Phase I & II Geo-Environmental Assessment

Leeds City Academy
Bedford Field
Woodhouse Cliff
Leeds
LS6 2LG

Prepared for:

Leeds City Academy
Bedford Field
Woodhouse Cliff
Leeds
LS6 2LG

EPS Reference Number:	UK22.6213
Date Issued:	28th March 2024
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LEEDS CITY ACADEMY

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 proposed development consists of the construction of a new teaching accommodation extending from the main school building, extension to the dining hall and a hard surfaced playing area to the north west.

The geology comprises bedrock of Elland Flags Sandstone, classified as a Secondary A Aquifer. Above the sandstone is extensive cover of Made Ground. The site does not lie within a Source Protection Zone (SPZ) for local groundwater.

Intrusive investigations involved the drilling of boreholes to a maximum depth of 4.0m using a window sampler and a further two boreholes to a depth of 15.0m using cable percussive and rotary methods. Three hand dug pits were undertaken to expose foundations beneath existing structures. From the surface, made ground was found to have a maximum thickness of 6.0m, overlying Sandstone down to 15.0m, the maximum drilling depth. Groundwater was found through gas monitoring visits at around 14.34m, although it was not struck during initial drilling.

Soil samples were tested for the presence of potential contamination and no significplaygrounant risk to users of the site have established. Waste analysis has indicated that, on the basis of the current data, all made ground materials and deep Elland Flags Sandstone can be classed as INERT for the purposes of offsite disposal.

Ground gas monitoring was conducted as part of these works and in total six return visits were carried out and found that there is no unacceptable risk of ground gas entering indoor spaces and to site users.

ENGINEERING SUMMARY

The ground conditions across site are not considered to be suitable for conventional sı foundations due to the substantial thickness of made ground (fill) and alternative found solutions should be considered, such as a piles.

At the current time, a design CBR value of only 3-4% can be recommended for the site due to the made ground, although laboratory CBR tests do indicate higher values may be achievable.

Falling head infiltration testing found sandstone to be potentially suitable, whilst made ground is not suitable for infiltration drainage.

A Design Sulphate Class (DS) of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1sis considered suitable for shallow buried concrete.

The above points represent a simplified summary of the findings of this assessment and **must 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.

Project Reference:	UK22.6213
Title:	Phase I & II Geo-Environmental Assessment – Leeds City Academy
Client:	Adept Consulting Engineers
Date:	28th March 2024
EPS Contact Details:	10-12 East Parade Leeds West Yorkshire LS1 2BH [redacted]
Status:	Issue 3 – Updated development plan (App. B) with associated minor text alterations relating to the removal of sport pitches from the scheme

Author:	**Reviewed:**	**Authorised:**
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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 2019 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 December 2022, EPS (Leeds) Ltd was commissioned by Adept Consulting Engineers on behalf of Leeds City Academy to complete a Phase I and II Geo-Environmental Assessment Report at Leeds City Academy, Bedford Field, Woodhouse Cliff, Leeds, LS6 2LG ('the site'); see Figure 1.

The work was commissioned in order to provide information to support the redevelopment of parts of Leeds City Academy. Proposed development plans includes a two-storey extension for additional teaching facilities.

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

1.1 Objectives

The objectives of this investigation were as follows:

a) Compile a Phase I Desk Study and Conceptual Site Model through a Preliminary Risk Assessment to evaluate the potential risks the site may pose to human and environmental receptors, both currently and in future.
b) Investigate potential contaminant linkages identified in the CSM by means of investigating shallow soils and soil gases.
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 the Environment Agency's *Land Contamination: Risk Management* guidance (LC:RM, 2020) and the *National Planning Policy Framework.*
d) Collect information on ground conditions and strength in order to make appropriate recommendations for geotechnical design.
e) Recover a number of samples for Waste Analysis, including Waste Acceptance Criteria (WAC) to support soil disposal.
f) Assess existing foundation by excavating hand-dug pits on existing structures and recording footing depth and design.

1.2 Scope of Work

To perform an exploratory assessment of the site in accordance with the principles and requirements of DEFRAs '*Contaminated Land Statutory Guidance*' (2012), BS10175 –'*Investigation of Potentially Contaminated Sites*', BS 5930:2015+A1:2020 '*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) through a 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 depth of 3.0m below ground level (bgl) using a track-mounted percussive rig.

Drilling of two boreholes to a depth of 15.0m using a combined approach of cable percussive drilling followed by rotary drilling methods.

Completion of trial pits to expose the existing building foundations at three locations in the approximate location of the proposed extensions.

Continual logging of ground conditions including inspection of samples for visual and olfactory contamination, and laboratory analysis of selected representative samples.

Installation of gas and groundwater monitoring standpipes at selected locations, with a return gas monitoring programme conducted.

Reporting:

Data collection

Interpretation of data including completion of Generic Quantitative Risk Assessment

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

1.3 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, 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.

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 SITE CONTEXT

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	Leeds City Academy is located to the north of Woodhouse Street and west of Cliff Road, approximately 2km north east of Leeds City Centre.
National Grid Reference	429190, 435800
Topographic Elevation	The topographical survey records lowest levels of around 92.50m Above Ordnance Datum (AOD) in the access road to the south, levels are around 94.50m AOD in the northeast and generally between 95m-97m elsewhere. It should be noted that to the north there is a steep slope, decreasing in gradient towards Meanwood Beck, which lies at approximately 55mAOD.
Description of Site	The site is currently a secondary school covering an area of roughly 3.9Ha that is surrounded by a metal fence on all sides. The area was found to comprise of the main two storey school building, a sports hall to the east and two temporary structures (used as classrooms), one located adjacent to the dining area and the other (a two-storey building) situated to the north west of the site. To the north of the main building a combination of soft landscaping and hardstanding were found. The hardstanding area is used as a playground for students. In addition, within the area of hardstanding a ramp sloping down gives access to a further line marked area that seems to be out of bounds for students. A retaining wall, approximately 1.00 m high, separates the playground and the areas that are out of bounds. Adjacent to this is a playing field used for PE lessons. Access to the southern area of the site is gained through a small route along the western side of the site.
Surrounding Land Use	The site lies within a residential area of Leeds with the property surrounded by dwellings on all sides except for the north which steeply dips into a valley.

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 Appendices C - F.

2.2 Geo-Environmental Setting

Detail	Description	
Geology	Geological mapping shows the site is directly underlain by Elland Flag Sandstone bedrock, without any overlying superficial deposits. Information on the site's geological context is included as Appendix D.	
British Geological Survey (BGS)	Within 500m there are 20 BGS mineral sites mapped, the majority to the east, within the existing area of Woodhouse. All 20 are defined as 'Opencast' and were extracting Elland Flags Sandstone. An historic borehole log was reviewed for a location found onsite which reports a thick layer of made ground extending to around 10m bgl (below ground level) overlying yellow and brown shaley Sandstone that extends to a depth of ~11m bgl to the full extent of the borehole. No groundwater was encountered. A copy of the historic borehole log is included within Appendix D.	
Geological Hazards	**Hazard**	**On Site Risk**
	Mining Activities (non-coal)	Highly Unlikely
	Collapsible Ground	Very Low
	Compressible Ground	Moderate
	Ground Dissolution	No Hazard
	Running Sand	Very Low/ No Hazard
	Landslide	Very Low (Low 5m NE)
	Shrinking / Swelling Clay	No Hazard (Very Low 5m NE)
Coal Mining	The Envirocheck Report suggests the site may in an area affected by mining. On consulting the Coal Authority website, the site is situated within both a 'Coal Mining Reporting Area' and 'Surface Coal Resource Area'. However, the site does not appear to lie within a 'Development High Risk Area' or have any mine entries mapped with 1km. Whilst risks from coal mining are likely to be low, it would be prudent to undertake a Preliminary Coal Mining Risk Assessment to confirm the risk level at the property. This could be done by way of planning condition.	
Radon	The Envirocheck indicates the site to lie in a location where the percentage of homes above the radon action level is less than 1%. It further reports that the site will not require radon protection measures in the construction of new buildings.	
Hydrogeology	Groundwater vulnerability maps for the area show that the underlying bedrock geology is classified as a Secondary A Aquifer, but 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 records one groundwater abstraction located 365m east of the site for general industrial use.	

Detail	Description
Hydrology	The nearest surface water feature is Meanwood Beck located approximately 185m north of the site. The Envirocheck report records a number discharge consents approximately 225m north from Yorkshire Water Ser release of storm water overflow into the Meanwood Beck. It has also been recorded that surface water is abstracted around 335m north west used for industrial cooling. 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 flooding from poor drainage or groundwater. A copy of the flood map for the site and surrounding area is also included within Appendix E.
Landfill & Waste	The BGS, Local Authority, and historical records detail the prese two historic landfills within 1km of the site. The nearest is located around 740m east which deposited waste including inert and commercial. In total ten areas of infilled land are located within 250m of the site. The nearest is situated around 5m east which has been inferred as old, infilled quarry on maps. A BGS mineral site is recorded on site, which is recorded as an opencast sandstone quarry targeting Elland Flags, named Wood's Hill. In addition, several records for 'Woodhouse Quarries' are recorded from 15m to 400m away, highlighting extensive sandstone quarrying in the area. It is understood that many of these quarries are infilled.

2.3 Industrial Land Use & Pollution

There are 11 sites licensed for industrial and commercial activity within the surrounding 500m, the details of the most pertinent are detailed below.

Land Use	Approximate Distance (Direction)	Status
Ware24 7 Ltd (Computer Manufacturers)	105m (NE)	Active
R S Murray & Son (Garage services)	110m (SW)	Active
Dazzle 'N' Shine Cleaning Services (Commercial Cleaning)	120m (NE)	Active
Etyres (Tyre Dealers)	170m (NE)	Active
White Rose Cleaners (Dry Cleaners	185m (SW)	Inactive
Woodhouse Garage (Garage Services)	225m (S)	Active

In total seven pollution incidents to controlled waters are reported within 250m of the site. The nearest is 170m north whereby Diesel (including agricultural) was released into a freshwater river in September 1993. This incident is reported as a 'Category 3' (minor) incident.

2.4 Sensitive Land Use

No environmentally sensitive areas/ designations are present within 250m of the site.

2.5 Site History

A summary of historical map data from 1851 to 2022 is provided below and copies of relevant historic maps and any others examined during the investigation are included in this report as Appendix F. A map detailing historic features in the area surrounding the site is displayed below.

Earliest maps from 1851-1854 shows the site and surrounding area to have been a region of sandstone quarrying. These quarries have been assumed to have been infilled by the start of 1900s where the site area remained undeveloped and labelled as playing fields until 1949 where a wireless station for the police was constructed onsite.

The first signs Leeds City Academy was in 1962 when Bedford Fields Middle School was developed. In 1993 further development of the school took place and the map of 2013 shows the school in its current layout.

In the surrounding area the predominant land use has been schools, and residential properties.

3 PRELIMINARY RISK ASSESSMENT & CONCEPTUAL SITE MODEL

In accordance with the Environment Agency's Land Contamination: Risk Management, there are three stages to managing contaminated land (Risk Assessment, Remedial Options Appraisal, Remediation and Verification). This section outlines the first tier of Stage 1, the Preliminary Risk Assessment.

The following section provides a review of the contaminant linkages that may be active at the site, 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 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 / co substance is, (or was,) derived.
Pathway	A route or mechanism via which a source could come into contact with a receptor to cause significant harm.
Receptor	An environmentally sensitive object or condition e.g. perso controlled water, or ecological system, which may be present now or in future.

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.

3.2 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
Historic Site Use	Potential historic infilled sandstone quarry on-site.	Ground Gas (CH_4, CO_2)
	Presence of historic tanks on-site.	TPH, PAH

Potential Source	Source Description	Principal Contaminants of Concern
Current and Historic Surrounding Land Use	Sandstone quarries within 100m of site.	Ground Gas (CH_4, CO_2)
	Electricity Substation south of site.	PCBs

Notes: PAH Polycyclic Aromatic Hydrocarbons; ACM Asbestos Containing Material; TPH Total Petroleum Hydrocarbons; PCB Polychlorinated Biphenyls; CO_2 Carbon Dioxide; CH_4 Methane

3.3 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 have been further developed into six generic land uses in the Category 4 Screening Levels project for Land Affected by Contamination (DEFRA/Contaminated Land: Applications in Real Environments (CL:AIRE) Project Report SP1010, 2014) which form a basis for the development of the Conceptual Site Model.

Risks posed to controlled waters have been considered in line with the Environment Agency's *approach to groundwater protection* (v1.2, 2018) and associated position statements.

The proposed development plan includes the extension of the school onto existing hardstanding for new teaching accommodation, dining room extension and hard surfaced playing areas. Therefore, the land use has been considered as:

Public Open Space –Residential (POS_{RESI})

The proposed land use (for soft landscaping) is considered to be most relevant to a POS_{RESI} for the following reasons:

Soft landscaped areas will exist within close proximity to the school which although is not residential housing, the same children will access the soft landscaping for consecutive days/years. The frequency with which site users will be returning to the site will be much higher than that considered to be representative of POS_{PARKS}.

Home-grown vegetable intake is not assumed to take place but the soft landscaped areas are considered close enough to allow the tracking back of soils into the school. Although this is likely to be a conservative assumption given that the school is not the permanent residence for pupils.

Receptor	Site Specific Description
Human	Future site users, site workers involved in the site redevelopment, and th working in the surrounding area have the potential to be at risk from exposure to potential contaminants of concern (CoCs).
Groundwater	The underlying geology comprises of Elland Flags Sandstone, which is classified by the EA as a Secondary A Aquifer and historic boreholes at the site suggest the groundwater to be below 10m. Whilst the site does not lie within a SPZ for nearby groundwater abstraction, the underlying geology is an important groundwater resource and therefore, groundwater should be considered as a potential receptor to site derived contaminants.
Surface Water	The nearest surface watercourse is Meanwood Beck which comes within 185m north of the boundary. It is considered that site derived contaminants of concern do not pose an unacceptable risk to this watercourse due to the distance and will therefore not be considered as a receptor going forward.
Flora and Fauna	The proposed development includes the provision of soft landscaping. Som e 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 adversely affected by the potential presence of the identified contaminants of concern. These include concrete used in building foundatior potable water supply pipes and other service lines and pipes.
Adjacent Land	Given the limited mobility of the site-derived contaminants of concer adjacent properties including private residential dwellings are not considered to be at risk from potential contaminants.

3.4 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 d
- Inhalation of fugitive soil dust
- Inhalation of fugitive household
- Inhalation of vapours outside
- Inhalation of vapours inside

Clearly, not all of these potential pathways apply for every standard land-use. For example, ingestion of contaminated vegetables will not apply to land uses other than residential with plant uptake and allotments.

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 contaminants in soil either by gravity or through being 'leached' by percolating rainwater	Direct seepage or leaching of contaminants from soil into subsurface drains or supply pipework.
Lateral migration of contaminants dissolved in groundwater.	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.

