



GEOENVIRONMENTAL DESK STUDY REPORT

Capitol Park Junction 37 - M1 Barnsley

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The Harris Partnership. Capitol Park, Junction 37 - M1, Higham Lane, Barnsley. Proposed Development. Job-Dwg No. 14120-14 Rev. B.

Appendix B Site Photographs

Appendix C Historical Plans

Appendix D BGS Trial Pit Logs

Appendix E Coal Authority Report

Appendix F Notes on Limitations



CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

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DOCUMENT HISTORY

VERSION	PURPOSE/DESCRIPTION	DATE
1	Final – For issue to Client	May 2016



EXECUTIVE SUMMARY

Site Address	Capitol Park, Junction 37 - M1, Barnsley
NGR	Approximate centre of site NGR 431723, 405994.
Current Site Use & Proposed Development	Most of the site comprises an engineered level plateau and is currently undeveloped. The proposed development comprises four commercial units.
Site History	From the mid-1800s, the site remained farm land, with associated buildings across the north western corner of the site. The farm buildings were shown as demolished from around 2010 and this is presumed to coincide with the site regrade undertaken in the mid-2000s.
Site Setting	Geology – Based on the sites historical and recent site regrade, made ground is to be expected on site. The site is shown to be underlain by Pennine Middle Coal Measures – sandstone, siltstone, mudstone and coal seams. No faults are shown to affect the site. Two coal seams outcrop on site. Mining – Previous borehole investigation did not encounter any workings in the form of voids, broken ground or soft push material and the site can be considered stable with regard to coal mining. Hydrogeology – The underlying bedrock is classified as a Secondary A Aquifer. There are no groundwater abstractions within 1km of the site. Hydrology – The nearest surface water feature is a drain (Tertiary River), located at approximately 12m to the west of the site. There are no surface water abstractions within 1km of the site. Flooding – The site does not lie within a floodplain. However, a flood risk assessment may be required by the Local Authority as part of any planning application for the site. Landfill – There are no records of any currently licenced or historical landfill sites within 250m of the site. However, there large spoil heaps located on the site. Radon Risks – No radon protective measures are necessary.
Environmental Risk Assessment	The following potential sources of contamination may be present on the site: • Made ground associated with site history, site regrade and stockpiles. • Hazardous gases/soil vapours associated with made ground. On the basis of the proposed end use and known history, the following potential pollutant linkages may be present: • Development and maintenance workers and site end users, i.e. employees and customers, could come into contact with soils containing elevated concentrations of potential contaminants and hazardous gases. • The underlying Secondary A Aquifer and nearby drain (Tertiary River) could become contaminated due to the leaching and migration of contaminants from soil into surface water via surface run-off. • Buildings and services could be affected by potentially aggressive contaminants in the soils; and • Planting in landscape areas could be affected by phytotoxic elements within the soils. These are based on current site conditions and do not consider exposure pathways following any further remediation of the site. If the site can be shown to pose no "significant harm" or pollution to controlled waters, then the site can be considered to be uncontaminated. Based on the potential pollutant linkages present on the site, the site should be considered to be low risk with respect to contamination.
Preliminary Engineering Assessment	Mining – The risk to the site from instability due to mining is considered to be low. Foundations – The selection of foundation type for the proposed development would be governed by the thickness of the made ground and the strength and settlement characteristics of the underlying natural strata, which will need to be confirmed. If weathered bedrock is present at shallow depth, then strip or pad foundations are likely to be suitable. If the shallow natural strata prove unsuitable, then consideration could be given to the adoption of deeper foundations such trench fill or stone columns. Ground Floor Construction – The nature and thickness of any made ground and the properties of the natural soils will need to be investigated to determine if ground bearing floor slabs can be used. Groundwater – It may be expected that shallow perched groundwater will be encountered within the made ground and natural strata. The presence of groundwater will need to be assessed as part of any ground investigation. Obstructions – The presence of obstructions in the made ground related to previous structures may be anticipated. Excavations – Excavations through any made ground and natural ground may be unstable and temporary side support is likely to be required. Roads, Pavements and Hardstanding Surfaces – It is recommended that at this stage, a conservative bearing value for the sub-grade is used, until the nature of the sub-grade can be physically assessed. Chemical Attack on Buried Concrete – Samples of made and natural ground should be obtained and submitted to the laboratory for testing in order to assess the sulphate content and acidity and hence the concrete class required for buried concrete to the latest standard.



Further Work Required	In order to assess the potential environmental and geotechnical constraints, it is recommended that the following investigative works should be carried out: • Trial pitting in order to assess the shallow ground conditions at the site and confirm the composition, extent, depth and nature of the made ground and underlying natural strata. • Cable percussion or window sampling formed boreholes with in situ tests to provide geotechnical information in order to assess the nature of the sub-surface and confirm the depth and distribution of any made ground. These boreholes will also facilitate the installation of gas and groundwater monitoring wells. • Chemical analysis of soil and water samples in order to determine the concentrations of potential contamination on the site. • Geotechnical testing to classify materials and inform foundation design and chemical testing to determine the Aggressive Chemical Environment for Concrete classification. • Monitoring of gas and groundwater wells for hazardous gases, methane, carbon dioxide, and oxygen and flow rate to the requirements of the Local Authority.
This sheet is intended as a summary only of the assessment of the site in relation to ground condition. It does not provide a definitive engineering analysis.	



1.0 INTRODUCTION

1.1 Instruction

JPG (Leeds) Limited (JPG) has been instructed by Commercial Development Projects Limited to carry out a geoenvironmental desk study for a proposed new commercial development at Capitol Park, near the Junction 37 - M1, Barnsley.

1.2 Objectives

The main objective of the geoenvironmental desk study is to identify potential geotechnical and environmental issues that may represent constraints to the proposed redevelopment of the site.

1.3 Scope of Works

The scope of works for the desk study included the following:

- Site inspection and description.
- Review of any previous reports provided.
- Review of contemporary and historical Ordnance Survey publications.
- Consultations with regulatory authorities where appropriate.
- Review of geological publications (including hydrology, hydrogeology and soil survey publications where appropriate).
- Review of the risk from past mining.
- Review of the radon status of the site.
- An environmental database search.
- Outline environmental risk assessment.
- Preliminary recommendations with respect to foundations, ground floor and pavement design.
- Recommendations for further work where appropriate.
- Presentation of the findings in a tabular non-technical summary.

