on the east and west side. This now appears to be approximately the same building footprint as is currently on-site.</p>	<p>As above. The 1972-79 1:2500 plan shows that the creosoting works had been demolished by this time.</p>
1977-1982	As above	<p>This more detailed 1:2500 map shows a new power station building immediately northeast of the subject site, just beyond the canal (between the canal and the railway lines). There appears to have been an associated tank farm further east (four very large storage tanks). This suggests oil fired power generation.</p>
1985-89	As above	<p>Power station also shown on 1:10000 map. It also appeared on the 1990-95 1:10000 map but had gone by 2006.</p>
2013	Similar to the above	<p>Limited changes to the regional land use, although with some rationalisation of the industrial areas apparent, and roads and general urban areas.</p>

3.3 Overview of Site Operations

Coffee is understood to have been produced at the site since the late 1930s. Chocolate manufacture at the site is not understood as the Coffee business management team who supported the Phase I have nothing to do with this activity. The chocolate manufacturing operation was located in the basement of the main building. It was reported that the site was a chocolate factory between 1908-2005¹, when the production was moved to the Nestlé York site. All equipment and materials are understood to have been removed. Site utilities (such as water supply and boiler house) were reported to be shared between the two Nestlé businesses.

The history of development of the site has been outlined in Section 3.1, as the historic OS maps provided a reasonable illustration of when the site was first established and how the building footprint changed over time.

In summary the coffee manufacturing operation and site as a whole comprises the following key elements (an operation that has not greatly changed over time at the site, although the location of the various stages and elements has moved and of course the equipment used has changed with time):

- Green coffee received (green bean warehouse)
- Blending operation (R Plant) – R Plant roasters are located on the 3rd floor; also extraction and spray drying area
- Roasting operation (Roaster Building)
- Coffee ground and extracted (R Plant) – aqueous extract (solid waste)
- Spray or freeze drying operation (the latter started in 1962). Spray drying in R Plant and Freeze drying in main building.
- Fill and Packaging lines (Eden Building) – jars, pouches, up to 300kg bags
- OOH Building. Final preparation and canning line for Out Of Home products
- Utility buildings such as the boiler house including the CGCP (Coffee Grounds Combustion Plant)
- Amenities building (no longer used).

Originally most if not all operations would have been in the main factory building (e.g., roasting and drying pre-1960s). Additional buildings (e.g., the roaster building on the west side of the site) have been installed to house specific activities over time. The boiler house was originally located in a separate building immediately west of the main building. A new boiler house was located in juxtaposition to the northwest corner of the main building, with the old one being demolished.

The Hayes site was never used to manufacture decaffeinated coffee, a key finding as a number of the processes to decaffeinate coffee involve use of chlorinated solvents for the extraction process (e.g., methylene chloride).

¹ This start date seems at odds with OS maps for the time which suggest no significant site development until after 1920.

The boiler house was converted to run on gas/diesel fuel in 1993/94 with above ground transfer lines from the diesel bulk storage tanks located on the northern boundary (refer to Figure 3) to the west of the boiler house. Prior to this the diesel tanks are understood to have been present, but the boiler was fired with Heavy Fuel Oil (HFO) stored in 3 bulk storage tanks to the north of the boiler house on the site boundary (refer to Figure 3 and Photograph B9). The feed from these tanks was thought to have been underground originally. Because of the character of HFO the tanks and pipelines would be expected to have been insulated and heated to keep the fuel mobile. This would not have been the case for diesel.

In the mid-1990s the original old boiler house was removed. This was located just to the west of the existing conventional boiler house and north of the R Plant. At the same time the CGCP (Coffee Grounds Combustion Plant) was built immediately adjacent to the conventional boiler house on its south side. Before this the coffee grounds were a waste product.

The other areas of the site that may be relevant to this Phase I assessment (and have been subject to review during the site audit) include the following (refer to Figure 3):

- There are a number of typically small engineering workshop rooms/areas on-site, some of which are understood to have included degreasing operations using a chlorinated hydrocarbon (CHC) solvent in the past. The typical degreasing unit was reported to have been small (perhaps 25-100 litres). It is thought the CHC used was trichloroethene. Each work shop is expected to have had a solvent store and an oil store (probably in the form of one hazardous chemical lockable store). It is noted that most engineering stores have been reported to have been located in elevated positions within buildings (i.e., not on the ground floor).
- A former vehicle garage was noted on the Ordnance Survey plans located in the south-eastern corner of the site, in the northwest corner of what is now the main car park (refer to Figure 3). Reported to have been used for forklift trucks not lorries;
- Former vehicle washing area (included an oil:water interceptor which is still present) and possible bunkering of site vehicles, on eastern boundary if site
- Former amenities building (unused with restricted access now) – one of a number of buildings or areas where asbestos containing materials (ACM) are present
- Footprint of former boiler plant – now waste storage area
- General storage along the northwest boundary line of the site (WSW of diesel storage)
- Ammonia and carbon dioxide (gases) bulk storage tanks on the west (northeast corner) of the main building linked to the freeze drying unit at this location within the building
- Other refrigerants in use at the site included chilled water/brine and HCFC based chiller units. An inventory of HCFC, HFC and HC refrigerants has been provided. The refrigerants used on-site are R134a, R404a, R401a, R407c, R600a, R717, R744, and R1270. In total about 9,150kg of HCFCs are in refrigeration units on-site. No losses have been reported. No back up supplies are stored on-site, rather a nationwide specialist contractor is used to service all such units.

4 SITE INSPECTION

4.1 Introduction

A guided site tour was undertaken by Dr. Marcus Ford of Geosyntec on the 27th August 2013, in the company of Mark Gregory of Nestlé. This tour followed meetings with key staff, in particular Steve Pavier and Mark Gregory, to discuss various aspects site coffee manufacturing operations that might have led to land and groundwater related environmental liability. Areas of asbestos were not inspected, mainly due to lack of access.

4.2 Current Site Operations and Hazardous Chemical Use

The current site layout is shown in Figure 3 and photographs of the site are provided as Appendix B. There is reported to be limited hazardous chemical use, and therefore related hazardous waste generation, at the site. The main hazardous chemicals appear to be:

- Diesel fuel (standby fuel for boiler)
- Sodium hydroxide
- Small amounts of other hazardous chemicals, including paints, white spirit and solvents, in small, designated hazardous chemical storage units (e.g., metal, lockable cupboards)

Diesel fuel is stored in two bunded above ground storage tanks (AST) located on the site northwest boundary within one dedicated concrete bund. Photographs B1 and B2 (Appendix B) show a view of the tanks from the front (southeast) and side (northeast), respectively. The bund is approximately 4m high. The front view shows the two, tank-specific, fill points with small drip trays beneath them. There was no obvious staining of the concrete hard standing beneath these fill points. The side elevation shows some staining close to the bund access ladder, perhaps linked to cleaning out of the bund. The inside of the bund was inspected from the top of the access ladder. There was a little water accumulation in the bund and this was a little oily. It was reported that this bund does tend to fill with rainwater and has to be pumped out. Photo B2 also shows the pump house and pipelines for delivering diesel to the boiler house (pipelines above ground).

It is believed that this diesel AST farm may have been present before 1993/94. It is also believed that there used to be other diesel fuel feeds into the roasting and spray drying plants (for specific heating applications), some of which are expected to have been directed underground.

In the past (pre-1993/4) the boilers were fuelled by Heavy Fuel Oil (HFO). The HFO storage tanks (AST) are still present directly to the north of the current boiler house. They are now used for soft water storage for the boilers. On the outside of one tank there is still evidence of tank overfilling (apparent HFO staining on one side). The main bund wall structure appeared adequate (no access to the eastern most tank as solid internal wall) but within it there was a drain on one side (the opposite side to the canal). From the site drainage plan this seems to directly discharge to the canal (SW4 outfall).

Sodium hydroxide is bulk stored in a main raw material tank (25% solution) and 2-3 smaller tanks used for diluted caustic mixtures (12%). These tanks are located within the main building on its north side, where the former roasting and drying plants were located. One other bulk storage tank for sodium hydroxide is located in the chemical storage room on the south side of the main boiler house. Sodium hydroxide solution is used for cleaning and for reverse osmosis (RO) to produce softened water for boiler feed. Before the RO Plant was built, in the 1980s, there was a demineralisation plant that used both caustic (sodium hydroxide) and sulphuric acid. The chemical storage for the demineralisation plant was reported to have been in the room between the main boiler room and the CGCP, as was brine storage (now outside on the northern side of the main building)..

Engineering and related workshops have been located (past or present) in a number of building areas (refer to Figure 3) which can be summarised as follows:

- An estimated five workshops in the Main Building, including the main 1st floor machine shop located in the central/southern part of the building
- Workshops in CGCP and the R Plant
- Workshop in the southeast corner of the OOH Building

Most appear to have been quite small scale and within buildings above the ground floor (main building in particular). Use of chlorinated solvents (trichloroethene) for degreasing is expected to have been limited and confined to small purpose designed degreasing units in one or more workshop. The degreasing baths were reported to have been a few tens of litres in capacity, perhaps up to 100 litres. It was reported that there were a few such degreasers and storage of solvent in perhaps 25 litres drums would have been local to the workshop in question. It was reported that in the early days there may have been poor waste management practices (e.g., possible solvent wastes discharge to drain) but from the 1970s onwards practices would have changed. Chlorinated solvents were replaced (thought to have been in the late 1990s) and a specialist contractor (SafetyKleen) has been used to maintain the units and replace solvents since the 1990s also.

One former flammables store was seen on the east side of the main building opposite the roadway between the Green Bean Warehouse and the Eden building (see Photograph B3). Immediately to the east of the conventional boiler house was located a small locked room which was used historically for hazardous chemical storage, up to an estimated 15-20 years ago. This room was inspected and had a good concrete floor with no visible floor drains (entrance to former store shown on Photograph B4).

The boiler house is located on the northwest corner of the main production building. It comprises a set of conventional oil or gas-fired boilers (20-40 years old). One boiler is gas fired. The two oil fired boilers are fed from fuel pipes that enter the building high up on its western side and drop down into an in-floor service conduit that runs west to east and is directed to all three boilers (one as standby feed). The boiler house floor was observed to be in good condition and free from residues relating to apparent oil leaks.

4.3 Site Services

There is a network of foul and surface water drains beneath the site and a detailed drainage plan has been reviewed as part of the Phase I exercise (reference G2698/007). Foul drainage system is also connected to production areas within the main building, R Plant, Roaster Building and boiler houses. These are fed by box gully drains which take floor water. There is likely to be a mixture of ceramic and plastic foul drains at the site. Process water and foul from most of the buildings appears to be directed south and combined to discharge at Flume No.2 ("Squash Courts") located at the central/southern end of the site, which is understood to be the permitted discharge to sewer. Thames Water receive and treat the effluent via this route. The site EA (IPPC) discharge consent includes a pH6-11 limit and the site occasionally has had exceedences of pH11 due to caustic (sodium hydroxide) discharges.

The main process effluent for the coffee process appears to be recovered on the ground floor of the R Plant, with treated liquors discharged to sewer and dewatered waste coffee grounds transferred to the CGCP (Coffee Grounds Combustion Plant) just east of the R Plant.

Some site foul sewers are directed to the east and discharge to sewer in the southeast corner of the site *close to the site entrance). The network of surface water drains discharge at various discrete points (7 to the south). Originally there appear to have been >10 active surface water discharge points to the canal along the northern boundary, however many are now marked as blocked (with removable bung) with the remaining open drains discharging via a series of 7 oil:water interceptors located close to the northern boundary with the canal. They include an oil water separator which is cleaned every three months during 'high' season.

Another suspected interceptor was identified during the site walkover near the central eastern boundary of the site (see Photograph B5&6). This was subsequently inspected by site staff and was confirmed to be an interceptor (rather than an underground tank). It is not marked on the drainage plan but is expected to have been associated with a former vehicle washing area at this location.

An active (in-use) groundwater abstraction borehole is located at the site, in a central location close to the northern boundary of the main building. The well is accessible from within the building and there is a sample tap and flow meter on the rising main. There is no site information about its depth or construction. A copy of the EA Full Licence to Abstract Water has been provided, effective from 1st April 2013 (expiry date 31 March 2025). This allows abstraction of up to 54m³/hour (1,296 m³/day; 473,040 m³/year) for evaporative cooling and boiler feed. The groundwater source is stated as confined Chalk (confined by the London Clay).

There are large mains water storage tanks located at the western extremity of the site. The 3 tanks are designed to give the site 6 hours storage in the event of a mains water supply failure. There are two water treatment chemical tanks and dosing systems located beside the water tanks, one for sodium chloride solution and the other a non-hazardous additive BETZ 5927). Both tanks were double walled and bunded. Beside this was a gardeners and builders store/base (shed).

4.4 Asbestos Containing Materials (ACMs)

The site maintains an asbestos management system that is based on a Type 1 & 2 assessment (now referred to as an Asbestos Management Survey). The site approach has been to survey, using a specialist Bardon Environmental, and then ensure containment rather than implement major removal programmes.

There was reported to be a detailed Asbestos Containing Material (ACM) inventory for the site, prepared in 2010. Thereafter an annual survey has been commissioned to keep the register up to date. Geosyntec requested and received detailed information on ACM for the site, which was voluminous (hundreds of pages), and has been subject to an initial screening review. The information supplied and briefly reviewed can be summarised as follows:

Year	Areas of site covered	Key content
2007	Sub-floor duct Main Building (Undercroft)	Report text, photos and 2 plans (scanned information)
2010	Boiler House	As below
August 2011	R Plant, Freeze Dried, Spray Dried	As below
Late 2011 to early 2012	CGCP Building and fan yard; Green Bean Warehouse; Main Building (split into 4 quadrants A-D); various switch and plant rooms; Roaster Building; general roof areas; occupational health department.	Register of ACM items, ranked into 4 categories (High, medium, low and very low risk) with recommended action, including laboratory analyses, photographs and site plans showing locations (Geosyntec not clear how plan reference numbers correspond to item or photo numbers).
April 2012	Freeze Dried and Spray Dried areas	Series of floor and area plans showing location of ACM
May-2013 Update of previous management asbestos survey report	Boiler House; CGCP Building and fan yard; Green Bean Warehouse; Main Building (split into 4 quadrants A-D); the factory managers house; OOH Building; external buildings and areas; various switch and plant rooms; Roaster Building; general roof areas; squash court building;	Numerous site plans showing location of ACM

Examples of some of the main forms of ACM reported to be present are pipe insulation, insulation board, gaskets, asbestos paper coated fibreboard, asbestos cement including on pipes, cowlings and as roof and wall sheets, floor and wall tiles, bitumen adhesives (e.g., for floor tiles) and expansion joints, and Galbestos cladding.

Bardon have been clear in their reports regarding which areas have been surveyed within site buildings and identified survey areas, and state where access was limited or not possible. They also note that whilst every reasonable effort was made to identify ACM onsite with specific reference to all individual asbestos gaskets, due to the amount of pipework present and the difficulty in accessing joints and flanges where unexposed gaskets are present, the report is not an exhaustive list of all asbestos containing gaskets present. A quick look at the annual review reports suggests that where actions were recommended by Bardon (in terms of removal or isolation) these appear to have been typically carried out in the intervening period.

Site management report that there is a large amount of ACM in on-site site buildings, particularly associated with (i) the Undercroft area beneath the Main Building and the former Amenities Building (both building/areas understood to be sealed off). Both have been surveyed by Bardon Environmental.

The Undercroft is a below ground floor area within the eastern third of the Main Building (under the chocolate factory area and the former roasting and drying area). Some photographs of this area are included as Appendix C. It can be seen that apparent ACM lagging on pipes and spray-on material on the underside of the floor (and possibly piles that are on a 5m grid below the Main Building) has deteriorated and a lot appears on the ground (which appears to be open ground rather than hard standing). Bardon recommended classifying the whole void/duct space as being contaminated with asbestos insulation debris and be designated an area of restricted access, suitably labelled, with any access manholes to the void secured to prevent accidental access by unauthorised personnel. It is understood this was done.

Some Bardon photographs also show the amount of services that are underneath the groundwater floor of the Main Building. It would seem likely that the deeper service routes that also underlie the western half of the Main Building and seem to be routed from the boiler house area to the southeast area of the Main building will also contain similar types of ACM. These are also likely to contain ACM on services, the fabric of the conduit and on the floor of the structures due to deterioration.

Site management reported that below the Undercroft soils may be impregnated with ACM down to 1m depth (because it is non-surfaced ground at this level). Aside from the building infrastructure and service line ACM associated with the Main Building and former Amenities Building there are reported to be a very large number of ACM containing gaskets in the process areas, floor, wall and ceiling tiles, asbestos insulation board, mastic in window frames, boiler house ACM and cement bound ACM sheets on the roof of certain buildings.

It is noted that any ACM identified in areas that are to be subject to demolition must be removed prior to such work commencing (any disturbance for such purpose). It is also noted that whilst comprehensive inventories exist for site buildings this is not a complete inventory, as stated by Bardon. Site management reported they have already scheduled a major survey of ACM in 2014, as a pre-demolition exercise. This will be critical to complete, and include a programme of intrusive sampling and a higher level of quantification of the type, extent and volume of ACM at the site and how this should be managed and dealt with under a demolition scenario. At this time Bardon should include some soil sampling in the Undercroft to consider contaminated soil volumes and character.

4.5 Poly Chlorinated Biphenyls (PCBs)

There are a number of transformers at the site. For example, five were located in the northwest area, one in the former boiler plant area and four around the Roaster Building, plus a set of transformers located centrally within the southern part of the Main Building. The main substation for the site is located in the southeast corner, just outside the site boundary. It was reported that all electrical equipment including transformers and switchgear are PCB-free.

4.6 Waste Management

The main waste storage area for the site is close to the north-western boundary, north and west of the R Plant and Roaster Building (refer to Figure 3).

The main hazardous waste storage compound is located immediately to the west of the diesel tanks. It is approximately 11m by 5m in plan and has walls on 3 sides and was secure (refer to Photograph B7). It was bunded and the floor sloped to the rear of the compound from the access gate at the front. There was also a collection sump covered by a metal grill on the entrance. From quick inspection it was seen to contain mainly waste oil containers (about 50 in number of ~20-25 litre capacity). It also contained empty containers, a bin for oily rags and waste. It was well organised and secure.

Next to the above hazardous waste compound was a hazardous chemical storage compound for water treatment chemicals and oil (2 * 200 litre Primol 352 drums). This had a roof but was open on two sides. It appeared neat and tidy on the day of the inspection.

The former boiler house footprint is now used as a segregated waste storage area for skips and recyclables (refer to Photograph B8).

