



Harron Homes Ltd  
Merchant Fields, Cleckheaton  
Specification for Treatment of Mineworkings

June 2022

Contaminated Land, Brownfield & Environmental Contracting



**REPORT TITLE:** **Specification for Treatment of Mineworkings**

**REPORT NUMBER:** **001 Rev B**

**CLIENT NAME:** **Harron Homes Ltd**

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Issue 1	Revision A	
Issue 2	Revision B - Updated to reflect treatment requirements beneath roads	04/07/2022

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## **1.0 INTRODUCTION**

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### **1.1 Background**

VertaseFLI Limited (VFLI), have been commissioned by Harron Homes to prepare a Specification for the Treatment of Shallow Mineworkings on land at Merchant Fields, Cleckheaton.

Treatment of shallow mineworkings has been deemed necessary as previous investigations concluded that there was an inadequate thickness of competent cover over workings in the Middleton 11 Yard Coal in the north west of the site, and the Blocking Coal in the south east of the site and a ground stability risk existed for the proposed development. Ground stability problems above such workings can arise as the roof collapses, pillars fail and/or the floor heaves. Progressive deterioration means that there may be a subsidence delay of over 100 years. The mechanism of roof collapse involves progressive upward migration of a void until it is either choked by the spalled roof debris or reaches the surface as a crown hole.

To inform this revised treatment specification VFLI have reviewed past investigation information and completed a supplementary site investigation, the findings of which are presented in Section 2 of this report.

### **1.2 Available information**

Information in digital format will be sent to all Contractors that confirm their intention to submit a tender for the Drill and Grout Works described in this document. The information includes:

- Topographic Survey, Proposed Plot Layout, Grouting Grid (all in AutoCAD format);
- Service Drawings (electric, gas etc). The appointed Contractor will be expected to obtain up to date plans prior to commencement of the works.
- VertaseFLI Ltd Investigation works November 2020.

### **1.3 Contractor appointment**

The successful Contractor will be engaged in accordance with VertaseFLI Ltd's Form of Subcontract. The commission will be on a lump sum fixed-price basis.

The objective of the Drill and Grout Works is to substantially fill the old workings and any voids or broken ground found in the overlying rock strata via the injection of a suitable grout via boreholes.

All works should be carried out in accordance with all current UK health and safety legislation, HSE guidance, the Construction Design Management (CDM) Regulations and the Construction Phase Health and Safety Plan.

The successful Contractor will be appointed by VertaseFLI Ltd and VertaseFLI Ltd will be the Principal Contractor for the duration of the Drill & Grout Works.

On appointment, the contractor shall submit an application (with the associated fee) to the Coal Authority (CA) for 'Permission to enter CA mining interests'.

The proposed Drill and Grout Works shall be undertaken in accordance with BS EN12715:2000 'Execution of Special Geotechnical Work: Grouting', and the Coal Authority's "Permission to Enter or Disturb Coal Authority Mining Interests" (to be applied for by the successful Contractor).

### **1.4 The proposed development**

The proposed residential development comprises detached, semi-detached and terraced houses, forming a total of 242 new dwellings, as shown on Drawing D1874HHL\_017 (a copy of which is presented in Appendix A).

Access to the development will be from Kilroyd Drive in the north and Hunsworth Lane in the west.

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## 2.0 SITE INVESTIGATION

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### 2.1 Site description

The site is located approximately 1.2km north of Cleckheaton Town centre and comprises approximately 12 hectares of disused, pastoral farmland. The site is accessed from the north off Kilroyd Drive. The site slopes down from Kilroyd Drive toward Nann Hall Beck at the eastern site boundary, is generally flat lying in the centre of the site and slopes down toward the south western, southern and south eastern site boundaries.

### 2.2 Coal Authority Information

A CA mining report, states that:

- *The property is in the likely zone of influence from workings in 4 seams of coal at shallow to 170m depth, and last worked in 1970. The shallow depth relates to seams at less than 30m depth and probably refers to the Blocking Coal and possibly Wheatley Lime Coal.*
- *The property is not in the likely zone of influence of any present underground coal workings.*
- *The property is not in an area for which the Coal Authority are determining whether to grant a licence to remove coal using underground methods.*
- *The property is not in an area that is likely to be affected at the surface from any planned future workings.*
- *Within, or within 20m, of the boundary of the property there are 4 mine entries. These are shown on Drawing 2828/8; three are in the far east and one is in the far west.*
- *The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.*
- *The property is not within the boundary of an opencast site, or within 800m of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.*

- *The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50m.*
- *There is no record of a mines gas emission requiring action.*

The property is in an area for which notices of entitlement to withdraw support were published in 1951 & 1954.

The Coal Authority have provided a copy of the abandonment plan for the Blocking Coal which shows recorded workings beneath approximately 65% of the site area in the centre, east and north. A copy of the abandonment plan is available on request.

### **2.3 Previous Investigation**

Extensive previous investigation was carried out by Lithos. In total 49 probe holes were drilled to various depths to identify the location of coal seams and potential shallow mineworkings. The Lithos analysis of the data is as follows:

- *The Wheatley Lime Coal is between 0.1m and 1.3m thick (average 0.9m) and the thickness of competent (rock) cover above the seam is always less than 10 times seam thickness.*
- *None of the 27 holes advanced through the Wheatley Lime Coal encountered evidence of workings.*
- *The Middleton 11 Yard Coal is between 0.7m and 1.7m thick (average 1.1m) and is shallowest in the far south.*
- *Evidence of workings were encountered in 3 of the 40 holes through the Middleton 11 Yard Coal. In addition, a further 12 holes did not encounter either solid coal or mineworkings.*
- *The thickness of competent (rock) cover above the Middleton 11 Yard seam is between 9 and 13 times seam thickness in the west and was as little as two times seam thickness towards the south.*
- *The Blocking Coal has not been encountered in any of the probeholes. However, evidence of mineworkings was encountered in 4 probeholes advanced in the far east (vicinity of mine shafts) at between 15.5m and 21.6m depth.*

In addition, Lithos noted that the Middleton 11 Yard Coal was absent in a number of probeholes with no evidence of coal or mineworkings

encountered. Lithos interpreted this lack of evidence as possible 'packed' workings where the Middleton 11 Yard has actually been worked.

Based on this analysis Lithos produced a specification for the treatment of the shallow mineworkings at the site which was broadly as follows:

- 843 boreholes to enable grouting of shallow workings in the Middleton 11 Yard Coal in the north west of the site;
- 1,040 boreholes to enable grouting of shallow workings in the Blocking Coal in the south east of the site;
- 1,247 boreholes as part of proof-drilling for the Middleton 11 Yard Coal.

#### **2.4 Vertase FLI Investigation Works**

The treatment scope of works produced by Lithos contained a large amount of uncertainty due to the large amount of proof-drilling recommended to investigate the Middleton 11 Yard seam. As such Vertase FLI were commissioned to review the information produced by Lithos and provide a scope of treatment works that would provide a greater degree of certainty. As part of this review, it was considered likely that further drilling, using rotary coring techniques may reduce the uncertainty associated with the presence/absence of the Middleton 11 Yard seam and provide evidence for whether workings in the Middleton 11 Yard had been 'packed'.

In addition, further examination of the Coal Authority abandonment plan No. M259 showed that there is likely to be an east-west trending fault across the south of the site which marks the extent of workings in the Blocking Bed. It was proposed that further site investigation should be carried out either side of the conjectured position of the fault to establish the true extent of works in the Blocking Bed.

#### **2.5 Scope of Works**

13 boreholes were drilled as part of the Vertase investigation. Boreholes were positioned to provide widespread coverage of the site, locations are shown on Drawing D1874HHL\_018. 9 boreholes were drilled using rotary open-hole drilling techniques and 4 boreholes were drilled with rotary open-hole and coring techniques. The boreholes ranged in depth from 23m to 42m bgl with coring targeting anticipated

depths of coal and/or mineworkings in the Middleton 11 Yard and Blocking Bed seams.

Coring was carried out as follows;

- BH1 from 5m to 23m bgl;
- BH6 from 15m to 21m bgl and from 26m to 35m bgl;
- BH7 from 18m to 24m bgl; and
- BH8 from 20m to 26m bgl and 29m to 32m bgl.

**2.6 Results**

Coal and/or suspected mineworkings were encountered in all boreholes. The depths of coal and/or suspected workings and the name of the conjectured seam is shown in the table below. The borehole logs from the investigation are included in Appendix B and investigation locations are shown on Drawing D1874HHL\_018 in Appendix A.

		BH1	BH2	BH3	BH4	BH5	BH6	BH7	BH8	BH9	BH10	BH11	BH12	BH13
<b>Wheatley Lime</b>	Top				6.2	6.7	5.8	8.1	7				1.6	5.5
	Base				6.5	7.2	6.3	9.3	7.6				2	6
<b>Middleton 11 Yard</b>	Top		13.5	16.5	16.5	16.6				16.5	6.6	6	22.5	
	Base		14.7	17.5	NP	17.6				17	8	6.5	22.8	
<b>Blocking Bed</b>	Top	17	37.8	22		34.7	31.46	27.6	26.9	24	32	27.5	29	29
	Base	18.84	38	23		35.9	32.63	28.8	27.5	25.3	33.2	28.4	30.1	32

Notes: All depths are in m below ground level; black numbers denote intact coal, red numbers denote suspected workings and blue numbers denote loss of flush/no drilling returns.

**Wheatley Lime**

The Wheatley Lime coal seam has been found, intact, at depths of between 1.6m in BH12 in the north east of the site and 8.1m in BH7 in the north west of the site. Boreholes BH1, BH2, BH3, BH9, BH10 and BH11 did not encounter the Wheatley Lime seam as they are beyond the outcrop. The thickness of the Wheatley Lime varies from 0.3m to 1.2m but is typically 0.5m thick. 16 trial pits were excavated as part of the Vertase investigation to establish the precise position of the

outcrop. The position of the outcrop is shown on Drawing D1874HHL\_019.

### ***Middleton 11 Yard***

The Middleton 11 Yard seam is present in boreholes BH2, BH3, BH4, BH5, BH9, BH10, BH11, BH12, and BH13 and absent in BH1 and boreholes in the north and northwest of the site. No evidence for the seam or workings was recorded in boreholes BH6, BH7, BH8 and BH12. Coring carried out in boreholes BH6, BH7 and BH8 at depths designed to target the conjectured depth of the Middleton 11 Yard showed no evidence of 'packed' workings with cores generally recording solid strata and logged as laminated mudstone. Photographs of the cores are attached at Appendix C.

BH4, in the centre of the site, recorded a loss of drilling flush at 16.5m and no drilling returns were recorded thereafter. This depth correlates with the conjectured depth of the Middleton 11 Yard seam and could be an indication of mineworkings. However, the drilling below 16.5m was noted to be through solid strata down to a depth of 42m.

### ***Blocking Bed***

The results of the drilling in boreholes BH2, BH5, BH10 and BH11 confirm the extent of workings in the Blocking Bed, as shown on the abandonment plan. The depth of the Blocking Bed encountered in these boreholes indicates that this is due to faulting, with the Blocking Bed downthrown, to the south, by approximately 12m.

The Blocking Bed was also encountered intact in boreholes BH7, BH8 and BH9. As these areas are shown to have been worked on the abandonment plan it is assumed that these boreholes have intercepted pillars of coal left in the workings to prevent roof collapse.

Suspected mineworkings were encountered in the Blocking Bed in boreholes BH1, BH3, BH6, BH12 and BH13. The suspected workings are recorded as areas of no recovery, soft ground, soft clay or broken ground. The thickness of features associated with suspected mineworkings varies between boreholes but where the Blocking Bed has been found intact it is consistently 1.2m thick. Therefore, where indications of workings are thicker or thinner than 1.2m this is likely to signify partial collapse of the workings creating larger or smaller voids.

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## 2.7 Recommendations

CIRIA C758D:2019 (Abandoned mine workings manual) suggests voids resulting from mineral extraction are unlikely to migrate more than 10 times the worked seam thickness through competent bedrock. The guidance notes that the use of this 10 times 'rule-of-thumb', as the design basis for treatment depth, has been observed to be successful over many years for a wide range of mineworkings and overlying rock/soil strata scenarios.

Based on the guidance and the findings of the investigation it is recommended that treatment of shallow coal and shallow mineworkings be carried out using drilling and grouting techniques.