3.5 Summary of 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 soil	Direct contact and inadvertent ingestion by eating or smoking with dirty hands & inhalation of fugitive dust	Construction workers during redevelopment & site users
	Ground gas entering indoor and outdoor air generated by unknown fill material	Future Site Users
Contaminated soil and/ or groundwater	Ingress / diffusion through permeable potable water supply pipes	Site users
	Direct contact	Buried infrastructure
	Vertical migration of contaminants through unsaturated soils towards groundwater	Groundwater

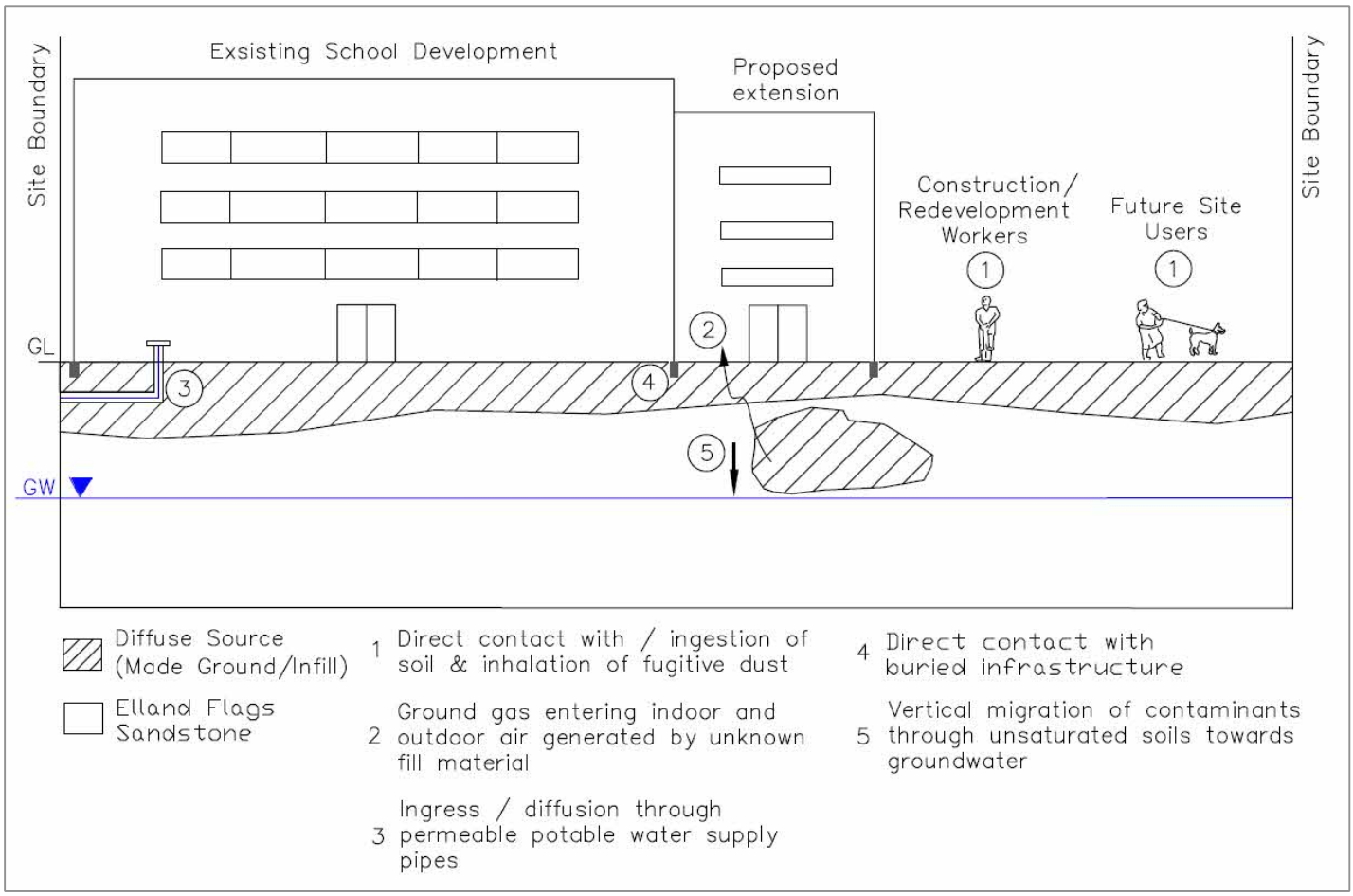
The following comments are made with respect to contaminant linkages which have been considered through development of the conceptual model, but have not been concluded as 'plausible' –i.e. through which a significant possibility of significant harm could occur to an identified receptor:

PAHs and metals have been identified as contaminants of concern associated with the historic on-site infill, however these contaminants are considered to be relatively immobile in the environment by virtue of their very low solubility and volatility. On this basis, plausible pathways by which these potential contaminants could pose a significant risk to the underlying groundwater (or nearby surface watercourses) are not considered to be active.

PCBs have been identified as contaminants of concern associated with the electricity sub-station located to the south of the site, however given the limited mobility of PCBs in the environment and that the sub-station is down hydrological gradient from the site, this has therefore been discounted as a plausible contaminant.

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 –Leeds City Academy



4 SUMMARY OF INTRUSIVE INVESTIGATIONS

Intrusive ground investigations were undertaken between 13th to 16th December 2022 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

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

Four window sample boreholes (WS01 –WS04) were formed at the site to a maximum depth of 3.0m using a track-mounted percussive drilling rig. A further two boreholes (BH01 & BH02) were formed to a maximum depth of 15.0m using combined cable percussive and follow-on rotary methods.

In addition to this, foundation exposure pits (FE01 - FE03) were excavated at three locations against the building to assess the nature of the existing foundations.

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

Standpipes were installed within positions BH01, BH02 and WS02. Groundwater sampling pipes were installed using 50mm diameter HDPE 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 of washed gravel extended from the base of the boreholes to approximately 0.1m above the slotted section with a bentonite seal to surface. All installations were finished with flush-mounted, bolt-down headworks.

A borehole location plan 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 and window sample logs are presented in Appendix G.

Standard or cone penetration tests (SPT / CPT) were carried out at approximately 1m intervals. The number of blows required to advance a standard split spoon, (or solid 60º 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).

A laboratory testing schedule is included as Table 1.

4.3 Laboratory Testing

Samples obtained for analysis of identified contaminants of concern were submitted to Element Materials Technology 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 The Testing Lab, Doncaster, a UKAS accredited laboratory. Copies of chain of custody documentation are held by EPS and will be made available on request.

4.4 Ground Gas Monitoring

Six rounds of ground gas monitoring have been completed in order to assess gas being emitted from the potentially contaminated underlying soils and areas of infilled ground.

These took place on the 6th, 13th, 18th, and 27th January 2023, and the 2nd and 3rd February 2023 to measure the presence and concentration of ground gas (including carbon dioxide, oxygen and methane) and organic vapour using a GFM 436 gas analyser, PID and flow meter to provide indicative information on the on-site migration of ground gas and organic vapour.

Measured ground gas concentrations are presented in Table 3. It should be noted that the duration of the monitoring programme was condensed due to project timescales relating to submission of tender documents.

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, two cable percussion with follow on rotary boreholes and three hand dug trial pits (foundation exposures) were formed at the site and the ground conditions encountered, from surface level, were found to comprise:

Topsoil
Made Ground
Elland Flags Sandstone

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)
Topsoil	0.35	0.10 - 0.35
Made Ground	6.10	0.10 - 6.0
Elland Flags Sandstone	>15.0 (not proven)	>5.80->8.90 (not proven)

5.1.1 Topsoil

Topsoil was encountered from the surface and observed as a dark brown slightly silty gravelly clay within WS01 and WS03 and dark grey slightly clayey gravelly sand within WS04 beneath the grass covering and progressed to around 0.3m depth.

5.1.2 Made Ground

Made ground was encountered in all locations, with subbase materials found in WS02 recovered as light grey sandy cobbly gravel between 0.10 –0.40m depth.

Further made ground comprising of light brown slightly clayey slightly sandy cobbly gravel of sandstone and siltstone fragments was found in all locations between 0.4 -6.0m depth. This material is considered to be representative of potential infill material from the former potential quarry on-site.

5.1.3 Elland Flags Sandstone

Directly underlying the made ground material interpreted as the Elland Flags Sandstone was encountered. This was recovered as a very weak to weak, light brown, thinly laminated fine to coarse grained sandstone to beyond the formation depth of each of the boreholes. This was recorded to be fractured along its bedding planes with occasional interbedded silty clay lenses throughout.

5.2 Groundwater

Groundwater was not encountered during or upon completion of drilling. However, during return monitoring visits, groundwater was recorded between 14.32m and 14.33m bgl in BH01. In BH02, groundwater was recorded at 11.39m on the first return monitoring visit, although this well was dry on the remaining visits. The only shallow well, installed at WS02, was recorded to be wet at the base during monitoring, which is considered to be perched water within the well.

5.3 Physical Evidence of Contamination

Despite the presence of a notable thickness of made ground, there was no palpable evidence of contamination, waste or putrefiable material encountered in any of the sampling locations during the investigation including any visual or olfactory evidence of hydrocarbon staining.

5.4 Existing Foundations

Three hand-dug trial pits were formed based on the locations of the extension. The aim of these trial pits were to expose and examine the type of foundation used at the locations where the proposed development is to take place. Foundation exposure pit drawings are included as Appendix H and the relative positions are shown in Figure 4.

FE01 was undertaken in the soft landscaping to the west of the sports hall. The foundation was found to comprise a vertical brick course extending to a depth of 0.15m, sitting on a cemented gravel foundation which slopes downwards towards the west. The edge of the foundation extends approximately 0.65m away from the wall and at its lowest point it is 0.40m bgl and is possibly deeper. The thickness of this foundation could not be found due to close proximity of a drainage pipe near the trial pit. A membrane that is blue in colour was also encountered on top of the foundation.

FE02 was undertaken on the northern wall of the main school building and was found to comprise a vertical brick course extending to a depth of 0.30m bgl, sitting on a concrete foundation. This section stepped out 0.27m perpendicular from the building line, before progressing a further 0.05m vertically and resting on made ground. Blue membrane is found on top as with FE01.

FE03 was undertaken on a wall adjacent to the existing dining area. An hydraulic breaker was used to break through an 11cm thick concrete slab, beneath this was further concrete which could not be broken through with the hydraulic breaker.

5.5 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 I. 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	6	6	0.5	9.4	WS03 (0.10 –0.30)
Cadmium	6	3	0.1	0.8	WS02 (0.30 – 0.40)
Chromium III	6	6	15.7	68.6	WS04 (0.20 –0.40)
Chromium VI	6		-		-
Copper	6	6	4	24	WS01 (0.10 –0.20)
Lead	6	6	8	51	WS03 (0.10 –0.30)
Mercury	6	1	0.2		WS03 (0.10 –0.30)
Nickel	6	6	8	43.7	WS04 (0.20 –0.40
Selenium	6	3	1	2	BH02 & WS03
Zinc	6	6	44	116	BH02 (0.70 –1.00)
Naphthalene	6	3	0.05	0.08	WS01 & WS03
Benzo[a]pyrene	6	3	0.34	0.73	WS03 (0.10 – 0.30)
Dibenz(ah)anthracene	6	3	0.04	0.08	WS03 (0.10 –0.30)
Total TPH (Aliphatic & Aromatic -CWG)	6	2	50	140	WS03 (0.10 –0.30)
Total Aromatic (C5 – C35)	6	3	33	140	WS03 (0.10 –0.30)
Aromatic C12 –C16	6	1	9		WS03 (0.10 –0.30)
Aromatic C16 –C21	6	2	14	36	WS03 (0.10 –0.30)
Asbestos (%)	6	0	-		-

Notes: - Contaminant not found above laboratory detection limits PAH Polycyclic Aromatic Hydrocarbons
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 Online™. The results of the WAC analysis are included within Appendix I and the outputs from the software are included in a Waste Classification Report in Appendix J.

Waste Acceptance Criteria was subsequently undertaken on one sample of made ground and one sample of sandstone. These results are summarised in the following table:

Strata	Typical Depth (m bgl) and Description	Is it Hazardous? (number of hazardous samples)	Waste Acceptance Criteria	Appropriate Landfill
Made Ground	0.3-1.0- Light brown slightly clayey sandy cobbly gravel.	No (0 of 4)	Passed criteria for inert landfill	**INERT**
Elland Flags Sandstone	1.0->4.0 - Light to dark brown thinly laminated, fine to coarse grained sandstone.	No (0 of 1)	Passed criteria for inert landfill	**INERT**

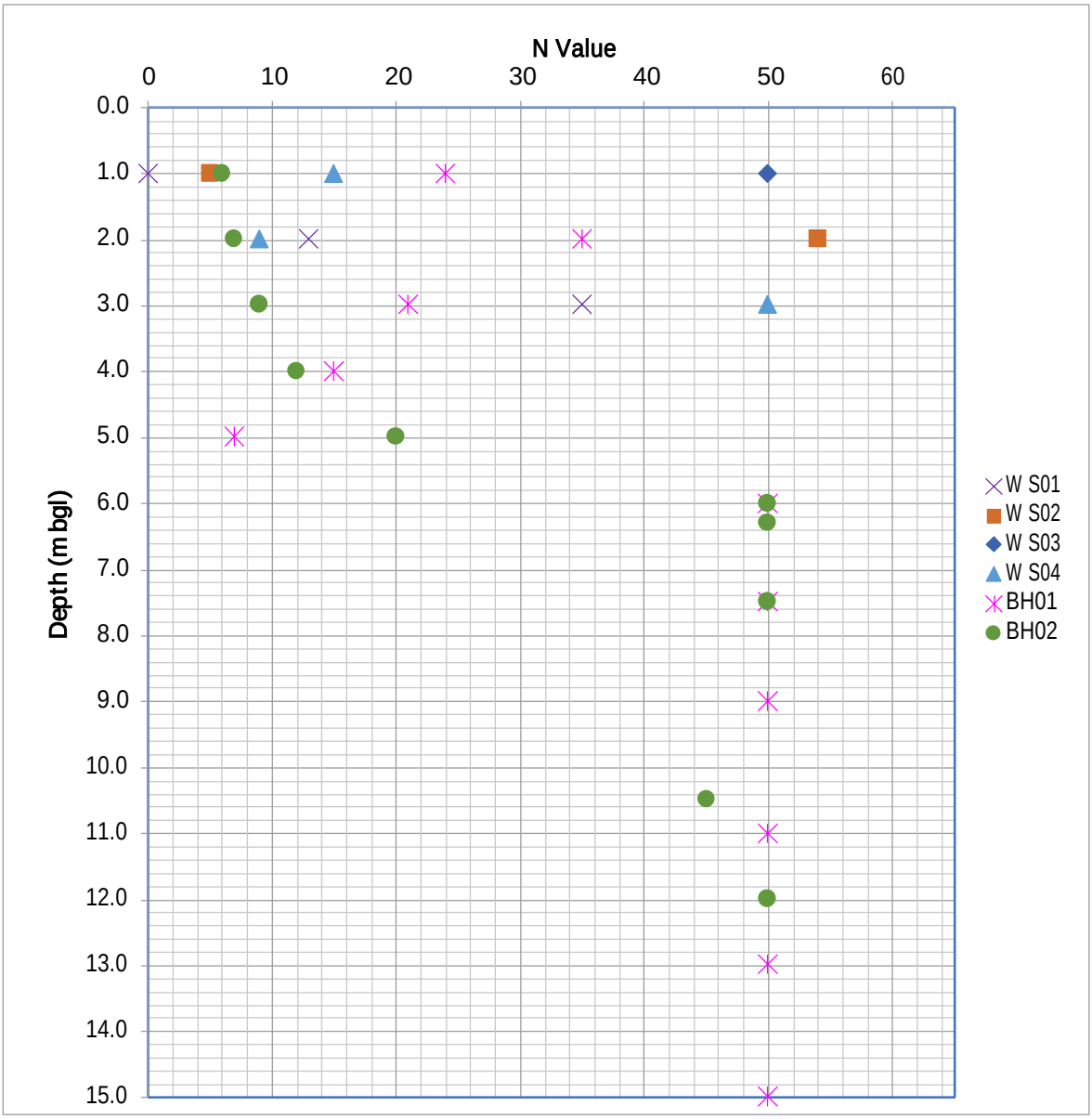
Based on the above the topsoil/ made ground along with the Elland Flags sandstone can be classified as **INERT** for the purposes of off-site disposal, under the waste code **17 05 04**. It should be noted that the final decision on waste acceptance criteria will lie with the chosen waste receiver.

