



Phase I & II Geo-Environmental Assessment

Crescent Parade

Uxbridge Road
Hillingdon
UB10 0LG

Prepared for:

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CRESCENT PARADE, HILLINGDON

NON TECHNICAL CLIENT SUMMARY

This report presents the findings of a combined Phase I Desk Study and Phase II Intrusive Investigation undertaken to determine ground conditions, establish if there are any environmental risks associated with the site and its development and provide a geotechnical appraisal. Pertinent findings and conclusions may be summarised as follows:

- The Phase I desk study identified the site to have historically been used as it currently is, a builder's yard. On this basis, a number of potential risks to site users and the environment were identified that required further investigation.
- The intrusive investigation comprised the forming of four boreholes to a maximum depth of 5.0m, with ground conditions identified to comprise a layer of made ground overlying both cohesive and granular superficial deposits. Below this, London Clay was identified extending to the base of all boreholes. Groundwater was identified at all locations, with rest levels ranging from 1.06m to 1.86m.
- Waste analysis undertaken at the site for the made ground and underlying natural geology is summarised below: -

Strata	Waste Classification
Made Ground	Inert*
Natural Soils	Inert

*Provided no visible fragments of asbestos are identified during excavation.

- Laboratory analysis of selected samples has shown that concentrations of cyanide in groundwater could pose unacceptable level of risk to human health and water resource receptors. On this basis it is recommended that additional groundwater monitoring is undertaken to further understand the risks from cyanide to future residents and water resources associated with the site.

ENGINEERING SUMMARY

- The ground conditions are considered suitable for the use of conventional spread foundations with allowable bearing pressures as follows:-

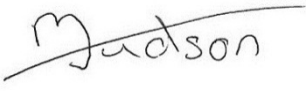
Depth (m bgl)	Allowable Bearing Capacity (kN/m ²)	
	Strip Foundations	Pad Foundations
1.0	55	70
1.5	65	85
2.0	80	100
2.5	90	115

- Suspended ground floor construction is recommended.
- The ground conditions are considered unlikely to be suitable for the use of soakaways.
- A design sulphate class of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1 is considered appropriate for shallow buried concrete, but further testing may be required if foundations bear in the London Clay.

The above points represent a simplified summary of the findings of this assessment and should not form the basis for key decisions for the proposed development. A thorough review of the details is contained within the following report, or alternatively get in touch and we'll talk you through it.



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Where ground investigations have been conducted, these have been limited to the level of detail required for the site in order to achieve the objectives of the investigation.

The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

The National Planning Policy Framework 2012 requires a competent person to prepare site investigation information, which is defined as a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation. EPS considers that it fulfils these criteria and would welcome any request for staff CVs or case studies to demonstrate it.

As stated within DEFRA's Contaminated Land Statutory Guidance (2012), with any complex risk assessment it is possible that different suitably qualified people may reach slightly different conclusions when interpreting the same information. EPS recognises this and considers the conclusions presented within this report to be robust and appropriate but input from the Local Authority and their judgement in line with this guidance would still be welcomed.

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1 INTRODUCTION

In August 2017, Environmental Protection Strategies Ltd (EPS) was commissioned by Planning & Consulting Ltd to complete a Phase I and II Geo-Environmental Assessment Report at Crescent Building Supplies, Land Rear of Crescent Parade, Uxbridge Road, Hillingdon, UB10 0LG ('the site'); see Figure 1.

The work was commissioned in order to support development proposals for the erection of a three storey building to create 6 x 2-bed and 3 x 1-bed self-contained flats, with associated parking, landscaping, cycle and bin stores, involving demolition of existing builders yard; under the London Borough of Hillingdon planning reference 70895/APP/2015/4349.

This report presents the findings, conclusions, and recommendations of the Phase I Desk Study and subsequent Phase II Intrusive Investigation undertaken as instructed.

1.1 Background

A Desk Study comprises the first stage of any geo-environmental assessment, the purpose of which is to determine what potentially contaminative activities may have occurred at the property or the surrounding area which may pose an environmental or geological risk to site users, the surrounding environment or proposed development, either at present or in the future.

The method used in this investigation to assess the environmental risk posed is based on the concept of 'contaminant linkage', which considers the following three factors:

Source	The location from which an environmentally hazardous / contaminative substance is, (or was,) derived.
Receptor	An environmentally sensitive object or condition e.g. person, property, controlled water, or ecological system, which may be present now or in future.
Pathway	A route or mechanism via which a source could come into contact with a receptor to cause significant harm.

If all three factors are identified, there is the potential for a 'contaminant linkage' to be active, which could result in significant harm being caused to the environment or human health. The subsequent Phase II investigation is designed to address plausible contaminant linkages identified during Desk Study phase of works.

1.2 Objectives

The objectives of this investigation were as follows:

- Compile a Conceptual Site Model (CSM) and undertake a Preliminary Risk Assessment to evaluate the potential risks the site may pose to human and environmental receptors, both currently and in future.
- Investigate potential contaminant linkages identified through the CSM by means of an Intrusive Investigation and Generic Quantitative Risk Assessment.

- c) Determine the potential risks posed by the site and make recommendations for further work that may be required, to ensure safe development in accordance with the *Model Procedures for the Management of Land Contamination - Contaminated Land Report 11* and the *National Planning Policy Framework*.
- d) To collect information on ground conditions and strength in order to make appropriate recommendations for geotechnical design and undertake infiltration testing (in general accordance with *BRE 365 Soakaway Design*) to assess the infiltration characteristics of the natural soils.

1.3 Scope of Work

To perform an exploratory assessment of the site in accordance with the principles and requirements of DEFRA's 'Contaminated Land Statutory Guidance' (2012), BS10175 – 'Investigation of Potentially Contaminated Sites', BS5930:2015 'Code of practice for ground investigations' and BS EN 1997 'Geotechnical Design', the following tasks were undertaken:

Desk Study:

- Collection of site records.
- Study of existing geological, hydrogeological and historic maps of the area.
- Consultation of environmental databases, including records held by the local authority (where available).
- Review of proposed development plans.
- Development of a Conceptual Site Model (CSM) and Preliminary Risk Assessment.

Intrusive Investigation:

- Site walkover, inspection of any visual evidence of contamination at the site, obtaining photographic records.
- Health and safety briefing / site supervision.
- Drilling of four window sample boreholes to a maximum depth of 5.0m below ground level (bgl).
- Recording of ground conditions including inspection of samples for visual and olfactory contamination.
- Undertaking of falling head permeability tests at three locations.
- Continual logging of ground conditions including inspection of samples for visual and olfactory contamination, and laboratory analysis of selected representative samples.
- In-situ testing using a photoionisation detector.

Reporting:

- Data collection
- Interpretation of data including completion of Generic Quantitative Risk Assessment
- Reporting.

The findings and conclusions of these investigations are presented in the following sections.

1.4 Limitations and Constraints

The purpose of this report is to present the findings of a soil sampling investigation conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, Environmental Protection Strategies Ltd (EPS) makes the following statements:

No investigation method is capable of completely identifying all ground conditions that might be present in the soil or groundwater under a site. Where outlined in our report, we have examined the ground beneath a site by constructing a number of boreholes and / or trial pits to recover soil and / or groundwater samples. The locations of these excavations and sampling points are considered to be representative of the condition of the whole site subsurface however, ground conditions are naturally variable and it may be possible that the conditions encountered may differ to those found during the investigation.

No visible evidence of Japanese Knotweed was identified during the site walkover, however this plant can be difficult to identify in the early stages of growth and therefore it is not always possible to identify its' presence at certain times of the year. For this reason EPS cannot confirm that Japanese Knotweed rhizomes do not exist and it is recommended that if it is suspected that this species, or other similarly invasive plants are present at the site, a specialist contractor should be commissioned to make a detailed assessment.

This report does not include specific investigation for the presence of Potential Asbestos Containing Material (PACM). Specialist contractors should be commissioned to make detailed assessments and recommendations if these materials are suspected.

The investigation was carried out to assess the significance of contamination resulting from the use of the site as identified in this report. Unless EPS has otherwise indicated, no assessment of potential impact of any other previous uses has been made.

2 GEO-ENVIRONMENTAL SETTING

The following section provides a summary of the information collected in relation to the site location and history.

2.1 Site & Location Description

Detail	Description
Location	The site is located to the northwest of Crescent Parade, in central Hillingdon, Greater London.
National Grid Reference	507360, 182772
Topography	The site lies at an approximate topographic elevation of 56-58m Above Ordnance Datum (AOD) and slopes slightly to the south.
Description of Site	At the time of drilling, the site was used as Crescent Building Supplies. The site is accessed from Crescent Parade and Long Lane to the east via a driveway. The site opens up into a yard with storage of various building materials surrounding it, along with an office and shop located in the southeast corner. A track used for parking site vehicles and cars runs along the north, northeast facing boundary. The site is almost entirely laid to hardstanding, with some evidence of subsidence of the hardstanding towards the southwest corner. Adjacent to the west of the shop and running along the southern boundary lies a wood-built structure with a corrugated sheet roof and shelves used to store various construction material. Further to the west of this lay further storage including bricks, wood and a skip. In the southwest corner lay two areas used to store sand and ballast. Adjacent to the southwest of the track, along the northeast facing boundary lies another structure with corrugated sheet roofing and shelves used to store material along with further blocks of bricks. Further to the northwest lies storage of breeze blocks, additional shelves and a small storage building located in the very northwest corner.
Surrounding Land Use	The surrounding land use currently comprises a mixture of residential, commercial and Public Open Space. The properties to the south and southeast comprise mixed commercial and residential use, commercial properties are generally located at the ground floor with residential flats above. The commercial properties include dry cleaners, a pharmacy, an estate agent and a number of restaurants. Residential properties are located to the north of the site whereas to the west and northwest Public Open Space is located. A petrol station lies beyond Long Road approximately 100m to the southeast.

A plan showing the site location is provided as Figure 1, the current site layout is detailed on Figure 2 and an aerial photograph is included as Figure 3. Selected site photographs are included as Appendix A, a proposed development plan is included as Appendix B and relevant extracts of a Landmark Envirocheck report are included as Appendix C.

2.2 Geology & Geological Hazards

Detail	Description	
Geology	Ground conditions are indicated to comprise Black Park Gravel Member overlying bedrock of the London Clay Formation. Information on the sites geological context is included as Appendix D.	
Geological Hazards	Hazard	On Site Risk
	Coal Mining	No Hazard
	Collapsible Ground	Very Low
	Compressible Ground	No Hazard
	Ground Dissolution	No Hazard
	Landslide	Very Low
	Running Sand	Very Low
	Shrinking / Swelling Clay	No Hazard
Radon	The BGS and Health Protection Agency (HPA) report entitled ' <i>Indicative Atlas of Radon in England and Wales</i> ' shows the site to lie within a lower probability area, where the percentage of homes above the radon action level is between 0% and 1%. The joint Building Research Establishment Ltd (BRE) report entitled: ' <i>Radon: Guidance on Protective Measures for New Buildings</i> ' reports that no radon protection methods are needed for this area.	

2.3 Hydrology & Hydrogeology

Detail	Description
Hydrogeology	Groundwater vulnerability maps for the area show that the superficial geology is classified as a Secondary 'A' Aquifer with the underlying bedrock classified as Unproductive Strata. The site does not lie within a Source Protection Zone (SPZ) for local groundwater abstraction. Groundwater vulnerability maps are included as Appendix E. The Envirocheck report does not list any potable groundwater abstractions within 1km radius of the site. The closes abstraction is located approximately 616m southeast and is licensed for industrial, commercial and public services: laundry use. In addition Hillingdon Hospital NHS Trust abstraction licenced for: drinking, cooking, sanitary, washing (small garden) is located approximately 717 southwest of the site.
Hydrology	The nearest surface water feature is an unnamed drain located approximately 700m to the southwest. The Envirocheck report does not report any discharge consents within 1km. There are no surface water abstractions reported within same search radius.

