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FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY REPORT for ACCU STADIUM HOTEL, HUDDERSFIELD

Prepared on behalf of
Town Sports & Entertainment Group Limited

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Document Revisions

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Contents

1. EXECUTIVE SUMMARY

1.1. Summary

1.1.1. Clancy Consulting Ltd. has been commissioned by Town Sports & Entertainment Group Ltd (TS&EG) to prepare a Flood Risk Assessment & Drainage/SuDS Strategy for the Accu Stadium Hotel development at Stadium Way in Huddersfield, HD1 6PG.

Table 1.1-1 Executive Summary

Existing Site Usage & Constraints	Existing swimming pool and leisure centre
Existing Site Area & Impermeable Area (not infiltrating or stored for reuse)	7324m^2 (0.732Ha) & 2840m^2 (0.284Ha)
Topography	There is a lack of topographical information available for the area immediately surrounding the existing building footprint. Nonetheless, the adjacent levels to the North of the building are shown to be relatively flat with some localised areas of depression, likely at surface water collection features. To the south of the development the levels slope up very sharply from approximately 66.30m at the bottom of the bank to 91.00m at the top of the bank where the topo terminates.
Hydrology (Nearby Watercourse and/or Bodies of Water)	The site directly neighbours the River Colne, West Yorkshire, with the river being approximately 55m North West of the proposed building footprint.
Geology (Surface, Superficial strata, Bedrock strata)	Existing borehole logs taken from various locations at the Accu Stadium site indicate Made Ground down to approximately 6.00-7.00m bgl, which is then followed by either gravelly Clay or sandy Gravel.
Hydrogeology (Source Protection Zone, Water table, Infiltration testing)	Groundwater levels are dependent on proximity to River Colne, with levels ranging from 0.40-13.00mbgl. The site is not within a groundwater source protection zone. Infiltration testing has not been conducted for this site.
Drainage (Public & private)	The existing site utilises a piped gravity network for both the foul and surface water drainage, with the surface network discharging to the adjacent River Colne, and the foul network discharging to an existing Yorkshire Water pumping station.
Flood Risk – Fluvial (River)	The site is located within Flood Zone 3 and is therefore at a heightened risk of fluvial flooding due to the close proximity to the River Colne.
Flood Risk – Tidal, Surface Water (Overland), Ground Water, Artificial, Sewer and/or Historical	The River Colne is not tidal and therefore tidal flooding is low risk. Surface water flooding is shown to be at high risk within the area surrounding the building. Ground water is also a risk due to proximity to the River Colne. Flooding from artificial sources is low risk.
Proposed site Usage & Constraints	The existing leisure centre is to be demolished and replaced with a proposed 141 bed, 4 storey hotel with internal courtyard and leisure use at ground floor. As part of the works there will also be alterations to be stadium's North Stand.

	The constraints are the proximity to the River Colne and the existing ground levels.
Sequential Test	Not required
Exemption Test / Mitigation	Not required, but mitigation has been included.
Proposed Surface Water & SuDS Strategy	The proposed surface water network is to re-utilise the discharge to the River Colne, with the use of below ground attenuation crates and a flow control device to restrict flows to 50% of existing discharge rate.
Existing Discharge Rate(s) [1yr, 30yr & 100yr events] & Volume	24.1l/s, 59.0l/s, 76.1l/s, & 237.6m^3 (6hr, 100yr event)
Greenfield Discharge Rates [Qbar, 1yr, 30yr & 100yr events]	0.5l/s (Qbar), 0.4l/s (1yr), 0.9l/s (30yr), 1.0l/s (100yr)
Design Rates [1yr, 30yr, 30yr + CC, 100yr & 100yr +CC events] & Volume	12l/s (1yr), 12l/s (30yr), 12l/s (100yr), 12l/s (100yr + CC) & 237.6m^3 (6hr, 100yr event)
Climate change to be applied	45%
Proposed Foul Water Strategy	The proposed foul water network is to re-utilise the existing discharge to the Yorkshire Water pumping station via a piped gravity network – pending acceptance of proposed flows following completion of pre-development application.

2. INTRODUCTION

2.1. Commission

2.1.1. Clancy Consulting Ltd. has been commissioned by TS&EG to prepare a Flood Risk Assessment & Drainage/SuDS Strategy for the Accu Stadium Hotel development at Stadium Way in Huddersfield, HD1 6PG.

2.1.2. This report shall refer to the site in its predevelopment form (existing site) as the "Site", and the site & the proposed works as the "Development". A site location plan is provided in Appendix A.

