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## 1.0 EXECUTIVE SUMMARY

The pertinent conclusions of the report are tabulated below. However, the information below is not exhaustive, and it is recommended the report is read in its entirety.

Proposed Development	Residential dwellings with private gardens.
Existing Site Description	Mainly a large sloping grassed agricultural field. In the eastern corner is a triangular shaped wooded area, separated from the field area by a gravel access road. In the southwestern corner is a cover of hardstanding, and sporadic young to mature trees. Ground levels slope downwards from northeast to southwest. The site is steeper in the northeast, and less steep in the southwest, with a maximum gradient of around 1 in 5.
Site History	Majority of site has remained undeveloped. A coal seam has been worked by opencasting, across the central portion, and a small portion of the southwest was quarried for sandstone, which later had a small building and associated car parking. A triangular area on the east once had cluster of small buildings. A well (and later trough) was present at or close to where the site abuts Shop Lane.
Published Geology	Majority of the site underlain by undifferentiated strata of the Lower Coal Measures. Southwestern and northwestern areas of the site shown to be underlain by Grenoside Sandstone. Better Bed Coal seam outcrops on the site. Fault crosses the south of the site, from west to northeast.
Coal Mining	Deep fill present from opencast coal mining, with potential shallow underground workings north and west of this. Also potential for crop workings and bell pits. 9m drill and grout grid recommended for parts of the site, closing to 3m where workings with insufficient cover are found.
Hydrogeology	'Secondary A' Aquifer. No sensitive abstractions within 1km.
Hydrology	Nearest watercourse is 800m to the southwest. No active abstractions within 1km. Not at risk of river flooding.

Harmful Gases	CS2 gas protection measures required, comprising a membrane and ventilated sub floor void. This will also protect against radon.
Ground Conditions	Up to 0.35m of topsoil across most of site, overlying clays and gravels from weathering of solid strata (mudstone and sandstone). Backfilled opencast across the centre. Backfilled sandstone quarry across the southwest. Rubble present on the eastern triangle.
Contamination	Only confirmed soil contamination source is demolition rubble in the eastern triangle - elevated arsenic, copper, lead, PAH. Slab in southwest corner of the site prevented sampling.
Remediation Strategy	Affected area is proposed for POS. Where only turf is proposed, provide 0.3m thickness of clean soil. In any proposed planted areas, 0.6m thickness should be provided. Alternatively, the made ground could be removed from site. Investigate below the slab in the southwest if the slab is to be removed.
Foundations	Strip/trench fill foundations across majority of the site (reinforced if/where coal workings treated). Piles in the opencast area.
Excavations	Likely to remain stable in natural strata, unstable in made ground. Localised groundwater should be controllable by pumping.
Concrete	GEN1 designation for unreinforced buried concrete away from any made ground. FND3z designation for unreinforced buried concrete in contact with made ground. For any reinforced concrete, other design-specific mixes will apply.
Soakaways	Disposal of surface water using soakaways is unlikely to be feasible on the site due to the widespread presence of clay soils, and the potential for soakaway drainage to reappear downslope
Road Pavement	A formation on natural strata is unlikely to be possible on the backfilled opencast area. On the rest of the site, a design CBR value of 2% is considered applicable on the clays and 20% on the weathered sandstone gravel areas on the west. If considered necessary, this should be confirmed by testing at proposed subgrade level before construction.

Slope Stability	If the slopes are steepened or subjected to unusual localised loads, stability may be affected and retaining walls required.
Old Well	A well was once indicated at the far southwestern boundary, later becoming a "trough". If present on the site, and if the feature is a well, depending on its condition, it may need to be filled with single size stone and provided with a reinforced concrete cap. If the feature is producing water at the surface, this will need to be picked up as part of any drainage design for the site.

## **2.0 TERMS OF REFERENCE**

- 2.1 Gleeson Homes Ltd is considering developing the site at Cockley Hill, Lane, Kirkheaton with residential properties. It was considered appropriate to implement a desk study and ground investigation to provide information to aid the planning process, viability assessment, and design of any subsequent development.
- 2.2 ARP Geotechnical Ltd was appointed by Gleeson Homes Ltd to carry out the investigation, which involved a desk study assessment of the geological and coal mining aspects, Ordnance Survey archive maps, radon gas, indicative flood risk, hydrogeology, landfill, and other environmental issues, primarily by assessment of a Landmark Envirocheck Report. This was supplemented by an intrusive investigation to assess the ground conditions.
- 2.3 To assist with the investigation, information within two previous reports by ARP were permitted by the landowner to be used; "Stage 2 Geo-environmental Report" dated January 2017 (report reference CKD/01r1) and "Combined Stage 1/Stage 2 Geo-environmental Report" dated March 2019 (reference CKD/02r1). These reports covered two smaller adjacent sites than the current site. Along with additional area, these two sites are now to form a single development site. Information from the two reports has, therefore, been compiled and updated, along with information from further recent investigation (August 2025) to form a single report (this report).
- 2.4 The investigations were implemented generally in accordance with BS 5930:2015 +A1:2020 "Code of practice for site investigations", NHBC Standard Chapter 4.1 "Land quality - managing ground conditions", Environment Agency LCRM "Land Contamination Risk Management" and BS10175: 2011 + A2 : 2017 "Investigation of potentially contaminated sites - Code of practice". This report is limited to the data obtained as part of this investigation. It should be noted that there is a possibility of variation in ground conditions between test locations and interpretation of strata is given for guidance only. No liability is accepted for changes to site conditions, including groundwater levels, after the preparation of this report.

- 2.5 The general observation and assessment of the ground surface, and the identification/classification of vegetation is made in general terms only. It would be prudent for a specialist to undertake a more detailed survey, including for any invasive/harmful weeds.
- 2.6 The assessment of any topsoil is carried out in terms of potential chemical effects on human health only, and no account is taken of aesthetic or horticultural properties. Such considerations should be referred to a horticulturist or landscape architect.
- 2.7 The report has been prepared for the use and reliance of the Client only. The report shall not be relied upon or transferred to any other parties without the written agreement of ARP Geotechnical Ltd. For the avoidance of any doubt, where ARP Geotechnical Ltd enters into a letter of reliance for the benefit of a third party, that third party will be permitted to rely on the report. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party without ARP Geotechnical Ltd.'s consent.
- 2.8 Attention is drawn to the requirements of the Construction Design and Management Regulations 2015, and in particular the duties and obligation of the Client.
- 2.9 The report refers to, and includes a copy of an indicative proposed layout. This is only for the purposes of generating a conceptual site model for the contamination risk assessment. Unless the proposed layout changes significantly, such that the conceptual model and risk assessment is affected, there is no requirement to re-issue this report when the layout is revised.

### **3.0 SITE DESCRIPTION**

#### Site Location

- 3.1 The site, which is centred on Ordnance Survey Grid Reference 41827, 41794, is located between Cockley Hill Lane and Shop Lane, in the village of Kirkheaton, approximately 4km to the east of Huddersfield Town centre.
- 3.2 A site location plan and aerial photograph are presented in Appendix A.
- 3.3 Walkover surveys were carried out by ARP on all but the southeastern area of the site (which did not previously form part of the proposed site) during the ground investigations on the other areas of the site, in the summer of 2016 and February 2019, and in August 2025.
- 3.4 The site is irregular in shape, with the southeastern area (approximately 80m x 100m) proposed to be occupied by public open space and a surface water attenuation pond, and the southwestern protruding area (approximately 120m x 50m) proposed to comprise an area of public open space. The main development area (approximately 210m x 70m) is to the north of these areas.

#### On-Site Features

- 3.5 At the time of the investigation, the site mainly comprised a large sloping grassed agricultural field which was grazed by cattle. The site was accessed through the field gate in the north of the site, from Cockley Hill Lane, which is adjacent to the northeast.
- 3.6 In the eastern corner of the site is a triangular shaped wooded area (approximately 2,000m<sup>2</sup> in size), which is separated from the field area by a gravel covered access road to a third-party residential property located adjacent to the southeast of the site. In the central and southern portions of the site, the slope has a lower gradient, and the ground surface is waterlogged, with reed beds present. On the southwestern corner of the site, there is a cover of hardstanding, with a sporadic covering of young to mature trees. The maximum site gradient is around 1 in 5.

### Site Boundaries and Surrounding Land Use

- 3.7 The site is mainly surrounded by residential properties, except for some fields to the south. Cockley Hill Lane forms most of the northeastern boundary, and the southwestern corner of the site adjoins Shop Lane and Orchard Road (the junction of which is adjacent to the site).

### Site History

- 3.8 Ordnance Survey archive maps were obtained for the site as part of the 2019 report by ARP. Copies of the maps are included in Appendix B, and a summary of the findings is given below. It should be noted that the pink boundary shown on the maps is the site boundary as proposed in 2019, and the 2025 boundary covers a much larger area. This has been taken into account for the summary below.

<b>Map Date</b>	<b>On-Site</b>	<b>Off-Site</b>
1854-1855	No development is shown on the site, which comprises several agricultural fields.	Residential development of Kirkheaton village is shown to the north, west and south. 'Sandstone Quarry' is shown at 20m to the west of the site but does not encroach on to the site. A 'Well' is shown, just beyond the southwestern corner of the site.
1893	Access road to 'Broom Field' is shown to cross the eastern corner of the site. A public footpath is shown to cross the southern area of the site from northeast to southwest (from Cockley Hill Lane to Shop Lane). The adjacent 'Quarry' is now shown to encroach onto the southwest portion of the site.	Further residential development is shown, associated with Kirkheaton village, including 'The Knowle', comprising a large detached property with several smaller buildings, located adjacent to the west of the site. A 'Cloth Mill' is now shown at 160m to the west, comprising several large buildings and a well. A 'Quarry' extends to the south from the site's southwest corner. The 'Well', at the southwest corner of the site, is now shown as 'Trough'.
1894	No significant changes.	The quarry which extended to the south of the site is no longer shown.

1907	There is no longer any indication of quarrying on the site.	The quarry to the west is no longer shown and the area is now occupied by trees and provides access to 'The Knowle' from Shop Lane.
1919	A small roofed building can be seen on the eastern triangular area of the site, which abuts Cockley Hill Lane.	No significant changes.
1930-1931	On the southwest corner of the site, on the western tip of the former quarried area, a small roofed building is shown.	Further residential development is shown associated with Kirkheaton village typically to the north, west and southwest of the site.
1961	Further development is shown on the northeastern triangular area of the site, possibly comprising small agricultural buildings associated with 'Jidroyd' adjacent to the east.	No significant changes.
1970	No significant changes.	'Cuckstool' is no longer shown. Further residential development is shown around Kirkheaton village, including adjacent and to the south of the site at 'Orchard Road'.
1989	On the southwest of the site, to the northeast of the small building, an enclosed area, extends around 50m into the site from the rear of the building. A small (bus) 'Shelter' is shown on the southwestern tip of the site.	No significant changes.
2009 (Aerial Imagery)	The small building on the southwest of the site is no longer shown and the area adjacent to the northeast is shown with a cover of hardstanding and used for car parking.	The cloth/textile mill, on the opposite side of Shop Lane to the west of the site, is shown as demolished to slab level.
2016 and later	The hardstanding in the southwest appears overgrown and no longer in use as a car park.	No significant changes.

3.9 In summary, the maps indicate the majority of the site has remained undeveloped. A coal seam has been worked by opencast across the central portion and a small portion of the southwest of the site was quarried for sandstone rock, later occupied by a small building and associated car parking. A triangular area on the east of the site was developed with a cluster of small buildings, demolished sometime prior to 1994. A well (and later trough) was present at or close to where the site abuts Shop Lane.

## 4.0 ENVIRONMENTAL SETTING

### Geology

- 4.1 Extracts from the British Geological Survey 1:50,000 Series Geology Maps are included within the Envirocheck Geology Report in Appendix C. It should be noted that the pink site boundary marked on the maps only marks the southern portion of the site, with the remainder of the current site boundary adjacent to the north of this. In addition, publicly available digital data, and the 1:10,000 scale paper geological map SE11NE have been assessed. The maps show the majority of the site to be underlain by undifferentiated strata of the Pennine Lower Coal Measures (mudstone, siltstone and sandstone). The southwestern area of the site is shown to be underlain by Grenoside Sandstone, as well as the northwestern margins of the site. Drift deposits are shown to be absent from the site.
- 4.2 A curving geological fault is shown to cross the south of the site, aligned west to east-northeast, with the downthrown strata to the south of the fault.
- 4.3 A coal seam (The Better Bed) is conjectured to outcrop roughly north to south, in the western half of the site, and dipping to the east. The seam is reported to be 0.5m thick on the vertical section provided with the 1:10,000 scale map. The seam will underlie the site east of the outcrop. A rectangular area of made ground is indicated to be present on the eastern half of the site, with repetition of the Better Bed seam outcrop around its edges. This is consistent with the Better Bed having been worked by opencasting in the area of made ground.

### Coal Mining

- 4.4 A CON29M Coal Mining Report was obtained by ARP in 2019 for the southern part of the site, and by Sirius for the north of the site, as part of their 2013 Desk Study. For the Sirius area, the report stated that the site was not affected by any recorded underground coal workings, but there was believed to be coal at or close to the surface which may have been worked

(before statutory mine plans were required, therefore unrecorded). There were no known coal mine entries on or within 20m of the site, but unrecorded entries may exist. The site was recorded as being affected by opencast mining (confirming the geological maps). Sirius obtained an abandonment plan from the Coal Authority, and this is stated to show the seam is 0.5m thick and was opencast to depths of between 5m and 12m on the site. There is also a 0.75m thick fireclay band 1m beneath the seam, and the dip is recorded as 2 degrees to the southeast. There is no indication the fireclay has been worked.

- 4.5 For the southern area of the site, the CON29M report is presented in Appendix D. The report essentially repeats the findings of the report obtained by Sirius, as the geology is similar, and both areas are affected by opencasting.
- 4.6 It was evident from the above that there was the possibility of unrecorded shallow workings, and it was concluded that this would need to be assessed by an intrusive investigation using a rotary drilling rig. The investigation was subsequently carried out and is discussed in detail in later sections of this report.

#### Coal Recovery

- 4.7 The Better Bed coal seam is likely to be present at shallow depth east of the outcrop on the site. However, as the seam has already been worked by underground methods on the site, followed by opencast workings, it is unlikely that any commercially viable deposits remain. If viable deposits were available during the opencast workings, they are highly likely to have been taken at that time.

#### Mineral Workings

- 4.8 The Envirocheck Report indicates that there are several BGS Recorded Mineral Sites close to the area, typically relating to the Pennine Lower Coal Measures Formation and associated strata. However, the site itself is not within such a zone, and the nearest confirmed recorded activity is over 50m distance from the site. Although not indicated in the Envirocheck Report, a small portion of the southwest of the site is recorded as being worked at the surface for sandstone rock.

### Hydrogeology

- 4.9 The Landmark Envirocheck Report, included in Appendix E, indicates the Bedrock Aquifer Designation to be 'Secondary A' Aquifer. These Aquifers comprise "permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers"
- 4.10 There are no sensitive groundwater abstractions within 1km of the site.
- 4.11 The site is not within a groundwater Source Protection Zone.

### Hydrology

- 4.12 The ground on the site and surrounding area, slopes down to the south and southwest. Any surface water run-off is likely to be intercepted by the road drainage of Shop Lane, or adjoined residential side roads, probably eventually reaching Oxfield Beck approximately 800m to the southwest.
- 4.13 The site is not in an area at risk from river flooding. The risks of flooding from other causes such as adverse topography or insufficient surface water drainage, are not considered here. If such risk needs to be quantified, a separate specialist Flood Risk and Drainage Report should be commissioned, if not already available. BGS data indicates the general area has "limited potential for groundwater flooding to occur".
- 4.14 There are no surface water abstractions within 1km of the site.

## Other Environmental Data

- 4.15 The Landmark Envirocheck Report, included in Appendix E, contains information on numerous environmental aspects. A summary of the pertinent findings, not already covered, with additional comments, is given below.
- 4.15.1 There are no Pollution Control Authorisations within 500m of the site.
- 4.15.2 There are no discharge consents relating to, or adjacent to, the site.
- 4.15.3 There are no closed or currently licenced landfills within 250m of the site.
- 4.15.4 No radon protective measures are stated to be necessary for new dwellings on the site, although the southwestern portion of the site is in an intermediate probability radon area, as between 1% and 3% of homes are above the action level. In these circumstances of apparent conflict, conveyancing difficulties can sometimes occur during sale of properties. It may be prudent to assume basic radon protection is required, to prevent such difficulties. This is normally achieved by incorporating a radon barrier within a solid floor system and extending the barrier through the cavity wall.
- 4.15.5 There are no contemporary trade directory entries relating to any activities which could have significant impact on the site.
- 4.15.6 There is one fuel station entry within 250m of the site located at 215m to the southwest, however, the status is shown as 'obsolete'.

## 5.0 PRELIMINARY RISK ASSESSMENT AND CONCEPTUAL MODEL

5.1 Part II A of the Environmental Protection Act (EPA) 1990 became effective from 1<sup>st</sup> April 2000. The Regime was introduced by the Contaminated Land (England) Regulations 2000 (SI 2000, No. 227) along with the associated DEFRA Circular February 2000.

5.2 Section 78A (2) of the Act defines "Contaminated land is any land ..... in such a condition, by reason of substances in, on or under that land that –

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused".

From S78A (4) "Harm" : means harm to the health of living organisms or other interference with the ecological systems of which they form part and, in the case of man, includes harm to his property.

Controlled waters are defined as "..the waters in any relevant lake or pond, or of so much of any relevant river or watercourse as is above the freshwater limit, and ground waters, that is to say, any waters contained in underground strata". From the 1<sup>st</sup> October 2004, the definition of groundwater in relation to Part IIA was amended, by the Second Water Act Commencement Order SI 2004 No 2528. This makes clear that "ground waters" does not include waters above the saturation zone, i.e. does not include any soil water and pore water present in the unsaturated zone.

5.3 The objectives of the regime are to ensure that risks associated with contaminated land are reduced to an acceptable level, having regard to the costs of doing so. The costs should be proportionate, manageable and economically sustainable.

- 5.4 In assessing risk, it is necessary to consider the probability, or frequency, of occurrence of the hazard and the magnitude/seriousness of the consequences. Consequently, for land to be classified as contaminated, it must have, or be very likely to have, a detrimental effect on humans or the environment before it can be classified as contaminated land.
- 5.5 In establishing risk, the concept of the pollutant source/pathway/receptor linkage model, based on current and proposed site use, is to be considered. Therefore, for a site to be deemed contaminated under the Regime, all three linkages must be in place i.e. the site must not only contain harmful substances, but the substances must have a pathway by which to leak out and cause significant harm to a receptor.
- 5.6 The Environment Agency has published guidance on contaminated land, in the form of online documents referred to as LCRM "Land Contamination Risk Management". The documents are intended to provide the technical framework for structured decision making about land contamination, and to assist all those involved in "managing" the land, in particular landowners, developers, financial service providers, planners and regulators. As the documents currently provide the framework for best practice, the general principles are, therefore, followed in conducting the assessment below.
- 5.7 The categorisations of risk adopted in this report are adapted from CIRIA Report C552 (Contaminated Land Risk Assessment: A Guide to Good Practice, 2001). This approach assesses the potential severity of any pollution event and the probability of the event occurring, to arrive at a risk category, for the various potential source - pathway - receptor linkages. The relevant tables used, with the definitions, are presented in Appendix F.

#### Conceptual Site Model

- 5.8 It is known that the site is proposed for residential properties with private gardens. An indicative proposed site layout is presented in Appendix G. The site is shown to be underlain by undifferentiated strata of the Pennine Lower Coal Measures, with no drift cover, except for areas on the west, which are underlain by sandstone. The solid strata beneath the site

are designated a 'Secondary A' Aquifer. There are no sensitive groundwater abstractions within 1km of the site. The nearest surface water is Oxfield Beck located approximately 800m to the southwest. There are no surface water abstractions within 1km of the site.

5.9 The maps indicate the majority of the site has remained undeveloped. A small portion of the southwest of the site was quarried for sandstone rock and later occupied by a small building and associated car parking. A triangular area on the east of the site was developed with a cluster of small buildings, demolished sometime prior to 1994. A well (and later trough) was present at, or close to where the site abuts Shop Lane. Although not indicated on the Ordnance Survey archive maps, the geological records and Coal Authority abandonment plans indicate that opencast coal mining has been carried out on the eastern half of the site. The most likely contamination sources are considered to be:

5.9.1 Possible contaminated material placed in the backfilled opencast workings across the central portion of the site (although unlikely - the material is probably inert natural arisings) - metals, inorganics, TPH, PAH, phenol, asbestos.

5.9.2 Possible contaminated material placed in the backfilled sandstone workings encroaching on the southwest of the site (although unlikely - the material is probably inert sandstone arisings of less economic value i.e. sand, gravel and cobbles of sandstone) - metals, inorganics, TPH, PAH, phenol, asbestos.

5.9.3 Possible made ground associated with the limited areas of former development on the southwest and east of the site - metals, inorganics, TPH, PAH, phenol, asbestos.

5.9.4 Possible (unlikely) made ground on the rest of the site - metals, inorganics, TPH, PAH, phenol, asbestos.

5.9.5 Possible landfill and mine gases from historical backfilled opencast workings and shallow mining - carbon dioxide, methane.

5.10 The conceptual model needs to consider sources of contamination, pathways along which contaminants could migrate and the receptors, which may become exposed. Guidance published by the Environment Agency has been consulted with regard to pathways and receptors. The potential sources, pathways, and receptors, applicable to the proposed development are identified on the table below. Any pathways in italics are deemed not to be viable, and the reason given.

### Potential Source - Pathway - Receptor Matrix (Finished Development)

Contamination Sources	Pathways	Receptors	Severity of Consequence	Probability of Event	Risk
Backfilled opencast coal and sandstone workings: - metals, inorganics, TPH, phenols  Possible made ground on areas of former development: - metals, inorganics, TPH, phenols  Possible (unlikely) general made ground: - metals, inorganics, TPH, phenols	• Inhalation, ingestion and dermal contact with soil and dust	<b>Humans: -</b> • Future occupants • Maintenance workers • Adjacent residents and general public	<b>Medium</b>	<b>Low Likelihood</b>	<b>Moderate/Low</b>
	• Fruit and vegetable intake, with soil	<b>Humans (as above)</b>	<b>Medium</b>	<b>Low Likelihood</b>	<b>Moderate/Low</b>
	• Vapour inhalation outdoor	<b>Humans (as above)</b>	<b>Medium</b>	<b>Low Likelihood</b>	<b>Moderate/Low</b>
	• Vapour inhalation indoor	<b>Humans (as above)</b>	<b>Medium</b>	<b>Low Likelihood</b>	<b>Moderate/Low</b>
	• Migration in surface water	• Surface water (nearest downslope 800m away). No abstractions	<b>Mild</b>	<b>Unlikely</b>	<b>Very Low</b>
	• Migration in groundwater (old well to southwest is a potential pathway)	• Groundwater (Secondary A Aquifer, no sensitive abstractions)	<b>Mild</b>	<b>Unlikely</b>	<b>Very Low</b>
	• Root uptake	<b>Vegetation: -</b> • Landscape areas • Private gardens	<b>Medium</b>	<b>Low Likelihood</b>	<b>Moderate/Low</b>
	• Migration	<b>Services/Utilities: -</b> • Potable water supply	<b>Medium</b>	<b>Low Likelihood</b>	<b>Moderate/Low</b>
Backfilled opencast, possible shallow workings/coal: - methane, carbon dioxide	• Asphyxiation • Explosive risk	• Construction/demolition workers • Future occupants • Buildings	<b>Severe</b>	<b>Low Likelihood</b>	<b>Moderate</b>
Possible asbestos within any made ground	• Inhalation	• Future occupants • Maintenance workers • Adjacent residents and general public	<b>Severe</b>	<b>Low Likelihood</b>	<b>Moderate</b>

- 5.11 The above matrix indicates there are several potential source – pathway – receptor linkages applicable to the proposed development, ranging from moderate to very low risk.
- 5.12 The assessment was used to inform the design of the subsequent ground investigations. To fully characterise the site, in accordance with BS10175: 2011 + A2: 2017 "Investigation of potentially contaminated sites - Code of practice", and to address the above concerns, it was decided that, in addition to geotechnical information required, the site investigation should include:
- 5.12.1 Trial pit and windowless sampling borehole implemented on a grid basis, preferably 25m spacing.
  - 5.12.2 Samples of the made ground issued for testing for a broad suite of determinands, including metals, inorganics, asbestos, phenols, speciated PAH, and TPH.
  - 5.12.3 Landfill gas monitoring, due to the presence of historical backfilled opencast coal and sandstone workings and shallow coal seams/mining.
  - 5.12.4 Upon receipt of contamination test results, any elevated TPH would be speciated to allow further risk assessment, and leachability testing undertaken on all elevated determinands, to give indication of mobility.

## 6.0 SITE INVESTIGATIONS

### July 2016

- 6.1 A site investigation was undertaken by ARP Geotechnical Ltd in July 2016. The investigation covered the northwestern half of the current site area. The purpose of the investigation was to produce an assessment of the site in accordance with BS10175: "Investigation of potentially contaminated sites - Code of practice", and to provide geotechnical information to aid design of the development.
- 6.2 Trial pits were excavated and sampled on a 25m to 50m spacing, to satisfy the requirements of the British Standard. Twelve trial pits (TP1 to TP12) were excavated, to depths of between 1.1m and 3.5m. Three hand-excavated trial pits (H1 to H3), were excavated to 0.2m depth. The trial pits were organised, supervised and logged by an Engineer from ARP Geotechnical Ltd. The rationale for the trial pit locations is given below.

LOCATION	REASON
TP1	Target backfilled opencast
TP2 to TP4	Part of grid
TP5	Target edge of backfilled opencast
TP6 to TP11	Part of grid
TP12	Target line of conjectured outcrop (Better Bed coal)
H1 to H3	Part of grid, and to obtain soil samples to be tested for arsenic bio accessibility

- 6.3 Two cable percussive boreholes were drilled within the backfilled opencast workings in the east, primarily in order to determine the geotechnical properties of the deeper made ground, to depths of 5.5m and 7.8m.

- 6.4 Thirteen rotary boreholes (R1 to R10 and R1A, R3A and R5A) were drilled, by Ground Support Services (UK) Ltd, on 2<sup>nd</sup> August 2016, to depths of between 3m and 18m below existing ground levels, to check for the presence of any coal seams and associated coal workings. Due to the risk of mines/coal gas migration to adjacent dwellings, boreholes were drilled using full water flush techniques. The boreholes were organised and supervised by an Engineer from ARP Geotechnical Ltd and logged by the foreman driller.
- 6.5 Five gas monitoring wells were installed in R1A, R3A, R5A, CP1 and CP2, and subsequently monitored by ARP Geotechnical Ltd. The wells in the rotary boreholes were installed to 3m depth, with the bottom 2m comprising slotted pipe with gravel surround, and the upper 1m comprising plain pipe with bentonite seal and lockable flush cover. Wells were also installed into the cable percussive boreholes – one well to 5m depth, with the bottom 4m comprising slotted pipe with gravel surround, the upper 1m comprising plain pipe with bentonite seal, and one well to 7.5m depth, with the bottom 4.5m comprising slotted pipe with gravel surround and the upper 3m comprising plain pipe with bentonite seal. All wells were provided with lockable flush covers.
- 6.6 The Investigation Location Plan and logs are included in Appendix H.
- 6.7 Chemical analysis of twelve soil samples for metals, inorganics, speciated PAH, TPH, phenols, and asbestos was undertaken by the UKAS accredited Derwentside Environmental Testing Services (DETS) laboratory in Consett. Elevated determinands were tested further for leachability to determine the potential mobility of the contaminants. Chemical analysis of a further three soil samples was undertaken for arsenic bio accessibility. The test certificates are included in Appendix J.
- 6.8 Analysis for Atterberg Limits and moisture content was undertaken by the UKAS accredited Professional Soils Laboratory (PSL) in Doncaster. Geochemical testing comprising pH and water-soluble sulphate was undertaken by DETS. The test certificates are included in Appendix J.

## February 2019

- 6.9 A site investigation was undertaken by ARP Geotechnical Ltd in February 2019. The investigation covered approximately three quarters of the southeastern half of the current site area. The purpose of the investigation was to produce an assessment of the site in accordance with BS10175: 2011 + A2: 2017 "Investigation of potentially contaminated sites - Code of practice", and to provide geotechnical information to aid design of the development.
- 6.10 To satisfy the requirements of the British Standard, the site was gridded on a maximum 25m spacing and trial pits and windowless sampling boreholes were implemented and sampled on the grid, along with any targeted locations. Eight trial pits (TP1 to TP8) were excavated, to depths of between 0.7m and 3.2m. Seven window sample boreholes (WS1 to WS7) were drilled, to depths of between 2.1m and 5.45m. One dynamic probe (DP1) was carried out, to 10m depth. The investigation was organised, supervised and logged by an Engineer from ARP Geotechnical Ltd. The rationale for the investigation locations is given below.

