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Phase 2 Geo-environmental Report

ON

PROPOSED UNIT

AT

FLUSH MILLS, HECKMONDWIKE

FOR

CLECKHEATON CONSTRUCTION

APRIL 2020

E19/7577/R001

Prepared by

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0.0 EXECUTIVE SUMMARY

SITE	The area to be developed forms part of the industrial estate to the north of the A638 Flush, Heckmondwike. At the time of the site investigation, demolition works had already begun on site. The majority of roof and internal walls had been removed. The concrete floor slabs were intact, with the western floor slabs set lower than the northern and eastern floor slabs. An electrical substation was being reconstructed in the south west of the site.
HISTORY	The site was shown as part of Victoria Colliery from 1892-1931 where it was redeveloped as part of Flush Mills. There was gradual redevelopment of the Flush Mills industrial estate from 1931 to the present day. From 1892, two mill ponds were shown encroaching on the north western boundary, these were gradually built over as part of the industrial development, with the last pond still remaining in 2002.
GEOLOGY	No areas of made ground or superficial strata were shown overlying the site. The site is underlain by the Pennine Lower Coal Measures consisting of Mudstone, Siltstone and Sandstone. The trial pits proved up to 2.8m of made ground and clays over the majority of the site with a sandstone or mudstone bedrock. In the north of the site, a depth of 3.4m of fill was encountered, presumably in the footprint of the former mill ponds. The boreholes undertaken proved alternating bands of mudstone and sandstone to a depth of 30m.
MINING/QUARRYING	The Mining Risk Assessment for the site identified two mineshafts located beneath the proposed development. There is potential for a thick coal seam to have been worked at shallow depth beneath the north eastern corner of the site. The rotary borehole investigation found no coal seams or evidence of mine workings up to 30m below the site. Both mineshafts were located on site. One was found to have been infilled with concrete rubble and capped with a 3.2-3.7m thick concrete plug. The second was filled with water and had a cap made of steel beams and concrete.
HYDROLOGY	There are no open surface water features recorded within 250m of the site.
HYDROGEOLOGY	The bedrock underlying the site is classified as a Secondary (A) aquifer.

Perched groundwater was found within the former footprint of the mill ponds in the north of the site.

During the drilling of the deeper boreholes, the groundwater level was noted to settle around 5.5-5.7m below existing ground levels. During the gas monitoring, water levels have been recorded at 1.75m-4.0m below existing ground levels, this is assumed to be perched surface water run-off.

HAZARDOUS GAS

The property is not in an area requiring radon protection measures.

A maximum carbon dioxide concentration of 1.9% and no methane was recorded in BH03. No flow rates have been detected during the monitoring.

Based on the maximum concentrations and gas flow rates measured to date, the gas regime found on this site can be classified as Green, or CS1 by BS 8485:2015

CONTAMINATION

No elevated levels of phytotoxic or heavy metals or PAH compounds were recorded in the samples taken from site.

No asbestos fibres were recorded in the samples taken from site.

REMEDIATION

It is proposed to reduce ground levels on site to accommodate the proposed floor construction to the new industrial unit. All fill material and made ground should be removed from site to a suitable licensed waste facility.

The second shaft is to be infilled in accordance with Ciria SP32 specifications and Coal Authority guidelines. Both shafts are to be capped to Coal Authority approved designs with a validation report prepared upon their completion.

FOUNDATIONS

Due to the shallow nature of the foundations to the boundary walls, the depth of made ground and the presence of the mine shafts, we would suggest that the industrial unit should be constructed on strip/trench fill and pad footings founded entirely onto the weathered mudstone to avoid the transfer of loadings to the mineshafts and boundary walls.

Consideration should be given to piled pad foundations, or phased excavations of the isolated pad footings adjacent the northern boundary wall.

1.0 INTRODUCTION

- 1.1 As requested by Cleckheaton Construction, this practice carried out ground and contamination investigation works to the proposed redevelopment of Unit 17 at Flush Mills, Westgate, Heckmondwike.
- 1.2 The purpose of the report was to:-
 - 1.2.1 Identify the nature of the near surface strata, in order to enable recommendations to be made as to the most economic foundation solution for the proposed residential development.
 - 1.2.2 To identify any areas of contaminated ground.
 - 1.2.3 Determine if ground gas migration from areas of infilled land and shallow mineworkings in the vicinity would adversely affect the site.
 - 1.2.4 Determine if shallow mineworkings or mineshafts would adversely affect the site.
- 1.3 Soil sampling was undertaken via trial pits to determine the near surface strata. Distributed samples were taken for testing to ascertain the nature of the soils and fills present.
- 1.4 The conclusions and recommendations made in this report are limited to the findings of the preliminary Geotechnical Survey. The report is made on condition that Haigh Huddleston Associates will not in any circumstances be liable for loss, arising directly or indirectly from ground conditions encountered between trial pits and boreholes, which have not been revealed by the investigation.
- 1.5 Any opinion given on the possible configuration of strata between trial pit and borehole locations and below maximum depth of the investigation is for guidance only. Any remarks on groundwater conditions made are based solely on observations made at the time of investigation. Kindly note that levels may differ from those reported due to seasonal variations or other influences.
- 1.6 Furthermore, there is the possibility that any trial pits or boreholes undertaken as part of the investigatory works may be within the influence of existing or proposed foundations or excavations. Haigh Huddleston Associates cannot be held responsible for any failure of any excavations, foundations or structures within the influence of the trial pits, boreholes or window samples.

2.0 THE SITE

- 2.1 The area to be developed is located in a small industrial area to the north of the A638 Flush, Heckmondwike and is situated around Ordnance Survey grid reference 421345, 423734. A site location plan is included in Appendix A.
- 2.2 The site is approximately rectangular in shape with shorter southern and northern boundaries. There are further industrial units to the north and west and residential properties to the east and south east. An electric substation was being reconstructed at the south western corner of the existing unit.
- 2.3 At the time of the site investigation, demolition works had already begun on site. The majority of roof and internal walls had been removed. The concrete floor slabs were intact, with the western floor slabs set lower than the northern and eastern floor slabs.
- 2.4 The entire unit is to be demolished, concrete floor slab and levels reduced to accommodate a new steel frame industrial unit with concrete floor.
- 2.5 The western and northern boundaries are formed by industrial units, an approximately 3m brickwork wall with buttressing forms the eastern boundary and the south is open to the remainder of the industrial estate.

3.0 SITE HISTORY

A number of historical Ordnance Survey plans from 1854-2014 have been consulted. These are contained for reference within Appendix C to the rear of the report. Below is a brief description outlining the significant developments that may effect future construction of the site.

	Historical uses on site	Historical findings within 100m perimeter of the site	Historical findings further than 100m perimeter of the site
1854	i). The site is shown as open ground.	i). Flush Mills immediately west and south west of site. ii). Residential properties east of site.	i). No significant features further than 100m from site.
1892-1905	i). Site shown as part of Victoria Colliery which extends northwards.	i). Two mill ponds immediately north west of site, possibly encroaching on boundary. ii). Buildings shown to south of site.	i). No significant features further than 100m from site.
1931-1967	i). Victoria Colliery no longer shown. ii). Flush Mills building has extended to cover site.	i). Groundworkings immediately north of site from former colliery. ii). Only one mill pond north west of site.	i). No significant features further than 100m from site.
1975-2002	i). Building configuration changed on site.	i). Industrial buildings extended to north over former colliery ground workings.	i). No significant features further than 100m from site.
2010-2019	i). The on-site features are similar to previous sheet.	i). Industrial buildings now shown over former pond to north west.	i). No significant features further than 100m from site.

4.0 SITE GEOLOGY & MINING

- 4.1 The BGS Digital Geological Map of Great Britain at 1:10,000 scale has been consulted and we would report as follows:-
- 4.2 There are no areas of made ground or superficial strata shown overlying the site.
- 4.3 The site is shown to be underlain by the Pennine Lower Coal Measures Formation consisting of Mudstone, Siltstone and Sandstone.
- 4.4 An inferred coal seam is shown on the northern boundary of the proposed development. No outcrops are indicated here on the Coal Authority Interactive Online Map.
- 4.5 A Coal Mining Risk Assessment undertaken by JNP Group Consulting Engineers (Ref: B22583 CMRA) has been consulted and we would report as follows:
- No probable unrecorded shallow workings are indicated beneath the site.
 - Two shafts are recorded within the development area. One is recorded as having been infilled with hardcore and concrete while there are no records of treatment to the other shaft.
 - There is potential for a thick coal seam to have been worked at shallow depth beneath the north eastern area of the site to be developed.
- 4.6 It is recommended that an intrusive investigation by rotary boreholes using water flush methods is undertaken There are no recorded deep BGS boreholes in the immediate vicinity of the site.

5.0 ENVIRONMENTAL CONSIDERATIONS

5.1 Radon

The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

No Radon Protective Measures are necessary.

5.2 Landfill Sites

There are no landfill sites recorded within 250m of the site. However, a former mill pond/reservoir was located in the north western portion of the development and has been infilled with unknown material. In addition to this, the area north west of the site is recorded as being a waste transfer station dealing with electronic and electrical equipment.

5.3 Flood Risk

The site does not lie within an Environment Agency designated Flood Zone.

5.4 Groundwater

The bedrock strata is classified as a Secondary (A) aquifer. These are 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. These are generally aquifers formerly classified as minor aquifers

There are no groundwater or surface water abstraction licences recorded within 250m of the -site.

There are no licensed discharge consents within 250m of the site.

There are two recorded pollution incidents in controlled water recorded within 250m of the site. These were both Category 3 (Minor) incidents immediately north of the site and involved Chemicals/Products.

The site is not located in a source protection zone.

There are no open surface water features within 250m of the site.

6.0 PRELIMINARY CONCEPTUAL SITE MODEL

- 6.1 The initial stage in assessing the risks posed from contaminated land during the redevelopment of a site is to prepare a conceptual model. A generalised conceptual model can be developed highlighting the main pollutant linkages through a contaminant ► pathway ► receptor model for an industrial unit. In order to prepare the conceptual model for a particular site the following parameters need to be reviewed as discussed below.
- 6.2 Contamination of existing land can be caused by a number of factors, including:-
- i) Possible historical/current industrial activities.
 - ii) Disposal of waste materials.
 - iii) Storage of materials.
 - iv) A number of natural processes can also lead to hazardous gases and elevated heavy metals.
- 6.3 Potential pathways can include ground and surface water, permeable strata, existing services providing a conduit and voided ground. Potential receptors can include human health, ecosystems, controlled waters and building structures. There are a number of ways that a receptor can be exposed to the contaminant these include, inhalation, direct contact, ingestion, dermal contact and uptake.
- 6.4 The site has been shown as being in industrial usage since the earliest historical maps. There is a risk of contamination from the following:-
- i) Historical industrial usage of the site and surrounding land.
 - ii) Infill material to former mill pond north west of site.
 - iii) Potential made ground used in levelling ground beneath floor slabs/hardstanding.
 - iv) Infill material to mineshafts recorded on site
 - v) Possible ground gas migration from infill material and shallow mine workings
- The risk of existing contamination from historic activities on site is therefore considered to be moderate.
- 6.5 Considering the proposed industrial end use, there will be two possible human receptor groups exposed to the existing onsite contamination:-
- a) Site operatives during development.
 - b) End users, future site users (the critical receptor is a 17 year old female).

- 6.6 Human receptors may be exposed to site contamination by a number of possible pathways. These pathways are summarised in Table 1 below.

Table 1- Potential Human Exposure Pathways

<u>Human Exposure Pathway</u>	<u>Site Residents</u>	<u>Construction Workers</u>
Soil Ingestion	YES	YES
Consumption of Home Grown Vegetables	NO	NO
Dermal Contact	YES	YES
Dust Inhalation	YES	YES
Gases/Vapours	YES	NO

- 6.7 The construction workers will come into contact with any contaminated soil to a far greater extent than future residents. The exposure pathways are generally through dermal contact and indirect ingestion. However their exposure will be for a limited time and the provision and correct use of personnel protective equipment and adequate welfare facilities during construction should restrict their risks to acceptable levels
- 6.8 The risk of pollution to controlled waters by existing contamination is considered low. There are no licensed water abstractions within 250m of the site. There are no open surface water features within 250m of the site.
- 6.9 No specific areas of ecological importance have been identified in the initial desk top study. Therefore the site is considered to be in a low risk environmental setting. The potential for phototoxic materials to exist at shallow depth should be considered, these could pose a potential risk to new planting and soft landscaping areas within the proposed development.
- 6.10 The proposed planning drawings indicates the majority of the site to be taken up by a single industrial unit with parking to the south. The presence of elevated sulphates and hydrocarbons could affect the long term integrity of buried concrete structures, including foundations and drainage pipes. Plastic water supply pipes can also be damaged by the presence of hydrocarbon contamination.

7.0 FIELDWORK

- 7.1 Initial site investigation works were undertaken on 19th December 2019 using an 8 tonne tracked excavator with 600mm wide bucket. The individual trial pit locations were agreed on site and broken out with a pecker prior to the excavation taking place. A total of eight trial pits were excavated on this occasion. In late January 2020, a further three trial trenches were undertaken adjacent the northern boundary wall to determine the nature of the existing foundations.
- 7.2 On the 8th and 9th of January 2020, a rotary borehole investigation was undertaken to determine the presence of shallow mine workings and locate the two shafts recorded on site. Two boreholes were undertaken at opposite corners of the site to a depth of 30m to determine the presence of shallow mine workings. A further 39 shallow boreholes were undertaken to depths of 3-6m to locate the two shafts recorded on site. Materials encountered in the trial pits and boreholes were examined and categorised. Trial pit and borehole logs recording the materials on site are contained within Appendix B.
- 7.3 The site investigation works were designed to achieve comprehensive site coverage within the proposed development area. In particular, the recorded location of the shafts were marked on site and boreholes drilled in a spiral as recommended in Ciria SP32. Trial pit and borehole locations were restricted by the remnants of the industrial unit and existing services running through the site.
- 7.4 Soil samples were removed from the natural and made ground deposits within the trial pits. The samples were removed by operatives wearing gloves and placed into airtight clean plastic containers and glass bottles for transportation to the laboratory.
- 7.5 A total of six samples from the natural and made ground deposits were recovered from the trial holes for chemical analysis. The testing was carried out by a UKAS accredited laboratory to nationally or accredited in-house methods. The results of the contamination testing are contained within Appendix C of this report.
- 7.6 A suite of common potential contaminants consisting of heavy metals, phytotoxic metals, sulphates, sulphides and poly-aromatic hydrocarbons was analysed for, including a range of metals and inorganic substances and Asbestos.

8.0 RESULTS OF THE INVESTIGATION

8.1 GEOTECHNICAL INVESTIGATION

- 8.1.1 A copy of the trial pit and borehole logs providing a complete record of strata encountered beneath the proposed development is presented in Appendix B.
- 8.1.2 The fieldwork generally proved a concrete slabs overlying a moderate depth of made ground and clays and with a mudstone or sandstone bedrock.
- 8.1.3 The surface of all the trial pits proved a 0.1-0.25m thick reinforced concrete slab. In TP01, there were four concrete slabs with thin layers of crushed stone between, extending to a depth of 1.1m. The concrete slabs to all trial pits were broken out with a pecker attached to the excavator.
- 8.1.4 In all but TP03, beneath the concrete slab construction was a layer of made ground consisting of crushed brick, ash, gravels and clay. This varied in thickness from 0.4-1.95m across site except in TP04 and TP08 in the north where there was a predominantly ashy fill extending to a depth of 3.4m below existing ground levels, this is presumed to be in the footprint of the former mill ponds. Considerable ingress of ground water was noted within both these trial pits. In TP05 a 1m thick block of concrete with visqueen wrap was encountered. At the base of fill at 0.9m in TP07, a 0.3m thick cobbled pavement was encountered.
- 8.1.5 Beneath the concrete slab in TP03, and the fill material in all but TP04 and TP08, there was a soft to firm, light brown/grey sandy clay with occasional mudstone gravels. In TP05, occasional flags of sandstone were encountered within the clay strata. The thickness of the clay varied between 0.6m and 1.2m across site.
- 8.1.6 In TP01, TP02 and TP07, a moderately weak highly weathered sandstone that was difficult to excavate was encountered at the base of the trial pits at depths of 2.0m to 2.7m below existing ground levels.
- 8.1.7 In the remaining trial pits, a moderately weak weathered mudstone was encountered. In TP03, TP05 and TP06, this was encountered at 1.5m to 2.8m below existing ground levels. In TP04 and TP08 in the north of the site, the mudstone was encountered at a depth of 3.4m below existing ground levels.

- 8.1.8 The trial trenches TP10-TP12 adjacent the northern boundary wall proved that the boreholes undertaken on site proved the wall had been constructed directly off the fill material at 0.4-0.5m below existing ground levels. These showed a sharp decrease in the depth of fill approximately halfway across the northernmost building to match the 0.4-1.95m depth of fill in the remainder of the site.
- 8.1.9 Instability was only noted within TP06 and TP08 during the site investigation works. It should be noted however, that the trial pits only remained open for a short period of time before being infilled.
- 8.1.10 The deep boreholes undertaken proved the site to be underlain by alternating bands of mudstone and sandstone to a depth of 30m. No evidence of coal seams or workings were encountered within the boreholes.
- 8.1.11 Boreholes 24 and 25 directly over the shaft proved 3.2-3.7m of concrete overlying a rubble fill that extended to the base of the boreholes at 5.50m and 7.00m respectively. This shaft was measured at 2.5m diameter and was stonelined. Photographs of this shaft are included within Appendix B. No evidence of the second shaft was proved during the drilling.
- 8.1.12 Outside of the shaft, the majority of the shallow boreholes proved up to 2.1m of ash and brick fill, with solid mudstone or sandstone encountered at depths of 1.5-2.2m below existing ground levels. The western edge of the drilling grid for the shafts proved 0.7-1.4m of clay beneath a thinner layer of made ground.
- 8.1.13 BH04 was undertaken in the north of the site, where the deeper fill material had been encountered during the trial pit investigation. This proved the ash fill extended to a depth of 3.1m below existing ground levels where a mudstone bedrock was encountered.
- 8.1.14 The site scrape undertaken following discussion with the Coal Authority and removal of the concrete slab proved the second mineshaft approximately 3m east of the first mineshaft. This mineshaft had been covered with a mix of steel beams and concrete slabs and was found to contain water. After the water was pumped, the shaft was proved to be 12.5m in depth and 2.5m in diameter and stonelined down to 3m from the base of the shaft. Drainage pipes were noted connecting into the mineshaft near

the surface. The location of the shafts were surveyed and are shown on the site investigation plan in Appendix A. Photographs of the shaft are included in Appendix B.