2.2. Project Overview

2.2.1. The Site (existing site) currently is an empty and unused 2 storey swimming pool and leisure centre which is conjoined with the Accu Stadium, Huddersfield.

2.2.2. The Development (proposed site) is to demolish the existing leisure centre building and erect a new 141 bed, 4 storey hotel with internal courtyard in its place, including alterations to the existing North Stand. It is also proposed to reduce the footprint of the existing building to accommodate for increased turnstile capacity.

2.3. Objective

2.3.1. This report has been prepared in accordance with the National Planning Policy (NPPF), National SuDS Standards and the Lead Local Flood Authority (LLFA) Guidance.

2.3.2. The objective of this Report is to

- Assess the Site's characteristics & constraints
- Assess existing flood risks
- Complete Sequential Test and, if required, Exemption Test
- Provide any flood risk mitigation
- Apply the local LLFA SuDS hierarchy and National SuDS Standards to the proposed development to ensure that run off is managed in a way that avoids negative impacts of the development on flood risk, morphology and water quality of receiving waters, whilst taking into account Climate change allowances in accordance with the Environment Agency's (EA's) current guidance.
- Provide a drainage design that follows the principles set out in the National SuDS Standards and local LLFA Guidance.

3. SITE CHARACTERISTICS

3.1. Location

3.1.1. The site is located at Stadium Way in Huddersfield, as illustrated in figure 3.1-1 below (red arrow) with a location plan provided in Appendix A. The post code for the site is HD1 6PG with central coordinates of E, 415473 N, 417627. Kirklees District Council are the Local Planning Authority (LPA) and the Lead Local Flood Authority (LLFA) for this development.

Figure 3.1-1 Location Plan (Source: UK StreetMap)

3.2. Boundaries & Usage

3.2.1. Fig 3.2.2 shows an aerial view of the Site (indicate by the red boundary) and the surrounding area.

3.2.2. The Site is bounded by an existing cinema and associated car parking to the Northeast of the site. The site is adjacent to the River Colne which is approximately 55m Northwest of the proposed footprint of the Accu Hotel. The site is also bounded by an extensive wooded area to the Southeast, with the stadium adjoining the proposed site to the Southwest.

3.2.3. The Site is currently a two-storey swimming pool and leisure centre which is now empty and unused, and is conjoined to the proposed Accu Stadium at the developments Southwest boundary.

3.2.4. A detailed catchment plan for the existing site is provided in Appendix F. The planning application boundary is 7324m^2 (0.732ha), however the actual catchment boundary is 3,824m^2 (0.382ha). The reduction of catchment is due to the proposals only relating to updates to the existing building with the associated hardstanding

being retained as is. The hardstanding area has therefore been excluded from the calculations.

3.2.5. The existing site utilises a piped gravity network for both the foul and surface water drainage, with the surface discharging to the adjacent River Colne, and the foul network discharging to an existing Yorkshire Water pumping station. The ground conditions generally consist of made ground underlain by Gravel or Clay. Due to the presence of made ground, and the high-water table, infiltration has been discounted at the site.

Figure 3.2-2 Existing Aerial View (Source: Bing Maps)

3.3. Topography

3.3.1. A topographical survey has been completed and is provided in Appendix B.

3.3.2. There is a lack of topographical information available for the area immediately surrounding the existing building footprint. Nonetheless, the sitewide survey indicates levels adjacent to the North of the building are relatively flat with various localised areas of depression, which tie-in with existing surface water collection features that can be seen from google maps.

3.3.3. Adjacent to the site, on the Southern side of the Stadium complex is a wooded area which stretches approximately 100m to the Southeast. This area has an extreme downward slope from the top of the bank (90.00m AOD) to bottom of the bank (65.00m AOD), which terminates approximately 20m from the building footprint.

3.4. Hydrology

3.4.1. The published mapping from shows that the River Colne runs to the Northwest of the site and further to the Northwest is the Huddersfield Broad Canal.

3.4.2. The nearest watercourse or waterbody to the site shown on Main River mapping by Magic Maps, is approximately 55m Northwest of the building footprint. The Huddersfield Broad Canal is approximately 500m Northwest of the site. To the East of the site is Lees Beck which is approximately 1200m away.

3.5. Existing Drainage Public

3.5.1. Yorkshire Water are the incumbent sewerage authority for the area and copies of their asset records are provided in Appendix B. Their records indicate:

- There are no surface Yorkshire Water assets within close proximity to the site that would facilitate a connection. The closest manholes being approximately 220m Northwest, located within seemingly private development areas. Connection would also require crossing of the River Colne, which is not feasible.
- There are no foul Yorkshire Water assets within close proximity to the site that would facilitate a connection. However, there is a number of combined water assets in the surrounding area with the closest manholes being approximately 80m to the Northeast within Bradley Mills Road.