<b>LOCATION</b>	<b>REASON</b>
All TP & WS	Part of the grid
TP1 & WS7	Also targeting the area of former buildings on the east
TP2 & TP4	Also defining the lateral extent of the infilled opencast workings
TP3 & WS5	Also targeting the centre of the infilled opencast workings
TP5 to TP7	Also defining the lateral extent of the infilled sandstone quarry
TP8 & WS1	Also targeting the deeper area of the infilled sandstone quarry
DP1	Targeting the infilled opencast workings, adjacent to WS5

- 6.11 Four gas monitoring wells were installed, in WS1, WS3, WS5 and WS7, and subsequently monitored by ARP Geotechnical Ltd. The wells were installed to depths of between 2m and 5m, with the upper 1m comprising plain pipe with bentonite seal and lockable flush cover and the lower sections comprising slotted pipe with gravel surround.

- 6.12 The trial pit, borehole and dynamic probe logs are included in Appendix H, along with the location plan.
- 6.13 Chemical analysis of 19 soil samples for metals, inorganics, speciated PAH, TPH, phenols, and asbestos was undertaken by the UKAS accredited Chemtech Environmental Ltd laboratory in Consett, County Durham. Elevated determinands were tested further for leachability to determine the potential mobility of the contaminants. The test certificates are included in Appendix J.
- 6.14 Analysis for Atterberg Limits, moisture content, pH and water-soluble sulphate was undertaken by the UKAS accredited Professional Soils Laboratory (PSL) in Doncaster. The test certificates are included in Appendix J.

#### **May 2019**

- 6.15 Fourteen rotary boreholes (R101 to R114) were drilled by Groundsource Drilling and Contracting Ltd on 9<sup>th</sup> and 10<sup>th</sup> May 2019, to depths of between 9m and 18m below existing ground level. The investigation was designed, organised and supervised by ARP, and boreholes were logged by both the Engineer and the lead driller. The borehole location plan and logs are included in Appendix H, along with indicative cross sections.
- 6.16 All rotary borehole locations were well over 50m distance from occupied buildings, and as a consequence they were drilled using air flush techniques. No elevated gas levels were detected during the drilling works.

#### **September 2025**

- 6.17 A site investigation was undertaken by ARP Geotechnical Ltd on 1<sup>st</sup> September 2025. The purpose of the investigation was to provide additional information on a new area of land added to the site since 2019, in which a surface water attenuation basin was to be constructed as part of the proposed development, and to improve the resolution of the previous investigations. In addition, surface water monitoring pipes would be installed into boreholes to provide information on groundwater levels.

- 6.18 Seven windowless sample boreholes were implemented, referenced WS08 to WS14, to depths of between 1.36m and 5.43m below existing ground levels. The borehole location plan and logs are included in Appendix H.
- 6.19 Monitoring wells were installed into WS08 to WS11, to depths of between 1.5m and 5.0m. The response zones comprising slotted pipe with gravel surround, from a depth of 0.5m to the base of each hole. The upper 0.5m comprised plain pipe with bentonite seal surround, capped by a bung, tap, and locking flush cover.

## 7.0 SUMMARY OF GROUND CONDITIONS

7.1 The trial pits revealed between 0.1m and 0.35m cover of dark greyish brown slightly clayey, sandy, sometimes gravelly topsoil, in which the gravel component included sandstone, to a lesser extent mudstone and siltstone. In the southwest of the site, where reeds were present, the ground surface was waterlogged, and the topsoil was spongy. Topsoil was locally absent in the southwest and east of the site, where previous development had occurred.

### **Area of Former Opencasting (South-Central Area of the Site)**

7.2 As anticipated, made ground was encountered below the topsoil (2016 TP1, TP5, CP1 and CP2, 2019 TP2, TP3, TP4, WS3, WS5, R101, R102, R103 and R104, and 2025 WS11), to proven depths of up to 11.5m (generally deepest in the southeast). There is evidence of a stepped or shelved profile to the edge of the opencast, for example R101 found made ground to only 3.7m, far shallower than the underlying coal seam, which was opencasted to 11.5m in R102 nearby.

7.3 The made ground typically comprised soft/loose (min. SPT N=4) to medium dense/firm (max. SPT N=20) clayey gravel and gravelly clay, in which the gravel component included angular and subangular sandstone, mudstone and siltstone, with a medium angular cobble content of sandstone and siltstone, and locally brick (2019 TP4). At CP1 and CP2, the made ground was underlain by (at least) very weak siltstone bedrock. At TP4 (2019) and WS3 (2019), toward the outcrop, the made ground was found to be underlain by firm (medium strength) silty sandy laminated clay. Elsewhere, the base of the made ground could not be reached in the trial pits or window sample holes.

7.4 A dynamic probe (DP1) was undertaken from the base of WS5 (2019) in an attempt to determine the base of the opencast at this location (WS5 had not found the base of the made ground by 5.45m depth). The probe hole indicated the opencast backfill to be typically loose, only becoming 'medium dense' from around 9.6m depth. The full extent of the dynamic probe was reached at 10m depth, and rock head had still not been encountered.

7.5 Trial pits TP4 2019 (southwestern side of the opencast, at the approximate coal outcrop position) and TP2 2019 (approximate northeastern extent of the opencast), were used to define the approximate extent of the opencast workings. The two points, roughly aligned southwest to northeast, were in excess of 100m apart. The approximate extent of the opencast coal workings is shown on the plan in Appendix H titled "Made Ground Depths & Approximate Extent of Opencast and Quarry".

### **Former Sandstone Quarry in the Southwest**

7.6 The area of quarrying in the southwest, identified by the Ordnance Survey archive maps, was confirmed in this area in the 2019 investigation (no investigation was carried out in this area in 2016). As anticipated, below any topsoil, made ground was present (excluding the very southwest tip of the site), revealed in TP5, TP8 and WS1. The made ground was proven to depths of between 1.5m and at least 3.2m, but the base of the made ground was not reached in TP8, by the maximum depth achieved of 3.2m. The made ground typically comprised loose (unconsolidated) to medium dense (maximum SPT N=21) sand, gravel and cobbles, in which the gravel component comprised angular and subangular sandstone, siltstone and mudstone, and the cobble component subangular sandstone and siltstone. At WS1, from 0.25m to 1.3m depth, fragments of wood were also noted.

7.7 At WS1 (in the southwest of the workings), the made ground was underlain by gravel of mudstone over what was interpreted as very weak dark grey laminated mudstone bedrock. At TP5 (on the northeast of the workings), the made ground was underlain by at least very weak sandstone bedrock.

7.8 The historical maps indicate the workings were irregular in shape. Trial pits TP5 and TP6 define, approximately, the northeast extent of the of the backfilled sandstone quarry. The backfilled sandstone quarry is shown to extend to the southwest corner of the site. The approximate extent of the backfilled quarry is shown on the plan in Appendix H titled "Made Ground Depths & Approximate Extent of Opencast and Quarry".

## **Limited Areas of Former Development – Eastern Triangle and Southwest Corner**

- 7.9 On the eastern triangular area of the site, which was formerly developed with a cluster of small buildings, made ground was encountered at both locations (TP1 & WS7), to depths of between 0.35m and 0.5m, respectively, and typically comprised made ground topsoil at TP1, and gravelly sand with cobbles of brick and concrete (i.e. construction/demolition rubble) at WS7. Relict footings and/or low-lying brick structures were visible at the surface which, in some locations, created stepped level changes of around 0.9m. The area was heavily wooded with low-lying overhead electricity cables and as such was generally inaccessible. The made ground was underlain by firm (medium strength) slightly sandy silty clay, becoming stiff (high strength), and overlying extremely weak mudstone and siltstone bedrock. The eastern triangle is now not shown to form part of any proposed development.
- 7.10 On the southwest of the site, beneath the former car parking area, made ground was encountered at both locations (TP7 & WS1). At TP7, a surface covering of bitmac, overlying residual soils derived from the weathering of solid strata, was present. At WS1, the made ground associated with the backfilled former sandstone quarry workings was present, to a depth of 1.5m.
- 7.11 On the southwest tip of the site, a concrete slab remained intact, approximately 20m x 15m in size, of unknown thickness, and with an unknown depth of fill beneath. The slab was bounded to the north, west and south by a metal palisade fence and there was a stepped level change formed by a retaining wall of around 1m in height on the east side. The surface of the intact slab, and the materials directly beneath, were, therefore, inaccessible during the investigation.

### **Remaining Areas (Excluding Areas of Opencast, Quarrying and Previous Development)**

- 7.12 Beneath the topsoil in these areas, made ground was only encountered at two locations (TP3 2016 and TP9 2016), on the north/northeast of the site, and one location in the far south (2025 WS08, close to the western edge of the opencast). The made ground at these locations was present to depths of between 0.6m and 1.8m, and typically comprised gravelly clay (re-worked natural material), in which the gravel component included mainly sandstone, mudstone and siltstone. In TP9, the bottom 0.4m thickness of made ground comprised tabular cobbles of sandstone. The made ground was underlain at TP3 by gravelly clay (completely weathered mudstone), and at TP9 by thin coal seam, interpreted to be the Better Bed. This location is therefore at/close to the outcrop position of the seam. In TP9, the made ground was probably associated with a land drain encountered within the pit, orientated northeast to southwest. In WS08, firm natural clay was present beneath, and mudstone from 2.3m depth.
- 7.13 Natural cohesive subsoils were present directly beneath the topsoil in the rest of the trial pits and boreholes, where made ground was not encountered. In the southwest, and the western margins of the site (2016 locations TP6, TP11, TP12, and 2019 locations TP6, TP7 & WS2), this comprised sands and gravels derived from weathering of the underlying solid sandstone (which was encountered from depths of between 0.6m and 1.5m). On the rest of the site, a profile typical of weathering of underlying solid mudstone was encountered, generally comprising medium strength (firm) to very high strength (very stiff) clays over gravels of mudstone. Solid mudstone was generally present from depths of between 0.7m and 2.9m.

### **Groundwater Ingress, and Stability and Difficulty of Excavations**

- 7.14 Excavations through the natural strata generally remained stable. Some instability was recorded within made ground, including moderate instability below 2.1m in TP5 (2016), from 2m to 2.5m depth in TP5 (2019), and to 3.2m depth in TP8 (2019). Slight instability was noted in TP2 (2019) to 1.2m depth and TP3 (2019) to 3.2m depth.

7.15 At TP4 (2016), and at TP4, TP5 and TP6 (all 2019), the surface was waterlogged. Slight groundwater seepages were recorded at locations TP4 (2016), TP7 (2016), and TP10 (2016), at depths of 1.5m, 1.6m and 1.3m, respectively. A moderate groundwater seepage was recorded at TP5 (2016), at a depth of 1.6m, with a rapid seepage recorded below 2m. A slight groundwater seepage was noted in TP5 (2019), from 2.5m depth (below the base of the made ground). In the borehole wells in the natural strata, the shallowest groundwater resting levels recorded in the 2016 investigation were 1.39m (R1A), 0.52m (R3A) and 0.87m (R5A), and in the made ground 3.43m (CP1) and 0.89m (CP2). In the 2019 investigation, in the borehole wells in the natural strata, the shallowest groundwater resting levels recorded were 0.6m (WS3) and 1.83m (WS1); although these likely reflect perched groundwater rather than the geological water table.

#### **Coal Mining Investigation of August 2016 (Northwestern Half of Site)**

7.16 Rotary boreholes were carried out in 2016, on the northwestern half of the site (outside the opencast area), to investigate possible shallow underground coal workings. All the boreholes recorded sandstone at depths of between 0.6m and 1.4m, with the exception of borehole R05, which recorded coal at a depth of 1.2m to 2.0m, with sandstone bedrock below.

7.17 In most rotary boreholes, a coal seam (interpreted to be the "Better Bed") was encountered, between 0.2m and 2.2m in thickness, and at a depth of between 1.2m and 7.2m, with the exception of R06 and R04 where it was absent. The location of R06 may have been beyond the line of the conjectured outcrop (orientated approximately north-south), whilst in the location of R04, the borehole may have intercepted a buried soakaway, which would account for the loss of flush at relatively shallow depth (from 1.3m to 3m depth). The depth of the coal generally increased from northwest to southeast (base at 2.0m in R05, 3.3m in R08, 8.6m in R09).

- 7.18 Boreholes R01 and R10 were drilled on the northeastern part of the site, where ground levels rise up toward Cockley Hill Lane. This area is to the northeast of an area of backfilled opencast workings. The boreholes revealed workings in the Better Bed seam, comprising broken ground (partial voiding with a loss of flush and no returns), at 10.7m (with a thickness of 2.6m) in R01 and at 14.0m (with a thickness of 2.1m) in R10. Underlying the workings, hard strata were proven to 18.0m and 15.0m depth, respectively. There were no returns from the hard strata below the broken ground.
- 7.19 The base of the Better Bed seam was proven in R05 to be at 2.0m, and in R02 to be at 4.0m, which corresponds in depth to the base of the adjacent opencast workings. In boreholes R02, R03, R05, R07, R08, and R09, intact coal was encountered, with no indication of workings.
- 7.20 No other coal seams were encountered during the rotary borehole investigation.

#### **May 2019 Coal Mining Investigation (Southeastern Half of Site)**

- 7.21 A curving geological fault, trending west to east-northeast, is shown to cross the south of the site, with the downthrown strata to the south of the fault. The northern side of the fault comprises the vast majority of the site and was targeted with 11 rotary boreholes. In 2019, only a small part of the site was south of the fault, with three rotary boreholes in this area.
- 7.22 In six out of eleven rotary boreholes drilled north of the fault, a coal seam was encountered (interpreted to be the "Better Bed"). Its depth increases towards the northeast as the land rises up in this direction. The dip is likely to be just south of southeast. In the southwest, close to the conjectured seam outcrop, the (intact) seam was between 0.3m and 0.6m in thickness, and at depths of between 2m and 6.8m. In borehole R104, two 0.2m thick leaves of coal are separated by a mudstone band (also 0.2m thick). Borehole R110, even further west, did not encounter a coal seam, consistent with its position beyond the line of the conjectured coal outcrop.

7.23 In the northeast of the site, where ground levels rise up toward Cockley Hill Lane, thin coal seam traces interbedded with hard black mudstone were encountered between around 11.0m and 15.0m depth (R101, R111 and R113). Full flush returns were maintained. Soft and broken ground, coinciding with flush loss, was encountered in borehole R112 (12.7m depth, thickness 1.3m) and borehole R114 (15.5m depth, thickness of 0.5m), interpreted to be coal mine workings (and void migration). Underlying the workings, hard strata ("solid ground") were proven to 15m and 18m depth, respectively, although flush loss continued, probably into the workings above.

### **Assessment of Ground Stability**

7.24 It is a generally accepted rule of thumb that, unless there is at least 10 times the seam thickness of rock cover above any workings, they have the potential to adversely affect ground stability on the site. A critical factor, therefore, for assessment of stability is the original seam thickness that could be extracted. There is a wide range of reported thicknesses of the seam from the boreholes across the site, probably as a result of the presence of dark, hard mudstone in combination with the seam, instead of actual variation in the seam thickness. The actual thickness will be difficult to determine in these circumstances, using openhole drilling. The most reliable measure of thickness is concluded to be from the BGS geological maps and the Coal Authority abandonment plan records for the backfilled opencast on the site. These both record the seam thickness as 0.5m and this, therefore, forms the basis of the assessment presented on the table below. The seam was a good quality seam of high economic value.

BH	Depth to Rock on Log (m)	Depth to Rock (m) (ARP Estimate)	Depth (m) to base of coal or workings	Depth to Original Roof (m)	Rock Cover to Original Seam Roof (m)	Comment on Rock Cover Thickness
RO1	0.6	2.0	13.3 (B)	12.8	10.8	Sufficient
RO2	1.4	2.0	4.0 (IC)	3.5	1.5	Insufficient
RO3	0.8	1.7	4.3 (IC)	3.8	2.1	Insufficient
RO5	1.2	2.0	2.0 (WC)	1.5	0	Insufficient
RO6	1.3	1.1	No Coal	N/A	N/A	West of Outcrop
RO7	1.2	1.8	4.2 (IC)	3.7	1.9	Insufficient
RO8	1.1	2.5	3.3 (IC)	2.8	0.3	Insufficient
RO9	1.4	2.9	8.6 (IC)	8.1	5.2	Sufficient
RO10	1.1	1.7	16.1 (B)	15.6	13.9	Sufficient
R101	3.7	3.7	12.5 (IC Traces)	12.0	8.3	Sufficient
R102	11.5	11.5	11.5 (OC)	11.0	0.0	Opencast
R103	5.3	5.3	5.3 (OC)	4.8	0.0	Opencast
R104	3.5	3.5	6.8 (IC)	6.3	2.8	Insufficient
R105	1.0	1.8	4.7 (IC)	4.2	2.4	Insufficient
R106	1.0	1.65	3.2 (IC)	2.7	1.05	Insufficient
R107	1.0	1.5	3.2 (IC)	2.7	1.2	Insufficient
R108	0.8	1.5	2.4 (IC)	1.9	0.4	Insufficient
R109	0.7	1.5	1.9 (IC)	1.4	0.0	Insufficient
R110	0.8	1.5	No coal	N/A	N/A	West of Outcrop
R111	1.0	1.9	14.5 (IC Traces)	14.0	12.1	Sufficient
R112	1.2	1.9	14.0 (S)	13.5	11.6	Sufficient
R113	1.2	1.9	16.2 (IC Traces)	15.7	13.8	Sufficient
R114	1.5	1.9	16.0 (S)	15.5	13.6	Sufficient

B = Broken Ground S = Soft IC = Intact coal WC = Weathered coal  
OC = Coal removed already by opencasting

7.25 The locations and depths of coal and/or workings have been annotated onto the plan in Appendix H titled "Map Showing Coal & Workings Depths, Where Encountered & Drill/Grout Area". In areas where there is sufficient cover, based on a 0.5m extraction thickness, a green font has been used for the depths, and where there is insufficient cover, a purple font. It can be seen from the distribution that there are areas north/northwest, and southwest of the backfilled opencast area where coal is present with insufficient cover, although there is no evidence of workings from the limited number of holes carried out. In these areas, it is recommended that holes should be drilled on a 9m grid and, where there is any evidence of workings with insufficient cover, the grid closed to 3m. If found to be necessary by the results of the drilling, the treatment area should be extended beyond the shaded areas. All the holes should be injected with grout in accordance with CIRIA 32 "Construction Over Abandoned Mine Workings".

7.26 No evidence of mine entries (shafts or adits), or bell pits, was encountered during the investigation. However, the surface area of investigation locations is very small in proportion to the total site area, and this does not guarantee the absence of mine entries or bell pits. It is recommended that, on areas east of the coal outcrop (excluding the opencast), the surface should be inspected by a suitably qualified engineer following the topsoil strip, to check for any suspect features. Vigilance should also be maintained during the proposed development works and any suspect feature should be inspected by the engineer.

#### Gas Monitoring

7.27 From the 2016 investigation, gas monitoring wells were installed into boreholes R1A, R3A and R5A (each offset 1m to the south of the corresponding rotary boreholes RO1, RO3 and RO5) along with CP1 and CP2. From the 2019 investigation, gas monitoring wells were installed into WS1, WS3, WS5 and WS7. Each position was located to target a potential hazardous gas generation potential source, as well as locations away from the potential source, to determine migration. CP1, CP2, and WS5, were located within the deep backfilled opencast area. WS1 was located within the backfilled quarry in the southwest, and the remaining positions were distributed around the site. The gas well positions are shown on the plan titled "Gas Well Location Plan" in Appendix L.

7.28 Monitoring has been undertaken in accordance with BS 8576: 2013 "Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)". Ground gas risk assessment was carried out in accordance with BS 8485: 2015 + A1: 219 "Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings". The monitoring was carried out from October 2016 to April 2017 for CP1, CP2, R1A, R2A and R3A, and from March 2019 for WS1, WS3, WS5 and WS7. In general, monitoring visits were at least two weeks apart.

7.29 The monitoring showed methane (CH<sub>4</sub>) up to 0.9%, a maximum carbon dioxide (CO<sub>2</sub>) concentration of 7.4% v/v, and a maximum flow rate of 1.8l/h.

7.30 The British Standard, BS 8485: 2015 + A1: 2019, utilises the concept of borehole hazardous gas flow rates ( $Q_{hg}$ ), in litres/hour (l/hr), which are obtained by multiplying flow rate by concentrations in the air stream of the particular gas being considered for each borehole. The  $Q_{hg}$  is used to derive a gas screening value (GSV), which is defined as the "flow rate of a specific hazardous gas representative of a site or zone, derived from assessment of borehole concentration and flow rate measurements and taking account of all other influencing factors, in accordance with a conceptual site model".

7.31 The table below allows the selection of the 'Characteristic Situation' (CS) based on the GSV, using a numbering system of 1 to 6, where 1 equates to a very low hazard potential and 6 equates to a very high hazard potential.

<b>Characteristic Gas Situation (CS)</b>	<b>Hazard Potential</b>	<b>Gas Screening Value - l/hr - (GSV)</b>	<b>Additional Factors</b>
1	Very Low	<0.07	Typically, <1% CH <sub>4</sub> and <5% CO <sub>2</sub> , otherwise consider an increased Characteristic Gas Regime
2	Low	>0.07 to <0.7	Typical Measured Flow Rate <70 l/hr, otherwise consider an increase to CS 3
3	Moderate	>0.7 to <3.5	
4	Moderate to high	>3.5 to <15	
5	High	>15 to <70	
6	Very High	>70	

Based on Table 2 of BS 8485: 2015 + A1: 2019

7.32 A summary of the results obtained from the ground gas monitoring investigation, together with the  $Q_{hg}$  for carbon dioxide and methane, is presented in the table on the following page:-

Borehole ref.	Max Recorded Steady Flow (l/hr)	Max. CO <sub>2</sub> (% v/v)	Max CH <sub>4</sub> (% v/v)	Max BH Qhg (CO <sub>2</sub> )	Max BH Qhg (CH <sub>4</sub> )
CP1	0.1	4.8	0.1	0.005	0.000
CP2	0.1	2.9	0.0	0.003	0.000
R1A	0.1	6.0	0.0	0.006	0.000
R3A	0.1	6.0	0.5	0.006	0.001
R5A	0.1	5.0	0.1	0.005	0.000
WS1	1.0	1.8	1.0	0.018	0.010
WS3	1.0	0.9	0.3	0.009	0.003
WS5	1.0	7.4	0.0	0.074	0.000
WS7	1.8	0.8	0.9	0.014	0.016

Worst-credible Qhg (l/hr) *	0.074	0.016
Worst-possible Qhg (l/hr) +	0.074	0.016

\* Based on maximum recorded concentration and maximum flow rate applicable to any individual borehole.

+ Based on maximum recorded concentration and maximum flow rate across the whole site (any borehole)

7.33 Up to 1.0% methane was recorded and the maximum concentration of carbon dioxide was 7.4%. The worst credible gas regime identified on the site (based on the maximum recorded flow rate and concentration detected together within an individual borehole) is a Q<sub>hg</sub> of 0.074l/hr for carbon dioxide and 0.016l/hr for methane. This equates to a Characteristic Situation of CS2 (by a small margin). The CS1 tentative limits of 5% for carbon dioxide and 1% for methane should also be considered. Four boreholes have readings at or above these values and reinforce the CS2 classification.

7.34 It is also a requirement of the British Standard to check the very worst-case combination of the highest flow and the highest detected concentrations, of any borehole, with values not necessarily from the same borehole. If the worst-case conditions indicate a higher hazard could reasonably exist, then this should be adopted as the GSV, unless further monitoring or other justification is provided for it not to be used. In this case, the worst possible Q<sub>hg</sub> for both carbon dioxide and methane remain the same and, therefore, a CS of 2 for the site remains applicable.

### **Proposed Attenuation Basin Area (In the Far South of the Site)**

- 7.35 WS8 and WS9 were located in the proposed position of a large attenuation basin in the south of the site. WS8 revealed firm to very stiff clay with mudstone beneath (from 2.3m depth), with no groundwater ingress. WS9 encountered firm clay to 0.6m depth, over thinly laminated mudstone, which contained a coal seam between 0.95m and 1.3m depth. No groundwater ingress occurred.
- 7.36 The monitoring wells in WS8 and WS9 will be monitored on three occasions, along with those installed in WS10 and WS11, to give an indication of general groundwater levels across the site, as the equilibrium level is unlikely to be established in low permeability materials during the course of a ground investigation.

## 8.0 CONTAMINATION ASSESSMENT

### Screening Values - Soils

- 8.1 In March 2014, DEFRA published Category 4 Screening Levels (C4SLs) for six contaminants: arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead for soils which should be used in contamination assessment for proposed development. Two further C4SLs for naphthalene and inorganic mercury were added in 2024. The values are based on the toxicological benchmark of a "low level of toxicological concern" (LLTC) rather than the previous regulatory approach of "minimal or tolerable level of risk". As the C4SLs are less protective of health than the previous approach, the Chartered Institute of Environmental Health (CIEH) has advocated an alternative approach based on minimal risk, but with some adjustment of exposure parameters to more realistic scenarios than those previously used. To this end, the CIEH has collaborated with Land Quality Management to publish "Suitable 4 Use Levels" (S4ULs) "The LQM/CIEH S4ULs for Human Health Risk Assessment", November 2014 (LQM/CIEH). However, DEFRA has reiterated its intention that the C4SLs should be used in generic risk assessment for proposed development, and there is indication that other parties will collaborate, in the near future, to extend the range of C4SL determinands beyond the eight published so far.
- 8.2 Soil contamination test results in this report have been compared first against the more conservative S4UL, and where a C4SL exists for the same determinand, consideration given to the use of the C4SL for any exceedances of the S4UL, within the site-specific context (including the use of benzo(a)pyrene as a surrogate marker for genotoxic PAH compounds, where appropriate). Where no S4UL exists for a determinand, for example lead, the C4SL has been used. The LQM/CIEH screening values have been calculated for soil organic matter contents of 1% and 2.5%, as well as 6%, and the appropriate screening value is used for the organic matter content of the soil. All the C4SL values published are for a soil organic matter content of 6%.
- 8.3 A table showing the screening values utilised is included in Appendix J.

### Screening Values - Leachability and Groundwater

8.4 In order of preference, the Environmental Quality Standards (EQS) annual averages for freshwater have been used as generic screening values for these results. Where no EQS is available, the stringent UK Drinking Water Standards (DWS) have been used, and other sources in the absence of EQS and DWS, as indicated on the groundwater screening values table in Appendix J.

### Soils Analysis

8.5 Twenty-five soil samples were issued to the UKAS accredited Derwentside Environmental Testing Services in Consett for a suite of testing (As, Cd, Cr (VI), Cr (III), Cu, Hg, Ni, Pb, Se, Zn, Total Sulphate, Water Soluble Sulphate, pH, Phenol-monohydric, Speciated PAH, Total TPH, Asbestos, and Organic Matter). The testing comprised:

- 22No. samples of Topsoil, 13No. comprising Natural Topsoil from TP2, TP4, TP6, TP7, TP8, TP10, TP11, TP12 (all 2016), from WS2, WS4 and WS6 (all 2019), and from WS9 and WS14 (2025). 9No. samples comprised Made Ground Topsoil from TP3 and TP9 (both 2016), from TP1, TP2, TP3, TP5, WS1 and WS3 (all 2019), and from WS11 (2025).
- 1No. sample of general granular made ground from WS7 (2019) in the far eastern triangular area of the site.
- 3No. samples of granular made ground from the quarry in the southwest (all 2019), from TP5, TP8 and WS1.
- 8No. samples of opencast backfill (three granular and five cohesive) from TP1 (x 2, 2016), TP4, WS5 (x3), TP2 (all 2019).
- 1No sample of clay made ground from the far south of the site (WS8, 2025)

8.6 For the topsoil, any determinands with exceedances of screening values were subjected to statistical analysis to determine the 95% Upper Confidence Level (UCL). The other materials were not present in a sufficient number of samples to allow reliable statistical analysis.

## Topsoil

8.7 A results summary table for determinands within the topsoil found to be above screening values is given below

BH/TP	Depth	Arsenic	Lead
TP2	0.00-0.20	50	75
TP4	0.00-0.20	46	81
TP6	0.00-0.20	47	90
TP7	0.00-0.20	39	66
TP8	0.00-0.20	57	110
TP10	0.00-0.20	66	110
TP11	0.00-0.20	51	110
TP12	0.00-0.30	61	140
WS2	0.10-0.20	49	107
WS4	0.10-0.20	36	104
WS6	0.10-0.20	49	70
TP3	0.00-0.30	51	75
TP9	0.00-0.30	54	120
TP1	0.00-0.35	50	227
TP2	0.10-0.20	51	68
TP3	0.00-0.15	38	78
TP5	0.00-0.10	24	94
WS1	0.10-0.20	9.0	39
WS3	0.10-0.20	48	106
WS9	0.10	32	74
WS11	0.10	40	56
WS14	0.10	61	90
<b>Screen Values</b>		<b>37</b>	<b>200</b>
<b>95% UCL</b>		<b>51</b>	<b>110</b>

All values in mg/kg unless indicated otherwise

Exceedance

Acceptable

8.8 It can be seen from the table that the 95% UCL concentration of lead is below the screening value, despite the presence of one elevated concentration above the screening value (TP1, which is in the eastern triangle, not proposed for development. The lead concentration is well within limits for public open space near residential sites. However, the concentration of arsenic will need to be considered further in the risk assessment, as the 95% UCL concentration is above the screening value.