Waste skips used to be stored on a concreted area to the east of the diesel storage tanks. There was a surface drain in the hard standing in this former skip storage area.

The area to the west of the above compounds was previously used for contractors (accommodation and storage). This is no longer the case. A surface water drain runs along the back of this whole boundary area (oil water interceptor on the route).

On the west side of the OOH Building was located a cardboard and paper recycling area, which included a compactor and bailer, plus skip storage.

Finally it was reported, post the site audit, that historically there may have been some solid waste material loss or disposal into the canal beside the northern site boundary, before the site security fence was erected. No further detail could be provided (this was essentially anecdotal evidence).

4.7 Spill & Leakage History (potential impact on land and groundwater)

There have been two reported major spillages of hydrocarbons at the site, one of which involved the EA (prosecution of Nestlé site). In addition mercury contaminated soils were found when the site developed the CGCP. Finally, it was reported that an incident involving

a small truck diesel fuel tank rupture took place. These incidents, for which no documentation is thought to remain, plus ACM related soil contamination, can be summarised as follows:

- Heavy Fuel Oil (HFO) and diesel spill (1998)
- Diesel (Gas Oil) Fuel Leak (underground leakage up to early 1990s)
- Mercury losses to ground (again up to early 1990s)
- Small Diesel loss (2009)
- ACM in soils below Undercroft

The HFO loss resulted in a prosecution of the site relating to pollution of controlled waters (the canal), under the Water Resources Act (1991). The incident was reported (EnviroCheck) to have involved the pollution of the Grand Union canal with a mixture of HFO and diesel and be due to the collapse of a sewer that was blocking a drain in July 1998. Nestlé was reported to have also been charged with failing to maintain and keep plant and equipment in good repair. The hearing date was 2nd August 1999 which resulted in a guilty verdict and a fine of £15k plus costs.

During the site audit it was reported that the loss was due to an overflow of the tank (the site was on an interruptible gas supply so the tanks were kept full). On this basis the spill may have been expected to have been either diesel or HFO, not both. During the incident the oil on the canal was contained using oil booms and then recovered.

When an excavation for a new de-aerator tank for the boiler house was made diesel contamination in the soils was found. This is believed to have been sourced from a leaking underground diesel line, there originally being underground pipeline transfer to the boiler house from the tanks.

In addition when the excavation for the CGCP (Coffee Grounds Combustion Plant) took place mercury contamination was identified in the soils. This was believed to have been associated with the use of mercury switches within the old (former) boiler house (e.g., outlet damper controls and boiler pressure controls). Such switches would have used a small volume (ball) of elemental mercury to allow the switch to move. Because the number of boilers was limited to 3-4 the number of mercury switches is expected to have been small. The report associated with this mercury contaminated soil has not been found (would have dated from the early 1990s).

The small diesel loss that took place in 2009 was associated with the rupture of a delivery vehicle (truck) diesel fuel tank. It reportedly involved a 150 gallon loss (about 700 litres). It was reported to have been caused by an out of place drain cover puncturing the fuel tank. It is unclear who this spill was dealt with and where the diesel ended up. The EA should have been notified. It is understood to have taken place on the back road to the north of the Main Building.

The Undercroft area and associated deep service conduits are a known area of asbestos containing material (ACM) which has impacted open ground. It has been reported that soils in this area may be impregnated with ACM down to 1m depth.

Over and above the due diligence process that is required as part of the site closure and divestment process (as follow up to this Phase I exercise) it is expected that a site soil and groundwater report will have to be submitted to the EA as part of handing back the IPPC license (reportedly the EA has stated this to site management in there closure planning discussions).

5 CONCLUSIONS AND RECOMMENDATIONS

This study has comprised a Phase I environmental Assessment of the Nestlé facility in Hayes that is due to close in late 2014 and will be divested.

The overall aim of this Phase I exercise culminating in this report was to identify potential issues of historical or current land use, on or adjacent to the subject site, that could have led to a material impact on soil or groundwater quality. In addition consideration has been given to the presence of hazardous substances at the site that could materially impact site decommissioning, demolition and/or sale, specifically associated with asbestos containing materials (ACM), possible PCBs and refrigerants. Where major issues of potential concern have been identified the study was to also provide an assessment of the potential scope of Phase II work that may be expected to be required to understand them and allow a cost estimate for the environmental liability to be presented, in the light of a future commercial or light industrial, or mixed use development.

The Nestlé Hayes facility comprises an area of around 12 hectares. It currently has a main production building, other newer production related buildings, a raw material (green bean) warehouse, other product processing and packaging buildings such as OOH and Eden, conventional and waste coffee grounds fuelled boilers, a former amenities block, plus security building and car-parking. The site is a coffee manufacturing site with some chocolate production until 2005. The early Ordnance Survey plans for the area show the site to have been initially developed after 1920.

The land to the south of the site is residential, with mainly industrial land use to the west, north and east.

The site appears to be underlain by a sequence which comprises Made (Reworked) Ground, of unknown character, over an important shallow sand and gravel unit, beneath which there will be London Clay bedrock. The shallow geological system should protect groundwater at depth, expected to be within the Chalk (another Principal Aquifer). Groundwater will also be present within the alluvial sand and gravel deposits. This is classified as a Principal Aquifer which is reported to also have high vulnerability due to being so close to surface. It is anticipated that shallow groundwater flow will be towards the east or south towards the local river and/or ultimately towards the River Thames. There could be flow beneath the canal, but groundwater is not expected to discharge to this surface water body.

This study has identified a number of potential site-specific, localised contamination sources of ground contamination for which intrusive investigations are recommended so that a corrective action plan and cost estimate can be developed for the redevelopment scenarios that could be undertaken at the site. These are summarised in the following table.

Potential contamination Source	Main Potential Contaminants of Concern	Likely risk for Residential Redevelopment if present	Likely/possible risk for Industrial or Commercial Redevelopment
Made Ground - potentially site wide	Heavy Metals and PAHs	Yes - key exposure pathways are likely to be related to garden areas	Low potential risk especially where hard standing predominates in the development design
Former underground fuel transfer from the diesel (heavy fuel oil) tanks	Petroleum Hydrocarbons	Yes	Yes
Known heavy fuel oil and diesel fuel losses (tank farm and boiler house)	Petroleum Hydrocarbons	Yes	Possible
Contamination of soils below the CGCP footprint as a result of small scale losses from mercury switches in the boiler house.	Mercury	Yes	Possible
Former and current Engineering shops and associated stores in the main production building and the western site boundary	Petroleum Hydrocarbons and solvents	Yes	Yes
Former garage/depot at the north-western end of the main car park	Petroleum Hydrocarbons and solvents	Yes	Possible
ACM in soil, especially beneath the main building	asbestos	Yes	Yes

In summary, it is apparent that the potential exists for there to be ground gas, shallow soil and possibly groundwater contamination associated with the previous use of the site and possibly also adjacent land use (most notably former land use to the north of the canal). The potential need for corrective action should be based on the results of an intrusive investigation and risk assessment.

There is potential for some, at least localised, contamination by chlorinated solvents (CHCs), although this is from expected small scale engineering shop use and not decaffeination of coffee which has been reported to have never taken place at the site. It is considered more likely that the main contaminants of potential concern (COPC) comprise diesel fuel and low mobility hydrocarbons linked to heavy fuel oil (HFO), and possibly heavy metal and PAH contamination within shallow Made Ground materials. In the event of a relatively low sensitivity commercial or industrial development, it is possible that some or all of these COPC may not represent a significant risk that drives the need for corrective action beyond a clean cap on landscaped areas. However, should a more sensitive end use such as residential housing, perhaps as part of a mixed use development, be adopted then more extensive remedial works may be expected to be required.

The main areas requiring investigation to better quantify potential soil and groundwater liability at the site include:

- Northwest and northern boundary area where hydrocarbon bulk storage and previous underground transfer lines were located. Also area of two reported hydrocarbon losses,

one of which led to a prosecution due to impact on the canal. Finally, this area of the site has been used for waste storage over the years and as a contractor accommodation and working area

- Boiler house area (reported hydrocarbon and mercury contamination related)
- Former, expected small scale, chlorinated solvent storage and use, including solvent waste storage and disposal
- Asbestos impregnated soils below the Main Building and possibly elsewhere
- Possible migration of contaminated groundwater from the north or northwest (if possible beneath the canal) from former industrial (landfill) sites in this area. It is considered unlikely that former creosoting and power station sites to the east would have impacted the subject site, although rail links to these sites passed just north of the Nestlé site, beyond the canal. It is possible that the small industrial units on the west side of the site may contribute to groundwater contamination on this side of the site

It is believed that any Phase II site investigation work should be done to two phases. Firstly an assessment of whether groundwater within the Principal sand and gravel aquifer is impacted could be readily done without disrupting site operations and would provide the big picture understanding of whether a significant groundwater liability exists at the site. This is expected to require 6-7 well locations to a nominal depth of 6-8m. At the same time the on-site abstraction well would be investigated further and sampled for a range of site relevant inorganic and organic compounds. The canal would also be inspected and possibly sampled.

The second phase of intrusive work is expected to be focused on targeted soil (and possible some local, additional groundwater) sampling of both known former contamination issues associated with hydrocarbons and mercury, as well as unknowns such as hazardous chemical or waste (including solvent) storage and use areas, and Made Ground quality. It will be informed by the groundwater investigation. This may be expected to require about a week of window sampling, with perhaps 25-30 shallow soil sampling boreholes drilled to a nominal depth of 2-3m. A second groundwater monitoring round would be completed at this time. The data assessment and reporting exercise linked to this is expected to have to satisfy license surrender requirements as well as be supportive of planning related needs linked to land use change.

The site is known to have a number of buildings, some with a lot of asbestos containing materials (ACM). It is expected that Bardon Environmental will be contracted directly by Nestlé to undertake a 2014 survey, including a full pre-demolition survey (definitely needed if the site is to be demolished pre-sale; probably can only be done once the site has closed given the intrusive nature of such a survey). It is understood that Nestlé understand the budget required for such a full survey (Bardon has quoted), however if needed Geosyntec can work with Bardon to assess this in more detail as part of a Phase 2 activity. It may be expected that addressing ACM at the site, as part of site closure and change of use, will be a significant cost. The proposed detailed survey should serve to quantify this more accurately and ensure the cost implication of addressing such issues will be known.

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Geosyntec Consultants trust the information and discussion contained in this report meets all your immediate requirements. Please do not hesitate to contact the undersigned if you have any further comments or questions about any aspect of the work.

Respectfully submitted

On behalf of **Geosyntec Consultants**

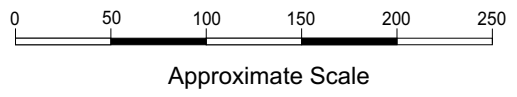
A handwritten signature in black ink, appearing to read "Marcus Ford". The signature is written in a cursive style with a large, prominent loop at the top of the letter 'F'.

Dr. Marcus Ford
Project Director

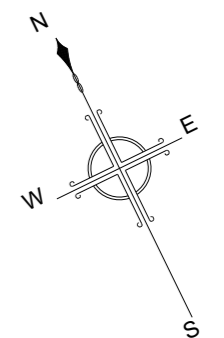
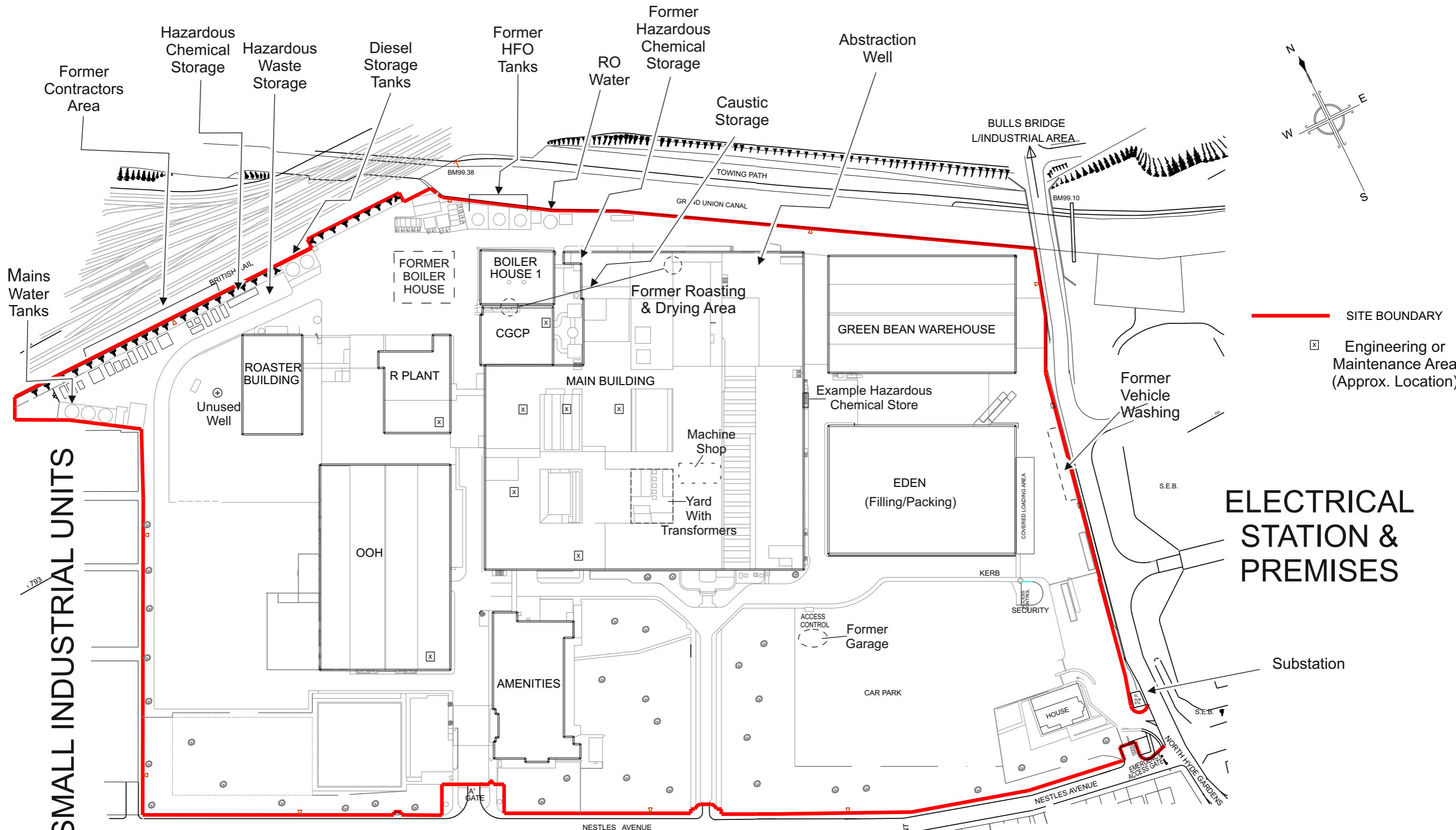
FIGURES



 - Site Boundary



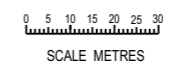
Aerial Photograph Image of Site		
GCU0124020	Nestlé UK Ltd Facility, Hayes, Middlesex	
	Alps Group Ltd	Figure 2
	Delph, UK	September 2013



- SITE BOUNDARY
- x Engineering or Maintenance Area (Approx. Location)

SMALL INDUSTRIAL UNITS

ELECTRICAL STATION & PREMISES






Site Plan Showing Key Aspects or Features		
Hayes, Middlesex	GCU0124020	
Geosyntec consultants	Nestle Hayes	Figure 3
Delph, UK	20/09/2013	

APPENDIX A






Select Envirocheck Figures and Information

Geology 1:50,000 Maps Legends



Artificial Ground and Landslip

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	WGR	Worked Ground (Undivided)	Void	Holocene - Holocene
	MGR	Made Ground (Undivided)	Artificial Deposit	Holocene - Holocene
	WMGR	Infilled Ground	Artificial Deposit	Present Day - Present Day

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	ALV	Alluvium	Clay, Silt, Sand and Gravel	Flandrian - Flandrian
	LASI	Langley Silt Member	Clay and Silt	Devensian - Devensian
	LHGR	Lynch Hill Gravel Member	Sand and Gravel	Wolstonian - Wolstonian
	TPGR	Taplow Gravel Formation	Sand and Gravel	Wolstonian - Wolstonian
	BHT	Boyn Hill Gravel Member	Sand and Gravel	Wolstonian - Hoxnian

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	LC	London Clay Formation	Clay, Silt and Sand	Eocene - Eocene
	LC	London Clay Formation	Clay and Silt	Eocene - Eocene

Geology 1:50,000 Maps

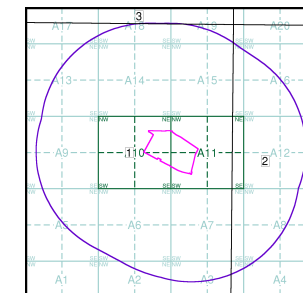
This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps.