1.4 Location

The site is located on Capitol Park, adjacent to Junction 37 of the M1 motorway, to the north of Dodworth near Barnsley. The approximate centre of the site is located at NGR 431723, 405994. A site location plan is given as Figure 1 in Appendix A.



1.5 Site Description and Topography

A site inspection was carried out by an engineer from JPG (Leeds) Ltd on the 4 May 2016.

An aerial photograph of the site and a site plan are included in Appendix A as Figure 2 and Figure 3 respectively. Photographs from the visit are presented in Appendix B.

The site is a roughly triangular shaped piece of land extending to an area of approximately 5.60ha.

The site is bounded to the west by Higham Lane, to the north east by Capitol Close and to the south east by Whinby Road. However, there are no substantial physical boundaries between the site and the adjacent roads, apart for a low wooden fence in places and some overgrown hedging along the western boundary. The site is essentially open on all sides.

The majority of the site comprises a level engineered plateau and is currently undeveloped. The surrounding area slopes to the south east.

To the north of the site, the slope batters rise up from the plateau to the adjacent Capitol Close and the northern end of Higham Lane above, with a maximum difference in level of approximately 8.5m. To the south of the site, a batter slopes down from the site plateau to the adjacent southern end of Higham Lane and also Whinby Road below, with a maximum difference in level of approximately 8m. The plateau and batters are shown on the site plan included as Figure 3 in Appendix A.

The majority of the site is covered with short rough grassland, with small trees and saplings located mainly along the western boundary and on the south eastern batter slope. Large areas of standing water and boggy ground were noted during the inspection. Two large stockpiles are present on site, annotated Stockpile A and Stockpile B on the site plan in Appendix A. Shallow hand dug trial pits undertaken during the site inspection revealed the surface of the stockpiles to comprise grey/brown clay with gravel and occasional cobbles of mainly siltstone. Further small stockpiles were noted on site and comprised either clean rounded gravel, large concrete boulders, or a mixture including concrete, broken manhole rings, large broken bitmac fragments and timber.

Manhole covers were noted through the centre of the site and are highlighted in the yellow hatched area on the site plan in Appendix A. In addition, an assumed gravel drain was noted following the base of the batter around the perimeter of the site plateau. Further manhole covers were noted periodically along the run of the drain.

The site is located in an area of mixed commercial and industrial use, with open fields immediately to the north, and more commercial development further north. The town of Dodworth is located to the south and the M1 motorway to the east, with Barnsley beyond.



1.6 Development Proposals

It is proposed to redevelop the site with four commercial units.

A proposed development plan is available, which is referenced below, and a copy is contained in Appendix A.

- The Harris Partnership. Capitol Park, Junction 37 - M1, Higham Lane, Barnsley. Proposed Development. Job-Dwg No. 14120-14. Rev. B.

1.7 Previous Reports

The following previous reports were available for review:

- FWS Consultants. November 1998. Contamination Investigation of a site adjacent to Junction 37, M1 Motorway, Dodworth near Barnsley.
- Sirius Geoenvironmental Appraisal. September 2005. Land Adjacent to Junction 37, M1, Dodworth, Barnsley (ref. C0855).

The above reports covered a much larger area than the current subject site and were undertaken prior to the site regrade. Both reports included extensive intrusive investigations with approximately 25 No. exploratory trial pits and rotary boreholes covering the current site.

The relevant trial pits encountered topsoil over made ground, to a maximum depth of 1m. The made ground generally comprised sandy gravelly clay, with the gravel comprising clay pipe, coal, brick and ceramic tiles. Below the topsoil and made ground, firm to stiff clay, derived from weathered Coal Measures strata was encountered to a maximum depth of 2.7m, over bedrock.

Deeper made ground, to a maximum depth of 3.6m, was identified on the larger site. However, this is now beyond the current site boundary.

Rotary boreholes proved Coal Measures strata to 30m depth and also the presence of several coal seams. However, no evidence of workings, in the form of voids, broken ground or soft push material were encountered.

Only a single elevated PAH and single leachable zinc were recorded at one location from the within the current site boundary and one groundwater sample was found to have slightly elevated chromium, lead, copper and nickel. Further slight potential contamination was recorded and discussed in the above reports, but the areas now fall outside the current site boundary.

With regard to the identified slight potential contamination, no areas of concern were identified within the current site boundary and no remediation measures were recommended for this area.

As part of the investigations, gas monitoring was undertaken. Elevated carbon dioxide, along with positive flows were measured. It was concluded gas protection measures should be installed.



1.8 Site Regrade

Between approximately 2005 and 2007, the site was regarded as part of the works associated with the larger site covered in the Previous Reports section discussed above. A brief description of the understood site preparation works is given below:

- Re-levelling to prepare for redevelopment. Including a site scrape to remove all softened (weather effected) material and vegetation prior to carrying out any works. The materials removed from site to a suitably licensed facility.
- Carry out notional cut and fill to achieve formation levels required. Remove any surplus materials from site or make up quantity with granular imported as appropriate. Lift all surfacing materials and crush these materials to a grading of 75mm down paying particular attention to remove deleterious materials. Retain these materials for later reuse on site.
- Construct formations and surfaces.
- Remove all arisings from site.
- Excavate area to the base of made ground.
- A suitable qualified engineer to carry out a visual and olfactory assessment of all excavated soils. All identified contaminants shall be removed from site to be disposed in a suitably licensed facility.
- All excavations monitored to check for the possible unrecorded workings in the coal outcrops, or unreported shafts.
- Coal outcrops mapped accurately.
- Monitor for the presence of unrecorded mine entries.

1.9 Limitations

The general limitations to the nature of the investigation are outlined in Appendix F.

2.0 SITE HISTORY

Historical plans for the site were prepared by Groundsure (GS) and obtained through Centremaps. These have been reviewed in order to establish any former uses of the site and identify any potentially contaminative historical uses, or potential geotechnical constraints to the proposed development.



A summary of the relevant map information is presented in Table 2 and copies of relevant plans are presented in Appendix C.