Detail	Description
	Review of the EA Flood Zone Map for the area indicates that the site lies within Flood Zone 1, which is defined as the area with a low potential risk of flooding from fluvial or tidal sources. It should be noted that the EA maps do not take into account the presence of flood defences or flooding from poor drainage, or groundwater. A copy of the flood map for the site and surrounding area is also included within Appendix E.

2.4 Landfill & Waste

One historic landfill is recorded within 500m, located 321m to the southwest. Harlington Road landfill received commercial and household waste during an unspecified period.

A number of infilled pits / quarries and ponds are recorded between 250m and 500m from the site, with the closest located 259m south of the site comprising potentially infilled land (non-water).

2.5 Industrial Land Use & Pollution

There are 56 sites licenses for industrial activity within the surrounding 500m (one of which is noted to lie within the site boundary), the details of the most pertinent are detailed below.

Land Use	Approximate Distance (Direction)	Status
Builder's Merchants	Onsite	Active
Hardware & DIY	16m (SE)	Inactive
Dry Cleaners	19m (S)	Active
Petrol Filling Station	117m (SE)	Active
Ken Bittly (Commercial Cleaning Services)	219m (S)	Inactive
Floor Cleaning & Polishing Equipment – Manufacturers & Distributors	229m (NW)	Inactive
Cleaning Services – Domestic	247m (S)	Inactive
The Woodcroft Press	269 (SE)	Inactive
Wood Products, Except Furniture - Manufacturers	341m (E)	Active

One pollution incident to controlled waters is recorded within 500m. Located approximately 390m to the southwest and classified as a category 2 (significant) incident, it comprised the release of oils to an unknown receptor in April 1989.

2.6 Sensitive Land Use

Review of the available data indicates that there are no sensitive land uses within 2km radius of the site.

2.7 Site History

A summary of historical map data from 1865 to 2017 is provided below and copies of relevant historic maps and any others examined during the investigation are included in this report as Appendix F.

- In the late 1800s, the site appears to have been undeveloped, with a line of trees located along the western boundary. The surrounding land use comprises largely undeveloped land with a few residential properties to the north and south of the site. It is also noted that two gravel pits are marked approximately 240m and 260m to the southwest of the site, by 1895 the gravel pits are no longer marked on the map.
- By 1914, little has changed, however what appears to be a driveway for Hillingdon Place (a residential development) to the north appears to run through the western half of the site. In addition, tramway line is located approximately 30m to the south of the site. The tramway line runs from northwest to southeast. Further residential development in the area are noted between 1914 and mid-1960s.
- By 1964 the site is marked as a builders yard in a very similar form to that which exists in the present, including the buildings / structures in the northwest and southeast corners, as well as along the southern and northeast facing boundaries. In addition, garage is located approximately 170m southeast of the site, the garage is present at this location to this day. Pond is located approximately 200m south of the site.
- In 1975, an additional structure has been constructed to the west. Also, by 1971 fire station is shown to be located approximately 90m to the southeast of the site.
- The site layout remains consistent until the last available mapping dated 1999.

3 CONCEPTUAL SITE MODEL

The following section provides a review of the contaminant linkages that may be active at the site through the process of a Preliminary Risk Assessment, whereby EPS have examined the potential sources that may be present as a result of historic and / or current site activities and where potential interaction between these sources and the identified human / environmental receptors may occur.

3.1 Source Characterisation

The following potential contaminant sources have been identified at the site and in the surrounding area:

Potential Source	Source Description	Principal Contaminants of Concern
Current Site Use	In-fill material of unknown origin (Made Ground) used to level areas beneath existing / historic buildings and hardstanding.	PAH, Metals, ACM
	Current use of the site as a Builders Merchant.	TPH, PAH, Metals, ACM
Current and Historic Surrounding Land Use	Current / historic industrial land use of the surrounding area including a petrol filling station 120m to the southeast.	VOC, TPH, PAH, Metals
	Historic landfill located approximately 320m to the southwest and infilled pits / quarries located between 250m and 500m.	Landfill Gas (CO ₂ , CH ₄).

Notes: PAH Polycyclic Aromatic Hydrocarbons ACM Asbestos Containing Material
TPH Total Petroleum Hydrocarbons VOC Volatile Organic Compounds

3.2 Potential Receptors

A framework for the assessment of risks arising from the presence of contamination in soils has been produced by the Environment Agency and the Department for the Environment, Food and Rural Affairs (DEFRA) and is presented with the report '*Using Science to Create A Better Place: Updated Technical Background to the CLEA Model – Science Report SC050021/SR3*'. This guidance document defines a series of standard land-uses, which form a basis for the development of a Conceptual Site Model.

The proposed development plan includes erection of a three storey building to create 6 x 2-bed and 3 x 1-bed self-contained flats, with associated parking, cycle and bin stores, and landscaping, involving demolition of existing builders yard. Therefore, the land use has been considered as:

- Residential (without plant uptake).

In view of the environmental setting, current and potential future land use of the site and surrounding sites, the potential receptors for any contaminant impact are discussed in the table below:

Receptor	Site Specific Description
Human	Future site users, site workers involved in the site redevelopment, and those working and living in the surrounding area have the potential to be at risk from exposure to potential contaminants of concern (CoCs).
Groundwater	The site is reported to be underlain by Black Park Gravel Member which is defined by the EA as a secondary aquifer. Whilst the site does not lie within a SPZ for nearby groundwater abstraction, the underlying geology does have some resource potential and therefore groundwater should be considered as a potential receptor to site derived contaminants.
Surface Water	The nearest surface watercourse is a small unnamed drain, located 700m from the site. Given the considerable distance of this watercourse from the site, it is considered highly unlikely that site derived contaminants could impact this receptor and on this basis surface waters have not been identified as a sensitive receptor to site derived contaminants.
Flora and Fauna	The proposed development includes the provision of communal garden areas / landscaped areas. Some of the identified contaminants of concern are known to be phytotoxic and as such, the potential for this impact should be considered.
Buildings & Infrastructure	Subsurface structures are likely to be present at the site which may be adversely affected by the potential presence of the identified contaminants of concern. These include concrete used in building foundations, buried potable water supply pipes and other service lines and pipes.
Adjacent Land	Adjacent properties including private residential dwellings could also be at risk from potential contaminants found at the site.

3.3 Potential Pathways

Where contaminants may be present in soil, there are a number of potential pathways that enable human receptors to come into contact with or be exposed to them. The most direct pathways, considered under current UK legislation, can be summarised as follows:

- Direct ingestion of contaminated soil
- Ingestion of household dust
- Ingestion of contaminated vegetables
- Ingestion of soil attached to vegetables
- Dermal contact with contaminated soil
- Dermal contact with household dust
- Inhalation of fugitive soil dust
- Inhalation of fugitive household dust
- Inhalation of vapours outside
- Inhalation of vapours inside

Clearly, not all of these potential pathways apply for every standard land-use; the simplest example for exclusions being a commercial / industrial site which is covered by concrete hardstanding. The concrete precludes the direct exposure of humans working at the site to any contaminated soils.

However, in addition to direct exposure pathways, a number of physical transport mechanisms / pathways may also exist at a site that allow remote or less accessible contaminants in soil or groundwater to reach human or environmental receptors both at a site and beyond the site boundary. These include the transport mechanisms listed below.

- Downward and lateral movement of contaminants in soil either by gravity or through being 'leached' by percolating rainwater
- Lateral migration of contaminants dissolved in groundwater.
- Direct seepage or leaching of contaminants from soil into subsurface drains or supply pipework.
- Volatilisation of contaminants from groundwater or unsaturated soils into buildings or outdoor air.

Through examination of the standard land use and environmental setting at each site, the presence of pathways and transport mechanisms described above must be considered when assessing whether a contaminant linkage may plausibly be active, and therefore be included in the conceptual site model.

3.4 Summary of Site-Specific Contaminant Linkages

Considering the site use and environmental setting, and proposed land use, the following plausible contaminant linkages have been identified through this phase I assessment and require further investigation.

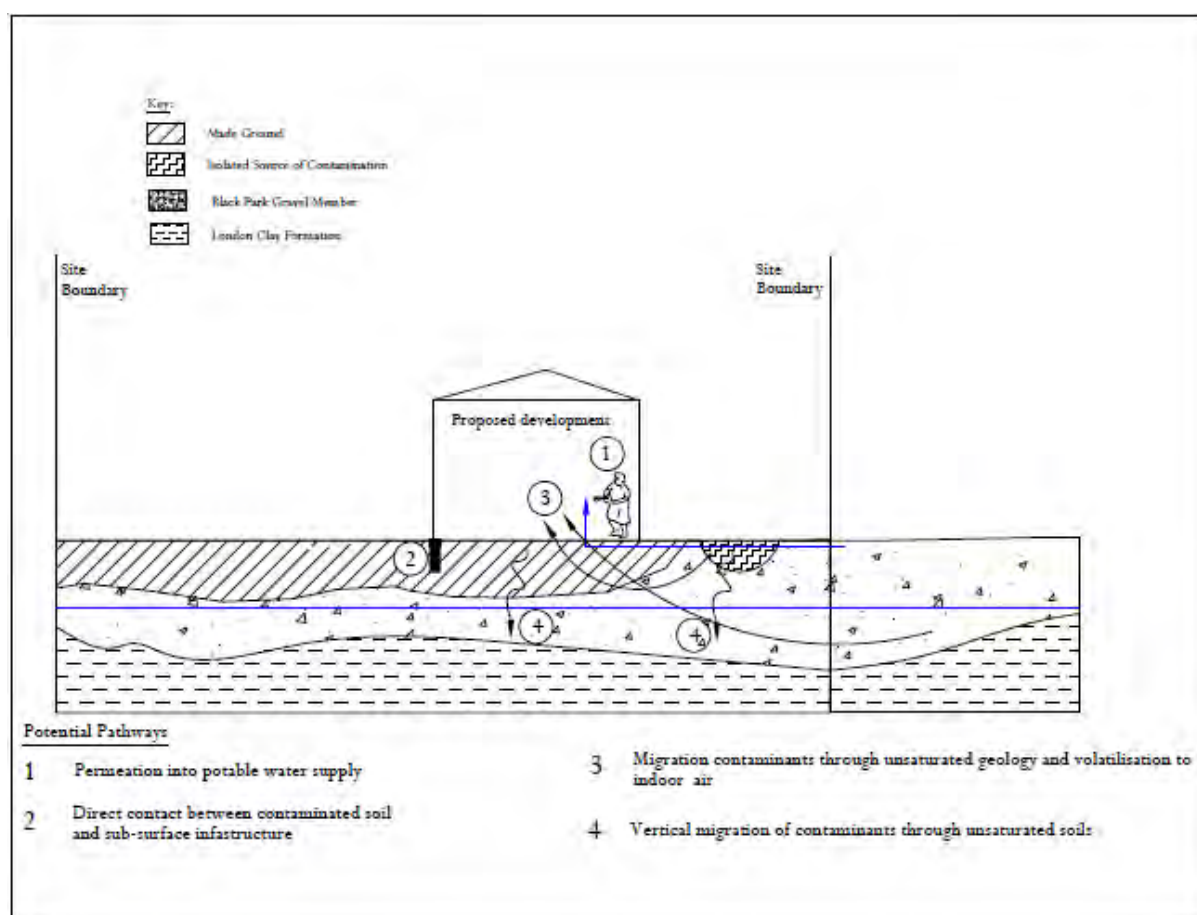
Source	Pathway	Receptor
Contaminated Soils	Exposure to soil through direct contact. Inadvertent ingestion of soils from fugitive dusts and consumption of home grown vegetables.	End Users
	Direct contact and inadvertent ingestion by eating or smoking with dirty hands	Construction workers during redevelopment
	Direct contact	Buried infrastructure
	Leaching of contaminants vertically through unsaturated soils	Groundwater
Contaminated soil / groundwater	Volatilisation of organic compounds to indoor air.	Site users / neighbouring residents
	On-site migration of organic compounds in groundwater and volatilisation to indoor air.	