3.5.2. The combined Yorkshire Water pumping station which is proposed to be used as the ultimate outfall location for the foul water network is located approximately 65m North of the site within the footway adjacent to Bradley Mills Road.

3.6. Existing Drainage – Private

3.6.1. The existing private drainage has not been surveyed at this time, however based on drainage record drawings for the site, it is reasonable to state: The existing site utilises a piped gravity network for both the foul and surface water drainage, with the surface water discharging to the adjacent River Colne, and the foul network discharging to an existing Yorkshire Water pumping station.

3.7. Geology

3.7.1. Exerts of the site investigation completed by Dunelm, revision D8279/00, 26.01.18 is provided in Appendix C.

3.7.2. The site investigation conducted by Dunelm includes borehole logs taken from various locations at the Accu Stadium site, which indicate Made Ground of varying depths, in some cases down to approximately 7.00m bgl, which is then followed by either gravelly Clay or sandy Gravel. The made ground is generally made up of Sand and Gravel with various deposits of Clay.

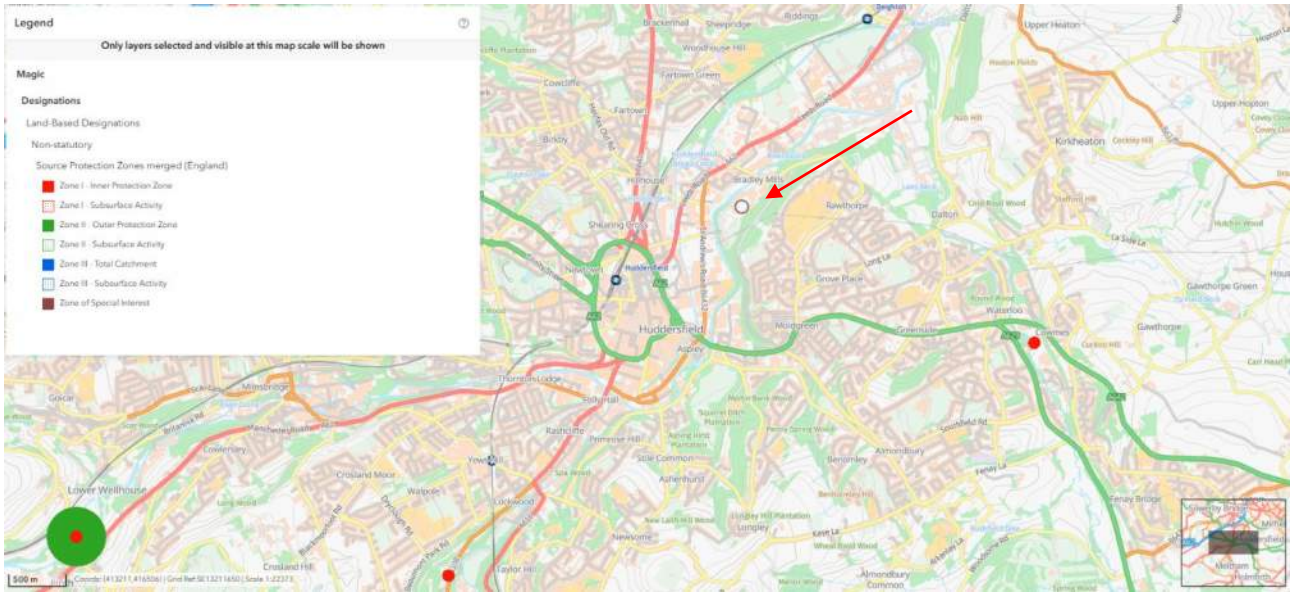
3.7.3. The boreholes reviewed are from various locations around the larger stadium site complex and the records are consistently showing deep make ups of made grounds

and therefore, it is reasonable to assume that the deep made ground is consistent at our proposed development site.

3.8. Hydrogeology

3.8.1. The site is not located in a Source Protection Zone (SPZ). Site location indicated by the red arrow.

Figure 3.8-1 Source Protection Zones (Source: Magic Maps)



3.8.2. The site investigation included ground water strikes as part of the borehole logs, which indicated groundwater levels ranging from approximately 0.40-13.00m bgl, dependant on the proximity in which the testing location were to the River Colne.

3.8.3. Infiltration testing has not yet been carried out at the proposed development; however, it is unlikely that infiltration will be used as the chosen method of discharge for the surface water network. This is due to the likely high-water table and presence of a large amount of made ground to significant depths which could pose a contamination risk and is not suitable for infiltration methods to be utilised.