For made ground present, 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

5.7.1 In -Situ Geotechnical Testing

The results of in-situ geotechnical testing are summarised in the graph below.



The data above shows that within the first 5.0m below ground there is a large range of N-values obtained matching the variability of the made ground. After which the majority of results are refusals (N=50) which is reflective of the strength of the sandstone underlying the property. A copy of a dynamic probe log from WS01 is also included within Appendix G to highlight strength from 3.0m to 5.0m following drilling refusal while window sampling at that location.

5.7.2 Laboratory 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 K. The key results of laboratory testing on geotechnical soil samples are summarised below.

	Range of Parameters			
	Moisture Content (%)		Plasticity Index (%)	
	Min	Max	Min	Max
Made Ground	9.7	12	7 (4)	12 (8)

	Particle size distribution (%)							
	Fines		Sand		Gravel		Cobbles	
	Min	Max	Min	Max	Min	Max	Min	Max
Made Ground	11	31	17	38	31	72	N/A	N/A
Elland Flags Sandstone	14	40	21	55	5	50	11	52

BH ID	Depth (m)	Load at Failure (kN)	Point Load (Is_{50}) (MN/ m^2)
BH01	11.76 –11.85	3.90	1.22
		4.70	2.94
	13.24 –13.38	1.50	0.67
		4.80	1.71
		2.70	1.38
BH02	10.29 –10.40	1.50	0.84
		3.00	1.73
		3.10	2.36

Moisture contents and Atterberg Limit testing was conducted in accordance with BS1377: 1990.

The particle size distribution was established for three samples of Made Ground and four samples of Elland Flags Sandstone in accordance with BS1377: Part 2:1990, clause 9.2.

Sulphate contents and pH values determinations were carried out by the analytical laboratory, the results of which are included in Appendix I and summarised in Chapter 6.7.

Point load tests were undertaken on eight samples of Sandstone in accordance with the International Journal of Rock Mechanics, Mineral Science and Geomechanics. Vol. 22 No. 2 1985.

A laboratory analysis testing schedule is presented as Table 1.

6 GEOTECHNICAL APPRAISAL

The ground conditions have been found to comprise topsoil overlying made ground material to a maximum depth of 6.0m underlain by bedrock of the Elland Flags Sandstone.

6.1 Geotechnical Category

Geotechnical Category (BS EN 1997-1:2004)	Definition
GC1	Geotechnical Category 1 (GC1) should only include small and rel simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations with negligible risk in terms of overall stability or ground movements and in ground conditions which are known.
GC2	Geotechnical Category 2 (GC2) should include conventional structure and foundation with no exceptional risk or difficult or loading conditions. Designs for structures in Geotechnical Category 2 should normally include quantitative geotechnical data and analysis.
GC3	Geotechnical Category 3 (GC3) should include structures or structures, which fall outside the limits of Geotechnical Categories 1 and 2. This may include very large or unusual structures, structures involving abnormal risks, or unusual or exceptionally difficult ground or loading conditions, or structures in areas of probable site instability or persistent ground movements that require separate investigation or special measures.

The proposed development comprises a limited number of small extensions to the existing structure, and therefore the below assessment has been undertaken in accordance with Geotechnical Category 2 (GC2), including conventional types of structure and foundation with no exceptional risk or difficult ground or loading conditions, as defined by BS EN 1997-1:2004.

6.2 Structural Foundations

6.2.1 Spread Foundations

The ground conditions are not considered to be suitable for the use of conventional spread foundations, either strip or pad foundations due to the depth and heterogenous nature of the made ground recorded across the site. Therefore, further consideration is given to alternative foundation options below.

6.2.2 Piles

Due to made ground extending to a maximum depth of 6.0m, a piled foundation solution is considered the most suitable. If piles are to be adopted for any new structures, they will likely terminate in the Elland Flags Formation, which extends to at least 15m. When considering this option, potential for obstructions in the made ground, such as cobbles that were recorded during drilling, must be accounted for. It is therefore recommended that pre-probing is undertaken at proposed piling locations.

Piles will and carry their loads in a combination of end bearing and skin friction. It would be unwise to assume any positive contribution to skin friction within the made ground.

In view of the wide variety of piles sizes available, and the range of installation plant and techniques, the design of the piles should be carried out by and should remain the responsibility of the specialist piling contractor, who will reflect their own methods, experience and design procedures within their proposals.

6.3 Pavement Design

Laboratory CBR testing was undertaken on two samples of made ground from two locations and gave CBR values ranging from 39% - 64% at location BH01 and 16% - 29% at location BH02 at depth of 2.0m and 1.5m, respectively.

Although recorded laboratory CBR results are high, the samples tested are of made ground, which was observed to be variable in composition and the high CBR values in the samples are unlikely to be representative of site wide made ground.

Typically, a CBR value of 2% would be considered appropriate for the Made Ground be adopted due to the inherently variable nature of this strata. However, given that the Made Ground does appear to be predominantly granular in nature a CBR value of 3-4% could be adopted subject to further testing of the subgrade to confirm this is achievable.

Once the formation level for the new pavement has been achieved, proof rolling should be carried out using a heavy roller, and any soft or loose areas revealed should be excavated and a greater depth of sub-base provided.

Exposed subgrades will likely deteriorate rapidly on exposure to wet weather and should be shaped to shed water. Sub-base should be placed as soon as possible to minimise the exposure of the subgrade to adverse weather conditions.

6.4 Ground Floor Construction

Given the depth and variability of made ground recorded, ground bearing floor slabs are not considered appropriate and suspended floor construction is recommended.

6.5 Drainage

Falling head infiltration testing was undertaken twice in BH01 and once in WS04 at the request of the client. These tests were undertaken to give an indication of the infiltration potential of the underlying soils.

Borehole	Indicative Infiltration Rate(m/ s)		Depth of Test (m bgl)	Strata
BH01	Test 1	3.0×10^{-3}	14.64	Elland Flags Sandstone
	Test 2	1.8×10^{-3}		
WS04	Test 1	2.6×10^{-6}	1.35	Made Ground

Based on the above results from WS04, which exhibited poor infiltration rates, and the nature of the underlying made ground, the use of shallow infiltration drainage is not recommended in the Made Ground.

It should be noted that drainage may be suitable in the underlying Elland Flags Sandstone, which would require deep/borehole soakaways to be installed. The Elland Flags Sandstone exhibited relatively good drainage conditions but it should be noted that due to the fact that water drained away quickly upon addition to the borehole, it was not possible to collect accurate falling head data. The above rate was calculated by factoring in the amount of water that was added to the borehole and the time taken for the borehole to be dry, rather than measurements of linear reduction in water level in the borehole.

6.6 Groundworks

The long-term stability of any excavations in made or 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 are unlikely to be encountered within shallow excavations for foundations or drainage.

6.7 Concrete Grade

Sulphate contents and pH values determinations were carried out for the natural material by the analytical laboratory, the results of which are also included within Appendix I. Results for concrete grade are summarised within the following table:

Strata	Water Soluble Sulphate (mg/l SO_4)		pH	
	Min	Max	Min	Max
Made Ground	13	24	7.6	9.3
Elland Flags Sandstone	21		7.7	

In accordance with Part 1 of the BRE Special Digest 1 ' *Concrete in Aggressive Ground*' 2005, the mean of the highest two water soluble sulphate values has been used. This gives a Design Sulphate Class (DS) of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1s.

7 ENVIRONMENTAL APPRAISAL

The following section outlines the approach applied to assessing the risks posed to human health and controlled waters, then identifies any sample results found by this investigation which warrant further consideration. In accordance with the Environment Agency's Land Contamination: Risk Management, this section represents the second tier of Stage 1, the Generic Quantitative Risk Assessment.

7.1 Human Health

7.1.1 Land Use Setting

The proposed development plan includes the extension of the school onto existing hardstanding for new teaching accommodation, dining room extension and new hard surfaced playing areas to the north west.. In order to screen laboratory data for concentrations of contaminants in soil with potential to cause harm to human health in these soft landscaped areas, relevant generic screening values most applicable to this land use have been utilised. A land use setting of POS_{RESI} has been adopted as it is considered the most representative.

The technical framework used to derive DEFRA's Category 4 Screening Levels (Policy Companion Document '*SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination')* outlines the relevant factors for determining land use selection in the application of the screening levels and the following key considerations have been taken into account.

7.1.2 Generic Screening – Soils

The technical framework used to derive the assessment criteria 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.

Where assessment of the risk to human health from asbestos in soil is concerned there is no nationally recognised suitable for use /generic screening value commonly referred to through the planning system. Due to this, it is necessary to take a more qualitative approach to the risks posed to future site users from asbestos on a site-specific basis.

7.1.3 Assessment of Results- Human Health

The results of the screening process for on-site human receptors showed that generic screening criteria representative of risks to future site users were not exceeded for any contaminant at any location.

7.2 Controlled Waters

7.2.1 Generic Screening

In addition to screening the recorded concentrations of contaminants to pose risks to human health, EPS has also screened the results of soil analysis for potential to cause harm to water resources.

The criteria used for this process were derived by EPS using the following technical guidance

Environment Agency Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination.

Primary Receptor Associated with Site	Basis of Tier 1 Criteria
Groundwater	UK Drinking Water Standards (UKDWS)
Surface Water	UK Environmental Quality Standards (EQS)

The site is underlain by Secondary A Aquifer. In the absence of surface water in close proximity of the site the primary receptor associated with the site is groundwater. As such, groundwater screening criteria have been selected in the assessment of risks to water resource receptors.

7.2.2 Assessment of Results - Controlled Waters

The screening process has shown that screening criteria representative of suitability of soil concentrations as applicable to controlled waters have not been exceeded.

Contaminant	Screening Criteria (mg/ kg)	Detection (mg/kg)
	Groundwater	
Aromatic TPH EC12 –EC16	4.23	9 (WS03 ES2 0.10 –0.30)

Whilst the above table highlights a single exceedance of screening criteria protective of groundwater, this does not indicate that an unacceptable risk to this receptor exists. Firstly, the exceedance is marginal and relates to a fraction of TPH (EC12-EC16) that exhibits relatively low mobility in the soil environment. There have been no other exceedances of TPH fractions across the property, which highlights that this is an isolated exceedance that was recorded in topsoil. No detections of any TPH fraction were recorded in samples of underlying sandstone, highlighting that gross contamination of bedrock has not occurred.

In addition, the findings of the ground investigation have confirmed that groundwater is not present within 15m of ground level and therefore any contamination would have to migrate a considerable depth vertically in order to impact groundwater resources.

7.3 Ground Gas and Vapour Monitoring

7.3.1 Generic Screening

An assessment of the risks posed by ground gas and organic vapour generation has been undertaken through consideration of a conservative maximum individual Gas Screening Value (GSV) or site characteristic hazardous gas flow rate, in accordance with the following guidance:

CIRIA 665 –'*Assessing Risks Posed by Hazardous Ground Gases to Buildings*'.
NHBC –'*Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present*' (March 2007).
British Standard BS8485:2015 – '*Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.*'

The gas screening values have initially been calculated as per the CIRIA 665 guidance '*Assessing Risks Posed by Hazardous Ground Gases to Buildings*' however the gas screening values presented by EPS within this report have also been defined based on the BS 8485:2015 guidance '*Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*' which suggests that gas screening values should not only be based on measured data '*but ultimately derived using professional judgement*'.

7.3.2 Assessment of Ground Gas Results

The results of six soil gas monitoring visits are presented in Table 3 along with calculated gas screening values, set out in CIRIA Guidance Document 665 – *Assessing Risks Posed by Hazardous Ground Gases to Buildings (2007).*

Hole ID	Date	CO_2 (%v/ v)	
		Min	Max
WS02	06.01.23	0.4	0.5
	13.01.23	<0.1	
	18.01.23	0.2	0.4
	27.01.23	0.3	0.4
	02.02.23	<0.1	
	03.02.23	<0.1	
BH01	06.01.23	0.3	
	13.01.23	0.1	0.2
	18.01.23	0.3	0.4
	27.01.23	0.1	
	02.02.23	<0.1	0.1
	03.02.23	<0.1	0.2
BH02	06.01.23	<0.1	
	13.01.23	0.2	0.4
	18.01.23	0.2	0.3
	27.01.23	0.3	
	02.02.23	<0.1	0.3
	03.02.23	0.1	0.3

The maximum CO_2 concentration recorded was 0.5% v/v, within WS02, on 6th January 2023, whilst CH_4 concentrations were all recorded below instrument detection levels.

No concentrations of organic vapour or indications of flow were recorded.

In accordance with CIRIA C665, the subsequent gas screening values have been found to fall into the 'very low risk' classification for both Carbon Dioxide and Methane. This is defined as Characteristic Situation 1 (CS1) and therefore no gas protection measures are required in accordance with BS8485:2015 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings (2015).

7.4 Summary of Findings

Laboratory analysis of shallow soils sampled across site identified no contaminants of concern at levels that exceeded screening criteria for human health and therefore no additional works are considered necessary in relation to human health risk assessment or remediation.

Groundwater was not encountered within 15m of surface level during intrusive works, but is later identified at 14.34m during gas monitoring visits. No visual / olfactory evidence of hydrocarbon impacts were identified within the field, however, a marginal exceedance of screening criteria protective of groundwater was recorded for TPH Aromatic EC12-EC16 in one sample of topsoil. Despite this, an unacceptable risk to groundwater is not considered to be present given the context of the site, the low exceedance and low distribution of TPH across the property.

In the context of potentially unacceptable or acceptable risks as outlined within the Environment Agency's *Land Contamination: Risk Management* guidance (LC:RM, 2020), the risks identified by this work can be addressed through implementation of the following recommendations.

Ground Gas monitoring was conducted over six return visits and identified that there is not an unacceptable risk associated with ground gas and therefore no gas protection measures are needed.

Due to the presence of variable made ground to a maximum recorded depth of 6.0m, shallow foundations are not considered suitable and consideration should be given to an alternative solution such as piles, which will need to be designed and installed by specialists.

7.5 Recommendations

Overall, the site is considered to at low risk in relation to contaminated land, with no further works or remedial measures recommended. A number of precautionary measures have been recommended to ensure safe development, as follows:

a) All construction workers operating at the site should be advised of the potential for contact with made ground material within shallow soils, particularly beneath the existing buildings and hardstanding. Appropriate health and safety precautions should be adopted during any excavation works to avoid exposure to infilled soils. Reference should be made to relevant health & safety guidance including the following CIRIA document: *R132 Guide to Safe Working on Contaminated Sites.*

b) Although the findings of the investigation would suggest that significant quantities of asbestos are unlikely to be encountered, the possibility of discrete pockets of this material existing within the made ground remains. If any evidence of visually identifiable ACM is suspected and is to be disturbed during the site development it is recommended that all works are postponed until suitable assessment and control measures (including a Working Method Statement (WMS)) are created. This WMS should be in accordance with guidance from CIRIA as well as the CL:AIRE /Joint Industry Working Group industry guidance on Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials (2016).

c) 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 this is provided as Appendix M.

It is recommended that a copy of this report be provided to the Environmental Health Department of Leeds City Council so that the information may be incorporated into their land quality records and used to support the current planning application. This report should satisfy the pre-commencement requirements of the planning process relating to contamination. A Verification Report will be required documenting the implementation of the remediation prior to completion.