The following comments are made with respect to contaminant linkages which have been considered through development of the conceptual model, but have not been concluded as 'plausible' – i.e. through which a significant possibility of significant harm could occur to an identified receptor:

- Proposed redevelopment plans indicated that post-redevelopment none of the soils will be exposed, with the majority of the site covered by building, car park and some landscaped areas. As such, pathways of direct contact, ingestion of vegetables or soils attached to vegetables grown in private gardens are not considered active.
- Whilst a historic landfill site is located approximately 320m from the site and some potentially infilled pits and quarries between 250m and 500m, given the distance of these features from the site and the presence of infrastructure in between, a plausible contaminant linkage is not recognised from the on-site migration of landfill gas.

The following diagram provides an illustration of the plausible contaminant linkages that may be active at the site and which may need further investigation or control to ensure safe development:

Illustrative Conceptual Site Model



4 SUMMARY OF INTRUSIVE INVESTIGATIONS

Intrusive ground investigations were undertaken on the 11th September 2017 in accordance with EPS standard operating procedures, copies of which will be made available on request. A summary of all site activities is presented in the following sections.

4.1 Exploratory Hole Locations

Borehole locations were selected through consideration of the potential contaminant linkages identified through the Phase I Desk Study, the proposed development layout, existing site restrictions, the location of below ground utilities as well as operational and health & safety considerations.

Four window sample boreholes (WS1 – WS4) were drilled at the site to a maximum depth of 5.0m using a track-mounted, window sampler drilling rig.

The overall objective in terms of exploratory hole locations was to provide an appropriate lateral and vertical coverage of the soils and groundwater underlying the site in order to provide information relating to their quality and nature as well as provide information for geotechnical design.

Standpipes were installed within all window sample locations. Each was installed using 50mm diameter uPVC well casing and fitted with a gas tap. Slotted casing (1mm slot) was installed at each location from the base of the borehole to approximately 1.0m below the surface. The installations were completed to ground surface using plain casing. A filter pack of 2-3mm washed gravel extended from the base of the boreholes to approximately 0.1m above the slotted section with a bentonite seal to surface. All boreholes were finished with flush-mounted, forecourt rated, bolt-down headworks.

All boreholes were formed in accordance with standard EPS drilling methodologies and subcontractors were supervised at all times by an EPS engineer. A detailed site layout plan showing the location of the boreholes completed during the investigation is presented as Figure 4.

4.2 In Situ Testing & Soil Sampling

Each borehole was logged for ground conditions encountered and inspected for any physical evidence of contamination, such as soil staining, odour and the presence of separate phase liquids on a precautionary basis. Borehole logs are presented in Appendix G.

Standard or cone penetration tests (SPT / CPT) were carried out in all materials using an automatic trip hammer. The number of blows required to advance a standard split spoon, (or solid 60° nose cone for the CPT test) over the final 300mm of a 450mm total drive was recorded, and is shown on the borehole records at the penetration resistance (“N” value).

Where potentially volatile organic compounds are suspected, EPS carries a Photoionisation Detector (PID), which can be used to measure the relative concentrations of vapour associated with soil samples collected from different depths and locations at the site. In these circumstances, soil samples will be placed into plastic bags, sealed, shaken and then allowed to rest for a few minutes to allow time for volatile vapour to accumulate in the air trapped within the bag.

The PID probe will then be used to pierce the bag and sample the air above the soil to measure the concentration of volatile compounds that have accumulated. PID readings are only used to provide EPS with a basic means to quantify areas of volatile organic compound in the field to help guide the investigation. As potentially volatile organic compounds, specifically including petroleum hydrocarbons, were identified in the conceptual site model, PID readings were collected during this intrusive investigation. These readings are included within borehole logs presented as Appendix G and the results are discussed further in later sections.

In-situ tests using a hand-held penetrometer, indicated as PP on the borehole records, were undertaken throughout the window sampler boreholes. The peak undrained shear strength for each test is presented in kN/m^2 on the window sampler records.

A laboratory testing schedule is included as Table 1.

4.3 Groundwater Sampling

During the ground investigation, grab samples of the groundwater were obtained from three locations for laboratory analysis of selected contaminants.

4.4 Laboratory Testing

Samples obtained for analysis of identified contaminants of concern were submitted to Exova Jones Environmental of Flintshire, who hold appropriate UKAS / MCERT accreditation for the required testing. Samples were transported in laboratory supplied containers and delivered to the laboratory by approved courier.

Geotechnical testing was undertaken by Soil Property Testing, Huntingdon, a UKAS accredited laboratory.

Copies of chain of custody documentation are held by EPS and will be made available on request.

5 FINDINGS OF THE INVESTIGATION

This section of the report provides a summary of the findings of the various aspects of the ground investigation.

5.1 Ground Conditions

A total of four window sample boreholes were formed at the site and the ground conditions encountered, from ground level, were found to comprise:

- Made Ground
- Black Park Gravel Member
- London Clay Formation

Site specific borehole logs are included as Appendix G and give descriptions and depths of strata encountered. A summary of the general strata encountered across the site is provided in the table below, with more detailed description given in the following sub sections.

Geological Strata	Maximum Depth to Base of Strata(m bgl)	Strata Thickness (m)
Made Ground	0.8	0.1-0.8
Black Park Gravel Member	2.5	1.0-2.2
London Clay Formation	>5.0	Not Proven

5.1.1 *Made Ground*

Below a surface layer of concrete, made ground was identified at three locations. Within WS2, it comprised a layer of beige-brown, gravelly sand with small brick fragments overlying brown, sandy, gravelly clay to a depth of 0.8m. In WS3, it was noted as a thinner layer of soft, black, slightly gravelly, sandy clay with a slight organic odour to a depth of 0.5m. Finally, in WS4 it comprised a grey, sandy, very clayey gravel to 0.4m.

5.1.2 *Black Park Gravel Member*

Black Park Gravel was found directly underlying the made ground and comprised sandy gravelly clay underlain by medium-dense, yellowish-brown, sandy gravel and gravelly sand.

5.1.3 *London Clay Formation*

Below the Black Park Gravel Member and extending to the base of all boreholes lay material interpreted as London Clay Formation, comprising a firm to stiff, grey clay.

5.2 Groundwater

Groundwater was identified at all locations, with rest levels ranging from 1.06m to 1.86m.

5.3 Physical Evidence of Contamination

Other than the presence of made ground which generally comprised fragments of brick within shallow soils, there was no palpable evidence of contamination, waste or putrefiable material encountered in any of the sampling locations during the investigation including no visual or olfactory evidence of hydrocarbon staining.

5.4 Laboratory Analysis – Soil

A laboratory analysis testing schedule is presented as Table 1 and all environmental sample results obtained from the laboratory are included as Appendix H. The key results of laboratory testing on environmental soil samples are summarised below.

Contaminant	No. of Samples	No of Detections	Range of Detections (mg/kg)		Highest Location & Depth (m bgl)
			Min	Max	
Arsenic	5	5	11.1	27.1	WS2 (0.3-0.5)
Cadmium	5	3	0.1	0.6	WS4 (0.2-0.3)
Chromium III	5	5	22.7	108.6	WS3 (0.3-0.5)
Copper	5	5	6	65	WS2 (0.3-0.5)
Lead	5	5	17	511	WS4 (0.2-0.3)
Mercury	5	0	-	-	-
Nickel	5	5	10.8	40.0	WS2 (0.3-0.5)
Selenium	5	2	1	2	WS3 (0.3-0.5)
Zinc	5	5	22	489	WS4 (0.2-0.3)
Benzo[a]pyrene	5	3	0.96	3.37	WS2 (0.3-0.5)
PAH (Total of 16)	5	3	11.4	43.3	WS2 (0.3-0.5)
MTBE	5	0	-	-	-
BTEX	5	0	-	-	-
TPH	5	3	137	196	WS3 (0.3-0.5)
Cyanide	3	1	-	0.8	WS3 (0.3-0.5)
PCB	2	0	-	-	-
Asbestos (%)	5	0	-	-	-

Notes: - Contaminant not found above laboratory detection limits PAH Polycyclic Aromatic Hydrocarbons
BTEX Benzene, Toluene, Ethylbenzene, Xylenes
TPH CWG Total Petroleum Hydrocarbons (Criteria Working Group)

- Detectable concentrations of ACM, in the form of chrysotile fibre bundles were identified in shallow soils recovered from WS3 and WS5. However, upon quantification analysis, percentage of ACM by sample mass was identified at below minimum detection limits (MDL) of 0.001%.

5.5 Laboratory Analysis – Groundwater

All environmental sample results obtained from the laboratory are included as Appendix H. The key results of laboratory testing on environmental soil samples are summarised below.

Contaminant	No. of Samples	No of Detections	Range of Detections (µg/l)		Highest Location & Depth (m bgl)
			Min	Max	
Arsenic	1	0	-	-	-
Cadmium	1	0	-	-	-
Chromium	1	0	-	-	-
Copper	1	0	-	-	-
Lead	1	0	-	-	-
Mercury	1	0	-	-	-
Nickel	1	1	-	9	WS2
Selenium	1	0	-	-	-
Zinc	1	1	-	4	WS2
Naphthalene	1	1	-	4.3	WS2
Benzo[a]pyrene	1	1	-	0.148	WS2
PAH (Total of 16)	1	1	-	13.553	WS2
MTBE	3	0	-	-	-
BTEX	3	0	-	-	-
TPH	3	0	-	-	-
Cyanide	1	1	-	300	WS2

Notes: - Contaminant not found above laboratory detection limits PAH Polycyclic Aromatic Hydrocarbons
BTEX Benzene, Toluene, Ethylbenzene, Xylenes
TPH CWG Total Petroleum Hydrocarbons (Criteria Working Group)

5.6 Waste Analysis

Waste classification (i.e. hazardous or non-hazardous) was undertaken on samples of both Made Ground and natural soils, which included total concentrations of metals and hydrocarbons, using computer software provided by HazWaste OnlineTM. The results of the WAC analysis are included within Appendix H. The outputs from the HazWaste OnlineTM software are included in a Waste Classification Report in Appendix I.

Waste Acceptance Criteria was subsequently undertaken on one sample of Made Ground and one sample of the underlying natural soils. These results, together with those of the waste classification above are summarised in the following table:

Strata	Is it Hazardous?	Waste Code	Waste Acceptance Criteria	Waste Classification
Made Ground	No	17 05 04	Passed Criteria For Inert Landfill	INERT*
Natural Soils	No	17 05 04	Passed Criteria For Inert Landfill	INERT

* For made ground present on a brownfield site such as this, although the soil sampling process did not identify potentially hazardous concentrations of Asbestos Containing Material (ACM) within the soil, it must be acknowledged that the material may exist within areas which were not sampled or accessible during the investigation. Any visually identifiable fragments of ACM can invalidate any non-hazardous waste classification, as such, the above waste classifications are made on the proviso that any visually identifiable fragments of ACM are removed from the material prior to its disposal off-site. The subsequent ACM must then be disposed of in accordance with the Control of Asbestos Regulations 2012.