- 8.9 The above arsenic assessment is based on the use of a generic screening value, which assumes 100% bio accessibility of the arsenic. However, it is acceptable to use a site-specific screening value, taking into account arsenic bio accessibility.
- 8.10 Arsenic bio accessibility testing was, therefore, subsequently undertaken in 2016, on three samples of topsoil (H1, H2 and H3), and in 2019, on two samples of topsoil (TP1 and WS2). The CLEA software model can accept bio accessibility corrections for both ingestion of soil and inhalation of dust, and the software is the most appropriate way to correct for bio accessibility. Following the guidance given in the CLEA handbook for this circumstance, the user needs to insert the bio accessible fraction in the "soil" column only (in the advanced settings area), and not in the "Airborne dust" column. The value for airborne dust should remain at 1 (i.e. 100%). The results are presented in Appendix K, along with the detailed model settings.
- 8.11 The corrected site-specific screening value for arsenic is 83mg/kg for the 2016 data and 85mg/kg for the 2019 data. All the arsenic concentrations measured in the topsoil on the site are below this corrected screening value and, therefore, the topsoil can be suitable for re-use on the site, in terms of human health.

## General Made Ground in Far Eastern Triangle (WS7)

8.12 A results summary table for determinands within the made ground (demolition rubble) in this area found to be above screening values is given below

Determinand	WS7	Screening	Screening
	<b>0.20-0.50</b>	<b>Value</b>	<b>Value</b>
		<b>Resi Garden</b>	<b>Resi POS</b>
<b>Arsenic (total)</b>	67	37	79
<b>Copper (total)</b>	5032	80	12000
<b>Lead (total)</b>	331	200	630
<b>Nickel (total)</b>	51	50	230
<b>Zinc (total)</b>	1910	200	81000
<b>Benzo(a)anthracene</b>	7.58	7.2	29
<b>Benzo(b)fluoranthene</b>	9.55	2.6	7.1
<b>Benzo(a)pyrene</b>	8.30	5	10.0
<b>Dibenz(ah)anthracene</b>	1.23	0.24	0.57
<b>EPH (&gt;C10-C35)</b>	1350	500	500
<b>TOC</b>	16.2	N/A	N/A

All values in mg/kg unless indicated otherwise

Exceedance - Residential Garden

Exceedance – Residential Garden & POS

8.13 It can be seen from the table that several determinands are above the screening value for residential gardens, and some also above the screening values for public open space (POS) near residential sites. None of the elevated PAH determinands has significant volatility (naphthalene was not found to be present above the screening value). The PAH concentrations are typically shown, by their PAH component ratios, to be derived from a petrogenic source such as coal, or possibly coal ash. The ratio plots are presented in Appendix J. The TOC content appears high at 16.2%, however; the detailed borehole log description indicates the material to comprise predominantly sand, gravel and cobble of brick and concrete (i.e. relict demolition rubble), with a negligible degradable content. The elevated TOC is attributable to non-degradable coal/ash fragments within the laboratory subsample, as indicated by the PAH component ratios.

- 8.14 The elevated EPH within the sample from WS7, at 1,350mg/kg, was tested further for aliphatic/aromatic split speciation testing, for individual carbon bands ranging from C5 to C44. The results indicate that none of the individual aliphatic or aromatic carbon bands were found to be elevated above the S4UL residential screening values. Potentially volatile petroleum hydrocarbon fractions were shown to be below the laboratory limit of detection.
- 8.15 No asbestos was identified in the sample tested.

### **Backfilled Former Opencast, Former Quarry, and Far South**

- 8.16 In the 11 samples of the backfilled former opencast/quarry workings tested, none of the determinands tested were present in concentrations above the "Residential With Home-Grown Produce" screening values. Two of the 11 samples did have slight exceedances of the Ministry of Agriculture, Food and Fisheries screening value for agricultural land, of 50mg/kg with 53mg/kg and 68mg/kg obtained in TP5 (2019) and TP8 (2019) respectively. However, both locations are in public open space, and the slight exceedances are not, therefore, considered significant in this context. The single sample of made ground clay on the far south (WS8) did not reveal any exceedances of screening values.
- 8.17 No asbestos was detected in the samples of the backfilled former opencast/quarry workings tested, or within WS8 in the far south.

### Leachability Analysis

- 8.18 Leachability testing was carried out on two samples of topsoil from 2016, showing elevated arsenic, and the sample of made ground from WS7 in the 2019 investigation for arsenic, copper and lead. The laboratory test certificates are presented in Appendix J. The analysis shows the determinands have negligible leachability, i.e. effectively immobile with respect to water/groundwater transport.

## Updated Risk Assessment and Conceptual Model

8.19 The updated source – pathway – receptor matrix is presented below, taking into account the findings of the investigation. Any pathways in italics are deemed not to be viable, and the reason given.

### **Viable Source - Pathway - Receptor Matrix (Finished Development)**

<b>Contamination Sources</b>	<b>Pathways</b>	<b>Receptors</b>	<b>Severity of Consequence</b>	<b>Probability of Event</b>	<b>Risk</b>
<p>Made ground (demolition rubble) at WS7 only: - Elevated arsenic, copper, lead, PAH</p> <p>All applies ONLY to eastern triangle area, proposed for POS. Rest of site uncontaminated</p>	<ul style="list-style-type: none"> <li>Inhalation, ingestion and dermal contact with soil and dust</li> </ul>	<b>Humans: -</b> <ul style="list-style-type: none"> <li>Maintenance workers</li> <li>Adjacent residents and general public</li> </ul>	<b>Minor</b>	<b>Low Likelihood</b>	<b>Very Low</b>
	<ul style="list-style-type: none"> <li>Fruit and vegetable intake, with soil (not applicable to POS)</li> </ul>	<b>Humans (as above)</b>	<b>Pathway Not Applicable</b>		
	<ul style="list-style-type: none"> <li>Vapour inhalation outdoor (not applicable)</li> </ul>	<b>Humans (as above)</b>	<b>Pathway Not Applicable</b>		
	<ul style="list-style-type: none"> <li>Vapour inhalation indoor (not applicable)</li> </ul>	<b>Humans (as above)</b>	<b>Pathway Not Applicable</b>		
	<ul style="list-style-type: none"> <li>Migration in surface water (not applicable)</li> </ul>	<ul style="list-style-type: none"> <li>Surface water (nearest downslope 800m away). No abstractions.</li> </ul>	<b>Pathway Not Applicable</b>		
	<ul style="list-style-type: none"> <li>Migration in groundwater (not applicable)</li> </ul>	<ul style="list-style-type: none"> <li>Groundwater (Secondary A Aquifer, no abstractions)</li> </ul>	<b>Pathway Not Applicable</b>		
	<ul style="list-style-type: none"> <li>Root uptake</li> </ul>	<b>Vegetation: -</b> <ul style="list-style-type: none"> <li>Landscape areas</li> </ul>	<b>Mild</b>	<b>Low Likelihood</b>	<b>Very Low</b>
	<ul style="list-style-type: none"> <li>Migration</li> </ul>	<b>Services/Utilities: -</b> <ul style="list-style-type: none"> <li>Potable water supply</li> </ul>	<b>Medium</b>	<b>Low Likelihood</b>	<b>Moderate/Low</b>
<p>Backfilled opencast, shallow workings/coal: - methane and carbon dioxide</p>	<ul style="list-style-type: none"> <li>Asphyxiation</li> <li>Explosive risk</li> </ul>	<ul style="list-style-type: none"> <li>Construction/demolition workers</li> <li>Future occupants</li> <li>Buildings</li> </ul>	<b>Severe</b>	<b>Low Likelihood</b>	<b>Moderate</b>

- 8.20 It can be seen from the above matrix that on the vast majority of the site, the soils are uncontaminated and suitable for reuse on a residential development, in terms of human health risks. On the eastern enclosed corner only, which is assumed to be proposed for public open space, some form of remedial action is necessary to prevent excess risk to the public and future maintenance workers. There is also a risk from ground gases.

#### Risk Based Assessment of Remedial Options

##### **Ground Gases**

- 8.21 The risk from ground gases can be addressed by provision of CS<sub>2</sub> gas protection. This usually comprises a gas barrier lapping through the cavity walls, in conjunction with passively vented underfloor voids.
- 8.22 The specific design of the protection measures, and the verification required, is dependent on the detailed foundation design, the selection of products/suppliers, the gas regime, and who installs the protection. Once more detail of these factors are known (as a minimum following foundation design and design of the protection measures), a Statement on Gas Protection should be prepared. The document should provide information for the Client and other interested parties, such as the regulatory authorities, outlining how gas protection measures for properties on the site will be implemented and the installation verified as satisfactory. The document should be agreed, prior to implementation, with the relevant Regulatory Authorities, usually the local Planning Authority and NHBC or other building control provider.

##### **Made Ground (Demolition Rubble) in Eastern Triangular Area - Ingestion, Dust Inhalation, Dermal Contact, Root Uptake**

- 8.23 This area of the site is proposed for public open space (POS). Where only turf is proposed, provision of clean topsoil of a minimum 0.3m thickness is likely to provide adequate protection. In any proposed planted areas, 0.6m thickness should be provided, and may include subsoil as well as topsoil. Alternatively, the made ground could be removed from site.

8.24 There is also a risk of contaminated material in the southwestern tip of the site, where an intact concrete ground slab was present, preventing access to the underlying material for sampling. The underlying fill materials (excluding any backfilled natural arisings) must be assumed at this stage, in the absence of any further sampling or testing, to be similarly contaminated to the relict demolition rubble at/around WS7. As the area is proposed for POS, it may be the case that the slabs can remain in situ, and then no action is likely to be necessary.

### Migration to Utilities

8.25 Any migration to utilities is unlikely to be significant and will only apply to utilities running through made ground in the eastern triangular area (e.g. WS7). If any proposed water supply pipes are to pass through this area, the local water company are likely to require details of the contaminants present on the site, to make a judgment on any requirement for protection of buried water supply pipes from chemical attack/ingress.

### Risks During Construction Period

8.26 It is also necessary to consider the effects of the contamination present on the site in relation to the risks to adjacent residents, construction workers and the general public during construction. This is assessed in the following matrix.

Source	Pathway	Potential risk	Risk after employing suitable Health and Safety plan.
Existing made ground (eastern triangle only)	Inhalation	Moderate	Damping down of the site during dry periods and timely placement of the existing made ground below barriers should block this pathway and reduce the risk to negligible.
Existing made ground (eastern triangle only)	Ingestion	Moderate	Site fencing will exclude access to members of the public. Existing made ground will be contained within the site boundary, and placed below barriers as soon as possible. Washing facilities and a clean mess room from which work boots and overalls are excluded should be provided. These measures should block this pathway and reduce the risk to negligible.

Existing made ground (eastern triangle only)	Contact	Moderate	Education of workers to use adequate hygiene and PPE should block this pathway and reduce the risk to negligible.
Soils in general	Particulates in surface water	Moderate	Provided a suitable surface water run off management plan is employed, the risk of particulate pollution of watercourses should be negligible.

8.27 Provision of all the above measures will ensure that all the identified pathways for the contamination will be blocked.

### Summary of Contamination Assessment and Remedial Options

8.28 The majority of the site is generally underlain by up to 0.35m thickness of made ground, overlying natural residual soils derived from in situ weathering of solid strata. In the south-central area of the site, opencast backfill material is present (made ground of reworked natural material) to proven depths of up to 11.5m. In the southwest, a backfilled quarry is present to depths of at least 3.2m, again generally infilled with reworked natural material.

8.29 The topsoil and made ground was found to be essentially uncontaminated and compatible with the proposed residential development. An exception was demolition rubble in the eastern triangle (WS7), which contained elevated copper at 5,032mg/kg, lead at 331mg/kg, and elevated PAH compounds, including benzo(a)pyrene at 8.3mg/kg. There was no significant leachability.

8.30 The contamination risk assessment, and assessment of remedial options, has indicated that, provided that the following remedial measures are adopted then the risks to the identified receptors are deemed acceptable for the proposed development of residential properties with private gardens, and areas of POS.

- 8.31 The eastern triangle is proposed for POS. Therefore, where only turf is proposed, provision of clean topsoil of a minimum 0.3m thickness is likely to provide adequate protection. In any proposed planted areas, 0.6m thickness should be provided, and may include subsoil as well as topsoil. Alternatively, the made ground could be removed from site. It would be inadvisable to move the material to proposed residential plot areas, but if this was to occur, 0.6m cover would be required in the garden areas.
- 8.32 In the southwestern tip of the site, an intact concrete ground slab was present, preventing access to the underlying material for sampling. The underlying fill materials (excluding any backfilled natural arisings) must be assumed, in the absence of any further sampling or testing, to be similarly contaminated to the relict demolition rubble at/around WS7. As the area is proposed for POS, it may be the case that the slabs can remain in situ, and then no action is likely to be necessary. If the slab is to be removed, sampling and testing would be required of the underlying material.
- 8.33 Any imported soils used within the cover blanket will need to be verified as suitable by inspection and testing, in accordance with guidance supplied in the document produced by the Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG): "Guidance on the Verification Requirements for Cover Systems".
- 8.34 If any water supply pipes are proposed that pass through the eastern triangular area (WS7), the local water company are likely to require details of the contaminants present on the site, to make a judgment on any requirement for protection of buried water supply pipes from chemical attack/ingress.
- 8.35 If any artificially hard materials (i.e. brick and concrete), from the limited areas of former development on the northeast and southwest of the site, are processed for retention as engineered fill material, this will require testing to confirm its chemical (and/or geotechnical) suitability for its proposed end use prior to placement, in accordance with current best-practice guidance.

- 8.36 If any contaminated material is removed from site, the receiving tip may require Waste Acceptance Criteria testing. Independent validation inspection will be required, to verify removal of all the affected material. The disposal/transfer documents should be retained for inclusion in the Validation Report.
- 8.37 Any imported or site-won soils used within the cover blanket will need to be verified as suitable by inspection and testing, in accordance with guidance supplied in the document produced by the Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG): "Guidance on the Verification Requirements for Cover Systems".
- 8.38 A Contamination Remediation Statement is included in Appendix M.

## 9.0 GEOTECHNICAL TESTING

9.1 Selected samples of the natural strata were delivered to PSL in Doncaster for testing with regard to plasticity indices and moisture content. Test certificates are presented in Appendix J and a summary of the results, including Modified Plasticity Indices, is given below.

Location	Depth (m)	MC	LL	PL	PI	% <425µm	I'p
TP3	1.5-1.8	21	54	25	29	100	29
TP4	0.5-0.8	21	57	26	31	100	31
TP8	1.2-1.4	24	51	24	27	100	27
TP10	1.6-1.8	22	50	23	27	100	27
TP1	0.9-1.0	28	72	31	41	100	41
WS2	0.2-0.5	30	69	28	41	100	41
WS4	1.7-1.8	28	72	30	42	100	42
WS6	1.8-1.9	22	70	29	41	100	41
WS8	1.20	16	49	20	29	99	29
WS11	1.60	11	35	18	17	96	16
	<b>No. of results</b>	10	10	10	10	10	10
	<b>Min.</b>	11	35	18	17	96	16
	<b>Max.</b>	30	72	31	42	100	42

I'p	VCP
>40%	High
20% - <40%	Medium
10% - <20%	Low

MC= Moisture Content (%)    LL= Liquid Limit (%)    PL= Plastic Limit (%)  
 PI= Plasticity Index (%)    I'p= Modified PI (%)    VCP= NHBC Standard Chapter 4.2  
 Volume Change Potential

9.2 The plasticity test data shows the clay strata to be of high to very high plasticity, in accordance with BS 5930: 2015 "Code of Practice for Site Investigations". When the percentage retained on the 425-micron BS sieve is considered, the Modified Plasticity Index, in accordance with NHBC Standard Chapter 4.2 "Building Near Trees" is a maximum of 42. In accordance with the Standard, this equates to High Volume Change Potential.

9.3 Geochemical testing (water soluble sulphate and pH) was undertaken on selected samples by DETS, comprising 17 samples of natural strata and 15 samples of made ground. In accordance with the BRE Special Digest 1 "Concrete in aggressive ground", the characteristic values for the two materials are given below:

**Characteristic Values**

<b>Material</b>	<b>pH</b>	<b>SO<sub>4</sub></b>
Made Ground	5.6	439
Natural Strata	5.6	140

SO<sub>4</sub> = Sulphate content in mg/l on a 2:1 water: soil extract    pH = Acidity

9.4 The geochemical analyses show the natural undisturbed strata to have low water-soluble sulphate content and slightly acidic pH. The Aggressive Chemical Environment for Concrete (ACEC) class is AC-1. Testing on the made ground indicates class AC-3z. Therefore, the use of FND3z designated concrete will be necessary for unreinforced buried concrete in contact with made ground, in accordance with BS 8500-1:2015+A2:2019. For unreinforced buried concrete away from any made ground, the use of GEN1 designated concrete will be satisfactory. For any reinforced buried concrete, other design-specific mixes will apply.

## 10.0 GEOTECHNICAL ASSESSMENT

### Coal Mining and Coal Recovery

- 10.1 There is a coal seam outcrop (the Better Bed Coal Seam) running approximately north to south through the site. In the central area of the site, this seam is recorded to have been worked by opencast methods, and this has been proved by the ARP ground investigations. There are no specific Coal Authority records of underground workings, but unrecorded workings are suspected. Two phases of rotary borehole investigation by ARP found underground workings generally in areas east of the eastern side of the opencast, but the opencast records do also show some evidence of old underground workings encountered further west, although none were intersected in the boreholes implemented by ARP.
- 10.2 There is a wide range of reported thicknesses of the seam from the boreholes across the site, probably exacerbated by the presence of dark, hard mudstone in combination with the seam. The two independently produced previous reports interpreted the thicknesses differently. In the light of this, therefore, the most reliable measure of thickness is concluded to be from the BGS geological maps and the Coal Authority abandonment plan records for the backfilled opencast on the site. These both record the seam thickness as 0.5m. Based on this, there are areas north/northwest, and southwest, of the backfilled opencast area where coal is present with insufficient cover, as annotated onto the plan in Appendix H titled "Map Showing Coal & Workings Depths, Where Encountered & Drill/Grout Area". In these areas, it is recommended that holes should be drilled on a 9m grid and, where there is any evidence of workings with insufficient cover, the grid closed to 3m. If found to be necessary by the results of the drilling, the treatment area should be extended beyond the shaded areas. In addition, as there was indication of a shallower shelf of the opencast base on its eastern edge, with the seam at a greater depth below the shelf. To ensure full support to piled foundations (which would still need to be bored through to the base of the workings) this area should also be drilled and grouted. All the holes should be injected with grout in accordance with CIRIA 32 "Construction Over Abandoned Mine Workings".

- 10.3 No evidence of mine entries (shafts or adits), or bell pits, was encountered during the investigation. However, it is recommended that, on areas east of the coal outcrop (excluding the opencast), the surface should be inspected by a suitably qualified engineer following the topsoil strip, to check for any suspect features. Vigilance should also be maintained during the proposed development works and any suspect feature should be inspected by the engineer.

#### Foundations

- 10.4 All foundations will need to be supported by natural strata, with the existing made ground penetrated where it occurs. For the majority of the site, traditional strip/trench fill foundations will be suitable, with an allowable bearing pressure of 100kN/m<sup>2</sup> considered applicable, onto either clays of at least firm consistency (medium strength), or the granular material of highly weathered rock (sands and gravels). Higher allowable bearing pressures are usually available with increasing depth, to 300kN/m<sup>2</sup> on the underlying intact rock.
- 10.5 Where shallow underground mine workings are present within influencing distance of the surface then, following grout treatment of the workings, any strip foundations will need to be 300mm thick and reinforced with two layers of B503 mesh - one near the top and one near the bottom.
- 10.6 Where any foundation penetrates a coal seam (if present), the foundation should be surrounded by a membrane to prevent sulphate attack, and there should be 250mm thickness of concrete on the outer face of the foundation, outside the membrane. This is a sacrificial barrier in the unlikely event of a fire in the seam approaching the house from the outside. The risk of combustion from inside is considered very remote, so there is no requirement for additional concrete on the inside of the footprint. Where the foundation may step back up above the coal elsewhere on the plot, there is no requirement for these measures. The above recommendations assume that coal will not be extracted prior to construction.

- 10.7 In the area of backfilled opencast coal mining, the depth to natural strata (where proved) has been up to 11.5m. Piled foundations are likely to be the favoured solution, and these should be bored or predrilled in the vicinity of high wall lines or shelved edges. It should be ensured that these bored piles are taken to a level below the seam/workings.
- 10.8 There is a slight possibility of localised opencast coal excavations elsewhere on the site, along with, bell pits, and mine entries. Any suspect features, identified during site clearance or excavations, should be inspected by a Geotechnical Engineer.
- 10.9 The clays were shown to be of high-volume change potential. Therefore, in accordance with NHBC Standard Chapter 4.2 "Building Near trees", in the absence of trees, a minimum foundation depth of 0.9m below existing or proposed ground level is applicable, whichever is the lower. However, in the presence of any proposed, existing or removed trees, the foundation may need to be deepened, depending on the type of tree and its distance from the face of the foundation. If not already available, a tree survey may be required to enable a foundation schedule to be prepared. The tree survey will also need to consider trees on third party properties.
- 10.10 Where the founding strata are non-plastic, the minimum foundation depths given in NHBC Standard Chapter 4.2 "Building Near Trees" do not apply. However, to protect against fines washing subsidence in the event of a burst water supply pipe, it is recommended that a foundation depth of 0.9m is adopted in proximity to any such pipes.
- 10.11 Where piles are used, it is recommended that the guidance contained within NHBC Standard Chapter 4.2 "Building Near trees" is observed in relation to any requirement for heave protection.
- 10.12 For strip/trench fill foundations, the whole plan area of the building should be placed on similar natural material. Foundations should be reinforced where it is necessary to transition from suitable granular to suitable cohesive strata within a proposed building footprint.

- 10.13 If bedrock is encountered on part of a foundation excavation, the rest of the plot should be deepened to ensure founding on similar material. However, if rock is not encountered by 2.5m depth on the remainder of the plot, then the Engineer should be contacted for further advice.
- 10.14 Foundations within 20m either side of the geological fault indicated to cross the site will need to be 300mm thick and reinforced with two layers of B503 mesh – one near the bottom and one near the top, to mitigate any potential differential settlement associated with more deeply weathered zones or tilted/stepped strata.

#### Excavations

- 10.15 It is likely that excavations into the natural strata will remain stable in the short term, requiring minimal trench support, in accordance with the prevailing statutory guidance. However, slight to moderate instability may be anticipated within the made ground.
- 10.16 In some areas of the backfilled opencast/quarry workings, the surface was waterlogged. Slight groundwater seepages were recorded locally across the site. Slight, moderate and rapid groundwater seepages were recorded in the opencast area. Any such encounters, within typical excavation depths, should be controllable by pumping from an artificial sump.
- 10.17 Excavations should be readily achieved using conventional hydraulic plant. However, excavations into intact bedrock are likely to require a hydraulic breaker. A breaker might be required to penetrate any buried foundations and structures in the eastern triangular area, although this area is not currently proposed for development.

### Chemical Precautions

- 10.18 The Aggressive Chemical Environment for Concrete (ACEC) class is AC-1 for the natural strata, but testing on the made ground indicates class AC-3z. Therefore, the use of FND3z designated concrete will be necessary for unreinforced buried concrete in contact with any made ground. For unreinforced buried concrete away from any made ground, the use of GEN1 designated concrete will be satisfactory. For any reinforced buried concrete, other design-specific mixes will apply.

### Road Pavement Construction

- 10.19 For any areas of road pavement, including parking areas, the formation across the majority of the site will be the clay soils (derived from the in-situ weathering of underlying mudstone/siltstone strata). Below any obvious soft spots, and at equilibrium moisture content, a design California Bearing Ratio (CBR) value of 2% is considered applicable. Where sands and gravels are present (derived from the in-situ weathering of underlying sandstone strata), in the west of the site, below any obvious soft spots and at equilibrium moisture content, a design CBR value of 20% is considered applicable. If considered necessary, this should be confirmed by testing at proposed subgrade level before construction. Formation of roads on the existing made ground will not be acceptable.
- 10.20 In the backfilled opencast area, a formation for road pavement on natural strata is likely to be impractical. There are several potential solutions for this situation, but the most economical is likely to comprise partial excavation and replacement, with appropriate layers of geogrid. The geogrid suppliers are normally able to provide a warranted design. The proposed measures will need to be agreed with the adopting authority, where applicable, and, therefore, consultations with the relevant authority should be undertaken at the earliest stage.

### Flooding

- 10.21 The site is not in an area at risk from river flooding. The risks of flooding from other causes such as adverse topography or insufficient surface water drainage, are not considered here. If such risk needs to be quantified, a separate specialist Flood Risk and Drainage Report should be commissioned, if not already available. BGS data indicates the general area has "limited potential for groundwater flooding to occur".

### Soakaways

- 10.22 The disposal of surface water using soakaways is unlikely to be feasible on the site due to the widespread presence of clay soils, and the potential for soakaway drainage to reappear downslope.

### Old Well

- 10.23 A well was once indicated at the far southwestern boundary, later becoming a "trough" (probably for watering animals). The precise location is uncertain. If present on the site, and if the feature is a well, depending on its condition, it may need to be filled with single size stone and provided with a reinforced concrete cap. If the feature is producing water at the surface, this will need to be picked up as part of any drainage design for the site.

### Gas Protection

- 10.24 CS2 Gas protection is required for proposed properties on the site. The specific design of the protection measures, and the verification required, is dependent on the detailed foundation design, the selection of products/suppliers, and who installs the protection. Once more of these factors are known, as a minimum following foundation design and design of the protection measures, a Statement on Gas Protection should be prepared. The document should provide information for the Client and other interested parties, such as the regulatory authorities, including detailed drawings of the gas protection, how the

design has been arrived at, how the protection will be installed, and how the installation will be verified as satisfactory. The document should be agreed, prior to implementation, with the relevant Regulatory Authorities, usually the local Planning Authority and NHBC or other building control provider.

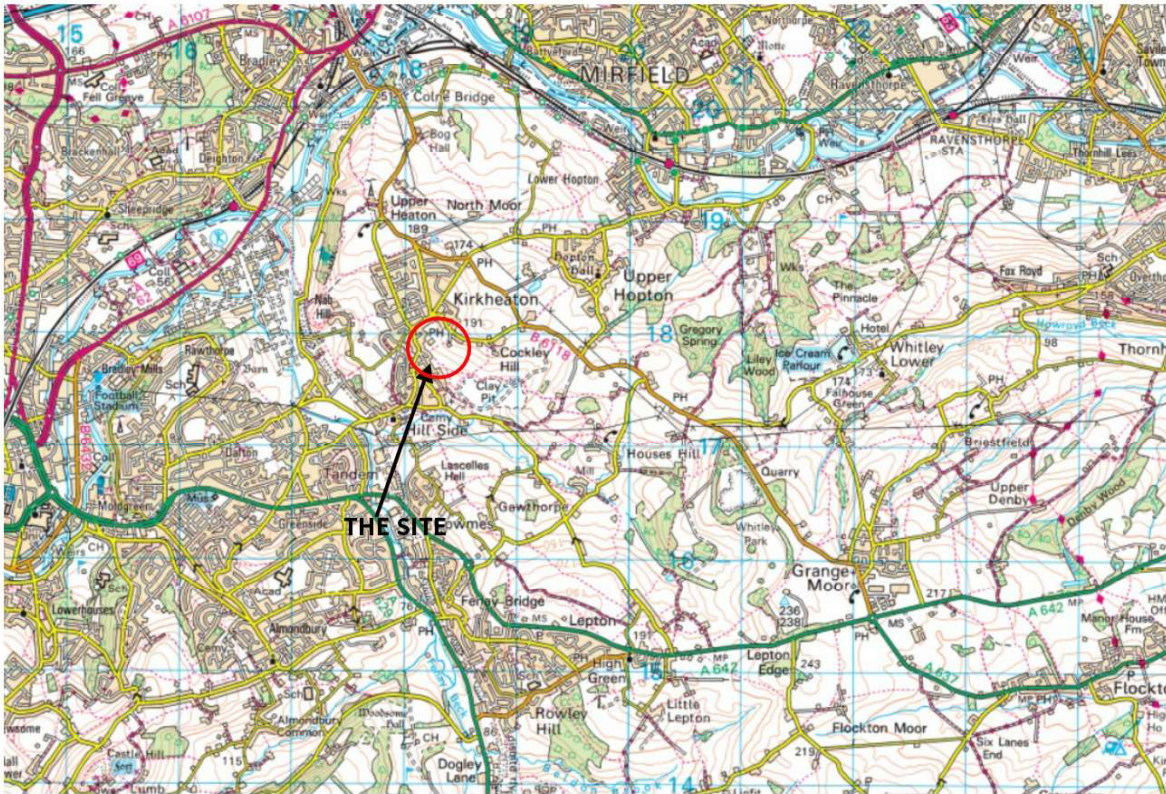
- 10.25 CS2 gas protection will also provide the equivalent of Basic Radon Protection.