7.6 Additional Considerations

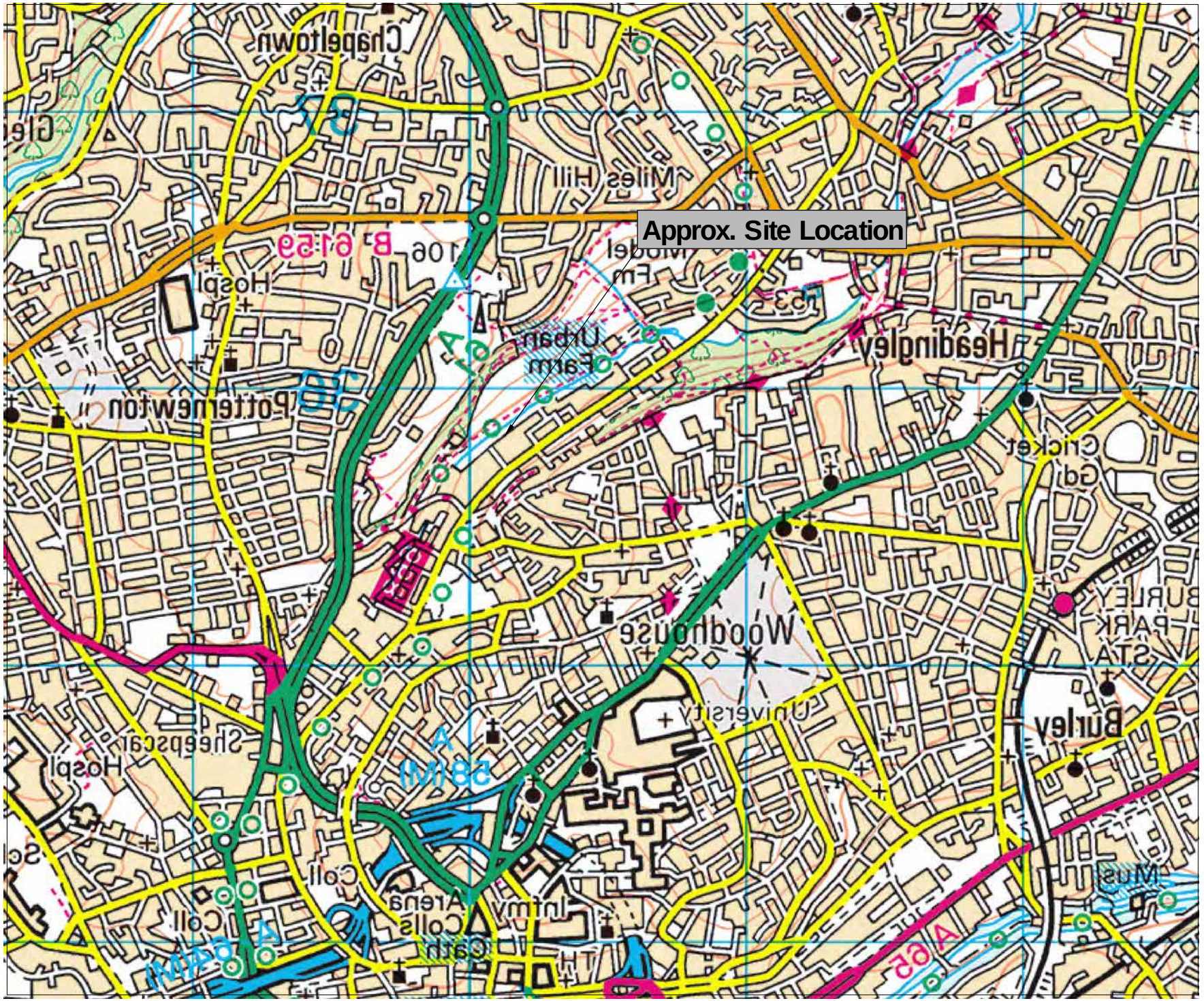
7.6.1 Waste Management

Depending on the requirements of the final scheme and any associated earthworks balance, it is possible that the site will be subject to a materials management exercise to ensure all potential waste soils are handled and re-used in a legally correct sustainable fashion.

In those circumstances, through a risk assessment process and in accordance with CL:AIRE's *Definition of Waste: Development Industry Code of Practice*, re-use criteria can be defined for site-won soils which are suitable for use being both protective of relevant receptors and geotechnically appropriate (with input from the structural engineers as necessary). If requested, EPS can prepare a Materials Management Plan and have it formally declared by a Qualified Person prior to commencement of groundworks. EPS can also assist with similar mechanisms for re-using waste materials exempt of an environmental permit, such as a U1.

Where viable, EPS would always encourage the employment of an MMP to sustainably manage the re-use of site won soils.

FIGURES



KEY:

SITE BOUNDARY

Rev	Date	Drawn	Description	Ch'k'd

The Geotechnical and Environmental Engineers
www.epstrategies.co.uk

Site: Leeds City Academy

Client: Adept Consulting Engineers

Title: Figure 1 - Site Location Plan

Surveyed:	JP	Drawn by:	JP
Checked by:	JB	Date:	07/12/22

Scale [A4 Sheet]: NTS

Drawing Reference: Fig1_LCA

Job No: UK22.6213

Rev: 01

KEY:

SITE BOUNDARY

N

Rev	Date	Drawn	Description	Ch'k'd

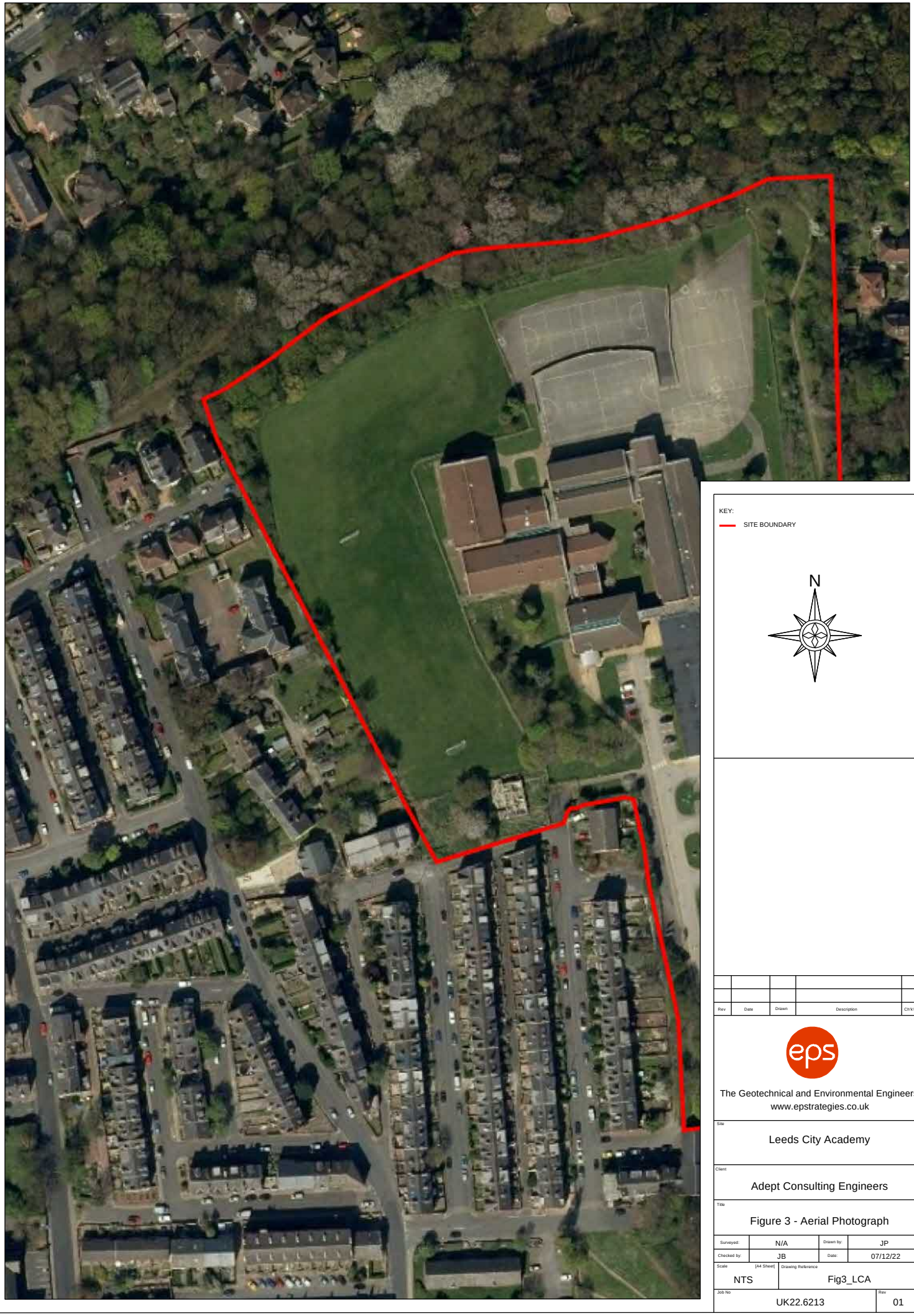
The Geotechnical and Environmental Engineers
www.epstrategies.co.uk

Site: Leeds City Academy

Client: Adept Consulting Engineers

Title: Figure 2 - Current Site Layout

Surveyed:	JP	Drawn by:	JP
Checked by:	JB	Date:	07/12/22
Scale [A4 Sheet]: NTS		Drawing Reference: Fig2_LCA	
Job No: UK22.6213			Rev: 01



Rev	Date	Drawn	Description	Ch'k'd

The Geotechnical and Environmental Engineers
www.epstrategies.co.uk

Site: Leeds City Academy

Client: Adept Consulting Engineers

Title: Figure 3 - Aerial Photograph

Surveyed:	N/A	Drawn by:	JP
Checked by:	JB	Date:	07/12/22

Scale [A4 Sheet]	Drawing Reference
NTS	Fig3_LCA

Job No	Rev
UK22.6213	01

KEY:

- SITE BOUNDARY
- EPS WINDOW SAMPLE BOREHOLE
- EPS CABLE PERCUSSION (SHELL & AUGER) BOREHOLE
- EPS FOUNDATION EXPOSURE TRIAL PIT
- EPS HAND PIT

N

Rev	Date	Drawn	Description	Ch'k'd

The Geotechnical and Environmental Engineers
www.epstrategies.co.uk

Site: Leeds City Academy

Client: Adept Consulting Engineers

Title: Figure 4 - Borehole Location Plan

Surveyed:	JP	Drawn by:	JP
Checked by:	JB	Date:	16/01/22
Scale [A4 Sheet]: NTS		Drawing Reference: Fig4_LCA	
Job No: UK22.6213		Rev: 02	

TABLES

Table 1 –Laboratory Testing Schedule (Environmental)

Sample ID	Sample Depth (m bgl)	EPS Mini Suite	EPS Waste Suite	EPS TPH Suite	pH and Water-Soluble Sulphate
WS01 ES1	0.10 - 0.20	-	x	-	-
WS01 ES2	0.50 - 0.80	-	-	-	x
WS02 ES1	0.30 - 0.40	x	-	x	-
WS03 ES1	0.30 - 0.50	-	-	-	-
WS03 ES2	0.10 - 0.30	x	-	x	-
WS04 ES1	0.20 - 0.40	x	-	x	-
BH01 ES1	6.00 - 6.30	-	x	-	x
BH01 B1	0.50 – 1.60	-	-	-	x
BH01 B2	2.00 –2.45	-	-	-	x
BH01 D6	5.75	-	-	-	x
BH01 D8	9.00	-	-	-	x
BH02 ES1	0.10 - 0.30	-	-	-	-
BH02 ES2	0.70 -1.00	-	x	-	x
BH02 D7	4.00	-	-	-	x

Notes:

mbgl	meters below ground level
x	Sample Taken
-	Sample Not Analysed
EPS Mini Suite	Organic Matter, Cyanide, Metals, PAH's, Phenols, Asbestos
EPS Waste Suite	Waste Characterisation Suite

Table 2 –Laboratory Testing Schedule (Geotechnical)

Sample ID	Sample Depth (m bgl)	Bulk Density	California Bearing Ratio	Particle Size Distribution
BH01 D1	0.20	-	-	-
BH01 B2	2.00 -2.45	-	x	-
BH01 D2	1.75	-	-	-
BH01 D3	2.75	-	-	x
BH01 D4	3.75	-	-	-
BH01 D5	4.75	-	-	x
BH01 B3	5.50 - 6.00	x	-	-
BH01 D7	7.00	-	-	-
BH01 B4	8.00 - 8.50	-	-	x
BH02 D1	0.50	-	-	-
BH02 SD2	1.20 - 1.65	-	-	x
BH02 B3	1.50 - 2.00	-	x	-
BH02 SD4	2.00 - 2.45	-	-	-
BH02 D5	3.00	-	-	-
BH02 SD6	3.00 - 3.45	-	-	-
BH02 SD8	4.00 - 4.45	-	-	-
BH02 D9	5.00	-	-	-
BH02 SD10	5.00 - 5.45	-	-	-
BH02 D11	6.00	-	-	x
BH02 SD12	6.00 - 6.185	-	-	-
BH02 B13	6.00 - 6.20	-	-	x
BH02 B14	6.20 - 6.30	-	-	x
BH02 SD13	6.30 - 6.45	-	-	-

Notes:

mbgl	meters below ground level
x	Sample Taken
-	Sample Not Analysed

Table 3 –Soil Gas Monitoring Results

Visit No. 1 - 06/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
W S02	>10s	<0.1	<0.1	0.5	20.4	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	0.4	20.3			<0.1		
	>1m	<0.1	<0.1	0.4	20.1			<0.1		
	>1m 30s	<0.1	<0.1	0.4	20.0			<0.1		
	>2m	<0.1	<0.1	0.4	20.0			<0.1		
	>2m 30s	-	<0.1	0.4	20.0			-		
	>3m		<0.1	0.4	19.9					
	>3m 30s		<0.1	0.4	19.9					
	>4m		<0.1	0.4	19.9					
	>4m 30s		<0.1	0.4	19.9					
	>5m		<0.1	0.4	19.9	<0.1	<0.1			
Min		<0.1	<0.1	0.4	20.4	<0.1-0	<0.1	<0.1	<0.0001	<0.0001
Max				0.5	19.9			<0.1	<0.0011	<0.0013

Note: *Readings collected during rising atmospheric pressure from 994 mbar to 995mbar on a dry and cloudy day. Prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

CH_4	*Methane*	CO_2	*Carbon Dioxide*
O_2	*Oxygen*	*CO*	*Carbon Monoxide*
H_2S	*Hydrogen Sulphide*	*VOC's*	*Volatile Organic Compounds*
ppmV	*Parts Per Million Volume*	*GSV*	*Gas Screening Value*

Visit No. 1 - 06/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH01	>10s	<0.1	<0.1	0.3	20.0	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	0.3	20.0			<0.1		
	>1m	<0.1	<0.1	0.3	19.9			<0.1		
	>1m 30s	<0.1	<0.1	0.3	19.9			<0.1		
	>2m	<0.1	<0.1	0.3	19.9			<0.1		
	>2m 30s	-	<0.1	0.3	19.9			-		
	>3m		<0.1	0.3	19.9					
	>3m 30s		<0.1	0.3	19.9					
	>4m		<0.1	0.3	19.9					
	>4m 30s		<0.1	0.3	19.9					
	>5m		<0.1	0.3	19.9	<0.1	<0.1			
Min		<0.1	<0.1	0.3	20.0	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max								<0.1	<0.0011	<0.0013