8.2 GROUNDWATER

8.2.1 Groundwater was encountered in half of the eight trial pits undertaken on site. In TP02 and TP06, adjacent the eastern and western boundaries, slight ingress was noted at the base and 0.5m below ground levels respectively. In TP04 and TP08 in the north of the site, considerable ingress of groundwater was noted at 1.9m and 1.3m below ground levels respectively.

8.2.2 During the drilling of the deeper boreholes, the groundwater level was noted to settle around 5.5-5.7m below existing ground levels. During the gas monitoring, water levels have been recorded at 1.75m-4.0m below existing ground levels, this is assumed to be perched surface water run-off.

8.2.3 It should be recognised that ground water levels may vary throughout the year. During periods of heavy rainfall the groundwater levels may be substantially higher than the results revealed in these investigations.

8.3 GAS MONITORING

8.3.1 As discussed previously WS01 and WS02 were installed with gas standpipes and lockable covers. Gas testing is currently being undertaken on site and to-date the wells have been monitored on three occasions.

8.3.2 A standard gas monitoring procedure has been followed in accordance with CIRIA guidance, including measurement of the following:-

- i) Methane, Oxygen and Carbon Dioxide concentrations.
- ii) Atmospheric Pressure.
- iii) Gas Flow Rate.
- iv) Standing water level.

8.3.3 The result of the monitoring undertaken to-date is summarised in Table 2 below. A complete set of results will be reported on completion of the intended testing programme.

Table 2 - Summary of Recorded Gas Levels.

Borehole No.	Date	Oxygen %	Carbon Dioxide %	Methane %	Flow Rate (l/hr)	Depth to Water (m)	Atmospheric Pressure (mb)
BH02	30.01.20	19.8	0.7	NR	ND	2.30	987
	14.02.20	19.4	1.0	NR	ND	2.40	1001
	05.03.20	20.0	0.1	NR	ND	1.75	988
BH03	30.01.20	17.4	1.7	NR	ND	4.00	988
	14.02.20	13.6	1.9	NR	ND	3.90	1000
	05.03.20	18.3	0.6	NR	ND	2.35	988

8.3.4 A maximum carbon dioxide concentration of 1.9% and no methane was recorded in BH03. No flow rates have been detected during the monitoring. Both sets of readings were obtained under falling atmospheric pressure.

8.3.5 Based on the maximum concentrations and gas flow rates measured, the gas regime found on this site can be currently classified as **Green**, or **CS1** by BS 8485:2015 Table 2 due to the low carbon dioxide concentration and no flow rate being recorded.

8.3.6 The gas monitoring stations were damaged after the third set of readings during ongoing site demolition works. However, due to the consistently low levels of carbon dioxide recorded and no flow rates, we would consider the three rounds of readings sufficient in this instance.

9.0 CONTAMINATION

9.1 HUMAN HEALTH RISK ASSESSMENT

9.1.1 The appraisal of contaminated land within the UK is based on a risk assessment approach. The method involves the principle of defining a source ► pathway ► receptor, linkage to establish a human health risk. For any risk to exist to a potential receptor from an identified contaminant there must be an unbroken source ► pathway ► target relationship.

9.1.2 In the first instance site data for the contaminant levels are compared against guidance such as the CLEA values published by DEFRA. Should the site values exceed the guidance criteria, the contamination levels are recognised to have the potential to pose a risk to human health. Two scenarios are then available:-

- a) To break or remove one of the source ► pathway ► receptor linkages, by specifying an appropriate level of remedial work. Examples of remedial action may include the removal of the contaminated material or alternatively specifying a sufficient capping layer.
- b) The alternative approach is to provide a more detailed human health site specific risk assessment. This will involve examining factors such as soil properties, exposure assumptions, groundwater flows and contamination composition.

9.2 CONTAMINATION RESULTS

9.2.1 As stated above, in order to put the analytical results into context, the data has in the first instance been assessed in relation to several sets of guidelines: -

9.2.2 The analytical results have been assessed via an initial screening assessment with regard to the current Contaminated Land Exposure Assessment model (CLEA UK) for human health, which has been produced for the Environment Agency and the Department of Environment, Food and Rural Affairs (DEFRA). The CLEA model provides Soil Guideline Values (SGVs) for a limited range of contaminants only, and these are based on risk to human health. As such they do not take into account potential risks to other receptors eg groundwater and third party land.

- 9.2.3 It is proposed to redevelop the site for an industrial unit with attached car parking. Soil results have therefore been assessed against the CLEA SGV's for commercial use, as these are considered to be the most suitable guidelines to protect the most critical targets from contaminants via all possible exposure routes.
- 9.2.4 Where no CLEA SGV has been published, Generic Assessment Criteria (GAC) based on guidelines from the Chartered Institute of Environmental Health (CIEH) and Land Quality Management Ltd (LQM) S4UL document residential land use with plant uptake has been used. Where there is no GAC, guidance limits have been adopted from sources referenced in the table below.
- 9.2.5 A new approach has now been adopted for the calculation of SGV based on an acceptably low level of risk. These Category 4 Screening Levels (C4SL) have been calculated for six substances to date by modifying the toxicological/exposure parameters within CLEA. C4SLs have been used as tier 1 trigger levels within this assessment, superseding the previous CIEH and LQM SGVs.
- 9.2.6 Assessment of risk is considered as a tiered approach. Assessment based on non intrusive means is considered Tier 1 assessment, comparison against SGVs and GACs is a Tier 2 assessment, and the generation of and comparison with Site Specific Assessment Criteria (SSAC) is a Tier 3 assessment and is conducted where deemed appropriate following the Tier 2 assessment.
- 9.2.7 The sulphate and acid concentrations have been compared against the BRE digest "Concrete in Aggressive Ground" parts 1-4. This will enable the concrete class to be specified in relation to possible contact with aggressive soils.
- 9.2.8 The results of the chemical analysis are presented on the laboratory analysis sheets with Appendix C. A summary of the significance of the results is presented in Table 3.

Table 3**Comparison of contaminant against accepted guidance values for commercial use**

<u>CONTAMINANT</u>	<u>SGV</u> <u>MG/KG</u>	<u>CONCENTRATION IN</u> <u>ALL SOILS.</u> <u>MG/KG</u>	<u>No. OF</u> <u>SAMPLES</u> <u>EXCEEDING</u> <u>GUIDANCE</u> <u>VALUES</u>	<u>PERCENTAGE</u> <u>OF SAMPLES</u> <u>EXCEEDING</u> <u>GUIDELINE</u> <u>VALUE</u>
Arsenic	40 (4)	8.4-46	0/6	
Cadmium	220 (4)	<0.1-0.3	0/6	
Chromium (Total)	130 (2)	14-20	0/6	
Lead	2300 (4)	26-180	0/6	
Mercury (Total)	58 (1)	<0.05-0.22	0/6	
Selenium	12000 (1)	<0.5-1.1	0/6	
Copper	68000(1)	25-82	0/6	
Nickel	980 (1)	23-64	0/6	
Zinc	730000 (1)	41-520	0/6	
Sulphate	0.24% (3)	0.14-0.32%	2/6	33.3%
Thiocyanate	50	<0.6	0/6	
Sulphide	250	<10-140	0/6	
Naphthalene	190 (1)	<0.1-0.1	0/6	
Benzo(a)pyrene	77 (4)	<0.1-0.6	0/6	
Dibenzo[ah]anthracene	3.5 (1)	<0.1	0/6	
PAH (Total)	100	<1.6-6.0	0/6	
Phenols	760 (1)	<0.3-0.5	0/6	
Asbestos	No fibres	No Fibres	0/6	
pH	6-8	7.3-10.1	3/6	50.0%

(1) Copyright Land Quality Management Ltd reproduced with permission; Publication Number S4UL3499. All rights reserved.

(2) DEFRA CLR SGV's withdrawn used for initial comparison

(3) BS 8110 1985 Table 6.1

(4) Category 4 Screening Levels

9.2.9 No elevated levels of phytotoxic or heavy metals were recorded in the samples taken from site.

9.2.10 No elevated levels of PAH compounds were recorded within the samples taken from site.

9.2.11 No asbestos fibres were recorded in the samples taken from site.

9.3 QUALITATIVE RISK ASSESSMENT

9.3.1 The Qualitative Risk Assessment is based upon the previously discussed source ► pathway ► receptor principle. In relation to the proposed site these may be described as follows:-

9.3.2 **SOURCE**

- i) Elevated levels of sulphate in north west of site.
- ii) No elevated gas levels.

9.3.3 **PATHWAYS**

- i) Ingestion of contamination material.
- ii) Inhalation of contaminated particles.
- iii) Dermal contact with the known contamination.
- iv) Leaching to controlled waters.

9.3.4 **RECEPTORS**

- i) Commercial site users.
- ii) Construction and maintenance workers.
- iii) Controlled waters.
- iv) The building structure.

9.3.5 Each of the receptors will now be appraised and attribute the likely risks involved.

i) Commercial site users.

Based on the chemical results obtained it is considered that there is currently a **negligible** risk to end users from contamination on-site.

There were no elevated levels of phytotoxic or heavy metals recorded in the samples from site.

No asbestos fibres were recorded in the samples taken from site.

It is proposed to reduce ground levels on site to accommodate the proposed floor construction to the new industrial unit. All fill material and made ground should be removed from site to a suitable licensed waste facility.

Based on the maximum concentrations and gas flow rates measured, the gas regime found on this site can be currently classified as **Green**, or CS1 by BS 8485:2015 Table 2 due to the low flow rate being recorded.

ii) Construction and Maintenance Workers.

It is considered that there is a **low** risk to construction and maintenance workers from the redevelopment of the site.

Construction workers should always wear PPE including overalls, boots and gloves when handling the contaminated materials onsite. In addition eating, drinking and smoking should be restricted to designated areas where the above hygiene facilities are available.

iii) Controlled Waters

The samples of strata both at the surface and at depth showed no evidence of contamination. The site has proven to be underlain by a relatively impermeable clays underlain by mudstone. It is therefore considered that there is a negligible risk to groundwater and controlled waters from existing contamination on site.

iv) Building Structures.

Elevated levels of 0.31 and 0.32% in the samples taken from TP04 in the north west of the site. Therefore a design sulphate class DS-2, ACEC class AC-2, when compared against the BRE Special Digest 1 "Concrete in aggressive ground".

Service providers should be forwarded the final validated chemical levels in order for them to provide an accurate specification for the apparatus to be provided. New services should be surrounded and backfilled with clean material to afford some protection to the apparatus and allow any future maintenance work to be undertaken in clean material.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 GEOTECHNICAL ASSESSMENT

- 10.1.1 The fieldwork generally proved fill and clays overlying a mudstone bedrock. For initial design purposes we would envisage a safe bearing capacity of 150kN/m² where foundations are extended onto the mudstone strata.
- 10.1.2 Due to the shallow nature of the foundations to the boundary walls, the depth of made ground and the presence of the mine shafts, we would therefore suggest that the industrial unit should be constructed on strip/trench fill and pad footings founded entirely onto the weathered mudstone to avoid the transfer of loadings to the mineshafts and boundary walls. The foundation widths and depths will vary dependent upon the line and point loadings calculated.
- 10.1.3 Careful consideration of the foundation depth will be required adjacent to the existing northern boundary wall, due to the extent of the existing fill material and groundworks. Stability of the existing wall during the foundation construction needs to be taken into account. Potential piled foundations or isolated pads excavated as individual foundations in a phased construction should be considered.
- 10.1.4 All foundations should be placed below a line of 45deg drawn up from the base of any services or other structures.
- 10.1.5 If any existing foundations or structures are encountered during construction, these should be totally removed from the excavations to enable the new foundations to be constructed without obstructions.
- 10.1.6 At present it is not anticipated that excessive ground water control measures will be required, however perched water was encountered in the north of the site. Please note that ground water flows can vary throughout the year and a further assessment should be undertaken if construction work is proposed following a prolonged rainfall event.
- 10.1.7 Elevated levels of 0.31 and 0.32% in the samples taken from TP04 in the north west of the site. Therefore a design sulphate class DS-2, ACEC class AC-2, when compared against the BRE Special Digest 1 "Concrete in aggressive ground".

10.2 MINING AND QUARRYING

- 10.2.1 The Coal Mining Risk Assessment undertaken by JNP Group Consulting Engineers (Ref: B22583 CMRA) is included in Appendix D and states that there are two shafts recorded within the site, one of which has been capped, and there is the potential for shallow mine workings below the north eastern corner of the site.
- 10.2.2 The two boreholes taken to 30m depth recorded no coal seam or evidence of former workings. It is considered unlikely that there would be coal seams greater than 2m in thickness below the site, therefore the 10:1 bedrock to seam thickness is achieved within all the boreholes. We can therefore confirm that the site has greater than ten times seam thickness of competent rock cover, and this property should not be at risk from mining subsidence in accordance with Ciria SP32.
- 10.2.3 The first shaft was located through the rotary borehole investigation. This proved a 3.2-3.7m thick concrete cap overlying the 2.5m diameter bricklined shaft which had been infilled with concrete rubble. The existing concrete cap needs to be broken out to accommodate the proposed floor construction to the new industrial unit.
- 10.2.4 The second shaft was found via a site scrape and was covered by steel beams and concrete slabs. This shaft was also bricklined and filled with water from drainage pipes that had been connected to the shaft. Upon pumping the shaft, it proved to be only 12.5m deep. It is proposed to infill this with 6F2 material prior to capping.
- 10.2.5 New designs and calculations for the mine shaft caps have been submitted to and approved by the Coal Authority and a permit for undertaking the capping works has been obtained. The Coal Authority Permit is included in Appendix D. These are to be inspected during the construction phase and a validation report confirming their construction prepared.

10.3 GROUND FLOOR SLAB – GAS MEASURES

- 10.3.1 As discussed previously, gas monitoring stations were installed in two of the boreholes undertaken on site.
- 10.3.2 A maximum carbon dioxide concentration of 1.9% and no methane was recorded in BH03. No flow rates have been detected during the monitoring.

10.3.3 No Radon Protection measures are required for the site.

10.3.4 The proposed development consists of an industrial property and therefore the gas regime has been characterised in accordance with the traffic light methodology as outlined in *CIRIA Report C665*. Based on the maximum concentrations and gas flow rates measured, the gas regime found on this site can be currently classified as **Green**, or CS1 by BS 8485:2105 Table 2.

GSV = max carbon dioxide concentration x max flow rate $0.019 \times 0.1 = 0.0019$ l/h

10.3.5 Based on the gas monitoring undertaken to date, we would not recommend that gas protection measures are required for the site. The gas monitoring stations were damaged after the third set of readings during ongoing site demolition works. However, due to the consistently low levels of carbon dioxide recorded and no flow rates, we would consider the three rounds of readings sufficient in this instance.

10.4 CONTAMINATION ASSESSMENT

10.4.1 No elevated levels of contaminants have been recorded from the samples taken from site for analysis.

10.4.2 It is proposed to reduce ground levels to accommodate the proposed floor and hardstanding construction. All fill material removed from site should be taken to a licensed waste facility.

10.4.3 Should any further suspected areas of contamination be exposed during site strip/construction, an engineer should be contacted to determine if additional chemical testing should be undertaken. The on-site staff should maintain a photographic record and dates of any exposed contaminated material.

10.4.4 It is not anticipated that any material will need to be imported to site.

11.0 SUGGESTED FURTHER WORK

- 11.1 Mineshafts to be infilled and capped as agreed with Coal Authority.
- 11.2 Validation report confirming infilling and capping to both mineshafts in accordance with approved details.

12.0 APPROVALS

12.1 Proposals for the remediation of contaminated land may require the approval of numerous bodies.

These include:

- a) Kirklees Council Environmental Health Department as required by the building and planning regulations.
- b) The NHBC or similar as they will provide the insurance costs to cover the property.
- c) The Environment Agency if there are risks of contamination to ground or surface water systems. They will also require notification if material is removed from site and taken to an appropriate tip.
- d) Relevant highways and drainage authorities and other service companies may also wish to know about the level of contaminants.
- e) Building Control and the Coal Authority regarding the mineshaft remediation works.

Prepared by



M. Huddleston. MEng

Checked by



T. Haigh. BSc.,C.Eng.M.I.C.E.

April 2020

This report is subject to the provisions of the Copyright Acts and is for the sole benefit of Cleckheaton Construction in respect of the proposals described.