5.7 Geotechnical Testing

The results of geotechnical laboratory testing are summarised in the table below and all geotechnical sample results obtained from the laboratory are included as Appendix J. The key results of laboratory testing on geotechnical soil samples are summarised below.

Strata	Range of Parameters					
	Moisture Content (%)		Plasticity Index (%)		Modified Plasticity Index (%)	
	Min	Max	Min	Max	Min	Max
Superficial Deposits	14.4		20		9	
London Clay Formation	27.7	30.2	43	45	-	-

The natural moisture content was established for three samples of cohesive soil in accordance with BS1377 Part 1:7.3 and BS1377: Part 2:3.2.

Atterberg limit tests were undertaken on three samples of cohesive soils in accordance with BS1377: Part 1:7.4 and BS1377: Part 2:3.2&4.2.

Particle Size Distribution was undertaken on four samples of granular material in accordance with BS1377: Part 2: 1990: 9.2.

A laboratory analysis testing schedule is presented as Table 2.

6 GEOTECHNICAL APPRAISAL

The ground conditions have been found to comprise a thickness of made ground, overlying both cohesive and granular superficial deposits, with underlying bedrock of the London Clay Formation.

6.1 Structural Foundations

6.1.1 Spread Foundations

The ground conditions are considered suitable for the use of conventional spread foundations, bearing on the underlying Black Park Gravel Member which has been identified as predominantly cohesive, although a band of granular material is present at around 2.0m depth. Should foundations need to be deeper due to the presence of nearby trees, they may also bear onto the underlying London Clay.

Allowable bearing capacities for the clay are provided in the table below, although it should be noted that these are limited due to the relatively low strength of the soils encountered. The allowable bearing capacity is the permissible increase in vertical stress at the level of the underside of the foundation, above existing overburden pressure, which may be calculated on the basis of a soil density of 19kN/m^3 .

Depth (m bgl)	Allowable Bearing Capacity (kN/m^2)	
	Strip Foundations	Pad Foundations
1.0	55	70
1.5	65	85
2.0	80	100
2.5	90	115

A minimum foundation depth of 1.0m, below existing or proposed ground level is considered suitable for the site, subject to the following provisos:-

- Foundations should fully penetrate any made ground and should extend a minimum of 150mm into undisturbed natural strata.
- The London Clay should be considered as having a high volume change potential and therefore, where affected by trees, foundations should be designed in accordance within Chapter 4.2 of NHBC Standard “*Building Near Trees*”.
- At the above bearing pressure, total settlements are unlikely to exceed approximately 20mm to 25mm. Settlements in clay will comprise both immediate and long term (consolidation) settlement and will take place over a long period of time. Settlements in any granular soils will occur rapidly as loadings increase.

Should foundations cross a change in strata, from granular to cohesive, then it would be prudent to incorporate some nominal reinforcement to control the effects of differential settlements.

Semi-mature to mature trees are present on site, particularly along the site boundaries. It is recommended that a full tree survey is undertaken so that full impact of these features can be accounted for in foundation design.

6.2 Ground Floor Construction

Given that made ground is present across the site to depths of greater than 0.60m and the near surface soils being likely to be susceptible to volume change, suspended ground floor slabs are recommended for the site.

6.3 Drainage

Falling Head Infiltration Tests were undertaken at three locations, the results of which are provided within the table below:

Location	Infiltration Rate (m/s)
WS2	1.213E-06
WS3	4.527E-07
WS4	7.077E-07

These results generally indicate poor drainage conditions and on the basis of this, combined with the presence of shallow groundwater, soakaways are unlikely to be suitable for use at the site.

6.4 Groundworks

Whilst excavations in cohesive soils may remain stable for short periods during construction the long term stability of these should not be relied upon. Any excavations in granular material or made / disturbed ground should not be relied upon in unsupported excavations.

Heavy plant and stockpiles of materials should not be permitted close to the edges of unsupported excavations.

Further reference may be made to CIRIA Report No. 97 '*Trenching Practice*' 1992.

On the basis of the findings of the ground investigation, significant quantities of groundwater may be encountered within shallow excavations for foundations or drainage.

6.5 Concrete Grade

Sulphate contents and pH values determinations were carried out by the analytical laboratory, the results of which are also included within Appendix H. Results for concrete grade are summarised within the following table, and have been divided into results applicable to soils recovered from both made ground and natural soils to assess different properties of the two materials and subsequent design classifications.

Strata	Water Soluble Sulphate (mg/l SO ₄)		pH	
	Min	Max	Min	Max
Made Ground	8.9	34.7	7.50	8.93
Black Park Gravel Member	15.2	39.8	6.81	7.72

In accordance with Part 1 of the BRE Special Digest 1 '*Concrete in Aggressive Ground*' 2005, the highest water soluble sulphate values has been used. For the Made Ground this gives a Design Sulphate Class (DS) of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1 which does not require special protective measures. The natural soils are also assigned DS-1 with ACEC of AC-1. If foundations are to bear in the London Clay, then consideration will need to be given to further testing to confirm concrete grades for this material .

7 ENVIRONMENTAL APPRAISAL

The following section summarises the method used to assess the risks posed to human health and controlled waters then identifies any sample results found by this investigation which warrant further consideration.

7.1 Human Health

7.1.1 Land Use Setting & Screening Criteria

In order to screen laboratory data for concentrations of contaminant in soil with potential to cause harm to human health at a residential setting (without home-grown produce), relevant generic screening values for contaminants in soil have been used. The technical framework used to derive the screening values and the documents in which they are published are summarised as follows:

- *EA Science Reports* (SC050021/SR2, SC050021/SR3, and SC050021/SR7)
- *EA Soil Guideline Value Science Reports*
- *Suitable For Use Levels (S4ULs) for Human Health Risk Assessment* – LQM and CIEH (2015).
- *Soil Generic Assessment Criteria for Human Health Risk Assessment* - EIC/AGS/CL:AIRE (2010)

Category 4 Screening Levels (C4SLs) provide generic suitable for use screening values for common contaminants in a variety of land uses and are also utilised as appropriate generic screening criteria.

For assessing concentrations of free and complex cyanide in soil, in the absence of any commonly accepted national criteria, reference has been made to the Dutch Intervention Values (DIV). It is acknowledged that there are significant limitations in the derivation of these figures and they are not based on UK exposure modelling, so they have only been used to further inform the initial screening of the dataset.

A summary of the screening criteria and the methodology used to derive them is included in Appendix K.

7.1.2 Assessment of Results

The results of the screening process for on-site human receptors show that generic screening criteria, representative of risk values for human health, have been exceeded for lead at two locations. A summary of the exceedances is provided within the table below:

Contaminant	Screening Criteria (mg/kg)	Number of Exceedances	Highest Exceedance (mg/kg) & Sampling Location
Lead	310	2	511 (WS4 (0.2-0.3))

Lead is not considered volatile and therefore can pose risk via direct contact and vegetable ingestion pathways only. The site is to be redeveloped for high density residential end use, meaning that the majority of soils will be covered by hardstanding and building with limited landscaped areas. As such, pathways of direct contact and vegetable ingestion are not considered active. Therefore, measured lead concentrations in shallow soils are not considered to pose unacceptable level of risk to human health.

Cyanide was measured above laboratory MDL in one out of three soil samples at concentration of 0.8mg/kg (WS3). In addition, cyanide was also measured above MDL in groundwater sampled from WS2 at concentration of 300µg/l. Cyanide can exist in the environment in many different forms and is mainly split between free and complex cyanide. Free cyanide is known to be the more mobile and toxic of the two forms. It is likely that the measured total cyanide concentrations comprise both forms and therefore the assessment below takes that into account.

Reference is made to international sources to assess the significance of measured cyanide concentrations. For soils Dutch Target and Intervention Values, 2000 report was consulted which provides a target value of 1mg/kg and the intervention value of 20mg/kg for free cyanide. In addition, US Environment Protection Agency provides Regional Screening Levels (RSLs) – Generic Tables (June 2017), and for hydrogen cyanide (considered the most toxic of cyanide forms) screening values for residential soils of between 2.3mg/kg and 78mg/kg are presented. Based on the above it is considered reasonable to conclude that the measured total cyanide concentration of 0.8mg/kg in soils is unlikely to pose a significant risk to human health.

In terms of groundwater, in absence of screening values directly applicable to human health, EA compliance criteria for drinking water are considered further for screening purposes. EA provides a value of 50µg/l which is defined as quality regarding suitability for abstraction for supply as drinking water. Measured total cyanide concentration of 300µg/l exceeds the criterion of 50µg/l as presented by EA.

7.2 Controlled Waters

7.2.1 Generic Screening

EPS has also screened the reported groundwater concentrations at an initial Tier 1 level for potential to cause harm to controlled waters within the local area. The criteria used for this process has been taken as follows:

Resource Sensitivity of Area	Screening Criteria
High Groundwater Resource Potential (HGwRP) - Principal aquifers	UK Drinking Water Standards (UKDWS)
Low Groundwater Resource Potential (LGwRP) - Secondary aquifers not being abstracted and Un-productive groundwater strata	UK Environmental Quality Standards (EQS)

Screening criteria for Low Groundwater Resource Potential (LGwRP) have been adopted due to the underlying geology being classified as a secondary aquifer.

A summary of the screening criteria and the methodology used to derive them is included in Appendix K.

7.2.2 *Assessment of Results*

The results of the screening process show that generic screening criteria, representative of values for controlled waters for risks from soil and / or groundwater have not been exceeded for any contaminant at any location.

It is noted that no screening value was available for cyanide. EA's chemical standards database (accessed on 17th October 2017) provides standards applicable for drinking water and in addition standards applicable for surface water. The standards for drinking water range from 50µg/l (UK Standard) to 70µg/l (WHO Drinking Water Guideline).

Cyanide concentration of 300µg/l was found above the compliance criteria of 50µg/l as presented by EA.

7.3 **Summary of Findings**

Laboratory analysis of shallow soils identified concentrations of lead to exceed relevant screening criteria representative of minimal / low risk to future site users. However, as lead is considered of limited mobility and volatility in the environment the main exposure route for lead is direct contact and ingestion of vegetables grown in potentially contaminated soils. Given the fact that following the development none of the soils are to remain exposed (with buildings and car park covering majority of the site) the potential risk from lead is not considered significant.

Cyanide was found at concentrations above laboratory MDL in soils and groundwater sampled from beneath the site. In the absence of readily available screening criteria, international sources were consulted and measured cyanide concentration of 0.8mg/kg in soil was found below international screening values of between 1mg/kg and 78mg/kg. As such, the risk from cyanide in soils was considered low.

In addition, cyanide was measured in groundwater sampled from beneath the site at concentration of 300µg/l which was found to be in excess of the drinking water criterion of 50µg/l (EA, Chemical Standards, website accessed 18th October 2017). Based on the above the potential risk from cyanide in groundwater could not be discounted.

Potential short-term risks associated with exposure of soils to construction workers involved with redevelopment work at the site may most appropriately be controlled through standard health and safety precautions; these are also detailed further in Section 7.4.

In accordance with the Model Procedures for Management of Land Contamination (*Contaminated Land Report 11*), risks have been identified by this work which will require further assessment. A summary of the approach outlined in CLR11, marking the work already completed under the risk assessment phase, is presented as a flow diagram in Figure 5 of this report.