#### Slope Stability

- 10.26 The site is sloping, with gradients up to around 1 in 6. Such slopes are unlikely to encounter instability in their present state. However, if the slopes are steepened or subjected to unusual localised loads, stability may be affected and retaining walls required. These should be suitably designed, and incorporate an assessment of global stability.

**APPENDIX A**

**SITE LOCATION PLAN AND AERIAL PHOTOGRAPH**



0m 1000m

Approximate Scale



Project	COCKLEY HILL, KIRKHEATON	
Client	GLEESON HOMES LTD	
Title	SITE LOCATION PLAN	
Date	AUGUST 2025	
Drawn	OG	Scale AS SHOWN
Job No.	GHO/11	



0m 200m

Approximate Scale

**ARP**

ARP GEOTECHNICAL LTD  
 CHARTERED CONSULTING ENGINEERS  
 Northwell House 5-6 Northwell Business Park Semla Hill Leeds LS2 2QH  
 Telephone: 0113 245 8888 Fax: 0113 244 3864 E-Mail: leeds@arpassociates.co.uk

Project	
COCKLEY HILL LANE, KIRKHEATON	
Client	
GLEESON HOMES LTD	
Title	
AERIAL PHOTOGRAPH	
Date	
AUGUST 2025	
Drawn	Scale
OG	AS SHOWN
Job No.	
GHO/11	

**A P P E N D I X B**

**ORDNANCE SURVEY ARCHIVE MAPS**

# Historical Mapping Legends

## Ordnance Survey County Series 1:10,560

**Gravel Pit**, **Sand Pit**, **Other Pits**  
**Quarry**, **Shingle**, **Orchard**  
**Osiers**, **Reeds**, **Marsh**  
**Mixed Wood**, **Deciduous**, **Brushwood**  
**Fir**, **Furze**, **Rough Pasture**  
 Arrow denotes flow of water, Trigonometrical Station  
 Site of Antiquities, Bench Mark  
 Pump, Guide Post, Signal Post, Well, Spring, Boundary Post  
 -200 Surface Level  
**Sketched Contour**, **Instrumental Contour**  
**Main Roads** (Fenced, Un-Fenced), **Minor Roads** (Fenced, Un-Fenced)  
**Carton Road**, **Revised Road**  
**Road over Railway**, **Railway over River**  
**Railway over Road**, **Level Crossing**  
**Road over River or Canal**, **Road over Stream**  
**Road over Stream**  
 County Boundary (Geographical), County & Civil Parish Boundary  
 Administrative County & Civil Parish Boundary  
 County Borough Boundary (England), Co. Burgh Bdy.  
 County Burgh Boundary (Scotland), Rural District Boundary, Civil Parish Boundary

## Ordnance Survey Plan 1:10,000

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

## 1:10,000 Raster Mapping

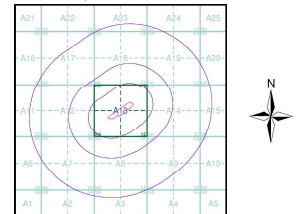
**Gravel Pit**, **Refuse tip or slag heap**  
**Rock**, **Rock (scattered)**  
**Boulders**, **Boulders (scattered)**  
**Shingle**, **Mud**  
**Sand**, **Sand Pit**  
**Slopes**, **Top of cliff**  
 General detail, Overhead detail, Narrow gauge railway, Multi-track railway, Single track railway  
 County boundary (England only), District, Unitary, Metropolitan, London Borough boundary, Civil parish or community boundary, Constituency boundary  
 Area of wooded vegetation, Non-coniferous trees, Coniferous trees, Positioned tree, Orchard, Coppice or Osiers, Rough Grassland, Heath, Marsh, Salt Marsh or Reeds, Scrub, Water feature, Flow arrows, Mean high water (springs), Mean low water (springs), Telegraphic wire (where shown), Bench mark (where shown), Point feature (e.g. Guide Post or Mile Stone), Site of (antiquity), General Building, Impervious Building



## Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pln
Yorkshire	1:10,560	1854 - 1855	2
Yorkshire	1:10,560	1894	3
Yorkshire	1:10,560	1908	4
Yorkshire	1:10,560	1930 - 1931	5
Yorkshire	1:10,560	1938	6
Yorkshire	1:10,560	1940	7
Ordnance Survey Plan	1:10,000	1956	8
Ordnance Survey Plan	1:10,000	1965	9
Ordnance Survey Plan	1:10,000	1976	10
Ordnance Survey Plan	1:10,000	1989	11
10K Raster Mapping	1:10,000	2000	12
Street View	Variable		13

## Historical Map - Slice A

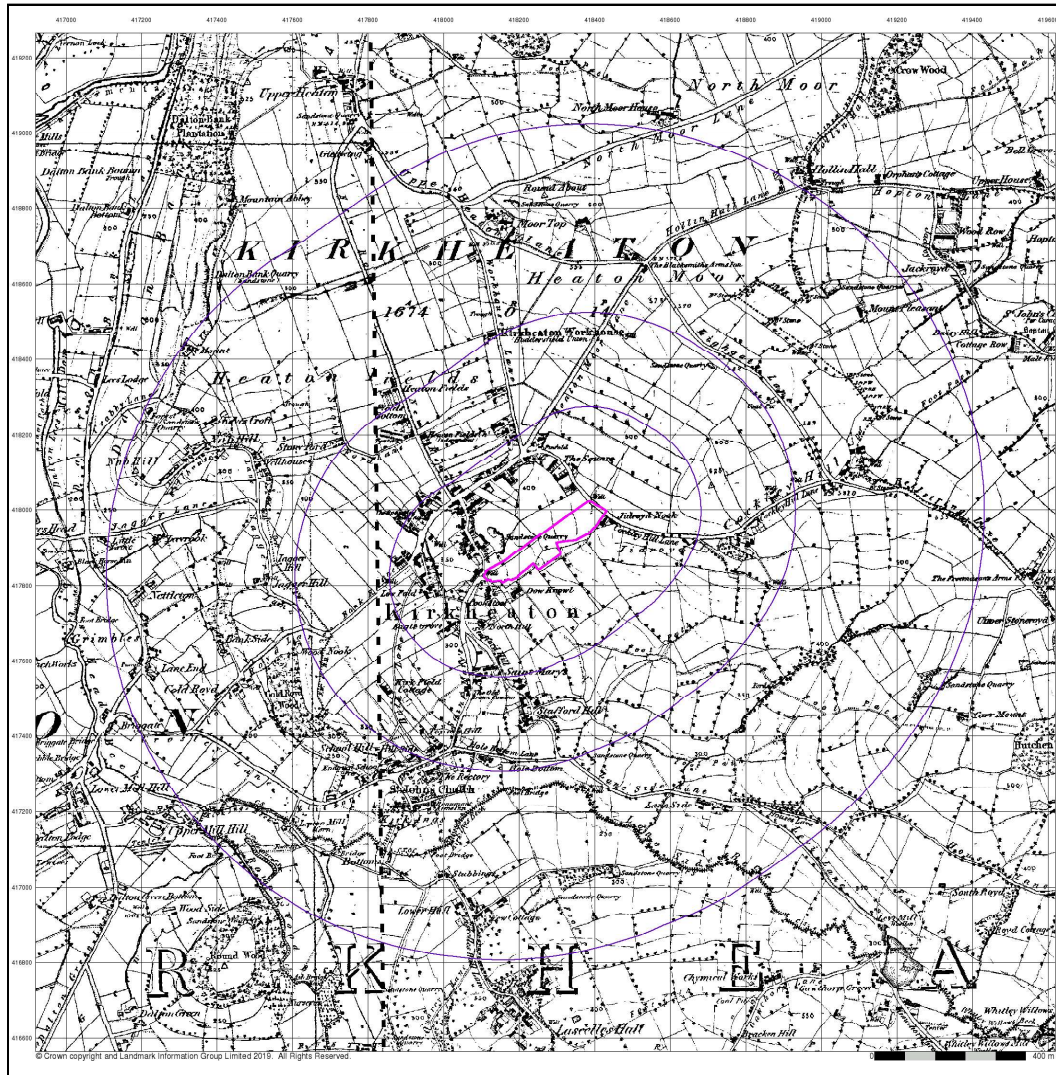


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 Slice: A  
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## Site Details

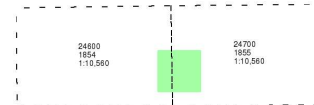
Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



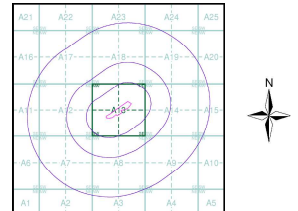
**Yorksire**  
**Published 1854 - 1855**  
**Source map scale - 1:10,560**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

**Map Name(s) and Date(s)**

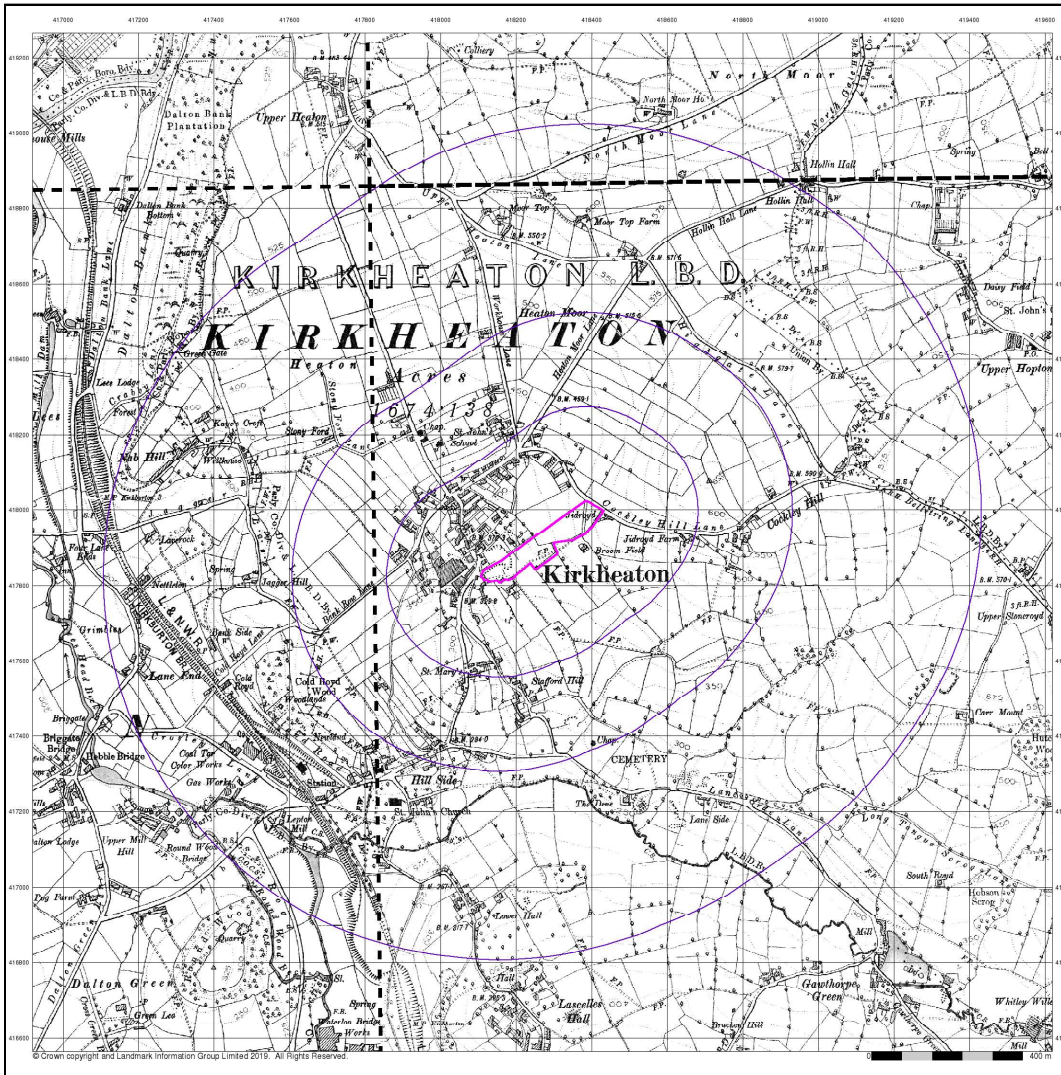


**Historical Map - Slice A**



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 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
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 Site Area (Ha): 2.08  
 Search Buffer (m): 1000

**Site Details**  
 Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



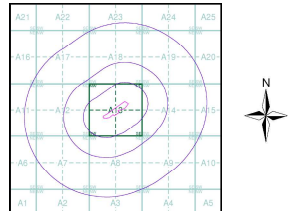
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**Published 1894**  
**Source map scale - 1:10,560**

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**Map Name(s) and Date(s)**

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246SE 1894 1:10,560	247SW 1894 1:10,560

**Historical Map - Slice A**



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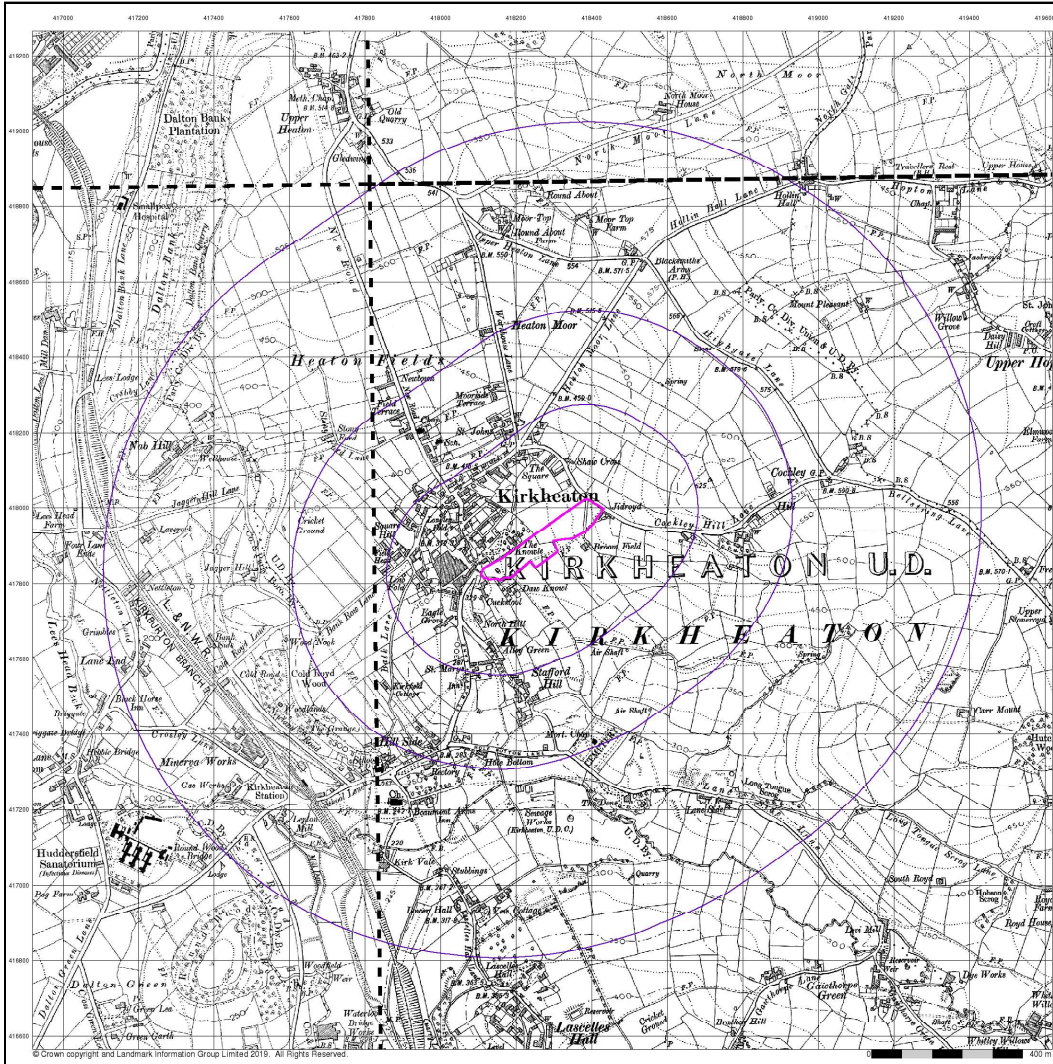
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 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 1000

**Site Details**

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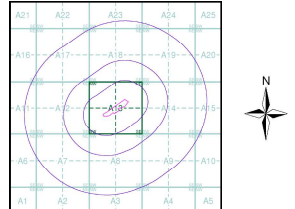
**Yorksire**  
**Published 1908**  
**Source map scale - 1:10,560**

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**Map Name(s) and Date(s)**

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246SE 1908 1:10,560	247SW 1908 1:10,560

**Historical Map - Slice A**



**Order Details**

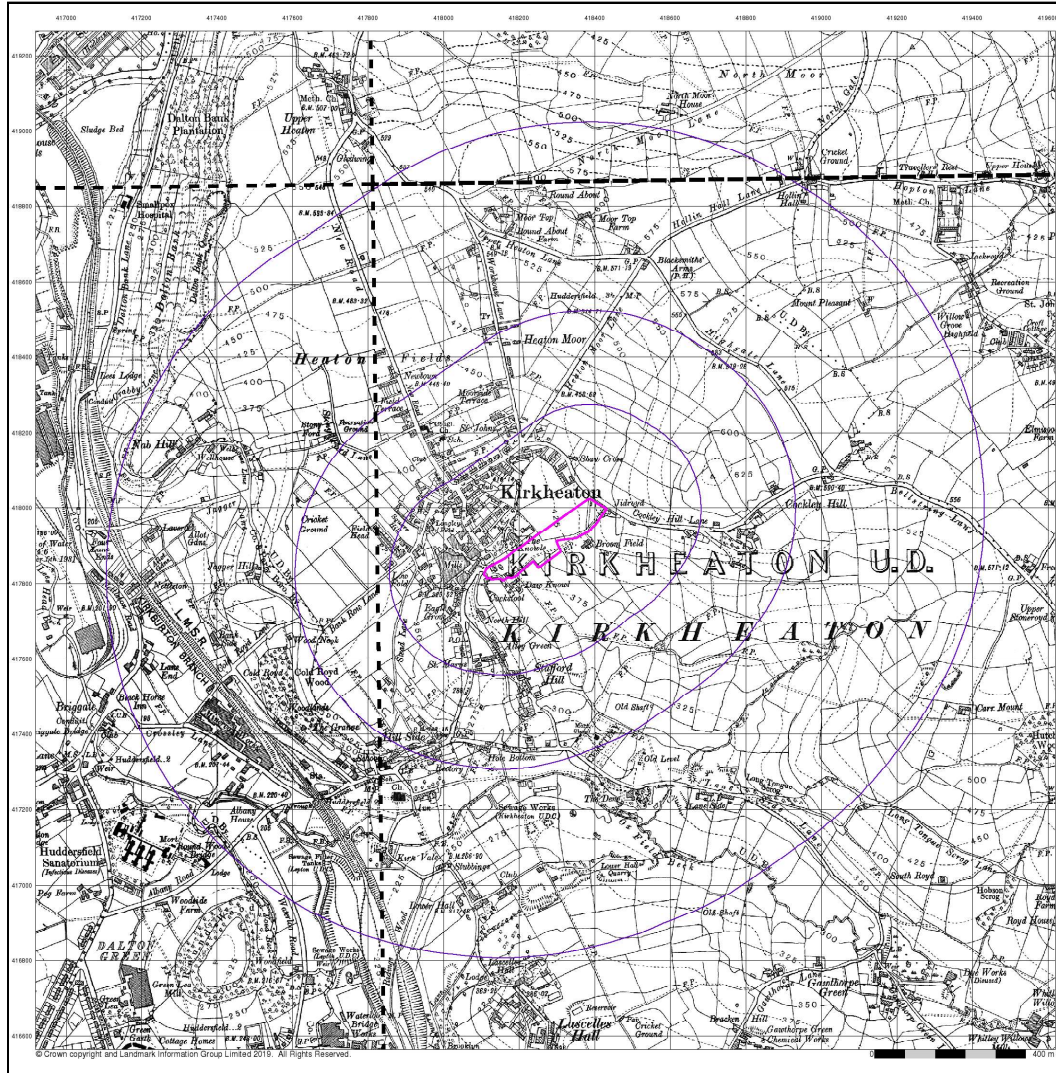
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**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



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 Web: www.enrtocheck.co.uk



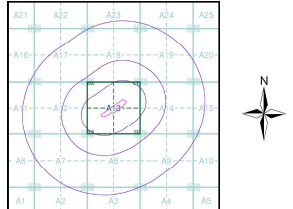
**Yorksire**  
**Published 1930 - 1931**  
**Source map scale - 1:10,560**

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**Map Name(s) and Date(s)**

246NE 1930 1:10,560	247NW 1931 1:10,560
246SE 1930 1:10,560	247SW 1930 1:10,560

**Historical Map - Slice A**

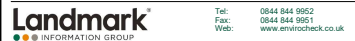


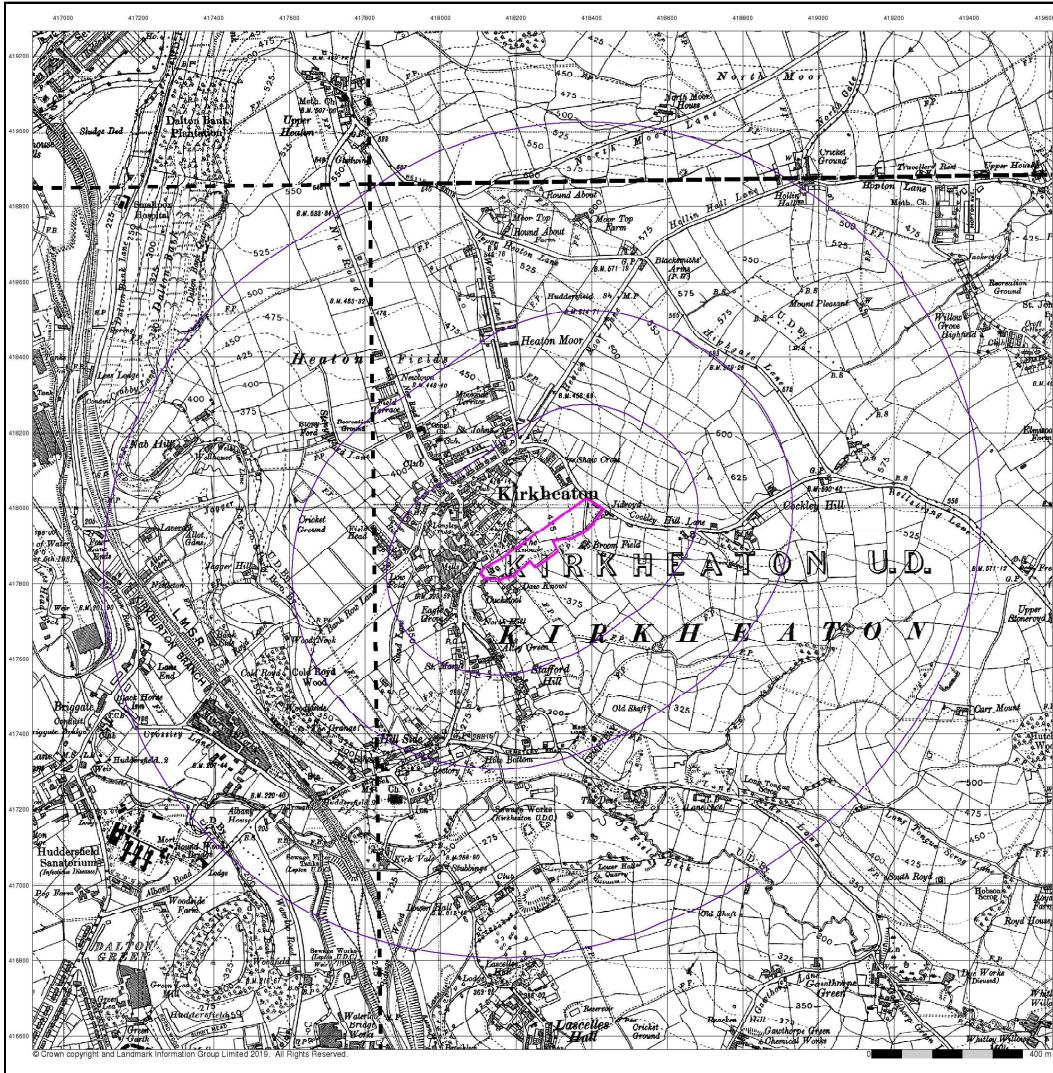
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**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH





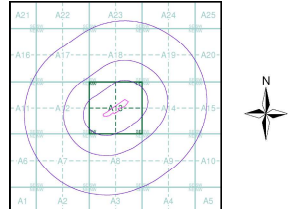
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**Published 1938**  
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**Map Name(s) and Date(s)**

24ENE 1938 1:10,560	24TNW 1938 1:10,560
24ESE 1938 1:10,560	24TSW 1938 1:10,560

**Historical Map - Slice A**

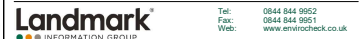


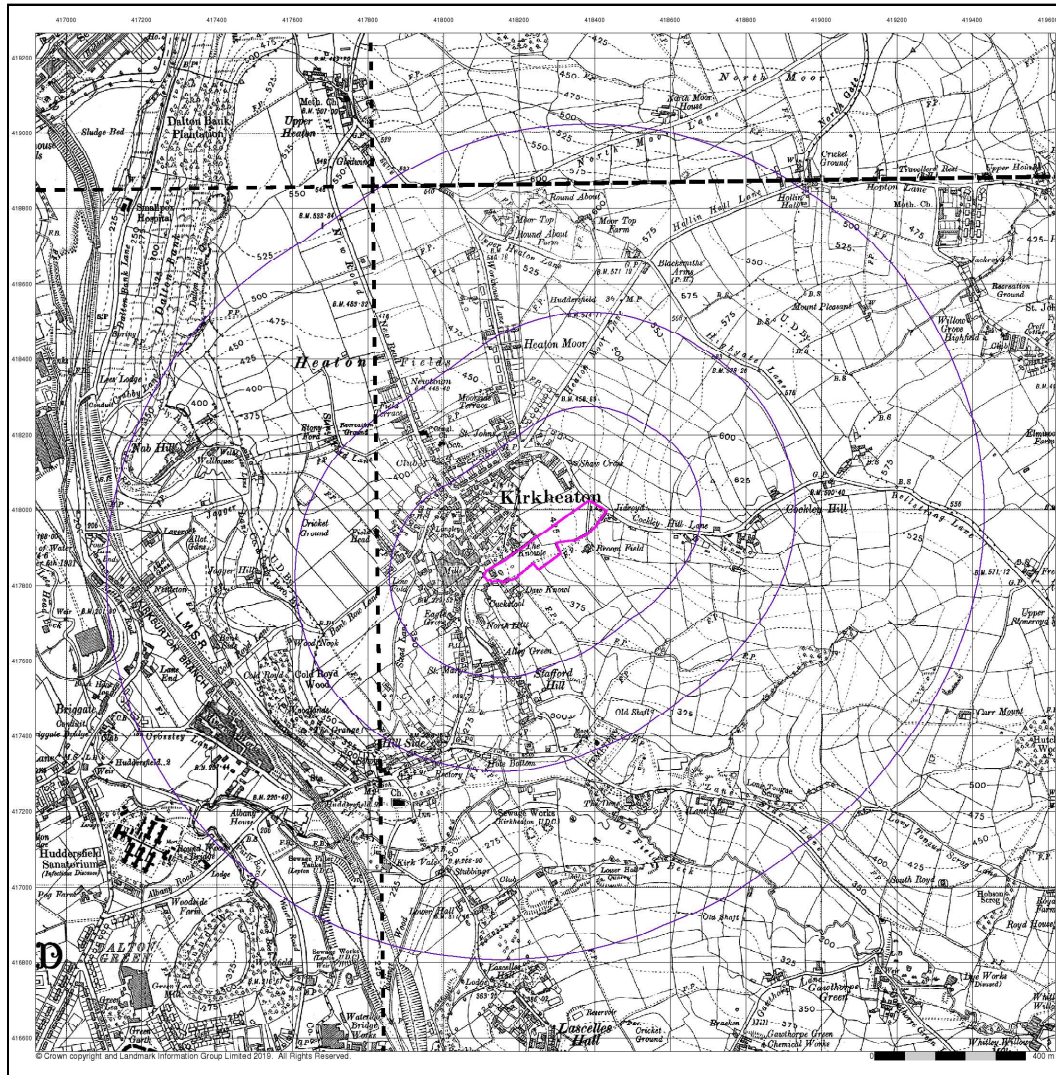
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**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH





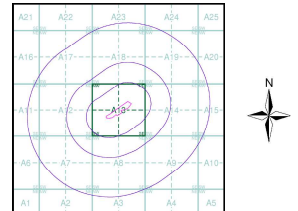
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**Map Name(s) and Date(s)**

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246SE 1948 1:10,560	247SW 1948 1:10,560

**Historical Map - Slice A**



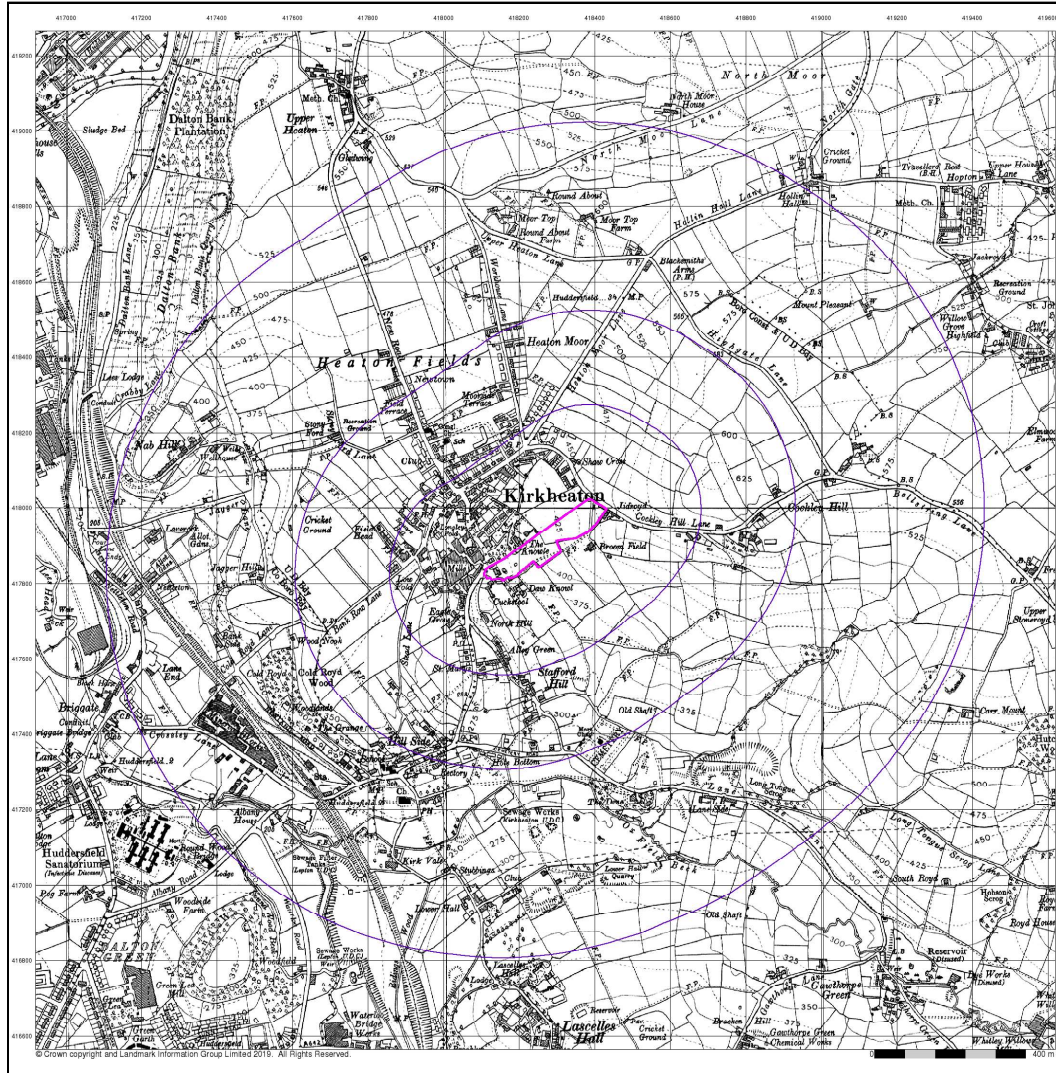
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 Site Area (Ha): 2.08  
 Search Buffer (m): 1000

**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH

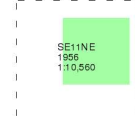




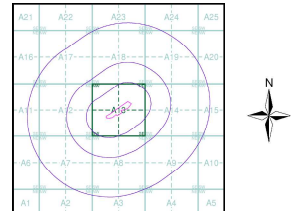
**Ordnance Survey Plan  
Published 1956  
Source map scale - 1:10,000**

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**Map Name(s) and Date(s)**



**Historical Map - Slice A**



**Order Details**

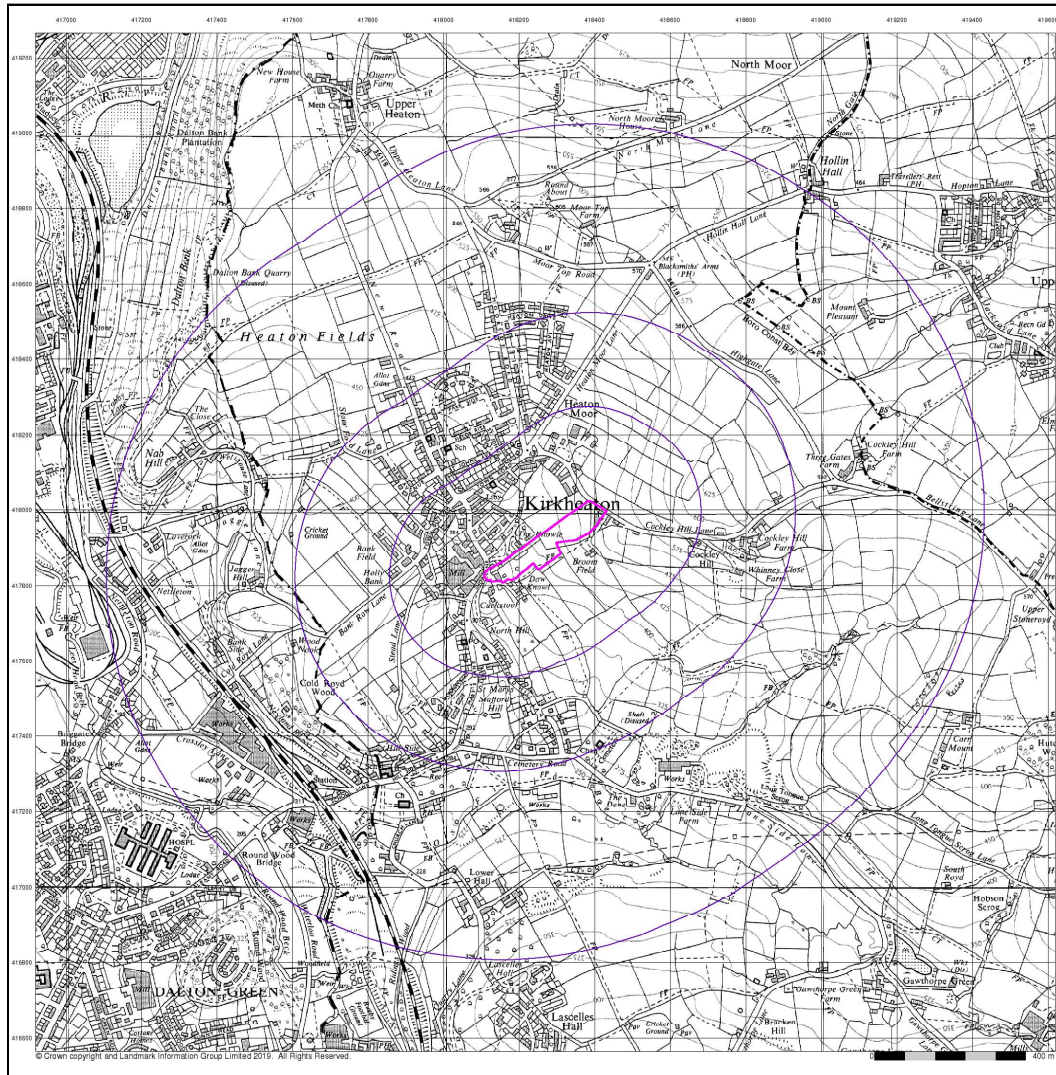
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 Site Area (Ha): 2.08  
 Search Buffer (m): 1000


**Site Details**

Cockey Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



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 Fax: 0844 844 9951  
 Web: www.landmark.co.uk





**ARP GEOTECHNICAL LTD**

**Ordnance Survey Plan  
Published 1965  
Source map scale - 1:10,000**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

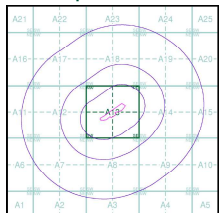
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**Map Name(s) and Date(s)**

SE11NE  
1965  
1:10,560

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**Historical Map - Slice A**





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**Order Details**

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Slice:	A
Site Area (Ha):	2.08
Search Buffer (m):	1000

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**Site Details**

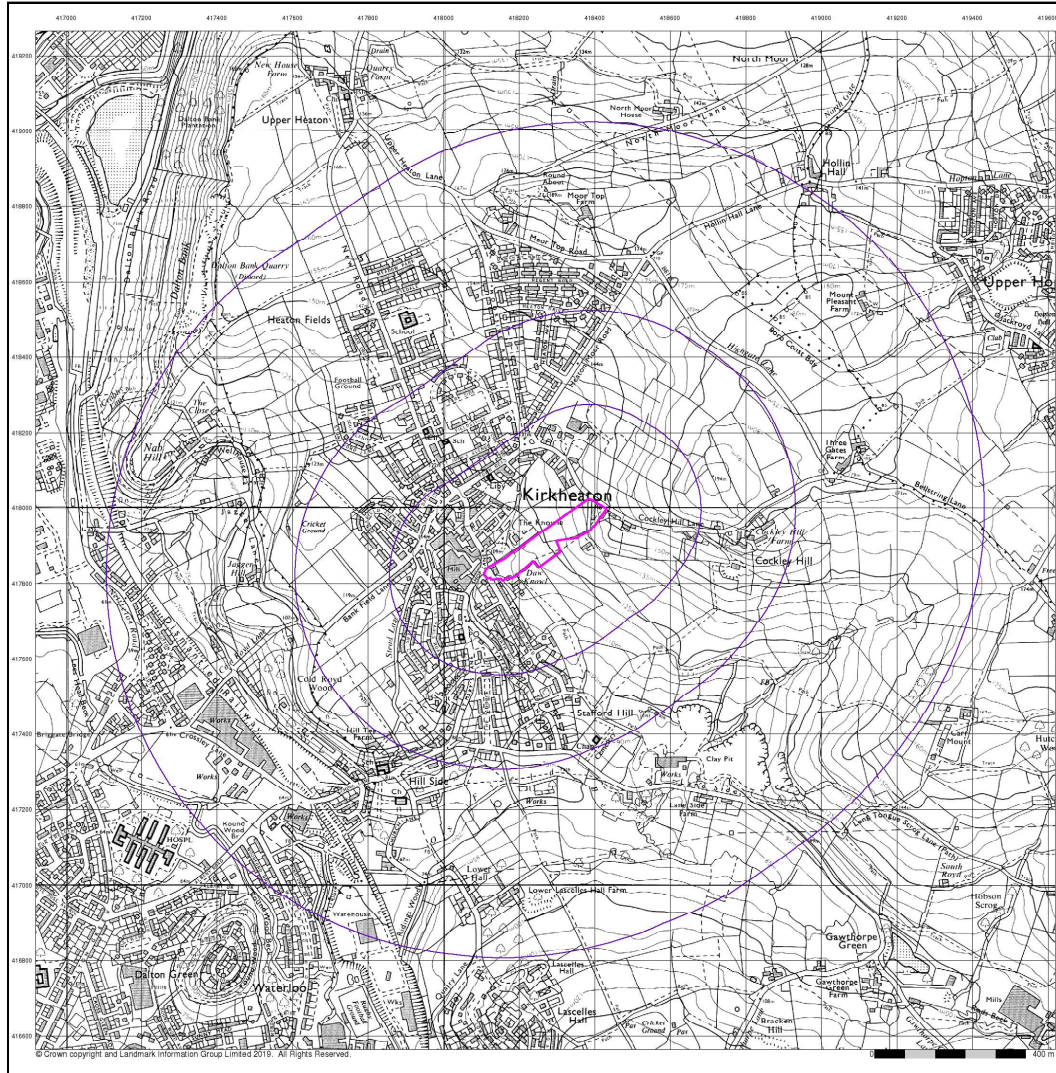
Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH

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**Landmark**  
INFORMATION GROUP

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Fax: 0844 844 9951  
Web: [www.envisiocheck.co.uk](http://www.envisiocheck.co.uk)

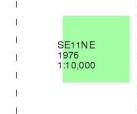
A Landmark Information Group Service v50.0 11-Feb-2019 Page 9 of 13



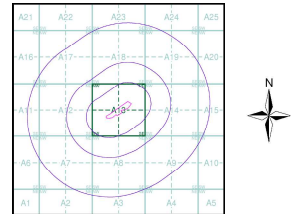
**Ordnance Survey Plan  
Published 1976  
Source map scale - 1:10,000**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

**Map Name(s) and Date(s)**



**Historical Map - Slice A**

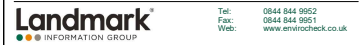


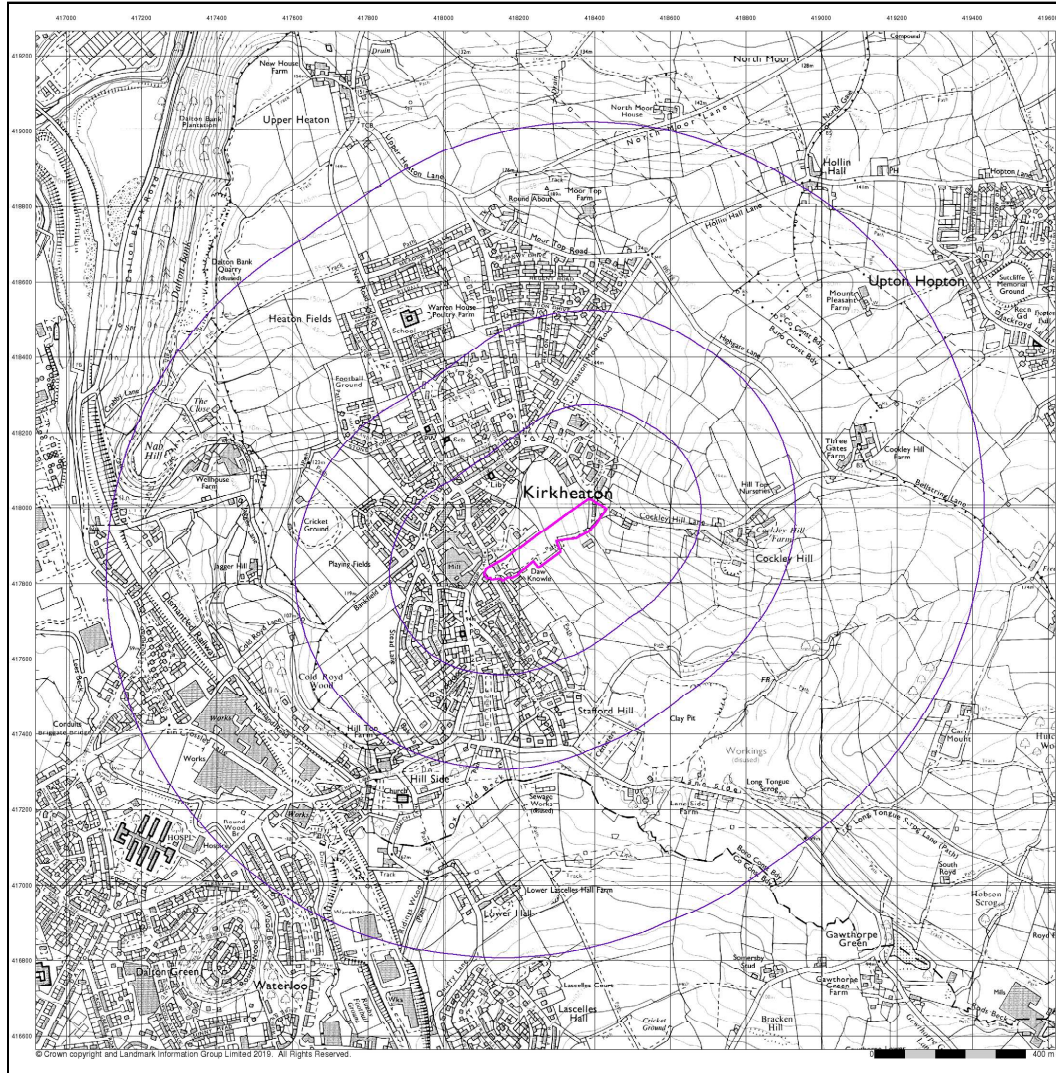
**Order Details**

Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 1000

**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH

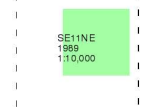




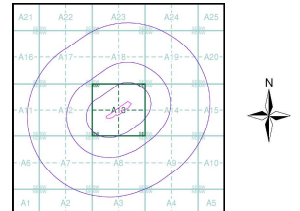
**Ordnance Survey Plan  
Published 1989  
Source map scale - 1:10,000**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

**Map Name(s) and Date(s)**



**Historical Map - Slice A**

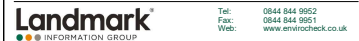


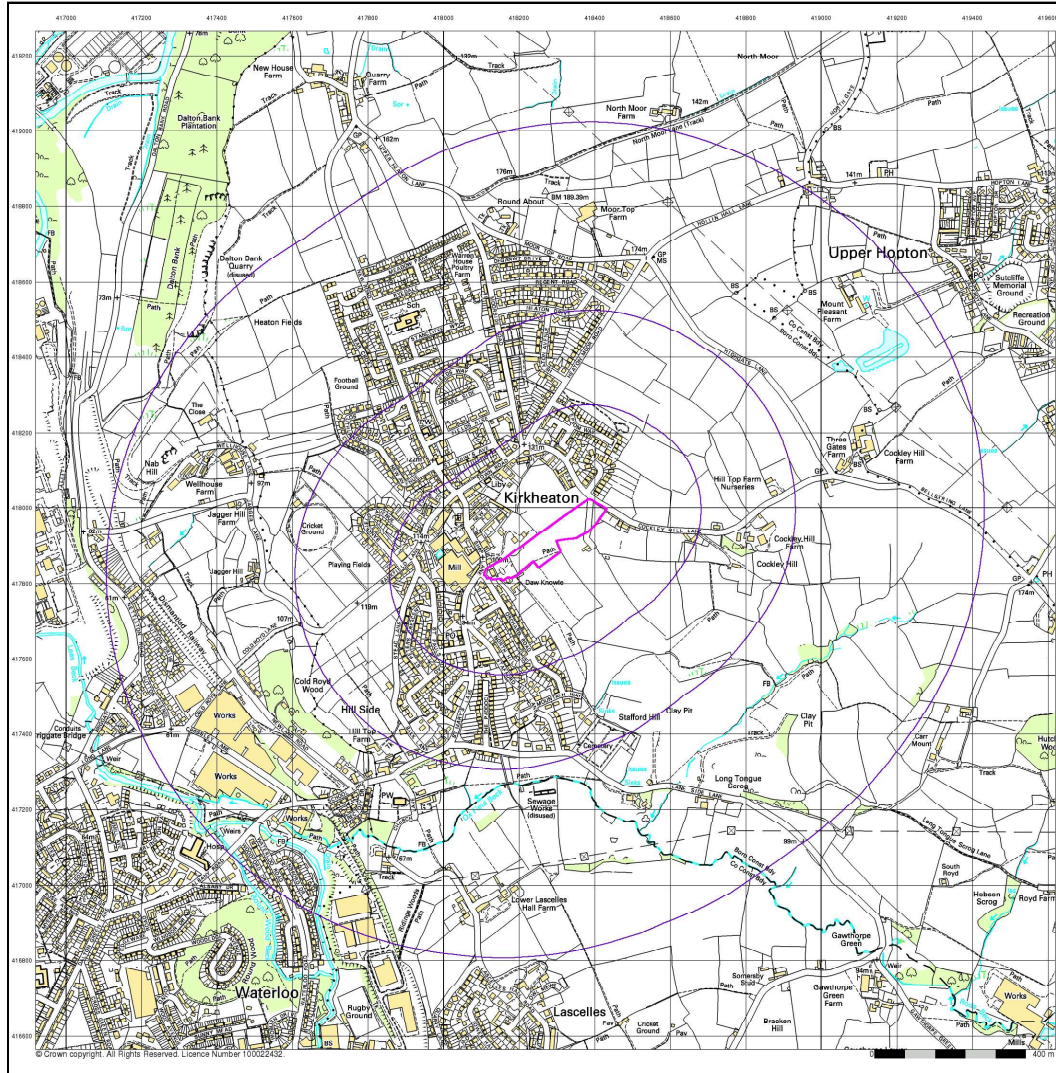
**Order Details**

Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 1000

**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH

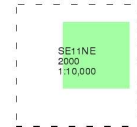




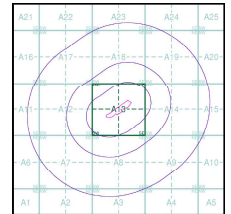
**10k Raster Mapping**  
**Published 2000**  
**Source map scale - 1:10,000**

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

**Map Name(s) and Date(s)**



**Historical Map - Slice A**



**Order Details**

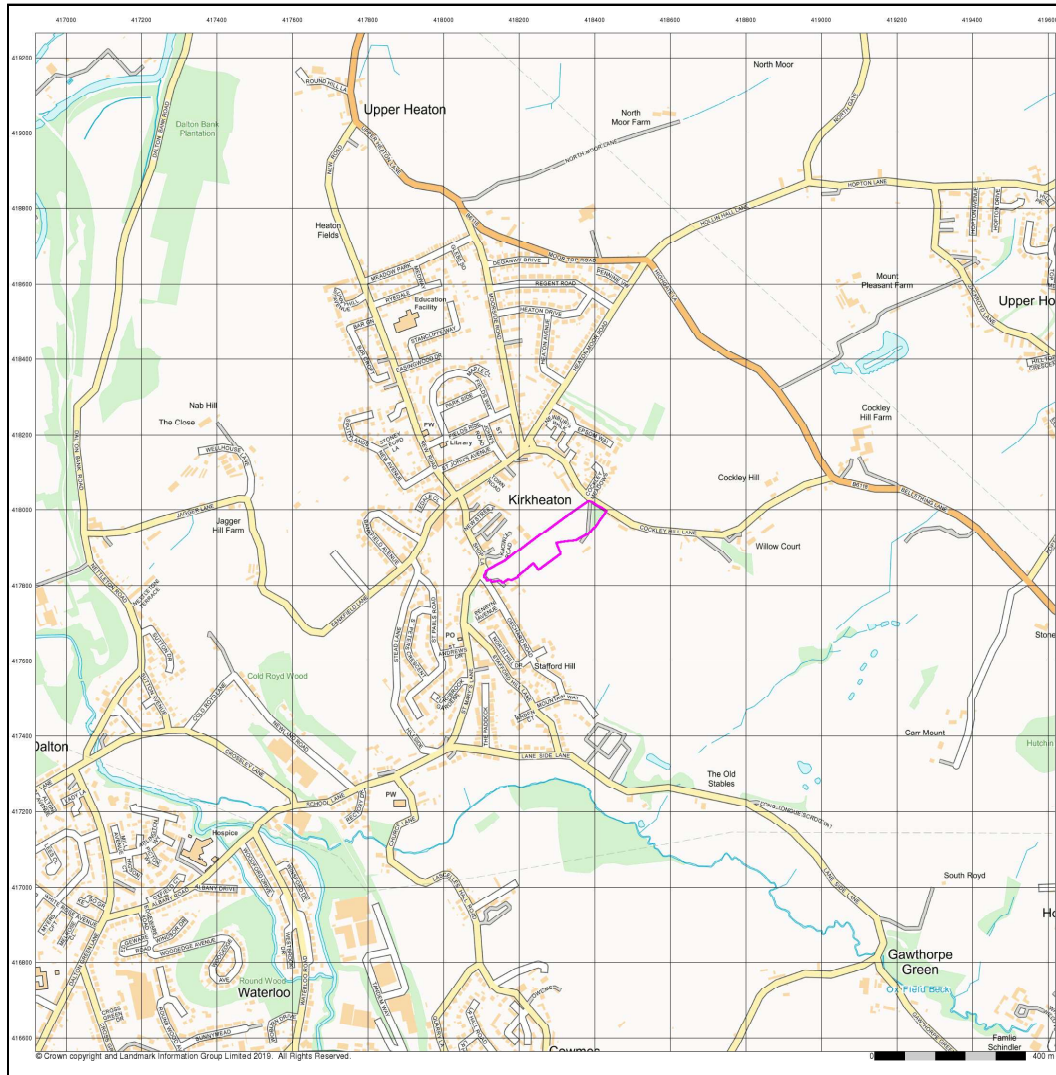
Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 1000


**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH

**Landmark**  
 INFORMATION GROUP

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**ARP**  
ARP GEOTECHNICAL LTD

**Street View**  
**Published 2019**  
**Source map scale - 1:10,000**

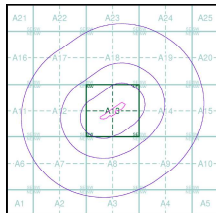
Street View is a street-level map for the whole of Great Britain produced by the Ordnance Survey. These maps are provided at a nominal scale of 1:10,000


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**Map Name(s) and Date(s)**

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**Street View Map - Slice A**





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**Order Details**

Order Number:	193766422_1_1
Customer Ref:	CKD/02
National Grid Reference:	418270, 417910
Slice:	A
Site Area (Ha):	2.08
Search Buffer (m):	1000

**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH

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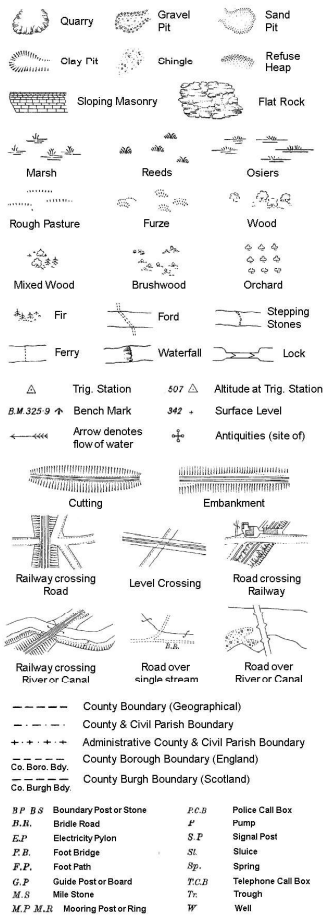
**Landmark**  
INFORMATION GROUP

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

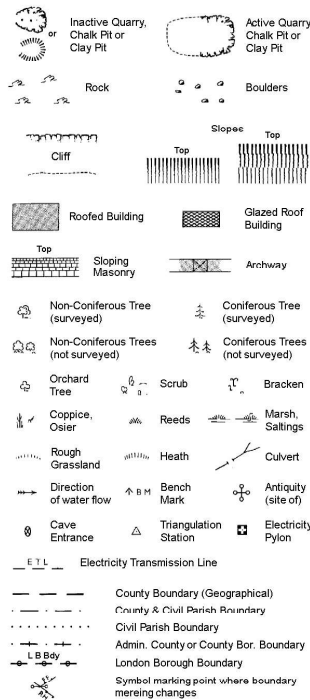
A Landmark Information Group Service v50.0 11-Feb-2019 Page 13 of 13

## Historical Mapping Legends

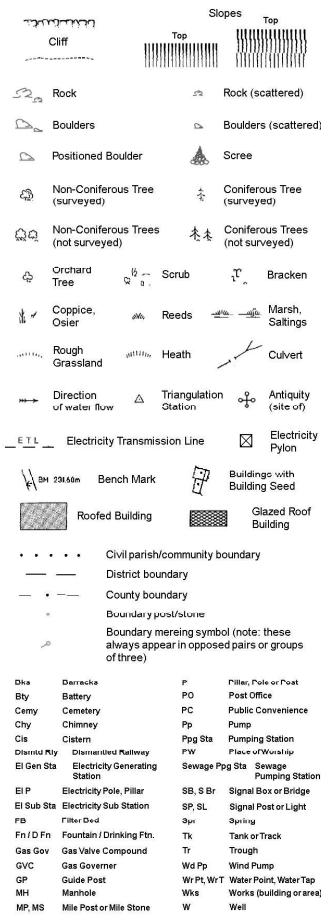
### Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



### Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



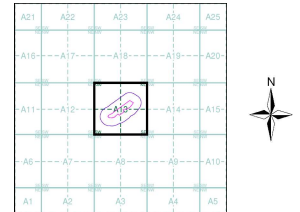
### Large-Scale National Grid Data 1:2,500 and 1:1,250



### Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pn
Yorkshire	1:2,500	1893	2
Yorkshire	1:2,500	1907	3
Yorkshire	1:2,500	1919	4
Ordnance Survey Plan	1:2,500	1961	5
Ordnance Survey Plan	1:2,500	1965 - 1971	6
Ordnance Survey Plan	1:2,500	1977	7
Additional SIMs	1:2,500	1977 - 1988	8
Ordnance Survey Plan	1:1,250	1984	9
Additional SIMs	1:1,250	1992	10
Large-Scale National Grid Data	1:1,250	1993	11
Large-Scale National Grid Data	1:1,250	1994	12
Large-Scale National Grid Data	1:1,250	1995	13

### Historical Map - Segment A13

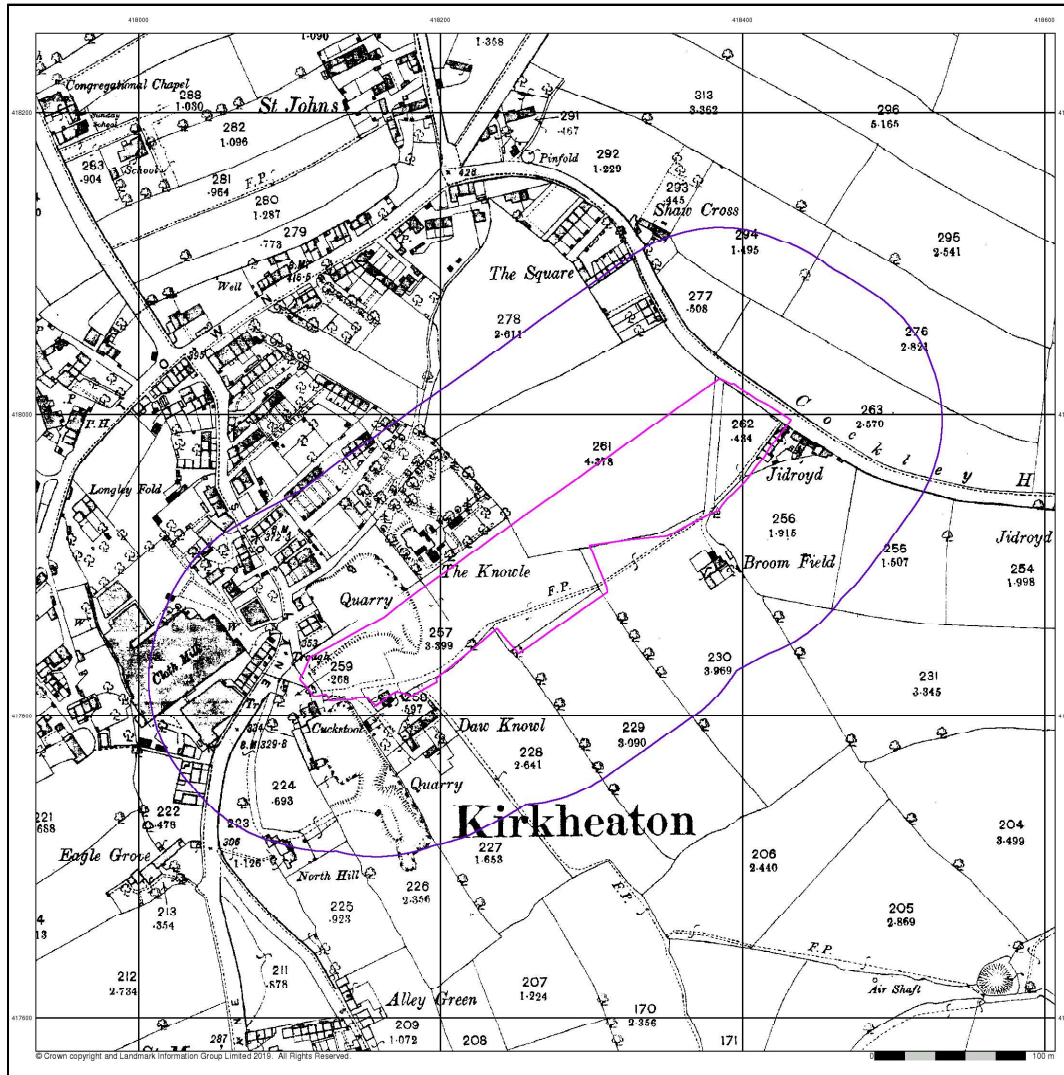


### Order Details

Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 100

### Site Details

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



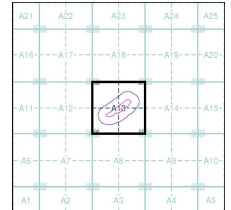
**Yorksire**  
**Published 1893**  
**Source map scale - 1:2,500**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1886 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

**Map Name(s) and Date(s)**



**Historical Map - Segment A13**



**Order Details**

Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 100

**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



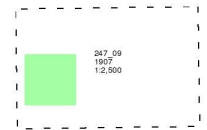
Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envisiocheck.co.uk



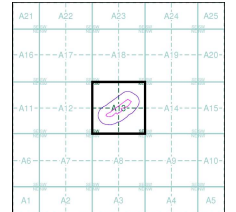
**Yorksire**  
**Published 1907**  
**Source map scale - 1:2,500**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1886 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

**Map Name(s) and Date(s)**



**Historical Map - Segment A13**



**Order Details**

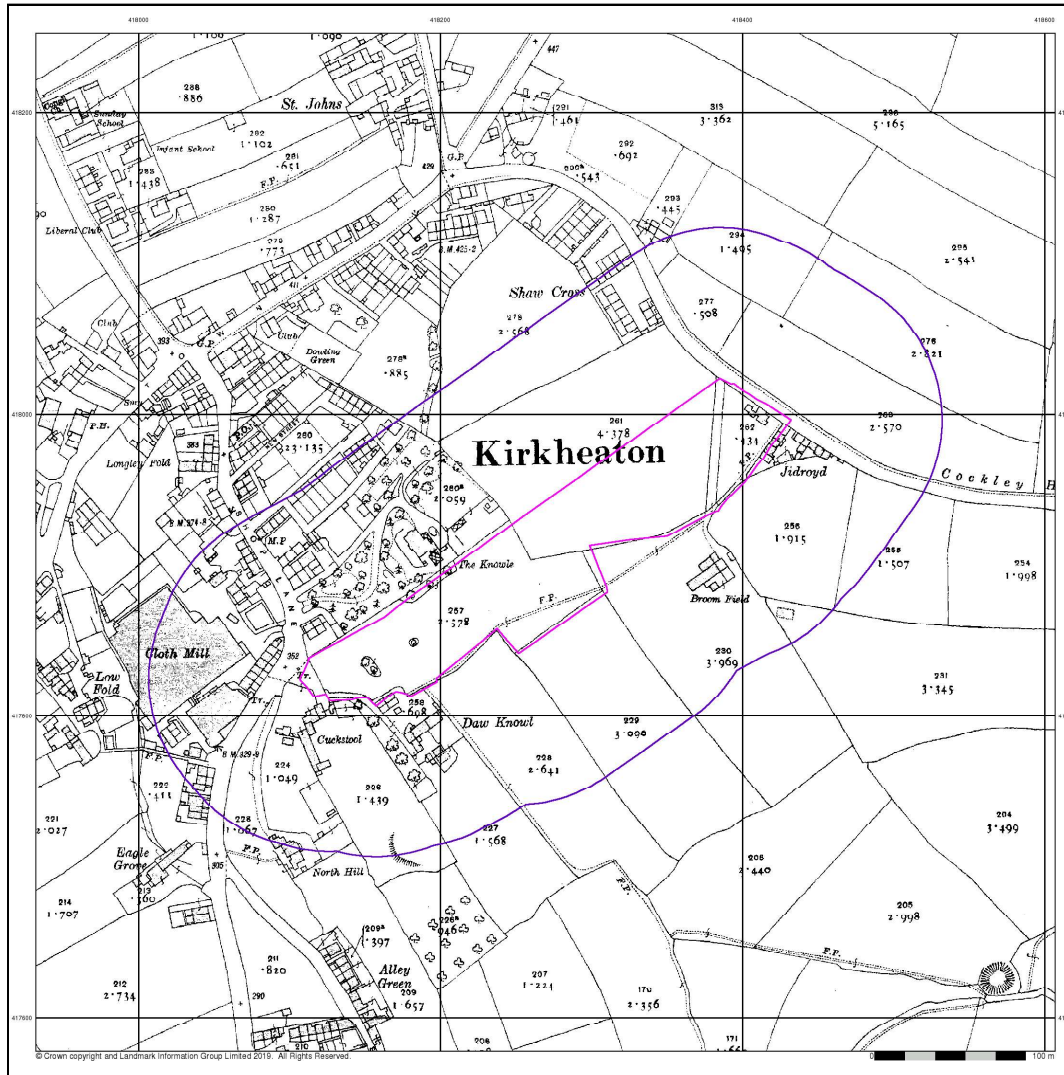
Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
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 Site Area (Ha): 2.08  
 Search Buffer (m): 100

**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



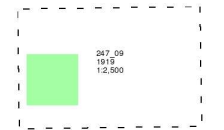
Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.environcheck.co.uk



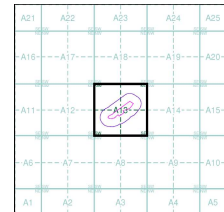
**Yorksire**  
**Published 1819**  
**Source map scale - 1:2,500**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1886 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

**Map Name(s) and Date(s)**



**Historical Map - Segment A13**



**Order Details**

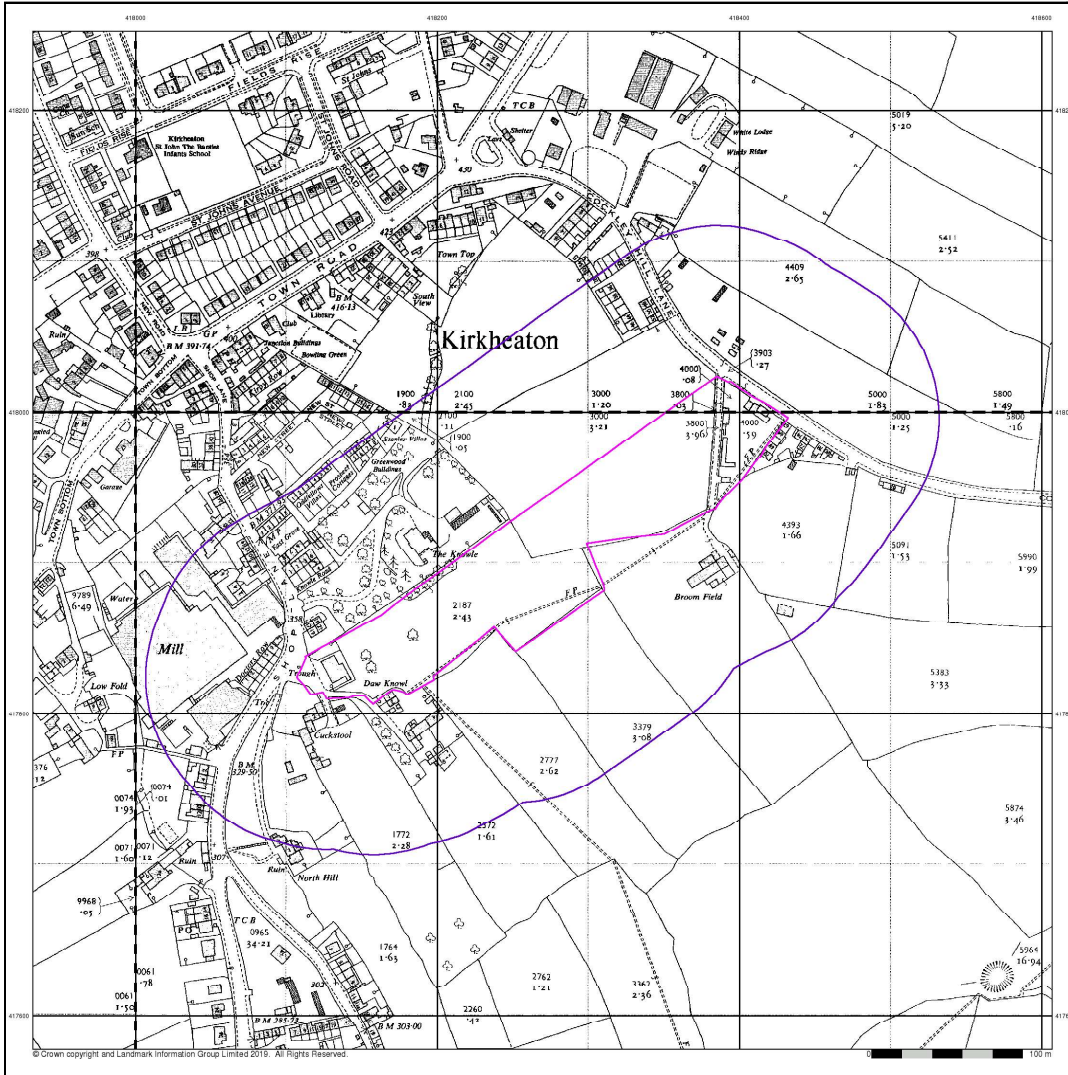
Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 100

**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



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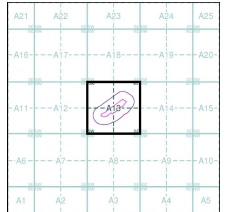
**Ordnance Survey Plan  
Published 1961  
Source map scale - 1:2,500**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1886 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

**Map Name(s) and Date(s)**

SE1718 1961 1:2,500	SE1818 1961 1:2,500
SE1717 1961 1:2,500	SE1817 1961 1:2,500

**Historical Map - Segment A13**

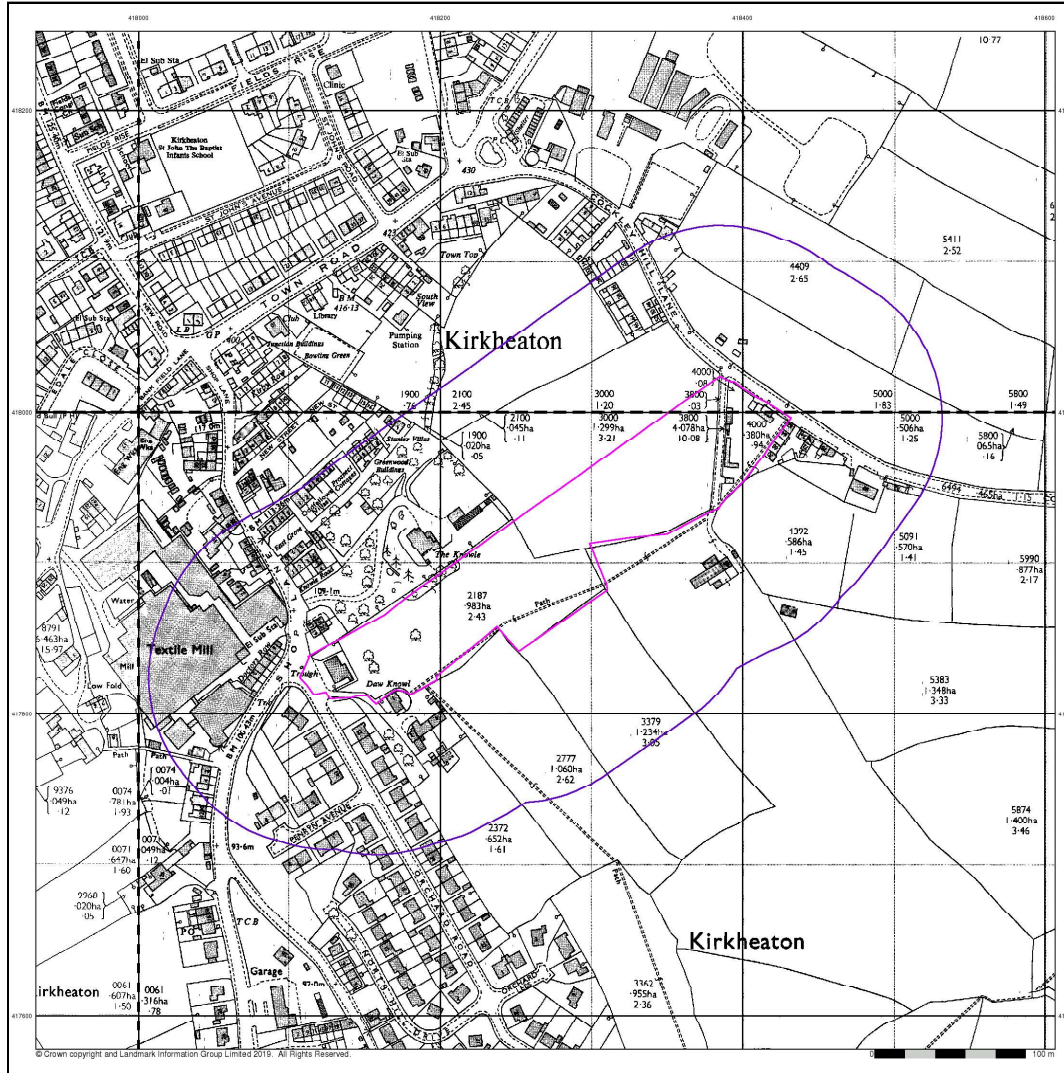


**Order Details**

Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 100

**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



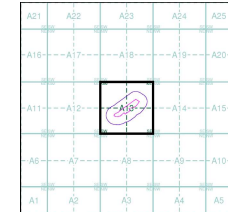
**Ordnance Survey Plan  
Published 1968 - 1971  
Source map scale - 1:2,500**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1886 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

**Map Name(s) and Date(s)**

SE1718 1971 1:2,500	SE1818 1988 1:2,500
SE1717 1970 1:2,500	SE1817 1970 1:2,500

**Historical Map - Segment A13**



**Order Details**

Order Number: 193766422\_1\_1  
Customer Ref: CKD/02  
National Grid Reference: 418270, 417910  
Slice: A  
Site Area (Ha): 2.08  
Search Buffer (m): 100

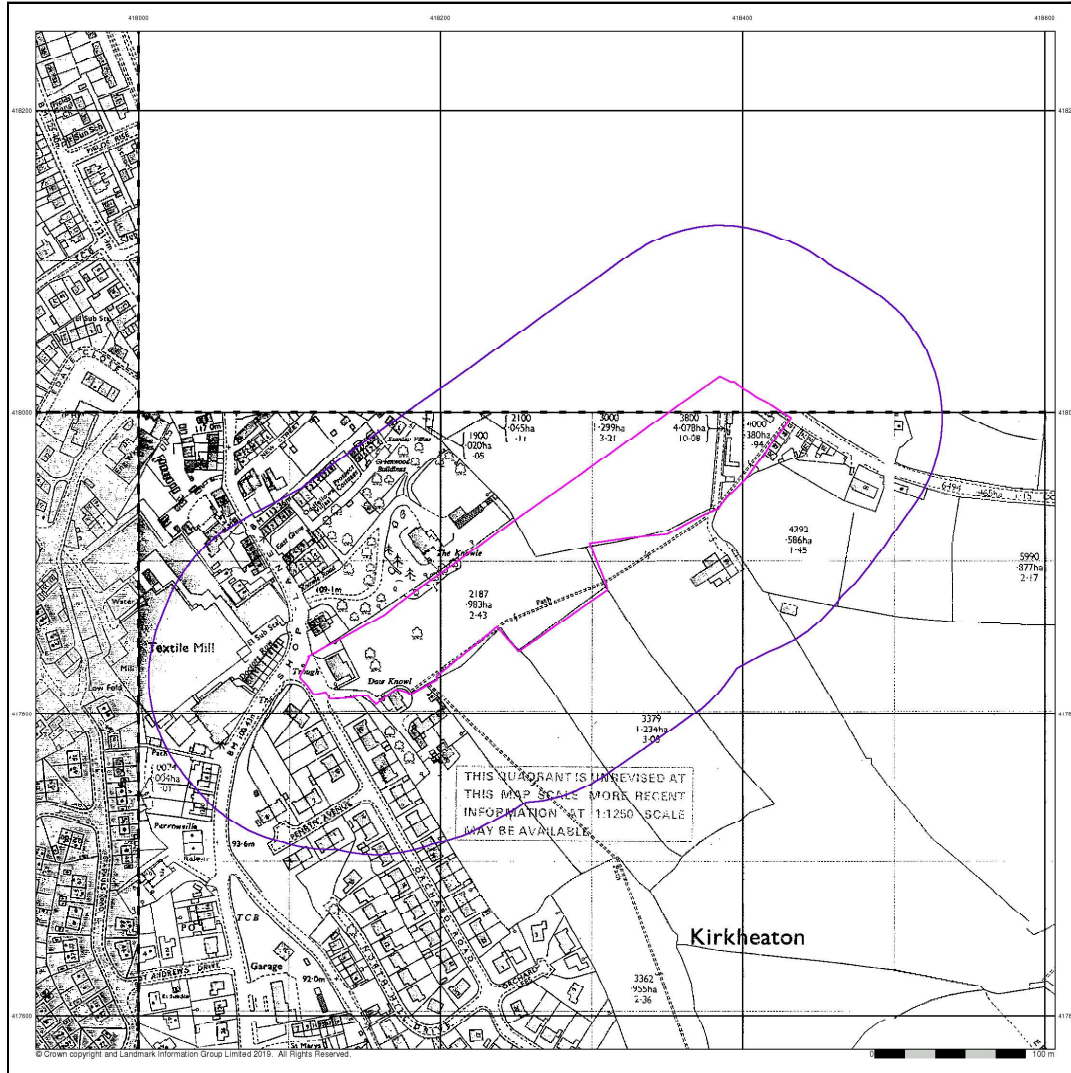
**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



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





**Additional SIMs**  
**Published 1977 - 1989**  
**Source map scale - 1:2,500**

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

**Map Name(s) and Date(s)**

SE1718	1977	1:2,500
SE1717	1977	1:2,500
SE1817	1989	1:2,500

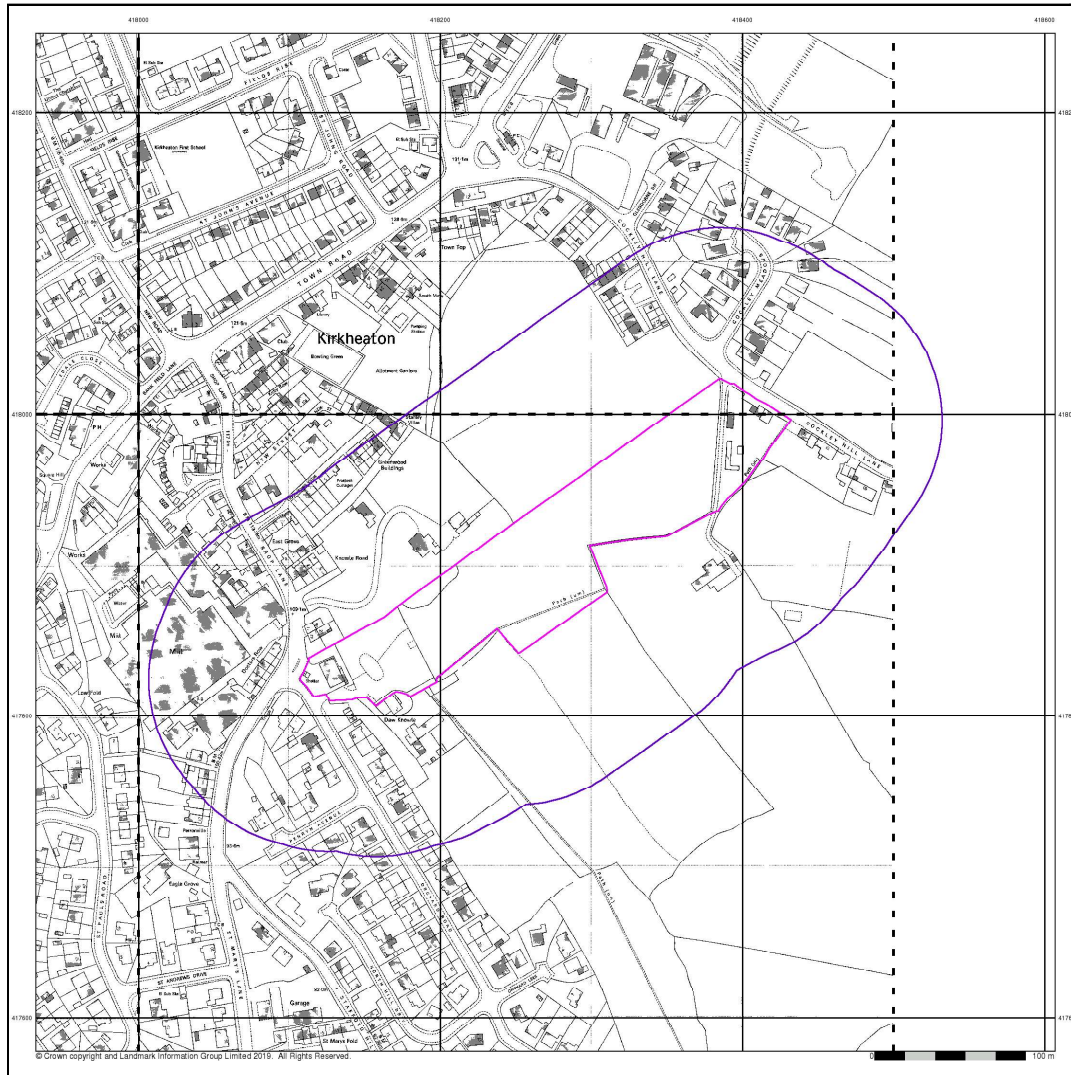
**Historical Map - Segment A13**


**Order Details**  
 Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 100

**Site Details**  
 Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH

**Landmark**  
 INFORMATION GROUP  
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 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk

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**ARP GEOTECHNICAL LTD**

**Ordnance Survey Plan  
Published 1984  
Source map scale - 1:1,250**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1886 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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**Map Name(s) and Date(s)**

SE1718SE 1984 1:1,250	SE1818SW 1984 1:1,250
SE1717NE 1984 1:1,250	SE1817NW 1984 1:1,250

**Historical Map - Segment A13**

A21	A22	A23	A24	A25
A16	A17	A18	A19	A20
A11	A12	A13	A14	A15
A6	A7	A8	A9	A10
A1	A2	A3	A4	A5

**Order Details**  
 Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 100

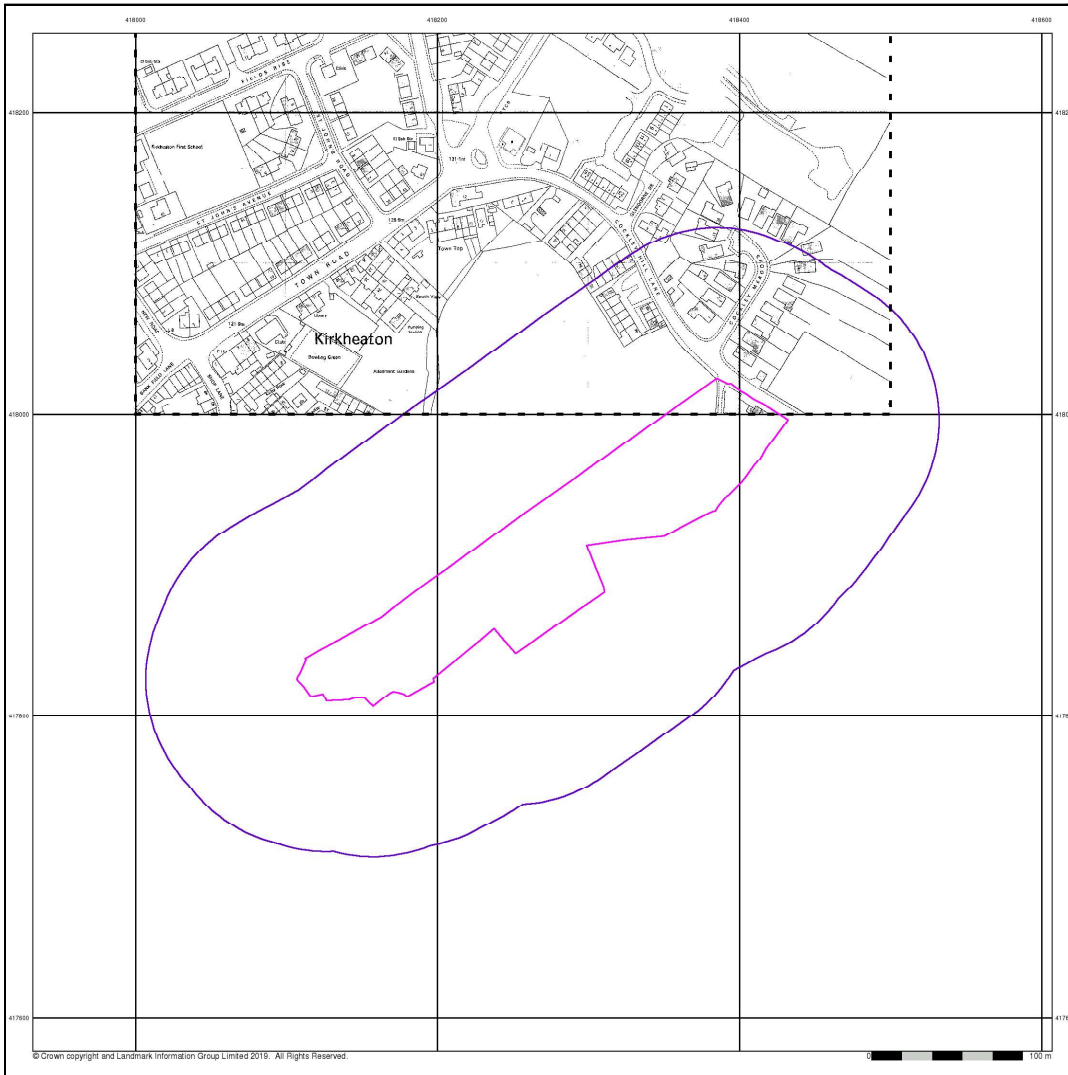
**Site Details**  
 Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH

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**Landmark**  
INFORMATION GROUP

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

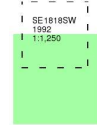
A Landmark Information Group Service v50.0 11-Feb-2019 Page 9 of 13



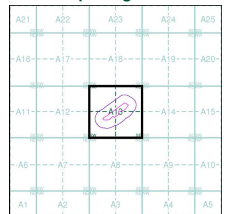
**Additional SIMs  
Published 1992  
Source map scale - 1:1,250**

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

**Map Name(s) and Date(s)**



**Historical Map - Segment A13**



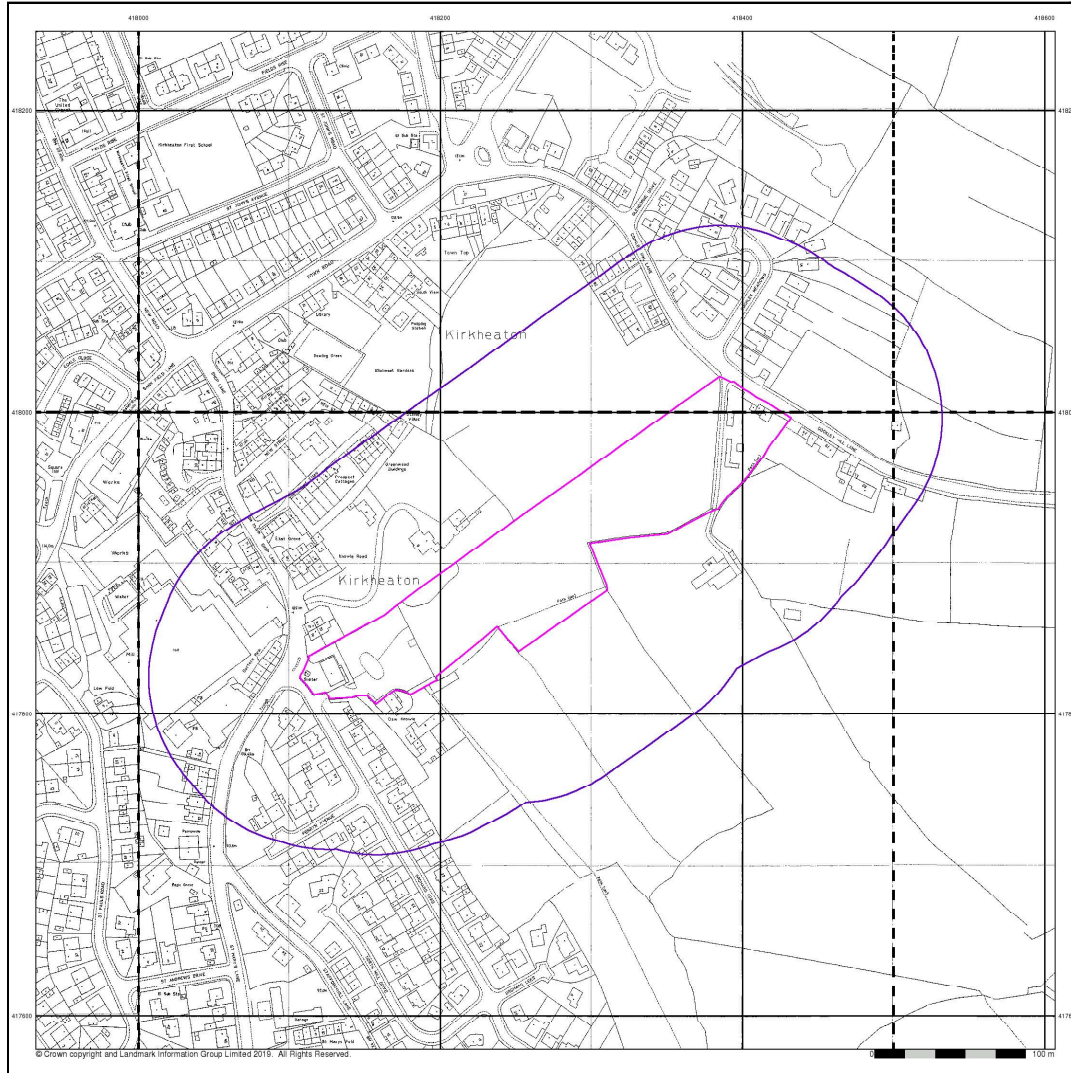
**Order Details**

Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 100

**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH





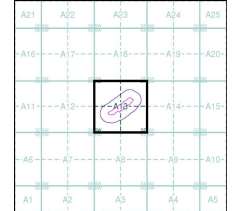
**Large-Scale National Grid Data**  
**Published 1993**  
**Source map scale - 1:1,250**

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

**Map Name(s) and Date(s)**

SE 17 18 SE 1993 1:1,250	SE 18 18 SW 1993 1:1,250	SE 18 18 E 1993 1:1,250
SE 17 17 NE 1993 1:1,250	SE 18 17 NW 1993 1:1,250	SE 18 17 NE 1993 1:1,250

**Historical Map - Segment A13**



**Order Details**

Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 100

**Site Details**

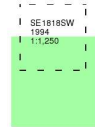
Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



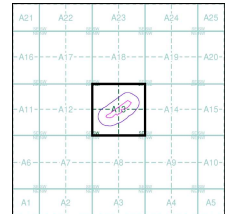
**Large-Scale National Grid Data**  
**Published 1994**  
**Source map scale - 1:1,250**

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

**Map Name(s) and Date(s)**



**Historical Map - Segment A13**

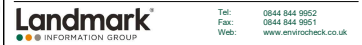


**Order Details**

Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 100

**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH

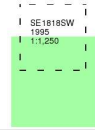




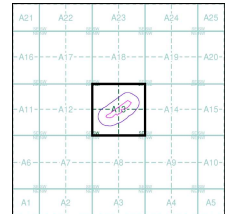
**Large-Scale National Grid Data**  
**Published 1995**  
**Source map scale - 1:1,250**

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

**Map Name(s) and Date(s)**



**Historical Map - Segment A13**



**Order Details**

Order Number: 193766422\_1\_1  
 Customer Ref: CKD/02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 100

**Site Details**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH

**APPENDIX C**

**LANDMARK GEOLOGY MAPS**

## Geology 1:50,000 Maps Legends

### Artificial Ground and Landslip

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	WMGR	Infilled Ground	Artificial Deposit	Not Supplied - Holocene
	MGR	Made Ground (Undivided)	Artificial Deposit	Not Supplied - Holocene
	SLIP	Landslide Deposit	Unknown/Unclassified Entry	Not Supplied - Quaternary

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

### Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	ALV	Alluvium	Clay, Silt, Sand and Gravel	Not Supplied - Holocene
	GDFMP	Glaciofluvial Deposits, Mid Pleistocene	Sand and Gravel	Not Supplied - Cromerian
	LDE	Lacustrine Deposits	Clay and Silt	Not Supplied - Quaternary
	HEAD	Head	Clay, Silt, Sand and Gravel	Not Supplied - Quaternary

### Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	PLCM	Pennine Lower Coal Measures Formation	Mudstone, Siltstone and Sandstone	Not Supplied - Westphalian
	GR	Grenoside Sandstone	Sandstone	Not Supplied - Westphalian
	PLCM	Pennine Lower Coal Measures Formation	Sandstone	Not Supplied - Westphalian
	TKS	Thick Stone	Sandstone	Not Supplied - Westphalian
	GM	Greenmoor Rock	Sandstone	Not Supplied - Westphalian
	CLRK	Clifton Rock	Sandstone	Not Supplied - Westphalian
	EF	Eiland Flags	Sandstone	Not Supplied - Westphalian
	KKBS	Kirkburton Sandstone	Sandstone	Not Supplied - Westphalian
	EYR	80 Yard Rock	Sandstone	Not Supplied - Westphalian
	FHR	Falhouse Rock	Sandstone	Not Supplied - Westphalian
		Rock Segments		



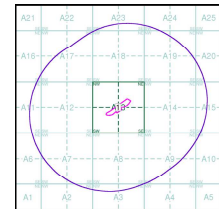
### Geology 1:50,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps. The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

### Geology 1:50,000 Maps Coverage

Map ID:	1
Map Sheet No:	077
Map Name:	Huddersfield
Map Date:	2003
Bedrock Geology:	Available
Superficial Geology:	Available
Artificial Geology:	Available
Faults:	Not Supplied
Landslip:	Available
Rock Segments:	Not Supplied

### Geology 1:50,000 Maps - Slice A



### Order Details:

Order Number:	193766422_1_1
Customer Reference:	CKD02
National Grid Reference:	418270, 417910
Slice:	A
Site Area (Ha):	2.08
Search Buffer (m):	1000

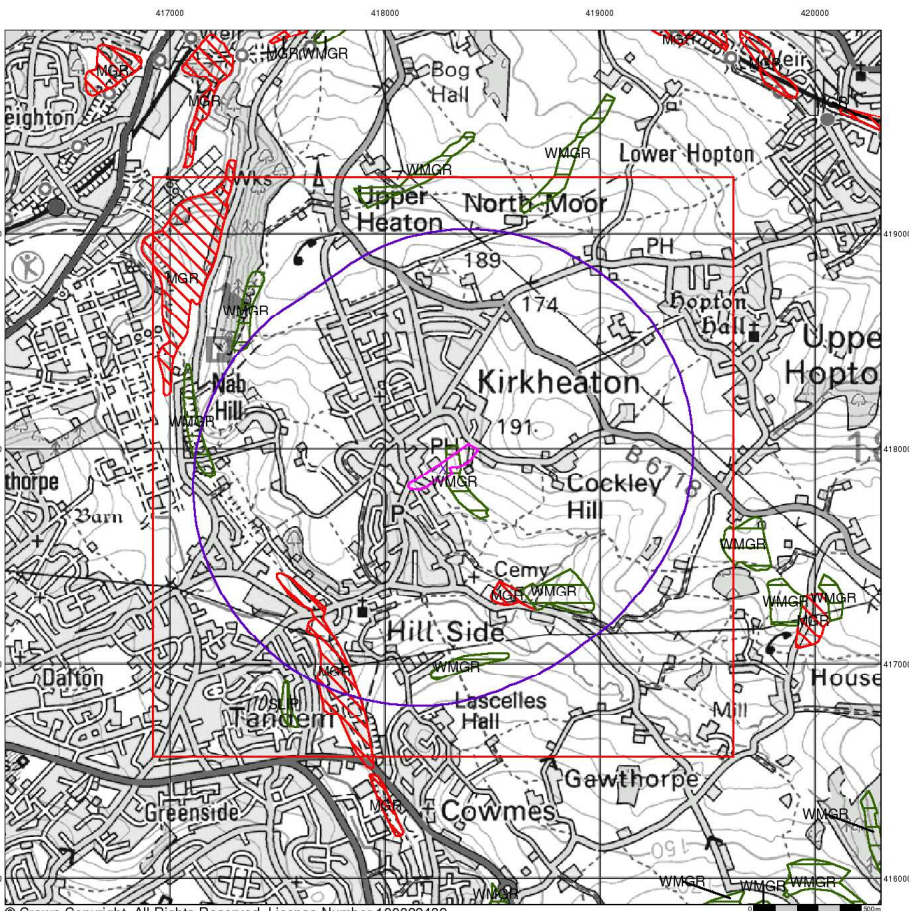
### Site Details:

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



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

v15.0 11-Feb-2019



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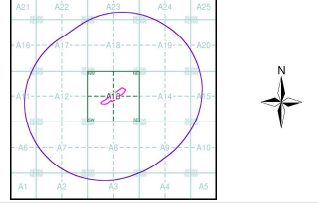


**Artificial Ground and Landslip**  
 Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material,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

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

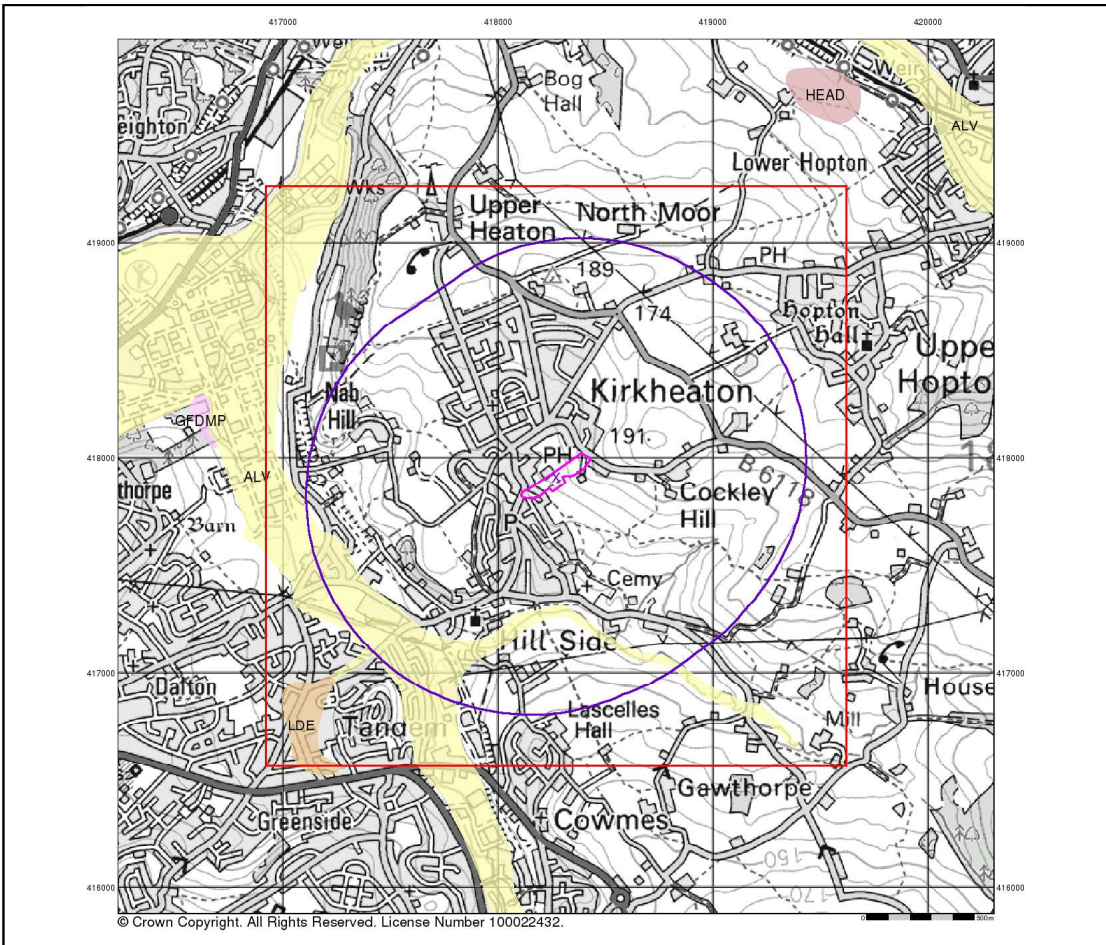
Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due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

**Artificial Ground and Landslip Map - Slice A**



**Order Details:**  
 Order Number: 193766422\_1\_1  
 Customer Reference: CKD02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 1000

**Site Details:**  
 Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



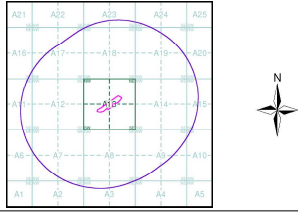
**Superficial Geology**

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

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

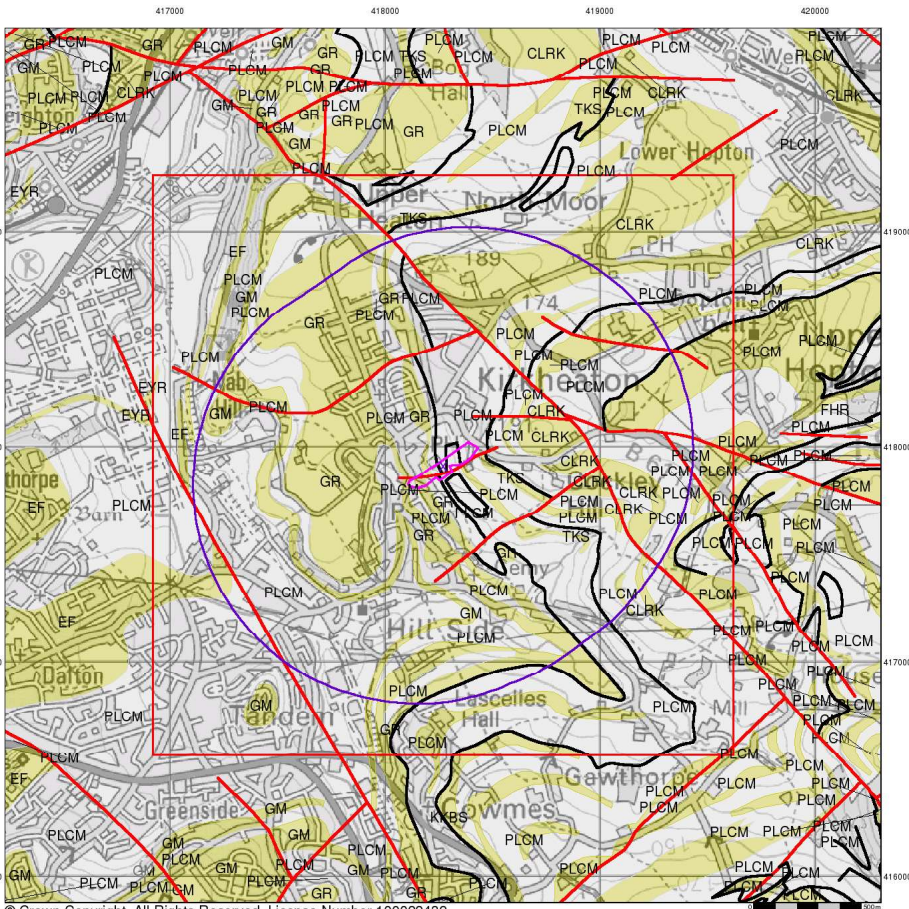
Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

**Superficial Geology Map - Slice A**



**Order Details:**  
 Order Number: 193766422\_1\_1  
 Customer Reference: CKD02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 1000

**Site Details:**  
 Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



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**Bedrock and Faults**

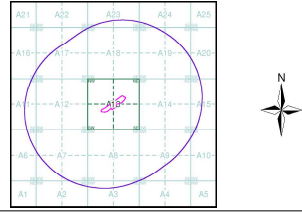
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

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

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

The BGS Faults and Rock Segments dataset includes geological faults (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seam, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but not across the strata and post date its deposition.

**Bedrock and Faults Map - Slice A**



**Order Details:**

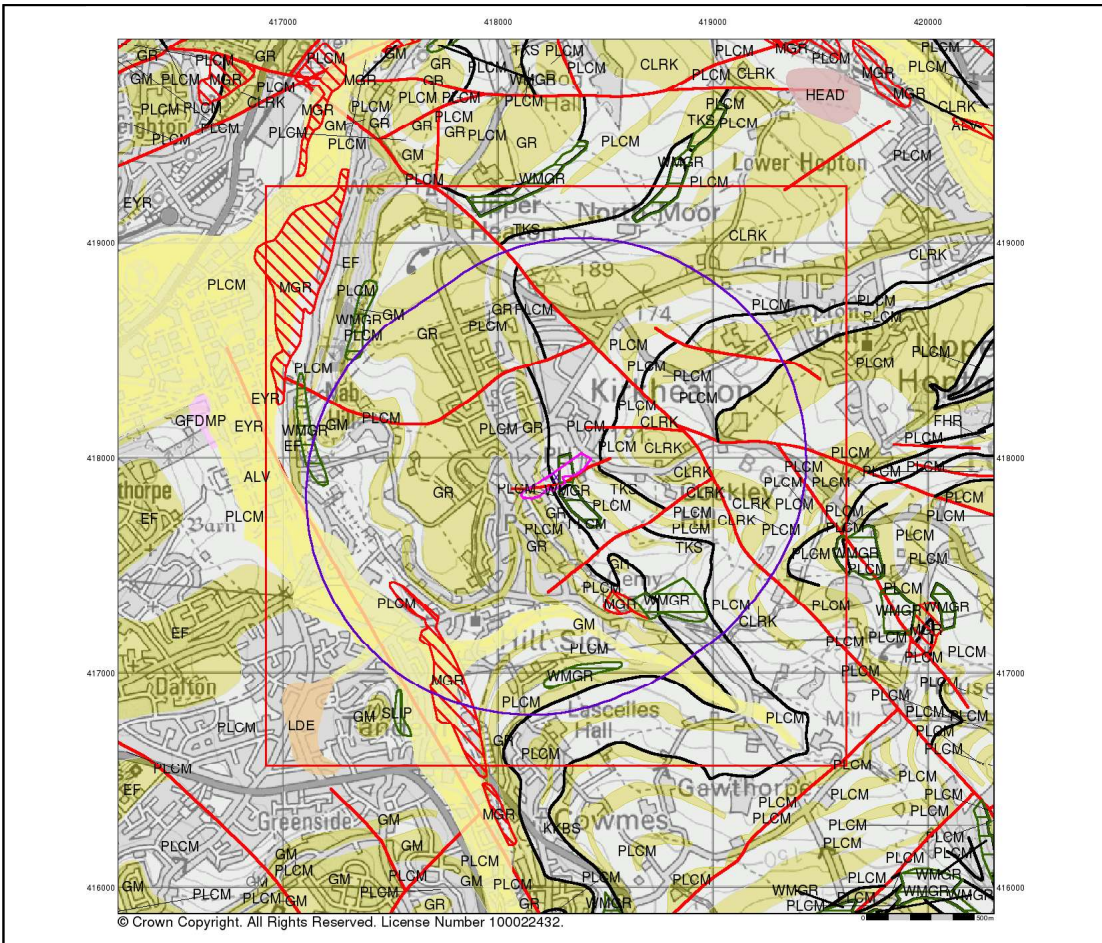
Order Number: 193766422\_1\_1  
 Customer Reference: CKD02  
 National Grid Reference: 418270, 417910  
 Slice: A  
 Site Area (Ha): 2.08  
 Search Buffer (m): 1000


**Site Details:**

Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH



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





**ARP**  
ARP GEOTECHNICAL LTD

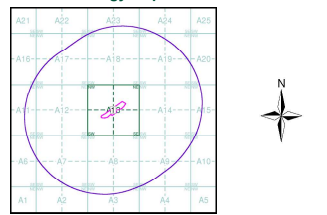
**Combined Surface Geology**  
The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

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

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

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

**Combined Geology Map - Slice A**



**Order Details:**

Order Number:	193766422_1_1
Customer Reference:	CKD02
National Grid Reference:	418270, 417910
Slice:	A
Site Area (Ha):	2.08
Search Buffer (m):	1000

**Site Details:**  
Cockley Hill Lane, Kirkheaton, Huddersfield, HD5 0HH

**Landmark**  
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Page 5 of 5

**APPENDIX D**

**COAL MINING REPORT**



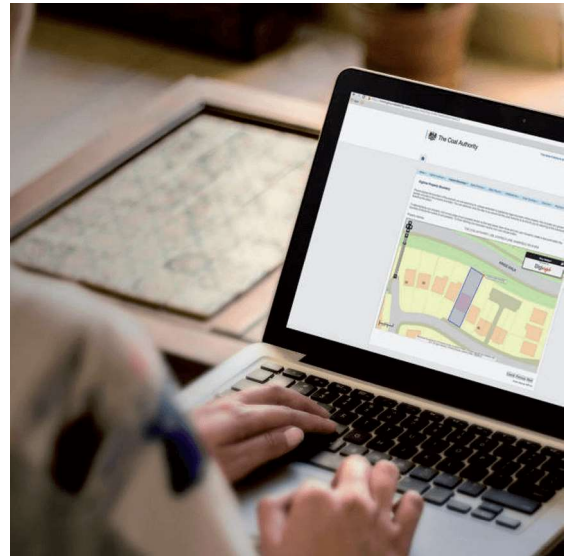
The Coal  
Authority

# CON29M Non-Residential Mining Report

COCKLEY HILL LANE  
KIRKHEATON  
HUDDERSFIELD  
WEST YORKSHIRE

Date of enquiry: 12 February 2019  
Date enquiry received: 12 February 2019  
Issue date: 12 February 2019

Our reference: 51002042950001  
Your reference: 193766422\_2|



# CON29M Non-Residential Mining Report

This report is based on, and limited to, the records held by the Coal Authority, at the time we answer the search.

## Client name

LANDMARK INFORMATION GROUP LIMITED

## Enquiry address

COCKLEY HILL LANE  
KIRKHEATON  
HUDDERSFIELD  
WEST YORKSHIRE



Approximate position of property

## How to contact us

0345 762 6848 (UK)  
+44 (0)1623 637 000 (International)

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Nottinghamshire  
NG18 4RG

[www.groundstability.com](http://www.groundstability.com)

 [@coalauthority](https://twitter.com/coalauthority)

 [/company/the-coal-authority](https://www.linkedin.com/company/the-coal-authority)

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# Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	Yes
5	Coal mining geology	No
6	Past opencast coal mining	Yes
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	Yes
13	Working facilities order	No
14	Payments to owners of former copyhold land	No

**For detailed findings, please go to page 4.**

# Detailed findings

## 1. Past underground coal mining

The property is not within a surface area that could be affected by any past recorded underground coal mining.

However the property is in an area where the Coal Authority believes there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered, particularly prior to any site works or future development activity, as ground movement could still be a risk. Your attention is drawn to the Comments on the Coal Authority information section of the report.

## 2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

## 3. Future underground coal mining

The property is not in an area where the Coal Authority has received an application for, and is currently considering whether to grant a licence to remove or work coal by underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

However, reserves of coal exist in the local area which could be worked at some time in the future.

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

## 4. Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

## 5. Coal mining geology

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

## **6. Past opencast coal mining**

The property is within the boundary of an opencast site from which coal has been removed by opencast methods.

The property is within the boundary of an opencast site from which coal has been removed by opencast methods.

## **7. Present opencast coal mining**

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

## **8. Future opencast coal mining**

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

## **9. 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 31 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.

## **10. Mine gas**

The Coal Authority has no record of a mine gas emission requiring action.

## **11. Hazards related to coal mining**

The property has not been subject to remedial works, by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.

## **12. Withdrawal of support**

The property is in an area where notices to withdraw support were given in 1951, 1952, 1953 and 1954.

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.

### **13. Working facilities order**

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

### **14. 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.

# Comments on the Coal Authority information

The Coal Authority own the copyright in this report and the information used is protected by our database right.

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/ former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

## Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's CON29M Coal Mining enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. This report is prepared in accordance with the Law Society's Guidance Notes 2018, the User Guide 2018 and the Coal Authority's Terms and Conditions applicable at the time the report was produced.

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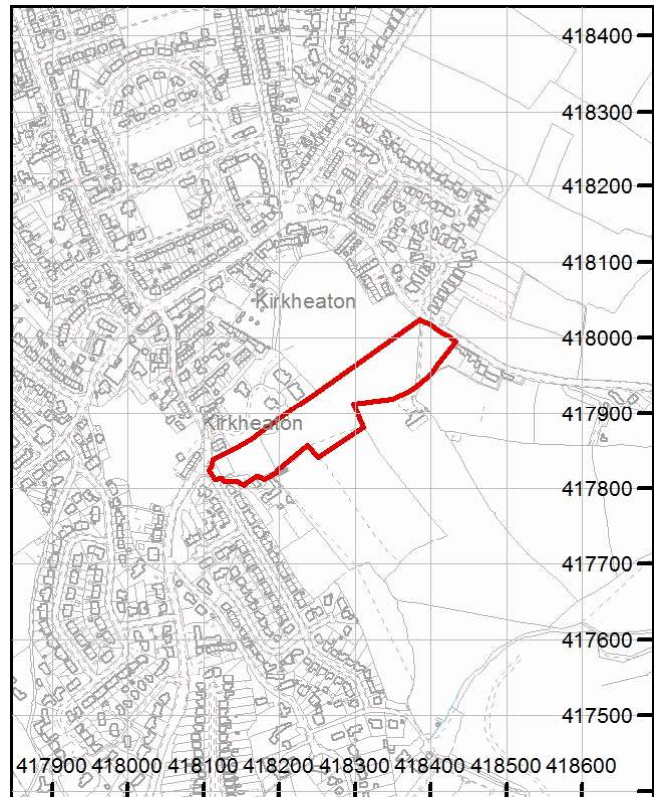
## Alternative formats

If you would like this information in an alternative format, please contact our communications team on 0345 762 6848 or email [communications@coal.gov.uk](mailto:communications@coal.gov.uk).