It is recommended that stabilisation of the Wheatley Lime seam is carried out beneath roads and plots where it is at a depth too great to make it economical to excavate. Stabilisation of the Blocking Bed is recommended beneath roads and plots in a small area to the south east of the site where it is shallow enough to have potential influence on surface stability.

To mitigate the potential risk from unidentified workings in the Middleton 11 Yard seam it is recommended that boreholes in the centre and west of the site are drilled 12m beyond the base of the Wheatley Lime seam and injected with grout. This is designed to stabilise workings where they are encountered and, if they are not encountered, show that workings are absent or the Middleton 11 Yard seam is at a depth that is unlikely to cause instability at the surface.

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### **3.0 Mine entries**

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The Coal Authority report indicated records of 4 mine entries within, or within 20m of, the site boundary; 3 beneath the east of the site and 1 to the west. The Lithos investigation located the 3 shafts beneath the east of the site and their positions have been recorded and are shown on Drawing D1874HHL\_019. The shafts varied in diameter with shaft 419426-001 measuring 2.6m in diameter, shaft 419426-002 measuring 3.2m in diameter and 419426-003 measuring 2.7m in diameter.

The shaft to the west of the site has yet to be located. Further research of the source of the shaft information shows that its location comes from the 1<sup>st</sup> edition OS Geological Plan and the feature can be identified on the 1854 historical OS plan. On this plan the feature is identified as a 'Coal Pit' and, although there is sometimes ambiguity in the nomenclature around mine entries, given the proximity of the feature to the outcrop of the Wheatley Lime seam it is likely that this is evidence of surface extraction of coal at outcrop as opposed to a shaft to either of the deeper coal seams present beneath the site.

The possibility of further, unrecorded mine entries being present on site cannot be entirely discounted, however, no further evidence of mine entries has been recorded during the investigation works. Should future site work reveal such a feature, work should be stopped in this area and advice on necessary treatment sought from the Vertase project team.

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## **4.0 SITE SET-UP, ORGANISATION AND SAFETY**

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All visitors to site must enter and register at the main Site Office.

Site works shall be supervised throughout by a suitably qualified Drilling Foreman, who will report to the VFLI Project Lead.

Site cabins and welfare facilities are to be established at a location to be agreed with VFLI and Harron Homes Ltd. All welfare facilities must be established in accordance with the relevant health & safety statutory requirements. Provision shall be provided on site for car parking for all site employees.

The VFLI Project Lead will require use of the Contractor's welfare facilities, including the sole use of a dedicated desk and power supply.

All site personnel shall undergo a site-specific health and safety induction prior to commencement of work on site.

If at any time during the works personnel begin to feel unwell, they are to inform the VFLI Project Lead and Contractor's Drilling Foreman, who will determine appropriate action.

The VFLI Project Lead shall be informed prior to any proposed entry of a confined space or deep excavation. Entry must be restricted to suitably qualified and equipped personnel.

Access into excavations etc. must be controlled and only undertaken in accordance with the Confined Spaces Regulations 1997. The atmosphere in shored trenches in excess of 1.2m should be monitored for oxygen and hazardous gas (methane & carbon dioxide), prior to personnel entering such excavations. Monitoring should continue whilst personnel are working in deep excavations.

## 5.0 CONTRACTOR'S RESPONSIBILITIES

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Prior to the commencement of any works the Contractor, in agreement with the VFLI Project Lead, shall:

- Prepare a Method Statement detailing how the Drill & Grout Works will be undertaken (and obtain approval from the VFLI Project Lead & Harron).
- Inform the VFLI Project Lead of any risk, identified and assessed, which could impact upon the VFLI Project Lead's activities
- Submit an application (with the associated fee) to the Coal Authority's "*Permission to Enter or Disturb Coal Authority Mining Interests*".
- Establish the boundaries of the site and the working areas.
- Undertake a dilapidation survey of site boundaries, adjacent properties and highways, via dated photographs or video footage in conjunction with the VFLI Project Lead.
- Liaise with the Local Authority regarding working hours, noise/dust/odour control, and protected trees.
- Liaise with the Local Water Company regarding water supply and any proposed discharge to sewer.
- Liaise with British Waterways and the Environment Agency regarding any work in close proximity to Nann Hall Beck in the northeast.
- Complete a full services search and liaise with all relevant utility companies regarding work in close proximity to their apparatus.
- Prepare the necessary COSHH statements and Health & Safety Plan in accordance with CDM regulations.
- Provide and erect secure Heras-type fence to protect monitoring wells.
- Organise setting-out of the grout grid.

The Contractor shall satisfy the Health & Safety Executive with regard to all matters concerning the health, safety and welfare of persons on the site.

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The Contractor shall ensure that:

- Personnel, plant, materials and other equipment related to the contract are confined within the boundaries of the site.
- Any live services lying within the site boundary are marked and protected, or appropriate arrangements made to truncate them.
- Good practices relating to personal hygiene are adopted including practices to deal with COVID-19.
- Suitable precautions are implemented at all times to prevent off-site migration of pollutants via airborne dust and vapours.
- Suitable precautions are taken to prevent the spread of mud and debris on public highways.
- Refuelling of mobile plant is undertaken in a designated area. Above ground oil storage tanks shall comply with the requirements of Pollution Prevention Guideline PPG2. A spill kit shall be kept on site, adjacent to the designated refuelling area.

Within one week of completion of the Drill & Grout Works, as agreed by the VFLI Project Lead, the Contractor shall ensure that the site is reinstated to the satisfaction of the Harron. For the avoidance of doubt, this will require the Contractor to:

- Pull any sacrificial plastic casings/tubes from the ground
- Remove any drill arisings and grout from around each borehole
- Remove any remaining stockpiles of PFA etc from site
- Clear the temporary site compound of cabins, plant, materials etc

## **6.0 ENGINEERING SUPERVISION AND VERIFICATION**

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The contractors Drilling Supervisor will ensure that the requirements of this Specification are complied with in a safe and orderly manner.

The responsibilities of the Drilling Supervisor shall include, but not be limited to, the following:

- Ensuring that all site personnel are suitably qualified and given an appropriate induction at the beginning of their first day
- Supervision of the Drill & Grout Works
- Guidance on the appropriate protective clothing and safety equipment that is to be made available and used
- Ensuring that personal hygiene arrangements are adequate including measures to prevent the spread of COVID-19.
- Liaison with statutory authorities as required
- The contractor will maintain records of the works to include the following:
  - A summary of the day's activities
  - Date and weather conditions
  - Visitors
  - Aspects relating to Health and Safety, Environmental Control, or non-compliance with either this Specification or the Contractor's Method Statement
  - Borehole details (depths, ground encountered, grout take etc)
  - Test results (including flow, bleed and cube crushing)

Copies of "template" record sheets to be used by the VertaseFLI Project Lead are included in Appendix B.

Copies of all records shall be supplied to the VFLI Project Lead.

On satisfactory completion of all the works the contractor will provide all necessary information to allow the VFLI Project Lead to prepare a Verification Report for the works.

The Verification Report will stand as certification that the Drill & Grout Works have been carried out in accordance with this Specification.

The Verification Report will include:

A summary of the Drill & Grout Works undertaken, including any works associated with unforeseen conditions (such as previously unrecorded mine entries)

Copies of any correspondence with Regulators relating to specific aspects of the remediation works

The contractor shall supply all relevant information to allow the preparation of the report.

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## **7.0 TREATMENT OF SHALLOW MINE WORKINGS**

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### **7.1 Grout hole locations**

Mineworkings have been encountered in the Blocking Coal and are suspected in the Middleton 11 Yard coal seam. Workings or suspected workings that have the potential to cause surface instability are present in the centre and south east of the site.

The areas where workings have been encountered within influencing depth of the surface are summarised on Drawing D1874HHL\_015E in Appendix A.

Where evidence of mineworkings has been encountered or is suspected within the above seams and within influencing depth of the surface of site, it is considered that the necessary grouting requires holes to be drilled on a primary 6m grid beneath building plots, in accordance with CIRIA C758D:2019, and in a 3m grid beneath highways in accordance with local authority geotechnical requirements. The proposed grid of treatment holes is shown on Drawing D1874HHL\_015E in Appendix A.

All drilling will be instructed by the VertaseFLI Project Lead.

The grid may require additional secondary and/or tertiary boreholes in areas of high grout take, as deemed appropriate by the VFLI Project Lead based on grout takes in adjacent areas.

Further holes will be instructed by the VertaseFLI Project Lead in areas of high grout take (to confirm filling of void space), and in areas where several adjacent holes encountered solid coal (to confirm that the local area is underlain by no workings, rather than pillars).

### **7.2 Drilling procedures**

All holes to be used for the injection of grout, including those which strike solid coal, shall be drilled by rotary or rotary percussive methods down to the pavement of the old workings. One metre of solid rock shall be proved below the pavement of the old workings.

Where neither evidence of workings, nor coal, is encountered (i.e. in the centre of the site), boreholes should extend to at least 12m beyond the base of the Wheatley Lime coal seam. This depth shall be agreed

with the VertaseFLI Project Lead on site, but at this stage will range from approx. 15m to 20m below ground level.

The drilling system and flushing medium to be used shall be approved by the VertaseFLI Project Lead. It should be noted that in accordance with Coal Authority requirements, air flush is only permitted where the distance to nearby properties is greater than 50m. Water flush will be the standard flushing medium unless otherwise agreed in writing by the VertaseFLI Project Lead.

The minimum diameter of the holes shall be 90mm unless otherwise specified by the VertaseFLI Project Lead. When it is impracticable to drill at the minimum diameter for the full depth, the diameter of the holes shall be increased in the upper sections.

The holes shall be cased through made ground and superficial deposits down to the rockhead as directed by the VertaseFLI Project Lead. Casing could either be sacrificial plastic, or temporary, recoverable steel tubes.

The holes shall be kept open until grout injection into the coal and/or workings is complete.

Where a hole proves abortive, because it becomes obstructed, or fails to achieve the required depth, it shall be re-drilled at a larger diameter and re-cased, or a new hole drilled and cased at the Contractor's expense.

The Contractor is expected to recover all borehole casing employed in any borehole and no payment will be made for any borehole casing abandoned in any borehole on completion of the Contract.

The Contractor should extend any holes encountering solid coal in the upper seam down to the lower seams.

The Contractor will need to take account of all known underground utilities (see also Section 10), most notably in the gas utility in the centre north and sewers in the east. This may result in the need for drilling of holes at an angle in order to reach the target zone at depth, where known underground utilities prevent the drilling of a vertical borehole.

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### **7.3 Grouting procedures**

Grout shall be introduced into all boreholes drilled.

The Contractor should give consideration to a perimeter grout wall to prevent unnecessary grout loss down dip.

Immediately prior to grouting each hole, the Contractor shall check that it is unobstructed to the required depth, and able to receive the tremie pipe. Obstructions shall be dealt with as described in 'drilling procedures' above.

Grout shall be tremied down each hole via an approved T-connection and flexible tube, or a series of steel tubes, placed to the base of the hole or to such other depth as specified by the VertaseFLI Project Lead. Provision shall be made for monitoring the pressure of the grout and the quantity being delivered in the line. No more than 5 Tonnes of grout shall be injected into any hole at any one time.

In instances where 5 Tonnes of grout is injected into any borehole and the grout has not reached the surface, grouting should cease in that hole and the grout allowed to set before continuing to grout in that hole. This process should continue in 5 Tonne increments until the grout hole is complete.

Grouting shall proceed upwards from the base of each borehole to the base of the superficial deposits. It is not intended that, as a general rule, significant quantities of grout shall be injected into the superficial deposits unless specified otherwise.

The grout shall be injected at the approved rates until either a limiting pressure of 10 kN/m<sup>2</sup> per m of overburden, or a maximum of 200 kN/m<sup>2</sup> is reached, or grout appears near the point of injection, when the hole shall be deemed complete. If one of these criteria is reached quickly, the grout tube or pipes shall be lifted to check that a local obstruction is not preventing the flow of the grout into the strata.

Pressure shall be applied to the grout in every hole where:

- Voids were encountered during the drilling of that hole
- Broken rock was encountered during the drilling of that hole

- Soft ground (including possible packed waste) was encountered below rockhead during the drilling of that hole
- The grout level in that borehole has fallen before the application of the pressure
- Solid rock, coal or suspected packed workings were encountered in the borehole and the VertaseFLI Project Lead requests that pressure be applied

If pressure is not achieved, or grout has not appeared at the point of injection after 15 tonnes of grout materials have been placed, then sand and/or pea gravel (gravel which passes through a 6.33mm sieve and is retained on a 2.36mm sieve) may be added to the mix, or placed down the hole with the permission of the VertaseFLI Project Lead.