APPENDIX A

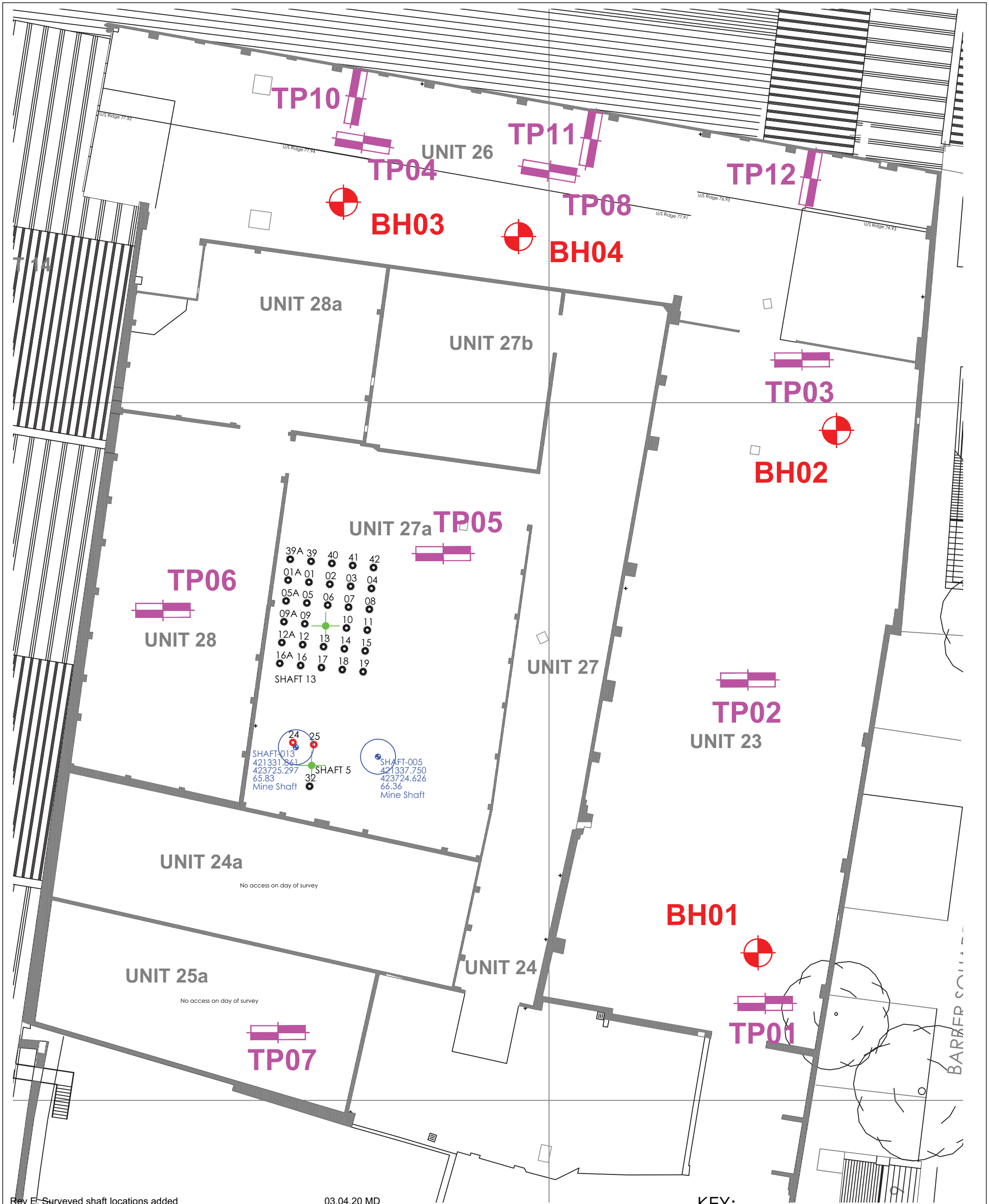
Site Location Plan

Site investigation Plan

Typical Site Conceptual Model



UNIT 24&25
FLUSH MILLS
HECKMONDWIKE
WF16 0EN

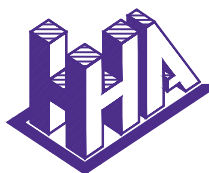


Rev E- Surveyed shaft locations added
Rev D- Extent of proposed site scrape and additional trial pits added
Rev C- Boreholes undertaken added
Rev B- Trial pits added to plan.
Rev A- Coordinates added to locate areas of concrete to be broken out.

03.04.20 MD
17.01.20 MD
10.01.20 MD
20.12.19 CM
27.11.19 JF

KEY:

-  TRIAL PIT LOCATION
-  BOREHOLE LOCATION
-  RECORDED SHAFT LOCATION FROM CA
-  SHALLOW BOREHOLE LOCATION
-  SURVEYED SHAFT LOCATION



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Civil Structural Engineering Consultants

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e trevor.haigh@haighhuddleston.co.uk

Client

CLECKHEATON CONSTRUCTION

Project

FLUSH MILLS, HECKMONDWIKE

Detail

SITE INVESTIGATION PLAN

Scale

1:2500A3 MD

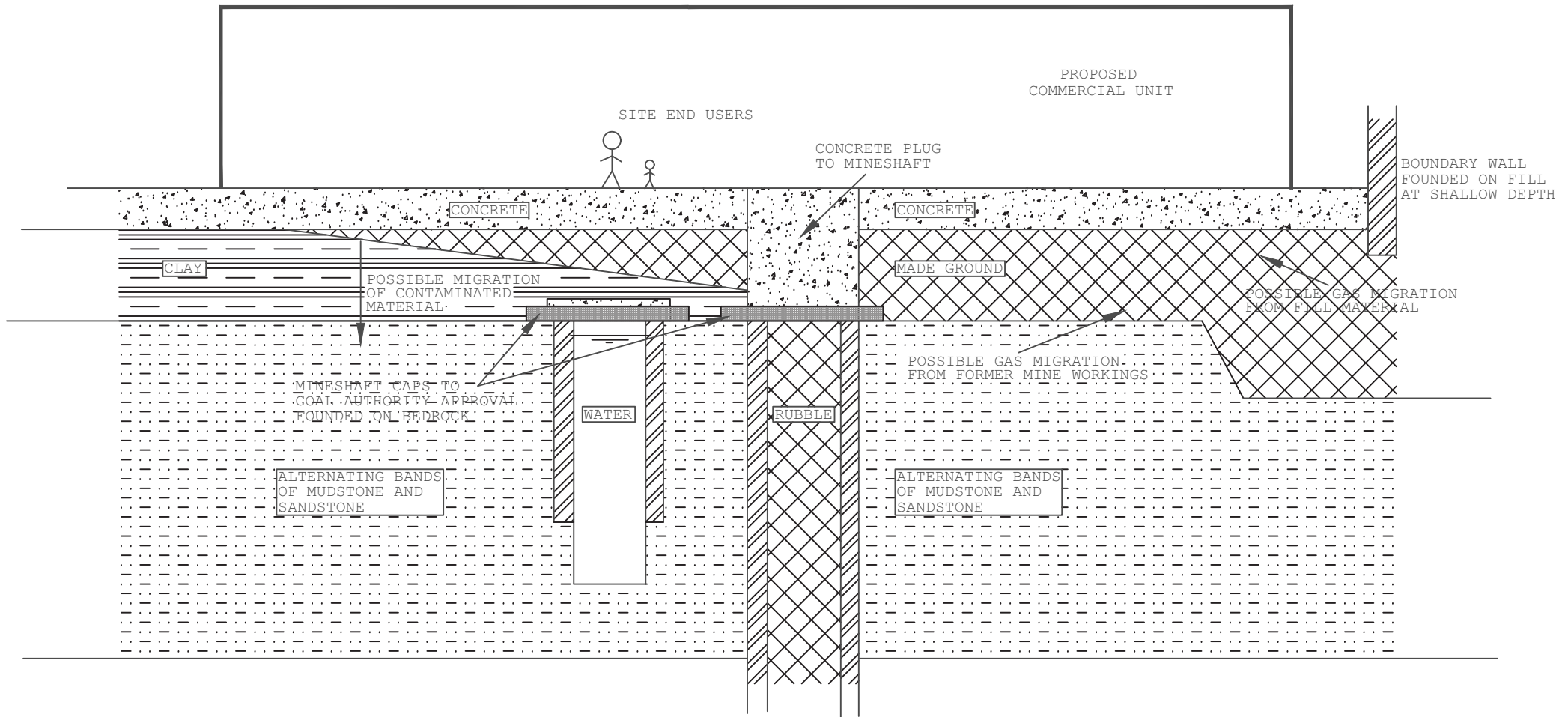
Chkd

Date

Sep'19

Dwg No.

E19/7577/03E



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Client

CLECKHEATON CONSTRUCTION

Project

FLUSH MILLS, HECKMONDWIKE

Detail

Typical Site Conceptual Model

Scale
NTS

Dwn
MD

Chkd
MD

Date
Apr'20

Dwg No.
E19/7577/32



The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 18944

Name and Address of Permit Holder:

*Cleckheaton Construction
Crossland House
Bank Street
Wakefield Road
Liversedge
WF15 6BJ*

Site Location:

*Units 24&25
Flush Mills
Heckmondwike
WF16 0EN*

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

Ground investigation by boreholes to 30m to determine presence of shallow mine workings, soil scrape to identify location of two mine entries

within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of 12 months from the granted date shown below. *The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- *Water flush*
- *Gas Monitoring CO, CH₄, CO₂, O₂, H₂S at borehole and rig*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*

Signed: Stuart Brown Granted Date: 21/10/2019

For and on behalf of The Coal Authority

Nominated Representative: Stuart Brown, Permitting Manager;

The Coal Authority, Permitting Office, 200 Lichfield Lane, Mansfield, Notts, NG18 4RG

Tel: 01623 637450; E-Mail: permissions@coal.gov.uk



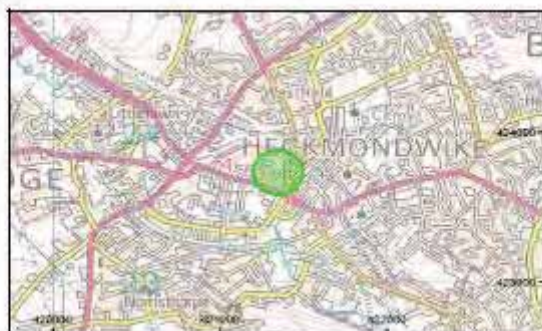
The Coal
Authority

Granted Permit Boundary

Site Location:

Permit Ref: 18944

Overview map



Permit Boundary:



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APPENDIX B

Trial Hole Logs

Borehole Logs

Mineshaft Photographs

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FORM HHA 5

TRIAL HOLE NO. 1

Client :	CLECKHEATON CONSTRUCTION	Job No :	7577
Site :	FLUSH MILLS	Date :	December 2019

0.0

		3
0.5		
	0.7	
	0.95	1
1.0		
	1.1	150
1.5	1.5	
	1.9	
2.0		
2.5		
	2.7	
	2.8	
3.0		
3.5		
4.0		

REMARKS:**NOTES:**

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FORM HHA 5

TRIAL HOLE NO. 2

Client :	CLECKHEATON CONSTRUCTION	Job No :	7577
Site :	FLUSH MILLS	Date :	December 2019

0.0

	0.25	
0.5		
1.0		0 9
	1.4	
1.5		
2.0	2.0	
	2.2	
2.5		
3.0		
3.5		
4.0		

REMARKS:

0 9

NOTES:

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FORM HHA 5

TRIAL HOLE NO. 3

Client :	CLECKHEATON CONSTRUCTION	Job No :	7577
Site :	FLUSH MILLS	Date :	December 2019

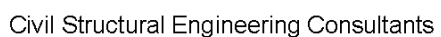
0.0

	0.25	
	0.3	
0.5		0 6
1.0		
1.5	1.5	
2.0		
	2.3	
2.5		
3.0		
3.5		
4.0		

REMARKS:

0 6

NOTES:



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NOTES:

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FORM HHA 5

TRIAL HOLE NO.5

Client :	CLECKHEATON CONSTRUCTION	Job No :	7577
Site :	FLUSH MILLS	Date :	December 2019

0.0		
	0.1	
	0.3	
0.5		
1.0		
1.5	1.5	1 5
2.0	2.1	
	2.4	
2.5		
	2.7	
3.0		
3.5		
4.0		

REMARKS:

1 5

NOTES:

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FORM HHA 5

TRIAL HOLE NO.6

Client :	CLECKHEATON CONSTRUCTION	Job No :	7577
Site :	FLUSH MILLS	Date :	December 2019

0.0		
	0.15	
		0 5
0.5		
	0.9	
1.0		
	1.5	
2.0	2.1	
	2.8	
2.5		
3.0	3.1	
3.5		
4.0		

REMARKS:**NOTES:**

**Haigh Huddleston & Associates**

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e trevor.haigh haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO.7

Client :	CLECKHEATON CONSTRUCTION	Job No :	7577
Site :	FLUSH MILLS	Date :	December 2019

0.0

	0.15	
0.5		
	0.9	
1.0		
	1.2	
1.5		
	1.7	
2.0	2.0	
	2.2	
2.5		
3.0		
3.5		
4.0		

REMARKS:**NOTES:**



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FORM HHA 5

TRIAL HOLE NO.8

Client :	CLECKHEATON CONSTRUCTION	Job No :	7577
Site :	FLUSH MILLS	Date :	December 2019

0.0

	0.1	
0.5		
		0 8
1.0		
		1 3
1.5		
2.0		
	2.3	
2.5		
3.0		
	3.4	
3.5		
4.0		

REMARKS:

0 8

NOTES:

STRATIGRAPHY GROUND ENGINEERS

DAILY DRILLING LOG

Site	Flush Mill	Date:	08/01/2020
Driller	GL	Flush	Water

bh	depth	description		bh	depth	description
1	GL to 0.30	Re-inforced concrete		3	GL to 0.10	Concrete
	0.30 to 1.90	Black Ash fill			0.10 to 2.20	Black Clay Fill
	1.90 to 7.30	Brown Sandstone			2.20 to 7.10	Brown Mudstone
	7.30 to 15.90	Grey Silty Mudstone			7.10 to 16.9	Grey Silty Mudstone
	15.90 to 23.60	Brown coarse Sandstone			16.9 to 27.5	Brown Sandstone
	23.60 to 30.00	Grey Silty Mudstone			27.5 to 28.9	Grey Mudstone
					28.9 to 30.0	Grey Sandstone
		Water settled at 5.5m				
						Water settled at 5.7m
		No gases encountered				
						No gases encountered

TODAYS TOTAL ____60m____

PREVIOUS TOTAL ____0____

TOTAL TO DATE ____60m____

TOTAL CASING ____0____

STRATIGRAPHY GROUND ENGINEERS

DAILY DRILLING LOG

Site	Flush Mill	Date:	09/01/2020
Driller	GL	Flush	Air

bh	depth	description		bh	depth	description
4	GL to 0.10	Concrete		9	GL to 0.10	Concrete
	0.10 to 0.30	Brick			0.10 to 1.80	Ash Fill
	0.30 to 3.10	Black Ash			1.80 to 2.20	Brown Mudstone
	3.10 to 6.00	Brown Mudstone			2.20 to 3.00	Brown Sandstone
2	GL to 0.10	Concrete		12	GL to 0.10	Concrete
	0.10 to 0.30	Brick			0.10 to 1.80	Ash Fill
	0.30 to 1.80	Black Ash/Clay			1.80 to 2.20	Brown Mudstone
	1.80 to 4.00	Grey Silty Mudstone			2.20 to 3.00	Brown Sandstone
	Shaft 13			13	GL to 0.10	Concrete
	GL to 0.10	Concrete			0.10 to 1.80	Ash Fill
	0.10 to 1.80	Ash Fill			1.80 to 2.20	Brown Mudstone
	1.80 to 2.20	Brown Mudstone			2.20 to 3.00	Brown Sandstone
	2.20 to 3.00	Brown Sandstone				

TODAYS TOTAL _____

PREVIOUS TOTAL _____

TOTAL TO DATE _____

TOTAL CASING _____

STRATIGRAPHY GROUND ENGINEERS

DAILY DRILLING LOG

Site	Flush Mill	Date:	09/01/2020
Driller	GL	Flush	Air

bh	depth	description		bh	depth	description
14	GL to 0.10	Concrete		6	GL to 0.10	Concrete
	0.10 to 0.30	Ash Fill			0.10 to 1.60	Ash Fill
	0.30 to 3.10	Brown Mudstone			1.60 to 2.20	Brown Mudstone
	3.10 to 6.00	Brown Sandstone			2.20 to 3.00	Brown Sandstone
10	GL to 0.10	Concrete		5	GL to 0.10	Concrete
	0.10 to 0.30	Ash Fill			0.10 to 0.90	Brick
	0.30 to 1.80	Brown Mudstone			0.90 to 1.60	Brown Clay
	1.80 to 4.00	Brown Sandstone			1.60 to 2.20	Brown Mudstone
					2.20 to 3.00	Brown Sandstone
7	GL to 0.90	Concrete				
	0.10 to 1.50	Brown Clay		5A	GL to 0.10	Concrete
	1.50 to 2.20	Brown Mudstone			0.10 to 0.90	Brick
	2.20 to 3.00	Brown Sandstone			0.90 to 1.60	Brown Clay
					1.60 to 2.20	Brown Mudstone
					2.20 to 3.00	Brown Sandstone

TODAYS TOTAL _____

PREVIOUS TOTAL _____

TOTAL TO DATE _____

TOTAL CASING _____

STRATIGRAPHY GROUND ENGINEERS

DAILY DRILLING LOG

Site	Flush Mill	Date:	09/01/2020
Driller	GL	Flush	Air

bh	depth	description		bh	depth	description
14	Shaft 5			2	GL to 0.10	Concrete
	GL to 0.10	Concrete			0.10 to 1.60	Ash Fill
	0.10 to 2.10	Ash Fill			1.60 to 2.20	Brown Mudstone
	2.10 to 5.50	Brown Mudstone			2.20 to 3.00	Brown Sandstone
32	GL to 0.10	Concrete		1	GL to 0.10	Concrete
	0.10 to 1.40	Ash Fill			0.10 to 1.50	Ash Fill
	1.40 to 3.00	Brown Mudstone			1.50 to 2.20	Brown Mudstone
					2.20 to 3.00	Brown Sandstone
25	GL to 3.20	Concrete				
	3.20 to 7.00	Rubble Fill		39	GL to 0.10	Concrete
					0.10 to 1.50	Ash Fill
24	GL to 3.70	Concrete			1.50 to 2.20	Brown Mudstone
	3.70 to 5.50	Rubble Fill			2.20 to 3.00	Brown Sandstone

TODAYS TOTAL _____

PREVIOUS TOTAL _____

TOTAL TO DATE _____

TOTAL CASING _____

STRATIGRAPHY GROUND ENGINEERS

DAILY DRILLING LOG

Site	Flush Mill	Date:	09/01/2020
Driller	GL	Flush	Air

bh	depth	description		bh	depth	description
8	GL to 0.10	Concrete		19	GL to 0.10	Concrete
	0.10 to 1.50	Ash Fill			0.10 to 1.50	Ash Fill
	1.50 to 2.20	Brown Mudstone			1.50 to 2.20	Brown Mudstone
	2.20 to 3.00	Brown Sandstone			2.20 to 3.00	Brown Sandstone
11	GL to 0.10	Concrete		18	GL to 0.10	Concrete
	0.10 to 1.50	Ash Fill			0.10 to 1.50	Ash Fill
	1.50 to 2.20	Brown Mudstone			1.50 to 2.20	Brown Mudstone
	2.20 to 3.00	Brown Sandstone			2.20 to 3.00	Brown Sandstone
15	GL to 0.10	Concrete		17	GL to 0.10	Concrete
	0.10 to 1.50	Ash Fill			0.10 to 1.50	Ash Fill
	1.50 to 2.20	Brown Mudstone			1.50 to 2.20	Brown Mudstone
	2.20 to 3.00	Brown Sandstone			2.20 to 3.00	Brown Sandstone