Note: *Readings collected during rising atmospheric pressure from 994 mbar to 995mbar on a dry and cloudy day. Prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 1 - 06/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH02	>10s	<0.1	<0.1	<0.1	20.2	<0.1	<0.1	<0.1	-	-
	>30s	- 0.1	<0.1	<0.1	20.9			<0.1		
	>1m	<0.1	<0.1	<0.1	20.6			<0.1		
	>1m 30s	<0.1	<0.1	<0.1	20.5			<0.1		
	>2m	<0.1	<0.1	<0.1	20.4			<0.1		
	>2m 30s	-	<0.1	<0.1	20.4			-		
	>3m		<0.1	<0.1	20.4					
	>3m 30s		<0.1	<0.1	20.3					
	>4m		<0.1	<0.1	20.3					
	>4m 30s		<0.1	<0.1	20.3					
	>5m		<0.1	<0.1	20.3	<0.1	<0.1			
Min		- 0.1	<0.1	<0.1	20.3	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max		<0.1			20.9			<0.1	<0.0011	<0.0013

Note: *Readings collected during a steady atmospheric pressure of 984 mbar on a dry and cloudy day, Prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 2 - 13/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
W S02	>10s	<0.1	<0.1	<0.1	20.2	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	<0.1	20.9			<0.1		
	>1m	<0.1	<0.1	<0.1	20.6			<0.1		
	>1m 30s	<0.1	<0.1	<0.1	20.5			<0.1		
	>2m	<0.1	<0.1	<0.1	20.4			<0.1		
	>2m 30s	-	<0.1	<0.1	20.4			-		
	>3m		<0.1	<0.1	20.4					
	>3m 30s		<0.1	<0.1	20.3					
	>4m		<0.1	<0.1	20.3					
	>4m 30s		<0.1	<0.1	20.3					
	>5m		<0.1	<0.1	20.3	<0.1	<0.1			
Min		<0.1	<0.1	<0.1	20.3	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max					20.9			<0.1	<0.0011	<0.0013

Note: *Readings collected during a steady atmospheric pressure of 984 mbar on a dry and cloudy day. Prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 2 - 13/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH01	>10s	<0.1	<0.1	0.1	20.4	<0.1	<0.1	<0.1	-	-
	>30s	-0.7	<0.1	0.2	20.4			<0.1		
	>1m	-1.0	<0.1	0.2	20.1			<0.1		
	>1m 30s	-0.7	<0.1	0.2	20.0			<0.1		
	>2m	-0.4	<0.1	0.2	20.0			<0.1		
	>2m 30s	-	<0.1	0.2	20.0			-		
	>3m		<0.1	0.2	20.0					
	>3m 30s		<0.1	0.2	19.9					
	>4m		<0.1	0.2	19.9					
	>4m 30s		<0.1	0.2	19.9					
	>5m		<0.1	0.2	19.9	<0.1	<0.1			
Min		<0.1	<0.1	0.1	19.9	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max				0.2	20.4			<0.1	<0.0011	<0.0013

Note: *Readings collected at a steady atmospheric pressure of 984 mbar on a dry and cloudy day. Prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 2 - 13/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH02	>10s	<0.1	<0.1	0.2	19.9	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	0.4	20.3			<0.1		
	>1m	<0.1	<0.1	0.4	20.0			<0.1		
	>1m 30s	<0.1	<0.1	0.4	20.0			<0.1		
	>2m	<0.1	<0.1	0.4	20.0			<0.1		
	>2m 30s	-	<0.1	0.4	20.0			-		
	>3m		<0.1	0.4	19.9					
	>3m 30s		<0.1	0.4	19.9					
	>4m		<0.1	0.4	19.9					
	>4m 30s		<0.1	0.4	19.9					
	>5m		<0.1	0.4	19.9	<0.1	<0.1			
Min		<0.1	<0.1	0.2	20.3	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max				0.4	19.9			<0.1	<0.0011	<0.0013

Note: *Readings collected at an atmospheric pressure of 984 mbar on a dry and cloudy day, prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 3 - 18/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
W S02	>10s	<0.1	<0.1	0.2	19.9	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	0.4	20.0			<0.1		
	>1m	<0.1	<0.1	0.4	19.7			<0.1		
	>1m 30s	<0.1	<0.1	0.4	19.6			<0.1		
	>2m	<0.1	<0.1	0.4	19.6			<0.1		
	>2m 30s	-	<0.1	0.4	19.5			-		
	>3m		<0.1	0.4	19.5					
	>3m 30s		<0.1	0.4	19.5					
	>4m		<0.1	0.4	19.5					
	>4m 30s		<0.1	0.4	19.4					
	>5m		<0.1	0.4	19.4	<0.1	<0.1			
Min		<0.1	<0.1	0.2	19.4	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max				0.4	20.0			<0.1	<0.0011	<0.0013

***Notes**: Readings collected at a stable atmospheric pressure of 979 mbar on a cold, frosty and windy day. Prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings*

Visit No. 3 - 18/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH01	>10s	<0.1	<0.1	0.3	19.4	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	0.4	19.6			<0.1		
	>1m	<0.1	<0.1	0.4	19.5			<0.1		
	>1m 30s	<0.1	<0.1	0.4	19.4			<0.1		
	>2m	<0.1	<0.1	0.4	19.4			<0.1		
	>2m 30s	-	<0.1	0.4	19.4			-		
	>3m		<0.1	0.4	19.4					
	>3m 30s		<0.1	0.4	19.4					
	>4m		<0.1	0.4	19.3					
	>4m 30s		<0.1	0.4	19.3					
	>5m		<0.1	0.4	19.3	<0.1	<0.1			
Min		<0.1	<0.1	0.3	19.3	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max				0.4	19.6			<0.1	<0.0011	<0.0013

Notes: *Readings collected at a stable atmospheric pressure of 979 mbar on a cold, frosty and windy day. Prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 3 - 18/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH02	>10s	- 1.0	<0.1	0.2	19.6	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	0.3	20.2			<0.1		
	>1m	<0.1	<0.1	0.3	19.8			<0.1		
	>1m 30s	<0.1	<0.1	0.3	19.7			<0.1		
	>2m	<0.1	<0.1	0.3	19.7			<0.1		
	>2m 30s	-	<0.1	0.3	19.6			-		
	>3m		<0.1	0.3	19.6					
	>3m 30s		<0.1	0.3	19.6					
	>4m		<0.1	0.3	19.6					
	>4m 30s		<0.1	0.3	19.6					
	>5m		<0.1	0.3	19.6	<0.1	<0.1			
Min		<0.1	<0.1	0.2	19.6	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max				0.3	20.2			<0.1	<0.0011	<0.0013

***Notes**: Readings collected at a stable atmospheric pressure of 979 mbar on a cold, frosty and windy day. Prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 4 –27/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
W S02	>10s	<0.1	<0.1	0.3	20.4	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	0.3	20.3			<0.1		
	>1m	<0.1	<0.1	0.4	20.2			<0.1		
	>1m 30s	<0.1	<0.1	0.4	20.1			<0.1		
	>2m	<0.1	<0.1	0.4	20.1			<0.1		
	>2m 30s	-	<0.1	0.4	20.0			-		
	>3m		<0.1	0.4	20.0					
	>3m 30s		<0.1	0.4	20.0					
	>4m		<0.1	0.4	20.0					
	>4m 30s		<0.1	0.4	20.0					
	>5m		<0.1	0.4	20.0	<0.1	<0.1			
Min		<0.1	<0.1	0.4	20.0	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max					20.4			<0.1	<0.0011	<0.0013

Notes: *Readings collected at a steady atmospheric pressure of 1017mbar on a cold clear day. Prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 4 –27/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH01	>10s	<0.1	<0.1	0.4	20.2	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	0.4	20.1			<0.1		
	>1m	<0.1	<0.1	0.4	20.0			<0.1		
	>1m 30s	<0.1	<0.1	0.4	20.0			<0.1		
	>2m	<0.1	<0.1	0.4	19.9			<0.1		
	>2m 30s	-	<0.1	0.4	19.9			-		
	>3m		<0.1	0.4	19.8					
	>3m 30s		<0.1	0.4	19.8					
	>4m		<0.1	0.4	19.8					
	>4m 30s		<0.1	0.4	19.8					
	>5m		<0.1	0.4	19.8	<0.1	<0.1			
Min		<0.1	<0.1	0.4	19.8	19.8	<0.1	<0.1	<0.0001	<0.0001
Max					20.2	20.2		<0.1	<0.0011	<0.0013

***Notes**: Readings collected at a steady atmospheric pressure of 1017mbar on a cold clear day. Prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 4 - 27/01/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH02	>10s	<0.1	<0.1	0.3	20.1	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	0.3	20.1			<0.1		
	>1m	<0.1	<0.1	0.3	20.2			<0.1		
	>1m 30s	<0.1	<0.1	0.3	20.1			<0.1		
	>2m	<0.1	<0.1	0.3	20.1			<0.1		
	>2m 30s	-	<0.1	0.3	20.1			-		
	>3m		<0.1	0.3	20.0					
	>3m 30s		<0.1	0.3	20.0					
	>4m		<0.1	0.3	20.0					
	>4m 30s		<0.1	0.3	20.0					
	>5m		<0.1	0.3	20.0	<0.1	<0.1			
Min		<0.1	<0.1	0.3	20.0	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max					20.2			<0.1	<0.0011	<0.0013

***Notes**: Readings collected at a steady atmospheric pressure of 1017mbar on a cold clear day. Prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 5 - 02/02/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
W S02	>10s	<0.1	<0.1	<0.1	20.3	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	<0.1	20.6			<0.1		
	>1m	<0.1	<0.1	<0.1	20.6			<0.1		
	>1m 30s	<0.1	<0.1	<0.1	20.5			<0.1		
	>2m	<0.1	<0.1	<0.1	20.4			<0.1		
	>2m 30s	-	<0.1	<0.1	20.3			-		
	>3m		<0.1	<0.1	20.3					
	>3m 30s		<0.1	<0.1	20.3					
	>4m		<0.1	<0.1	20.3					
	>4m 30s		<0.1	<0.1	20.3					
	>5m		<0.1	<0.1	20.3	<0.1	<0.1			
Min		<0.1	<0.1	<0.1	20.3	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max					20.6			<0.1	<0.0011	<0.0013

***Notes**: Readings collected at an atmospheric pressure of 1009mbar to 1008mbar on a clear day , prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 5 - 02/02/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH01	>10s	<0.1	<0.1	0.1	20.1	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	<0.1	20.7			<0.1		
	>1m	<0.1	<0.1	<0.1	20.6			<0.1		
	>1m 30s	<0.1	<0.1	<0.1	20.5			<0.1		
	>2m	<0.1	<0.1	<0.1	20.4			<0.1		
	>2m 30s	-	<0.1	<0.1	20.4			-		
	>3m		<0.1	<0.1	20.3					
	>3m 30s		<0.1	<0.1	20.3					
	>4m		<0.1	<0.1	20.3					
	>4m 30s		<0.1	<0.1	20.3					
	>5m		<0.1	<0.1	20.3	<0.1	<0.1			
Min		<0.1	<0.1	<0.1	20.3	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max				0.1	20.7			<0.1	<0.0011	<0.0013

***Notes**: Readings collected at an atmospheric pressure of 1009mbar to 1008mbar on a clear day, prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 5 - 02/02/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH02	>10s	<0.1	<0.1	<0.1	20.0	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	<0.1	20.1			<0.1		
	>1m	<0.1	<0.1	0.1	20.1			<0.1		
	>1m 30s	<0.1	<0.1	0.2	20.2			<0.1		
	>2m	<0.1	<0.1	0.2	20.2			<0.1		
	>2m 30s	-	<0.1	0.3	20.2			-		
	>3m		<0.1	0.2	20.2					
	>3m 30s		<0.1	0.2	20.2					
	>4m		<0.1	0.2	20.2					
	>4m 30s		<0.1	0.2	20.2					
	>5m		<0.1	0.3	20.2	<0.1	<0.1			
Min		<0.1	<0.1	<0.1	20.0	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max				0.3	20.2			<0.1	<0.0011	<0.0013

Notes: *Readings collected at an atmospheric pressure of 1009mbar to 1008mbar on a clear day, prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 6 - 03/02/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
W S02	>10s	<0.1	<0.1	<0.1	20.4	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	<0.1	20.7			<0.1		
	>1m	<0.1	<0.1	<0.1	20.5			<0.1		
	>1m 30s	<0.1	<0.1	<0.1	20.4			<0.1		
	>2m	<0.1	<0.1	<0.1	20.4			<0.1		
	>2m 30s	-	<0.1	<0.1	20.3			-		
	>3m		<0.1	<0.1	20.3					
	>3m 30s		<0.1	<0.1	20.3					
	>4m		<0.1	<0.1	20.3					
	>4m 30s		<0.1	<0.1	20.3					
	>5m		<0.1	<0.1	20.3	<0.1	<0.1			
Min		<0.1	<0.1	<0.1	20.3	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max					20.7			<0.1	<0.0011	<0.0013

***Notes**: Readings collected at an atmospheric pressure of 1013-1014mbar on a cloudy day, frosty and windy, prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 6 –03/02/2023

Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH01	>10s	<0.1	<0.1	0.1	20.6	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	<0.1	20.6			<0.1		
	>1m	<0.1	<0.1	<0.1	20.5			<0.1		
	>1m 30s	<0.1	<0.1	0.1	20.4			<0.1		
	>2m	<0.1	<0.1	0.1	20.3			<0.1		
	>2m 30s	-	<0.1	0.2	20.2			-		
	>3m		<0.1	0.2	20.2					
	>3m 30s		<0.1	0.2	20.2					
	>4m		<0.1	0.2	20.2					
	>4m 30s		<0.1	0.2	20.2					
	>5m		<0.1	0.2	20.2	<0.1	<0.1			
Min		<0.1	<0.1	<0.1	20.2	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max				0.2	20.6			<0.1	<0.0011	<0.0013

***Notes**: Readings collected at an atmospheric pressure of 1013-1014mbar on a cloudy day, frosty and windy, prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