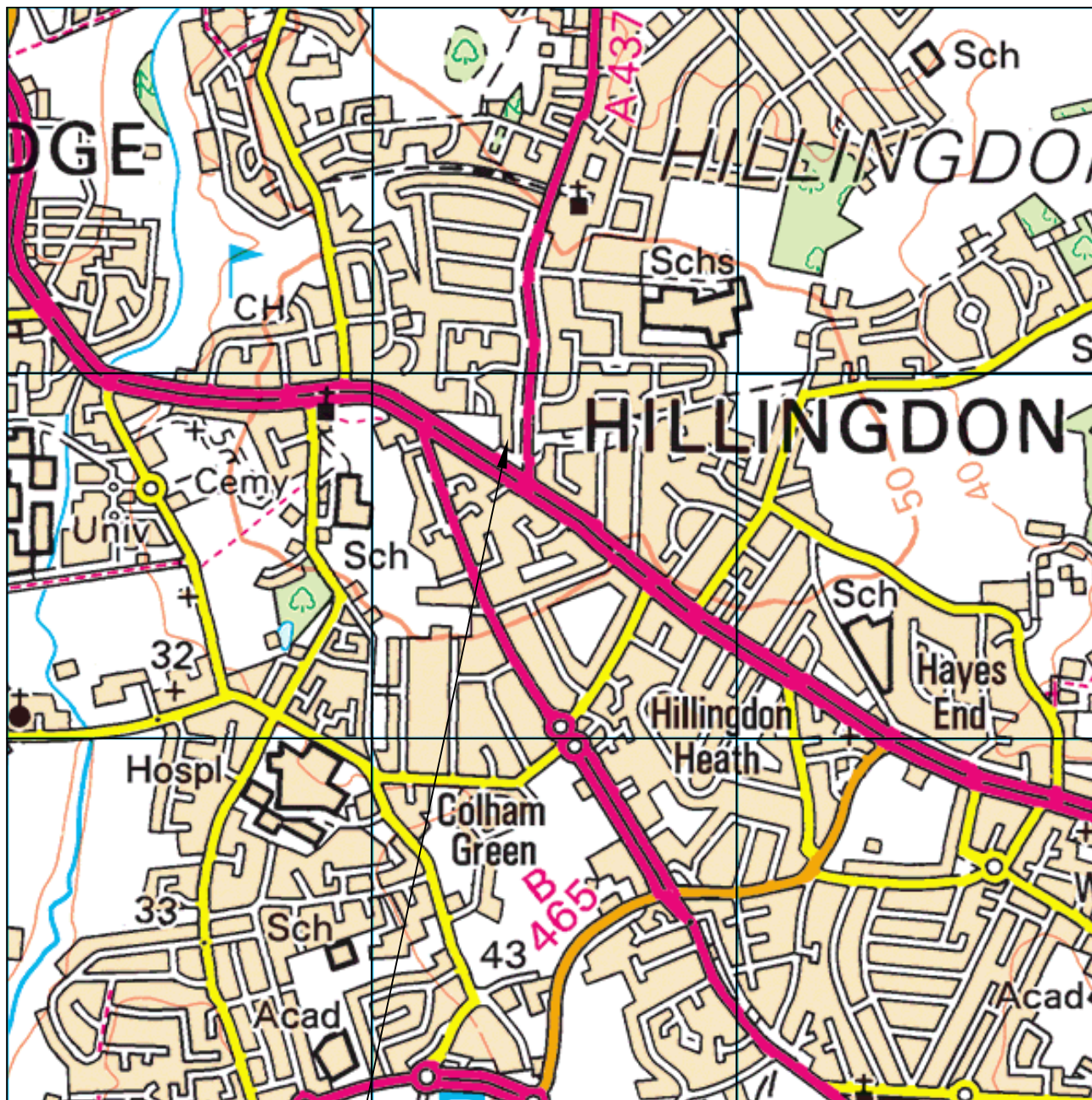
7.4 Recommendations

The following recommendations are made with respect to control measures deemed necessary to ensure the site is made safe and suitable for its proposed end use:

- a) To assess the potential risks to future residents and water resource receptors from measured cyanide concentrations in groundwater, additional sampling of all four wells and speciated cyanide analysis is recommended. Depending on the results of the analysis Detailed Quantitative Risk Assessment may also be required.
- b) In the event that topsoil / subsoil is to be imported onto the site for use within areas of gardens or soft landscaping it should be accompanied by appropriate laboratory analysis to demonstrate its chemical and physical suitability for use. The analysis should include Total Petroleum Hydrocarbons, Asbestos, Speciated Poly-cyclic Aromatic Hydrocarbons and Metals and should also comply with the relevant physical parameters outlined within the British Standard BS 3882:2015 '*Specification for topsoil and requirements for use*'.
- c) All construction workers operating at the site should be advised of the potential for exposure to and contact with, Made Ground in the subsurface of the site. Appropriate health and safety precautions should also be adopted during any excavation works to avoid exposure to soils. Reference should be made to relevant health & safety guidance including the following HSE document: *Protection of Workers and the General Public during Development of Contaminated Land*.
- d) Should any palpable evidence of unexpected contamination be encountered during the redevelopment work, it should be reported to EPS so that an inspection can be made and appropriate sampling and assessment work carried out. A method statement for encountering any unexpected contamination is included as Appendix L.

It is recommended that a copy of this report be provided to the Environmental Health Department of the Borough of Hillingdon Council so that the information may be incorporated into their land quality records and used to support the current planning application. It is assumed that the Council will require verification for the installation of the recommended control measures prior to discharging the relevant planning condition.