TODAYS TOTAL _____

PREVIOUS TOTAL _____

TOTAL TO DATE _____

TOTAL CASING _____

STRATIGRAPHY GROUND ENGINEERS

DAILY DRILLING LOG

Site	Flush Mill	Date:	09/01/2020
Driller	GL	Flush	Air

bh	depth	description		bh	depth	description
16	GL to 0.10	Concrete		9A	GL to 0.10	Concrete
	0.10 to 1.50	Ash Fill			0.10 to 1.50	Ash Fill
	1.50 to 2.20	Brown Mudstone			1.50 to 2.20	Brown Mudstone
	2.20 to 3.00	Brown Sandstone			2.20 to 3.00	Brown Sandstone
16 A	GL to 0.10	Concrete		1A	GL to 0.10	Concrete
	0.10 to 1.50	Ash Fill			0.10 to 1.50	Ash Fill
	1.50 to 2.20	Brown Mudstone			1.50 to 2.20	Brown Mudstone
	2.20 to 3.00	Brown Sandstone			2.20 to 3.00	Brown Sandstone
12 A	GL to 0.10	Concrete		39 A	GL to 0.10	Concrete
	0.10 to 1.50	Ash Fill			0.10 to 1.20	Brick
	1.50 to 2.20	Brown Mudstone			1.20 to 1.60	Brown Clay
	2.20 to 3.00	Brown Sandstone			1.60 to 2.20	Brown Mudstone
					2.20 to 3.00	Brown Sandstone

TODAYS TOTAL _____

PREVIOUS TOTAL _____

TOTAL TO DATE _____

TOTAL CASING _____

STRATIGRAPHY GROUND ENGINEERS

DAILY DRILLING LOG

Site	Flush Mill	Date:	09/01/2020
Driller	GL	Flush	Air

bh	depth	description		bh	depth	description
40	GL to 0.10	Concrete		3	GL to 0.10	Concrete
	0.10 to 1.50	Ash Fill			0.10 to 1.50	Ash Fill
	1.50 to 2.20	Brown Mudstone			1.50 to 2.20	Brown Mudstone
	2.20 to 3.00	Brown Sandstone			2.20 to 3.00	Brown Sandstone
41	GL to 0.10	Concrete		4	GL to 0.10	Concrete
	0.10 to 1.50	Ash Fill			0.10 to 1.50	Ash Fill
	1.50 to 2.20	Brown Mudstone			1.50 to 2.20	Brown Mudstone
	2.20 to 3.00	Brown Sandstone			2.20 to 3.00	Brown Sandstone
42	GL to 0.10	Concrete				BH3 installed to 3m
	0.10 to 1.50	Ash Fill				2m slotted/1m plain
	1.50 to 2.20	Brown Mudstone				
	2.20 to 3.00	Brown Sandstone				BH2 installed to 4m
						2m slotted/2m plain
						Gravel with bentonite seal

TODAYS TOTAL _____

PREVIOUS TOTAL _____

TOTAL TO DATE _____

TOTAL CASING _____



APPENDIX C

Chemical Analysis of Samples



Certificate of Analysis

Certificate Number 19-26259

06-Jan-20

Client Haigh Huddleston & Associates Ltd
Firth Buildings
99-101 Leeds Road
Dewsbury
WF12 7BU

Our Reference 19-26259

Client Reference 7577

Order No (not supplied)

Contract Title Flush Mills

Description 3 Soil samples.

Date Received 21-Dec-19

Date Started 21-Dec-19

Date Completed 06-Jan-20

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

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

Approved By

A handwritten signature in blue ink, appearing to read "A Fenwick", is placed over a faint, larger signature.

Adam Fenwick
Contracts Manager





Summary of Chemical Analysis

Matrix Descriptions

Our Ref 19-26259

Client Ref 7577

Contract Title Flush Mills

Sample ID	Depth	Lab No	Completed	Matrix Description
TP02	0.9	1617473	06/01/2020	Dark brown gravelly, clayey SAND (Possible made ground - brick)
TP05	1.5	1617474	06/01/2020	Brown sandy CLAY
TP08	0.8	1617475	06/01/2020	Dark brown gravelly, clayey SAND

Summary of Chemical Analysis

Soil Samples

Our Ref 19-26259

Client Ref 7577

Contract Title Flush Mills

Lab No	1617473	1617474	1617475
Sample ID	TP02	TP05	TP08
Depth	0.90	1.50	0.80
Other ID			
Sample Type	SOIL	SOIL	SOIL
Sampling Date	19/12/19	19/12/19	19/12/19
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Metals						
Arsenic	DETSC 2301#	0.2	mg/kg	22	8.4	30
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	< 0.1	0.1
Chromium	DETSC 2301#	0.15	mg/kg	19	17	18
Copper	DETSC 2301#	0.2	mg/kg	47	25	82
Lead	DETSC 2301#	0.3	mg/kg	140	26	84
Mercury	DETSC 2325#	0.05	mg/kg	0.07	< 0.05	0.06
Nickel	DETSC 2301#	1	mg/kg	23	25	23
Selenium	DETSC 2301#	0.5	mg/kg	1.0	< 0.5	1.1
Zinc	DETSC 2301#	1	mg/kg	520	62	41
Inorganics						
pH	DETSC 2008#		pH	8.6	7.3	8.4
Thiocyanate	DETSC 2130#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	88
Sulphate as SO ₄ , Total	DETSC 2321#	0.01	%	0.22	0.04	0.14
PAHs						
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.5	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.1	< 0.1	0.2
Fluoranthene	DETSC 3301	0.1	mg/kg	1.1	< 0.1	0.3
Pyrene	DETSC 3301	0.1	mg/kg	1.2	< 0.1	0.3
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.5	< 0.1	0.2
Chrysene	DETSC 3301	0.1	mg/kg	0.7	< 0.1	0.2
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.4	< 0.1	0.2
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	0.6	< 0.1	0.3
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	0.4	< 0.1	0.2
PAH Total	DETSC 3301	1.6	mg/kg	6.0	< 1.6	2.2
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.5	< 0.3	< 0.3

Summary of Asbestos Analysis Soil Samples

Our Ref 19-26259

Client Ref 7577

Contract Title Flush Mills

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1617473	TP02 0.90	SOIL	NAD	none	Lee Kerridge
1617474	TP05 1.50	SOIL	NAD	none	Lee Kerridge
1617475	TP08 0.80	SOIL	NAD	none	Lee Kerridge

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 19-26259

Client Ref 7577

Contract Flush Mills

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1617473	TP02 0.90 SOIL	19/12/19	GJ 250ml, PT 1L		
1617474	TP05 1.50 SOIL	19/12/19	GJ 250ml, PT 1L		
1617475	TP08 0.80 SOIL	19/12/19	GJ 250ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS 2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.



DETS

Certificate of Analysis

Certificate Number 20-00097

09-Jan-20

Client Haigh Huddleston & Associates Ltd
Firth Buildings
99-101 Leeds Road
Dewsbury
WF12 7BU

Our Reference 20-00097

Client Reference 7577

Order No (not supplied)

Contract Title Flush Mills

Description 3 Soil samples.

Date Received 06-Jan-20

Date Started 06-Jan-20

Date Completed 09-Jan-20

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

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

Approved By



Adam Fenwick
Contracts Manager





Summary of Chemical Analysis

Matrix Descriptions

Our Ref 20-00097

Client Ref 7577

Contract Title Flush Mills

Sample ID	Depth	Lab No	Completed	Matrix Description
TP03	0.6	1619856	09/01/2020	Brown slightly gravelly, sandy CLAY
TP04	0.4	1619857	09/01/2020	Dark brown gravelly, very sandy CLAY including some charcoal (Made ground -plastic,brick)
TP04	2	1619858	09/01/2020	Dark brown clayey, very gravelly SAND including odd wood (Possible made ground - brick)

Summary of Chemical Analysis

Soil Samples

Our Ref 20-00097

Client Ref 7577

Contract Title Flush Mills

Lab No	1619856	1619857	1619858
Sample ID	TP03	TP04	TP04
Depth	0.60	0.40	2.00
Other ID			
Sample Type	SOIL	SOIL	SOIL
Sampling Date	19/12/19	19/12/19	19/12/19
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Metals						
Arsenic	DETSC 2301#	0.2	mg/kg	4.5	32	46
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.3	0.3
Chromium	DETSC 2301#	0.15	mg/kg	20	14	15
Copper	DETSC 2301#	0.2	mg/kg	29	76	77
Lead	DETSC 2301#	0.3	mg/kg	16	180	170
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.18	0.22
Nickel	DETSC 2301#	1	mg/kg	27	57	64
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	62	93	95
Inorganics						
pH	DETSC 2008#		pH	10.1	7.3	7.3
Thiocyanate	DETSC 2130#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Sulphide	DETSC 2024*	10	mg/kg	< 10	140	140
Sulphate as SO ₄ , Total	DETSC 2321#	0.01	%	0.09	0.31	0.32
PAHs						
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.2
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.3
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.2	0.3
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	0.2	0.4
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	0.5	0.8
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	2.4
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3

Summary of Asbestos Analysis Soil Samples

Our Ref 20-00097

Client Ref 7577

Contract Title Flush Mills

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1619856	TP03 0.60	SOIL	NAD	none	Joanne Luscombe
1619857	TP04 0.40	SOIL	NAD	none	Joanne Luscombe
1619858	TP04 2.00	SOIL	NAD	none	Joanne Luscombe

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 20-00097
 Client Ref 7577
 Contract Flush Mills

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1619853	TP04 0.10 SOIL	19/12/19	No containers logged		Cannot evaluate
1619854	TP04 0.60 SOIL	19/12/19	No containers logged		Cannot evaluate
1619855	TP04 2.60 SOIL	19/12/19	No containers logged		Cannot evaluate
1619856	TP03 0.60 SOIL	19/12/19	GJ 250ml, PT 1L	Naphthalene (14 days), PAH FID (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	
1619857	TP04 0.40 SOIL	19/12/19	GJ 250ml, PT 1L	Naphthalene (14 days), PAH FID (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	
1619858	TP04 2.00 SOIL	19/12/19	GJ 250ml, PT 1L	Naphthalene (14 days), PAH FID (14 days), pH + Conductivity (7 days), Cyanide/Mono pHoh (14 days)	

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

APPENDIX D

Mining Risk Assessment



john newton & partners

jnp group

Consulting Engineers

www.jnpgroup.co.uk

Report

Coal Mining Risk Assessment

Project: Units 23-28a Flush Mills
Heckmondwike
WF16 0EN

Client: Wharfedale Ltd

Reference: B22583 CMRA

Date: July 2018

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- Civil Engineering
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- Geo-Environmental
- Green Energy
- Rail
- Structural Engineering
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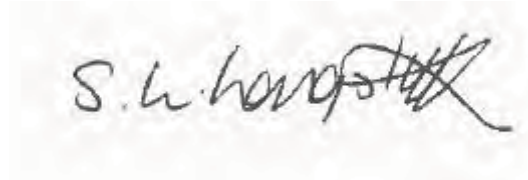
Hartlepool

Leamington Spa

Sheffield

DOCUMENT CONTROL SHEET

Coal Mining Risk Assessment



Prepared by.....
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Approved by.....
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Associate

FOR AND ON BEHALF OF JNP GROUP

Date: July 18

Document Issue Record

Rev	Date	Description	Prepared	Checked	Approved
~	05.07.2018	First Issue	SLL	RS	RS

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Appendix B	Existing and Proposed Site Layout
Appendix C	Coal Authority Report
Appendix D	Historical Map Extracts

1 INTRODUCTION

- 1.1.1 jnp group was instructed by Martin Walsh Architectural on behalf of Wharfedale Ltd to undertake a Coal Mining Risk Assessment of a site known as Units 23 to 28a, Flush Mills, Heckmondwike, WF16 0EN (hereinafter referred to as 'the site'). The site location is shown in Appendix A.
- 1.1.2 This report is confidential and has been prepared solely for the benefit of Wharfedale Ltd and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from jnp group; a charge may be levied against such approval. jnp group accepts no responsibility or liability for the consequences of this document being used for any purpose or project other than for which it was commissioned, and this document to any third party with whom an agreement has not been executed.
- 1.1.3 This report has been prepared following information gathered up to the 4th July 2018. jnp group warrants the accuracy of this report up to and including that date. Additional information, improved practices or changes in legislation may necessitate this report having to be reviewed in whole or in part after that date. If necessary, this report should be referred back to jnp group for re-assessment and, if necessary, re-appraisal.

1.2 Site Location and Description

- 1.2.1 The site is located approximately 100m north-west of the centre of Heckmondwike. This report covers the areas outlined in red and blue on the proposed development plan shown in Appendix B. There are existing long established industrial units on the site and the development comprises demolition of these in this part of the complex and the construction of portal frame, open plan sheds. The current site layout is also shown in Appendix B.
- 1.2.2 Topographical information about the site has been obtained from LiDAR data available via the GeoIndex website. The ground generally slopes towards the south west in the area with the site at approximately 65m above Ordnance Datum (aOD).

1.3 Scope of the Coal Mining Risk Assessment

- 1.3.1 The purpose of this Coal Mining Risk Assessment Report is to:
-  Present a desk-based review of all available information on the coal mining issues which are relevant to the site;
 -  Use that information to identify and assess the risks to the proposed redevelopment from the coal mining legacy, including the cumulative impact of issues;
 -  Set out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed redevelopment; and
 -  Demonstrate to the Local Planning Authority that the application site is, or can be made, safe and stable to meet the requirements of the National Planning Policy with regard to development on unstable land.

1.4 Sources of Information

- 1.4.1 The following sources of information have been obtained upon which the risk assessment of coal mining issues has been based. Reports/extracts are appended where relevant.

-  An up-to-date Consultants Report (Appendix C) from the Coal Authority. Note that the report covers the whole of the Flush Mills site.
-  Geological information obtained from the British Geological Survey (BGS) including GeoIndex (<http://mapapps2.bgs.aaboutuk/geoindex>) the 1:50,000 BGS map Series Solid and Drift Edition (Huddersfield, Sheet 77) and nearby borehole location records.
-  Historical maps from National Library of Scotland <http://maps.nls.uk/>, accessed 4th July 2018 (Appendix D).

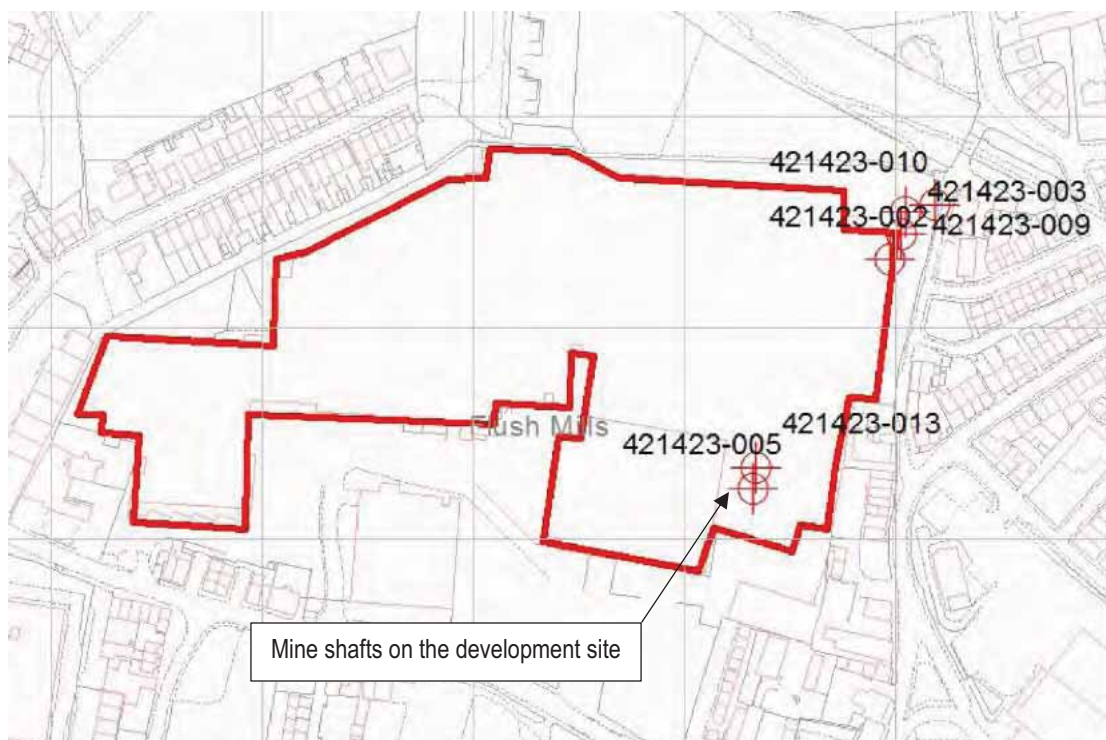
2 SUMMARY OF FINDINGS

- 2.1.1 Examination of the published BGS data for the site and surrounding area shows that the site is not located on an area of recorded artificial ground. The site is also indicated to be devoid of natural Superficial deposits.
- 2.1.2 The site is underlain by strata of the Pennine Lower Coal Measures Formation. The BGS describe the Pennine Lower Coal Measures Formation as:
'Interbedded grey mudstone, siltstone and pale grey sandstone.'
- 2.1.3 A coal seam outcrop crosses the site from north west to south east and a SW-NE orientated geological fault is indicated at or close to the north-western margin of the site. The 1:50,000 geological map of the area does not show the dip of the strata close to the site but in the local area, the strata generally dip to the north east.
- 2.1.4 From the 1:50,000 BGS map, the coal seam is probably the Middleton Main Coal which is reported to be between 0.2m and 1.8m thick.
- 2.1.5 The legend of the geological map indicates that beneath the Middleton Main Coal is the Whatley Lime Coal which is 0.4m to 1.2m thick beneath which are a number of other coal seams.
- 2.1.6 There are several borehole records either approximately 50m to the south-east or 120m to the west of site. All are within the same fault-bounded block as the site.
- 2.1.7 The former are all shallow trial pits constructed to the south west of the conjectured line of the coal seam outcrop. These encountered between 0.6m and 1.45m of Made Ground overlying clay containing traces of coal in part, proved to 3.35m below ground level (bgl).
- 2.1.8 The record to the west is for a borehole 182m deep, drilled for a water well for Firth Furnishings in 1979. The record indicates that 0.45m of fill overlies "drift" (possibly weathered rock) to 1.0mbgl which overlies the Lower Coal Measures to the base of the borehole. Coal seams were encountered at the following depths:
- | | | | |
|---|-----------|-----------------------------|--------------------|
|  | 24.2m bgl | 0.1m thick | Not named |
|  | 54.6m bgl | 1.2m thick | Wheatley Lime Coal |
|  | 80.5m bgl | 0.6m thick | Blocking Coal |
|  | 104m bgl | 2m thick ? (record unclear) | Lousey Coal |
- 2.1.9 Two trial pits have recently been completed on the site. Logs for the pits are not available at the time of reporting but they are reported to have encountered Made Ground (including concrete slabs) to depths of 1.5m to 1.6m bgl overlying firm clay strata.
- 2.1.10 A Coal Authority report (Appendix C) commissioned for the site indicates the following:
-  Past underground mining has occurred close to the site. Underground workings are included where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included. One seam has been worked, the Black

Bed, which was between 156m and 204m depth, with between 0.69m and 0.77m extracted between 1890 and 1912;

-  Probable unrecorded shallow workings are not indicated beneath the site;
-  No spine roadways recorded at shallow depth are indicated beneath the site;
-  Shafts are reported close to the site. Figure 1 shows the locations, which places two of the shafts within the development site. One of these is reported to have been filled with concrete and hardcore in 1986 but treatment details are not provided for the second shaft;
-  The report indicates that there are no coal outcrops within the site;
-  The property is not situated within 500m of an opencast coal mining site;
-  There are no Coal Authority managed tips within 500m of the site;
-  There is no evidence of coal mining related subsidence claims in relation to the property since 1994;
-  There are no recorded incidents of mine gas emissions or mine water treatment schemes within 500m of the site;
-  Section 46 Notices (stating that the land is at risk of subsidence) have not been given in relation to the site.