Table 2 – Summary of Relevant Historical Map Information

Date(s) & Scale	Feature.
1850 1:10,560	Most of the site comprises open fields. The site covers numerous sections of larger open fields. Neither the north eastern or south eastern site boundaries are present at this time. The western boundary comprises Dodworth Lane, which is presumed to be the currently present Higham Lane. An assumed farm comprising several buildings, annotated Lane Head, is located spanning the north western corner of the site. Abutting midway along the western boundary are further unnamed and assumed agricultural buildings. An east to west trending footpath crosses the centre of the site and terminates at Lane Head. The site is in a rural area, but the north east to south west trending Lincolnshire Railway passes approximately 25m to the south of the site and is assumed to be the currently present railway in this location. An old quarry (sandstone) is marked at approximately 500m to the east of the site.
1891 1:10,560 1893 1:2,500	Except for a track/footpath shown crossing centre of site to the farm buildings abutting the western boundary, no significant changes are shown on the site. Beyond the site, Higham Lane, abutting the outside of the western boundary of the site is now named. Church Lane Colliery (Old Silkstone Collieries on later plans) with associated reservoirs, coke ovens (labelled on later plans) and spoil heaps, is shown approximately 400m-450m to the south west.
1904 1:10,560 1906 1:2,500	No significant changes are shown on the site, or beyond. Except for residential growth of the village of Dodworth to the south of the site, there are no significant changes.
1929 1:10,560 1938 1:10,560 1948 1:10,560 1956 1:10,560	Alterations to the internal field boundary is shown and growth of spoil heap to west. Slight modifications to the internal field boundaries, mainly close to the farm buildings mid-way along the western boundary is noted during this period. Also, the spoil from the colliery to the west, edges eastwards towards the boundary of the site. An aerial cable, presumably to transport spoil to the top of the spoil heap is shown, terminating near Higham Lane.
1961 1:2,500 1966 1:2,500	There are additional assumed farm buildings and growth of spoil heap to west. A number of assumed agricultural buildings have been constructed mid-way along the western boundary of the site and the area to now be named Low Head Farm. Except for small enclosures close to the farm buildings themselves, the site is now essentially a single open areal of land. The spoil heap associated with Old Silkstone Collieries (now annotated as mine only), is now shown to be a considerable size, with the edge abutting the western side of Higham Lane.
1970 1:2,500	Additional Farm buildings are shown on site. The construction of the motorway to east is shown. Two large assumed barn buildings constructed between Low Head and Low Head Farm and the two farms essentially merge as Low Head Farm. Beyond the site, at approximately 150m to the north east, evidence of construction of the M1 motorway can be seen, with associated railway diversion toward new motorway bridge.
1977 1:10,000 1979 1:1,250	No significant changes are shown on the site, or beyond.
1982 1:10,000 1982 1:2,500	No significant changes are shown on or beyond the site. The spoil heap to west of site is shown to be wooded.
1991 1:1,250 partial coverage 1991 1:2,500 partial coverage 1993 1:1,250 partial coverage 1993 1:2,500 partial coverage 1993 1:10,000	No significant changes are shown on the site. The mine, to west of site is shown as demolished and a number of assumed commercial units are shown.
2002 1:10,000	No significant changes are shown on. Further assumed commercial units are shown constructed on former mine site to west.
2010 1:10,000 2014 1:10,000	The buildings previously on site have been demolished. No significant changes beyond site. All buildings associated with Low Head Farm demolished and site shown as open undeveloped land, and assumed to be representative of current site conditions.



In summary, the whole of the site has remained farmland, with associated buildings across the north western corner of the site, since the mid-1800s. The farm buildings are shown as demolished from around 2010 and this is presumed to coincide with the site regrade. A railway line has been present 25m to the south of the site since the mid-1800s. Old Silkstone Collieries was present approximately 450m to the south west of the site since the late 1800s, with an associated spoil heap which grew over the preceding years towards the site. The colliery was demolished in the early 1990s.

There is no indication of any potentially contaminating use of the site and the site has also been subject to an extensive regrade. But there is possibility that contamination may be present in any remaining fill material used on the area of the former farm. Also, subject to the extent of the recent site regrading works, there may also be the legacy of buried structures, foundations and services and possible basement structures. In addition, asbestos may have been present in the farm buildings.



3.0 SITE SETTING

3.1 Geology

The GS report and the following BGS maps have been consulted:

- British Geological Survey 1:50,000 Series. Sheet 87 Barnsley. Bedrock and Superficial Geology Edition. Published 2008.

Most of the site is underlain by Pennine Middle Coal Measures Formation, from the Carboniferous Period, comprising sandstone and undifferentiated strata (interbedded sequences of sandstone, siltstone, mudstone and coal seams). Close to the northern corner of the site, the little Haigh Moor Rock (sandstone) is present, also from the Carboniferous Period. There is no drift cover indicated on site and no faults are shown to affect the site.

Two coal seals are shown to outcrop on site. Both trend in a north west to south east direction with the more northerly outcrop being the Top Haigh Moor Coal and the southerly outcrop being Low Haigh Moor Coal.

An area of made ground is indicated 16m to the west of the site and this is presumed to be the colliery spoil heap identified on the historical plans.

Historical trial pit information has been obtained from the BGS. There are records of 13 trial pits on site.

They revealed either topsoil to depths of between 0.2m and 0.35m, or disturbed ground comprising clayey topsoil, clay with sandstone or coal, to depths of between 0.15m and 1.0m.

Natural strata were proven at all the historical trial pit locations and comprised firm to very stiff orangey brown and grey mottled slightly silty clay with gravel locally including siltstone, coal and ironstone nodules, to depths of between 0.55m and 2.10m. The underlying bedrock comprised siltstone, and locally sandstone, overlying shale. All the historical trial pits remained dry and stable.

Copies of the trial pit logs, and a location plan are contained in Appendix D.

3.2 Mining/Underground Working

A Coal Mining Report has been obtained from the Coal Authority, which states the following:

- According to the available records the property is in a surface area that could be affected by underground workings in six seams of coal at 70m to 280m depth and last worked in 1967. Any ground movement in the ground due to coal mining activity should have stopped.



- However, the property is in an area where the Coal Authority believe there is coal at or close to the surface, which may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity.
- The property is not within a surface area that could be affected by present underground mining.
- The property is not in an area for where the Coal Authority has plans to grant a licence, or has granted a licence, to remove coal or otherwise work coal using underground methods.
- The property is not in an area that is likely to be affected at the surface from any planned future workings. However, reserves of coal exist in the local area which could be worked at some time in the future.
- There are no known coal mine entries within, or within 20m of, the boundary of the property. There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.
- The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.
- The property is not within 800m of the boundary of an opencast site from which coal has been removed by opencast methods.
- The property does not lie within 200m of the boundary of an opencast site from which coal is being removed by opencast methods.
- The property is not within 800m of the boundary of an opencast site for which the Coal Authority is determining whether to grant or has granted a licence to remove coal by opencast methods.
- There is no record of a mine gas emission requiring action by the Coal Authority.
- The property has not been subject to remedial works by, or on behalf of, the Authority.