FIGURES



Approximate Site Location

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Title: Site Location Plan

Project: Crescent Parade, Hillingdon

Fig No: 1

Scale: NTS

Drawn By: MJ **Approved By:** WE

Job No: UK17.2816

Dwg No: CrescentParade/1017/01

Date: October 2017



— Approximate Site Boundary

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Title: Site Layout Plan

Project: Crecent Parade, Hillingdon

Fig No: 2

Scale: NTS

Drawn By: MJ | Approved By: WE

Job No: UK17.2816

Dwg No: CrescentParade/1017/02

Date: October 2017



— Approximate Site Boundary

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Title: Aerial Photograph

Project: Crecent Parade, Hillingdon

Fig No: 3

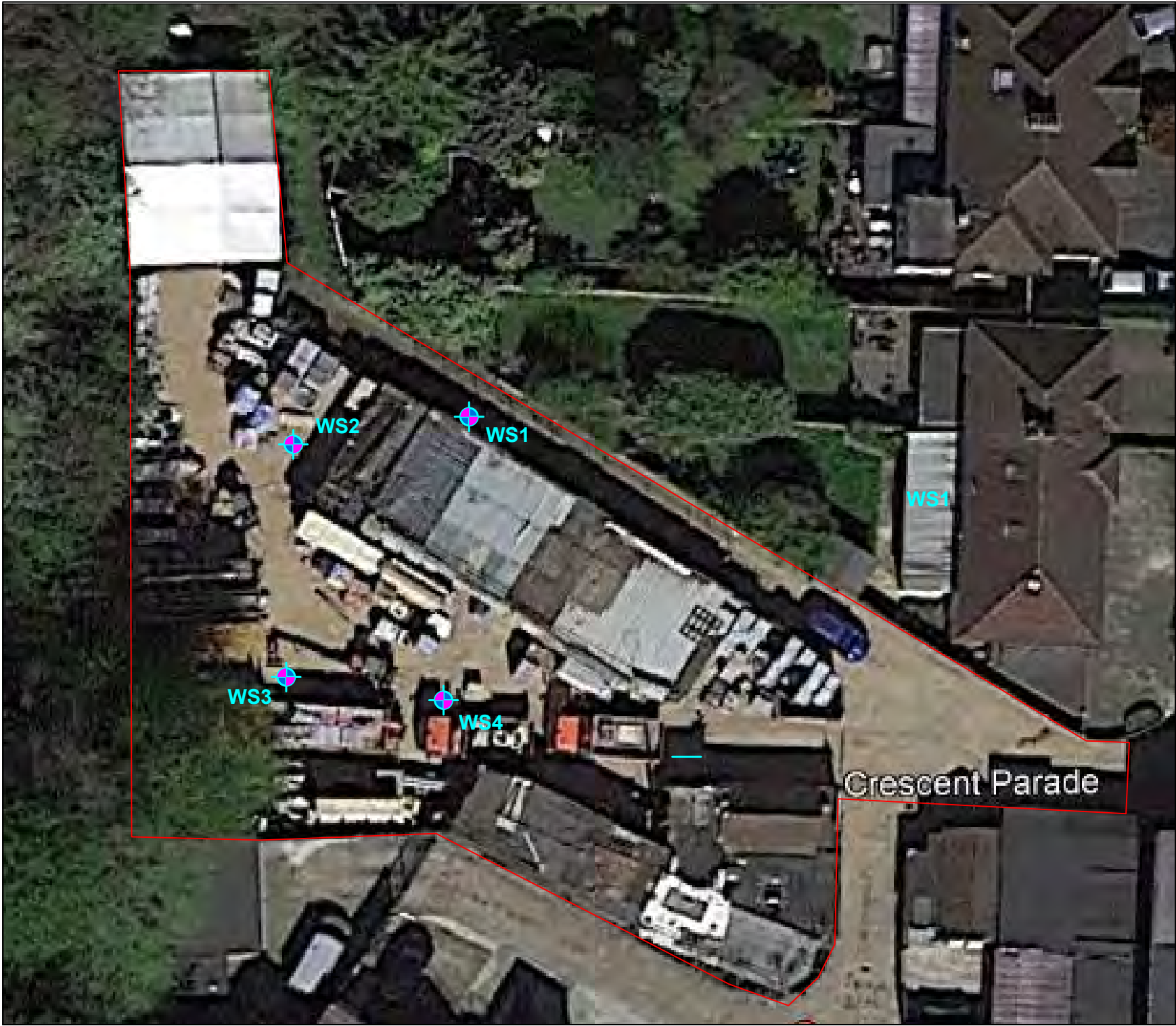
Scale: NTS

Drawn By: MJ | Approved By: WE

Job No: UK17.2816

Dwg No: CrescentParade/1017/03

Date: October 2017



- KEY:**
-  Approximate Site Boundary
 -  Approximate proposed Borehole Location

Fig: 4

Title: Borehole Location Plan

Project: Crescent Parade, Hillingdon

Client: Planning & Consulting Ltd

Scale: NTS for illustration purposes only

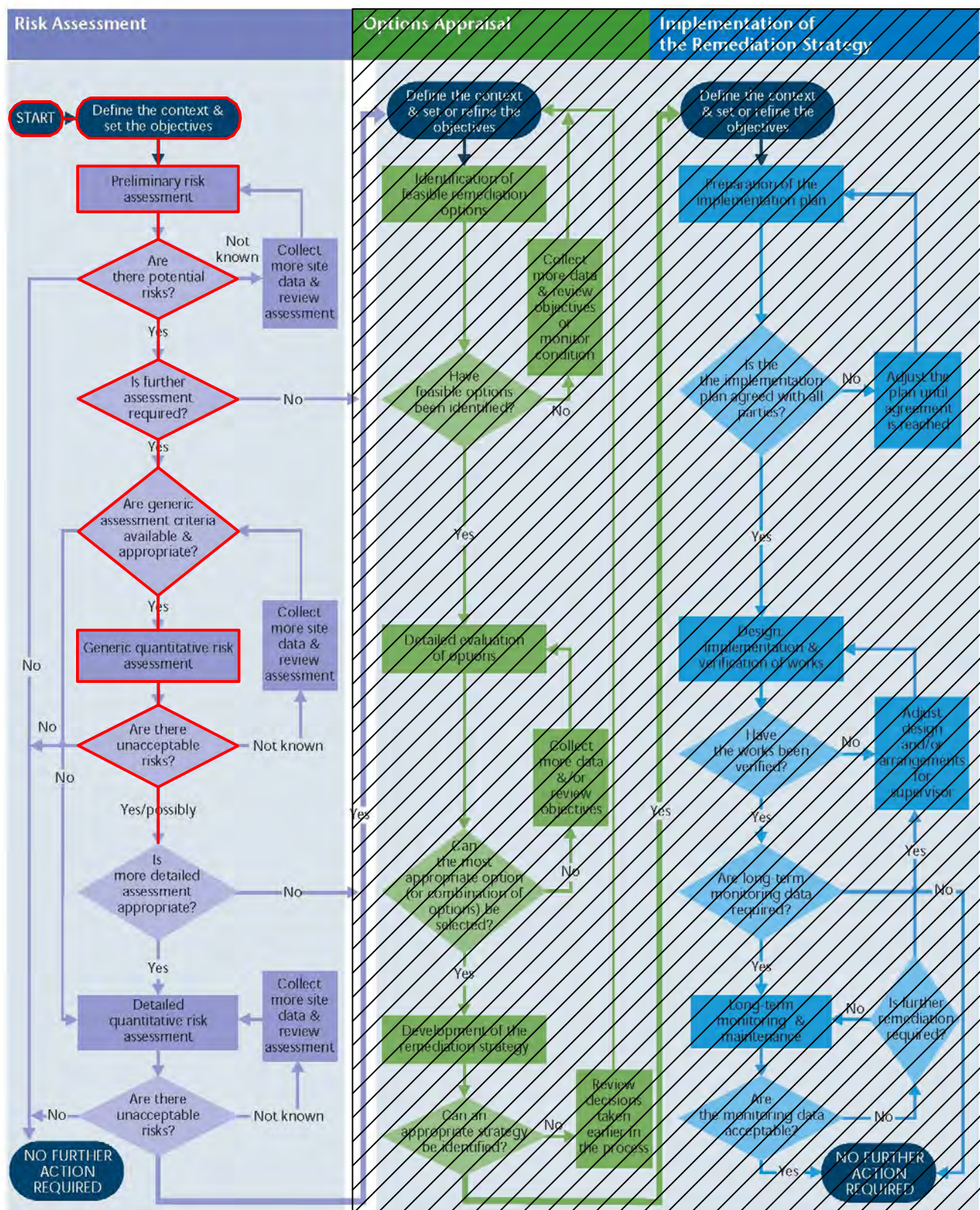
Drawn By: MJ

Job No: UK17.2816

Dwg No: Planning & Consulting/UK17.2816/04

Date: September 2017





Assessment Pathway for Site



Title: Site Context - CLR11

Project: Crescent Parade, Hillingdon

Fig No: 5

Scale: n/a

Drawn By: MJ

Approved By: WE

Job No: UK17.2816

Dwg No: CrescentParade/1017/05

Revision Date: October 2017

TABLES

Table 1 – Laboratory Testing Schedule (Environmental)

Sample ID	Sample Depth (m bgl)	EPS Mini Suite	EPS Waste Suite	EPS TPH Suite
WS1	0.2-0.5	1	-	1
WS2	0.3-0.5	-	1	-
WS2*	n/a	1	-	1
WS3	0.3-0.5	1	-	1
WS3*	n/a	-	-	1
WS4	0.2-0.3	1	-	1
WS4	1.3-1.5	-	1	-
WS4*	n/a	-	-	1

Notes

mbgl

1

-

EPS Mini Suite

EPS Waste Suite

EPS TPH Suite

*

meters below ground level

Sample Taken

Sample Not Analysed

Organic Matter, Cyanide, Metals, PAH's, Phenols, Asbestos

Waste Characterisation Suite

Total Petroleum Hydrocarbons, BTEX

Groundwater Sample

Table 2 – Laboratory Testing Schedule (Geotechnical)

Sample ID	Sample Depth (m bgl)	Moisture Content	Liquid / Plastic Limits	PSD	pH/sulphate
WS1	0.8-1.0	-	-		1
WS1	2.0	-	-	1	-
WS1	2.8	1	1	-	-
WS2	1.2-1.3	-	-	-	1
WS2	2.0	-	-	1	-
WS3	1.2	1	1	-	-
WS3	1.3-1.5	-	-	-	1
WS4	1.8-2.0	-	-	-	1
WS4	2.8	1	1	-	-

Notes

mbgl

1

-

PSD

meters below ground level

Sample Taken

Sample Not Analysed

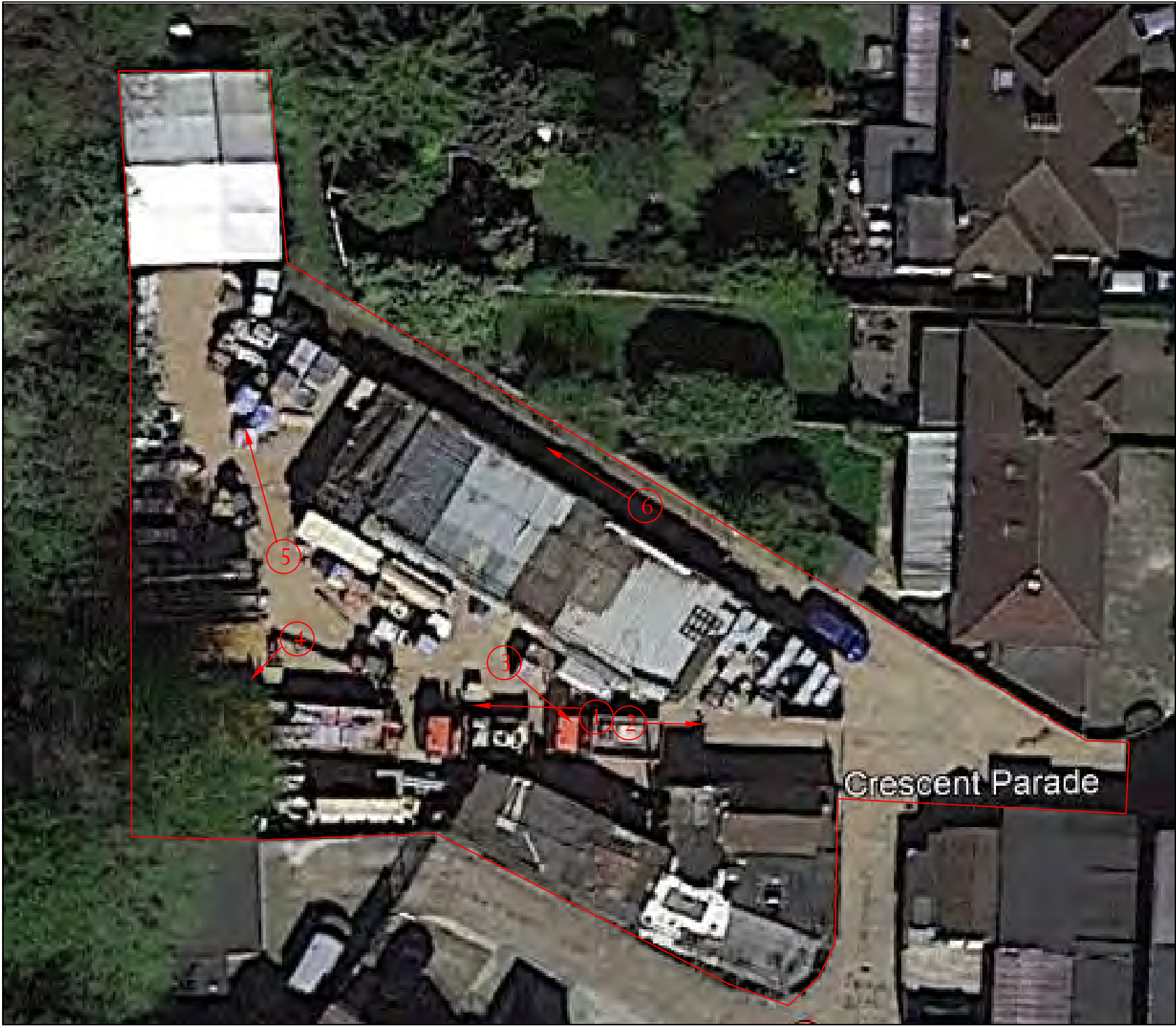
Particle Size Distribution

APPENDICES

APPENDIX A

Selected Site Photographs

Photo 1: View looking west from the east of the site.	Photo 2: View looking east across the east of the site.
	
Photo 3: View looking southeast from the centre of the site.	Photo 4: View looking at the southwest corner of the site.
	
Photo 5: View looking at the northwest corner of the site.	Photo 6: View along the track located on the northeast boundary.
	



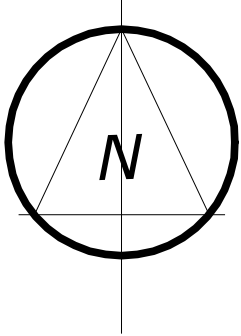
- KEY:
- Approximate Site Boundary
 - ① Approximate Photo Location

Appendix: A	
Title:	Photo Location Plan
Project:	Crescent Parade, Hillingdon
Client:	Planning & Consulting Ltd
Scale:	NTS - For illustration purposes only
Drawn By:	MJ
Job No:	UK17.2816
Dwg No:	Planning & Consulting/UK17.2816/A
Date:	October 2017

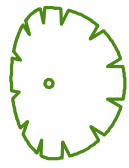


APPENDIX B

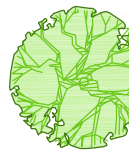
Proposed Development Plan



KEY



EXISTING TREES RETAINED.



INDICATIVE PROPOSED
TREE PLANTING.



LAND r/o CRESCENT PARADE ,UXBRIDGE ROAD
HILLINGDON.

W J Macleod
ARCHITECT
70b High Street Northwood Middlesex HA6 1BL
phone 01923 840800

Drawing Number	15 / 3378 / 1	Revision
Date	7 / 9 / 15	Drawn by
Scale	1:200@A1	Draw Ref.