3.8.1. In conclusion, infiltration methods are deemed to be unsuitable for the proposed development.

3.9. Site Specific Constraints

3.9.1. The site has constraints that need to be taken into account when determining what SuDS features / methodology are applicable for the proposed development.

3.9.2. The proposed development has minimal opportunity to include soft landscaped area within the site boundary, as it is proposed to retain the existing hard landscaping surrounding the new hotel building. As such there are spatial constraints on the implementation of open water SUDS features. Additionally, due to the high foot traffic associated with a development of this kind, open water features could pose a health and safety risk.

3.9.3. The presence of the high water table and potential contamination risk due to made ground highlighted in section 3.8.3 above, constrains the use of any below ground infiltration features.

The site is however in close proximity to an existing watercourse which is relatively high in the SUDS hierarchy and is the preferred choice for discharge in this location, with sub-surface attenuation features being used as a means of water storage due to the constraints mentioned above.

4. FLOODING

4.1. Types of Flooding

4.1.1. The National Planning Policy Framework (NPPF) in combination with the Lead Local Flood Authorities (LLFA) lists six types of flooding noted in table 4.1-3 below. Any new development is to be assessed against each of these types of flood risk, utilising published flood map data, The Strategic Flood Risk Assessment (SFRA) and data published by the LLFAs including historic flood reports.

Table 4.1-2 Flood Types

Flood Type
A – Fluvial (River)
B - Tidal
C - Surface Water
D - Ground Water
E - Artificial
F - Sewer

4.2. Fluvial (River)

4.2.1. Fluvial flooding occurs during periods of heavy rainfall when river flows exceed channel capacity which result in inundation of floodplains, overtopping of riverbanks and flood defences.

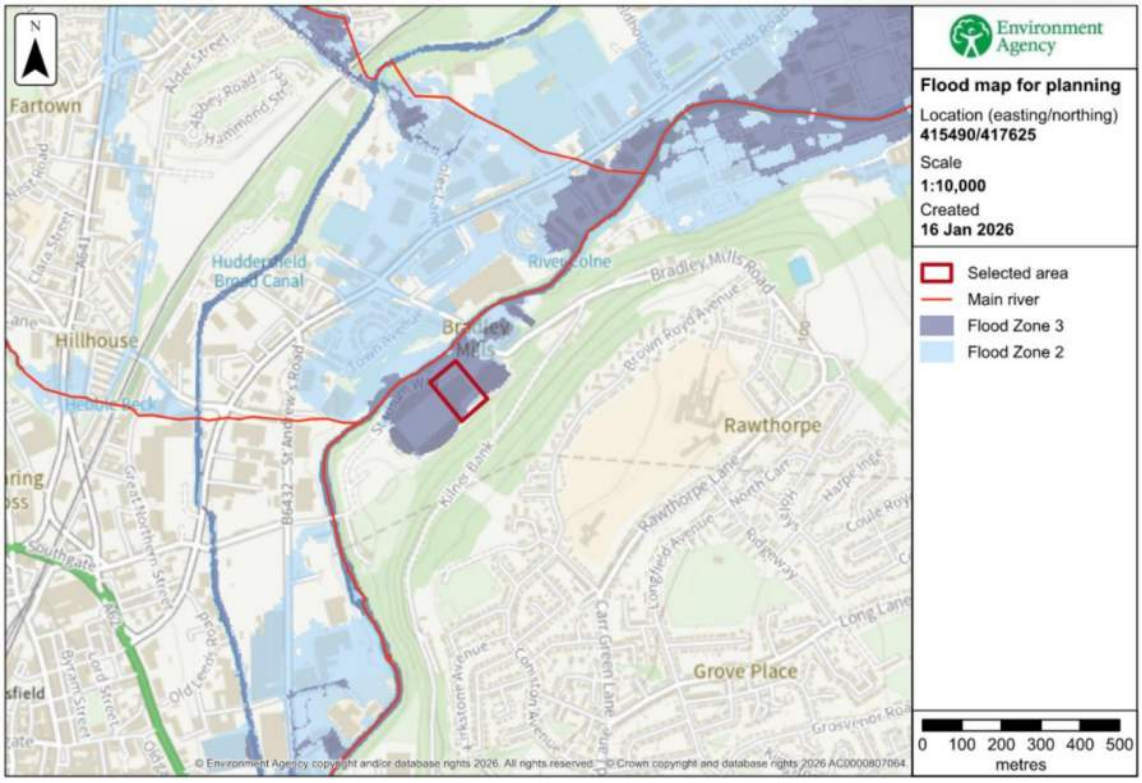
4.2.2. The Environment Agency publish a series of nationwide flood maps created from a combination of surveys, remote sensing and data analysis and are used to provide an indication of the areas likely to be affected by flooding.