Figure 1: Mine entry locations.



- 2.1.11 The earliest historical maps viewed (about 1888 - 1913) show the site had been developed (Appendix D) with multiple industrial and residential properties. The western part of the site was part of Flush Mills (a woollen mill). A shaft was identified in the centre of the site and mill ponds immediately to the north west.
- 2.1.12 The 1937 – 61 maps show that the mill buildings had been extended to cover much of the site.

3 IDENTIFICATION AND ASSESSMENT OF SITE SPECIFIC COAL MINING RISKS

- 3.1.1 The table below summarises the potential risks associated with coal mining legacy for the proposed development site, identified from the sources listed above.

Coal Mining Issue	Yes	No	Risk Assessment
Underground coal mining (recorded at shallow depths)		✓	No
Underground coal mining (probable at shallow depths)	✓		Yes
Mine entries (shafts and adits)	✓		Yes
Coal mining geology (faults)		✓	No
Record of past mine gas emissions		✓	No
Recorded coal mining surface hazard		✓	No
Surface mining (opencast workings)		✓	No

- 3.1.2 The Black Bed Coal has been worked within the physical influence of the site but at depths in excess of 152m bgl. Seams at shallower depths are recorded on the geological map and associated legend but are not mentioned in the Coal Authority report. The coal seam (the Middleton Main) that potentially crops out on the site could be up to 1.8m thick. A nearby borehole indicates that the seam beneath this, the Wheatley Lime Coal, was at a depth of 54.6m bgl. Due to the topography and dip of the strata, this seam is likely to be at this depth or greater beneath the development site.
- 3.1.3 The Coal Authority indicates that shallow coal mining has not occurred on the site. This contradicts information from the BGS.
- 3.1.4 Two shafts were located on the site, one of which has been treated.

4 MITIGATION STRATEGY PROPOSED

- 4.1.1 Further information is required about the mine shafts, particularly the untreated shaft. The investigation should also confirm that unrecorded shallow coal extraction has not occurred beneath the site.

5 THE COAL AUTHORITY PERMISSION

- 5.1.1 Prior written permission from The Coal Authority is required for any intrusive activities which will disturb or enter any coal seams, coal mine workings or coal mine entries (shafts and adits). Further information on The Coal Authority's permissions process can be found at:

www.coal.gov.uk/services/permissions/index.cfm

- 5.1.2 This permission has not been requested at this stage.

6 CONCLUSIONS AND RECOMMENDATIONS

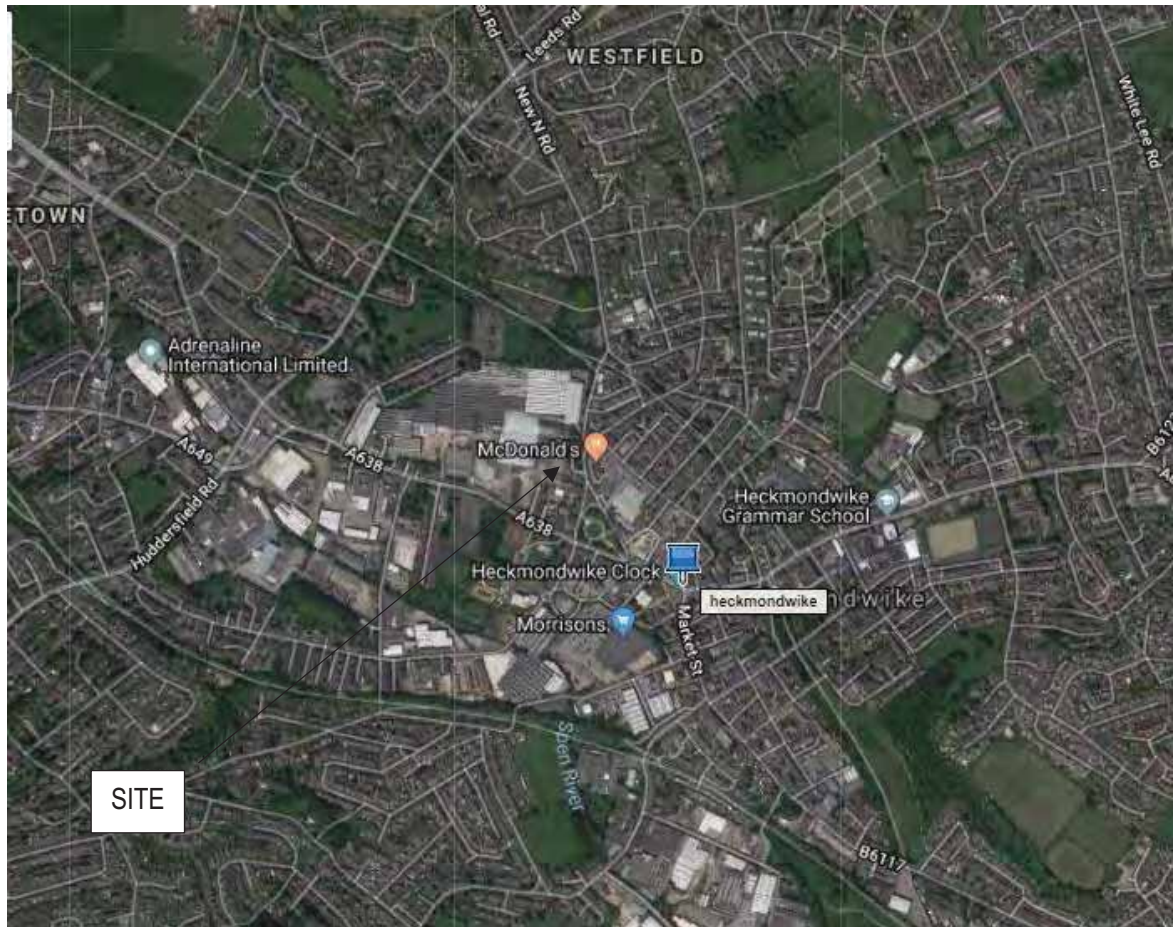
- 6.1.1 A review of available desk-based information has identified that the site is located in an area where underground coal mining has occurred. Recorded workings were at sufficient depth to be of no concern.
- 6.1.2 Although not indicated in the information from the Coal Authority, a coal seam (possibly the Middleton Main) outcrops at the site, underlying the north-eastern section of the site, and may have been mined via unrecorded shallow coal extraction. The possible thickness of and depth to this coal seam is such that associated workings could pose a risk to the site of ground movements / mining subsidence, if present.

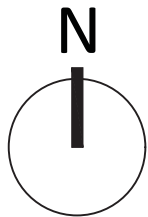
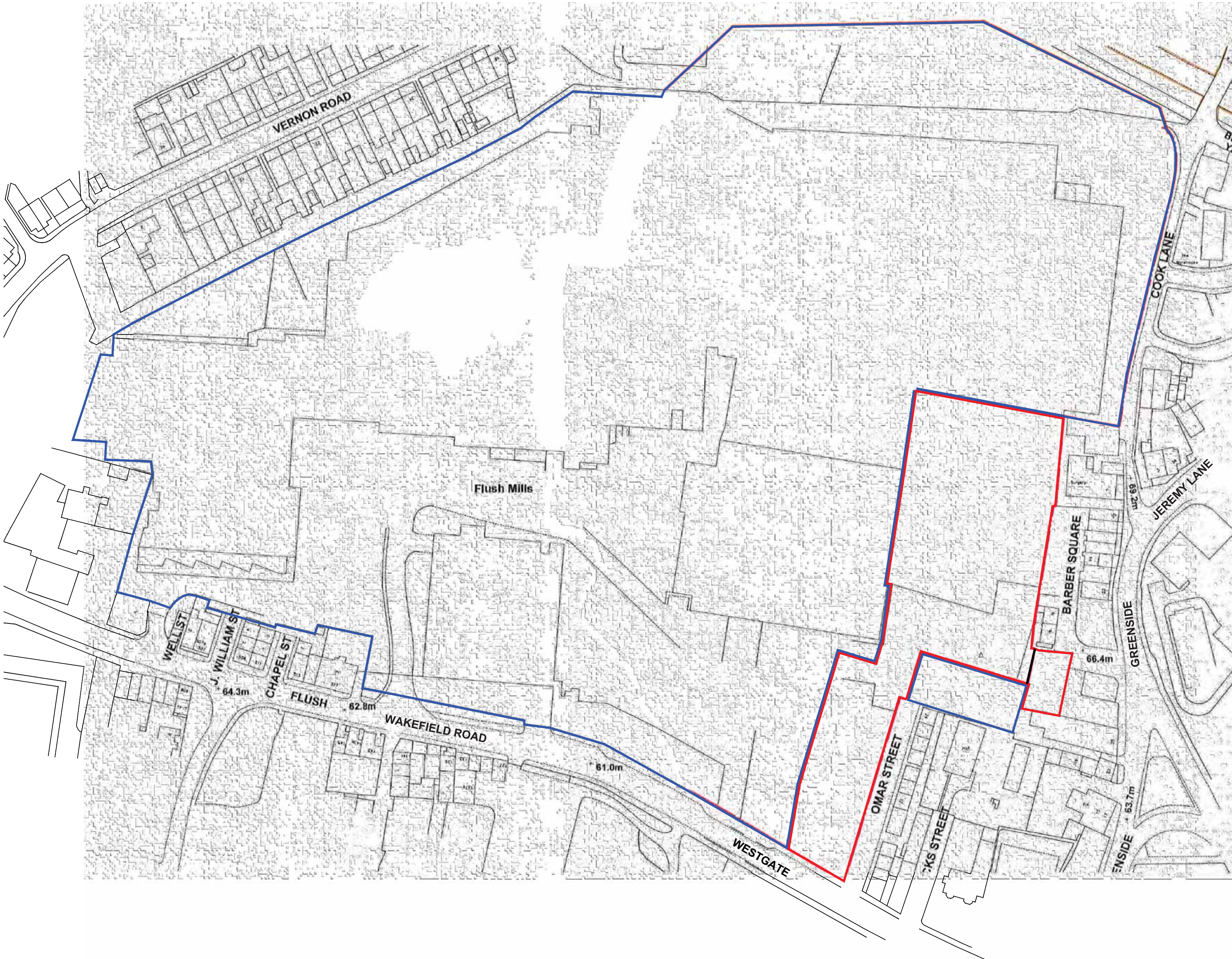
- 6.1.3 Similarly, the two recorded mine shafts identified at the site could pose risks to the intended redevelopment
- 6.1.4 Further site-specific investigations would mitigate, or at least enable better estimation of the associated risks. The following is recommended:
-  It is recommended that a programme of rotary drilling (using water as a flushing medium) should be undertaken in the area to the north east of the indicated coal seam outcrop to determine the depths to and thickness of the same and to investigate for evidence of shallow workings. These would likely be advanced to a range of depths, up to 30m.
 -  Additionally, it is recommended that the two recorded coal shafts at the site are investigated further. Ideally, they should be located; this can be done either by trench excavation or probe-drilling, depending on the nature and depth of Made Ground / Drift deposits at the site, together with underground obstructions. Once located, their dimensions, depths, infill and/or nature of previous treatment should be determined. From the findings of such work, the need or otherwise for further treatment can be determined, and associated costs estimated.
 -  As indicated above, any such works to investigate for coal workings and/or the mine entries at the subject site will need to be undertaken under permit from the Coal Authority.

Appendix A

Site Location Map







Rev	Description	Drawn	Checked	Date
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Document Status : **S0**

Purpose of Issue: **FOR INFORMATION**



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Project

REDEVELOPMENT TO FORM UNITS 24 & 25

UNITS 23 - 28a, FLUSH MILLS,

HECKMONDWIKE WF16 0EN

Title

LOCATION PLAN

Client

CLECKHEATON CONSTRUCTION LTD

MWA Project Ref	Scale	Original Paper Size	Paper Orientation	Drawn
6088	1:1000	@A2	Landscape	GS

File Identifier	Project	Originator	Volume	Level	Type	Role	Number	Revision
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CCFM - MWA - XX- XX - DR - A - 0002

Appendix B

Existing and Proposed Layout





Abbreviation & Symbol Key.			
B	Bolard	LB	Letter Box
BB	Basin Beacon	L/P	Lamp Post
BT	British Telecom Cover	MB	Multi Boe
BM	Bench Mark	MH	Man Hole
CL	Cover Level	MR	Marker Post
DK	Drop Kerb	MS	Mile Stone
EL	Electricity Cover	MT	Mercury Telecommunications
EP	Electricity Pole	NB	Notice Board
FF	Fire Hydrant	NFI	No Further Information
FFP	Flagged Footpath	P	Post
G	Gully	PB	Post Box
GM	Gas Meter	RE	Rodding Eye
GV	Gas Valve	RL	Roeline
IC	Inspection Cover	RS	Road Sign
IL	Invert Level	SS	Street Name Sign
RSJ	Reinforced Steel Joist	RSW	Rain Water Pipe
SP	Sign Post	SV	Stop Valve
SWP	Soil Vent Pipe	SWG	Storm Water Gully
SW	Storm Water	TTP	Tarmac Footpath
TL	Traffic Light	TP	Telegraph Pole
UL	Up to Lift	UR	Urinal
VP	Vent Pipe	WM	Water Meter
WP	Waste Pipe	WT	Wall Top

Fences & Walls			
Ref	Retaining Wall	C/L	Chain Link
B/W	Barbed Wire	C/P	Chestnut Paving
C/B	Clean Boarded	UR	Urinal
C/I	Corrugated Iron	Lot	Lattice
P/C	Post & Chain	P/R	Post & Rail
P/W	Post & Wire		

Survey Control Co-ordinates			
Reference	East	North	Elevation
GPS01	421363.188	423468.675	65.73
GPS03	421311.981	423462.921	64.62
H01A	421364.881	423706.638	67.13
H01B	421367.644	423743.149	67.11
H02	421341.723	423468.910	65.36
H02A	421351.436	423742.865	66.51
H02B	421351.434	423742.865	66.51
H02C	421351.494	423754.846	66.54
H02D	421338.634	423744.399	66.56
H02E	421330.045	423746.531	66.56
H02F	421329.284	423751.043	66.59
H03	421311.962	423462.920	64.65
H03A	421376.355	423676.457	66.22
H03B	421380.122	423677.549	66.53
H03C	421411.364	423675.483	67.31
H03D	421376.822	423718.746	68.13
H04	421296.907	423662.344	63.79
H02B1	421346.133	423712.309	66.52
R01	421365.734	423704.319	68.96
R02	421369.488	423707.789	68.74
R03	421355.927	423711.189	68.85
R04	421377.022	423742.197	68.90
R05	421371.025	423753.788	69.04
R06	421367.359	423757.912	68.72
R07	421322.092	423745.533	68.54
R08	421323.403	423761.712	68.44
R09	421326.111	423774.958	68.54

Site Survey Control & Datum Information
Grid Orientation:
Survey related to Ordnance Survey "OSGB36" at control point GPS01 and the survey data was processed on a plane grid. (No Scale Factor)
Level Datum:
OS Orthometric HTs

Control & Datum Information
Co-ordinates and levels are based upon OSGB 1936 National Grid (OSGB36) and Ordnance Survey Datum Newlyn (ODN).
They are derived using realtime on site GPS survey, that utilises the National Grid Transformation OSTN15GB and the National Geoid Model COSM15GB.
The data obtained for use in this drawing involved the use of realtime GPS survey and total station survey.
Contours are shown at 0.5m intervals.