APPENDIX C

Surrounding Land Use



General

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

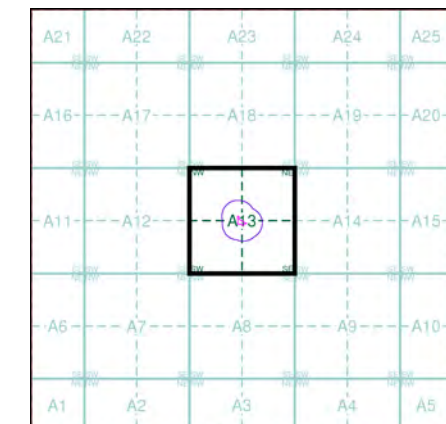
Agency and Hydrological

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

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Site Sensitivity Map - Segment A13



Order Details

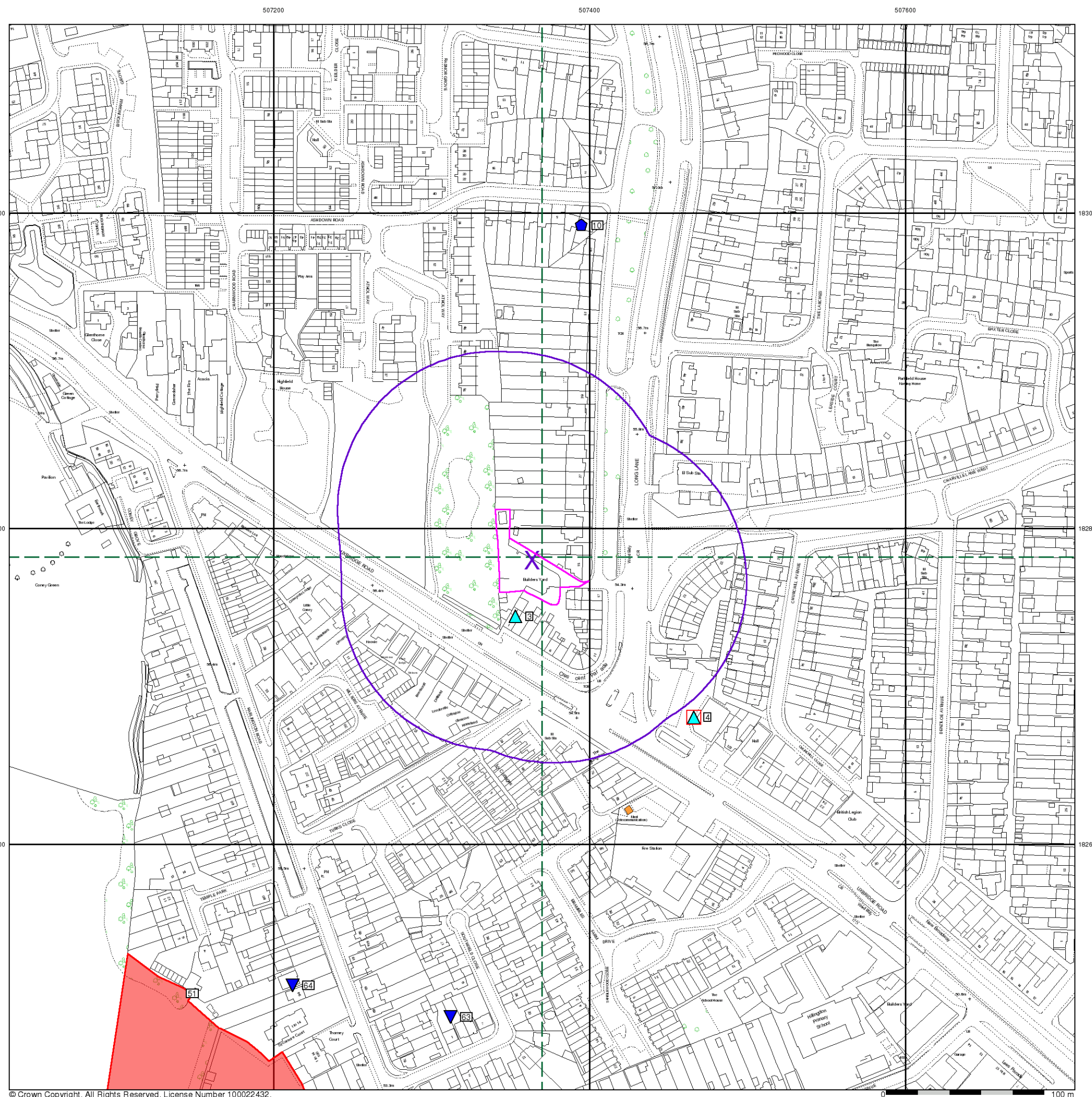
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Customer Ref: UK17.2816
National Grid Reference: 507360, 182780
Slice: A
Site Area (Ha): 0.14
Plot Buffer (m): 100

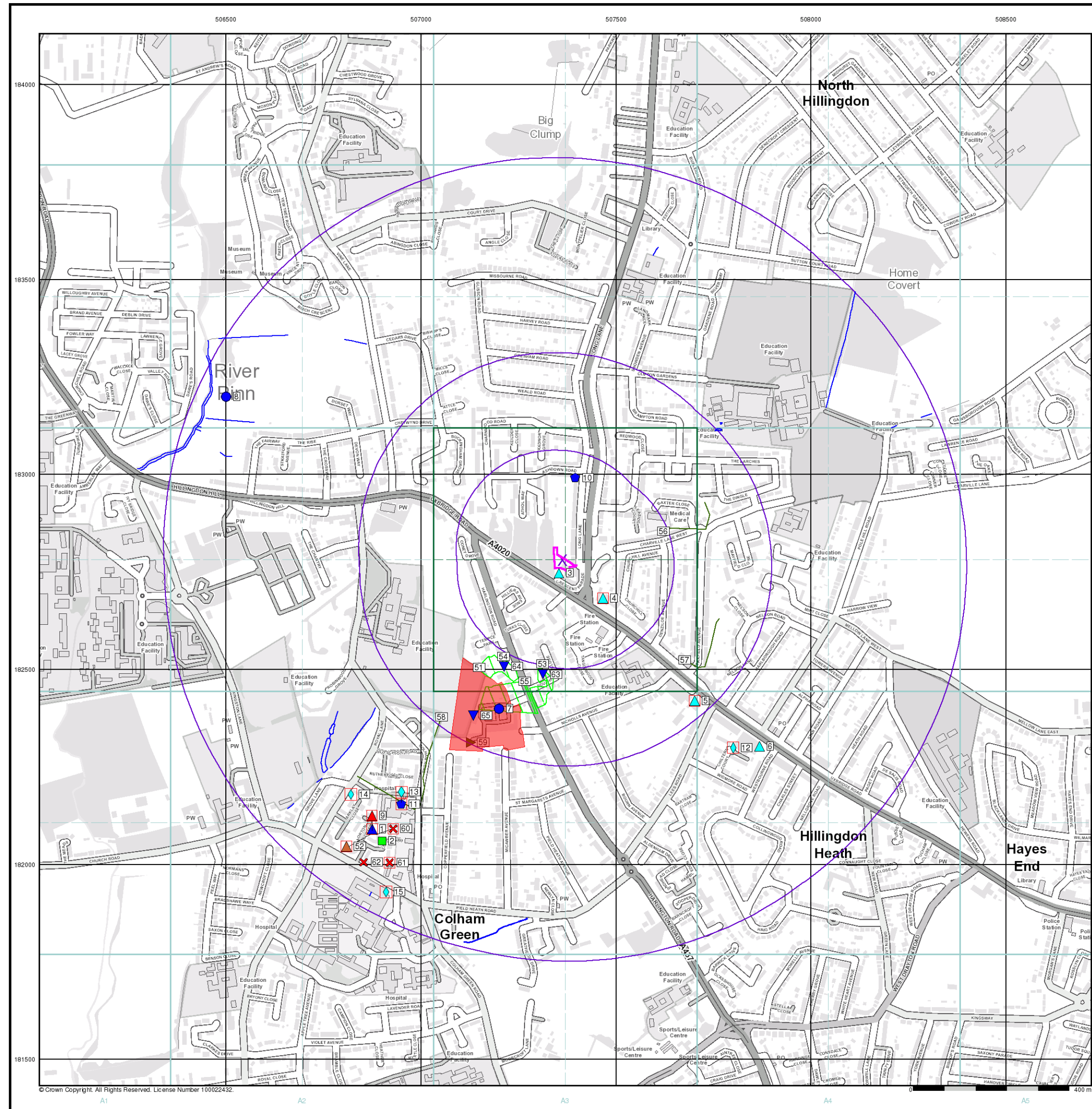
Site Details

Crescent Building Supplies, Crescent Parade, Uxbridge Road, Uxbridge, UB10 0LG



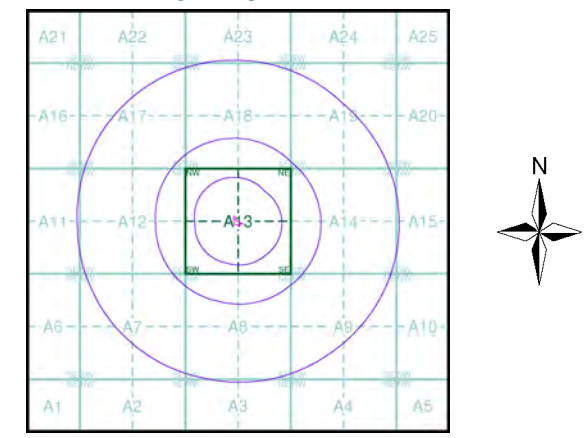
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk





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

Site Sensitivity Map - Slice A



Order Details

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Search Buffer (m): 1000

Site Details

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APPENDIX D

Geological Context

Geology 1:50,000 Maps Legends

Artificial Ground and Landslip

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

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
	SHGR	Shepperton Gravel Member	Sand and Gravel	Devensian - Devensian
	LHGR	Lynd 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
	BPGR	Black Park Gravel Member	Sand and Gravel	Anglian - Anglian
	HEAD	Head	Clay and Silt	Quaternary - Quaternary

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
	LMBE	Lambeth Group	Clay, Silt and Sand	Paleocene - Paleocene



Geology 1:50,000 Maps

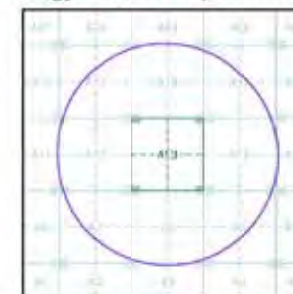
This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published 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:	1
Map Sheet No:	134
Map Name:	Seasomsham
Map Date:	2005
Bedrock Geology:	Available
Superficial Geology:	Available
Artificial Geology:	Available
Faults:	Not Supplied
Landslip:	Available
Rock Suppliment:	Not Supplied

Geology 1:50,000 Maps - Slice A



Order Details:

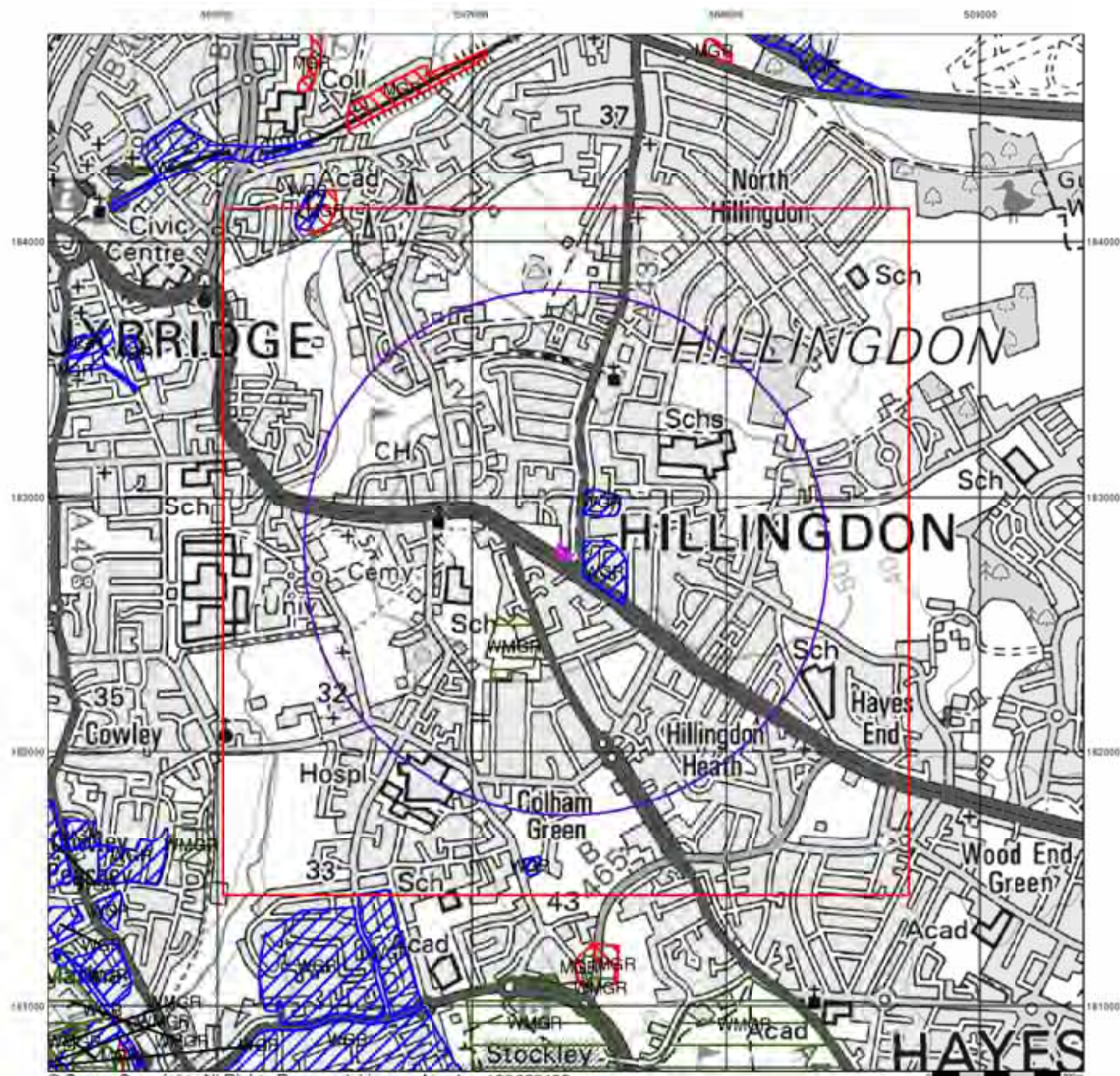
Order Number:	135986925_1_1
Customer Reference:	UK17.2816
National Grid Reference:	507360, 182780
Slice:	A
Site Area (Ha):	0.14
Search Buffer (m):	1000