4.2.3. Flood zones are classified as such:

- Zone 1 - as being Low Probability, comprised of land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year. (<0.1%)
- Zone 2 - as being Medium Probability, comprised of land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- Zone 3a - as being High Probability, comprised of land assessed as having between 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Zone 3b - as being Functional Flood Plain, comprised of land where water must flow or be stored in times of flood. SFRA should identify this zone.

4.2.4. The Site (marked by a red boundary) is located within Flood Zone 3 which is classified as an area which is at the highest risk of flooding, with a 1% or greater annual probability of fluvial flooding.

Figure 4.2-3 Fluvial Flood Map (Source: flood-map-for-planning.service.goc.uk)

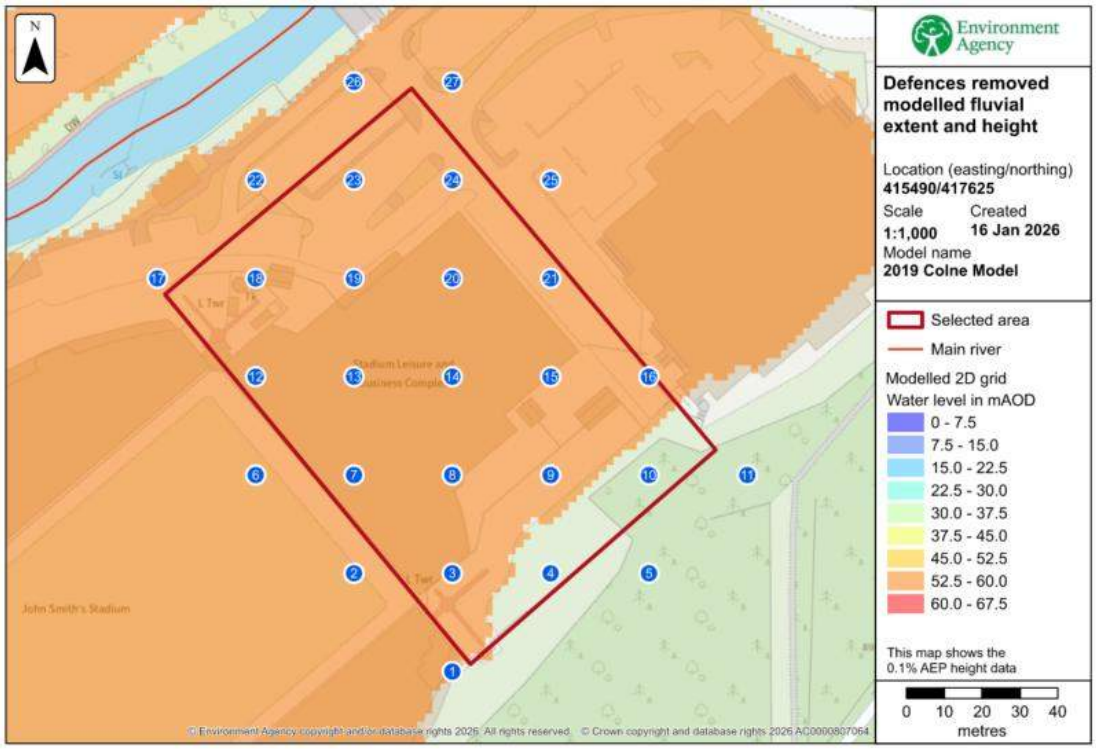


4.3. Environment Agency (EA) Consultation

4.3.1. In order to better understand the nature of flood risk associated with the site, Flood Product 4 was obtained from the EA this provides flood model data for Allison Dike and Blackhouse Dike, Grimescar Beck/Clayton Dike and Colne Model, dated 16/01/2026

4.3.2. Flood data was provided at 27 locations for the 10% AEP, 3.33% AEP, 1% AEP and 0.1% AEP storm events in the figure below.

Figure 4.3-4 Defences removed modelled fluvial extent and height map (Source: flood-map-for-planning.service.goc.uk)



4.3.1. A review of the flood nodes indicate there is no data for the 10% AEP and 3.33% AEP events for all locations, with points 8, 13, 14, 15 and 20 (the points in closest proximity to the development footprint) indicating flood heights of 59.60-59.67m for the 0.1% event.