The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:50,000 Maps Coverage

Map ID:	3	Map ID:	1
Map Sheet No:	255	Map Sheet No:	269
Map Name:	Beaconsfield	Map Name:	Windsor
Map Date:	2005	Map Date:	1999
Bedrock Geology:	Available	Bedrock Geology:	Available
Superficial Geology:	Available	Superficial Geology:	Available
Artificial Geology:	Available	Artificial Geology:	Available
Faults:	Available	Faults:	Available
Landslip:	Available	Landslip:	Available
Rock Segments:	Not Available	Rock Segments:	Not Available
Map ID:	2		
Map Sheet No:	270		
Map Name:	South London		
Map Date:	1998		
Bedrock Geology:	Available		
Superficial Geology:	Available		
Artificial Geology:	Available		
Faults:	Available		
Landslip:	Available		
Rock Segments:	Not Available		

Geology 1:50,000 Maps - Slice A

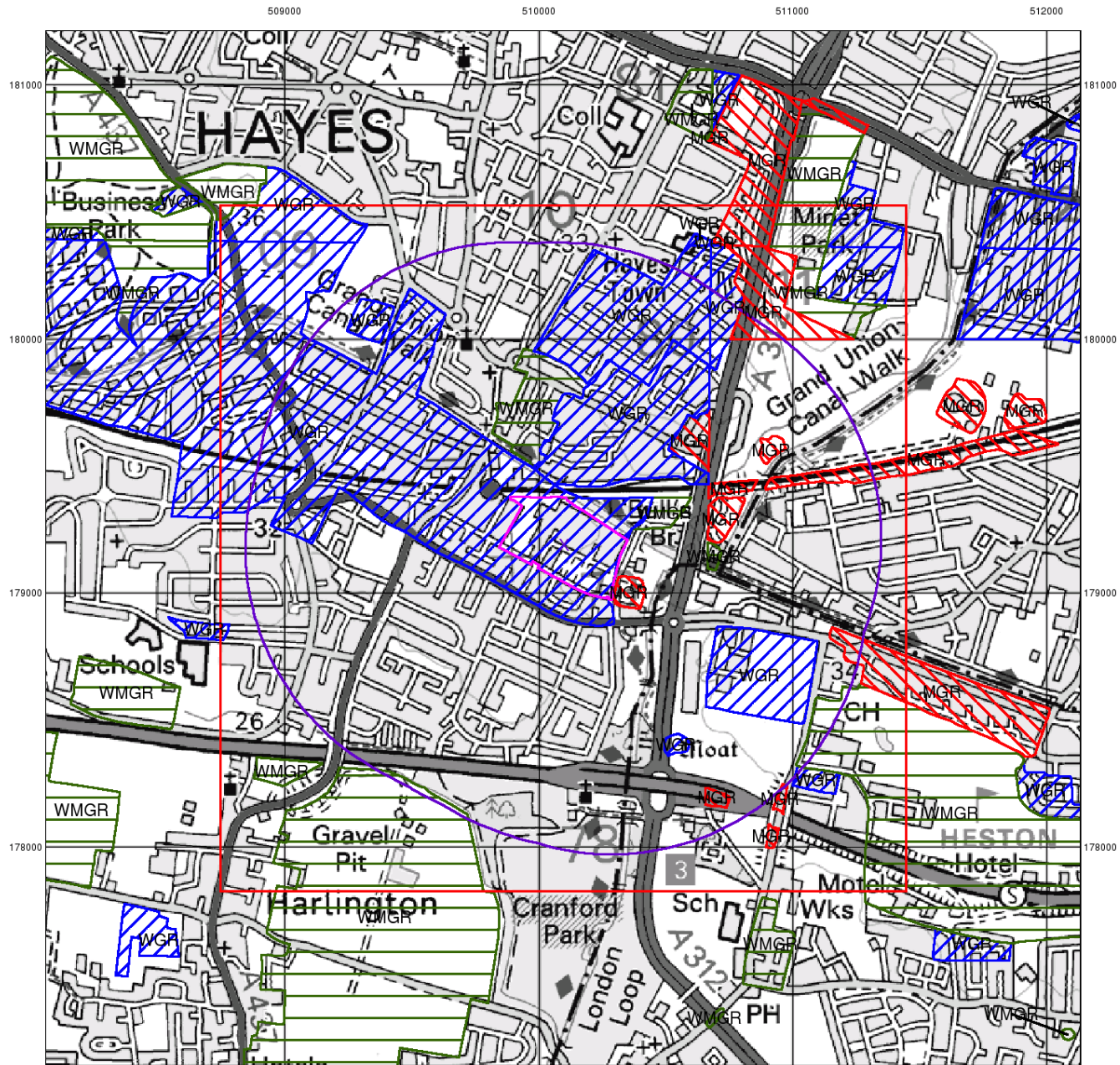


Order Details:

Order Number: 48644303_1_1
Customer Reference: GCU0124020
National Grid Reference: 510100, 179190
Slice: A
Site Area (Ha): 12.29
Search Buffer (m): 1000

Site Details:

Nestle UK Ltd, Beverage Division, North Hyde Gardens, HAYES, Middlesex, UB3 4RF



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Artificial Ground and Landslip

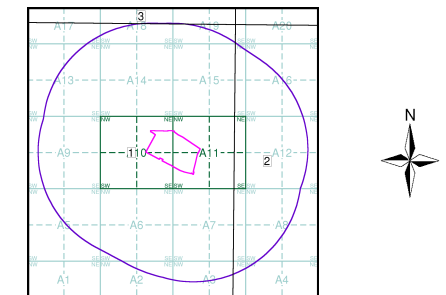
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- Infilled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice A

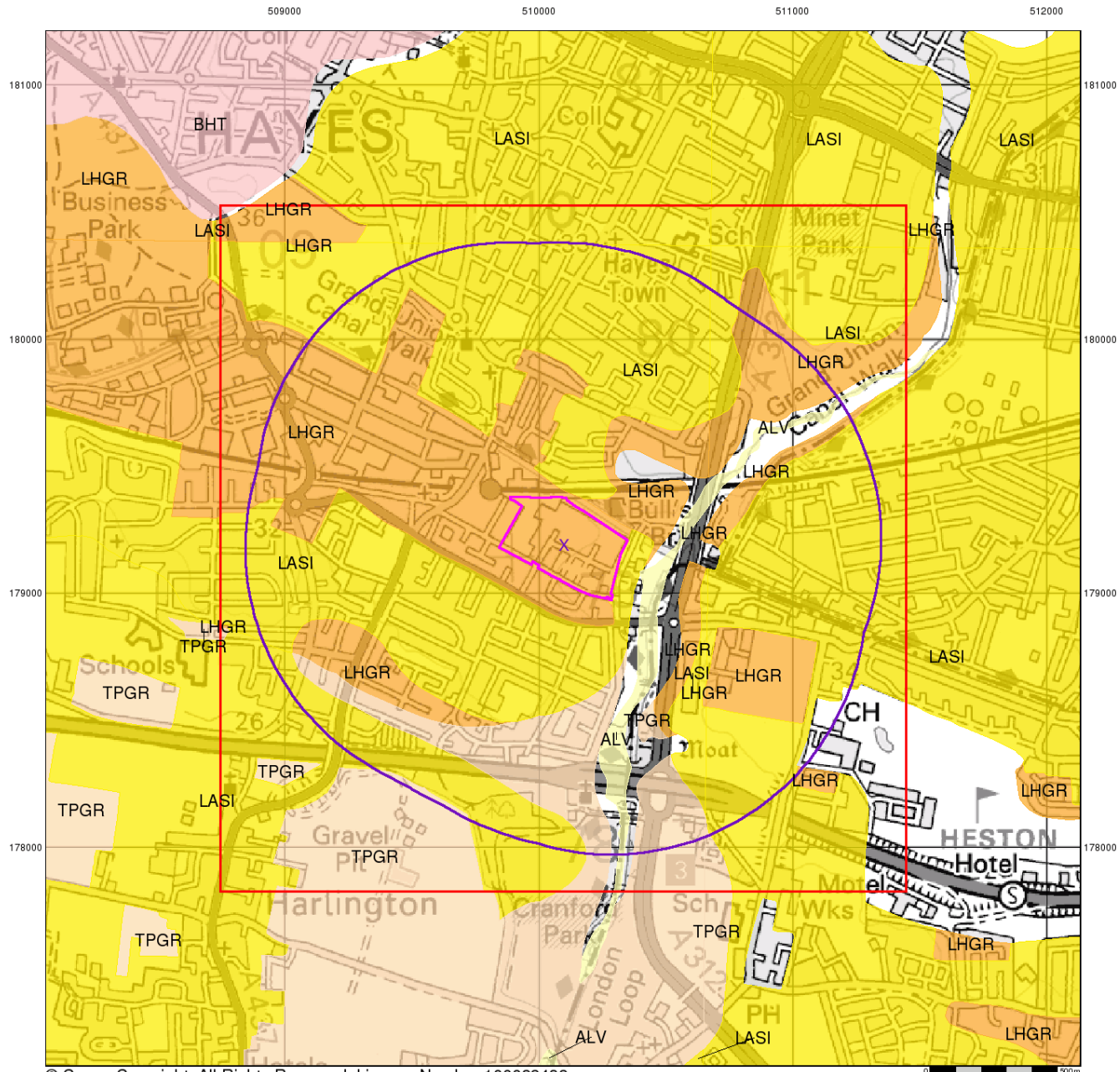


Order Details:

Order Number: 48644303_1.1
 Customer Reference: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details:

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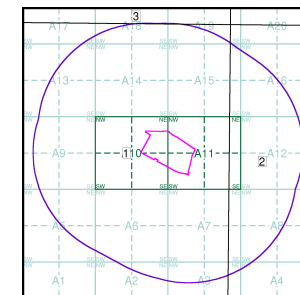
Superficial Geology

Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A

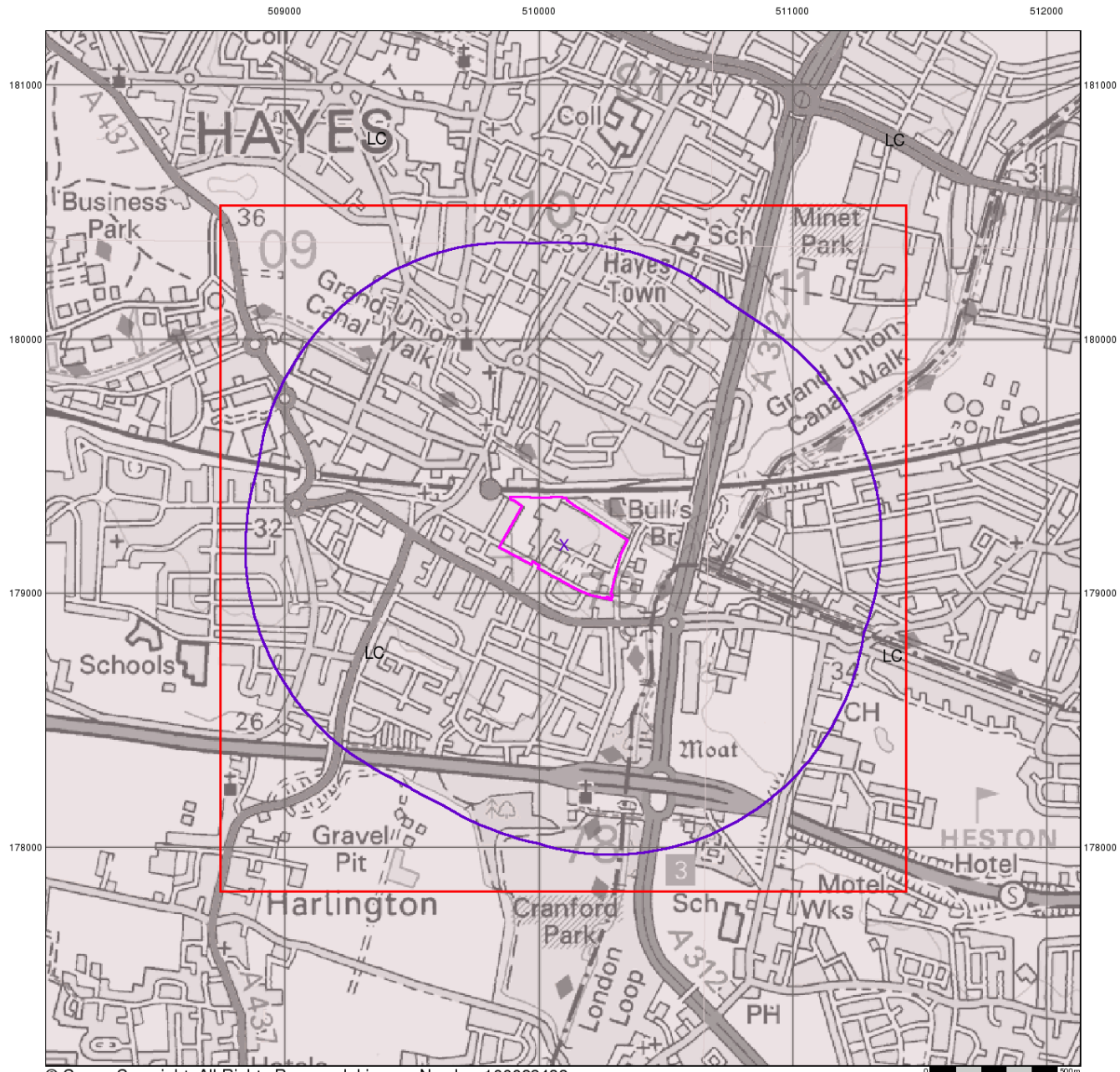


Order Details:

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Customer Reference: GCU0124020
National Grid Reference: 510100, 179190
Slice: A
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Site Details:

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Bedrock and Faults

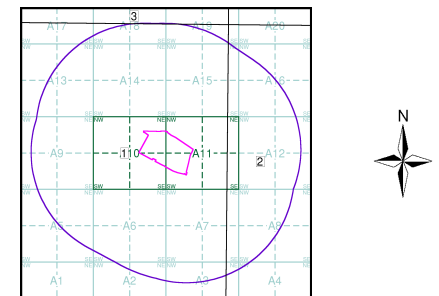
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seam, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but cut across the strata and post date its deposition.

Bedrock and Faults Map - Slice A

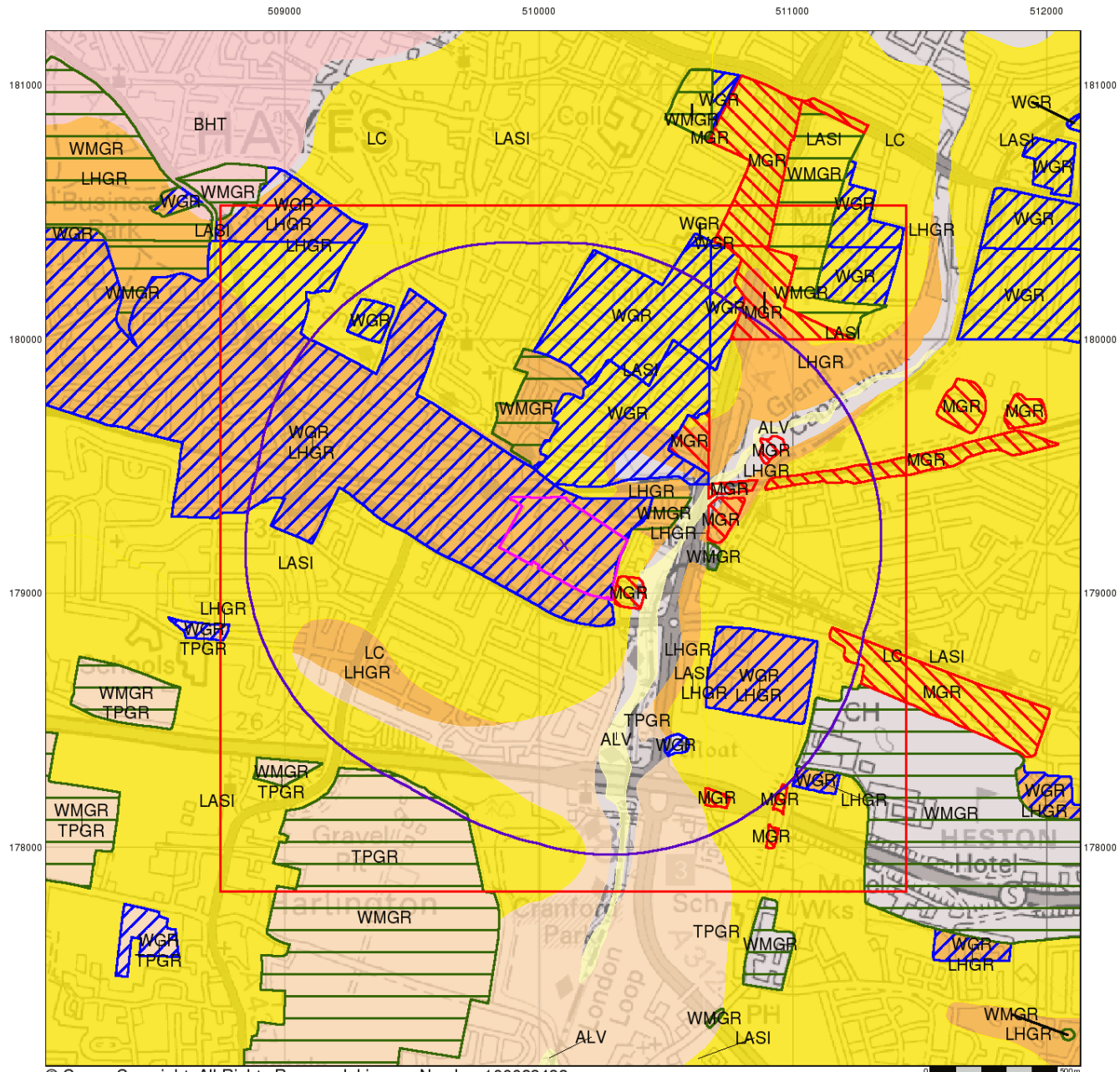


Order Details:

Order Number: 48644303_1_1
 Customer Reference: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details:

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Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

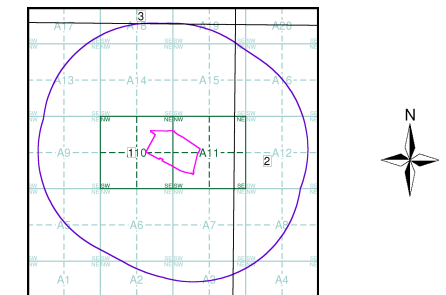
Additional Information

More information on 1:50,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice A