A copy of the Coal Mining report is presented in Appendix E.

Rotary boreholes undertaken during previous site investigation, proved coal measures strata to 30m depth and also the presence of several coal seams. However, no evidence of workings, in the form of voids, broken ground or soft push material were encountered.

3.3 Hydrogeology

The bedrock underlying the site is classified as a Secondary A Aquifer. These aquifers generally comprise permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

There are no groundwater abstraction licences within 1km of the site.

The site does not lie within an Environment Agency Groundwater Source Protection Zone.



3.4 Hydrology

The nearest surface water feature is a drain (Tertiary River) at approximately 12m to the west of the site, beyond Higham Lane.

There are no surface water abstraction licences within 1km of the site.

There are no recorded potable water abstractions licence within 1km of the site.

There are no discharge consents, red list discharge consents, or Water Industry Referrals (potentially harmful discharges to the public sewer) within 250m of the site.

Information on the EA website and presented in the GS report indicates that the site does not lie within a floodplain.

There are BGS groundwater flooding susceptibility areas within 50m of the site, and likely to be associated with unconfined aquifers. This classification is based on the geological information available to the BGS for the site at the present time. The BGS confidence level in their assessment is high, but the actual susceptibility and the risk of groundwater flooding occurring at the site should be assessed based on site specific information.

A flood risk assessment may be required by the Local Authority as part of any planning application for the site.

3.5 Pollution Incidents

There are no Environment Agency List 1 or List 2 recorded pollution incidents within 250m of the site.

3.6 Landfill and Waste

The GS report includes information on active and former landfill sites supplied by the Environment Agency, Landmark, Local Authority and the BGS.

There are no records of any currently licenced or historical landfill sites with 250m of the site.

There are three entries in the Other Waste section of the GS report, referring to the spoil heaps associated with the former colliery to the west. The heaps are listed at 6m, 144m and 197m to the west of the site.

3.7 Environmental Permits, Incidents and Registers

There are no records of any historic Integrated Pollution Control (IPC) authorisations within 500m of the site.

There are no recorded Part A(1) and Integrated Pollution Prevention Control (IPPC) authorised activity within 500m of the site.



There are no active Part A(2) or Part B permitted activities and enforcements within 500m of the site.

There are no records of any List 1 or List 2 Dangerous Substances Inventory Sites within 500m of the site.

There are no Category 3 or 4 Radioactive Substances Licence within 500m of the site.

There are no recorded Control of Major Accidents Hazard (COMAH) or Notification of Installations Handling Hazardous Substances (NIHHS) sites within 500m of the site.

There are no National Incidents Recording System List 1 or List 2 records within 250m of the site

The site is not determined as contaminated Land under Part IIA EPA 1990.

3.8 Radon Risks

The property is in a Radon Affected Area, as 1% to 3% of properties are above the Action Level. However, no radon protective measures are necessary.



4.0 ENVIRONMENTAL RISK ASSESSMENT

4.1 Introduction

The presence of contaminated materials on a site is generally only of concern if an actual or potentially unacceptable risk exists.

The statutory definition of contaminated land is given in the Environmental Protection Act, Part IIA, Section 78, 1990, which was introduced by the Environment Act, Section 57, Department of Environment, 1995 and is defined as:

Land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that:

- Significant harm is being caused or there is a significant possibility of such harm being caused (where harm is defined as harm to health of living organisms or other interference with the ecological systems of which they form a part and, in the case of man, includes harm to his property); and/or
- Significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused (by the land).

The potential for harm to occur requires three conditions to be satisfied:

- **Sources** – The presence of substances (potential contaminants/pollutants), in or under the ground, that may cause harm or pollution.
- **Receptors** - The presence of a receptor which may be harmed, e.g. the water environment or humans, buildings, fauna and flora; and
- **Pathway** - The existence of a linkage between the Source and the Receptor.

In order to assess the contamination risk at the site, the above rationale has been applied and is discussed in the context of Contamination Sources and Potential Pollutant Linkages.

4.2 Potential Sources

The site is proposed for commercial redevelopment.

Until the site regrade, undertaken in the mid-2000s, the site had remained farmland from at least the mid-1800s and included numerous assumed farm buildings across the north western corner of the site.

Previous investigation did not encounter any areas of concern across the site. In addition, it is understood all the buildings and made ground were removed from site during the regrade works. However, two large stockpiles, several smaller stockpiles are currently present on site. A large colliery spoil heap is present to the west of the site.



Based on the above, and the findings of the desk study, the following potentially contaminative sources may be present on the site:

- Made ground associated with site history, site regrading and stockpiles.
- Hazardous gases/soil vapours associated with made ground.

Potential contaminants which could be present on and beneath the site are listed below:

- Metals, metalloids and their compounds.
- Inorganic compounds.
- Polycyclic Aromatic Hydrocarbons (PAH).
- Asbestos.
- Hazardous Gases.

4.3 Potential Pathways

Based on the available information and the proposed redevelopment of the site for a commercial end use, the following potential exposure pathways will require consideration, both during the redevelopment works and on completion of the construction:

- Ingestion and dermal contact with contaminated soil and groundwater.
- Inhalation of hazardous gases.
- Leaching/migration of contaminants from soil into groundwater and surface water via surface flow.
- Permeation of water supply pipes and other services by organic and aggressive contaminants.
- Uptake of contaminants by planting in landscape areas.

4.4 Potential Receptors

The potential receptors considered are:

- Development workers and future maintenance workers involved in excavations, e.g. foundations or where services are being installed or repaired following development.
- Future end users of the site (i.e. employees and customers).
- The underlying Secondary A Aquifer.
- The nearby drain (Tertiary River).
- Buildings and services.
- Planting in landscape areas.



4.5 Pollutant Linkage Assessment

A potential pollutant linkage assessment has been completed and is summarised in the Conceptual Site Model which is presented as Figure 4 in Appendix A. This is based on the proposed redevelopment of the site for a commercial end use.

On the basis of the proposed end use and known history of the site, the following potential pollutant linkages may be present:

- Development and maintenance workers and site end users, i.e. employees and customers, could come into contact with soils containing elevated concentrations of potential contaminants and hazardous gases.
- The underlying Secondary A Aquifer and nearby drain (Tertiary River) could become contaminated due to the leaching and migration of contaminants from soil via infiltration or surface run-off.
- Buildings and services could be affected by potentially aggressive contaminants in the soils; and
- Planting in landscape areas could be affected by phytotoxic elements within the soils.