4.3.2. The topographical level information we have available in close proximity to the site indicates levels to be approximately 58.70m, which result in an approximate 1m depth of water during the 0.1% AEP event (which is almost equivalent to the 1% AEP + CC event we have used).

4.3.3. As a result, the water depth is far lower than the proposed level of occupancy (first floor level) meaning that occupants are protected in the event of a flood and there is also an internal egress route for those on the ground floor in the event of a flood.

4.4. Tidal (Sea)

4.4.1. Tidal flooding is caused by rising sea levels which overtop sea defences or natural barriers resulting in the sea water moving inland.

4.4.2. The River Colne which is directly adjacent to site is not tidal, therefore the Site is not affected by Tidal Flooding.

4.5. Surface Water

4.5.1. Surface water flooding occurs as a result of excessive rainfall which exceeds the capacity of local drainage systems. During prolonged periods of rainfall ground will become saturated and cannot absorb any more water, triggering rapid sheet water run-off from adjacent land and surcharging of sewers leading to flooding.

4.5.2. The main causes of surface water flooding are excessive rainfall, urbanisation, inadequate drainage infra-structure, ground conditions & climate change. The table below explains the flood risk categories used by the map

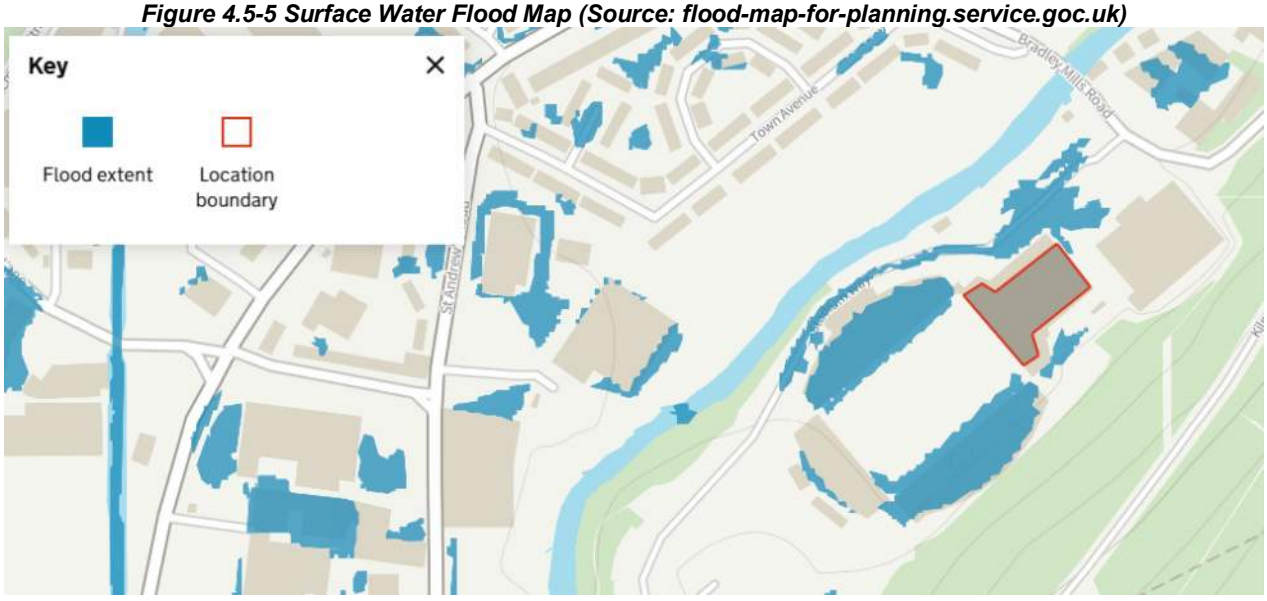
Table 4.5-3 Surface Water Flood Risk Categories

Risk	Description
High	Flooding occurring as a result of rainfall with a greater than 1 in 30 chance in any given year (annual probability of flooding 3.3%)
Medium	Flooding occurring as a result of rainfall of between 1 in 30 (3.3%) and 1 in 100 (1%) chance in any given year
Low	Flooding occurring as a result of rainfall of between 1 in 100 (1%) and 1 in 1000 (0.1%) chance in any given year
Very Low	Flooding occurring as a result of rainfall with less than 1 in 10000 (0.1%) chance in any given year

4.5.3. The EA's flood map shows the Site (marked by a black circle with a cross) is surrounded by areas of high-low risk of surface water flooding, with the highest risk area being the car park area to the North of the site.

4.5.4. This is likely due to the topography of the site which features a very steep gradient down towards the site from the Woodlands to the South, in combination with the relatively consistent levels within the car park providing no overland flow route away from the area, rather acting more like a detention area.