No more than four holes shall be filled with grout before pressure is applied.

No more than two adjacent drillholes shall have pressure applied at the same time.

Pressure should be applied to each borehole in a timely manner and before the grout has started to set. If, in the opinion of the VertaseFLI Ltd Project Lead, the time between grout injection and pressure application is too large, then that borehole shall be re-drilled within one metre of the original position and fresh grout introduced; all at the expense of the Contractor.

The Contractor's attention is drawn to the need to check for underground services etc. In particular when injecting grout, the Contractor shall ensure by regular inspections (via lifted manhole covers) at hourly intervals that grout is not entering adjacent drains, culverts etc.

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## **8.0 TREATMENT OF BACKFILLED MINE SHAFTS**

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### **8.1 Known shafts**

As discussed in Section 2.3, Coal Authority records indicate the presence of 3 shafts in the east which have been located during the site investigation. There are no treatment records for these shafts although they were encountered as backfilled, circular shafts.

Of these, shaft 419426-005 was found to be 18.5m deep; the two other shafts in this area should be investigated to confirm their depth. The contractor should include a cost for the investigation and treatment of all mine entries in accordance with the procedures outline in Sections 8.4 and 8.5.

In addition to the above, an additional CA-recorded mine entry is present in the far west (ref. 418426-008) which has not been located to date. The likelihood that this mine entry exists as a shaft is discussed in Section 2.3 of this report.

### **8.2 Shaft cap**

Shaft caps should be designed by a competent structural engineer, following the principles detailed below.

The reinforced concrete cap should be constructed at or below rockhead of sufficient bearing capacity for the expected loading. Alternatively, the cap could be founded on a suitably grouted base.

The width of the cap should be a least twice the external diameter of the shaft (the external diameter being that of the excavated area & not that of the shaft lining). The structural engineer should specify cap thickness and reinforcement.

A vent pipe may be required where the cap is constructed over shaft backfill; early liaison with the Coal Authority is recommended prior to design of the shaft cap.

All treatment and shaft cap designs shall be submitted to the Coal Authority, the Local Planning Authority and NHBC for comment/approval.

---

### **8.3 Unrecorded shafts**

Given the presence of a shallow coal seam (Wheatley Lime) in the centre and north, Middleton 11 Yard in the south, the presence unrecorded mine entries cannot be discounted. Given the nature of the mine entries likely to be found in this area (i.e. less than 1.5m in diameter and relatively shallow), it is intended that any shaft backfill encountered during these works will be stabilised by grouting and subsequently capped at rockhead with a reinforced concrete cap.

If any borehole drilled for the treatment of shallow workings suggests the presence of a shaft (i.e. loose backfill to around the anticipated depth of the coal/workings), drilling activities must cease until a steel safety platform has been established centrally over the possible shaft.

The VertaseFLI Project Lead and the Contractor's Drilling Foreman should be notified immediately if a borehole encounters significantly deeper loose/made ground (probable shaft backfill).

The contractor shall organise excavation to locate and expose the shaft. Once located, the shaft shall be accurately surveyed and its size, shape, orientation and fill material recorded. The shaft shall then be treated as outlined in Sections 8.4 & 8.5 below and capped as outlined in Section 8.2 above.

Any mine entries found in excavations for foundations and drainage will also require treatment, and this will be secured via separate supplementary contract(s) as necessary.

### **8.4 Drilling (shafts)**

A steel safety platform, on which the drilling rig can be positioned, should be established centrally over the location of each shaft.

Site workers who need to work within 5m of the possible shaft should be equipped with a suitable harness and extending safety lanyard securely anchored to a point remote from the shaft.

In the vicinity of the three known shafts in the east, rockhead should be encountered at depths of about 1.5m.

Each of the 3 known shafts in the east will require a minimum of 3 treatment boreholes. The boreholes should be evenly spaced across the

footprint of each shaft, to the satisfaction of the VertaseFLI Project Lead.

Holes to be drilled for the injection of grout should be drilled by rotary techniques, and extend 5m into solid natural strata below the base of the shaft. Given the proximity to adjacent residential properties (<50m) water will be required as the flushing medium.

The minimum diameter of the holes should be 90mm unless otherwise specified by the VertaseFLI Project Lead. When it is impracticable to drill at the minimum diameter for the full depth, the diameter of the holes shall be increased in the upper sections.

The holes should be temporarily cased through shaft backfill down to rockhead. The holes should be kept open until grout injection is complete.

Where a hole proves abortive, because it becomes obstructed or fails to achieve the required depth, it should be re-drilled at a larger diameter and re-cased, or a new hole drilled and cased at the Contractor's expense.

The Contractor should be expected to recover all borehole casing employed in any borehole.

## 8.5 Grouting (shafts)

Where the shaft has been only partly backfilled it shall be filled from the base up with approved granular material, via a borehole(s) of suitable diameter.

Approved granular material would include such materials as natural gravel or crushed rock/concrete. The maximum size will be dependent on the shaft diameter, but in general should not exceed 300mm in any dimension. The grading should be such as to give a reasonable density of filling whilst enabling water to drain through easily. The following proportions are recommended:

<b>Diameter</b>	<b>Proportion</b>
< 1mm	not more than 5%
2mm to 20mm	not more than 15%
20mm to 300mm	not less than 80%

The Contractor shall consolidate the shaft backfill by the introduction of PFA:OPC grout as described in Section 9.

In any shaft which has required the addition of approved granular material in order to achieve pressure, a minimum of one other hole shall be drilled and grouted in order to ensure full consolidation of the backfill.

The minimum number of boreholes required to treat each backfilled shaft shall be a function of shaft diameter, as outlined in the Table below:

<b>Diameter of shaft (m)</b>	<b>Minimum number of grout boreholes</b>
Up to 1.5	1
1.5 to 2.5	2
2.5 to 3.5	3
Greater than 3.5	4

The shaft should be drilled to its full depth to determine the nature of its backfill, and whether or not it has been entirely filled, or it is still open beneath any intermediate staging(s).

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## **9.0 GROUT**

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### **9.1 Constituent materials**

Water shall be from the mains supply, unless otherwise approved by the VertaseFLI Project Lead.

Cement shall be CEMI 42.5 (Ordinary Portland Cement) conforming to BS EN 197-1:2011.

Pulverised Fuel Ash (PFA) shall be conditioned hopper ash, or dry powder ash, of a type suitable as a constituent for grout, obtained from an approved supplier and conforming to BS3892:1997, Parts 1 and 3.

Sand shall comply with BS EN 12620:2002+A1:2008 and be of a grading suitable for use in the Contractor's plant and approved by the VertaseFLI Project Lead using guidance provided in PD 6682- 1:2009.

Pea gravel shall comply with BS EN 12620:2002+A1:2008 and be of grading approved by the VertaseFLI Project Lead using guidance provided in PD 6682-1:2009.

If required, and approved by the VertaseFLI Project Lead, thixotropic additives shall conform to relevant British/European standards and be approved by the VertaseFLI Project Lead.

### **9.2 Storage and use of materials**

Storage of materials shall be such as to prevent loss, contamination or deterioration. OPC shall be kept in a dry location, and the sequence of deliveries recorded so that OPC can be used in rotation.

PFA shall be stored under sheets which shall be weighted down to prevent dust nuisance and to retain the moisture.

### **9.3 Grouting plant**

The Contractor shall submit to the VertaseFLI Project Lead for approval, details of the proposed method of mixing, batching and pumping of grout to the injection points, together with the means of monitoring grouting pressures and the quantities injected. The materials shall be introduced into the mixer via approved weight batching equipment.

Continuous batching will **not** be permitted; each mixing pan must be emptied of grout prior to adding further PFA etc.

The grout mixer shall be capable of producing an intimate homogenous mix, all particles being thoroughly wetted, without segregation.

#### **9.4 Grout mixes**

The filling material shall generally consist of a PFA/OPC grout which should typically be mixed in the proportion of 10:1. The exact proportion of the mix to be used at any one time may be revised by the VertaseFLI Project Lead; most notably where water is present within the mineworkings and/or where cube crush strengths are considered unsatisfactory.

Where excessive lateral flow of grout is anticipated or experienced, the VertaseFLI Project Lead may order the addition of sand or pea gravel to the PFA/OPC mix. The specified grout mix shall have the minimum water content consistent with effective pumping.

The water:(OPC + PFA) ratio shall generally be in the range of 0.4 to 0.45 (including the moisture in the aggregates).

The actual proportions to be used initially for the various grouts shall be agreed with the VertaseFLI Project Lead paying due regard to the conditions encountered during drilling and the results of any trial grouting carried out before work commences.

#### **9.5 Grout properties and testing**

With the mixes described in Section 8.4 above, the grout should yield flow readings of between 300mm and 600mm, when measured in a meter of the "Colcrete" type.

A minimum of two flow tests shall be performed by the Contractor per shift, or as directed by the VertaseFLI Project Lead.

The sample for the flow test shall be obtained by the Contractor at the point of injection, i.e. from the end of the tremie pipe.

High bleed grouts shall be avoided, because they do not fill cavities efficiently. Bleed capacity should be limited to a maximum of 5%, unless agreed otherwise with the VertaseFLI Project Lead.

A minimum of two bleed capacity tests shall be performed by the Contractor per shift, or as directed by the VertaseFLI Project Lead. The sample of grout for the test shall be taken from the point of injection; i.e. the end of the tremie pipe.

Bleed capacity shall be measured in a clear plastic or glass graduated cylinder which has an internal diameter not less than 50mm and with a volume of approximately 1,000ml. After placing the grout, a cover shall be placed over the cylinder to avoid evaporation. Bleed capacity shall be read at hourly intervals. For neat OPC grout, readings should continue for not less than 3 hours, and for PFA: OPC grouts not less than 6 hours.

The Contractor shall prepare one set of 6 test cubes from one batch of grout per week, or as directed by the VertaseFLI Project Lead.

Each cube shall be of 100mm side, or as agreed with the VertaseFLI Project Lead, and shall be taken from the grout at the point of injection; i.e. the end of the tremie pipe.

The Contractor shall arrange for them to be tested by crushing at 7 and 28 days, in accordance with BS1881:2006. The testing shall be carried out by an independent laboratory agreed with the VertaseFLI Project Lead.

The mixes shall produce cubes with crushing strengths of not less than 1.0 MN/m<sup>2</sup> at 28 days (Note: the 7 day test is performed to indicate that the 28 day strength is achievable. Calculations of the strength development of the grout shall be provided to the VertaseFLI Project Lead with the results of the 7days tests).

If the VertaseFLI Project Lead considers the results of the tests indicate that a change of mix proportions is required, the Contractor shall make such modifications as the VertaseFLI Project Lead may direct.

All grout test samples (i.e. flow tests, bleed tests & strength tests) shall be obtained by the Contractor under the supervision of the VertaseFLI Project Lead.

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## **10.0 SERVICES AND ROADS**

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The appointed Contractor will be expected to obtain up to date plans for all known underground services prior to commencement of the works. It shall be the Contractor's responsibility to confirm that each borehole is clear of all underground services, above ground services, equipment, property and the like prior to commencing operations.

The Contractor shall take all necessary precautions, including making all reasonable investigations to ascertain the positions and depths of underground services and drains passing through the site.

The Contractor shall make full allowance in his tender for working around and protecting live services and drains.

The Contractor shall maintain and be responsible for any damage (caused by his own workmen, sub contractors' or suppliers' employees or vehicles) to: public or private roads; paved areas; footpaths; fences; and sewers, drains water, gas and electric mains, telephone and other services. The Contractor shall make good all such damage and meet and settle at his own cost all claims in connection therewith.

The Contractor shall be responsible for maintaining close liaison with the Local Authority and the Public Utility Authorities so as to avoid any disruption of the existing services.

The Contractor shall keep all public and private roads, paved areas, and footpaths etc free at all times of mud/debris etc, and allow for all labour, brushes, hoses etc necessary for removal, cleaning or reinstating. If such work has not been done to the VertaseFLI Project Lead's satisfaction, then the VertaseFLI Project Lead reserves the right to make his own arrangements in respect of such necessary cleansing, and the cost shall be a charge on the Contractor and deducted from any sum due in the final settlement of accounts.

The Contractor shall keep the public and private roads clear of all obstructions other than those permitted by the police and highway authority, or the owners, and shall abide by all other police regulations.