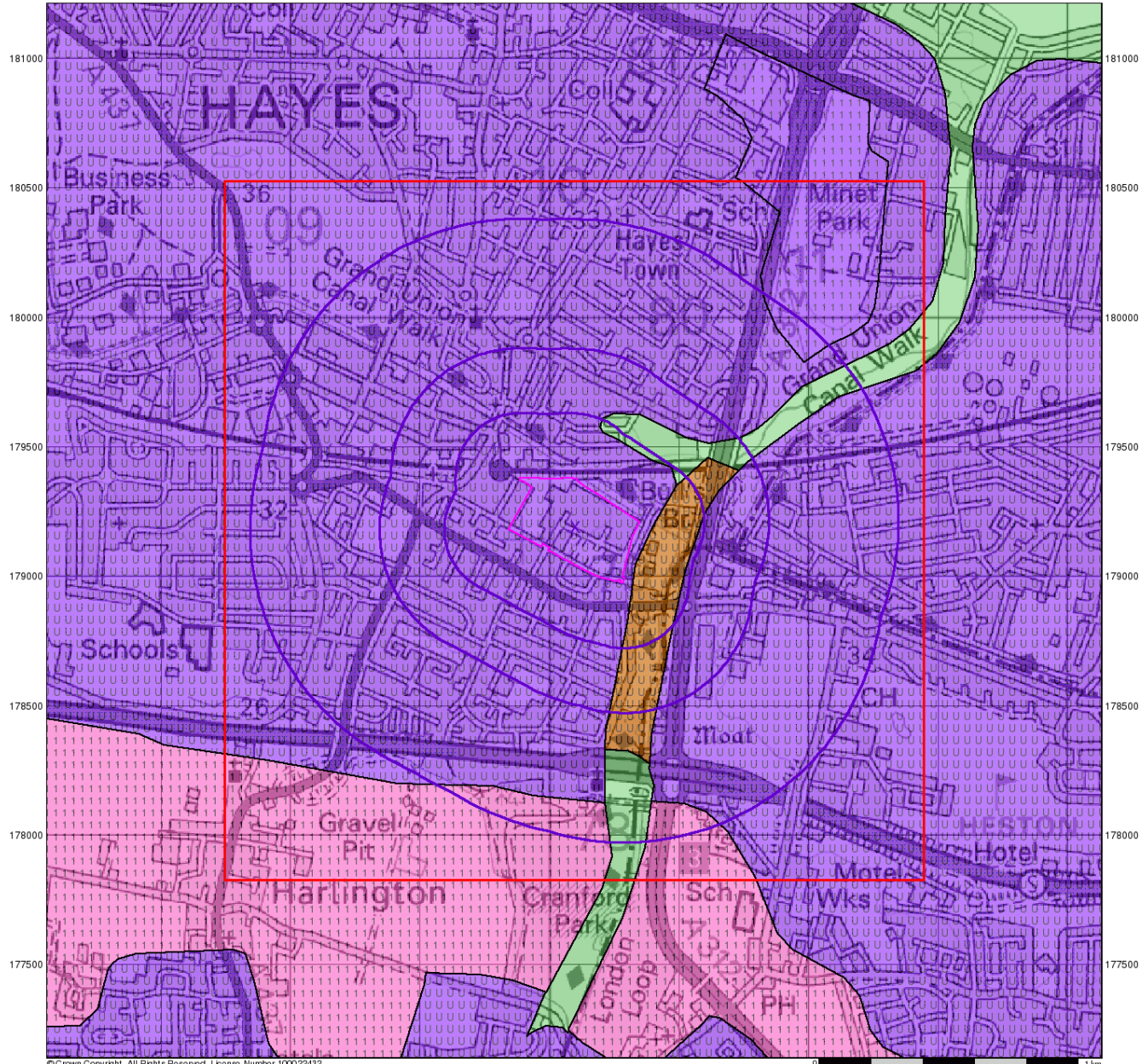
Order Details:

Order Number: 48644303_1_1
Customer Reference: GCU0124020
National Grid Reference: 510100, 179190
Slice: A
Site Area (Ha): 12.29
Search Buffer (m): 1000

Site Details:

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508500 509000 509500 510000 510500 511000 511500 512000



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FORD CONSULTING GROUP LTD
environmental science solutions

1st Floor Garsfield Business Park
High New Road
High Wycombe
HP12 3JF
tel 04842 951 9175
www.fordconsulting.co.uk

Groundwater Vulnerability

General

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

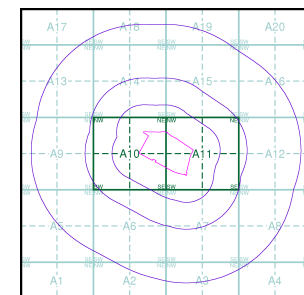
Agency and Hydrological

Geological Classes

- Major Aquifer (Highly Permeable)**
 - High (H) 1, 2, 3, U
 - Intermediate (I) 1, 2
 - Low
- Minor Aquifer (Variably Permeable)**
 - High (H) 1, 2, 3, U
 - Intermediate (I) 1, 2
 - Low
- Non Aquifer (Negligibly Permeable)**
 -
- Water or Sea**
 -
- Drift Deposit**
 -

Soil Classes

Site Sensitivity Context Map - Slice A



Order Details

Order Number: 48644303_1_1
 Customer Ref: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

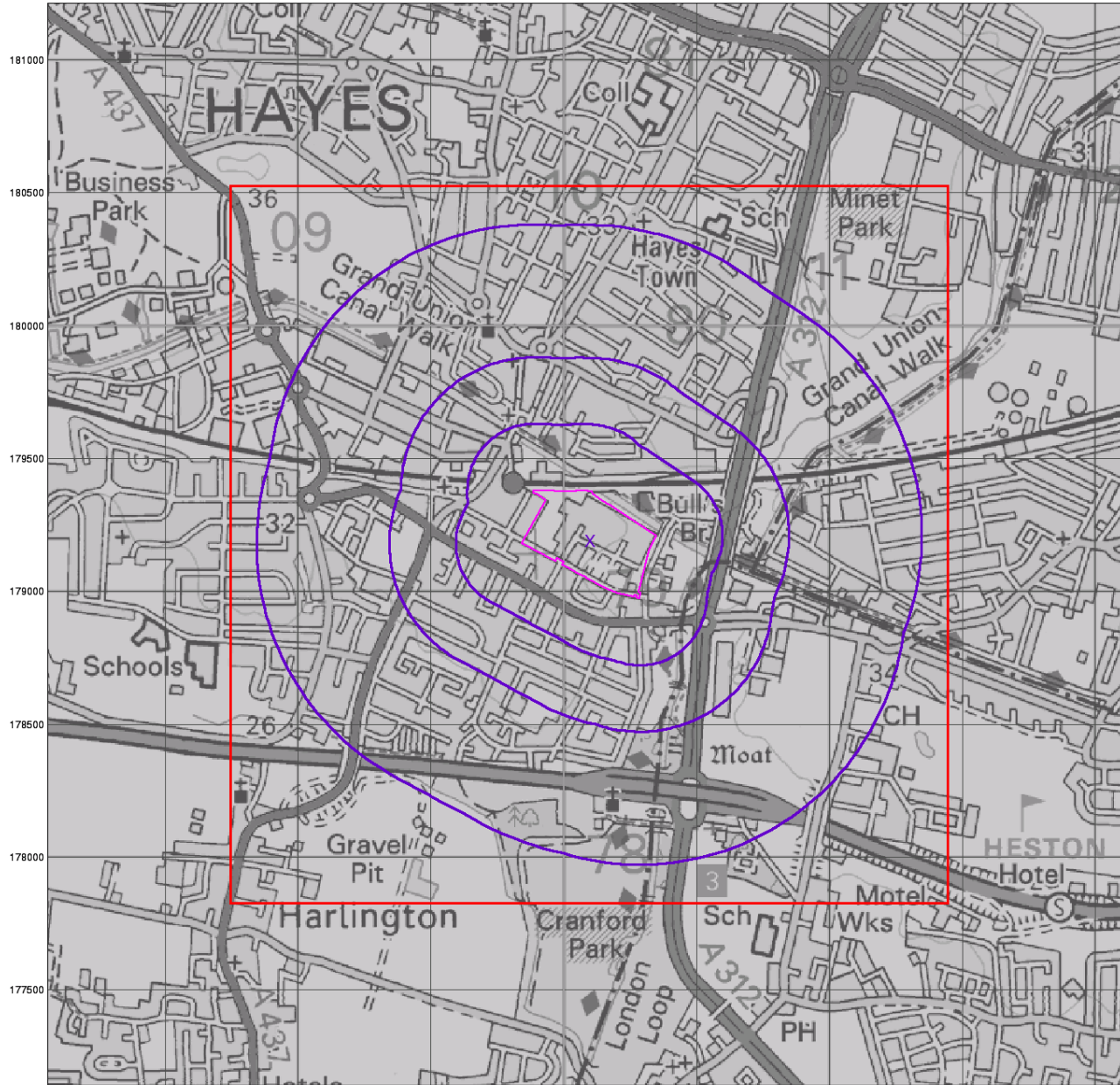
Site Details

Nestle UK Ltd, Beverage Division, North Hyde Gardens, HAYES,
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 Web: www.envirocheck.co.uk

508500 509000 509500 510000 510500 511000 511500 512000








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0 1 km

Bedrock Aquifer Designation

General

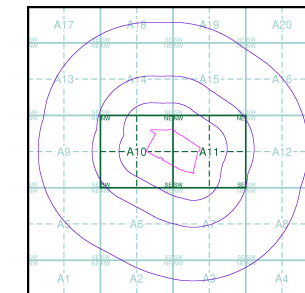
-  Specified Site
-  Specified Buffer(s)
-  Bearing Reference Point
-  Slice
-  Map ID

Agency and Hydrological

Geological Classes

-  Principal Aquifer
-  Secondary A Aquifer
-  Secondary B Aquifer
-  Secondary Undifferentiated
-  Unproductive Strata
-  Unknown

Site Sensitivity Context Map - Slice A



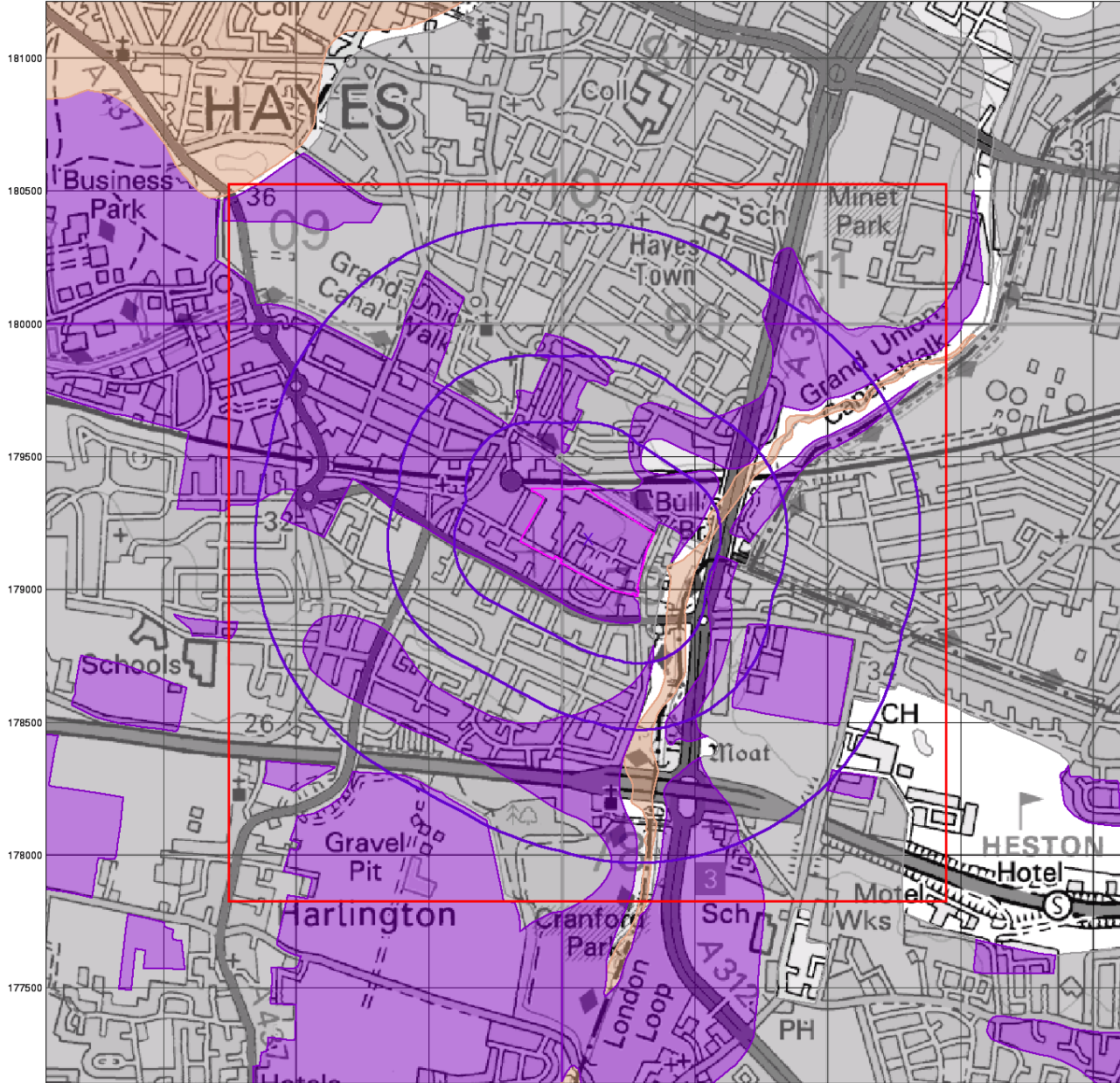
Order Details

Order Number: 48644303_1_1
 Customer Ref: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
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 Search Buffer (m): 1000

Site Details

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508500 509000 509500 510000 510500 511000 511500 512000



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0 1 km



1st Floor Garsfield Business Park
Highgate New Road
Highgate, London
N6 5JH
tel 0845 055 0575

www.fordconsulting.co.uk

Superficial Aquifer Designation

General

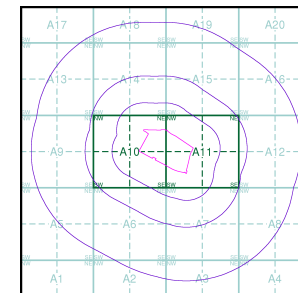
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A



Order Details

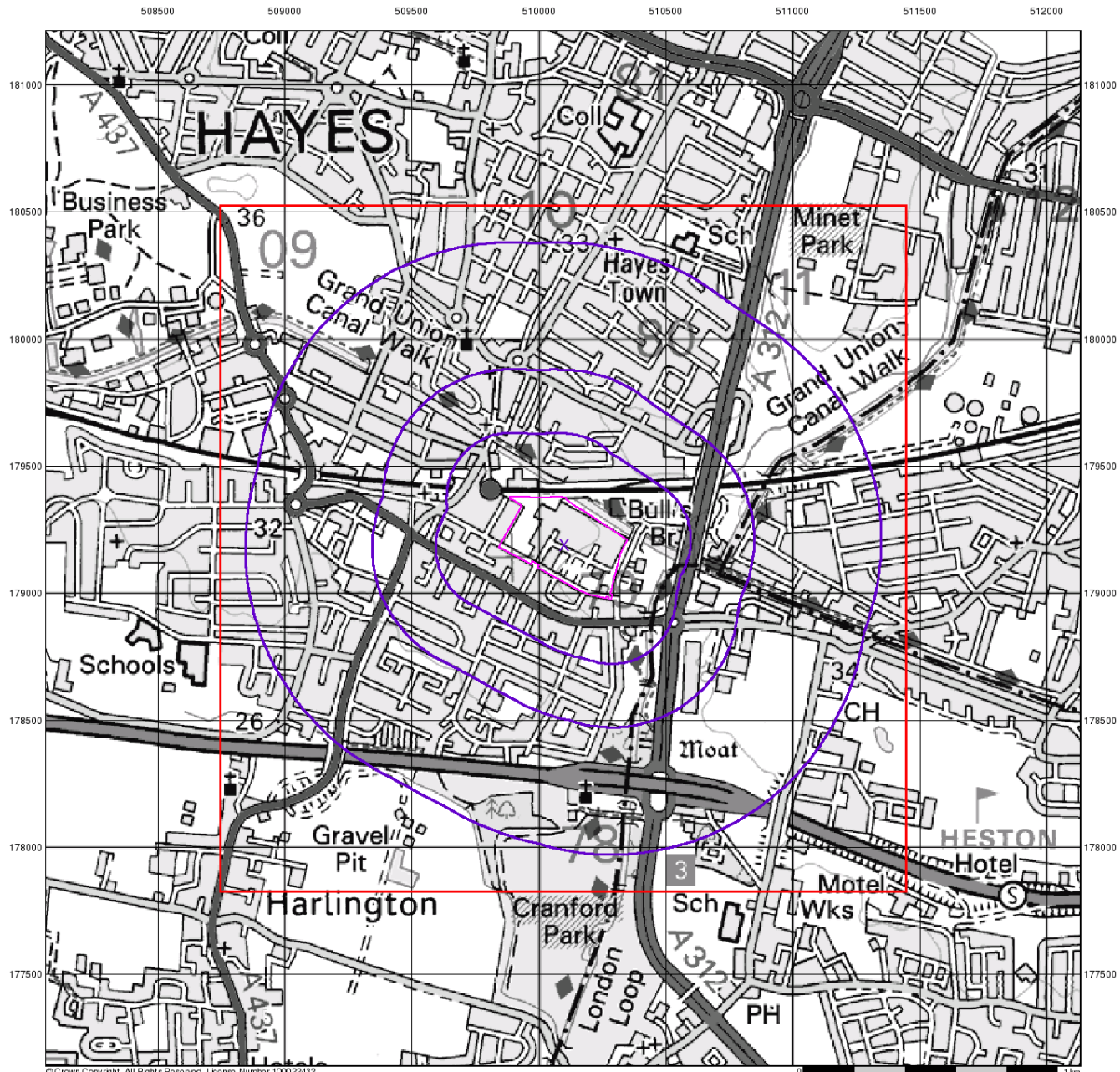
Order Number: 48644303_1_1
 Customer Ref: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details

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Source Protection Zones

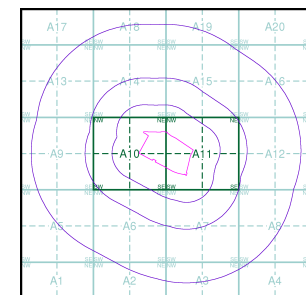
General

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

Agency and Hydrological

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III
- Zone of Special Interest
- Source Protection Zone Borehole