# Enquiry boundary

## Key

Approximate position of enquiry boundary shown



## How to contact us

0345 762 6848 (UK)  
+44 (0)1623 637 000 (International)

200 Lichfield Lane  
Mansfield  
Nottinghamshire  
NG18 4RG

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 [@coalauthority](https://twitter.com/coalauthority)

 [/company/the-coal-authority](https://www.linkedin.com/company/the-coal-authority)

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**APPENDIX E**

**LANDMARK ENVIROCHECK REPORT**

# Envirocheck<sup>®</sup> Report:

## Datasheet

### Order Details:

**Order Number:**

193766422\_1\_1

**Customer Reference:**

CKD/02

**National Grid Reference:**

418270, 417910

**Slice:**

A

**Site Area (Ha):**

2.08

**Search Buffer (m):**

1000

### Site Details:

Cockley Hill Lane

Kirkheaton

Huddersfield

HD5 0HH

### Client Details:

Mr J Race

ARP Geotechnical Ltd

Northwest House

5-6 Northwest Business Park

Servia Hill

Leeds

LS6 2QH

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	33
Hazardous Substances	-
Geological	36
Industrial Land Use	41
Sensitive Land Use	44
Data Currency	45
Data Suppliers	49
Useful Contacts	50

## Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.

For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In this datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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**Report Version v53.0**

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
<b>Agency &amp; Hydrological</b>					
BGS Groundwater Flooding Susceptibility	pg 1	Yes	Yes	Yes	n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1				5
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls	pg 2				5
Integrated Pollution Prevention And Control	pg 3				10
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 6				1
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 6			Yes	
Pollution Incidents to Controlled Waters	pg 6		2	2	21
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality	pg 10				2
River Quality Biology Sampling Points	pg 11				1
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register	pg 11				5
Water Abstractions	pg 12		5		1 (*52)
Water Industry Act Referrals	pg 26				1
Groundwater Vulnerability	pg 26	Yes	n/a	n/a	n/a
Drift Deposits			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 26	Yes	n/a	n/a	n/a
Superficial Aquifer Designations			n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
OS Water Network Lines	pg 27			2	48

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
<b>Waste</b>					
BGS Recorded Landfill Sites					
Historical Landfill Sites	pg 33				3
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)	pg 33			1	1
Licensed Waste Management Facilities (Locations)	pg 34				3
Local Authority Landfill Coverage	pg 34	1	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Registered Landfill Sites	pg 35				2
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
<b>Hazardous Substances</b>					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					
<b>Geological</b>					
BGS 1:625,000 Solid Geology	pg 36	Yes	n/a	n/a	n/a
BGS Recorded Mineral Sites	pg 36		1	3	9
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas	pg 38	Yes	n/a	n/a	n/a
Mining Instability	pg 38	Yes	n/a	n/a	n/a
Man-Made Mining Cavities	pg 38			1	
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 38	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 38	Yes		n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 38	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 39	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 39	Yes		n/a	n/a
Radon Potential - Radon Affected Areas	pg 40	Yes	n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
<b>Industrial Land Use</b>					
Contemporary Trade Directory Entries	pg 41		11	2	11
Fuel Station Entries	pg 43		1		
Gas Pipelines					
Underground Electrical Cables					
<b>Sensitive Land Use</b>					
Ancient Woodland					
Areas of Adopted Green Belt	pg 44	1			
Areas of Unadopted Green Belt	pg 44	1			
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves	pg 44				1
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	<b>BGS Groundwater Flooding Susceptibility</b> Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13SE (E)	0	1	418300 417910
	<b>BGS Groundwater Flooding Susceptibility</b> Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13SE (SW)	0	1	418270 417910
	<b>BGS Groundwater Flooding Susceptibility</b> Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13SW (W)	7	1	418100 417900
	<b>BGS Groundwater Flooding Susceptibility</b> Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SE (SE)	21	1	418300 417850
	<b>BGS Groundwater Flooding Susceptibility</b> Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13SE (SE)	51	1	418350 417850
	<b>BGS Groundwater Flooding Susceptibility</b> Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SE (SE)	90	1	418350 417800
	<b>BGS Groundwater Flooding Susceptibility</b> Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13SE (SE)	160	1	418400 417750
	<b>BGS Groundwater Flooding Susceptibility</b> Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8NE (SE)	381	1	418500 417550
	<b>BGS Groundwater Flooding Susceptibility</b> Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8NE (SE)	410	1	418550 417550
	<b>BGS Groundwater Flooding Susceptibility</b> Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8NE (SE)	441	1	418600 417550
1	<b>Discharge Consents</b> Operator: Yorkshire Water Services Ltd Property Type: STORM TANK/CSO ON SEWERAGE NETWORK (WATER COMPANY) Location: Lake Side Lane Sso Lake Side Lane, Kirkheaton, Huddersfield, West Yorkshire Authority: Environment Agency, North East Region Catchment Area: Calder Reference: 3681 Permit Version: 2 Effective Date: 31st March 2005 Issued Date: 28th February 2005 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Oxfield Beck <b>Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)</b> Positional Accuracy: Located by supplier to within 10m	A8NW (S)	557	2	418150 417250
1	<b>Discharge Consents</b> Operator: Yorkshire Water Services Ltd Property Type: STORM TANK/CSO ON SEWERAGE NETWORK (WATER COMPANY) Location: Lake Side Lane Sso Lake Side Lane, Kirkheaton, Huddersfield, West Yorkshire Authority: Environment Agency, North East Region Catchment Area: Calder Reference: 3681 Permit Version: 1 Effective Date: 14th March 1983 Issued Date: 14th March 1983 Revocation Date: 30th March 2005 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Oxfield Beck <b>Status: Transferred from Rivers (Prevention of Pollution) Act 1951-1961</b> Positional Accuracy: Located by supplier to within 100m	A8NW (S)	557	2	418150 417250

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
2	<p><b>Discharge Consents</b></p> <p>Operator: Edwin Briggs  Property Type: DOMESTIC PROPERTY (SINGLE) (INCL FARM HOUSE)  Location: Cockley Hill Farm Bellstring Lane, Kirkheaton, Huddersfield, West Yorkshire  Authority: Environment Agency, North East Region  Catchment Area: Calder  Reference: C3927  Permit Version: 2  Effective Date: 26th July 2012  Issued Date: 26th July 2012  Revocation Date: Not Supplied  Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company  Discharge: Land/Soakaway  Environment:  Receiving Water: Land Adj. To Cockley Hill Farm  <b>Status: Transferred from COPA 1974</b>  Positional Accuracy: Approximate location provided by supplier</p>	A14NE (E)	569	2	419000 418000
2	<p><b>Discharge Consents</b></p> <p>Operator: Edwin Briggs  Property Type: DOMESTIC PROPERTY (SINGLE) (INCL FARM HOUSE)  Location: Cockley Hill Farm Bellstring Lane, Kirkheaton, Huddersfield, West Yorkshire  Authority: Environment Agency, North East Region  Catchment Area: Calder  Reference: C3927  Permit Version: 1  Effective Date: 6th June 1985  Issued Date: 6th June 1985  Revocation Date: 25th July 2012  Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company  Discharge: Land/Soakaway  Environment:  Receiving Water: Land Adj. To Cockley Hill Farm  <b>Status: Transferred from COPA 1974</b>  Positional Accuracy: Approximate location provided by supplier</p>	A14NE (E)	569	2	419000 418000
3	<p><b>Discharge Consents</b></p> <p>Operator: Goulder Mikron Ltd,  Property Type: Undefined Or Other  Location: Goulder, Goulder, Goulder  Authority: Environment Agency, North East Region  Catchment Area: Calder  Reference: 3573  Permit Version: 1  Effective Date: 13th September 1983  Issued Date: 13th September 1983  Revocation Date: 4th June 1991  Discharge Type: Trade Effluent  Discharge: Freshwater Stream/River  Environment:  Receiving Water: Oxfield Beck  <b>Status: Authorisation revoked</b>  Positional Accuracy: Located by supplier to within 100m</p>	A7SW (SW)	845	2	417580 417160
4	<p><b>Integrated Pollution Controls</b></p> <p>Name: Jarmain And Son Ltd  Location: Minerva Works, Kirkheaton, HUDDERSFIELD, West Yorkshire, HD5 0QP  Authority: Environment Agency, North East Region  Permit Reference: AU8407  Dated: 29th August 1996  Process Type: IPC new application  Description: 6.5 A (B) Coating processes and Printing within Miscellaneous Industries  <b>Status: Authorisation superseded by a substantial or non substantial variation</b>  Positional Accuracy: Automatically positioned to the address</p>	A7NW (SW)	779	2	417425 417449
4	<p><b>Integrated Pollution Controls</b></p> <p>Name: Jarmain And Son Ltd  Location: Minerva Works, Kirkheaton, HUDDERSFIELD, West Yorkshire, HD5 0QP  Authority: Environment Agency, North East Region  Permit Reference: AP4688  Dated: 22nd December 1994  Process Type: IPC minor (non-substantial) variation to previous variation  Description: 4.4 A (B) processes involving Halogens within the Chemical Industry  <b>Status: Authorisation superseded by a substantial or non substantial variation</b>  Positional Accuracy: Manually positioned to the address or location</p>	A7NW (SW)	780	2	417420 417455

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
4	<b>Integrated Pollution Controls</b> Name: Jarmain And Son Ltd Location: Minerva Works, Kirkheaton, HUDDERSFIELD, West Yorkshire, HD5 0QP Authority: Environment Agency, North East Region Permit Reference: AL8967 Dated: 26th April 1994 Process Type: IPC application for process that was regulated by HMIP for air releases under previous legislation Description: 4.4 A (B) processes involving Halogens within the Chemical Industry <b>Status: Authorisation superseded by a substantial or non substantial variation</b> Positional Accuracy: Automatically positioned to the address	A7NW (SW)	782	2	417425 417444
4	<b>Integrated Pollution Controls</b> Name: Jarmain And Son Ltd Location: Minerva Works, Crossley Lane, HUDDERSFIELD, West Yorkshire, HD5 0QP Authority: Environment Agency, North East Region Permit Reference: BD4945 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 6.5 A (B) Coating processes and Printing within Miscellaneous Industries <b>Status: Authorisation revoked</b> Positional Accuracy: Automatically positioned to the address	A7NW (SW)	783	2	417420 417449
4	<b>Integrated Pollution Controls</b> Name: Jarmain And Son Ltd Location: Minerva Works, Crossley Lane, HUDDERSFIELD, West Yorkshire, HD5 0QP Authority: Environment Agency, North East Region Permit Reference: BD0575 Dated: 24th November 1998 Process Type: IPC minor (non-substantial) variation to previous variation Description: 4.4 A (B) processes involving Halogens within the Chemical Industry <b>Status: Authorisation revoked</b> Positional Accuracy: Automatically positioned to the address	A7NW (SW)	786	2	417420 417444
5	<b>Integrated Pollution Prevention And Control</b> Name: Matrix-Direct-Recycle-Limited Location: Matrix-Direct-Recycle, Units 1-5 Newlands Trade Park, School Lane, Kirkheaton, HUDDERSFIELD, West Yorkshire, HD5 0JS Authority: Environment Agency, North East Region Permit Reference: FP3231XA Original Permit Ref: Jp3731my Effective Date: 24th December 2008 <b>Status: Superseded By Variation</b> Application Type: Variation App. Sub Type: Substantial Positional Accuracy: Manually positioned to the road within the address or location Activity Code: 5.4 A(1) (C) (III) Activity Description: Recovery Of Waste; Hazardous Waste Greater Than 10T/D By Recycling Inorganics (Not Metals) Primary Activity: Y Activity Code: 2.2 A(1) (F) Activity Description: Non-Ferrous Metals; Producing Etc Cadmium/Mercury And Alloys Containing Greater Than 0.05 Percent Primary Activity: N	A7NE (SW)	660	2	417630 417367
6	<b>Integrated Pollution Prevention And Control</b> Name: Sita (Lancashire) Ltd Location: Off Lane Side Lane, Kirkheaton, Huddersfield Authority: Environment Agency, North East Region Permit Reference: Bk4839 Original Permit Ref: Bk4839 Effective Date: Not Supplied <b>Status: Application Validation (Application received by the Authority but is not yet authorised)</b> Application Type: Not Supplied App. Sub Type: Not Supplied Positional Accuracy: Manually positioned to the road within the address or location Activity Code: 5.2 A(1) (A) Activity Description: Waste Landfilling; Greater Than 10 T/D With Capacity Greater Than 25,000T Excluding Inert Waste Primary Activity: Not Supplied Activity Code: 5.3 A(1) (C) (I) Activity Description: Other Waste Disposal; Non-Hazardous Waste >50T/D By Biological Treatment Primary Activity: Not Supplied	A8NE (SE)	675	2	418602 417265

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
7	<p><b>Integrated Pollution Prevention And Control</b></p> <p>Name: P Casey Enviro Ltd            Location: Lane Side Quarry Landfill Site, Lane Side Quarry Landfill Site, Off Bellstring Lane, Kirkheaton, Huddersfield, West Yorkshire            Authority: Environment Agency, North East Region            Permit Reference: DP3336JN            Original Permit Ref: Rp3332ky            Effective Date: 4th September 2018  <b>Status: Effective</b>            Application Type: Variation            App. Sub Type: Simple Standard Variation            Positional Accuracy: Located by supplier to within 100m            Activity Code: 5.2 A(1) (A)            Activity Description: Waste Landfilling; Greater Than 10 T/D With Capacity Greater Than 25,000T Excluding Inert Waste            Primary Activity: Y            Activity Code: 5.4 A(1) a) (i)            Activity Description: DISPOSAL OF &gt; 50 T/D NON-HAZARDOUS WASTE (&gt; 100 T/D IF ONLY AD) INVOLVING BIOLOGICAL TREATMENT            Primary Activity: N</p>	A9NW (SE)	701	2	418700 417300
7	<p><b>Integrated Pollution Prevention And Control</b></p> <p>Name: P Casey Enviro Ltd            Location: Lane Side Quarry Landfill Site, Lane Side Quarry Landfill Site, Off Bellstring Lane, Kirkheaton, Huddersfield, West Yorkshire            Authority: Environment Agency, North East Region            Permit Reference: PP3339VD            Original Permit Ref: Rp3332ky            Effective Date: 28th February 2014  <b>Status: Superseded By Variation</b>            Application Type: Variation            App. Sub Type: Minor            Positional Accuracy: Located by supplier to within 100m            Activity Code: 5.2 A(1) (A)            Activity Description: Waste Landfilling; Greater Than 10 T/D With Capacity Greater Than 25,000T Excluding Inert Waste            Primary Activity: Y            Activity Code: 5.4 A(1) a) (i)            Activity Description: DISPOSAL OF &gt; 50 T/D NON-HAZARDOUS WASTE (&gt; 100 T/D IF ONLY AD) INVOLVING BIOLOGICAL TREATMENT            Primary Activity: N</p>	A9NW (SE)	701	2	418700 417300
7	<p><b>Integrated Pollution Prevention And Control</b></p> <p>Name: P Casey Enviro Ltd            Location: Lane Side Quarry Landfill Site, Lane Side Quarry Landfill Site, Off Bellstring Lane, Kirkheaton, Huddersfield, West Yorkshire            Authority: Environment Agency, North East Region            Permit Reference: RP3332KY            Original Permit Ref: Rp3332ky            Effective Date: 28th October 2011  <b>Status: Superseded By Variation</b>            Application Type: Application            App. Sub Type: New            Positional Accuracy: Located by supplier to within 100m            Activity Code: 5.2 A(1) (A)            Activity Description: Waste Landfilling; Greater Than 10 T/D With Capacity Greater Than 25,000T Excluding Inert Waste            Primary Activity: Y</p>	A9NW (SE)	701	2	418700 417300
8	<p><b>Integrated Pollution Prevention And Control</b></p> <p>Name: Electrical Waste Recycling Group Ltd            Location: Matrix-Direct-Recycle, Units 1-5 Newlands Trade Park, School Lane, Kirkheaton, HUDDERSFIELD, West Yorkshire, HD5 0JS            Authority: Environment Agency, North East Region            Permit Reference: QP3034KA            Original Permit Ref: Qp3034ka            Effective Date: 23rd October 2009  <b>Status: Superseded By Variation</b>            Application Type: Transfer            App. Sub Type: Whole limited change in management            Positional Accuracy: Manually positioned to the road within the address or location            Activity Code: 5.4 A(1) (C) (III)            Activity Description: Recovery Of Waste; Hazardous Waste Greater Than 10T/D By Recycling Inorganics (Not Metals)            Primary Activity: Y            Activity Code: 2.2 A(1) (F)            Activity Description: Non-Ferrous Metals; Producing Etc Cadmium/Mercury And Alloys Containing Greater Than 0.05 Percent            Primary Activity: N</p>	A7SE (SW)	706	2	417713 417234

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
9	<p><b>Integrated Pollution Prevention And Control</b></p> <p>Name: Electrical Waste Recycling Group Ltd  Location: Electrical Waste Recycling Group Limited, Units 1-5 Newlands Trade Park, School Lane, Kirkheaton, HUDDERSFIELD, West Yorkshire, HD5 0JS  Authority: Environment Agency, North East Region  Permit Reference: YP3037NF  Original Permit Ref: Qp3034ka  Effective Date: 29th November 2013  <b>Status: Effective</b>  Application Type: Variation  App. Sub Type: Substantial  Positional Accuracy: Automatically positioned to the address  Activity Code: 2.2 A(1) (F)  Activity Description: Non-Ferrous Metals; Producing Etc Cadmium/Mercury And Alloys Containing Greater Than 0.05 Percent  Primary Activity: N  Activity Code: 5.3 A(1) a) (vi)  Activity Description: DISPOSAL OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING RECYCLING OR RECLAMATION OF INORGANIC MATERIALS OTHER THAN METALS OR METAL COMPOUNDS  Primary Activity: Y  Activity Code: 2.2 Part A (1) c) 2017  Activity Description: Producing, melting or recovering cadmium or mercury  Primary Activity: N  Activity Code: 5.3 A(1) a) (ii)  Activity Description: DISPOSAL OR RECOVERY OF HAZARDOUS WASTE WITH A CAPACITY EXCEEDING 10 TONNES PER DAY INVOLVING PHYSICO-CHEMICAL TREATMENT  Primary Activity: N</p>	A7NE (SW)	707	2	417637 417293
9	<p><b>Integrated Pollution Prevention And Control</b></p> <p>Name: Electrical Waste Recycling Group Ltd  Location: Matrix-Direct-Recycle, Units 1-5 Newlands Trade Park, School Lane, Kirkheaton, HUDDERSFIELD, West Yorkshire, HD5 0JS  Authority: Environment Agency, North East Region  Permit Reference: GP3938CS  Original Permit Ref: Qp3034ka  Effective Date: 25th January 2013  <b>Status: Superseded By Variation</b>  Application Type: Variation  App. Sub Type: Standard  Positional Accuracy: Automatically positioned to the address  Activity Code: 5.4 A(1) (C) (III)  Activity Description: Recovery Of Waste; Hazardous Waste Greater Than 10T/D By Recycling Inorganics (Not Metals)  Primary Activity: Y  Activity Code: 2.2 A(1) (F)  Activity Description: Non-Ferrous Metals; Producing Etc Cadmium/Mercury And Alloys Containing Greater Than 0.05 Percent  Primary Activity: N</p>	A7NE (SW)	707	2	417637 417293
10	<p><b>Integrated Pollution Prevention And Control</b></p> <p>Name: P Casey Enviro Ltd  Location: Lane Side Quarry Landfill Site, Lane Side Quarry Landfill Site, Off Bellstring Lane, Kirkheaton, Huddersfield, West Yorkshire  Authority: Environment Agency, North East Region  Permit Reference: FP3338CZ  Original Permit Ref: Rp3332ky  Effective Date: 26th March 2012  <b>Status: Superseded By Variation</b>  Application Type: Variation  App. Sub Type: Minor  Positional Accuracy: Manually positioned to the address or location  Activity Code: 5.2 A(1) (A)  Activity Description: Waste Landfilling; Greater Than 10 T/D With Capacity Greater Than 25,000T Excluding Inert Waste  Primary Activity: Y</p>	A9NE (SE)	737	2	419035 417573

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
11	<p><b>Integrated Pollution Prevention And Control</b></p> <p>Name: Matrix-Direct-Recycle-Limited            Location: Matrix House, School Lane, Kirkheaton, Huddersfield, HD5 0JS            Authority: Environment Agency, North East Region            Permit Reference: JP3731MY            Original Permit Ref: Jp3731my            Effective Date: 4th September 2007  <b>Status: Superseded By Variation</b>            Application Type: Application            App. Sub Type: New            Positional Accuracy: Automatically positioned to the address            Activity Code: 2.2 A(1) (F)            Activity Description: Non-Ferrous Metals; Producing Etc Cadmium/Mercury And Alloys Containing Greater Than 0.05 Percent            Primary Activity: N            Activity Code: 5.4 A(1) (C) (III)            Activity Description: Recovery Of Waste; Hazardous Waste Greater Than 10T/D By Recycling Inorganics (Not Metals)            Primary Activity: Y</p>	A7SE (SW)	810	2	417615 417177
12	<p><b>Local Authority Pollution Prevention and Controls</b></p> <p>Name: Jarmain &amp; Son Ltd            Location: Minerva Works, Kirkheaton, HUDDERSFIELD, HD5 0QP            Authority: Kirklees Metropolitan Borough Council, Environmental Health Department            Permit Reference: AA8940            Dated: 23rd July 1991            Process Type: Application (pre- April 1991) under SI 318, 1989 The Control of Industrial Air Pollution (Registration of Works) Regulations 1989            Description: Processes registered under S. 9 of the Alkali Act 1906 and S. 5 of the Health &amp; Safety at Work Act 1974  <b>Status: Authorisation revoked</b>            Positional Accuracy: Automatically positioned to the address</p>	A7NW (SW)	784	3	417420 417449
	<b>Nearest Surface Water Feature</b>	A8NE (SE)	358	-	418440 417537
13	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Industrial Premises            Location: Stanley Ferry Rb, /Horbury Bridge Calder O2C            Authority: Environment Agency, North East Region            Pollutant: Miscellaneous - Vehicle Washings And De Waxing            Note: Not Supplied            Incident Date: 24th June 1993            Incident Reference: 145494            Catchment Area: Not Given            Receiving Water: Groundwater            Cause of Incident: Not Given            Incident Severity: Category 3 - Minor Incident            Positional Accuracy: Located by supplier to within 100m</p>	A13SW (W)	6	2	418200 417900
14	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Other General Premises            Location: Colne Afu            Authority: Environment Agency, North East Region            Pollutant: Unknown            Note: Fish Killed: No Information; Colne Afu            Incident Date: 13th September 1995            Incident Reference: SL950872            Catchment Area: Calder Tributaries            Receiving Water: Freshwater Stream/River            Cause of Incident: Not Given            Incident Severity: Category 3 - Minor Incident            Positional Accuracy: Located by supplier to within 100m</p>	A13NE (NE)	177	2	418400 418200
15	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Farm            Location: Mouth/Source Fenay Beck Af            Authority: Environment Agency, North East Region            Pollutant: Silage Liquor            Note: Not Supplied            Incident Date: 13th September 1993            Incident Reference: 147602            Catchment Area: Not Given            Receiving Water: Groundwater            Cause of Incident: Not Given            Incident Severity: Category 2 - Significant Incident            Positional Accuracy: Located by supplier to within 100m</p>	A14SW (E)	381	2	418800 417900

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
16	<b>Pollution Incidents to Controlled Waters</b> Property Type: Water Company Sewage: Foul Sewer Location: Oxfield Beck Authority: Environment Agency, North East Region Pollutant: Surcharged Sewage Note: Watercourse :Ox Field Beck; From Lepton Edge To Fenay Beck Incident Date: Not Supplied Incident Reference: SL980369 Catchment Area: Calder Tributaries Receiving Water: Freshwater Stream/River Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A8NW (S)	467	2	418250 417350
17	<b>Pollution Incidents to Controlled Waters</b> Property Type: Water Company Sewage: Foul Sewer Location: Mouth/Huddersfld Colne Afl Authority: Environment Agency, North East Region Pollutant: Unknown Sewage Note: Not Supplied Incident Date: 29th December 1993 Incident Reference: 149310 Catchment Area: Not Given Receiving Water: Freshwater Stream/River Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A8NW (S)	509	2	418200 417300
17	<b>Pollution Incidents to Controlled Waters</b> Property Type: Water Company Sewage: Foul Sewer Location: Mouth/Source Fenay Beck Af Authority: Environment Agency, North East Region Pollutant: Unknown Sewage Note: Not Supplied Incident Date: 6th July 1993 Incident Reference: 145826 Catchment Area: Not Given Receiving Water: Freshwater Stream/River Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A8NW (S)	514	2	418200 417295
18	<b>Pollution Incidents to Controlled Waters</b> Property Type: Water Company Sewage: Foul Sewer Location: Mouth/Source Fenay Beck Af Authority: Environment Agency, North East Region Pollutant: Unknown Note: Not Supplied Incident Date: 11th April 1991 Incident Reference: 121268 Catchment Area: Not Given Receiving Water: Freshwater Stream/River Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A8NW (S)	510	2	418100 417300
19	<b>Pollution Incidents to Controlled Waters</b> Property Type: Water Company Sewage: Foul Sewer Location: Road Bridge B6117, /Battyeford Bridge Calder 04C Authority: Environment Agency, North East Region Pollutant: Unknown Sewage Note: Not Supplied Incident Date: 2nd March 1994 Incident Reference: 150077 Catchment Area: Not Given Receiving Water: No Pollution Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A8SW (S)	609	2	418200 417200
19	<b>Pollution Incidents to Controlled Waters</b> Property Type: Water Company Sewage: Storm Overflow Location: Oxfield Beck, Kirkheaton, HUDDERSFIELD Authority: Environment Agency, North East Region Pollutant: Sewage - Storm Overflow Note: Ox Field Beck; No Fish Killed Incident Date: 12th June 1998 Incident Reference: SL980490 Catchment Area: Calder Tributaries Receiving Water: Freshwater Stream/River Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A8SW (S)	614	2	418200 417195

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
20	<b>Pollution Incidents to Controlled Waters</b> Property Type: Industrial Premises Location: Mouth/Source Fenay Beck Af Authority: Environment Agency, North East Region Pollutant: Miscellaneous - Inert Suspended Solids Note: Not Supplied Incident Date: 8th November 1990 Incident Reference: 116598 Catchment Area: Not Given Receiving Water: Freshwater Stream/River Cause of Incident: Not Given Incident Severity: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	A8SE (S)	688	2	418500 417200
21	<b>Pollution Incidents to Controlled Waters</b> Property Type: Water Company Sewage: Storm Overflow Location: Fenay Beck Authority: Environment Agency, North East Region Pollutant: Sewage - Storm Overflow Note: Fish Killed: No Information Incident Date: 3rd January 1995 Incident Reference: SL950159 Catchment Area: Calder Tributaries Receiving Water: Freshwater Stream/River Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A8SW (S)	722	2	418000 417100
22	<b>Pollution Incidents to Controlled Waters</b> Property Type: Highway/Car Park Location: Mouth/Huddersfld Colne Afl Authority: Environment Agency, North East Region Pollutant: Oils - Unknown Note: Not Supplied Incident Date: 13th April 1992 Incident Reference: 132173 Catchment Area: Not Given Receiving Water: Freshwater Stream/River Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7NE (SW)	728	2	417600 417300
23	<b>Pollution Incidents to Controlled Waters</b> Property Type: Clay (General) Location: Oxfield Beck Close To, Kirkheaton Church Authority: Environment Agency, North East Region Pollutant: Miscellaneous - Inert Suspended Solids Note: Fenay Beck/Shepley Dike; Fish Killed: No Information Incident Date: Not Supplied Incident Reference: SL990004 Catchment Area: Calder Tributaries Receiving Water: Freshwater Stream/River Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7SE (SW)	745	2	417900 417100
23	<b>Pollution Incidents to Controlled Waters</b> Property Type: Clay (General) Location: Oxfield Beck Close To, Kirkheaton Church Authority: Environment Agency, North East Region Pollutant: Miscellaneous - Inert Suspended Solids Note: Fenay Beck/Shepley Dike; Fish Killed: No Information Incident Date: Not Supplied Incident Reference: SL981078 Catchment Area: Calder Tributaries Receiving Water: Freshwater Stream/River Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7SE (SW)	750	2	417900 417095
24	<b>Pollution Incidents to Controlled Waters</b> Property Type: Water Company Sewage: Sewage Treatment Works Location: Mouth/Huddersfld Colne Afl Authority: Environment Agency, North East Region Pollutant: Sewage - Septic Tank Effluent Note: Not Supplied Incident Date: 22nd October 1991 Incident Reference: 127313 Catchment Area: Not Given Receiving Water: Freshwater Stream/River Cause of Incident: Not Given Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A7SE (SW)	802	2	417600 417200