When introducing grout into any borehole the Contractor shall ensure by regular inspections at hourly intervals (via lifted manhole covers) that the grout is not entering adjacent drains, services, culverts, ducts and the like. Manhole covers must be securely replaced between

inspections, unless manhole sites have been made secure, to the satisfaction of the VertaseFLI Project Lead, via locked barriers to prevent unauthorised access.

In the event that any leakage into drains etc is detected the Contractor shall immediately suspend the grouting operations and commence to remove any accumulated grout.

The cost of removing any accumulations of grout from services and the like, on and adjacent, to the site shall be borne by the Contractor and the work shall be to the satisfaction of the Authority or Undertaker concerned. No claims will be entertained by the VertaseFLI Project Lead for the costs of any such work arising out of the negligence of the Contractor to ascertain the position of such services or his failure to make regular inspections.

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## **11.0 TEST HOLES & IN-SITU TESTING**

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Additional “test” holes may be instructed by the VertaseFLI Project Lead in areas of high grout take (to confirm filling of void space), and in areas where several adjacent holes encounter solid coal (to confirm that the local area is underlain by no workings, rather than pillars).

If directed by the VertaseFLI Project Lead, the Contractor shall test the consolidated ground for permeability. On the VertaseFLI Project Lead's instructions the Contractor shall carry out permeability tests on specified boreholes. The test carried out shall be the single packer test as defined in BS EN ISO 22282:2012 “Code of practice for geotechnical investigation and testing.

Permeability by grout acceptance testing shall be checked by drilling test holes in positions to be selected by the VertaseFLI Project Lead, and injecting grout at pressures appropriate to the depth, all in accordance with the requirements for infilling grouting.

The test holes should hold an appropriate pressure for the depth for 2 minutes in order to confirm filling of the mineworkings. If the VertaseFLI Project Lead considers that pressure has not held, or the quantities of grout accepted are excessive, further holes shall be drilled and grouted.

After testing, holes shall be completed in accordance with the requirements for grouting infill holes.

## **12.0 RECORDS**

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The Contractor shall prepare, and keep available for inspection on site, plans showing the positions and surface levels of all holes, and Daily Drilling Records (see below). All levels shall be given with reference to a datum to be determined by the VertaseFLI Project Lead.

The plans shall be updated daily in conformity with the Records noted below. On completion of the Works, the Contractor shall give fair copies of the plans to the VertaseFLI Project Lead.

As work proceeds the Contractor shall maintain separate Daily Records, in a form to be approved by the VertaseFLI Project Lead, for:

- Drilling
- Grouting
- Materials and Plant Received

The Daily Records signed by the Contractor's agent shall be submitted each day to the VertaseFLI Project Lead for his agreement. The Contractor shall provide one copy of the agreed Record for the VertaseFLI Project Lead's retention and keep a further copy available for inspection on site.

Daily Drilling Records shall be provided which summarise daily and cumulative meterage drilled, and for each hole drilled provide the following information:

- Job title and location
- Hole reference number
- Date(s) drilled
- Depth of completed borehole
- Method of drilling, flushing medium and type of drill bit
- Type, diameter and depth of casing used
- Diameter and depth of hole at the beginning and end of each working day or shift
- Loss of any flushing medium during drilling
- Depth to each major change of stratum
- Description of the stratum, and whether it is intact or broken
- Details of any voids or suspected workings

- Each depth at which groundwater is encountered (if apparent) and any steps taken to seal the flow
- Plant in use, crew members and hours worked
- Standing time, with reason, or time lost overcoming obstructions
- Details of underground services located
- Details of any settlement or ground heave
- Depths at which any samples are taken
- Details and results of any permeability tests ordered by the VertaseFLI Project Lead
- Details of any emissions of gas, water, etc

Daily Grouting Records shall be provided for each hole and contain the following information:

- Job title and location
- Hole reference number
- Date(s) grouted
- Type of grout mix and mass of grout injected each day
- Grout pressures recorded, with the corresponding depths
- Details of type of injection grout-line dimensions (e.g. Tremie injection through 50mm diameter line)
- The results of all flow and bleed tests
- Details of any casing abandoned
- The nature, frequency and results of all inspections of services to check for grout penetration
- Plant in use, crew members and hours worked
- Details of all stoppages or delays and any other relevant information

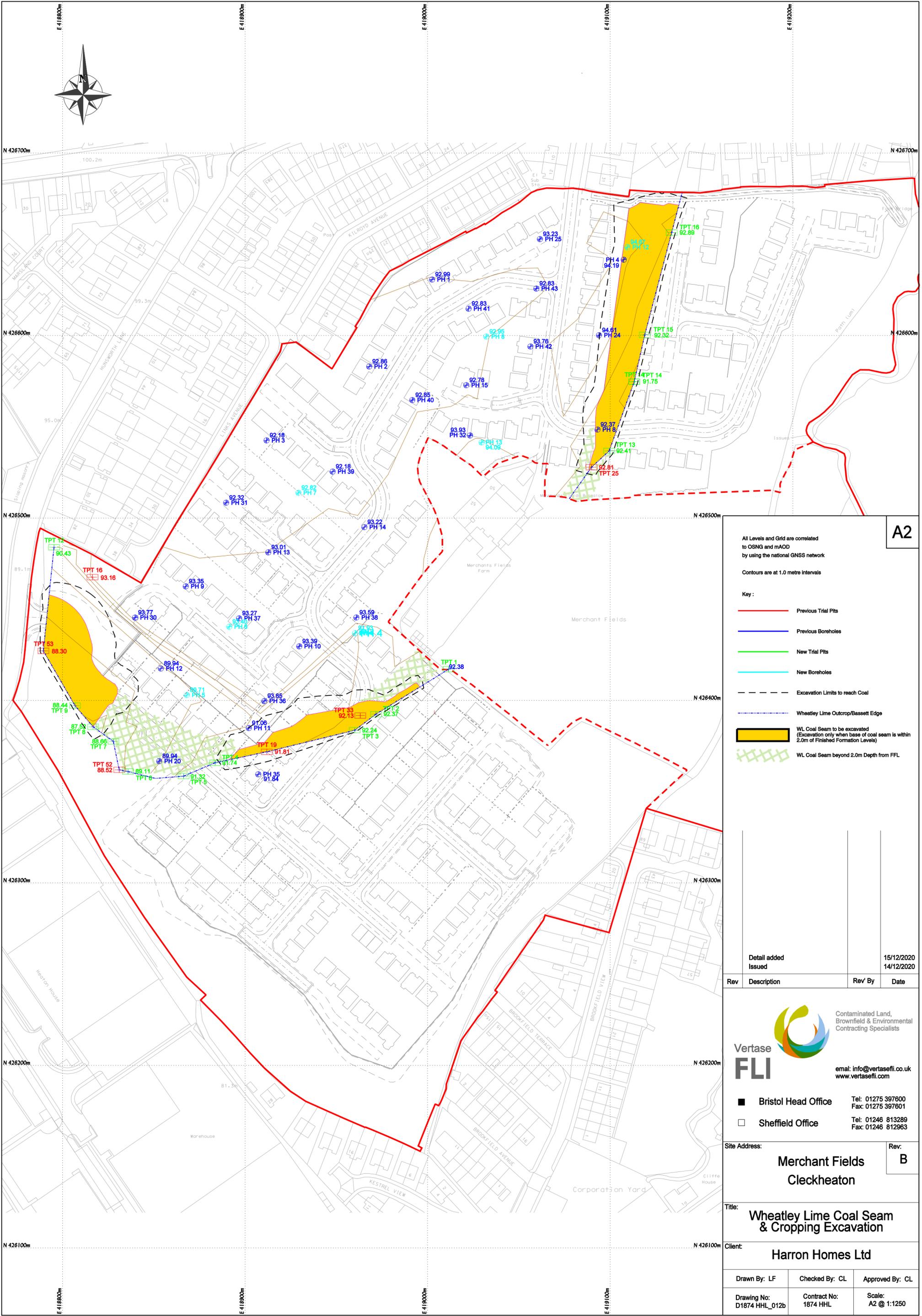
The Daily Records of Materials and Plant Received shall show in particular quantities delivered and used, by weight of each type of material, that day and cumulatively. With the Daily Records, the Contractor shall submit to the VertaseFLI Project Lead copies of

receipts or invoices for all materials delivered and he shall keep them on site until the Works are complete.

Notwithstanding the information listed above, the Contractor shall provide any other information required by the VertaseFLI Project Lead.

# Appendix A

## Drawings



A2

All Levels and Grid are correlated to OSNG and mAOD by using the national GNSS network

Contours are at 1.0 metre intervals

Key :

- Previous Trial Pits
- Previous Boreholes
- New Trial Pits
- New Boreholes
- Excavation Limits to reach Coal
- Wheatley Lime Outcrop/Bassett Edge
- WL Coal Seam to be excavated (Excavation only when base of coal seam is within 2.0m of Finished Formation Levels)
- WL Coal Seam beyond 2.0m Depth from FFL

Detail added	15/12/2020
Issued	14/12/2020

Rev	Description	Rev' By	Date
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<input checked="" type="checkbox"/> Bristol Head Office	Tel: 01275 397600 Fax: 01275 397601
<input type="checkbox"/> Sheffield Office	Tel: 01246 813289 Fax: 01246 812963

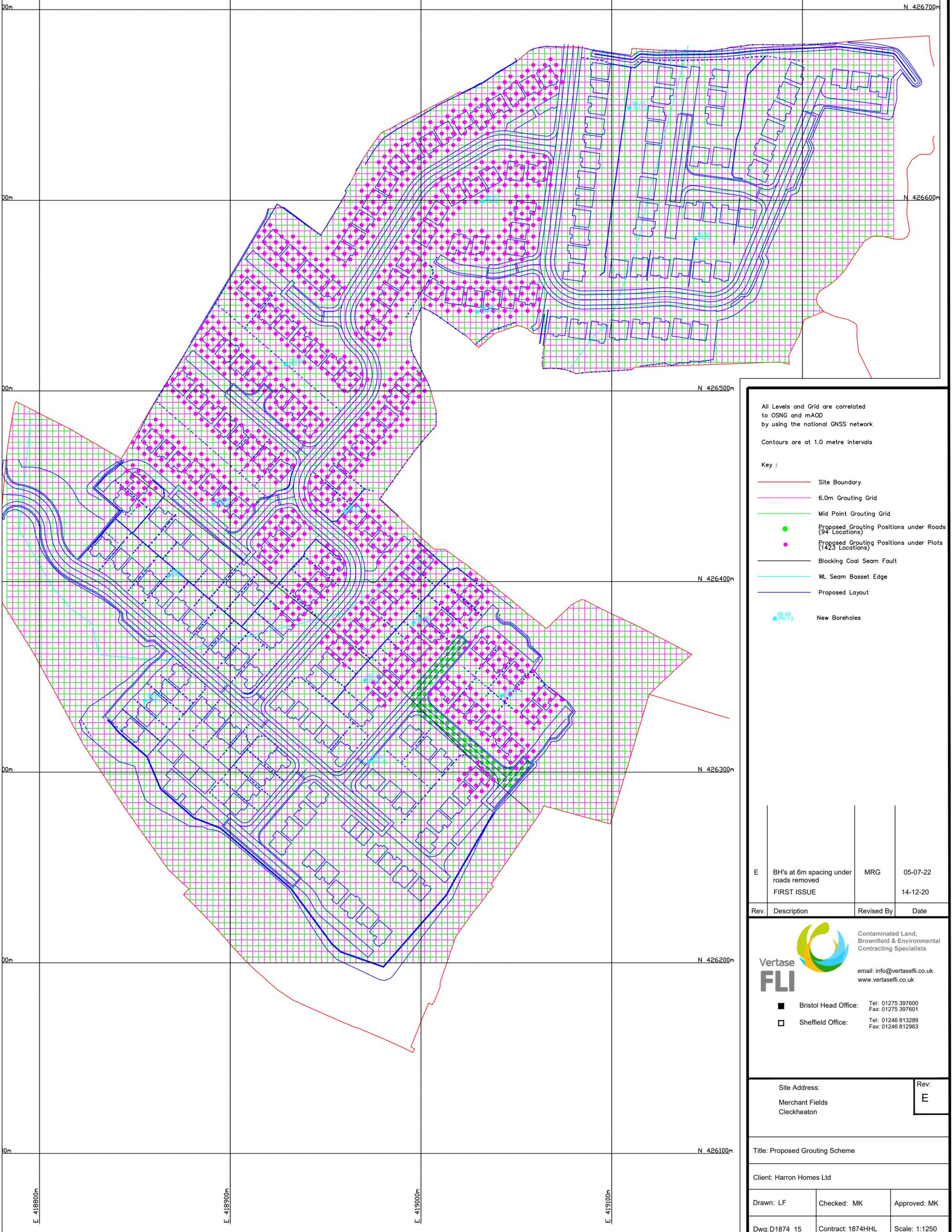
Site Address:	<b>Merchant Fields Cleckheaton</b>	Rev:	<b>B</b>
---------------	--	------	----------