Figure 4.5-5 Surface Water Flood Map (Source: flood-map-for-planning.service.goc.uk)



4.6. Ground Water

4.6.1. Ground water flooding occurs when the water table rises to surface near surface levels. This type of flooding originates from water stored underground within aquifers/ permeable rock formations.

4.6.2. Instances of historic ground water flooding/ risk of ground water flooding in the area is typically provided in the Strategic Flood Risk Assessment (SFRA) completed by the local authority. A copy of their groundwater flooding susceptibility map is provided in Appendix D with the site location approximately marked as a labelled red dot.

4.6.3. The plan shows the site within an area shown to be at higher risk of groundwater flooding, further consolidating the previous groundwater level issue noted.

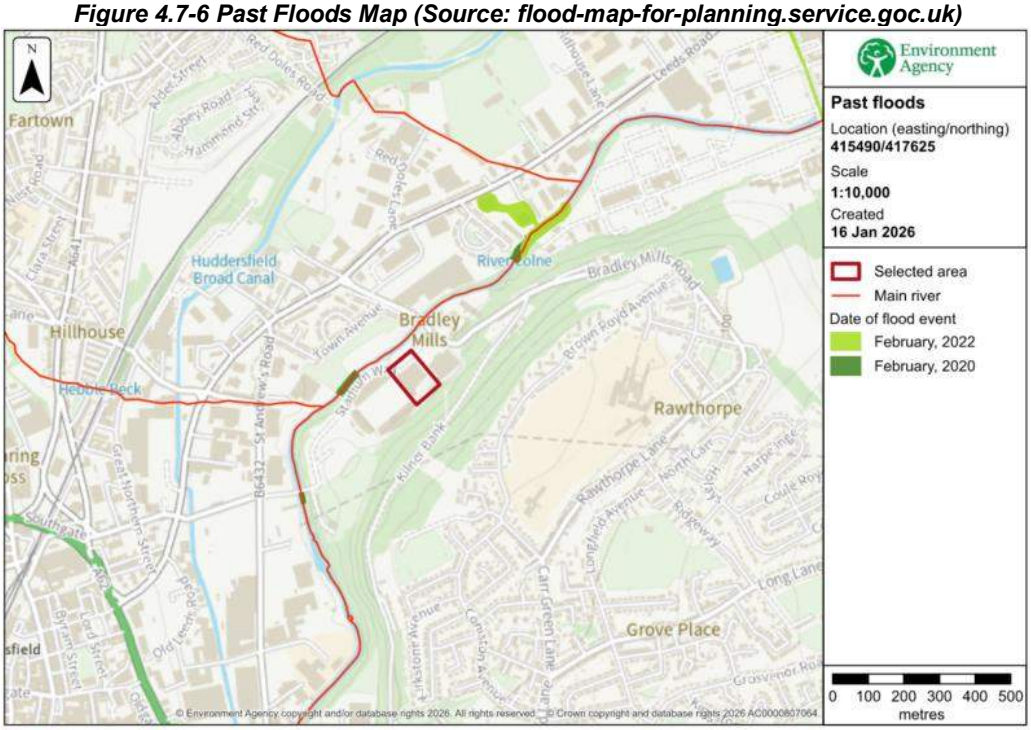
4.7. Historical/Artificial/Sewer

4.7.1. Artificial flooding occurs as a result of inadequate or poorly maintained drainage systems, infrastructure failures such as burst water mains and failed pumping stations.

4.7.2. Sewer flooding can be caused by a variety of factors including heavy rainfall, blockages, collapsed or damaged sewers, pumping station failures, inadequate design of existing drainage.

4.7.3. Instances of historic flooding are provided in the EA product 4 report, which show 2 past events in Feb 2020 and Feb 2022. One is in relative proximity to the site, approximately 150m West but does not affect the site.

Figure 4.7-6 Past Floods Map (Source: flood-map-for-planning.service.goc.uk)



4.8. Summary

4.8.1. Table 4.9-5 summarises the flood types and the associated flood risk for this development before any of the proposed SuDS features are implemented, which will be discussed in Section 8 later in this report.