Site Sensitivity Context Map - Slice A

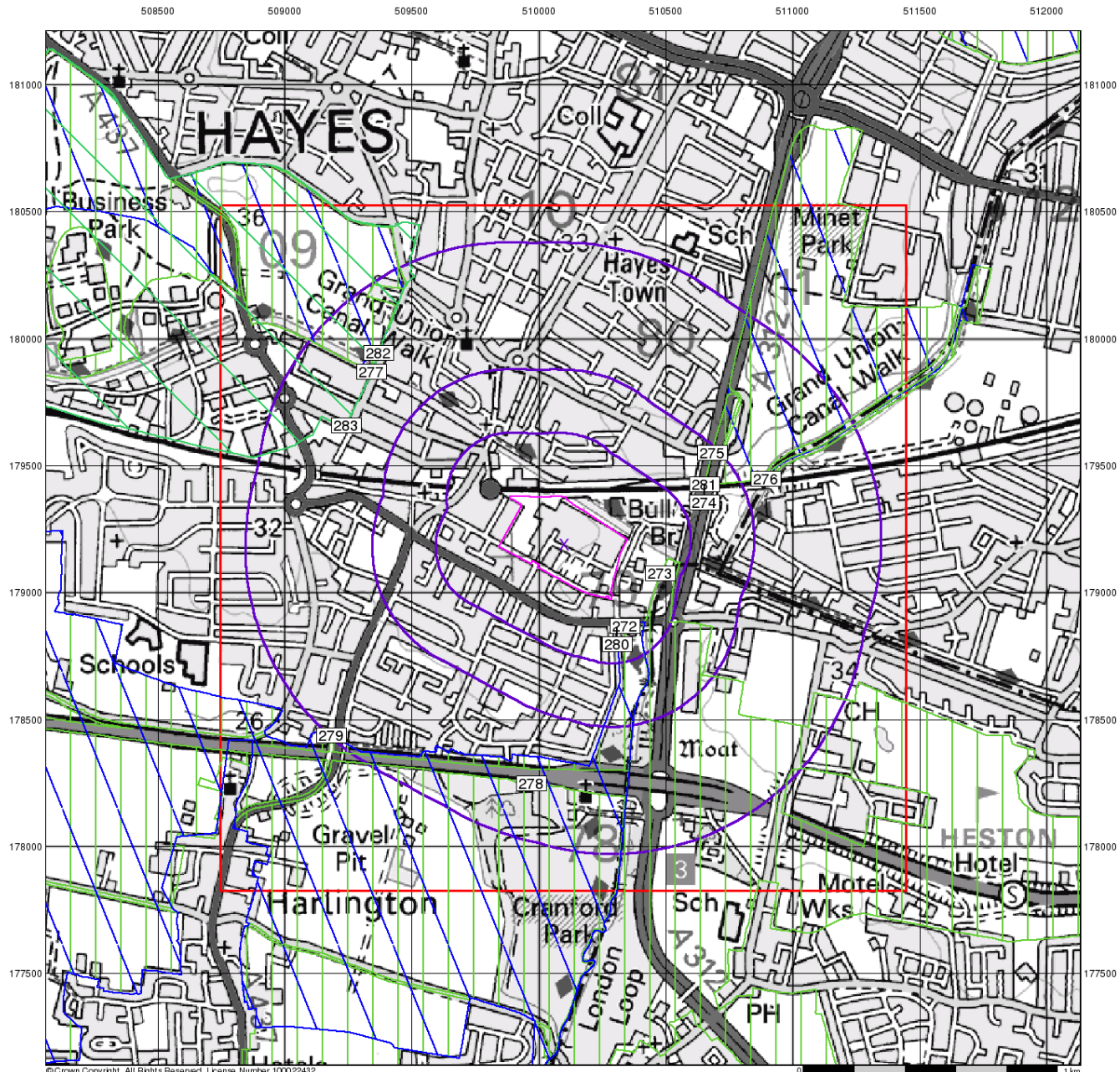


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Site Details

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Sensitive Land Uses

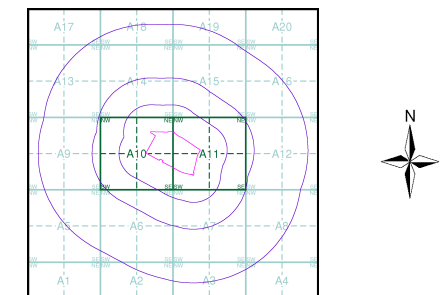
General

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

Sensitive Land Uses

- 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
- National Park
- Nitrate Sensitive Area
- Nitrate Vulnerable Zone
- Ramsar Site
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area

Site Sensitivity Context Map - Slice A

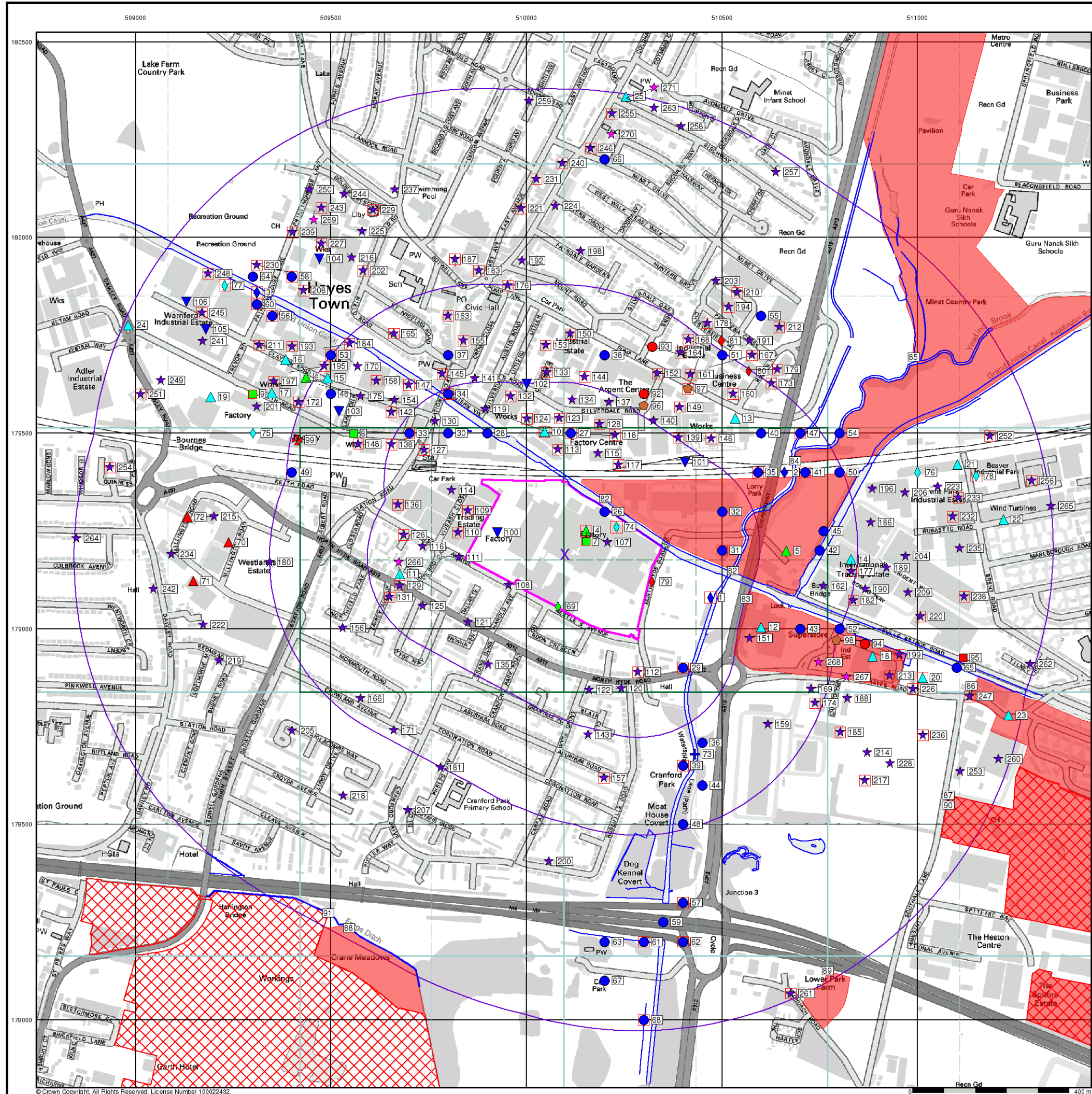


Order Details

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 Search Buffer (m): 1000

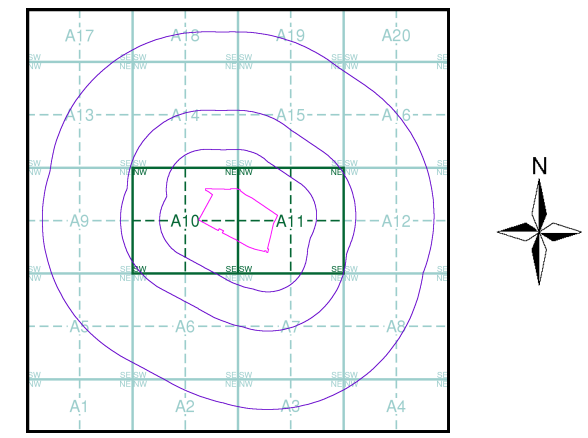
Site Details

Nestle UK Ltd, Beverage Division, North Hyde Gardens, HAYES, Middlesex, UB3 4RF



- 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 and Control
 - Local Authority Integrated 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

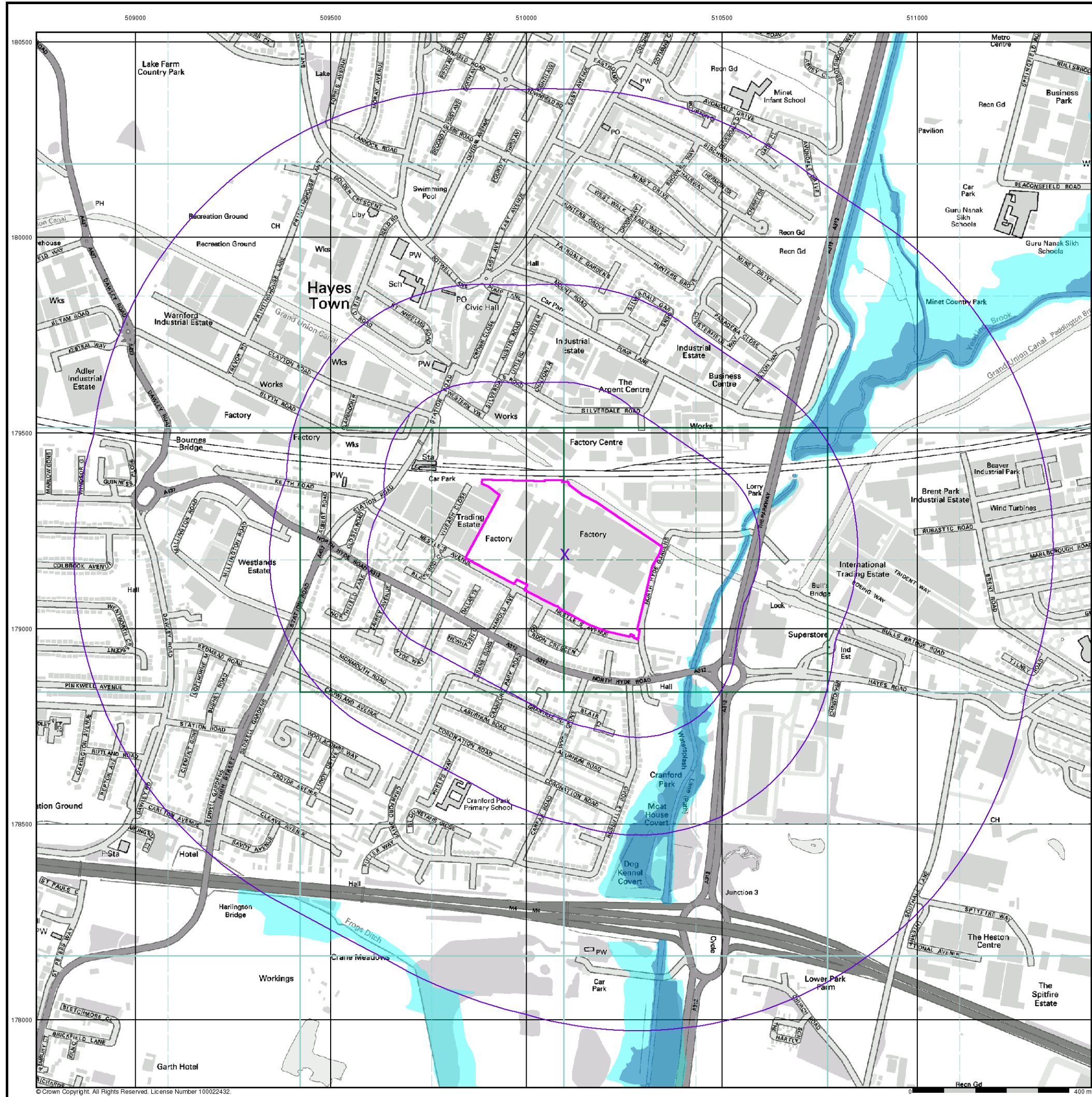


Order Details

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 Customer Ref: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

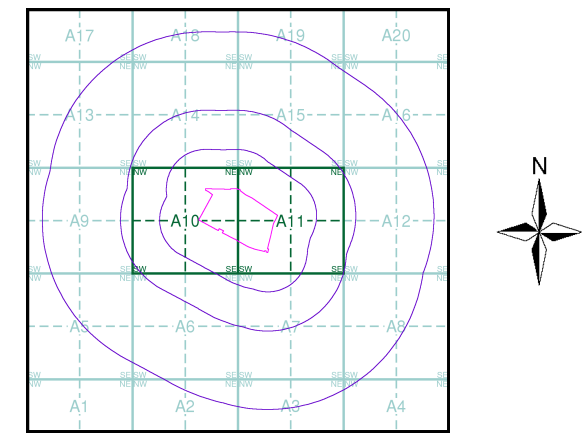
Site Details

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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

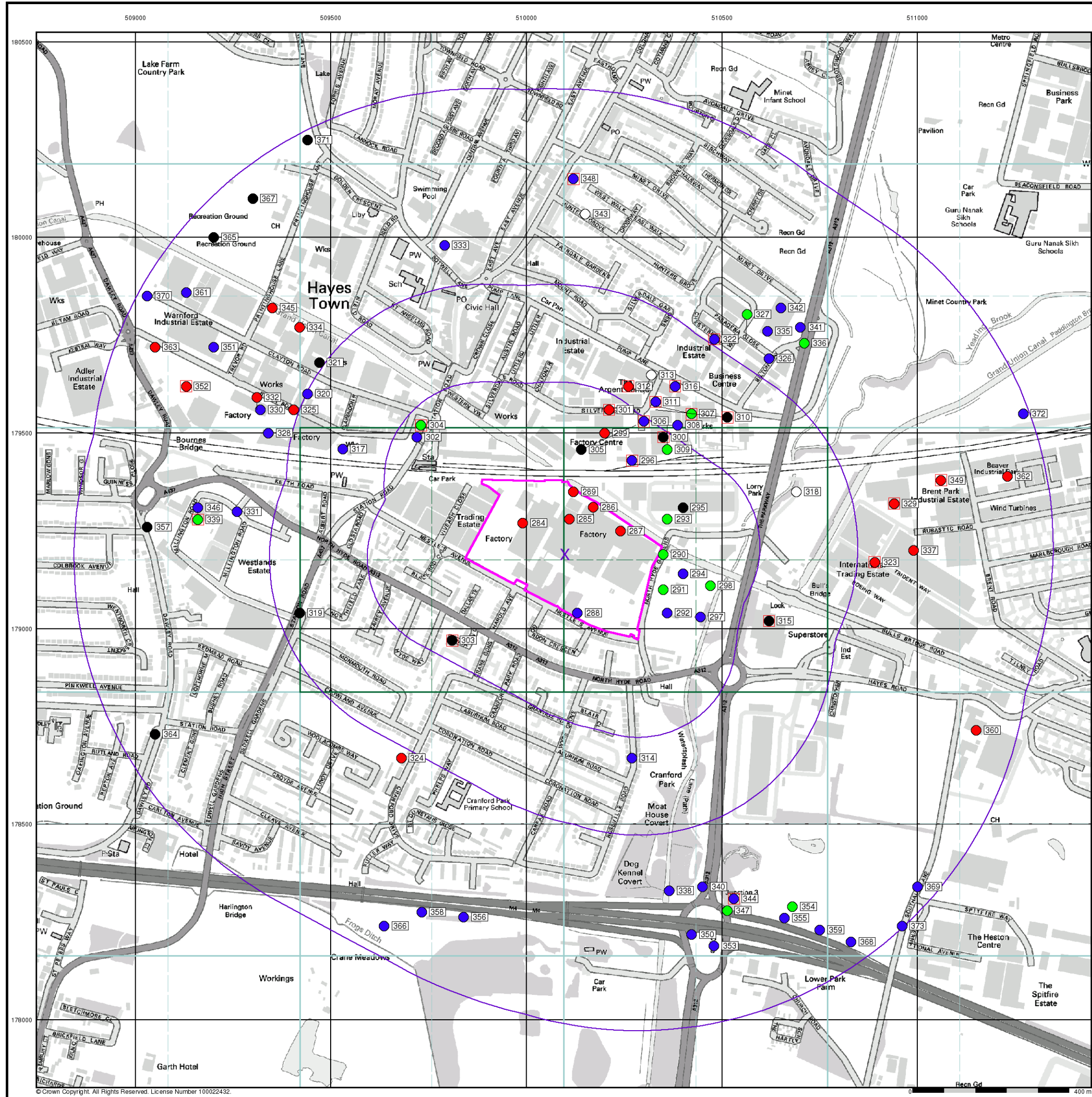


Order Details

Order Number: 48644303_1_1
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Site Details

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General

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

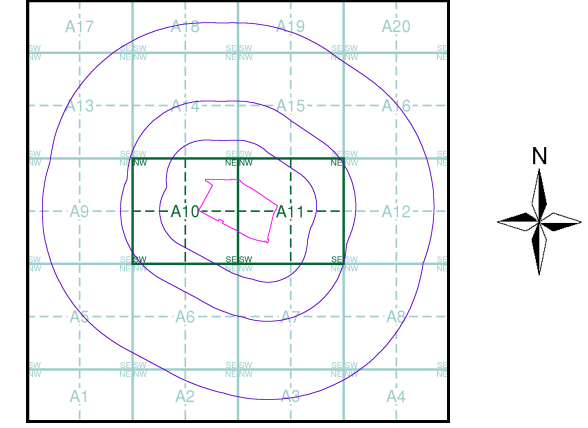
Agency and Hydrological (Boreholes)

- 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: 48644303_1_1
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 Slice: A
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Site Details

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APPENDIX B

Select Site Photographs



Photograph B1 Diesel AST Bund (from SE)



Photograph B2 Diesel AST Bund (from NE)



Photograph B3 Example Hazardous Chemical Store



Photograph B4 Entrance to Former Hazardous Chemical Store Close to Boiler House



Photograph B5 Oil-Water Interceptor at Eastern Extremity of Site



Photograph B6 Water Within One of the Oil-Water Interceptor Chambers



Photograph B7 Hazardous Waste Storage Compound in NW Yard Area



Photograph B8 Former Boiler House Footprint now used as Waste Storage Compound



Photograph B9 Distant View of Boiler House, Former HFO Tanks and Cooling Towers

APPENDIX C

Select Photographs (Undercroft)