Title: **Wheatley Lime Coal Seam & Cropping Excavation**

Client: **Harron Homes Ltd**

Drawn By: LF	Checked By: CL	Approved By: CL
Drawing No: D1874 HHL_012b	Contract No: 1874 HHL	Scale: A2 @ 1:1250





All Levels and Grid are correlated to OSNG and mAOD by using the national GNSS network

Contours are at 1.0 metre intervals

Key :

- Site Boundary
- 6.0m Grouting Grid
- Mid Point Grouting Grid
- Proposed Grouting Positions under Roads (94 Locations)
- Proposed Grouting Positions under Plots (1423 Locations)
- Blocking Coal Seam Fault
- WL Seam Basset Edge
- Proposed Layout
- 88 59 13 New Boreholes

E	BH's at 6m spacing under roads removed FIRST ISSUE	MRG	05-07-22 14-12-20
Rev.	Description	Revised By	Date

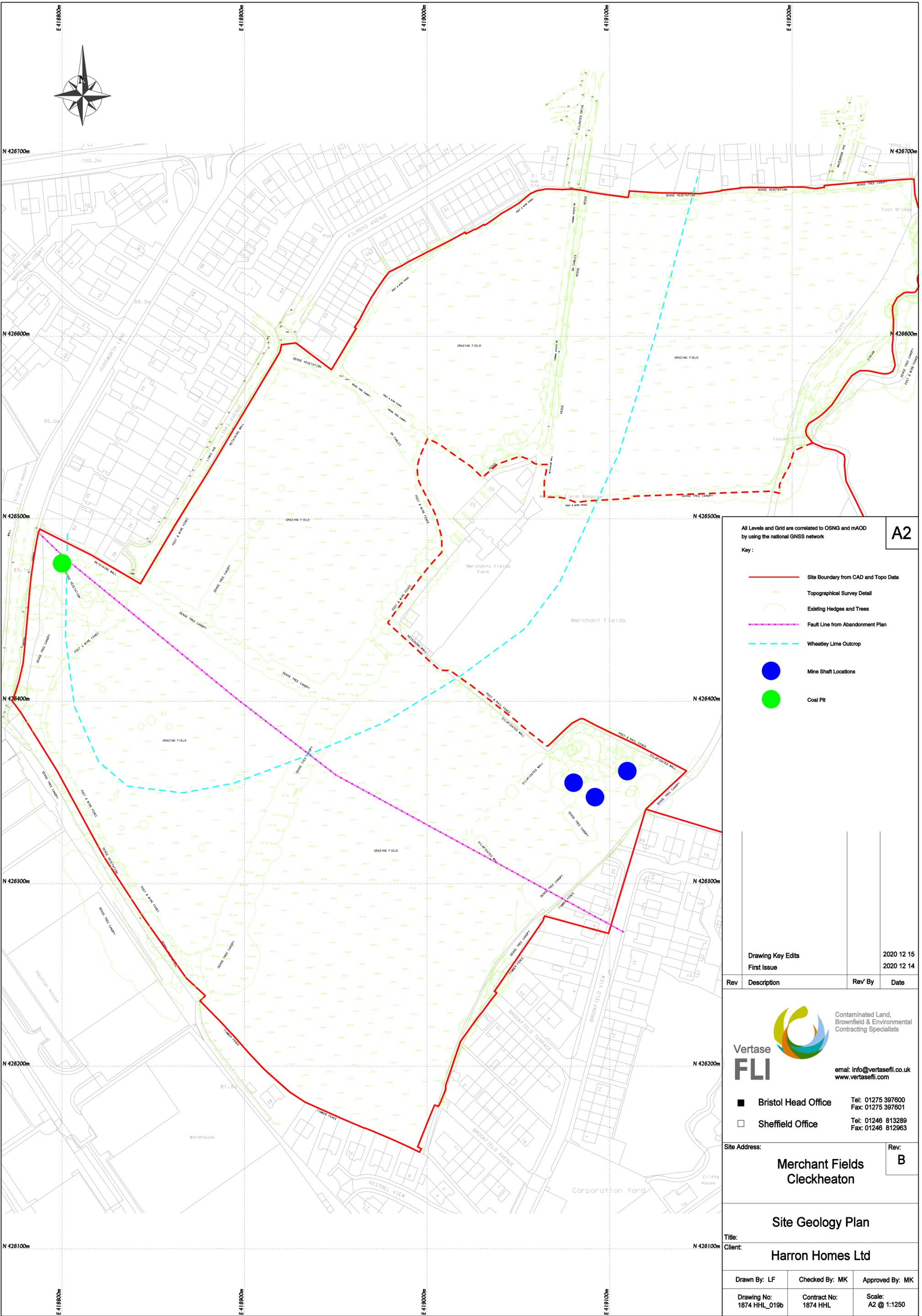
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 Fax: 01246 812963

Site Address: Merchant Fields Cleckheaton	Rev: <b>E</b>	
Title: Proposed Grouting Scheme		
Client: Harron Homes Ltd		
Drawn: LF	Checked: MK	Approved: MK
Dwg: D1874_15	Contract: 1874HHL	Scale: 1:1250





All Levels and Grid are correlated to OSNG and mAOD by using the national GNSS network

A2

- Key:
- Site Boundary from CAD and Topo Data
  - Topographical Survey Detail
  - Existing Hedges and Trees
  - - - Fault Line from Abandonment Plan
  - - - Wheatly Lime Outcrop
  - Mine Shaft Locations
  - Coal Pit

Drawing Key Edits	2020 12 15
First Issue	2020 12 14

Rev	Description	Rev' By	Date
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 □ Sheffield Office Tel: 01246 813289 Fax: 01246 812963

Site Address: **Merchant Fields Cleckheaton**

Rev: **B**

Title: **Site Geology Plan**

Client: **Harron Homes Ltd**

Drawn By: LF	Checked By: MK	Approved By: MK
Drawing No: 1874 HHL_019b	Contract No: 1874 HHL	Scale: A2 @ 1:1250

# **Appendix B**

## Borehole and Trial Pit Logs



No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH1**

Sheet 1 of 3

Project Name:	Merchant Fields, Cleckheaton	Project No. 1874HHL	Co-ords:	419042.54 - 426340.14	Hole Type RC
Location:	Kilroyd Drive, Cleckheaton		Level:	87.61	Scale 1:50
Client:	Harron Homes Limited		Dates:	28/10/2020 - 29/10/2020	Logged By

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							0.30	87.31		Loose black slightly gravelly very clayey SAND (TOPSOIL).	
										CLAY	1
							1.50	86.11		SANDSTONE	2
							3.50	84.11		MUDSTONE	3
							5.00	82.61		No Recovery.	4
		5.00 - 8.00		81	39	32	5.59	82.02		Very weak-Moderate Strong thinly laminated grey MUDSTONE. Variable weathering throughout from partially to highly weathered.	5
							8.00	79.61		No Recovery.	6
							8.10	79.51		Strong grey fine grained SANDSTONE.	7
							8.36	79.25		No Recovery.	8
		8.00 - 11.00		52	12	1					9
							9.62	77.99		Soft-Firm dark grey gravelly CLAY. Gravel of subangular-angular fine-medium mudstone	10

Continued on Next Sheet

Remarks





No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH1**

Sheet 2 of 3

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	419042.54 - 426340.14	Hole Type	RC
Location:	Kilroyd Drive, Cleckheaton			Level:	87.61	Scale	1:50
Client:	Harron Homes Limited			Dates:	28/10/2020 - 29/10/2020	Logged By	

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							10.16	77.45		Soft-Firm dark grey gravelly CLAY. Gravel of subangular-angular fine-medium mudstone	
		11.00 - 14.00		88	65	11	11.95	75.66		Moderate Strong thin laminated dark grey MUDSTONE with frequent laminations of very dark grey shale, increasing with depth. Becoming weaker with depth. 10.83-11.03 NR 11.10-11.24 NR 11.43-11.54 NR	11
							12.25	75.36		Very weak-Weak black COAL predominantly recovered as medium gravel. 12.03-12.24 NI	12
		14.00 - 17.00		99	74	38				Moderate Strong thin laminated dark grey MUDSTONE with frequent laminations of very dark grey shale.	13
							17.00	70.61		No Recovery.	17
		17.00 - 20.00		32	23	12	18.84	68.77		Very Weak-Weak thin laminated dark grey MUDSTONE with frequent laminations of shale with traces of coal at 19.55-19.80. 19.80-20.70 NR.	19
										Continued on Next Sheet	20

Remarks





No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH1**

Sheet 3 of 3

Project Name: Merchant Fields, Cleckheaton      Project No. 1874HHL      Co-ords: 419042.54 - 426340.14      Hole Type RC

Location: Kilroyd Drive, Cleckheaton      Level: 87.61      Scale 1:50

Client: Harron Homes Limited      Dates: 28/10/2020 - 29/10/2020      Logged By

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		20.00 - 23.00		75	60	45	20.70	66.91		Very Weak-Weak thinly laminated dark grey MUDSTONE with frequent laminations of shale with traces of coal at 19.55-19.80. 19.80-20.70 NR.	21
										Moderate Strong-Strong thinly laminated MUDSTONE with occasional laminations of shale.	22
							23.00	64.61		End of Borehole at 23.00m	23
											24
											25
											26
											27
											28
											29
											30

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH2**

Sheet 1 of 5

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	418971E - 426348N	Hole Type	RO
Location:	Kilroyd Drive, Cleckheaton			Level:	90.38	Scale	1:50
Client:	Harron Homes Limited			Dates:	30/10/2020	Logged By	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					1.00	89.38		CLAY	1
								SANDSTONE	2
					3.00	87.38		MUDSTONE	3
									4
									5
									6
									7
									8
									9
									10

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH2**

Sheet 2 of 5

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418971E - 426348N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 90.38

Scale  
1:50

Client: Harron Homes Limited

Dates: 30/10/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		11
					13.50	76.88	COAL		14
					14.70	75.68	MUDSTONE with SANDSTONE bands.		15
									16
									17
									18
									19
									20

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH2**

Sheet 3 of 5

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418971E - 426348N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 90.38

Scale  
1:50

Client: Harron Homes Limited

Dates: 30/10/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE with SANDSTONE bands.		
								21	
								22	
								23	
								24	
								25	
								26	
				26.70	63.68		SANDSTONE	27	
				28.00	62.38		MUDSTONE	28	
								29	
								30	

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH2**

Sheet 4 of 5

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418971E - 426348N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 90.38

Scale  
1:50

Client: Harron Homes Limited

Dates: 30/10/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								MUDSTONE	31
									32
									33
									34
									35
									36
									37
					37.80	52.58			
					38.00	52.38	COAL		
								MUDSTONE with SANDSTONE bands.	38
									39
									40

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
Bristol Road  
Portishead  
Bristol  
BS20 6PN

# Borehole Log

Borehole No.

**BH2**

Sheet 5 of 5

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418971E - 426348N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 90.38

Scale  
1:50

Client: Harron Homes Limited

Dates: 30/10/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE with SANDSTONE bands.		
								41	
								42	
								43	
								44	
								45	
								46	
								47	
				48.00	42.38		End of Borehole at 48.00m	48	
								49	
								50	

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH3**

Sheet 1 of 3

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418996E - 426378N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 90.98

Scale  
1:50

Client: Harron Homes Limited

Dates: 30/10/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							CLAY		1
					1.50	89.48	SANDSTONE		2
					3.00	87.98	MUDSTONE		3
									4
									5
									6
									7
									8
									9
									10

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH3**

Sheet 2 of 3

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418996E - 426378N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 90.98

Scale  
1:50

Client: Harron Homes Limited

Dates: 30/10/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		11
									12
									13
									14
									15
					16.50	74.48	COAL		16
									17
					17.50	73.48	MUDSTONE		18
									19
									20

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
Bristol Road  
Portishead  
Bristol  
BS20 6PN

# Borehole Log

Borehole No.