Visit No. 6 - 03/02/2023

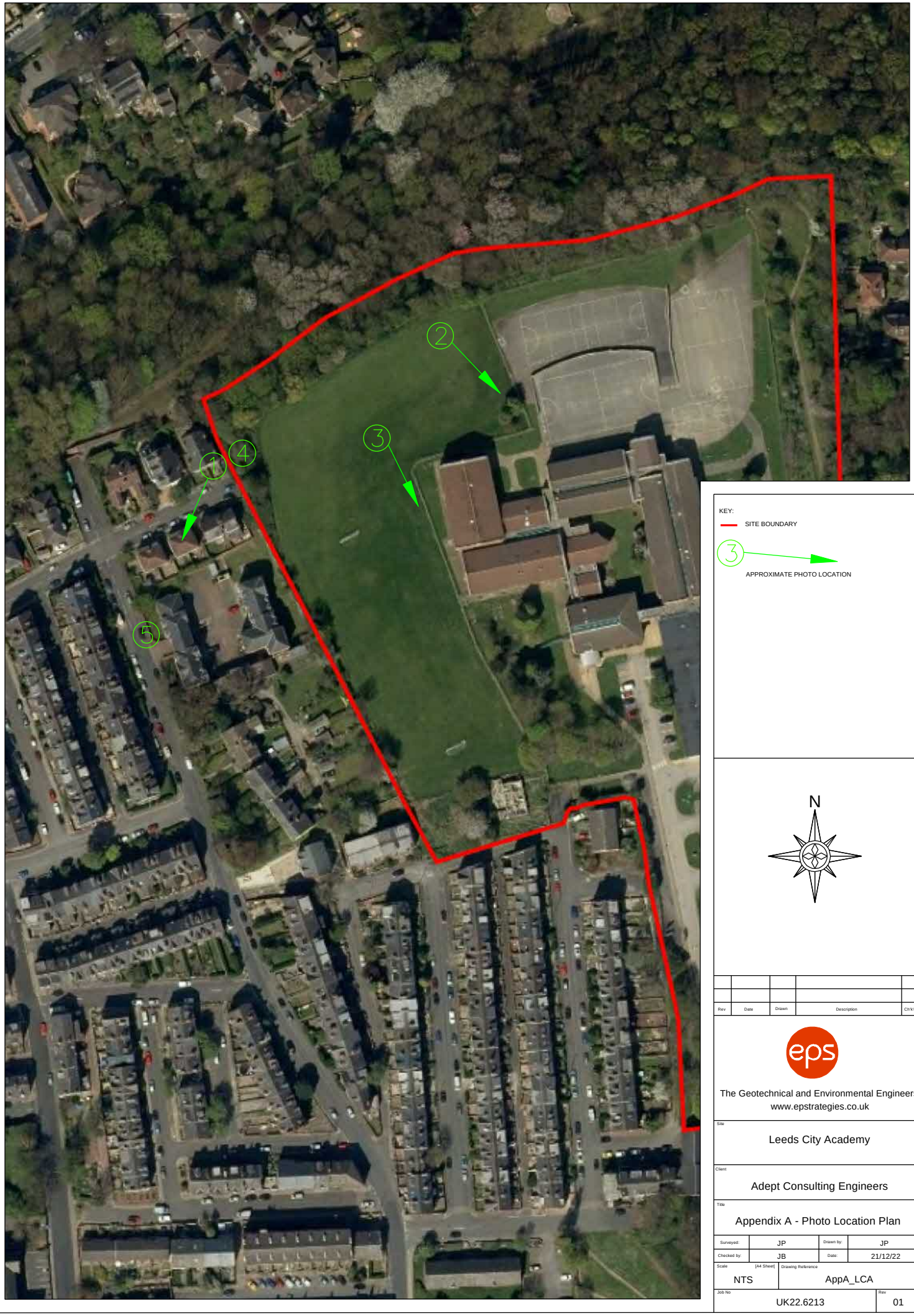
Borehole ID	Duration	Flow Rate (l/ hr)	CH_4 (%v/ v)	CO_2 (%v/ v)	O_2 (% v/v)	CO (ppmV)	H_2S (ppmV)	VOC's (ppmV)	CH_4 GSV (l/ hr)	CO_2 GSV (l/ hr)
BH02	>10s	<0.1	<0.1	0.1	20.7	<0.1	<0.1	<0.1	-	-
	>30s	<0.1	<0.1	0.2	20.5			<0.1		
	>1m	<0.1	<0.1	0.2	20.4			<0.1		
	>1m 30s	<0.1	<0.1	0.2	20.3			<0.1		
	>2m	<0.1	<0.1	0.2	20.2			<0.1		
	>2m 30s	-	<0.1	0.3	20.2			-		
	>3m		<0.1	0.3	20.1					
	>3m 30s		<0.1	0.3	20.1					
	>4m		<0.1	0.3	20.0					
	>4m 30s		<0.1	0.3	20.0					
	>5m		<0.1	0.3	-	<0.1	<0.1			
Min		<0.1	<0.1	0.1	20.0	<0.1	<0.1	<0.1	<0.0001	<0.0001
Max				0.3	20.7			<0.1	<0.0011	<0.0013

***Notes**: Readings collected at an atmospheric pressure of 1013-1014mbar on a cloudy day, frosty and windy, prior to recording the readings from the equipment, the equipment is tested in ambient air to ensure that it is functioning as intended with no unexpected readings.*

APPENDICES

APPENDIX A

Selected Site Photographs



KEY:

SITE BOUNDARY

3 APPROXIMATE PHOTO LOCATION

N

Rev	Date	Drawn	Description	Ch'k'd

eps

The Geotechnical and Environmental Engineers
www.epstrategies.co.uk

Site: Leeds City Academy

Client: Adept Consulting Engineers

Title: Appendix A - Photo Location Plan

Surveyed:	JP	Drawn by:	JP
Checked by:	JB	Date:	21/12/22
Scale [A4 Sheet]: NTS		Drawing Reference: AppA_LCA	
Job No: UK22.6213		Rev: 01	

Photo 1: Photograph of the temporary structure adjacent to dining area, facing south.	Photo 2: Photograph of current soft landscaping on north eastern part of site, facing south east.
	
Photo 3: Photograph overlooking rotary drilling rig on BH01, facing south east.	Photo 4: Photograph showing foundation exposure at FE02 with blue membrane.
	
Photo 5: Photograph at FE03.	Photo 6: Photograph of material taken from WS04.
	

APPENDIX B

Proposed Development Plan

NOTES

0 10 20 30 40m

N

Detailed Softworks Plan Sheet 1 of 2 (11225-FPCR-XX-XX-DR-L-0002)
Detailed Hardworks Plan Sheet 1 of 2 (11225-FPCR-XX-XX-DR-L-0005)

NETBALL COURT
NETBALL COURT
NETBALL COURT
NETBALL COURT
30.5m
15.25m
5V5 Pitch
Hard and Soft Reinstatment Works Required
Leeds City Academy
EXISTING PITCH MARKINGS TO BE RETAINED
42.212m
Proposed development includes new area to the east of site which will create 12 no. spaces.
8 EV Bays
Accessible EV Bays
8 EV Cable Prepared Bays
Minibus Bays
New Zebra Crossing
8 Enlarged Bays
7 Parking Bays
Path
The Coach House
Path
Fn
79
16 to 21
7 to 15
DELPH COURT
11
Quarry Mount
1
54 to 72
Delph Mews
El Sub Sta
29
DELPH LANE
41
35
52
49
33
40
37
23
36
28
13
3
14
2
12
6
1
4
7
7a
CLIFF MOUNT
BACK CLIFF MOUNT
CLIFF MOUNT TERRACE

Detailed Softworks Plan Sheet 2 of 2 (11225-FPCR-XX-XX-DR-L-0004)
Detailed Hardworks Plan Sheet 2 of 2 (11225-FPCR-XX-XX-DR-L-0007)

KEY

- Application Redline Boundary
- Adjacent Land in Leeds City Council Ownership
- Architecture
  See Watson Batty dwg. LCAMS-WBA-SI-XX-DR-A-90_100 for detail
- Proposed substation
- Existing tree
  Refer to Tree Retention Plan (ref: JCA Tree Constraints Plan)
- Root Protection Area (RPA)
  Refer to JCA Tree Constraints Plan (ref: 18073/AJB.)
- Tree removed
  Refer to Tree Retention Plan (ref: JCA Tree Constraints Plan)
- Existing wall
- Existing gate
- Existing soft landscaping
- Existing hard landscaping
- Existing fence
- Proposed indicative slope
- Proposed indicative gradients (TBC) (1:4)
- Dimensions (1m)
- Proposed hard standing
- Proposed permeable asphalt
- Proposed no-dig construction
- Proposed ball stop fence
- Proposed fence
- Proposed sports pitches (hard surfaced)
- Proposed white lining for new parking bays
- Proposed EV charger (by others) with hoop barrier protection
- Proposed retaining wall (to match existing)
- Proposed low retaining wall with handrail
- Minor retaining wall
- Relocated timber amphitheatre
- Proposed bollards (2 nr.)
- Proposed cycle stands (4 nr.)
- Proposed cycle storage lockers (8 nr.)
- Proposed cycle shelters (30 nr. capacity)
- Proposed trees
- Proposed meadow grassland
- Proposed amenity grassland

Notes

Location of 3G pitch subject to confirmation of Root Protection Areas (RPA).
Parking layout to be confirmed by a Highways Engineer.

rev	date	description	drn	chk
P22	29/02/2024	No dig extent update	AJK	
P21	14/02/2024	Permeable asphalt update	AJK	

masterplanning
environmental assessment
landscape design
urban design
ecology
architecture
arboriculture
FPCR Environment and Design Ltd
Lockington Hall
Lockington
Derby
DE74 2RH

client
Leeds City Academy

project
Leeds City Academy Expansion

drawing title
General Arrangement Plan

scale
1:500 @ A1

drn OFD chk DH

date created
15 NOVEMBER 2022

project number
11225

status
S3

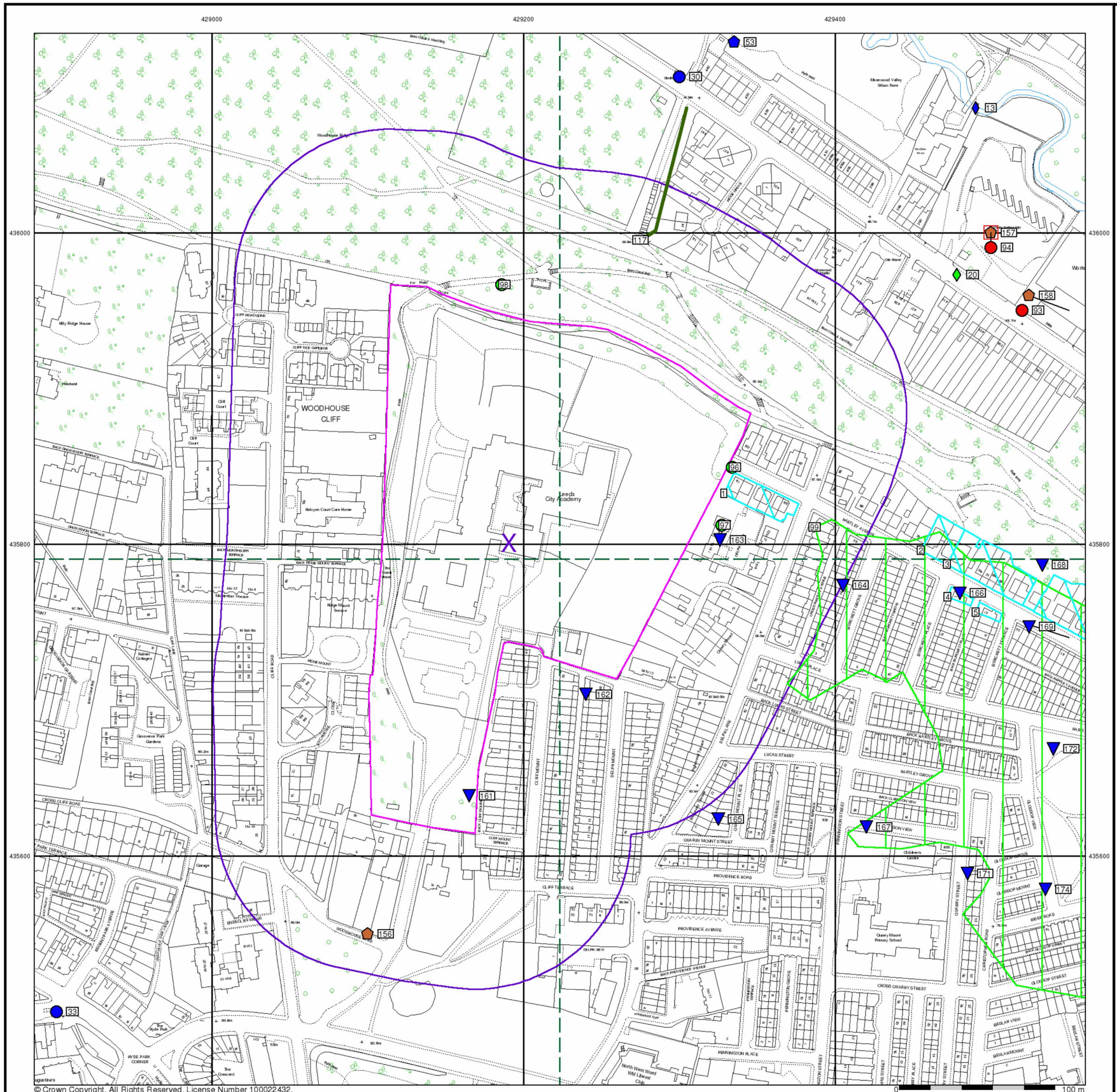
issue
P22

document number
11225-FPCR-XX-XX-DR-L-0001
Project Code - Originator - Zone - Level - Type - Role - Drawing Number

File: \\FPCR-FS-01\Projects2\11200\11225\LANDS\Drawings\11225 Landscaping Rev W.vwx

APPENDIX C

Surrounding Land Use



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LANDMARK INFORMATION GROUP®

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
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Hazardous Substances

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

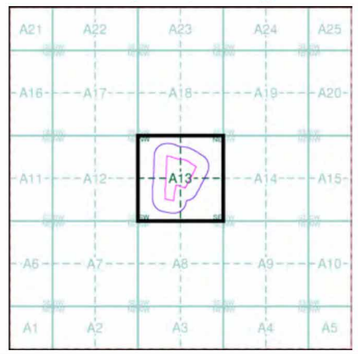
Geological

- BGS Recorded Mineral Site

Waste

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

Site Sensitivity Map - Segment A13



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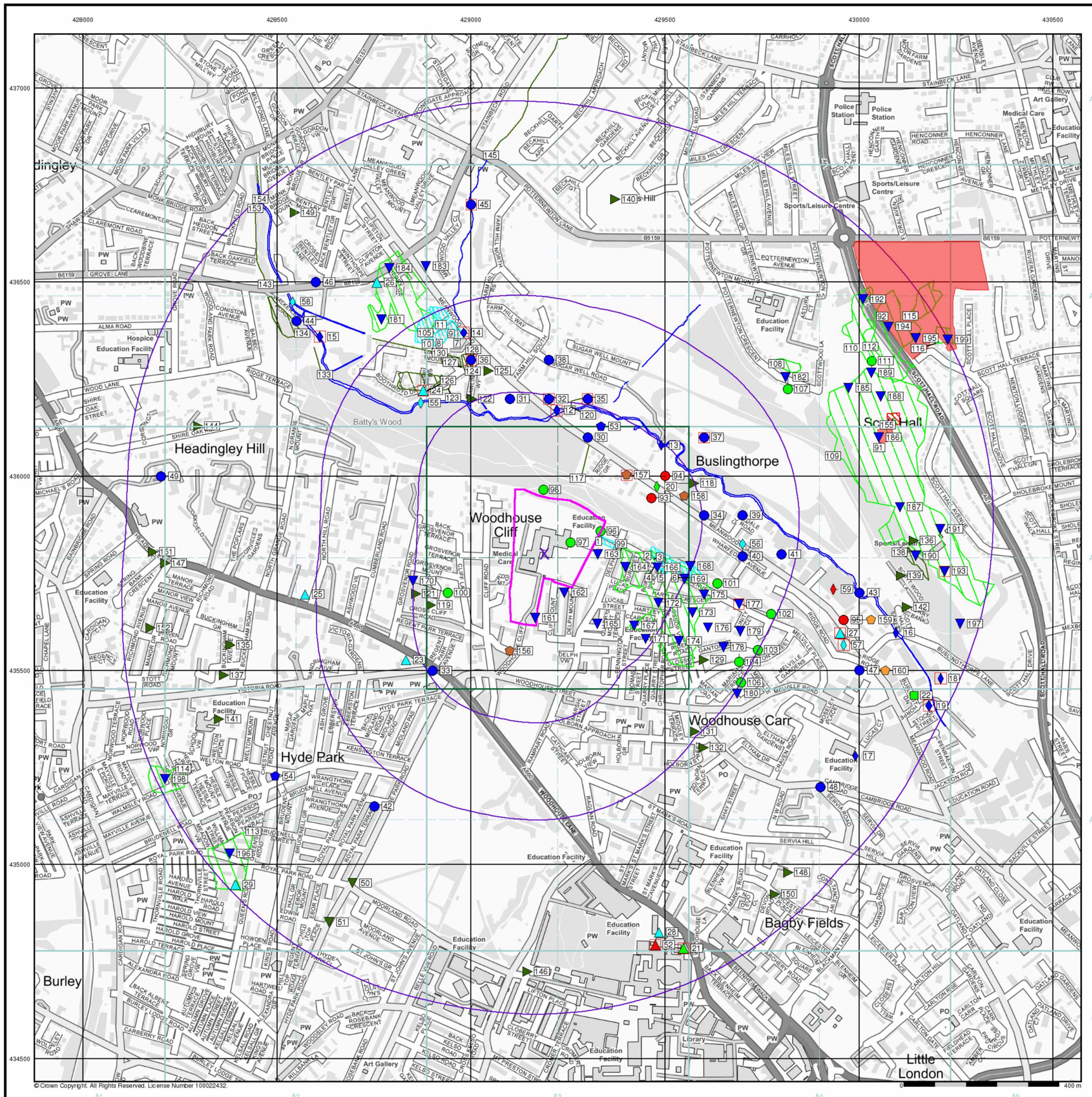
Customer Ref:	UK22.6213
National Grid Reference:	429190, 435800
Slice:	A
Site Area (Ha):	5.13
Plot Buffer (m):	100