Photograph C1 Undercroft



Photograph C2 Undercroft



Photograph C3 Undercroft Pipe Lagging



Photograph C4 Undercroft Pipe Lagging



Photograph C5 Undercroft Planned Service Runs



Photograph C6 Undercroft Later Service Runs



Photograph C7 Undercroft Apparent ACM Lagging on Ground Surface



Photograph C8 Undercroft Apparent ACM on Ground

APPENDIX D

Historical Landmark Maps

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

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

Ordnance Survey Plan 1:10,000

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

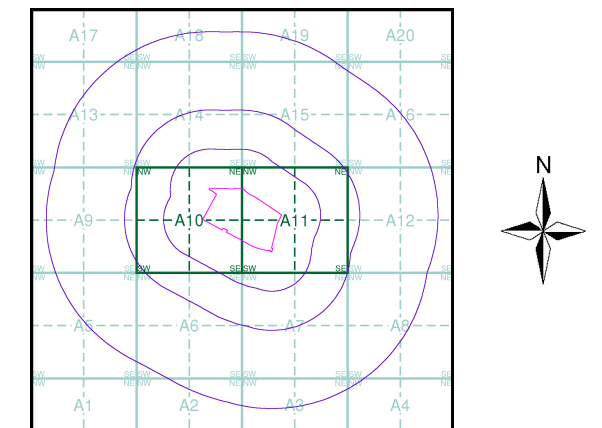
1:10,000 Raster Mapping

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

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Middlesex	1:10,560	1868 - 1869	3
Surrey	1:10,560	1871	4
Buckinghamshire	1:10,560	1881	5
Middlesex	1:10,560	1897	6
Buckinghamshire	1:10,560	1900	7
Middlesex	1:10,560	1920	8
Buckinghamshire	1:10,560	1932	9
Middlesex	1:10,560	1932 - 1935	10
Middlesex	1:10,560	1935	11
Middlesex	1:10,560	1938	12
Middlesex	1:10,560	1938	13
Historical Aerial Photography	1:10,560	1948	14
Historical Aerial Photography	1:10,560	1948	15
Ordnance Survey Plan	1:10,000	1960	16
Ordnance Survey Plan	1:10,000	1965 - 1966	17
Ordnance Survey Plan	1:10,000	1970 - 1975	18
Ordnance Survey Plan	1:10,000	1975 - 1977	19
Ordnance Survey Plan	1:10,000	1985 - 1989	20
London	1:25,000	1985	21
Ordnance Survey Plan	1:10,000	1990 - 1995	22
10K Raster Mapping	1:10,000	2006	23
10K Raster Mapping	1:10,000	2013	24

Historical Map - Slice A



Order Details

Order Number: 48644303_1_1
 Customer Ref: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
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Site Details

Nestle UK Ltd, Beverage Division, North Hyde Gardens,
 HAYES, Middlesex, UB3 4RF

Russian Military Mapping Legends

1:5,000 and 1:10,000 mapping

a. Not drawn to scale b. Drawn to scale

	Government and Administrative Buildings		Military and Industrial Buildings
	Military and Communication Areas		Subway Entrance
	Fireproof Building		Prominent Fireproof Building
	Non-fireproof Building		Non-fireproof Building (non-dwelling)
	Factory, mill, and flour mill, with chimneys		Factory, mill, and flour mill, without chimneys
	Power Station, drawn to scale		Hydroelectric Power Station
	Radio Station, drawn to scale		Telephone Station, drawn to scale
	Abandoned Open-pit Mine or Quarry		Open-pit Salt Mine
	Pit		Oil Deposit or Well
	Oil Seepage		Natural Gas Tank
	Tailings Pile		Fuel Storage Tanks
	Bench Mark		Drill Hole
	Burial Mound		Triangulation Point on Burial Mound
	Single-track Railroad		Double-track Railroad
	Railroad and Station Building		Small Bridge
	Tunnel		Pipe (Culvert)
	Coniferous Forest		Deciduous Forest
	Mixed Forest		Lawns
	Citrus Orchard		Wet Ground
	Scattered Vegetation		

243,8 Values for prominent elevations
186.0 Numbers for spot elevations, depth soundings, contour lines, etc.
0,2 Velocity of the current, width of river bed, depth of river
180/12 Fractional terms: length and capacity of bridges; depth of fords and condition of the river bottom; height of forest and the diameter of trees

Russian Alphabet (For reference and phonetic interpretation of map text)

А а (A)	З з (Z)	П п (P)	Ч ч (CH)
Б б (B)	И и (I)	Р р (R)	Ш ш (SH)
В в (V)	Й й (Y)	С с (S)	Щ щ (SHCH)
Г г (G)	К к (K)	Т т (T)	Ъ (-)
Д д (D)	Л л (L)	У у (U)	Ы (Y)
Е е (E)	М м (M)	Ф ф (F)	Ь (')
Ё ё (YO)	Н н (N)	Х х (KH)	Э э (E)
Ж ж (ZH)	О о (O)	Ц ц (TS)	Ю ю (YU or IU)
			Я я (YA or IA)

1:25,000 mapping

a. Not drawn to scale b. Drawn to scale

	Government and Administrative Buildings		Military and Industrial Buildings
	Military and Communication Areas		Subway Entrance
	Partly Demolished Buildings		Demolished Buildings
	Built-Up Area with Fireproof Buildings Predominant		Built-Up Area with Non-Fireproof Buildings Predominant
	Individual Fireproof Building		Prominent Industrial Building
	Individual Dwelling, Fireproof		Ruins of an Individual Dwelling
	Factory or Mill Chimney		Factory or Mill with Chimney
	Factory or Mill without Chimney		Mine or Open Pit Mine
	Operating Shaft or Mine		Non-Operating Shaft or Mine
	Salt Mine		Tailings Pile
	Pit		Gas Pump or Service Station
	Fuel Storage or Natural Gas Tank		Oil or Natural Gas Derrick
	Small Hydroelectric Power Station		Power Station
	Transformer Station		Cemetery
	Burial Mound (height in metres)		Triangulation Point on Burial Mound
	Triangulation Point		Bench Mark
	Bench Mark (monumented)		Telegraph Office
	Telephone Station		Radio Station
	Radio Tower		Airfield or Seaplane Base
	Landing Strip		Cut
	Fill		Km Post
	Plantings		Width of Road
	Steep Grade		Highway under Construction
	Improved Dirt Road (former truck road)		Small Bridge
	Pipe (Culvert)		Tunnel
	Dismantled Railroad		Double-track Railroad with First Class Station
	Railroad Under Construction		Shore Embankment
	River or Ditch with Embankment		Water Gauge
	Direction and velocity of current		Water Level Mark
	Well		Spring
	Water Reservoir or Rain Water Pit		Isobath with value
	Heavy (Index) Contour Line		Half Contour Line
	Contour Line and Value		Spot Elevation Value
	Coniferous		Deciduous
	Mixed		Scrub

Key to Numbers on Mapping

TQ07_London

No.	Description
74	Factory (Artillery)

TQ08_London

No.	Description
278	Warehouses (Use Unknown)

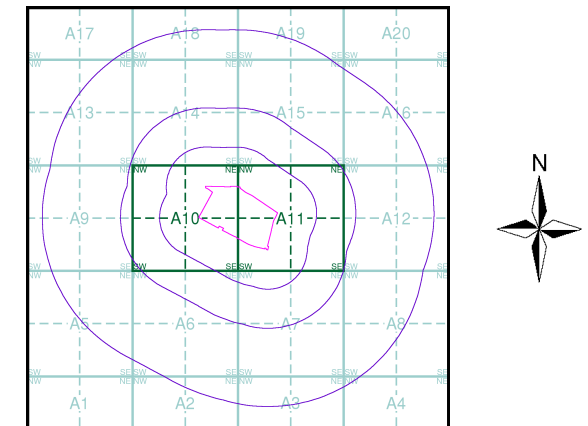
TQ17_London

No.	Description
157	Factories (Radio Electronics And Electro Technical)

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Middlesex	1:10,560	1868 - 1869	3
Surrey	1:10,560	1871	4
Buckinghamshire	1:10,560	1881	5
Middlesex	1:10,560	1897	6
Buckinghamshire	1:10,560	1900	7
Middlesex	1:10,560	1920	8
Buckinghamshire	1:10,560	1932	9
Middlesex	1:10,560	1932 - 1935	10
Middlesex	1:10,560	1935	11
Middlesex	1:10,560	1938	12
Middlesex	1:10,560	1938	13
Middlesex	1:10,560	1938	14
Historical Aerial Photography	1:10,560	1948	14
Historical Aerial Photography	1:10,560	1948	15
Ordnance Survey Plan	1:10,000	1960	16
Ordnance Survey Plan	1:10,000	1965 - 1966	17
Ordnance Survey Plan	1:10,000	1970 - 1975	18
Ordnance Survey Plan	1:10,000	1975 - 1977	19
Ordnance Survey Plan	1:10,000	1985 - 1989	20
London	1:25,000	1985	21
Ordnance Survey Plan	1:10,000	1990 - 1995	22
10K Raster Mapping	1:10,000	2006	23
10K Raster Mapping	1:10,000	2013	24

Russian Map - Slice A

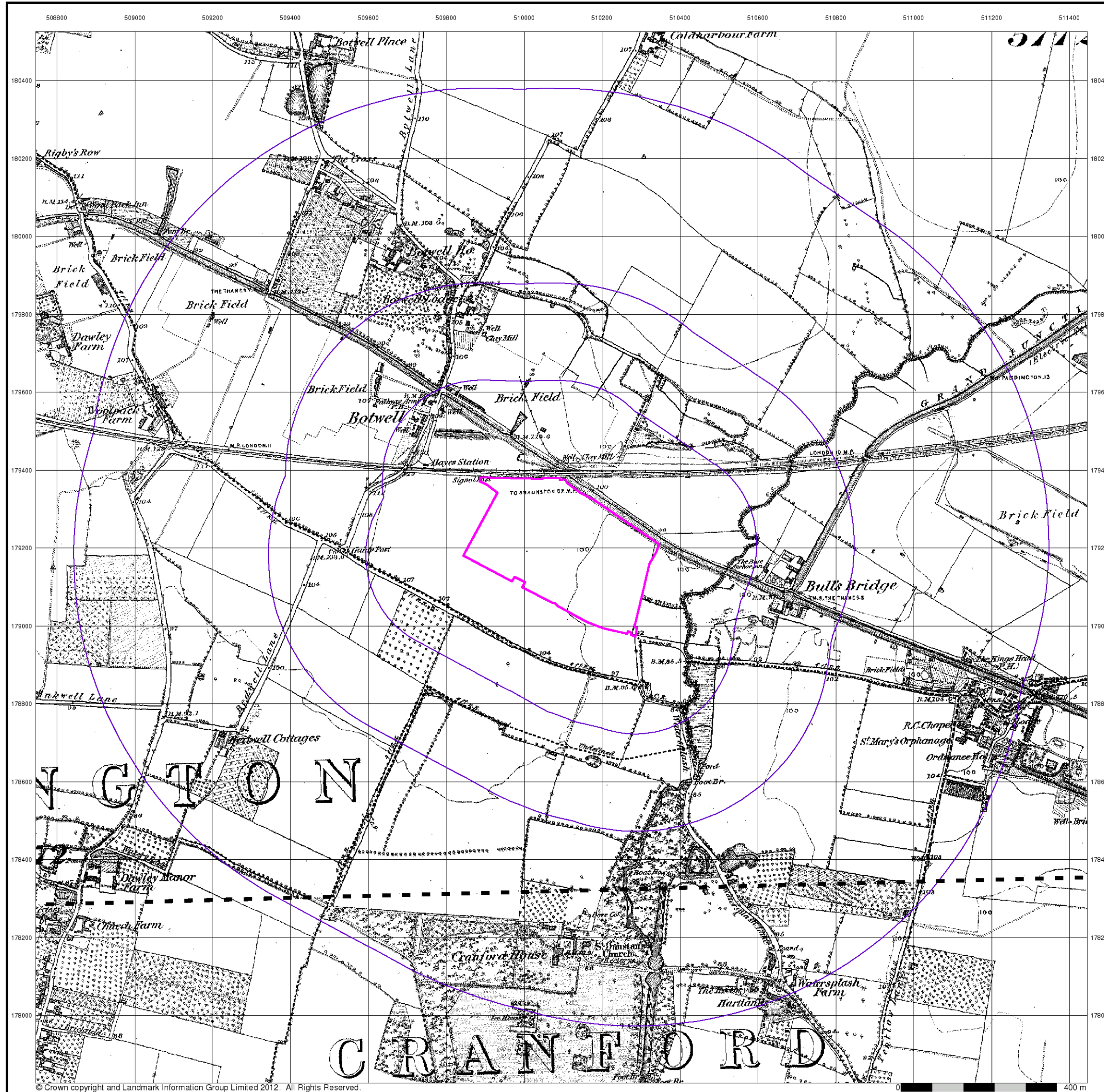


Order Details

Order Number: 48644303_1_1
 Customer Ref: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details

Nestle UK Ltd, Beverage Division, North Hyde Gardens, HAYES, Middlesex, UB3 4RF



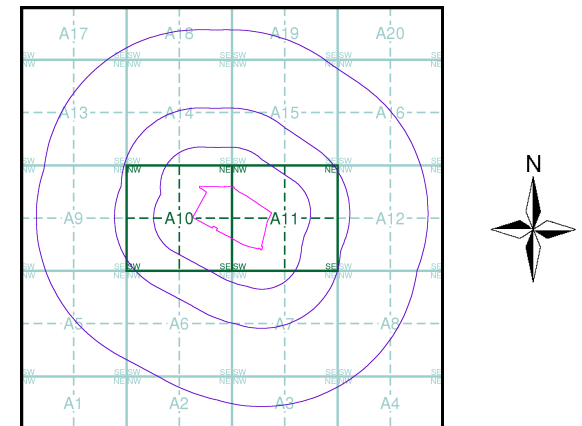
Middlesex
Published 1868 - 1869
Source map scale - 1:10,560

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)

01500	1868	1:10,560
02000	1869	1:10,560

Historical Map - Slice A

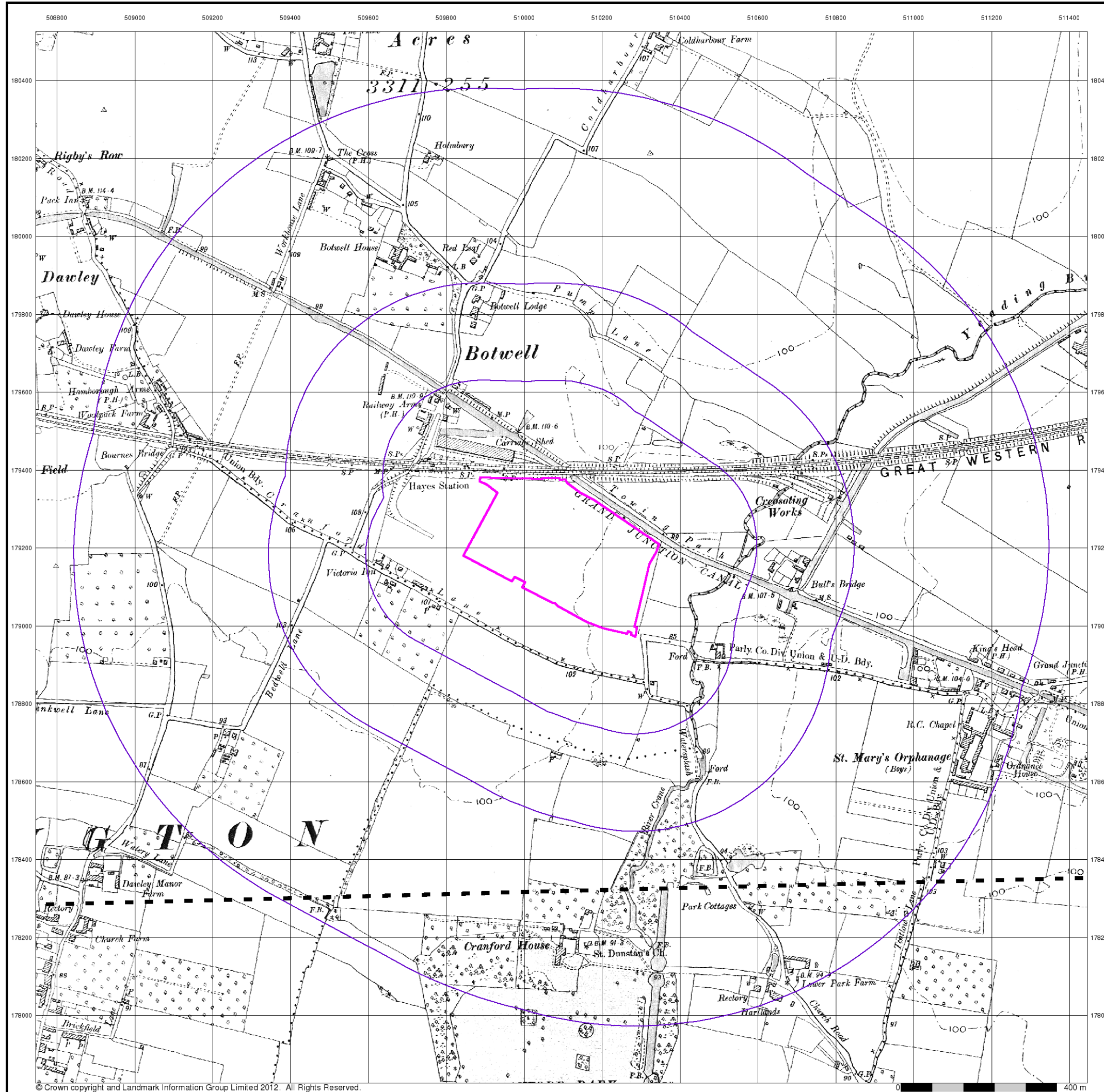


Order Details

Order Number: 48644303_1_1
 Customer Ref: GCU0124020
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 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details

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 HAYES, Middlesex, UB3 4RF



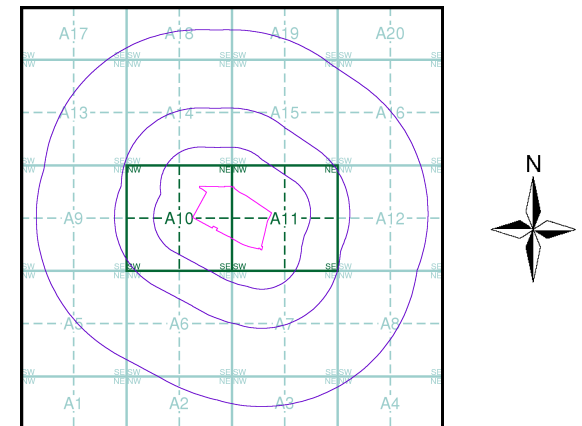
Middlesex
Published 1897
Source map scale - 1:10,560

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)