**BH3**

Sheet 3 of 3

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418996E - 426378N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 90.98

Scale  
1:50

Client: Harron Homes Limited

Dates: 30/10/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
							MUDSTONE		21	
					22.00	68.98		Soft Ground with coal traces.		22
					23.00	67.98		MUDSTONE		23
										24
										25
										26
					27.00	63.98		End of Borehole at 27.00m		27
										28
										29
										30

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH4**

Sheet 1 of 5

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	418960E - 426437N	Hole Type	RO
Location:	Kilroyd Drive, Cleckheaton			Level:	98.13	Scale	1:50
Client:	Harron Homes Limited			Dates:	26/10/2020	Logged By	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
							SANDY CLAY		1	
					4.00	94.12		MUDSTONE		4
					4.50	93.62		MUDSTONE with coal traces.		5
					5.00	93.12		MUDSTONE		6
					6.20	91.92		COAL		7
					6.50	91.62		MUDSTONE		8
										9
										10

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH4**

Sheet 2 of 5

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	418960E - 426437N	Hole Type	RO
Location:	Kilroyd Drive, Cleckheaton			Level:	98.13	Scale	1:50
Client:	Harron Homes Limited			Dates:	26/10/2020	Logged By	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					10.40	87.72		MUDSTONE	
								SANDSTONE	11
					12.00	86.12		MUDSTONE	12
					12.90 13.00	85.22 85.12		COAL	13
								MUDSTONE	14
									15
									16
					16.50	81.62		Solid strata, no returns.	17
									18
									19
									20

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH4**

Sheet 3 of 5

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418960E - 426437N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 98.13

Scale  
1:50

Client: Harron Homes Limited

Dates: 26/10/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Solid strata, no returns.		
								21	
								22	
								23	
								24	
								25	
								26	
								27	
								28	
								29	
								30	

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH4**

Sheet 4 of 5

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418960E - 426437N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 98.13

Scale  
1:50

Client: Harron Homes Limited

Dates: 26/10/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Solid strata, no returns.		
								31	
								32	
								33	
								34	
								35	
								36	
								37	
								38	
								39	
								40	

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH4**

Sheet 5 of 5

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418960E - 426437N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 98.13

Scale  
1:50

Client: Harron Homes Limited

Dates: 26/10/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
							Solid strata, no returns.	
					42.00	56.12	End of Borehole at 42.00m	



Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
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 BS20 6PN

# Borehole Log

Borehole No.

**BH5**

Sheet 1 of 4

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	418868E - 426403N	Hole Type	RO
Location:	Kilroyd Drive, Cleckheaton			Level:	96.41	Scale	1:50
Client:	Harron Homes Limited			Dates:	02/11/2020	Logged By	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					1.00	95.41		CLAY	1
								SANDSTONE	2
					4.50	91.91		MUDSTONE	5
					6.70	89.71		COAL	7
					7.20	89.21		MUDSTONE	8
									9
									10

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH5**

Sheet 2 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418868E - 426403N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 96.41

Scale  
1:50

Client: Harron Homes Limited

Dates: 02/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								MUDSTONE	11
									12
									13
									14
									15
					16.60	79.81	■	COAL	17
					17.60	78.81		MUDSTONE	18
					19.00	77.41	■	COAL	19
					19.10	77.31		MUDSTONE	19
									20

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH5**

Sheet 3 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418868E - 426403N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 96.41

Scale  
1:50

Client: Harron Homes Limited

Dates: 02/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		
								21	
								22	
								23	
								24	
								25	
								26	
								27	
								28	
								29	
								30	

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
Bristol Road  
Portishead  
Bristol  
BS20 6PN

# Borehole Log

Borehole No.

**BH5**

Sheet 4 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418868E - 426403N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 96.41

Scale  
1:50

Client: Harron Homes Limited

Dates: 02/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		31
					34.70	61.71	COAL		35
					35.90	60.51	MUDSTONE with hard SANDSTONE bands.		36
					39.00	57.41	End of Borehole at 39.00m		39
									40

Remarks





No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH6**

Sheet 1 of 5

Project Name:	Merchant Fields, Cleckheaton	Project No. 1874HHL	Co-ords:	418891.30 - 426440.42	Hole Type RC
Location:	Kilroyd Drive, Cleckheaton		Level:	99.20	Scale 1:50
Client:	Harron Homes Limited		Dates:	02/11/2020 - 04/11/2020	Logged By

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							0.90	98.30		CLAY	
										SANDSTONE	1
							3.40	95.80		MUDSTONE	2
											3
							5.80	93.40		COAL	4
							6.30	92.90		MUDSTONE	5
							7.60	91.60		COAL	6
							7.70	91.50		MUDSTONE	7
											8
											9
											10

Continued on Next Sheet

Remarks





No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH6**

Sheet 2 of 5

Project Name: Merchant Fields, Cleckheaton      Project No. 1874HHL      Co-ords: 418891.30 - 426440.42      Hole Type RC

Location: Kilroyd Drive, Cleckheaton      Level: 99.20      Scale 1:50

Client: Harron Homes Limited      Dates: 02/11/2020 - 04/11/2020      Logged By

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
										MUDSTONE	11
		15.00 - 18.00		94	59	38	15.00	84.20		Weak-Moderate Strong thinly laminated dark grey MUDSTONE. 15.00-15.11 NI 15.28-15.46 NI 16.30-16.50 NI 16.98-17.12 NI 18.0-18.32 Weathered to gravelly clay. 19.22-19.76 NR	15
		18.00 - 21.00		81	47	14					19
										Continued on Next Sheet	20

Remarks





No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH6**

Sheet 3 of 5

Project Name: Merchant Fields, Cleckheaton      Project No. 1874HHL      Co-ords: 418891.30 - 426440.42      Hole Type RC

Location: Kilroyd Drive, Cleckheaton      Level: 99.20      Scale 1:50

Client: Harron Homes Limited      Dates: 02/11/2020 - 04/11/2020      Logged By

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							21.00	78.20		Weak-Moderate Strong thinly laminated dark grey MUDSTONE. 15.00-15.11 NI 15.28-15.46 NI 16.30-16.50 NI 16.98-17.12 NI 18.0-18.32 Weathered to gravelly clay. 19.22-19.76 NR MUDSTONE with SANDSTONE bands.	21
		26.00 - 29.00		100	62	41	26.00	73.20		Weak-Strong thinly laminated, locally partially weathered, dark grey MUDSTONE with laminations commonly shale or shaley mudstone. 26.00-26.07 NI 26.16-26.28 NI 27.29-27.59 NI	26
							29.00	70.20		No recovery (observed to be hard during drilling).	29
							29.92	69.28			30

Continued on Next Sheet

Remarks





No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH6**

Sheet 4 of 5

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	418891.30 - 426440.42	Hole Type	RC
Location:	Kilroyd Drive, Cleckheaton			Level:	99.20	Scale	1:50
Client:	Harron Homes Limited			Dates:	02/11/2020 - 04/11/2020	Logged By	

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		29.00 - 32.00		60	16	11	30.72	68.48		Soft dark grey slightly sandy gravelly CLAY. Gravel of subangular-angular fine-medium mudstone and shale. 30.33-30.50 NR	
							31.46	67.74		Weak-Moderate Strong thinly laminated, locally highly weathered to clay, dark grey MUDSTONE with laminations commonly shale.	31
		32.00 - 35.00		100	72	44	32.00	67.20		Very Weak black COAL, predominantly recovered as medium-coarse angular gravel (NI).	
							32.26	66.94		Stiff-Very Stiff dark grey very gravelly CLAY. Gravel of subangular-angular fine-medium shale, mudstone and coal.	32
							32.63	66.57		Dense black GRAVEL of coal.	
							33.74	65.46		Moderate Strong thinly laminated partially weathered dark grey MUDSTONE with frequent laminations of shale/shaley mudstone.	33
							34.70	64.50		Moderate Strong-Strong thinly laminated grey MUDSTONE.	34
							39.00	60.20		Very Strong grey brown fine grained SANDSTONE.	35
										MUDSTONE with hard SANDSTONE bands.	39
										Continued on Next Sheet	40

Remarks





No.1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 BS20 6PN

# Rotary Core Log

Borehole No.

**BH6**

Sheet 5 of 5

Project Name: Merchant Fields, Cleckheaton      Project No. 1874HHL      Co-ords: 418891.30 - 426440.42      Hole Type RC

Location: Kilroyd Drive, Cleckheaton      Level: 99.20      Scale 1:50

Client: Harron Homes Limited      Dates: 02/11/2020 - 04/11/2020      Logged By

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							42.00	57.20		MUDSTONE with hard SANDSTONE bands.	41
										End of Borehole at 42.00m	42
											43
											44
											45
											46
											47
											48
											49
											50

Remarks





No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH7**

Sheet 1 of 4

Project Name:	Merchant Fields, Cleckheaton	Project No. 1874HHL	Co-ords:	418929.15 - 426513.81	Hole Type RC
Location:	Kilroyd Drive, Cleckheaton		Level:	100.92	Scale 1:50
Client:	Harron Homes Limited		Dates:	04/11/2020 - 05/11/2020	Logged By

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							1.50	99.42		CLAY	1
							3.50	97.42		SANDSTONE	2
							8.10	92.82		MUDSTONE	4
							9.30	91.62		COAL	8
										MUDSTONE	9
Continued on Next Sheet											10

Remarks





No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH7**

Sheet 2 of 4

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	418929.15 - 426513.81	Hole Type	RC
Location:	Kilroyd Drive, Cleckheaton			Level:	100.92	Scale	1:50
Client:	Harron Homes Limited			Dates:	04/11/2020 - 05/11/2020	Logged By	

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
										MUDSTONE	
		18.00 - 21.00		100	43	17	18.00	82.92		Weak-Moderate Strong thinly laminated dark grey MUDSTONE weith frequent laminations of shale/shaley mudstone. 21.00-21.51 NR 21.51-21.63 NI 22.28-22.41 NI 22.45-22.50 NR 22.62-22.83 NI 22.93-23.17 NI	11 12 13 14 15 16 17 18 19 20
Continued on Next Sheet											

Remarks





No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH7**

Sheet 3 of 4

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	418929.15 - 426513.81	Hole Type	RC
Location:	Kilroyd Drive, Cleckheaton			Level:	100.92	Scale	1:50
Client:	Harron Homes Limited			Dates:	04/11/2020 - 05/11/2020	Logged By	

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		21.00 - 24.00		81	36	26	24.00	76.92		Weak-Moderate Strong thinly laminated dark grey MUDSTONE weith frequent laminations of shale/shaley mudstone. 21.00-21.51 NR 21.51-21.63 NI 22.28-22.41 NI 22.45-22.50 NR 22.62-22.83 NI 22.93-23.17 NI	21 22 23 24 25 26 27 28 29 30
										MUDSTONE	
							27.60	73.32		COAL	
							28.80	72.12		MUDSTONE with SANDSTONE bands.	
Continued on Next Sheet											

Remarks





No.1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 BS20 6PN

# Rotary Core Log

Borehole No.

**BH7**

Sheet 4 of 4

Project Name: Merchant Fields, Cleckheaton      Project No. 1874HHL      Co-ords: 418929.15 - 426513.81      Hole Type RC

Location: Kilroyd Drive, Cleckheaton      Level: 100.92      Scale 1:50

Client: Harron Homes Limited      Dates: 04/11/2020 - 05/11/2020      Logged By

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
										MUDSTONE with SANDSTONE bands.	31
											32
											33
											34
											35
							36.00	64.92			36
										End of Borehole at 36.00m	37
											38
											39
											40

Remarks





No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH8**

Sheet 1 of 4

Project Name: Merchant Fields, Cleckheaton      Project No. 1874HHL      Co-ords: 419032.13 - 426599.42      Hole Type RC

Location: Kilroyd Drive, Cleckheaton      Level: 99.95      Scale 1:50

Client: Harron Homes Limited      Dates: 06/11/2020 - 09/11/2020      Logged By

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							1.00	98.95		CLAY	1
							3.50	96.45		SANDSTONE	2
										MUDSTONE	3
							7.00	92.95		COAL	4
							7.60	92.35		MUDSTONE	5
							9.00	90.95		COAL	6
							9.10	90.85		MUDSTONE	7
Continued on Next Sheet											8
											9
											10

Remarks





No.1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 BS20 6PN

# Rotary Core Log

Borehole No.