Site Details

Leeds City Academy, Bedford Field, Woodhouse Cliff, Leeds, LS6 2LG

Landmark INFORMATION GROUP

[redacted]



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LANDMARK INFORMATION GROUP®

General

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

Several of Type at Location

Agency and Hydrological

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

Hazardous Substances

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

Geological

- BGS Recorded Mineral Site

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
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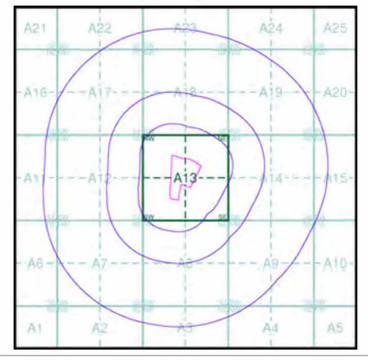
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Site Sensitivity Map - Slice A



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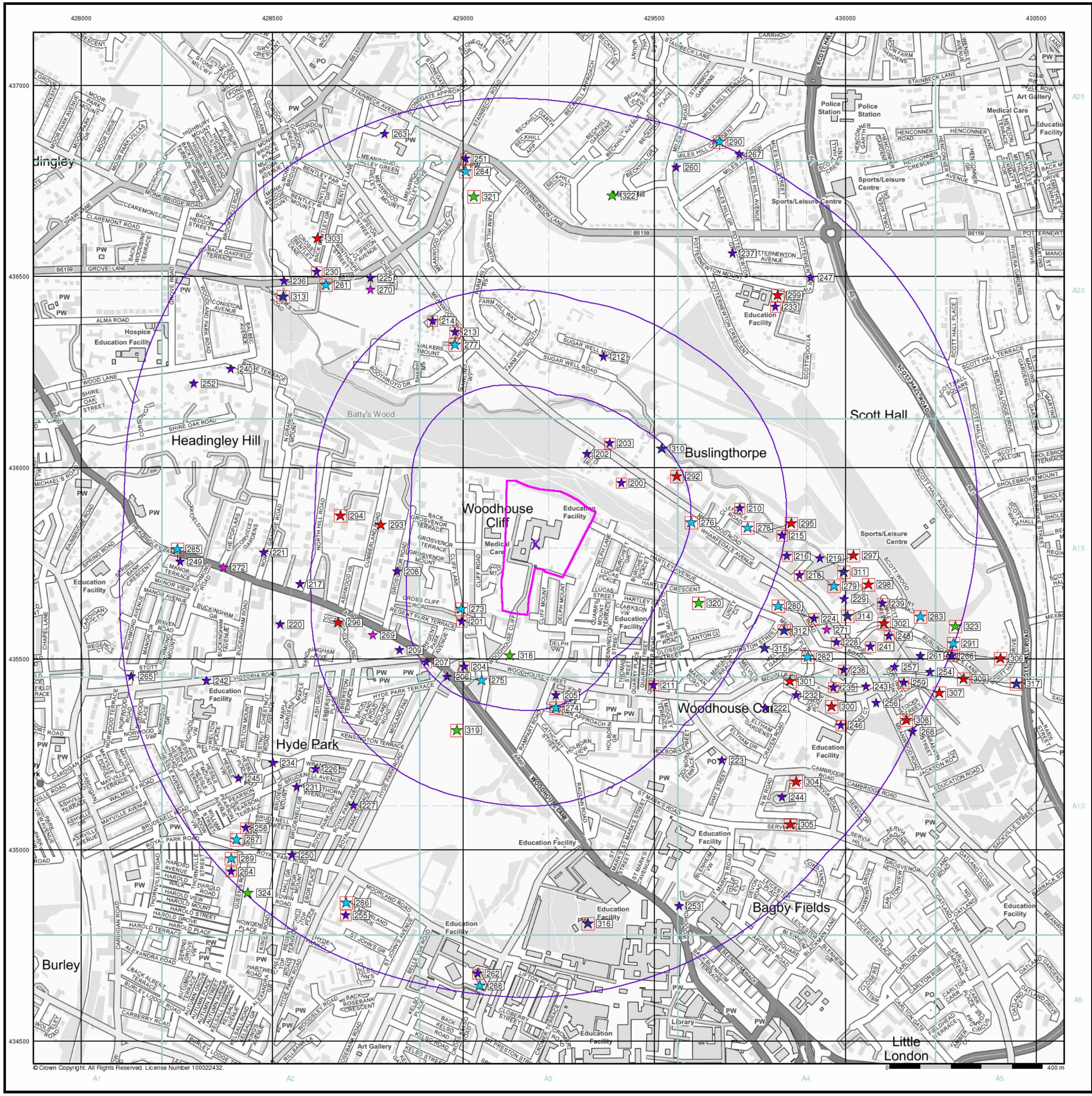
National Grid Reference:	429190, 435800
Slice:	A
Site Area (Ha):	5.13
Search Buffer (m):	1000

Site Details

Leeds City Academy, Bedford Field, Woodhouse Cliff, Leeds, LS6 2LG

Landmark INFORMATION GROUP

[redacted]



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Industrial Land Use Map

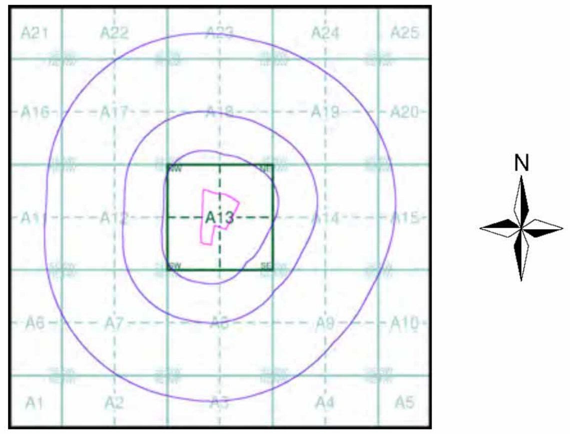
General

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

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- Gas Pipeline
- Points of Interest - Commercial Services
- Points of Interest - Education and Health
- Points of Interest - Manufacturing and Production
- Points of Interest - Public Infrastructure
- Points of Interest - Recreational and Environmental
- Underground Electrical Cables

Industrial Land Use Map - Slice A



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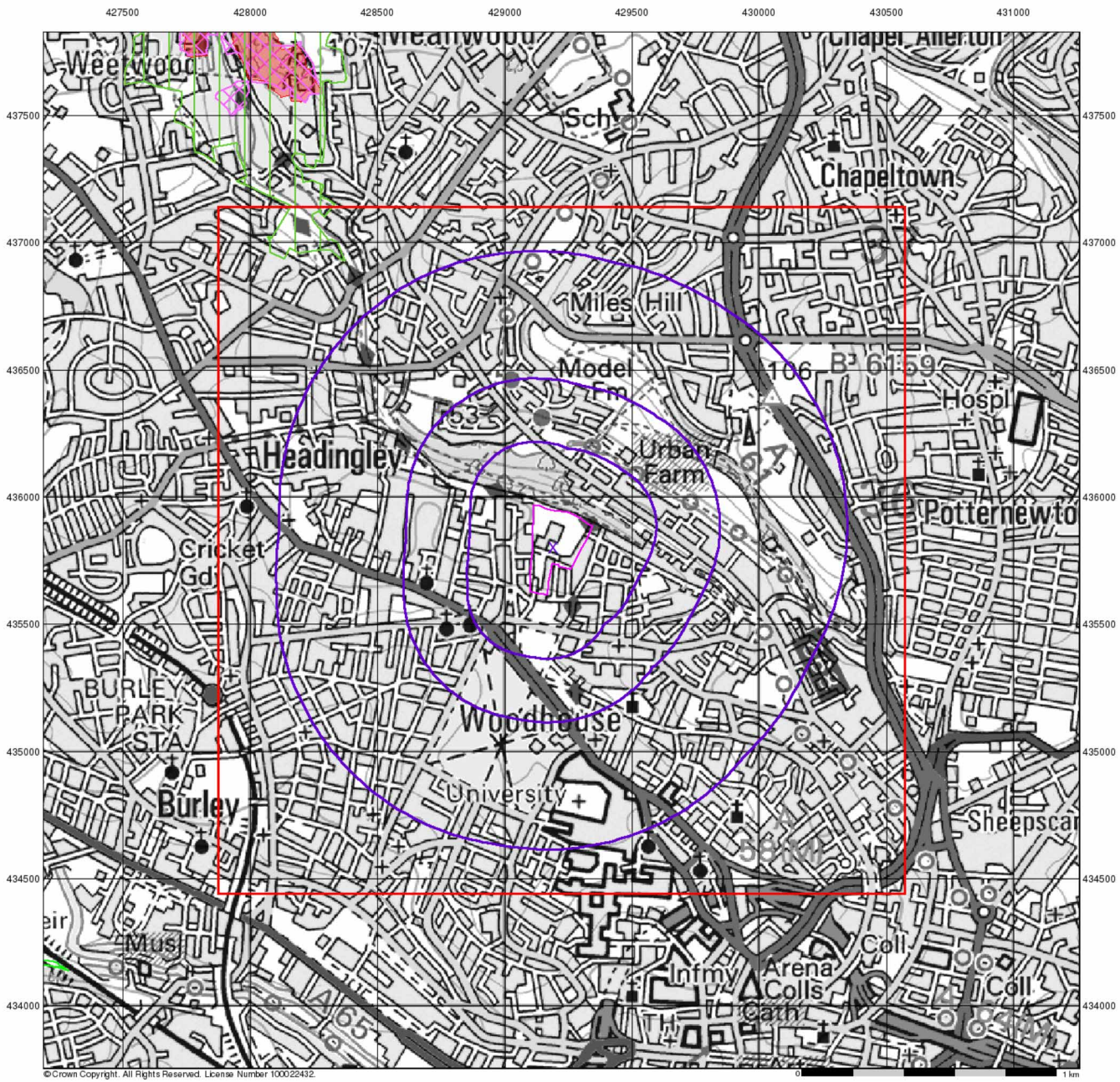
National Grid Reference:	429190, 435800
Slice:	A
Site Area (Ha):	5.13
Search Buffer (m):	1000

Site Details

Leeds City Academy, Bedford Field, Woodhouse Cliff, Leeds, LS6 2LG

Landmark INFORMATION GROUP

[redacted]



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LANDMARK INFORMATION GROUP

Sensitive Land Uses

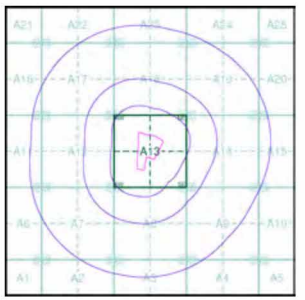
General

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

Sensitive Land Uses

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

Site Sensitivity Context Map - Slice A



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Customer Ref:	UK22.6213
National Grid Reference:	429190, 435800
Slice:	A
Site Area (Ha):	5.13
Search Buffer (m):	1000

Site Details

Leeds City Academy, Bedford Field, Woodhouse Cliff, Leeds, LS6 2LG

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	Not Supplied - Holocene
	DDGR	Disturbed Ground (Undivided)	Artificially Modified Ground	Not Supplied - Holocene
	MGR	Made Ground (Undivided)	Artificial Deposit	Not Supplied - Holocene

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
		Faults		
		Rock Segments		

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	ALV	Alluvium	Clay, Silt, Sand and Gravel	Not Supplied - Holocene
	HRT	Harrogate Till Formation	Clay, Sandy, Gravelly	Not Supplied - Anglian
	GDU	Glacial Deposits	Clay, Silt and Sand	Not Supplied - Pleistocene
	RTDU	River Terrace Deposits (Undifferentiated)	Sand and Gravel	Not Supplied - Quaternary

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	EF	Elland Flags	Sandstone	Not Supplied - Westphalian
	PLCM	Pennine Lower Coal Measures Formation	Mudstone, Siltstone and Sandstone	Not Supplied - Westphalian
	PLCM	Pennine Lower Coal Measures Formation	Sandstone	Not Supplied - Westphalian
	GR	Grenoside Sandstone	Sandstone	Not Supplied - Westphalian
	STNR	Stanningley Rock	Sandstone	Not Supplied - Westphalian
	TKS	Thick Stone	Sandstone	Not Supplied - Westphalian
	SBF	Soft Bed Flags	Sandstone	Not Supplied - Westphalian
	KKBS	Kirkburton Sandstone	Sandstone	Not Supplied - Westphalian
	RR	Rough Rock	Sandstone	Not Supplied - Namurian
	MG	Millstone Grit Group [See also Migr]	Mudstone, Siltstone and Sandstone	Not Supplied - Namurian

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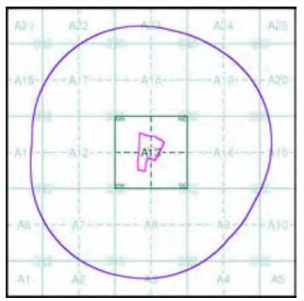
Geology 1:50,000 Maps

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:	**070**
Map Name:	**Leeds**
Map Date:	**2003**
Bedrock Geology:	**Available**
Superficial Geology:	**Available**
Artificial Geology:	**Available**
Faults:	**Not Supplied**
Landslip:	**Available**
Rock Segments:	**Not Supplied**