Rev	Description	By	Date

Surv.	Drawn	Date	Chkd	Date
NH	NH	27.11.17		

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Dwg No. MWA_175_Flush Mills

Sheet No. 1

SCALE	1/250	REV.	
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Rev	Description	Drawn	Checked	Date
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Document Status: **S0** Purpose of Issue: **FOR INFORMATION**
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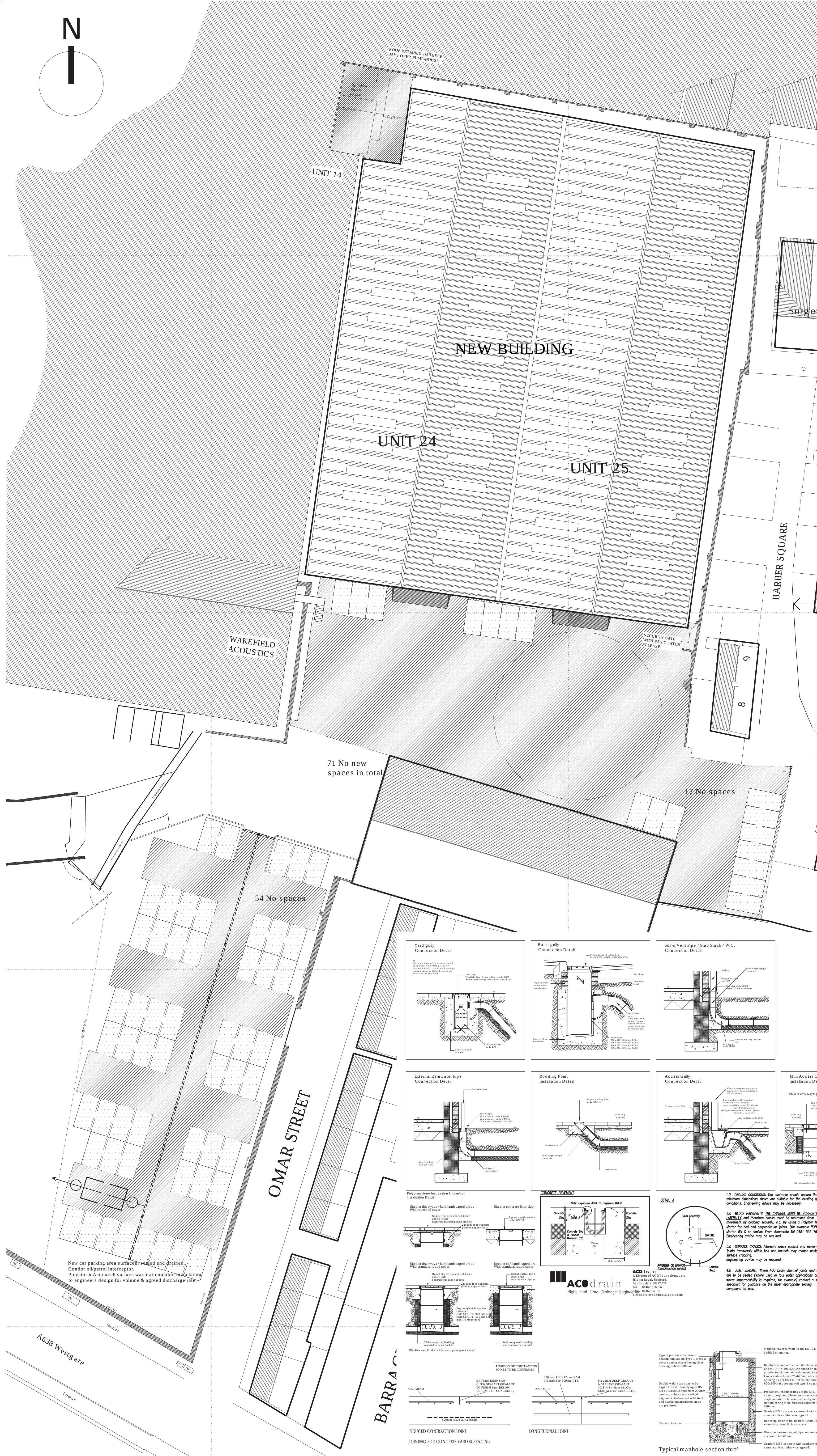
Project: **REDEVELOPMENT TO FORM UNITS 24 & 25 UNITS 23 - 28a FLUSH MILLS, HECKMONDWIKE WF16 0EN**

Title: **SITE SURVEY PLAN**

Client: **CLECKHEATON CONSTRUCTION LIMITED**

MWA Project Ref	Scale	Original Paper Size	Paper Orientation	Drawn
6088	1:250	@A1	Landscape	GS

File Identifier	Project	Originator	Volume	Level	Type	Role	Number	Revision
CCFM - MWA - XX - XX - DR - A - 0003								



SURFACE WATER DRAINAGE:
Underground drainage pipework to be PVCu/polypropylene solid wall pipes and fittings by Watney Plumbing & Drainage, with rubber sealing rings manufactured from SBR.
Product manufactured to BS EN 1401-1:1998, BS 4660 and with BBA Certification 88/1977.
Pipework runs to be bedded as denoted on the drainage drawing / site plan.

All drains to have 150mm concrete surround where cover is less than 1m to invert. Where below ground drainage pipework is concrete encased, flexible joints to be provided in concrete by inserting an 18mm thick compressible board (fibre board or polystyrene) at centres of 2.3m maximum, pre-cut to pipe dia. and to height and width equal to the concrete cross section.

A test for water-tightness using air or water should be applied initially after the system has been installed, before any back-filling, and again after back-filling is complete. Flush out the whole system with water to remove any silt and debris before final tests are applied.

Air test: For pipes up to 300mm diam apply a pressure of 110mm water gauge for approximately 5 minutes before testing. The pipe should then hold an initial 100mm pressure with a maximum loss of head on a manometer of 25mm, in 5 minutes for 100, 150 and 225mm pipelines, or 7 minutes for 300mm pipelines.

Water test: For pipes up to 300mm diam fill the system with water to a maximum depth of 5m above the lowest invert in the test section and a minimum depth of 1m above the highest invert in the test section. The loss per square metre of internal pipe surface area should not exceed:
0.15 litres for test lengths consisting of pipes only,
0.20 litres for test lengths consisting of pipes and manholes,
0.40 litres for tests on inspection chambers or manholes only.

WHITE LINING:
Any vehicle parking bays and associated markings to be made in thermoplastic paint. Markings 100mm wide.

FORECOURTS & VEHICULAR SURFACING WORKS:
Concrete A.E.C. 30 N/mm² at 28 days, min. 330 kg/m³ cement content all as C & C.A. recommendations. An enrichment to be 4.5:1.5%
250mm thick slab to have 1 No. layer A393 mesh placed 50mm below top face of concrete. Slab bedded on 300mm thick 75mm down crusher run stone consolidated in 2No. layers to achieve 95% compaction.
Surface to be tamped and brush finished transverse to direction of travel.

KERBING:
Trafficated areas to be bound by PC concrete kerbs, hot nosed profile, 255x150mm, Marshalls or similar approved & manufactured to BS EN 1340:2003. To include for angle and quadrant kerbs as necessary.
see details drawing for bedding.

BACK EDGING:
To footways where denoted, 50x150mm flat top edgings, Marshalls or similar approved & manufactured to BS EN 1340:2003.
see details drawing for bedding.

PAVINGS TO FOOTWAYS:
To consist of:
Textured concrete pavings, Marshalls Saxon from standard range.
Paving bedded on 50mm sand base on 150mm hardcore sub-base.

MANHOLES (denoted MH on plan)
Form in class B engineering brickwork walling 1B thick built up on 150mm concrete base slab. Benching to be formed to channels & to be smooth trowelled. Manhole covers and frames to be graded as denoted on manhole schedule. Covers and frames to be set to 150mm reinforced concrete cover slab.

Alternatively use precast concrete manhole sections complying with the requirements of BS 5911:Pt 2 & BS EN 1917.
All such manholes located within vehicular areas shall be encased in 150mm concrete surround.

MANHOLE COVERS / GULLY TOPS: (General)
Class B125 where located in pedestrian access only areas.
Class C250 where located against kerbs.
Class D400 where located in vehicular areas.

CONCRETE SLAB JOINTS
Slab joints to be as lay out unless agreed otherwise. Joint filler to be Fosroc Hydrotol XL, 10mm wide joint. Joint sealed with Fosroc Copor 200PF pointing grade joint sealant to a depth of 25mm. Bond breaker tape between sealant and filler board.
All placed and fitted in accordance with Fosroc Limited recommendations and specification, including for primers.

SERVICE DUCTS
Any new service ducts to be black polyethylene or pvc, 110mm dia. smooth walled ducting.
Ducts to be laid in trenches 300mm wide with depth to top of duct of 450mm. Underneath of duct to be laid on 50mm sand blinding layer.
Cable warning marker tape to be placed 150mm above the top of the duct.
Include for slow radius bend and raising pieces where ducting routes through walls and/or terminates at floor level.
All service ducting runs to be accurately recorded and marked on plans to be included with the Health & Safety Building Files/ Manuals.

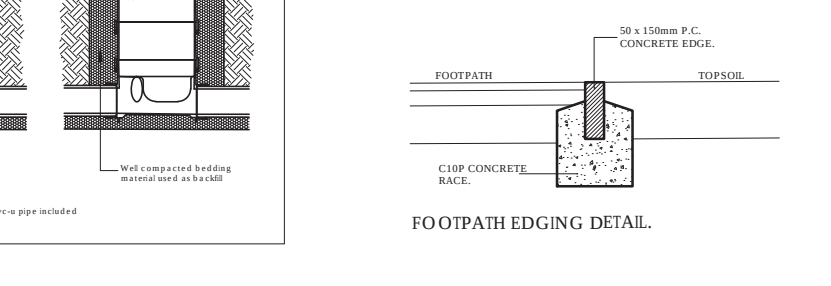
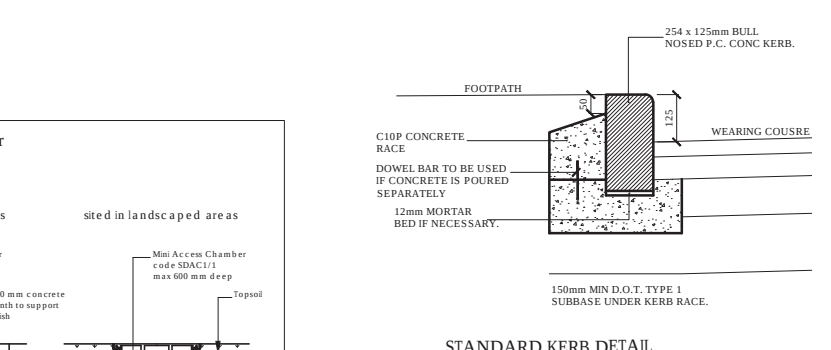
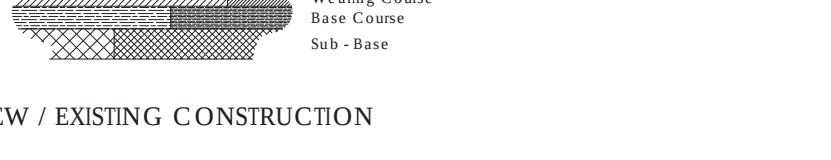
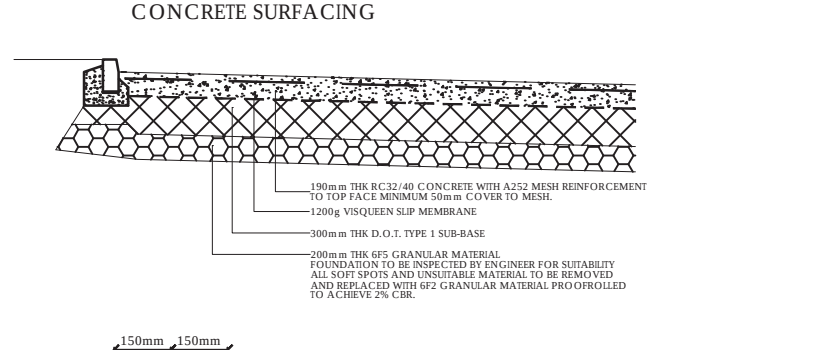
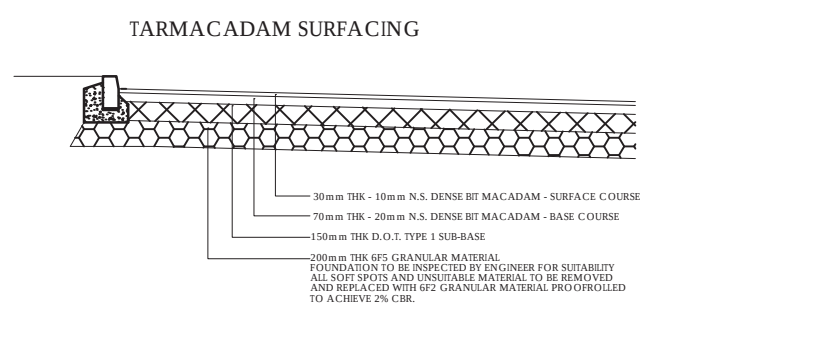
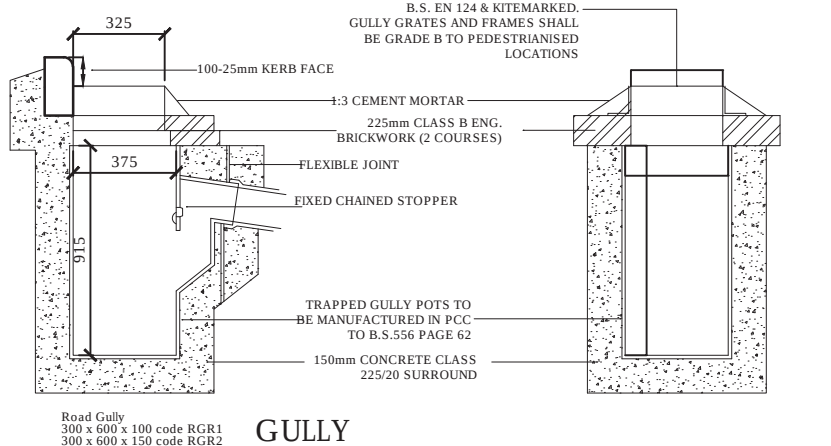
REDUNDANT DRAINAGE RUNS:
All redundant gullies and branch drains to the same to be broken out where accessible, or where at depth to be sealed with concrete.

EXTERNAL RAMPS TO SERVICE AND PERSONNEL DOORS:
Concrete ramp max. 1:12 gradient A.E.C. 30 N/mm² at 28 days, min. 330 kg/m³ cement content all as C & C.A. recommendations. An enrichment to be 4.5:1.5%
225mm thick slab to have 1 No. layer A393 mesh placed 50mm below top face of concrete. Slab bedded on 300mm thick 75mm down crusher run stone consolidated in 2No. layers to achieve 95% compaction.
Where shown new dowel connection of ramp to floor to be 16mm. dia. Dowel bars, 600mm long at 600mm c/c. Surface to be brush finished. All doors to have ramp externally, nominal rise 150mm. Ramps to personnel/effie ext doors to have level landings extending at least the same length as the width outside the wing of the door. Landings & ramps to be finished with coarse brush & trowelled perimeter edgings.

EXTERNAL PATHS:
Forming of any new pedestrian pathways:
Path edgings to be pc concrete plain square edgings founded on 150mm kerb race. Path surface to be pc concrete pavings (Marshalls Saxon or similar) bedded on 50mm sand on 100mm hardcore sub-base. Pavings to be mortar jointed.
Top surface of pavings to be minimum 150mm below internal floor level. Ramps to downways to be formed as at least to exceed 1:12 gradient.
Landings to be formed to provide level access at doorways.

EXTERNAL DOOR PROTECTION POSTS:
Include for 2No posts externally to bottom of each ramp and personnel doors as shown on detail. Plus 2no. posts inside the warehouse adjacent to the service doors to similar detail but bolted directly onto floor slab, all positions as shown on plans.
Posts projecting 1200mm high x 150mm dia. C.H.S. with a welded top plate. Delivered to site with red oxide paint undercoat.
Apply 2No coats polyurethane glass finish to 200mm horizontal deep bands of yellow and black. 10mm thick base plate on 600mmx3 x 300mm deep concrete pad foundation for external posts, depth to suit site conditions.

EXISTING MANHOLES:
Existing manholes within the area of the demolished building footprint, to be adjusted to suit new levels and construction.
Include for removing cover and frame. Make adjustment to the manhole construction and extend to suit new finished floor level. Supply and fit new heavy duty cover and frame having double seal bolt down fitting.
Covers & frames to be C250 grade to BS EN 124, Trough by Saint-Gobain or similar, single piece double seal with security locking.