015SW	1897	1:10,560
020NW	1897	1:10,560

Historical Map - Slice A

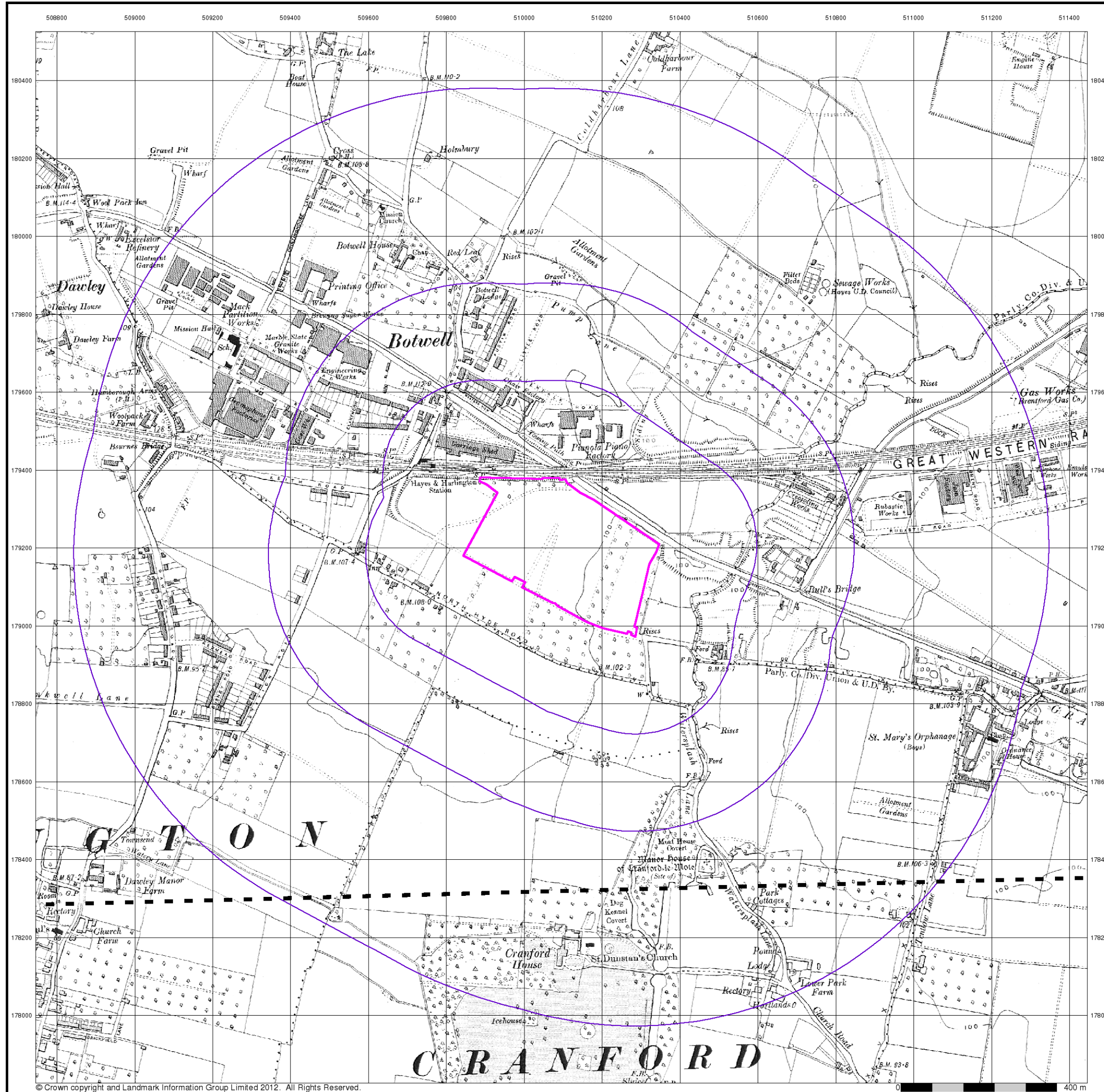


Order Details

Order Number: 48644303_1_1
 Customer Ref: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details

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 HAYES, Middlesex, UB3 4RF



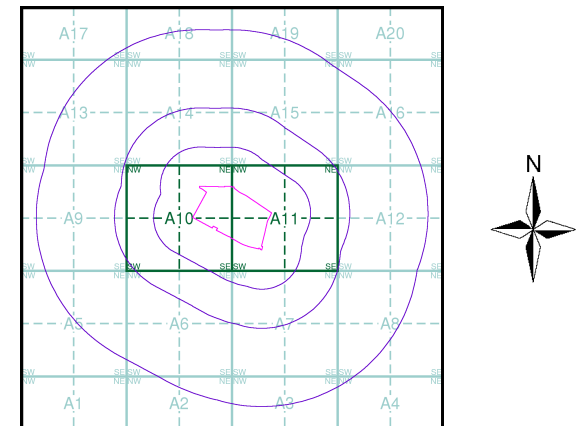
Middlesex
Published 1920
Source map scale - 1:10,560

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)

015SW	1920	1:10,560
020NW	1920	1:10,560

Historical Map - Slice A

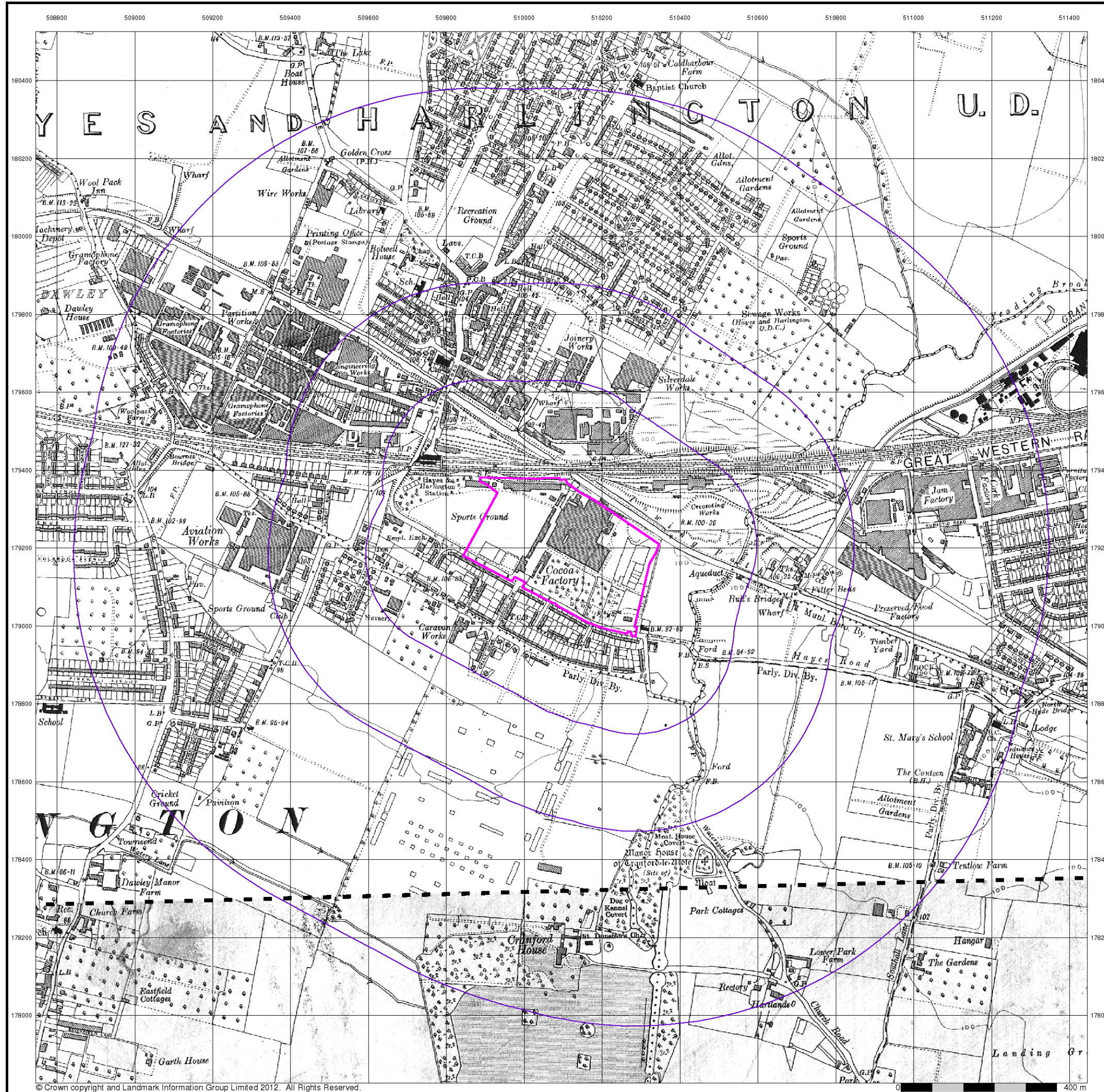


Order Details

Order Number: 48644303_1_1
 Customer Ref: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details

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 HAYES, Middlesex, UB3 4RF



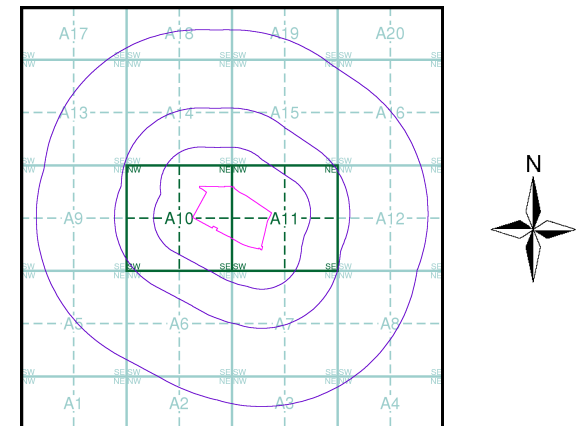
Middlesex
Published 1932 - 1935
Source map scale - 1:10,560

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)

015SW	1935	1:10,560
020NW	1932	1:10,560

Historical Map - Slice A

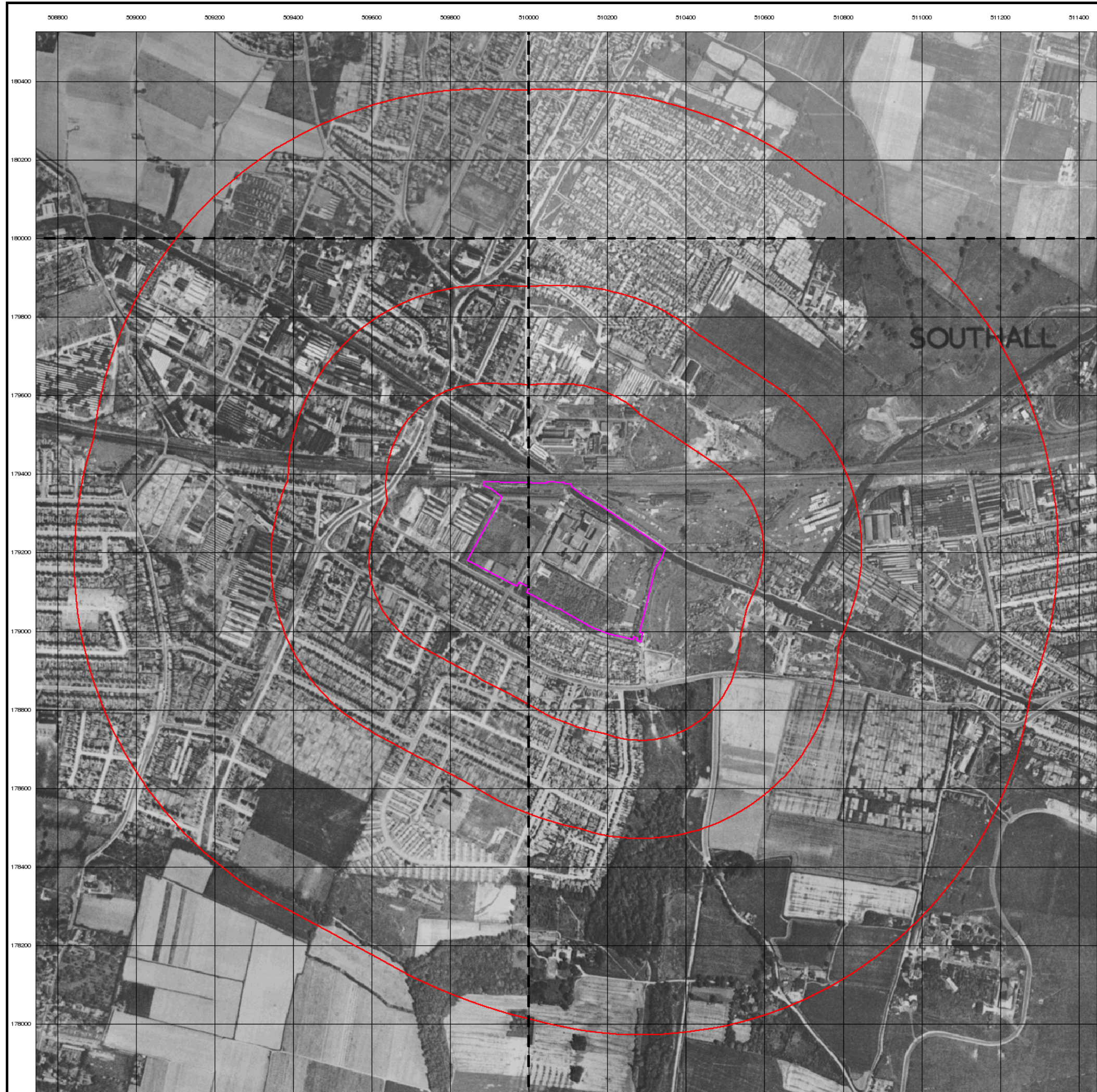


Order Details

Order Number: 48644303_1_1
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 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details

Nestle UK Ltd, Beverage Division, North Hyde Gardens,
 HAYES, Middlesex, UB3 4RF



Historical Aerial Photography

Published 1948

Source map scale - 1:10,560

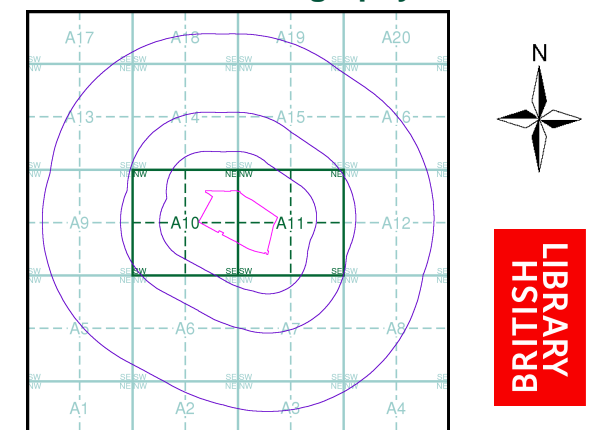
The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the 1950's meant that every photograph was re-checked for potentially unsafe information with security sites replaced by fake fields or clouds. The original editions were withdrawn and only later made available after a period of fifty years although due to the accuracy of the editing, without viewing both revisions it is not easy to spot the edits. Where available Landmark have included both revisions.

© Landmark Information Group and/or Data Suppliers 2010.

Map Name(s) and Date(s)

TQ08SE 1948 1:10,560	TQ18SW 1948 1:10,560
TQ07NE 1948 1:10,560	TQ17NW 1948 1:10,560

Historical Aerial Photography - Slice A

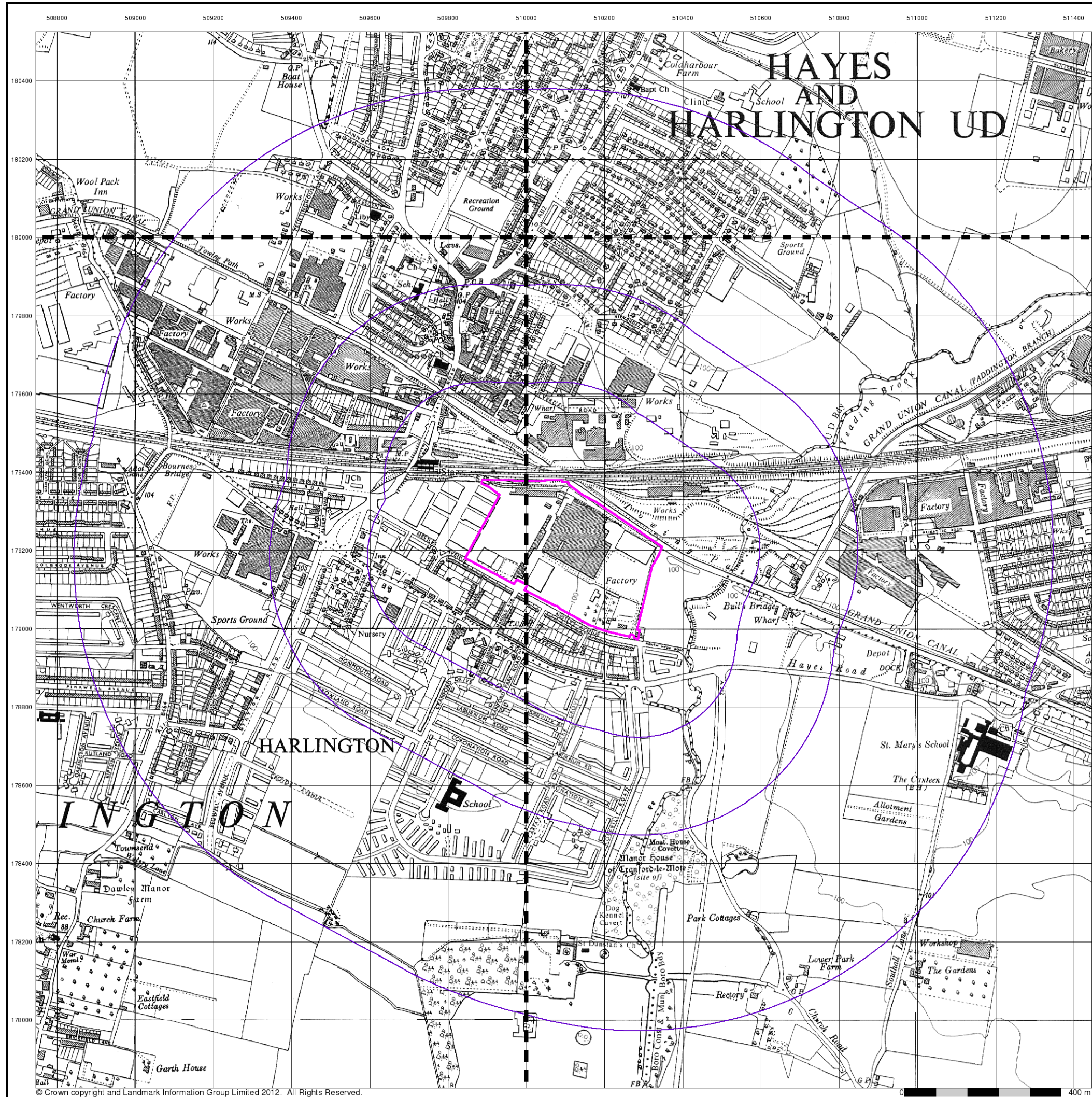


Order Details

Order Number: 48644303_1_1
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Site Details