These are based on current site conditions and do not consider exposure pathways following any further remediation of the site.

If the site can be shown to pose no “significant harm” or pollution to controlled waters, then the site can be considered to be uncontaminated.

4.6 Risk Classification

Based on the potential pollutant linkages present on the site, the site should be considered to be low risk with respect to potential contamination. This designation will be largely dependent on the nature of any made ground.

In order to fully assess and classify the risks to human health, underlying aquifer and buildings/services, a Phase 2 Intrusive Investigation, including chemical testing of soils and groundwater and gas monitoring will be required.



5.0 PRELIMINARY ENGINEERING ASSESSMENT

5.1 Development Proposals

It is proposed to redevelop the site with four commercial units.

A proposed development plan is available, which is referenced below, and a copy is contained in Appendix A.

- The Harris Partnership. Capitol Park, Junction 37 - M1, Higham Lane, Barnsley. Proposed Development. Job-Dwg No. 14120-14. Rev. B.

5.2 Mining

The site lies within an area where it is believed that coal is present close to the surface, which may have been worked at some time in the past. Borehole investigations undertaken previously did not encounter any workings in the in the form of voids, broken ground or soft push material. The risk to the site from instability due to mining is therefore considered to be low.

5.3 Foundations

Due to the site history and site regrading, made ground will be present on the site.

Based on the information presented in the GS report and the geological plan, ground conditions are likely to comprise made ground, underlain by weathered middle Coal Measures comprising undifferentiated strata (interbedded sequences of sandstone, siltstone, mudstone and coal seams).

The suitability of the made ground to support structural loads will depend on the selection of materials and the compaction applied as part of the regrading works. The made ground may be unsuitable for the support of structural loads due to variations in material properties. If shallow spread foundations were to be used, the made ground would become over-stressed, leading to significant settlements. Foundation loads will require transferring to natural strata of suitable bearing capacity. The existing properties of the made ground would need to be subject to further investigation and possible further treatment before use as a formation material.

For the underlying natural strata, the selection of foundation type for the proposed development would be governed by the thickness of the made ground and the strength and settlement characteristics of the natural material, which will need to be confirmed.

If weathered bedrock is present at shallow depth, then strip or pad foundations are likely to be suitable. The whole plan area of the foundation should be placed on similar material, and should be deepened accordingly as necessary.



If the shallow natural strata prove unsuitable, i.e. too weak or compressible, then consideration could be given to the adoption of deeper foundations such as trench fill or stone columns.

5.4 Ground Floor Construction

The nature and thickness of any made ground and the properties of the natural soils will need to be investigated to determine if ground bearing floor slabs can be used. Additional ground improvement may be required for existing made ground to be used to support slabs.

5.5 Groundwater

It may be expected that shallow perched groundwater will be encountered within the made ground and natural strata. The presence of groundwater will need to be assessed as part of any ground investigation.

5.6 Obstructions

The presence of obstructions in the made ground associated with the previous construction and site regrading may be anticipated. These may influence the implementation of any foundation solution and may have to be broken out and removed prior to the commencement of construction.

5.7 Excavations

Excavations through any made ground and natural ground may be unstable and temporary side support is likely to be required.

5.8 Roads, Pavements and Hardstanding Surfaces

It is recommended that at this stage, a conservative bearing value for the sub-grade is used, until the nature of the sub-grade can be physically assessed.

5.9 Chemical Attack on Buried Concrete

Samples of made and natural ground should be obtained and submitted to the laboratory for testing in order to assess the sulphate content and acidity and hence the concrete class required for buried concrete to the latest standard.



6.0 FURTHER INVESTIGATIONS

In order to assess the potential environmental and geotechnical constraints to the proposed development. It is recommended that the following investigative works should be carried out:

- Trial pitting in order to assess the shallow ground conditions at the site and confirm the composition, extent, depth and nature of the made ground and underlying natural strata. And to also investigate the onsite stockpiles.
- Cable percussion or window sampling formed boreholes with in situ tests to provide geotechnical information in order to assess the nature of the sub-surface and confirm the depth and distribution of any made ground. These boreholes will also facilitate the installation of gas and groundwater monitoring wells.
- Chemical analysis of soil and water samples in order to determine the concentrations of potential contamination on the site.
- Geotechnical testing to classify materials and inform foundation design and chemical testing to determine the Aggressive Chemical Environment for Concrete classification.
- Monitoring of gas and groundwater wells for hazardous gases, methane, carbon dioxide, and oxygen and flow rate to the requirements of the Local Authority.