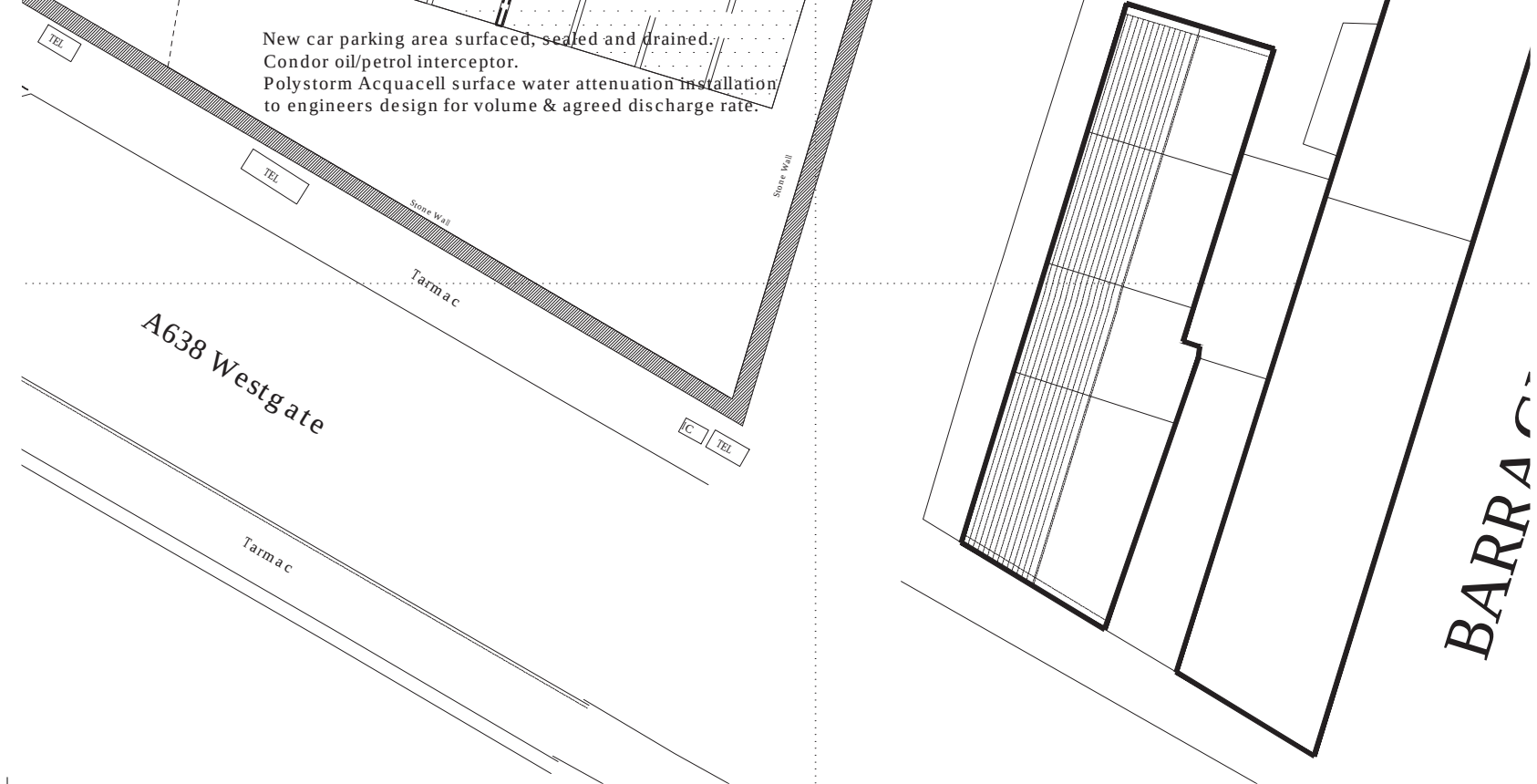
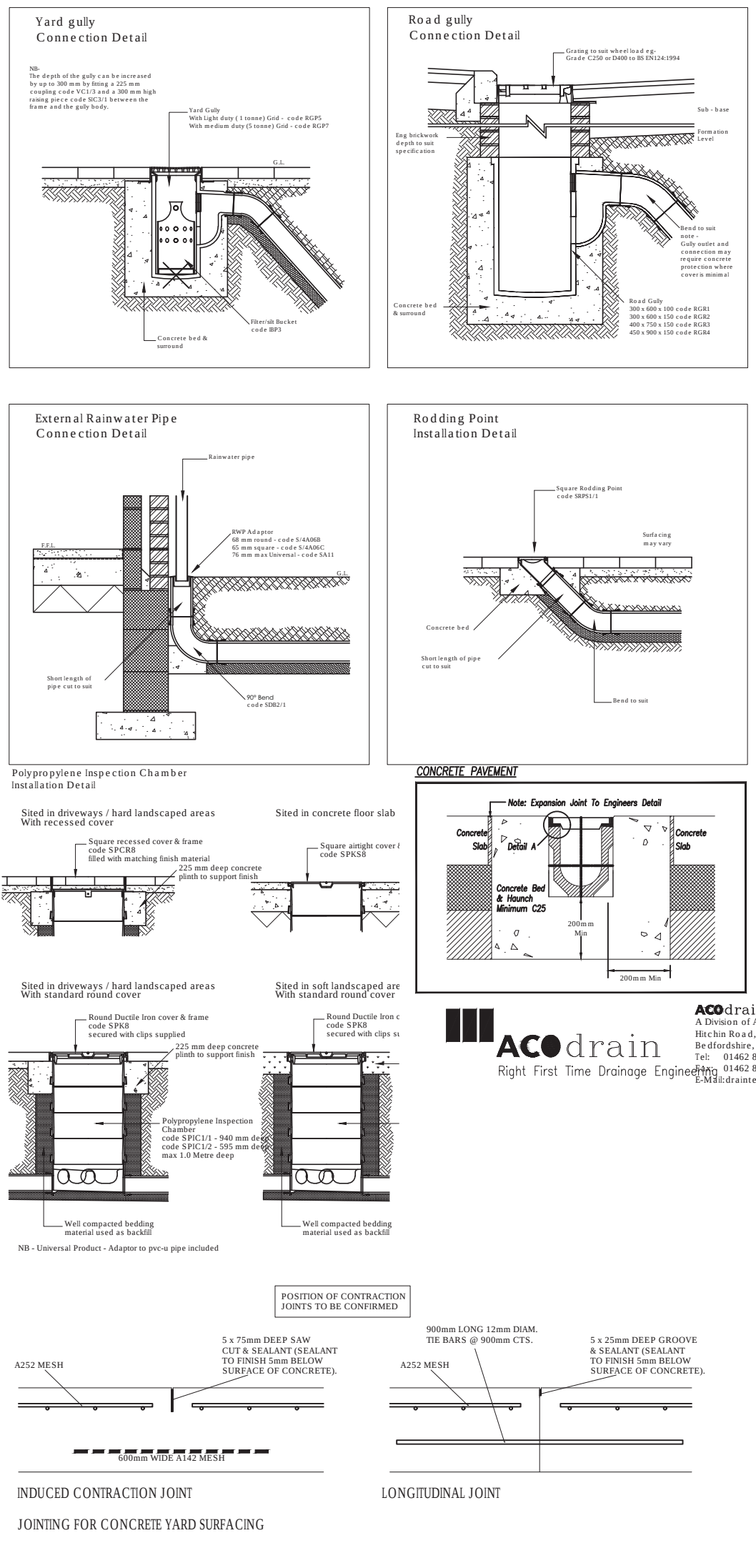
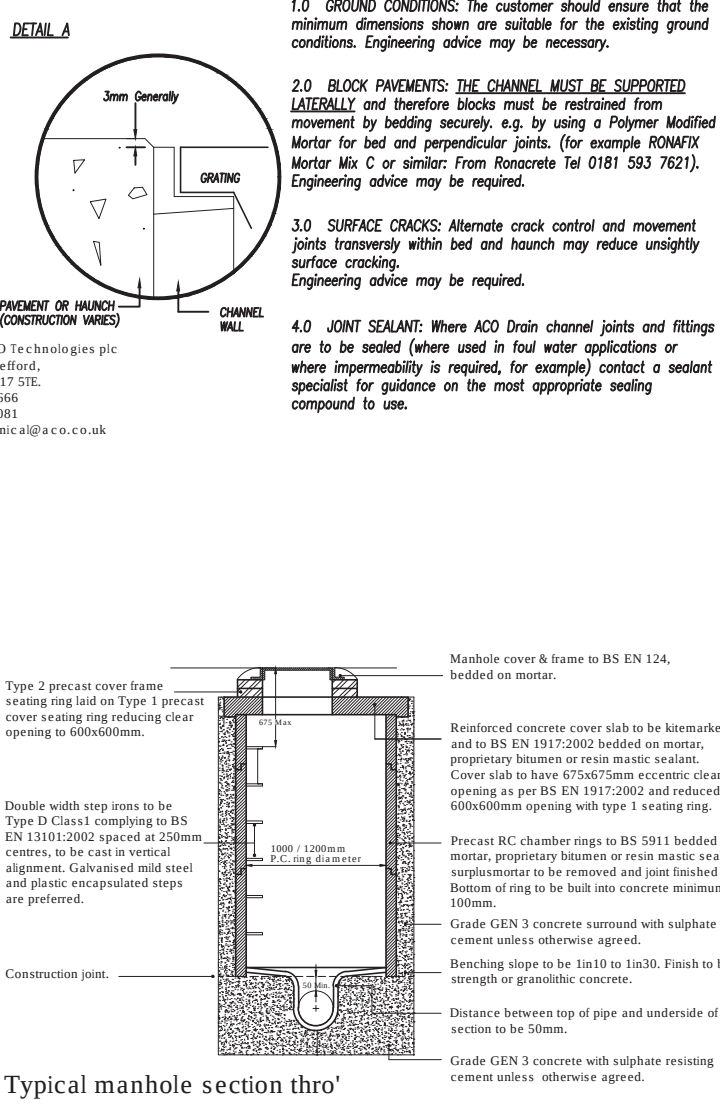
Rev	Description	Drawn	Checked	Date

Document Status: S0
Purpose of Issue: FOR INFORMATION

MARTIN WALSH ARCHITECTURAL

Firth Buildings, 99 - 103 Leeds Rd, Dewsbury, WF12 7BU
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e: info@martinwalsh.co.uk w: www.martinwalsh.co.uk

Project	Originator	Volume	Level	Type	Role	Number	Revision
CCFM - MWA - XX - XX - DR - A - 0006	MWA	1	250	Portrait	GS		



Appendix C

Coal Authority Report





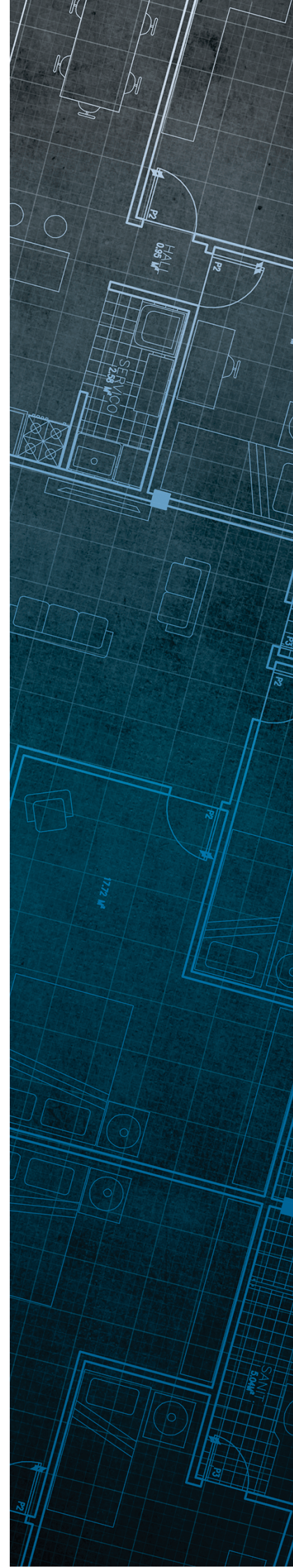
The Coal
Authority

Consultants Coal Mining Report

S T Paper Ltd
Units 24 To 28
Flush Mills
Westgate
Heckmondwike
Kirklees
WF16 0EN

Date of enquiry:	29 June 2018
Date enquiry received:	29 June 2018
Issue date:	29 June 2018

Our reference:	51001862018001
Your reference:	Brig 516



Consultants

Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

JNP GROUP

Enquiry address

S T Paper Ltd
Units 24 To 28
Flush Mills
Westgate
Heckmondwike
Kirklees
WF16 0EN

How to contact us

0345 762 6848 (UK)
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Nottinghamshire
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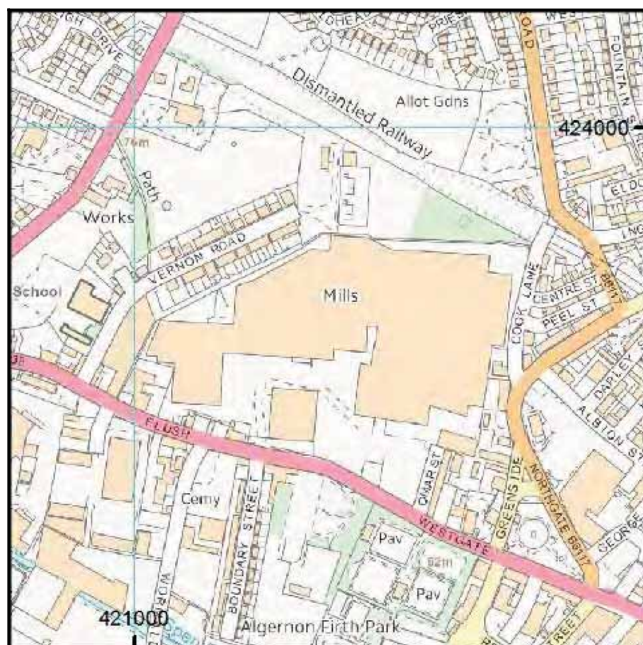
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 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	BLACK BED	Coal	6HFE	156	North	2.4	South-East	69	1890
unnamed	BLACK BED	Coal	6HF4	160	Beneath Property	2.4	South-East	69	1912
unnamed	BLACK BED	Coal	6HF5	162	Beneath Property	2.4	South-East	69	1908
unnamed	BLACK BED	Coal	6HF3	185	Beneath Property	2.9	East	69	1912
unnamed	BLACK BED	Coal	6HFB	204	North	2.9	East	77	1910

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	421423-002	421398 423832	it was reported that this shaft was capped in 1976 but we cannot confirm whether or not this was done	Coal	
Shaft	421423-003	421403 423844	it was reported that this shaft was capped in 1976 but we cannot confirm whether or not this was done	Coal	
Shaft	421423-005	421333 423724		Coal	
Shaft	421423-009	421405 423855		Coal	
Shaft	421423-010	421419 423858		Coal	
Shaft	421423-013	421334 423734	was filled with concrete and hardcore in December 1986	Coal	

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

6957	M31	M49
FGB402	5253	PO0
FGB437	FGB186	5879

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

No outcrops recorded.

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31st October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices

Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land

Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

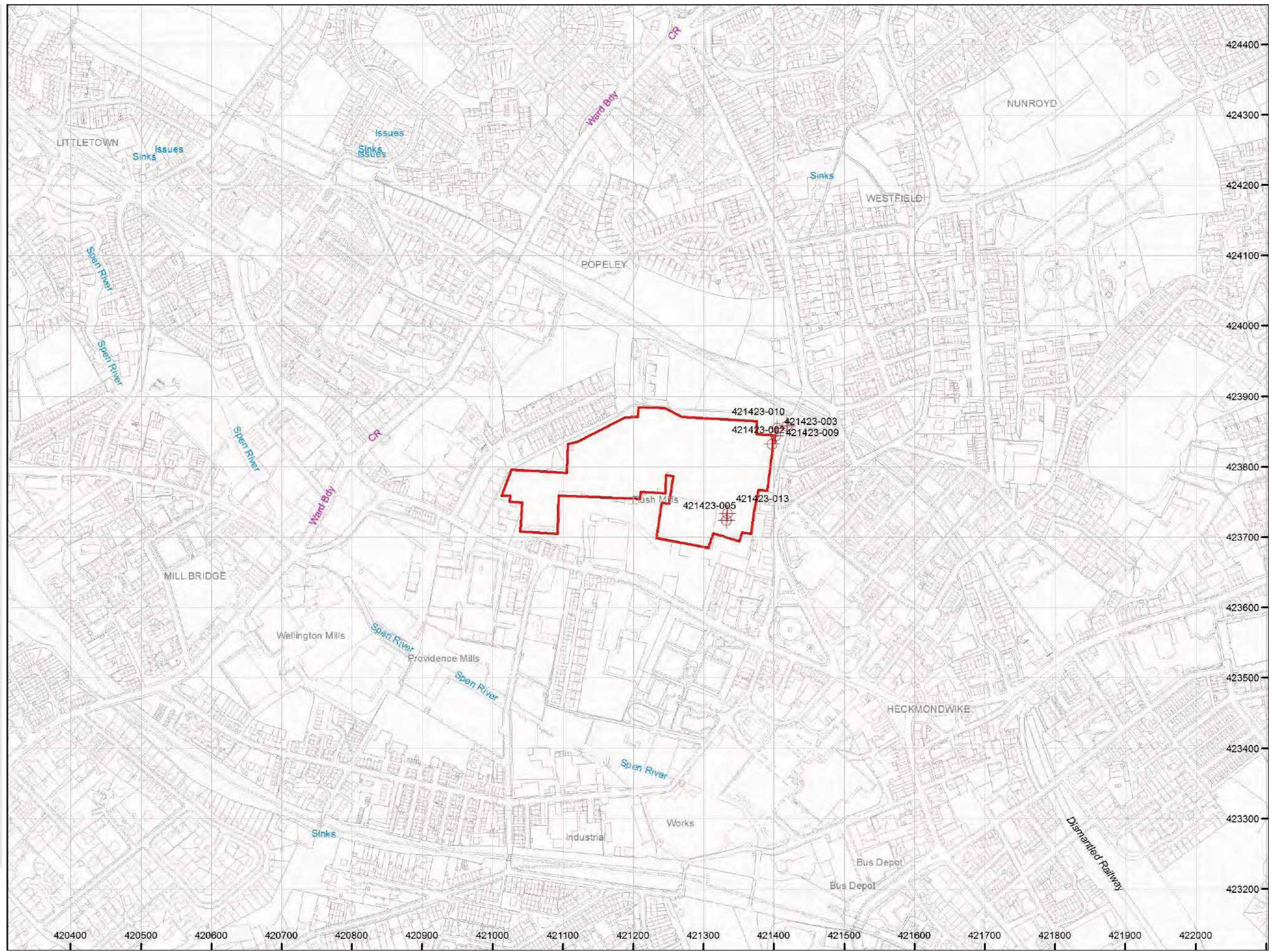
The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

Approximate position of the enquiry boundary shown 

Disused mine shaft 

How to contact us
0345 762 6848 (UK)
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www.groundstability.com



Appendix D

Historical Map Extracts



1892 – 1914 (with current aerial shot to the right)



1937 - 1961 (with current aerial shot to the right)





John Newton & Partners

jnp group

Consulting Engineers

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Sheffield
South Yorkshire
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telephone

0114 244 3500

email

sheffield@jnpgroup.co.uk



APPENDIX E

Historical Maps

Site Details:

FORMER CARPARK ADJACENT
127 WESTGATE,
HECKMONDWIKE, WF16 0EW

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Report Ref: GS-4654496
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Map Name: County Series

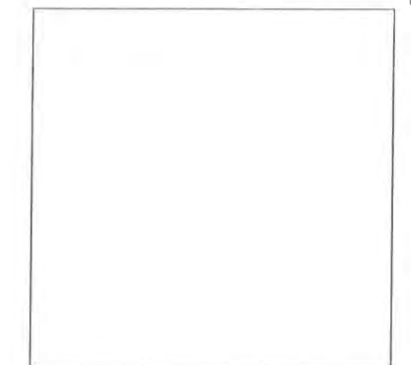
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Printed at: 1:10,560