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 HAYES, Middlesex, UB3 4RF



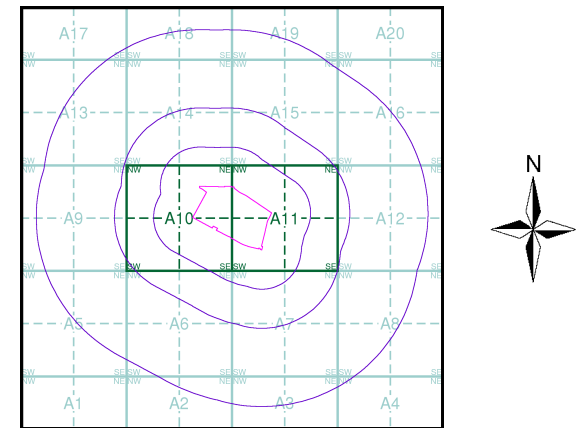
Ordnance Survey Plan
Published 1960
Source map scale - 1:10,000

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)

TQ08SE	TQ18SW
1960	1960
1:10,560	1:10,560
TQ07NE	TQ17NW
1960	1960
1:10,560	1:10,560

Historical Map - Slice A



Order Details
 Order Number: 48644303_1_1
 Customer Ref: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details
 Nestle UK Ltd, Beverage Division, North Hyde Gardens,
 HAYES, Middlesex, UB3 4RF

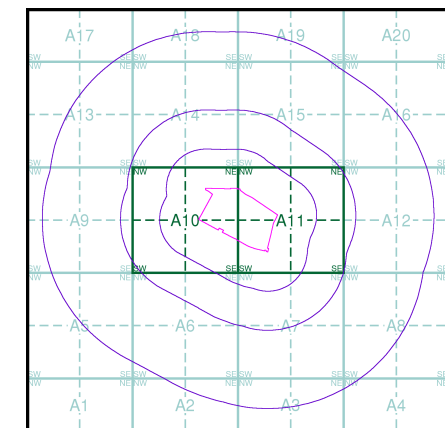
Ordnance Survey Plan Published 1970 - 1975 Source map scale - 1:10,000

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)

TQ08SE	TQ18SW
1970	1975
1:10,560	1:10,000
TQ07NE	TQ17NW
1970	1974
1:10,560	1:10,000

Historical Map - Slice A

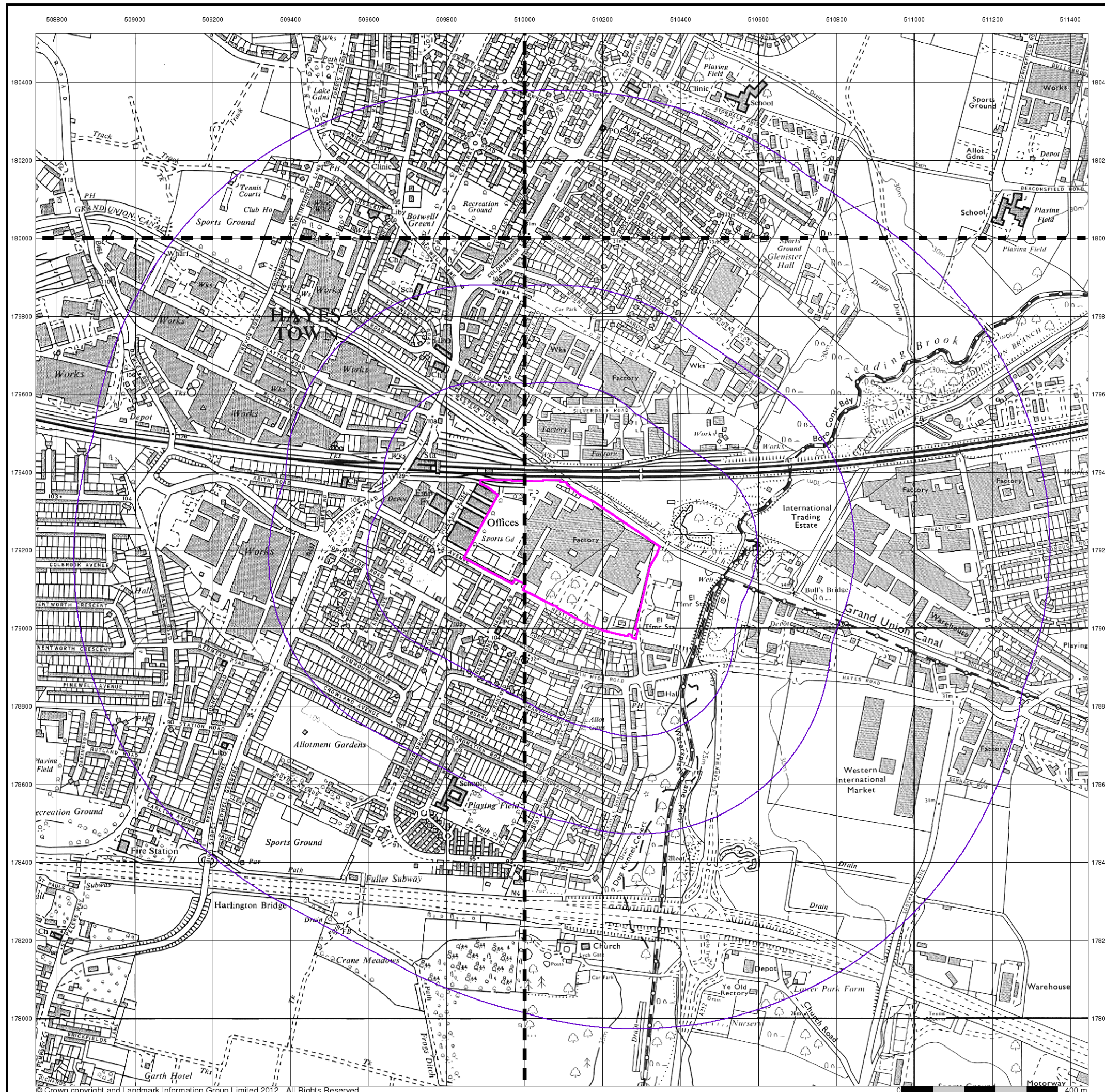


Order Details

Order Number: 48644303_1_1
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 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details

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Ordnance Survey Plan

Published 1985 - 1989

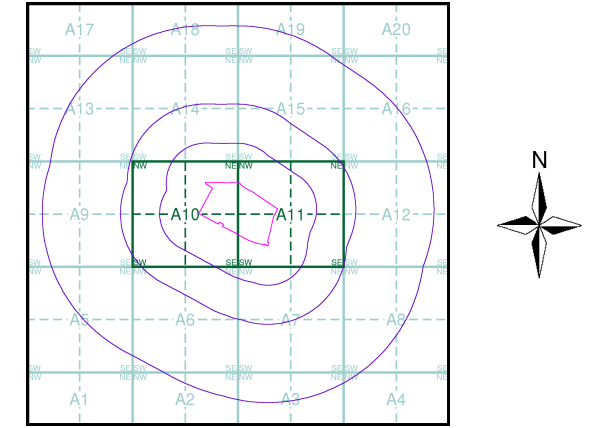
Source map scale - 1:10,000

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)

TQ18SW 1985 1:10,000	TQ17NW 1985 1:10,000
TQ07NE 1989 1:10,000	TQ17NW 1985 1:10,000

Historical Map - Slice A

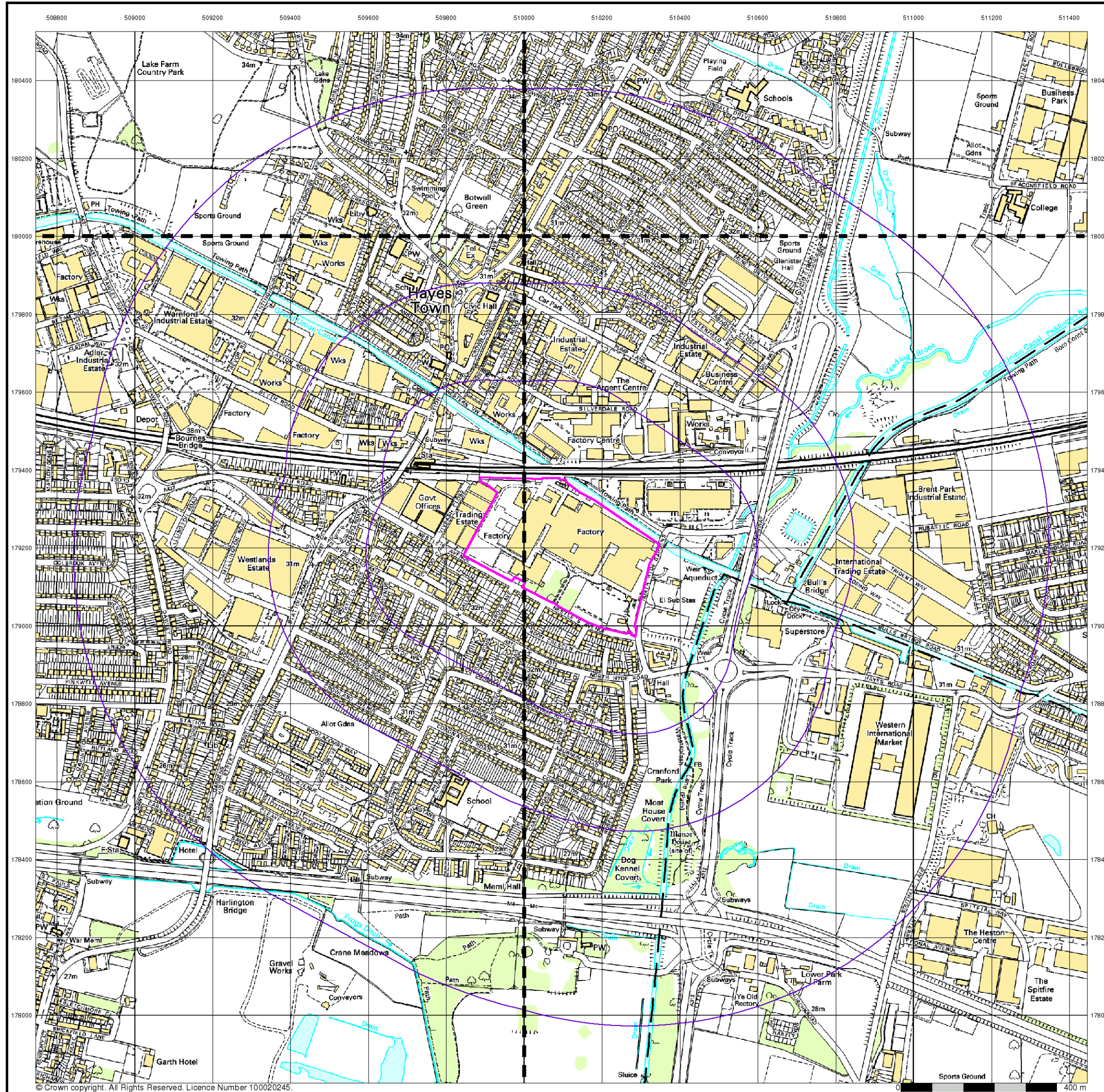


Order Details

Order Number: 48644303_1_1
 Customer Ref: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details

Nestle UK Ltd, Beverage Division, North Hyde Gardens,
 HAYES, Middlesex, UB3 4RF



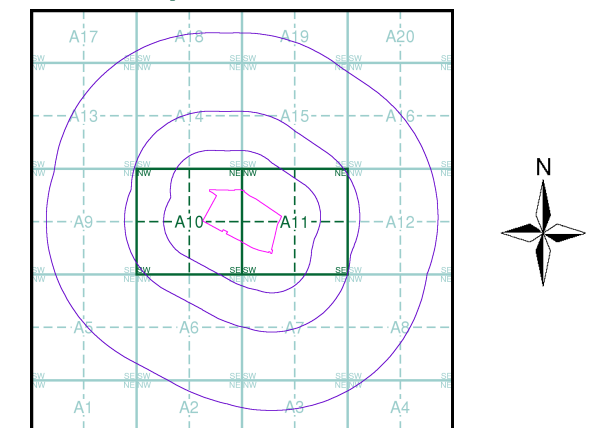
10k Raster Mapping
Published 2006
Source map scale - 1:10,000

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)

TQ08SE	TQ18SW
2006	2006
1:10,000	1:10,000
TQ07NE	TQ17NW
2006	2006
1:10,000	1:10,000

Historical Map - Slice A

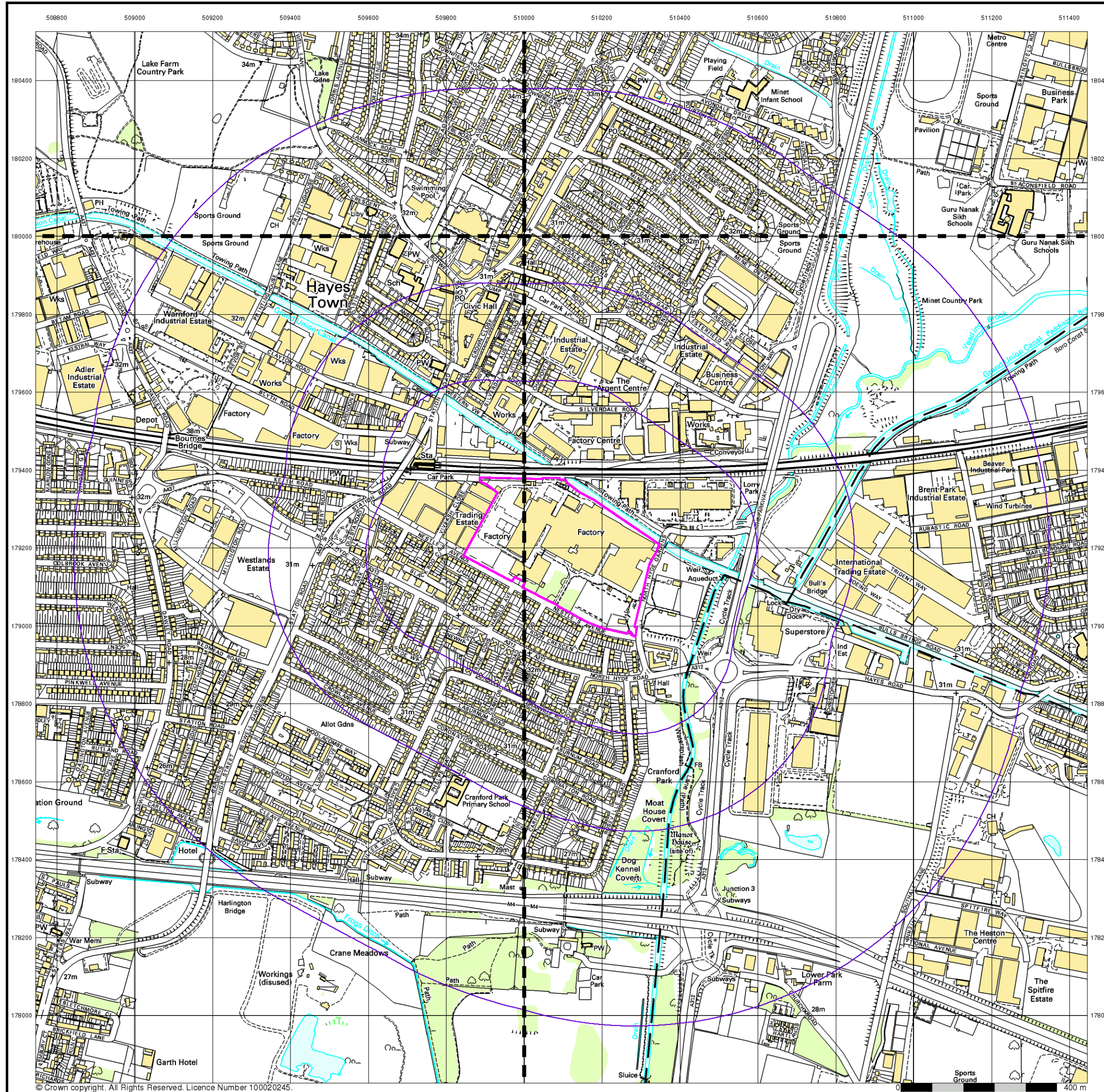


Order Details

Order Number: 48644303_1_1
 Customer Ref: GCU0124020
 National Grid Reference: 510100, 179190
 Slice: A
 Site Area (Ha): 12.29
 Search Buffer (m): 1000

Site Details

Nestle UK Ltd, Beverage Division, North Hyde Gardens,
 HAYES, Middlesex, UB3 4RF



10k Raster Mapping

Published 2013

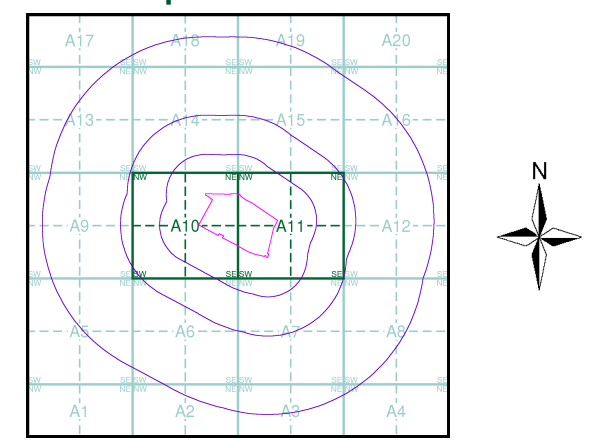
Source map scale - 1:10,000

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)

TQ08SE	TQ18SW
2013	2013
1:10,000	1:10,000
TQ07NE	TQ17NW
2013	2013
1:10,000	1:10,000

Historical Map - Slice A



Order Details

Order Number: 48644303_1_1
 Customer Ref: GCU0124020
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 Site Area (Ha): 12.29
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Site Details

Nestle UK Ltd, Beverage Division, North Hyde Gardens, HAYES, Middlesex, UB3 4RF