J Parkinson
BSc

For and on behalf of JPG (Leeds) Limited

May 2016



Appendix A Figures/Drawings

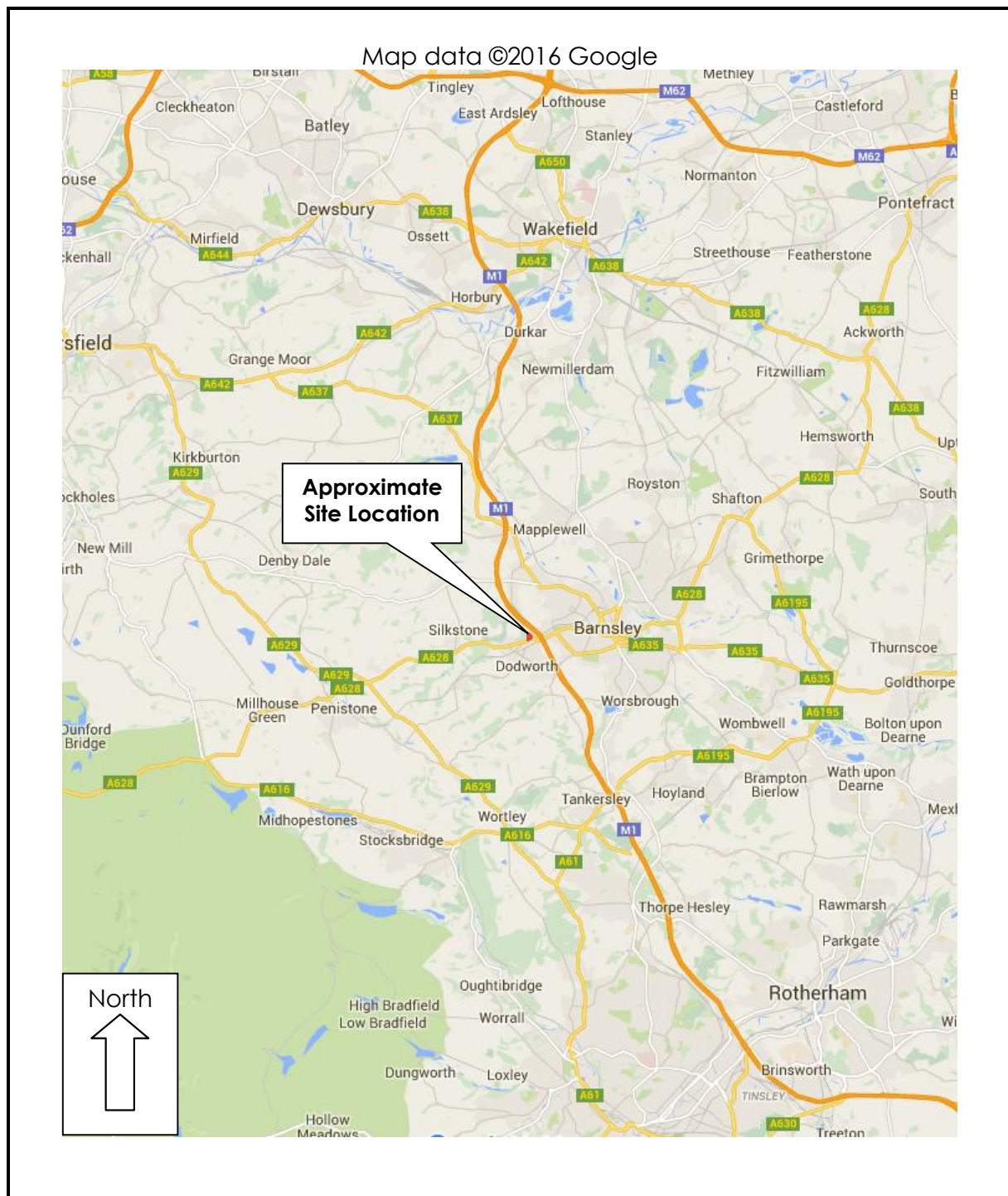


Figure 1 – Site Location Plan

Site	Capitol Park, Junction 37 - M1, Barnsley
Client	Commercial Developments Projects Limited
Job Number	2450
Scale	NTS

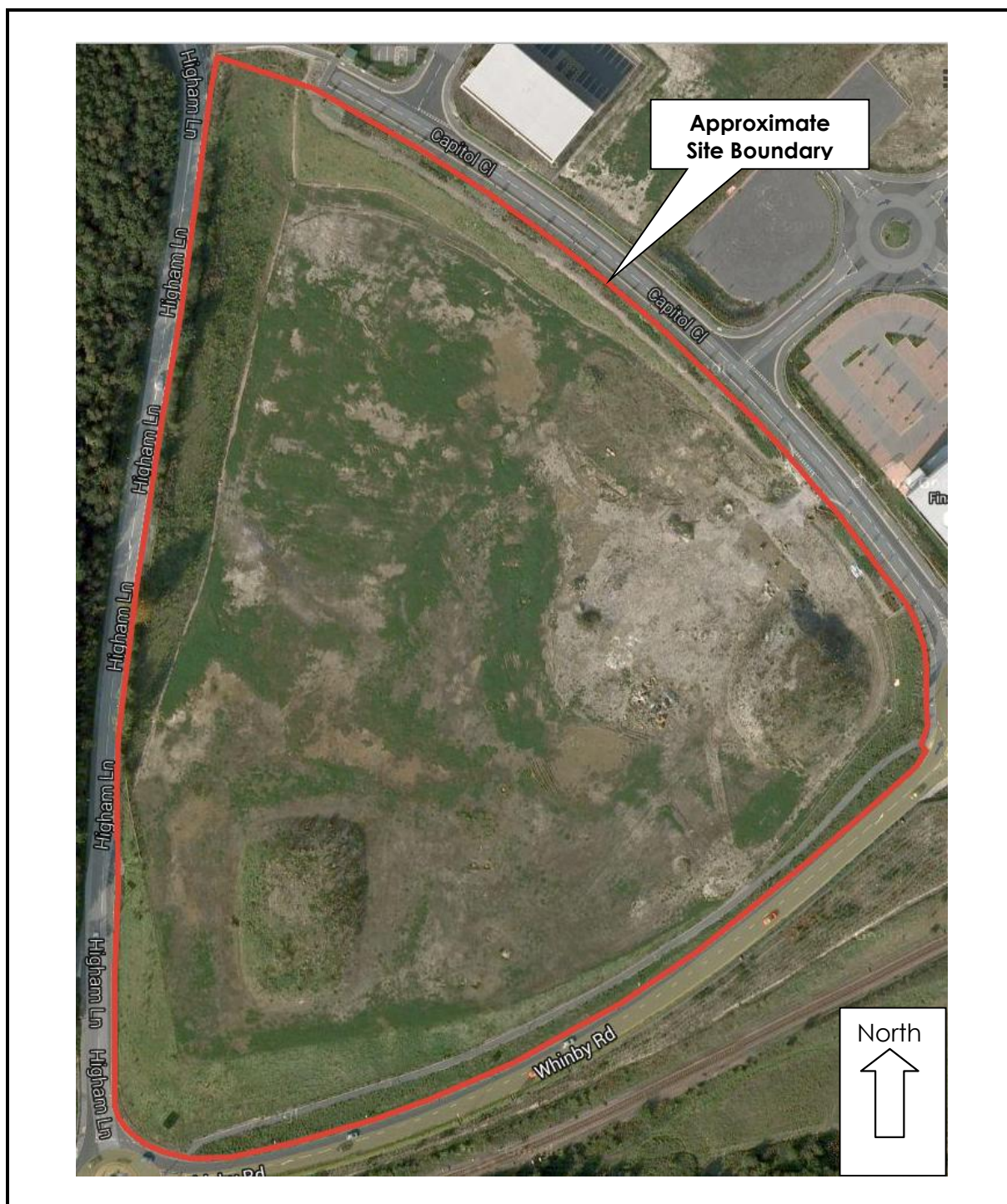


Figure 2 – Aerial Photograph

Site	Capitol Park, Junction 37 - M1, Barnsley
Client	Commercial Developments Projects Limited
Job Number	2450
Scale	NTS