Surveyed 1847
Revised N/A
Edition 1854
Copyright N/A
Levelled N/A

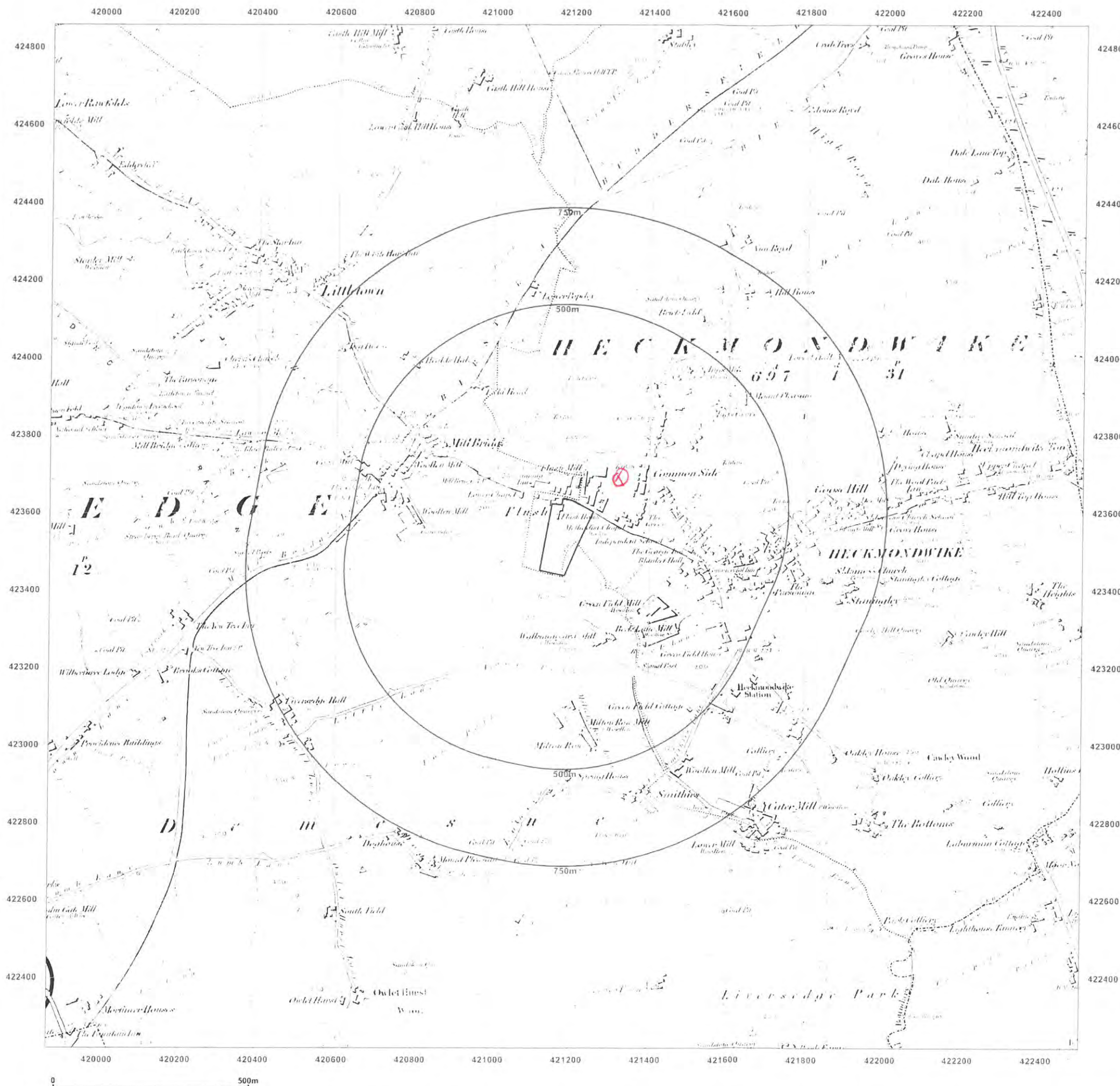


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To view map legend click here [Legend](#)



Site Details:

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127 WESTGATE,
HECKMONDWIKE, WF16 0EW

Client Ref: MWA_6946
Report Ref: GS-4654496
Grid Ref: 421187, 423539

Map Name: County Series

Map date: 1892

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1892
Revised 1892
Edition N/A
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Client Ref: MWA_6946
Report Ref: GS-4654496
Grid Ref: 421187, 423539

Map Name: County Series

Map date: 1905

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Printed at: 1:10,560



Surveyed 1889
Revised 1905
Edition N/A
Copyright N/A
Levelled N/A

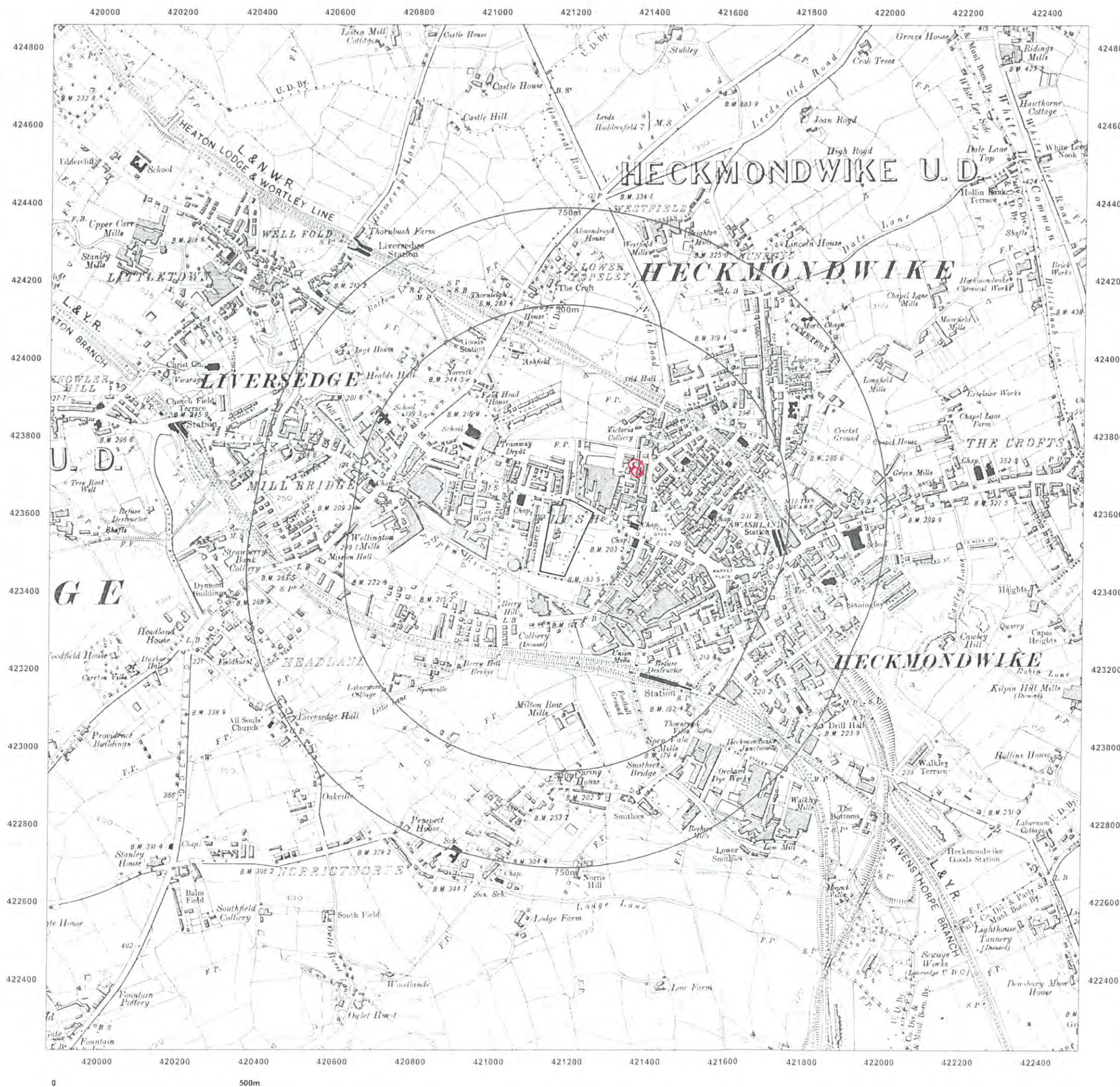


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Report Ref: GS-4654496
Grid Ref: 421187, 423539

Map Name: County Series

Map date: 1931

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1851
Revised 1931
Edition N/A
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Levelled N/A



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Report Ref: GS-4654496
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Map Name: County Series

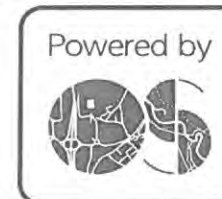
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Printed at: 1:10,560



Surveyed 1851
Revised 1938
Edition N/A
Copyright N/A
Levelled 1931



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Client Ref: MWA_6946
Report Ref: GS-4654496
Grid Ref: 421187, 423539

Map Name: County Series

Map date: 1948

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1851
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Edition N/A
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Levelled N/A



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Client Ref: MWA_6946
Report Ref: GS-4654496
Grid Ref: 421187, 423539

Map Name: Provisional

Map date: 1951-1955

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1951
Revised 1951
Edition N/A
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Surveyed 1951
Revised 1955
Edition N/A
Copyright N/A
Levelled N/A

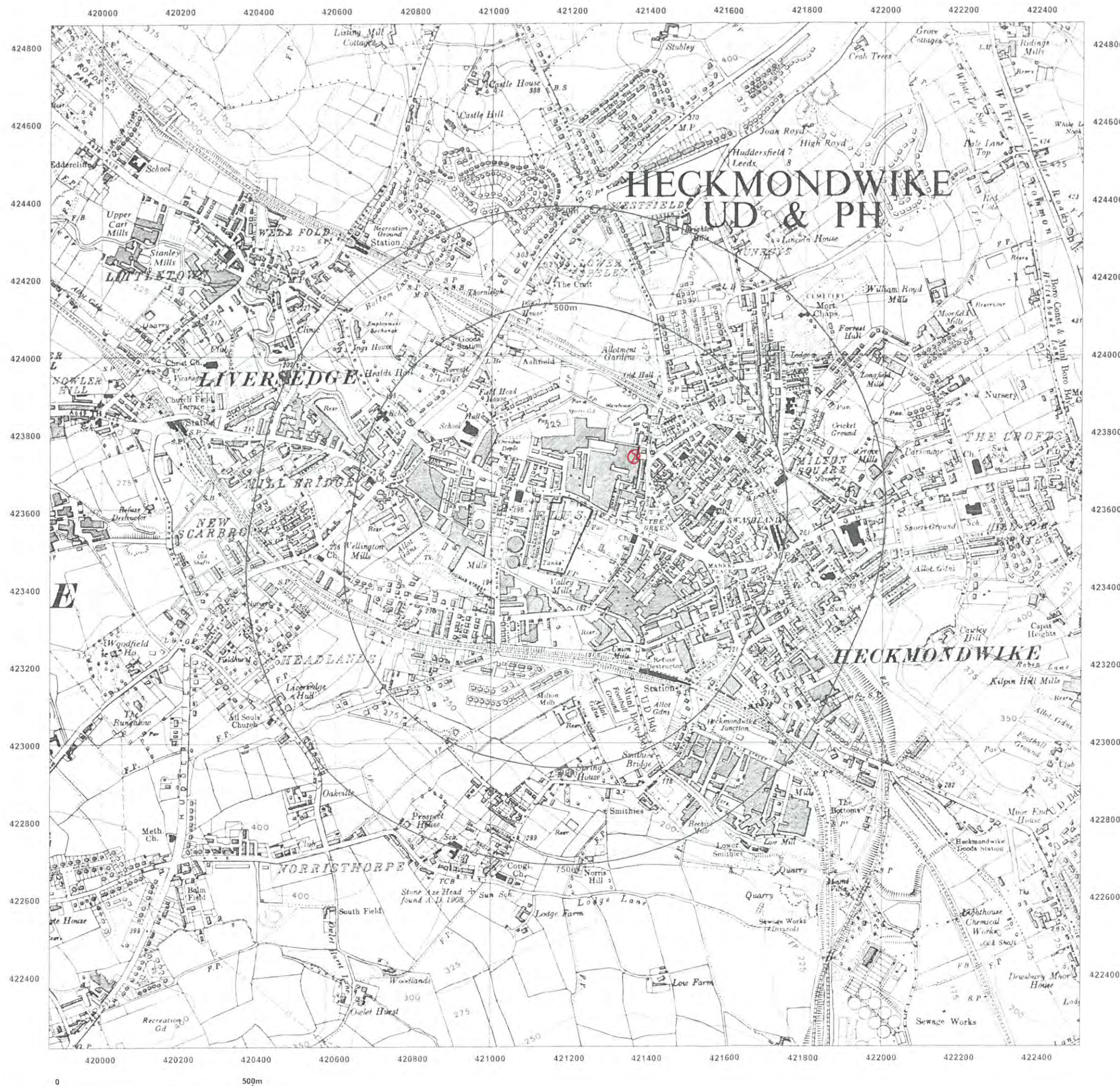


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Client Ref: MWA_6946
Report Ref: GS-4654496
Grid Ref: 421187, 423539

Map Name: Provisional

Map date: 1966-1967

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1966
Revised 1966
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1967
Revised 1967
Edition N/A
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Levelled N/A

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Client Ref: MWA_6946
Report Ref: GS-4654496
Grid Ref: 421187, 423539

Map Name: National Grid

Map date: 1974-1975

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1974
Revised 1975
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1974
Revised 1974
Edition N/A
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Site Details:

FORMER CARPARK ADJACENT
127 WESTGATE,
HECKMONDWIKE, WF16 0EW

Client Ref: MWA_6946
Report Ref: GS-4654496
Grid Ref: 421187, 423539

Map Name: National Grid

Map date: 1981-1985

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1985
Revised 1985
Edition N/A
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Levelled N/A

Surveyed 1977
Revised 1981
Edition N/A
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Site Details:

FORMER CARPARK ADJACENT
127 WESTGATE,
HECKMONDWIKE, WF16 0EW

Client Ref: MWA_6946
Report Ref: GS-4654496
Grid Ref: 421187, 423539

Map Name: National Grid

Map date: 1988

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1985
Revised 1988
Edition N/A
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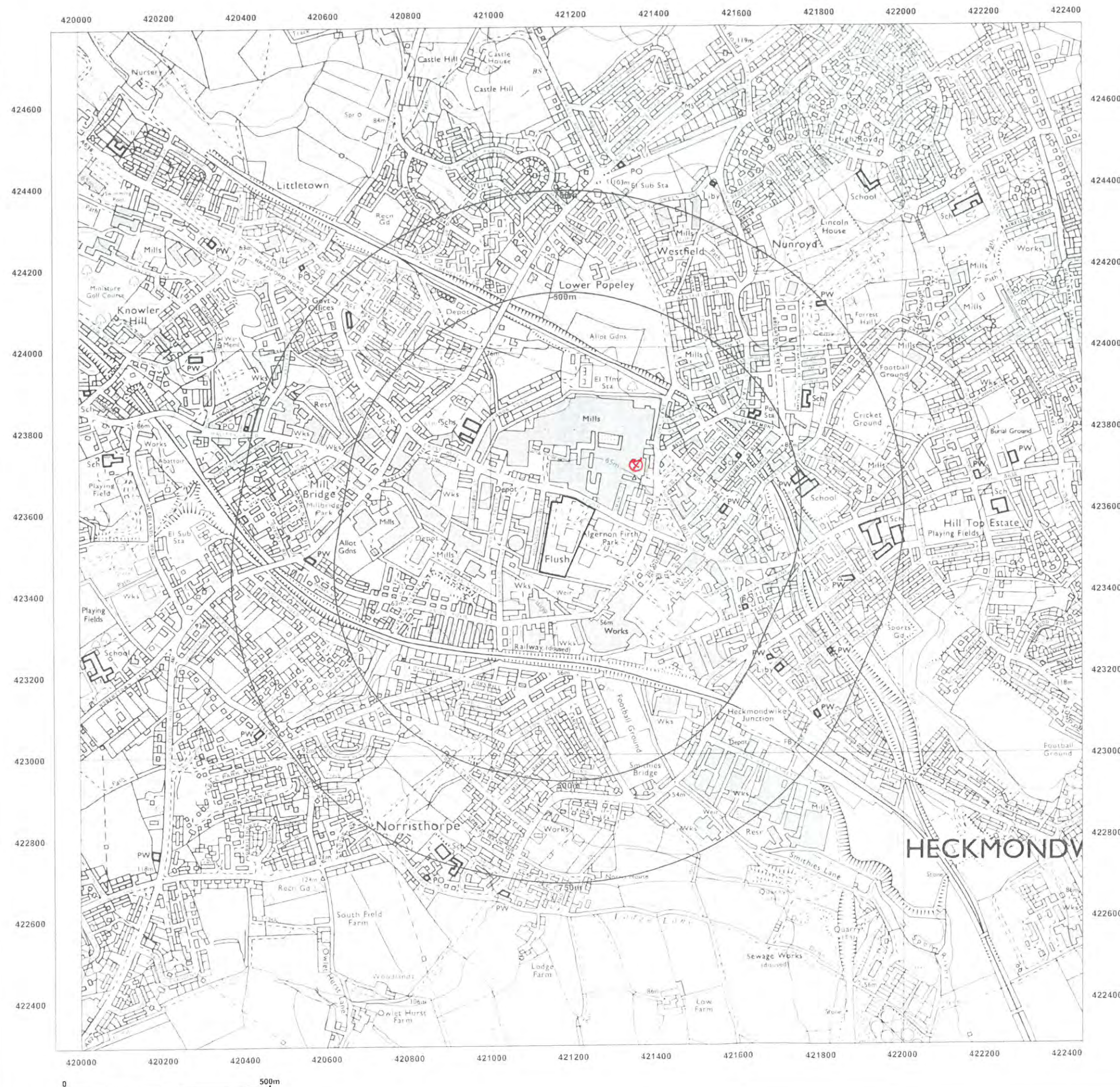


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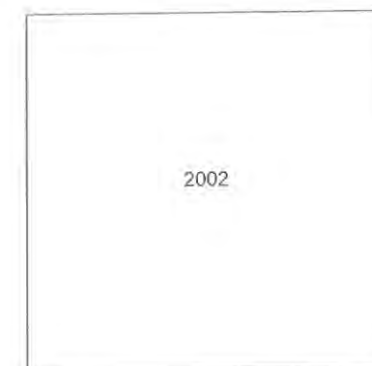
Client Ref: MWA_6946
Report Ref: GS-4654496
Grid Ref: 421187, 423539

Map Name: 1:10,000 Raster

Map date: 2002

Scale: 1:10,000

Printed at: 1:10,000



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Site Details:

FORMER CARPARK ADJACENT
127 WESTGATE,
HECKMONDWIKE, WF16 0EW

Client Ref: MWA_6946
Report Ref: GS-4654496
Grid Ref: 421187, 423539

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000



2010



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