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Artificial Ground and Landslip

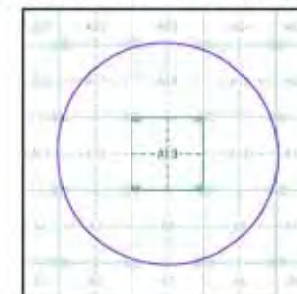
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions 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:	135986925_1_1
Customer Reference:	UK17.2816
National Grid Reference:	507360, 182780
Slice:	A
Site Area (Ha):	0.14
Search Buffer (m):	1000

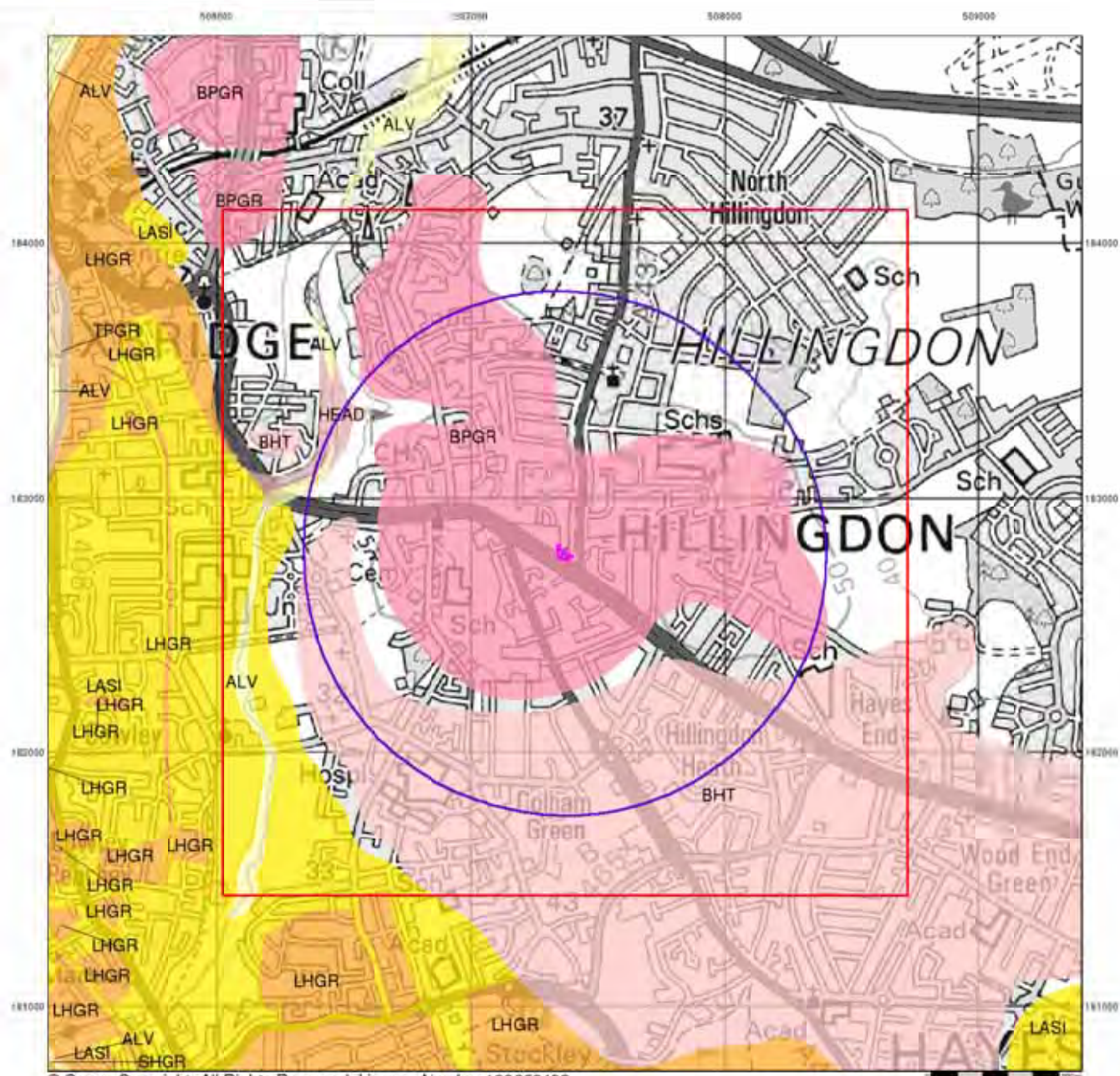
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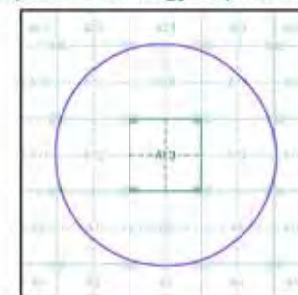
Superficial Geology

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:

Order Number:	135986925_1_1
Customer Reference:	UK17 2816
National Grid Reference:	507360, 182780
Slice:	A
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Bedrock and Faults

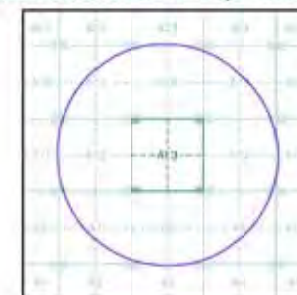
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

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: 135986925_1_1
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National Grid Reference: 507360, 182780
Slice: A
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Search Buffer (m): 1000

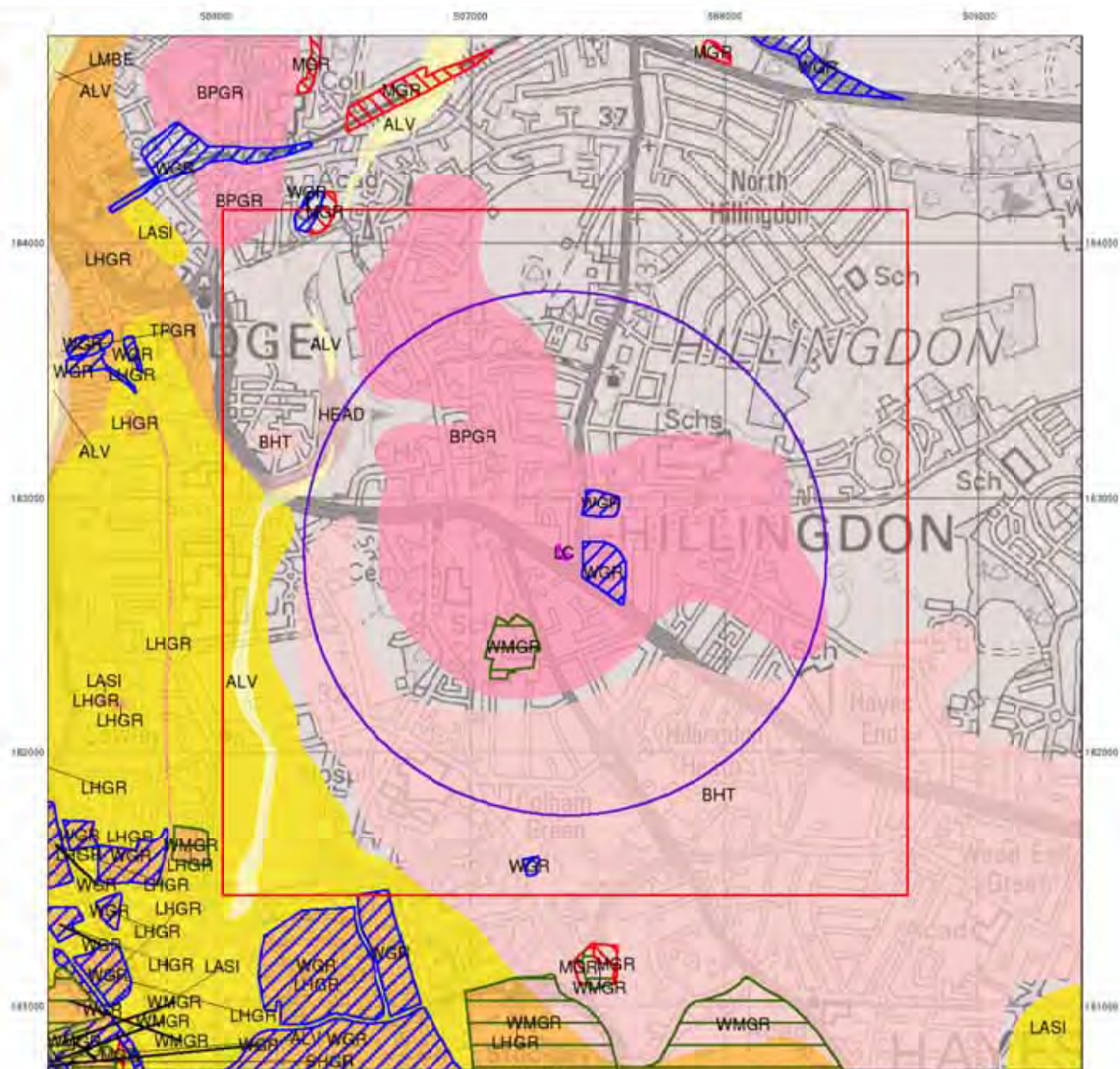
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Combined Surface Geology

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.

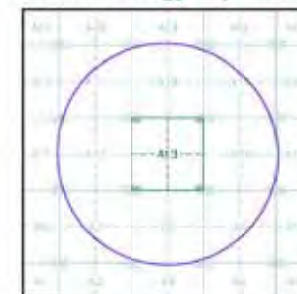
Additional Information

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

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website: www.bgs.ac.uk

Combined Geology Map - Slice A



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