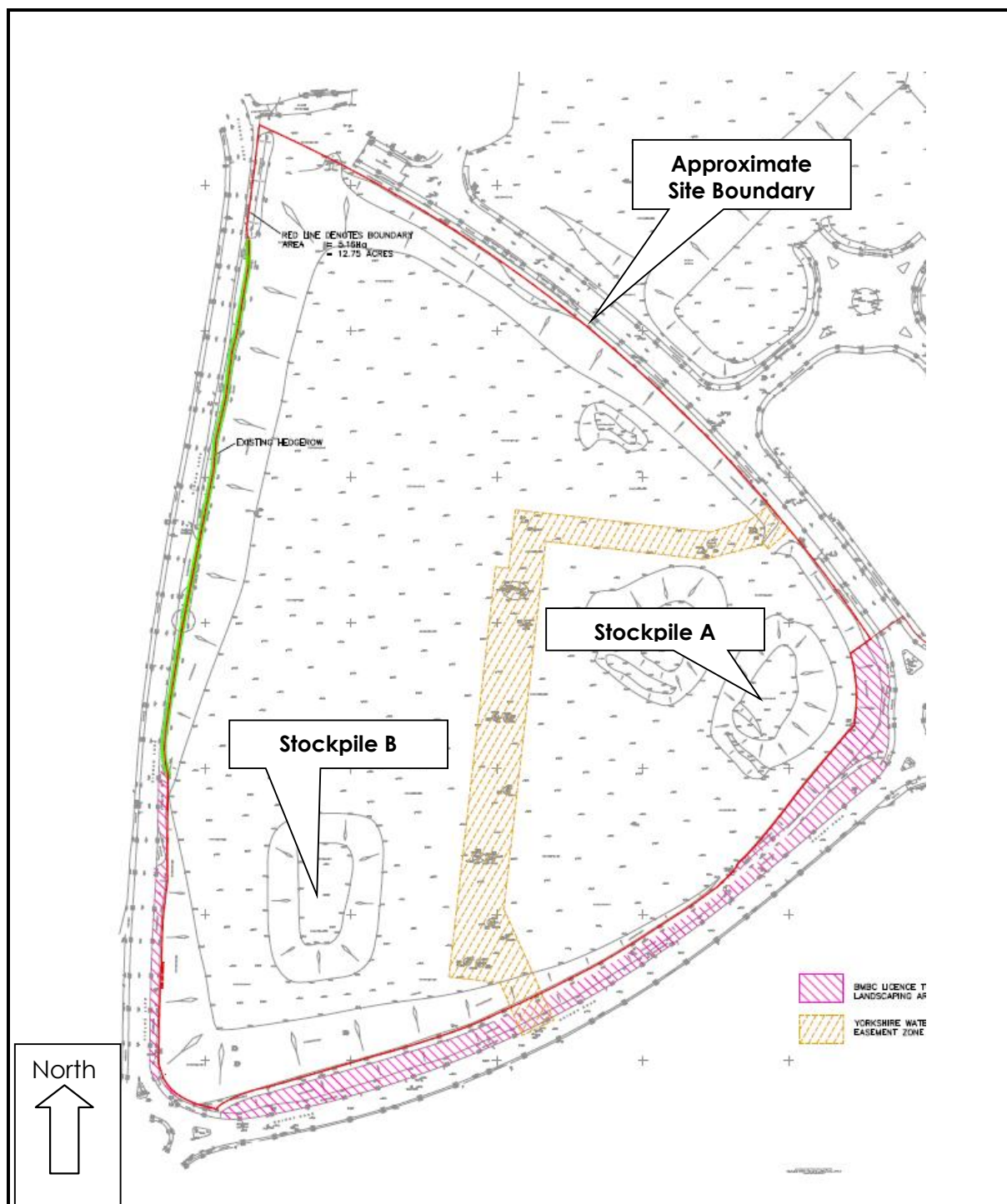


Figure 3 – Site Plan

Site	Capitol Park, M1 Junction 37, Barnsley
Client	Commercial Developments Projects Limited
Job Number	2450
Scale	NTS