**BH8**

Sheet 2 of 4

Project Name: Merchant Fields, Cleckheaton      Project No. 1874HHL      Co-ords: 419032.13 - 426599.42      Hole Type RC

Location: Kilroyd Drive, Cleckheaton      Level: 99.95      Scale 1:50

Client: Harron Homes Limited      Dates: 06/11/2020 - 09/11/2020      Logged By

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							20.00	79.95		MUDSTONE	11
											12
											13
											14
											15
											16
											17
											18
											19
											20

Continued on Next Sheet

Remarks





No.1 Middle Bridge Business Park  
Bristol Road  
Portishead  
BS20 6PN

# Rotary Core Log

Borehole No.

**BH8**

Sheet 3 of 4

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	419032.13 - 426599.42	Hole Type	RC
Location:	Kilroyd Drive, Cleckheaton			Level:	99.95	Scale	1:50
Client:	Harron Homes Limited			Dates:	06/11/2020 - 09/11/2020	Logged By	

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		20.00 - 23.00								No recovery. Core liner unable to be extracted from barrel, drilling observed solid strata.	21
		23.00 - 26.00		81	54	20	23.00	76.95		Moderate Strong thinly laminated dark grey MUDSTONE. 23.20-23.69 NR 23.09-23.20 NI 24.11-24.17 NI	23
							25.33	74.62		Weak dark grey partially weathered MUDSTONE.	
							25.56	74.39		Moderate Strong thinly laminated dark grey MUDSTONE.	
							26.00	73.95		25.90-26.00 NI MUDSTONE	26
							26.90	73.05		COAL	27
							27.50	72.45		MUDSTONE	28
							29.00	70.95		Moderate Strong thinly laminated dark grey MUDSTONE. 29.00-29.15 NR 29.60-30.50 NR	29
Continued on Next Sheet											30

Remarks





No.1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 BS20 6PN

# Rotary Core Log

Borehole No.

**BH8**

Sheet 4 of 4

Project Name: Merchant Fields, Cleckheaton      Project No. 1874HHL      Co-ords: 419032.13 - 426599.42      Hole Type RC

Location: Kilroyd Drive, Cleckheaton      Level: 99.95      Scale 1:50

Client: Harron Homes Limited      Dates: 06/11/2020 - 09/11/2020      Logged By

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		29.00 - 32.00		64	44	16				Moderate Strong thinly laminated dark grey MUDSTONE. 29.00-29.15 NR 29.60-30.50 NR	31
							32.00	67.95			32
											33
											34
											35
										End of Borehole at 36.00m	36
											37
											38
											39
											40

Remarks





No. 1 Middle Bridge Business Park  
Bristol Road  
Portishead  
Bristol  
BS20 6PN

# Borehole Log

Borehole No.

**BH9**

Sheet 1 of 3

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 419144E - 426580N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 90.93

Scale  
1:50

Client: Harron Homes Limited

Dates: 09/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					1.00	89.92		CLAY	1
								SANDSTONE	2
								MUDSTONE	3
					4.00	86.92		MUDSTONE	4
								MUDSTONE	5
								MUDSTONE	6
								MUDSTONE	7
								MUDSTONE	8
								MUDSTONE	9
								MUDSTONE	10

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH9**

Sheet 2 of 3

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 419144E - 426580N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 90.93

Scale  
1:50

Client: Harron Homes Limited

Dates: 09/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		11
									12
									13
									14
									15
					16.50	74.42	■	COAL	
					17.00	73.92		MUDSTONE	17
									18
									19
									20

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH9**

Sheet 3 of 3

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 419144E - 426580N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 90.93

Scale  
1:50

Client: Harron Homes Limited

Dates: 09/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		21
					24.00	66.92	COAL		24
					25.30	65.62	MUDSTONE with SANDSTONE bands.		25
					27.00	63.92	End of Borehole at 27.00m		27
									28
									29
									30

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH10**

Sheet 1 of 4

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	418973E - 426306N	Hole Type	RO
Location:	Kilroyd Drive, Cleckheaton			Level:	88.27	Scale	1:50
Client:	Harron Homes Limited			Dates:	10/11/2020	Logged By	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.50	87.77		CLAY	
								SANDSTONE	1
					3.00	85.27		MUDSTONE	2
									3
									4
					6.60	81.67		COAL	5
									6
					8.00	80.27		MUDSTONE	7
									8
					9.40	78.87		COAL	9
					9.50	78.77		MUDSTONE	10
								Continued on Next Sheet	

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH10**

Sheet 2 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418973E - 426306N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 88.27

Scale  
1:50

Client: Harron Homes Limited

Dates: 10/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		
								11	
								12	
								13	
								14	
								15	
								16	
								17	
								18	
								19	
								20	

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH10**

Sheet 3 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418973E - 426306N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 88.27

Scale  
1:50

Client: Harron Homes Limited

Dates: 10/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								MUDSTONE	
									21
									22
									23
									24
									25
									26
									27
					27.80 27.90	60.47 60.37		COAL MUDSTONE	28
									29
									30

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH10**

Sheet 4 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418973E - 426306N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 88.27

Scale  
1:50

Client: Harron Homes Limited

Dates: 10/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		31
					32.00	56.27	COAL		32
					33.20	55.07	MUDSTONE		33
					34.20	54.07		End of Borehole at 34.20m	34
									35
									36
									37
									38
									39
									40

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
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# Borehole Log

Borehole No.

**BH11**

Sheet 1 of 4

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	418855E - 426338N	Hole Type	RO
Location:	Kilroyd Drive, Cleckheaton			Level:	89.84	Scale	1:50
Client:	Harron Homes Limited			Dates:	02/11/2020	Logged By	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.70	89.14		CLAY	
								SANDSTONE	1
					3.90	85.94		MUDSTONE	4
					6.00	83.84		COAL	6
					6.50	83.34		MUDSTONE	7
									8
									9
									10

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH11**

Sheet 2 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418855E - 426338N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 89.84

Scale  
1:50

Client: Harron Homes Limited

Dates: 02/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		
								11	
								12	
								13	
								14	
								15	
								16	
								17	
								18	
								19	
								20	

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH11**

Sheet 3 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418855E - 426338N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 89.84

Scale  
1:50

Client: Harron Homes Limited

Dates: 02/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		21
					21.90	67.94	COAL		22
					22.60	67.24	MUDSTONE		23
									24
									25
									26
									27
					27.50	62.34	COAL		28
					28.40	61.44	MUDSTONE with SANDSTONE bands.		29
									30

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
Bristol Road  
Portishead  
Bristol  
BS20 6PN

# Borehole Log

Borehole No.

**BH11**

Sheet 4 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 418855E - 426338N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 89.84

Scale  
1:50

Client: Harron Homes Limited

Dates: 02/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE with SANDSTONE bands.		
					35.00	54.84	End of Borehole at 35.00m		



Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH12**

Sheet 1 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 419109E - 426648N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 96.27

Scale  
1:50

Client: Harron Homes Limited

Dates: 10/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							CLAY		
				1.00	95.27		SANDSTONE	1	
				1.60	94.67		COAL		
				2.00	94.27		MUDSTONE with SANDSTONE bands.	2	
								3	
								4	
								5	
								6	
								7	
								8	
								9	
								10	

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH12**

Sheet 2 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 419109E - 426648N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 96.27

Scale  
1:50

Client: Harron Homes Limited

Dates: 10/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE with SANDSTONE bands.		
								11	
								12	
								13	
								14	
								15	
								16	
								17	
								18	
								19	
								20	

Continued on Next Sheet

Remarks







No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH12**

Sheet 4 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 419109E - 426648N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 96.27

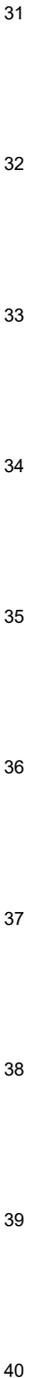
Scale  
1:50

Client: Harron Homes Limited

Dates: 10/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					30.10	66.17		COAL	
								MUDSTONE with SANDSTONE bands.	
					35.00	61.27		End of Borehole at 35.00m	



Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH13**

Sheet 1 of 4

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	419030E - 426541N	Hole Type	RO
Location:	Kilroyd Drive, Cleckheaton			Level:	99.59	Scale	1:50
Client:	Harron Homes Limited			Dates:	05/11/2020	Logged By	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					1.20	98.39		CLAY	1
					3.50	96.09		SANDSTONE	2
					5.50	94.09		MUDSTONE	4
					6.00	93.59		COAL	6
								MUDSTONE	7
									8
									9
									10

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH13**

Sheet 2 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 419030E - 426541N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 99.59

Scale  
1:50

Client: Harron Homes Limited

Dates: 05/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		
								11	
								12	
								13	
								14	
								15	
								16	
								17	
								18	
								19	
								20	

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
 Bristol Road  
 Portishead  
 Bristol  
 BS20 6PN

# Borehole Log

Borehole No.

**BH13**

Sheet 3 of 4

Project Name:	Merchant Fields, Cleckheaton	Project No.	1874HHL	Co-ords:	419030E - 426541N	Hole Type	RO
Location:	Kilroyd Drive, Cleckheaton			Level:	99.59	Scale	1:50
Client:	Harron Homes Limited			Dates:	05/11/2020	Logged By	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MUDSTONE		21
									22
									23
									24
					25.00	74.59	COAL		25
					25.60	73.99	MUDSTONE		26
									27
									28
					29.00	70.59		Broken ground with coal traces (partial returns).	29
									30

Continued on Next Sheet

Remarks





No. 1 Middle Bridge Business Park  
Bristol Road  
Portishead  
Bristol  
BS20 6PN

# Borehole Log

Borehole No.

**BH13**

Sheet 4 of 4

Project Name: Merchant Fields, Cleckheaton

Project No.  
1874HHL

Co-ords: 419030E - 426541N

Hole Type  
RO

Location: Kilroyd Drive, Cleckheaton

Level: 99.59

Scale  
1:50

Client: Harron Homes Limited

Dates: 05/11/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Broken ground with coal traces (partial returns).		31
					32.00	67.59	Solid strata (no returns).		32
									33
									34
									35
					36.00	63.59	End of Borehole at 36.00m		36
									37
									38
									39
									40

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E419011.42 N426417.13	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP1	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.30		Loose black slightly gravelly very clayey SAND (TOPSOIL).		
					1.10		Firm-Stiff orange brown mottled grey slightly gravelly sandy CLAY. Gravel of subangular-angular fine-coarse mudstone.	1	
					1.25		Very Weak black COAL.		
					1.40		Stiff grey mottled orange sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.		
							End of Borehole at 1.400m	2	
								3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E418971.75 N426392.54	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP2	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.25		Loose black slightly gravelly very clayey SAND (TOPSOIL).		
					0.85		Firm-Stiff orange brown mottled grey slightly gravelly sandy CLAY. Gravel of subangular-angular fine-coarse mudstone.		
					0.90		Very Weak black COAL.		
					1.10		Stiff grey mottled orange sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.	1	
							End of Borehole at 1.100m	2	
								3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks



# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E418960.06 N426383.71	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP3	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.20		Loose black slightly gravelly very clayey SAND (TOPSOIL).		
					0.60		Firm-Stiff orange brown mottled grey slightly gravelly sandy CLAY. Gravel of subangular-angular fine-coarse mudstone.		
					0.75		Very Weak black COAL.		
					1.10		Stiff grey mottled orange sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.	1	
							End of Borehole at 1.100m	2	
								3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E418883.55 N426365.89	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP4	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.30		Loose black slightly gravelly very clayey SAND (TOPSOIL).		
					1.70		Stiff orange brown sandy very gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.	1	
					2.60		Dense grey sandy very clayey GRAVEL of subangular-angular fine-coarse mudstone.	2	
					3.00		Very Weak highly weathered black COAL.		
					3.20		Dense grey sandy very clayey GRAVEL of subangular-angular fine-coarse mudstone.	3	
							End of Borehole at 3.200m	4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E418866.29 N426358.53	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP5	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.30		Soft black sandy CLAY (TOPSOIL).		
							Stiff orange brown mottled grey sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.	1	
					1.30		Very Weak black COAL with thin clay parting @ 1.35m-1.40m.		
					1.65		Stiff grey sandy very gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.		
					1.80		End of Borehole at 1.800m	2	
								3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E418835.83 N426361.04	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP6	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
							Soft black sandy CLAY (TOPSOIL).		
					0.35		Stiff orange brown mottled grey sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.		
					0.95		Very Weak black COAL.	1	
					1.20		Very Weak highly weathered grey SANDSTONE predominantly recovered as cobbles and gravel.		
					1.50		End of Borehole at 1.500m		
								2	
								3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks



# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E418827.80 N426377.59	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP7	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.35		Soft black sandy CLAY (TOPSOIL).		
					1.30		Stiff orange brown mottled grey sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.	1	
					2.00		Very Weak highly weathered grey MUDSTONE predominantly recovered as cobbles and gravel.		
					2.40		Very Weak black COAL.	2	
					3.00		Stiff grey mottled orange sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.		
							End of Borehole at 3.000m	3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E418816.75 N426385.62	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP8	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.30		Soft black sandy CLAY (TOPSOIL).		
					1.30		Stiff orange brown mottled grey sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.	1	
					2.30		Very Weak highly weathered grey MUDSTONE predominantly recovered as cobbles and gravel with traces of coal and shale.	2	
					2.90		Very Weak black COAL.		
					3.20		Stiff orange brown sandy very gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.	3	
							End of Borehole at 3.200m	4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E418806.79 N426397.17	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP9	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.30		Soft black sandy CLAY (TOPSOIL).		
					1.10		Stiff grey mottled orange brown slightly sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.	1	
					1.50		Very Weak black COAL.		
					1.90		Stiff orange brown sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.		
							End of Borehole at 1.900m	2	
								3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks



# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E418806.36 N426435.58	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP10	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.30		Soft black sandy CLAY (TOPSOIL).		
					1.10		Stiff orange brown mottled grey sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.	1	
					3.00		Very Weak highly weathered grey MUDSTONE predominantly recovered as cobbles and gravel.	2	
							End of Borehole at 3.000m	3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E418825.10 N426441.60	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP11	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.30		Soft black sandy CLAY (TOPSOIL).		
					1.00		Stiff orange brown mottled grey sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.	1	
					4.00		Very Weak highly weathered grey MUDSTONE with shale bands, predominantly recovered as cobbles and gravel.	2 3	
							End of Borehole at 4.000m	4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 11/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E418795.31 N426483.91	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP12	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.35		Soft black sandy CLAY (TOPSOIL).		
					1.00		Stiff orange brown mottled grey sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.	1	
					2.60		Very Weak highly weathered grey MUDSTONE predominantly recovered as cobbles and gravel.	2	
					3.15		Weak black COAL.	3	
					3.40		Very Weak highly weathered grey MUDSTONE predominantly recovered as cobbles and gravel.	4	
							End of Borehole at 3.400m	5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks



# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 12/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E419099.41 N426536.75	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP13	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.25		Loose black slightly gravelly very clayey SAND (TOPSOIL).		
					0.70		Loose brown slightly gravelly clayey SAND. Gravel of subangular-angular fine-coarse mudstone.		
					1.50		Soft-Firm orange brown mottled grey sandy CLAY.	1	
					1.70		Very Weak black COAL with thin clay parting.		
					2.10		Firm-Stiff brown mottled grey slightly gravelly sandy CLAY. Gravel of subangular-angular fine-coarse mudstone.	2	
							End of Borehole at 2.100m	3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 12/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E419113.14 N426574.69	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP14	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.30		Loose black slightly gravelly very clayey SAND (TOPSOIL).		
					0.90		Firm orange brown slightly gravelly slightly sandy CLAY. Gravel of subangular-angular fine-coarse mudstone.		
					1.20		Very Weak black COAL.	1	
					1.35		Firm-Stiff orange brown slightly sandy gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.		
					1.70		Very Weak black COAL.		
					1.80		Firm-Stiff grey mottled orange brown slightly sandy very gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.		
					2.00		End of Borehole at 2.000m	2	
								3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 12/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E419118.95 N426600.38	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP15	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.20		Loose black slightly gravelly very clayey SAND (TOPSOIL).		
					0.70		Loose orange brown slightly gravelly clayey SAND. Gravel of subangular-angular fine-coarse mudstone.		
					1.40		Firm-Stiff orange brown mottled grey sandy CLAY with rare gravel of angular fine-medium mudstone.	1	
					1.60		Very Weak black COAL.		
					2.00		Firm-Stiff orange brown sandy very gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.		
							End of Borehole at 2.000m	2	
								3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks





# Trial Pit Log

Project Name: Merchant Fields, Cleckheaton		Client: Harron Homes Limited		Date: 12/11/2020	
Location: Kilroyd Drive, Cleckheaton		Contractor: Groundsource Drilling and Contracting		Co-ords: E419133.67 N426656.42	
Project No. : 1874HHL		Crew Name:		Equipment: Zaxis 135US	
Location Number TP16	Location Type TP	Level	Logged By M Kelly	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Reference					
					0.25		Loose black slightly gravelly very clayey SAND (TOPSOIL).		
					0.85		Loose orange brown slightly gravelly clayey SAND. Gravel of subangular-angular fine-coarse mudstone.		
					1.35		Firm-Stiff orange brown mottled grey sandy CLAY with rare gravel of angular fine-medium mudstone.	1	
					1.45		Very Weak black COAL.		
					2.00		Firm-Stiff orange brown sandy very gravelly CLAY. Gravel of subangular-angular fine-coarse mudstone.		
							End of Borehole at 2.000m	2	
								3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks



# Appendix C

## Investigation Photographs



**Works**



**Works**



**Works**



**Site condition during works**



**Site condition during works**



**Site condition during works**



**TP1**



**TP1**



**TP2**



**TP2**



**TP3**



**TP3**



**TP4**



**TP4**



**TP5**



**TP5**



**TP6**



**TP6**



**TP7**



**TP7**



**TP8**



**TP8**



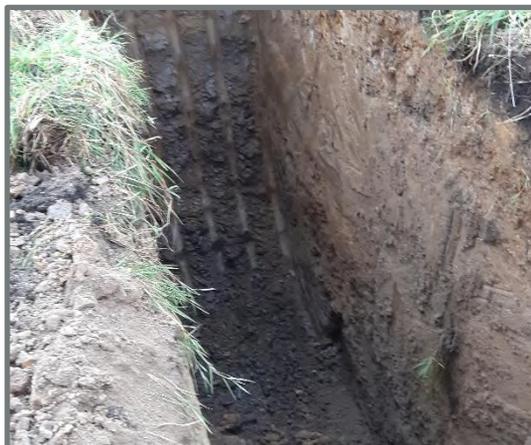
**TP9**



**TP9**



**TP10**



**TP10**



**TP12**



**TP12**



**TP13**



**TP13**



**TP14**



**TP15**



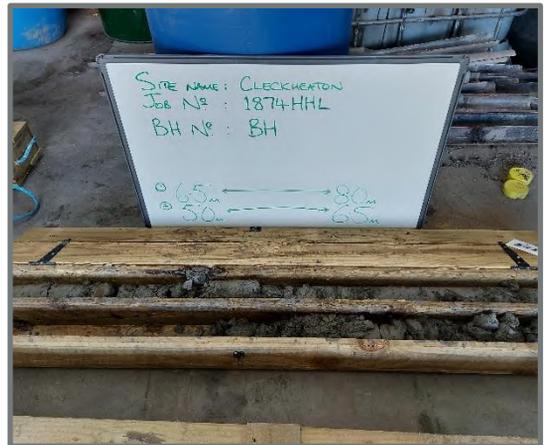
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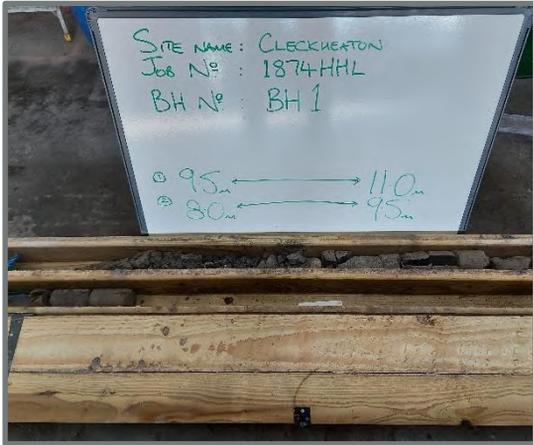
**TP16**



**TP16**



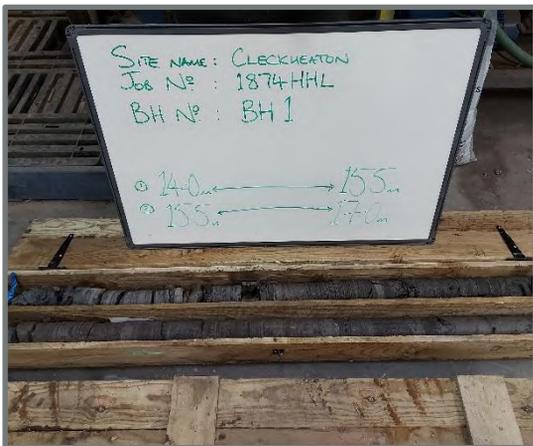
**BH1 5.0-8.0m**



**BH1 8.0-11.0m**



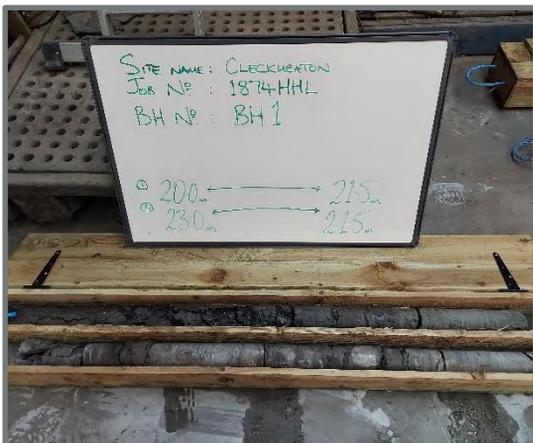
**BH1 11.0-14.0m**



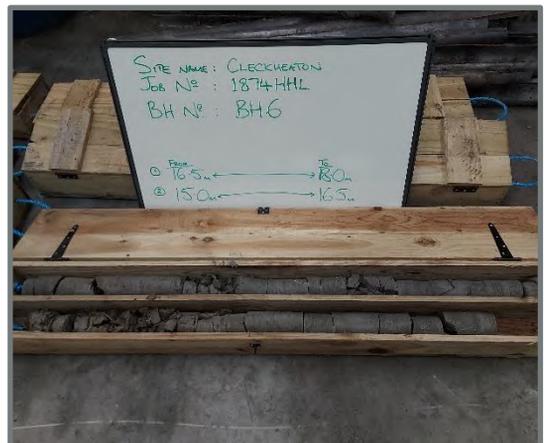
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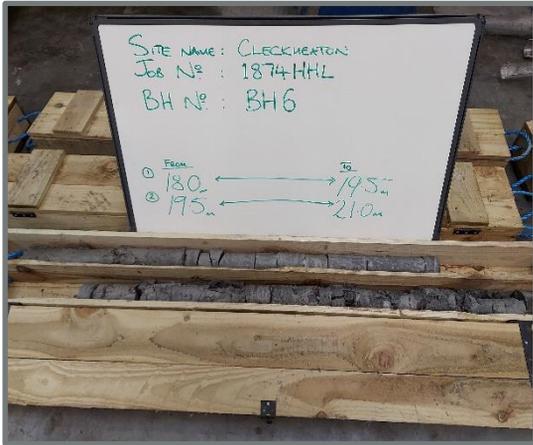
**BH1 17.0-20.0m**



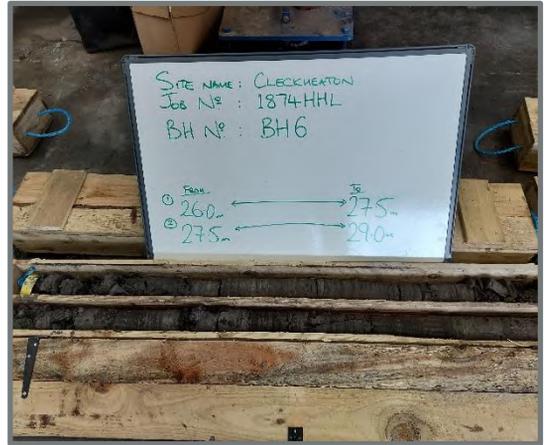
**BH1 20.0-23.0m**



**BH6 15.0-18m**



**BH6 18.0-21.0m**



**BH6 26.0-29.0m**



**BH6 29.0-32.0m**



**BH6 32.0-35.0m**



**BH7 18.0-21.0m**



**BH7 21.0-24.0m**



**BH8 23.0-26.0m**



**BH8 29.0-32.0m**



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