Geology 1:50,000 Maps - Slice A



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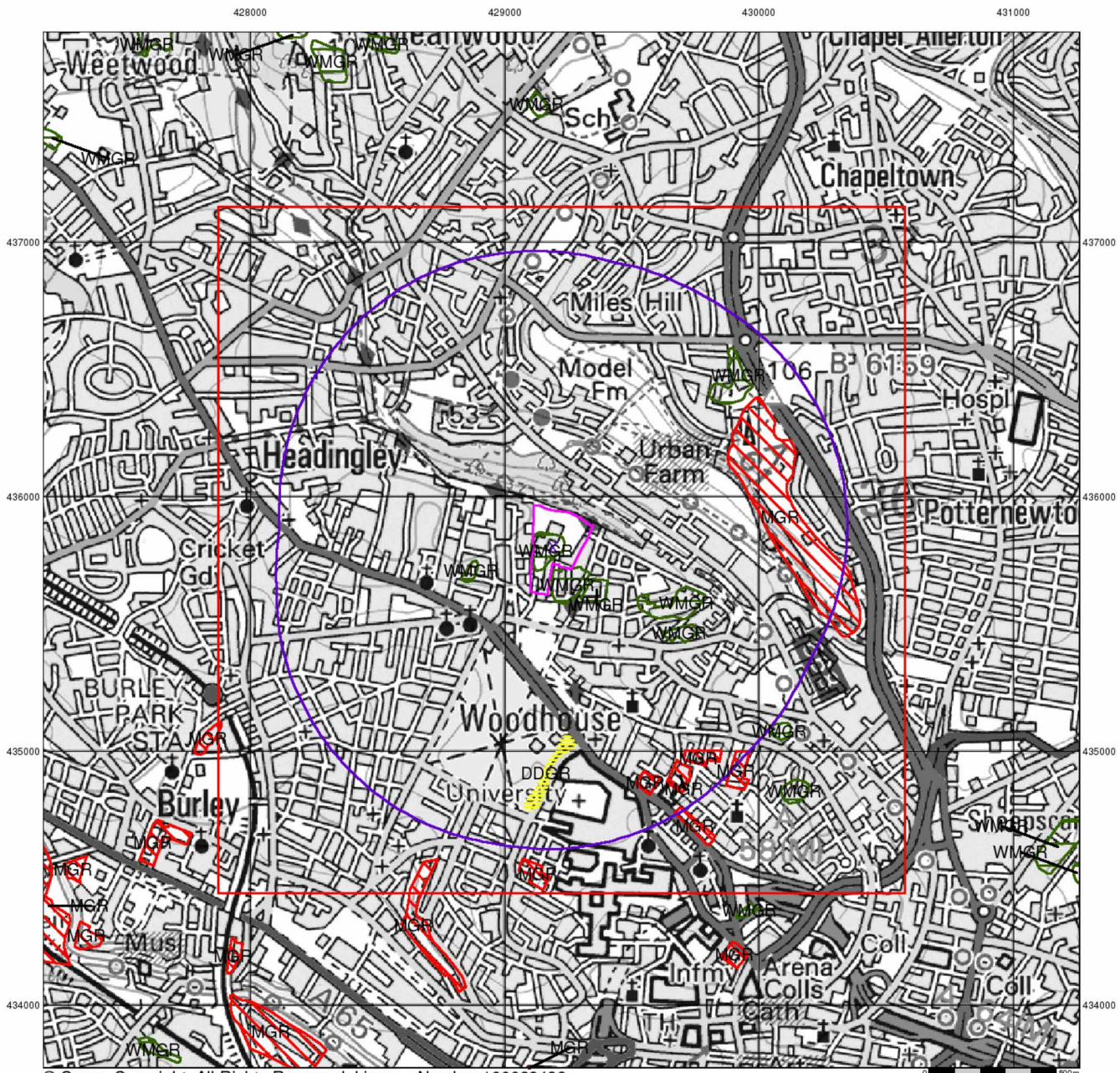
National Grid Reference:	429190, 435800
Slice:	A
Site Area (Ha):	5.13
Search Buffer (m):	1000

Site Details:

Leeds City Academy, Bedford Field, Woodhouse Cliff, Leeds, LS6 2LG

Landmark INFORMATION GROUP



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Artificial Ground and Landslip

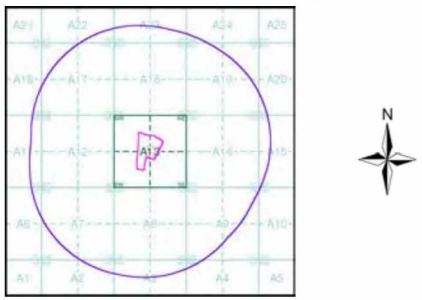
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions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



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National Grid Reference:	429190, 435800
Slice:	A
Site Area (Ha):	5.13
Search Buffer (m):	1000

Site Details:

Leeds City Academy, Bedford Field, Woodhouse Cliff, Leeds, LS6 2LG

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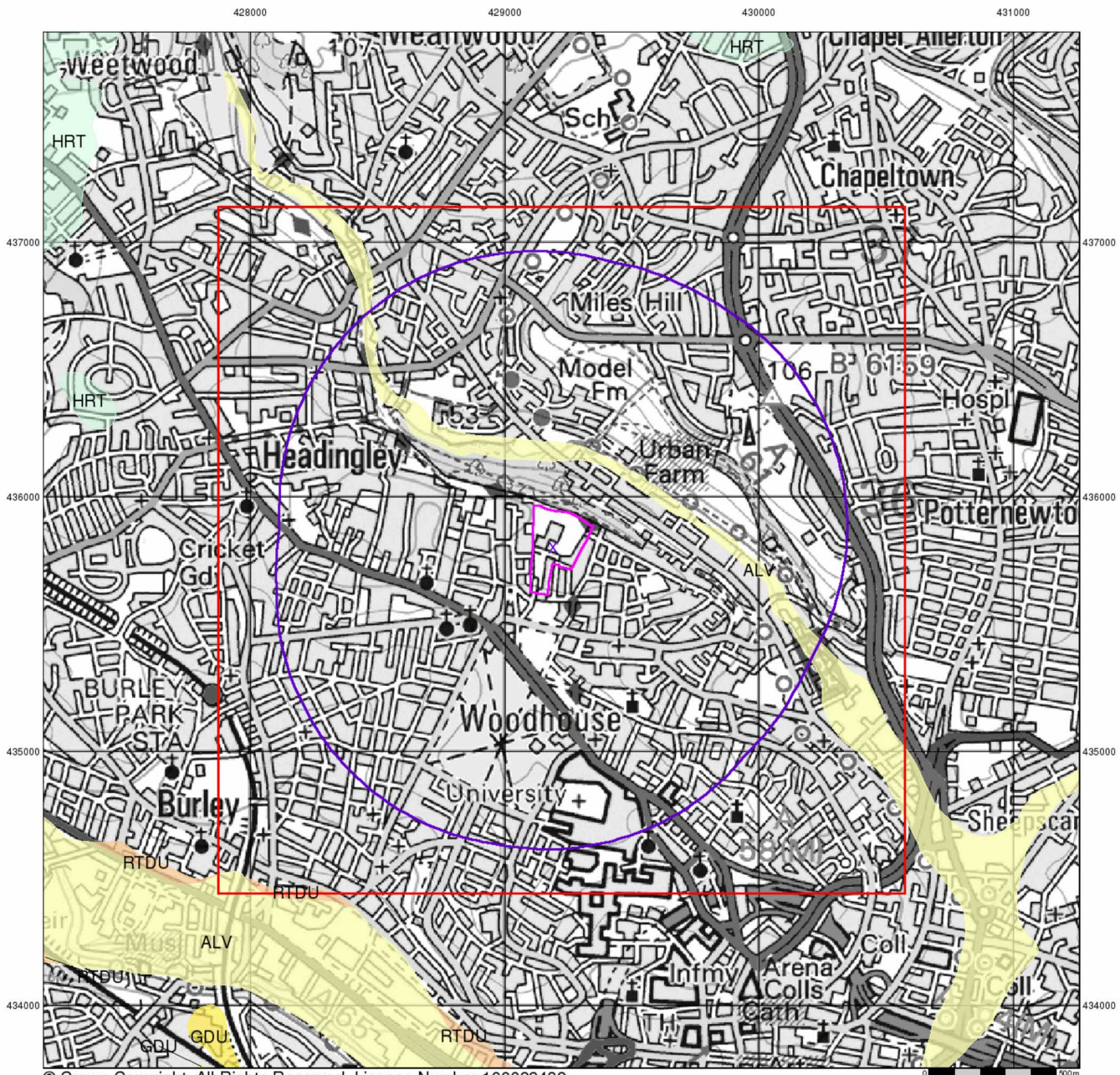

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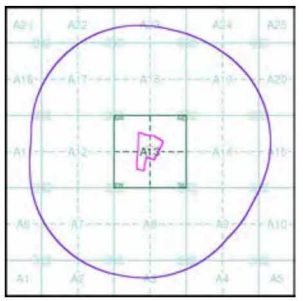
Superficial Geology

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



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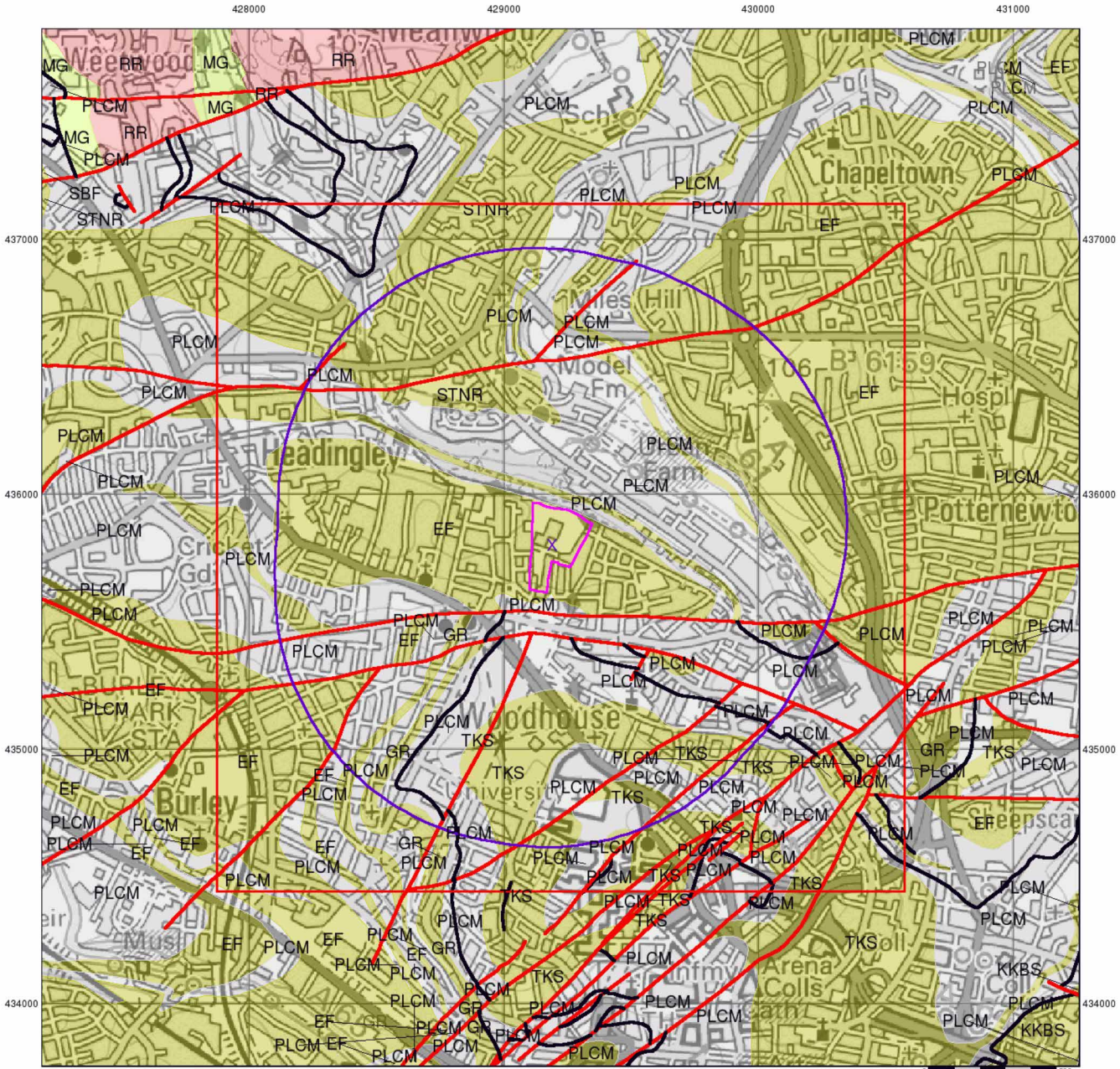

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Bedrock and Faults

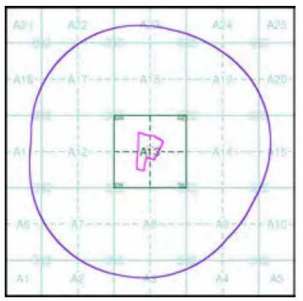
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

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



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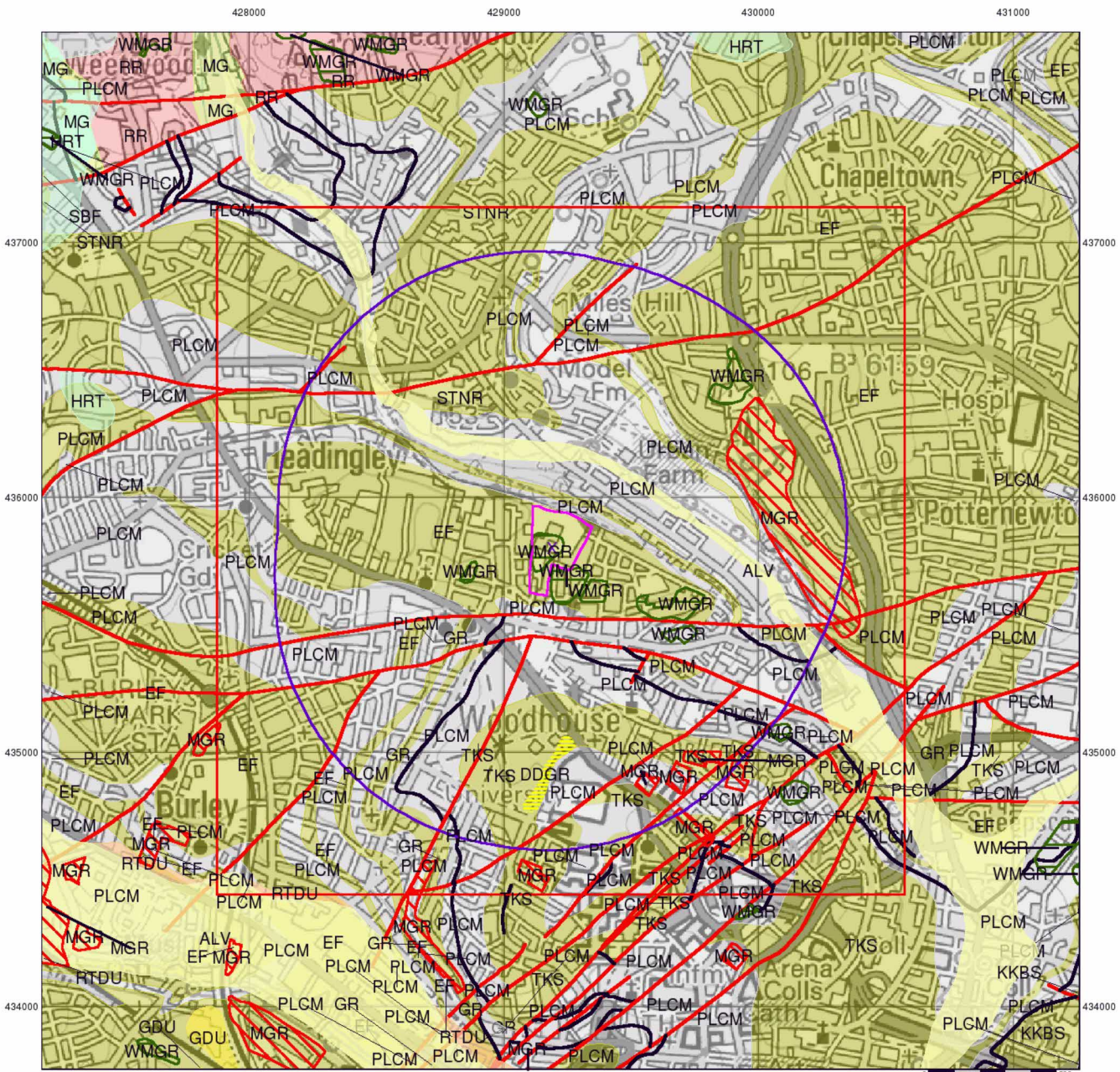

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Combined Surface Geology

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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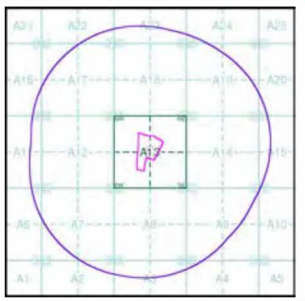
website: www.bgs.ac.uk

Combined Geology Map - Slice A



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