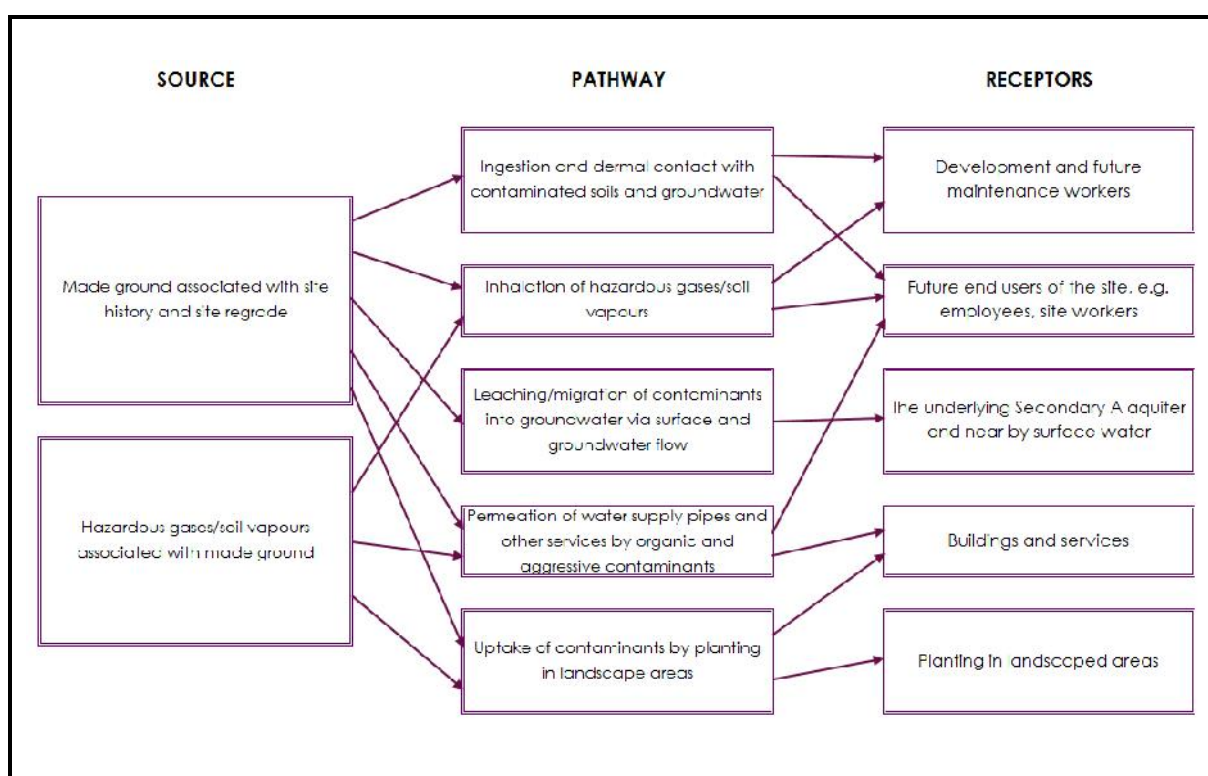
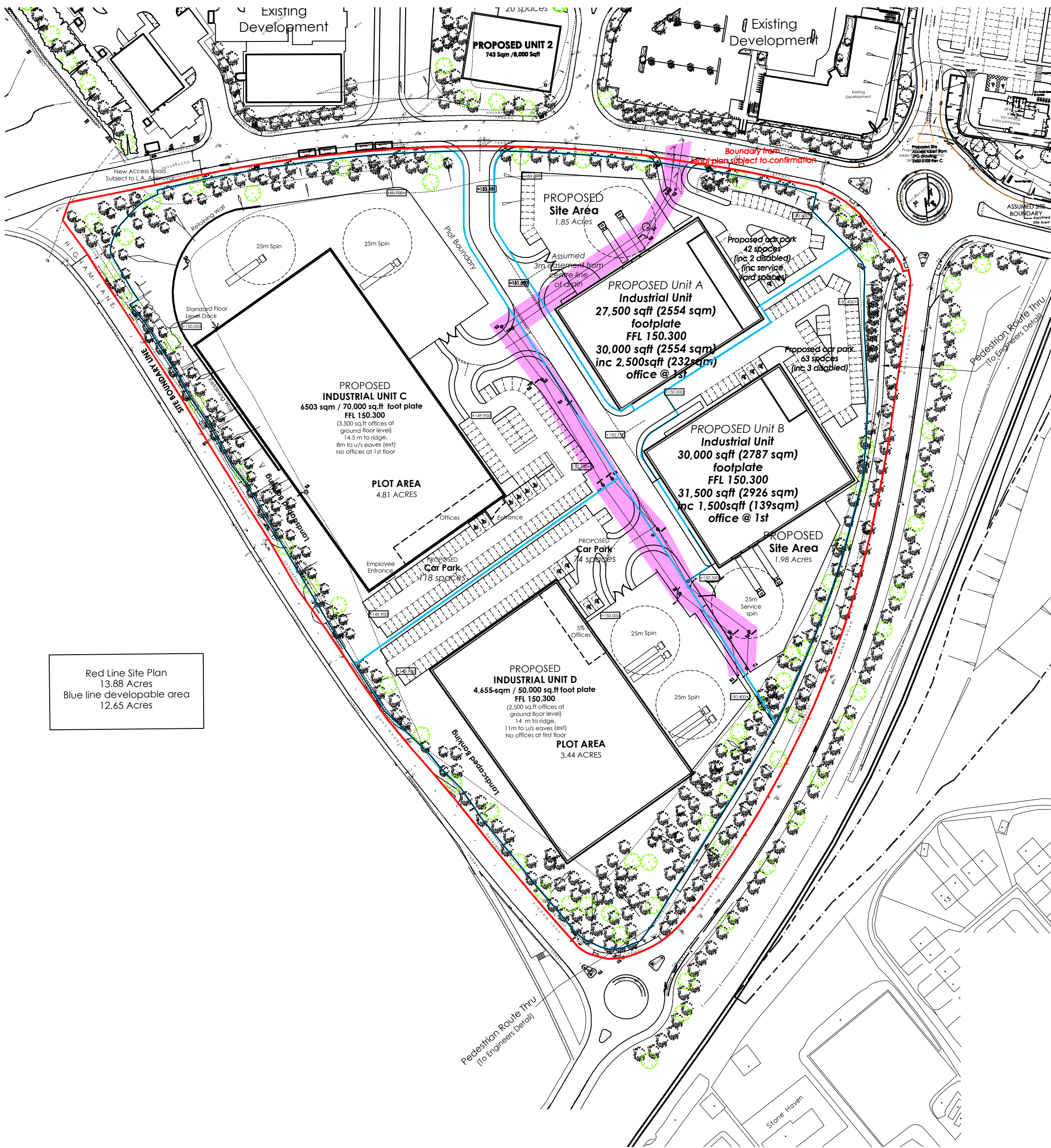
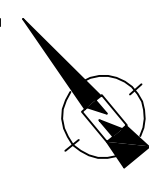


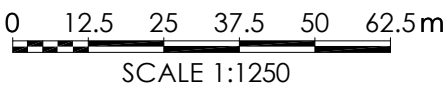
Figure 4 – Conceptual Site Model

Site	Capitol Park, Junction 37 - M1, Barnsley
Client	Commercial Developments Projects Limited
Job Number	2450

PROPOSED DEVELOPMENT
Capitol Park, Higham Lane, Barnsley



Red Line Site Plan
13.88 Acres
Blue line developable area
12.65 Acres



Note:
Information is based on OS map and received information and is subject to full topographical and building survey.
Assumed site boundary and site constraints subject to confirmation.
All Legal easements and extent of existing underground services locations are subject to confirmation.

SITE PLAN

Project Title	PROPOSED DEVELOPMENT		
	Capitol Park Junction 37 - M1 Higham Lane Barnsley		
Client	CDP		
Status	INFORMATION		
Scale	1:1250	Drawing Size	A2
Date	00/00/0000	Drawn By	ASR
		Checked	PSM

Rev	Date	Description	Rev By	Chk'd By
B	26.04.16	Drawing rescaled and site areas added	PRW	PSM
A	21.04.16	FFL added, services areas revised to Units A and C	PRW	PSM
Drawing Title: DRAWING-TITLE				
Job-Dwg No: 14120-14			Rev	B
2 St. Johns North, Wakefield, WF1 3QA t. 01924 291800 ☐ Carvers Warehouse, 77 Dale Street, Manchester, M1 2HG t. 0161 2388555 ☐ The Old Rectory, 79 High Street, Newport Pagnell, MK16 8AB t. 01908 211577 ☐ 101 London Road, Reading, RG1 5BY t. 0118 9507700 ☐ 10 Gees Court, St Christophers Place, London, W1U 1JJ t. 0207 4091215 THE HARRIS PARTNERSHIP ARCHITECTS www.harrispartnership.com				