Table 4.8-4 Flood Types Summary

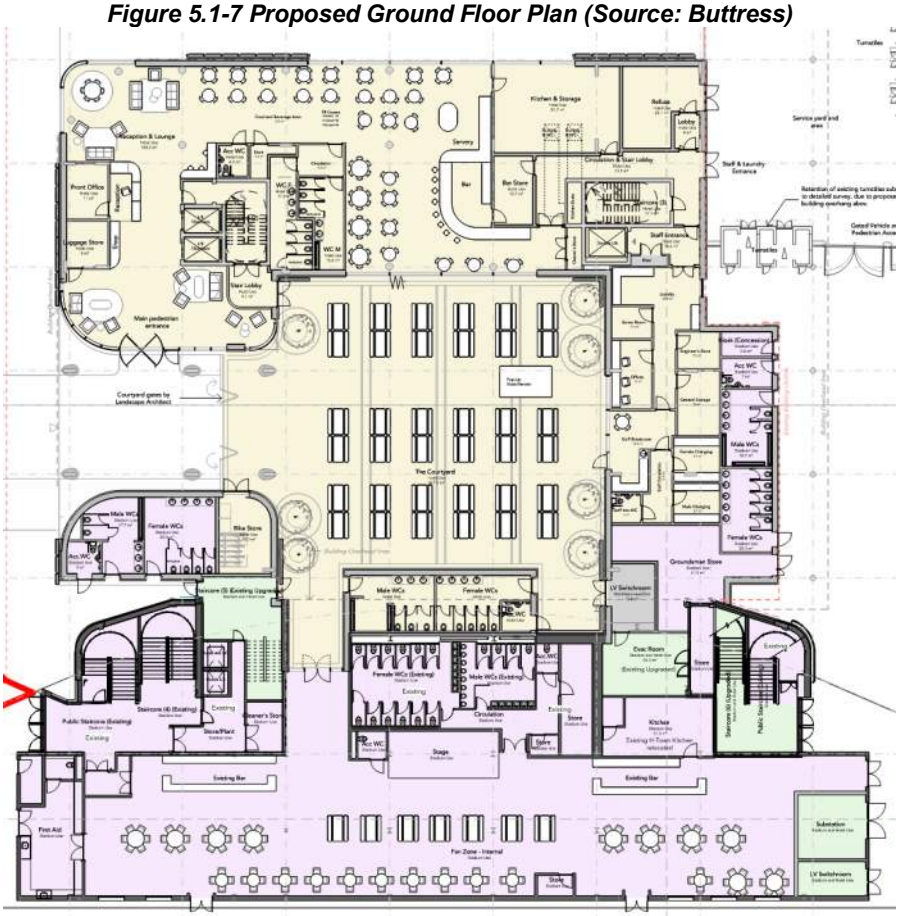
Flood Type	Risk Level
A – Fluvial (River)	HIGH
B - Tidal	VERY LOW
C - Surface Water	MEDIUM
D – Ground Water	MEDIUM
E - Artificial	LOW
F - Sewer	LOW

5. PROPOSED DEVELOPMENT

5.1. Development & Usage

5.1.1. The proposed development consists of the demolition of the existing swimming pool and 2 storey leisure centre, with a 4 storey hotel with internal courtyard erected in its place. A copy of the proposed site plan is provided in Appendix E.

Figure 5.1-7 Proposed Ground Floor Plan (Source: Buttress)



5.1.2. The proposed hotel development has been reduced in footprint size to accommodate an increase in the turnstile capacity. The ground floor layout consists of a courtyard area with various facilities serving the existing football stadium, with the first floor of the development consisting of the hotel reception and overnight accommodation.

5.2. Development Constraints

5.2.1. The site is classified as brownfield and is currently used as a leisure centre so there are a number of existing services already installed within the surrounding area serving the current development. The existing drainage network will be partially re-utilised within the new proposals. This however means that the scheme will be limited within the constraints of the existing drainage levels.

5.2.2. The presence of made ground and the nature of the site (operational football stadium) constrain the use of open water SUDS features and the use of infiltration as part of the surface water network.

6. SEQUENTIAL TEST

6.1. National Planning Policy Framework (NPPF)

The NPPF sets out the national planning policies including those relating to protecting people and property from flooding now and in the future and is supported by the statutory consultee the Environment Agency.

6.2. Sequential Testing Overview

6.2.1. The NPPF (Technical Guidance) provides the table below, indicating the highest risk category allowed per flood zone with & without the Exception Test (if required).

Table 6.2-5 Flood Risk Vulnerability and Flood Zone Compatibility

Flood Risk Vulnerability Classification					
Flood Zones	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	✓	✓	✓	✓	✓
2	✓	ET Required	✓	✓	✓
3a†	ET Required†	×	ET Required	✓	✓
3b*	ET Required*	×	×	×	✓

✓ Development is appropriate

X Development should not be permitted

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

" * " In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

6.2.2. The Sequential test, as applied by the NPPF & its technical guidance, compares the proposed development site against other potential sites to determine which site has the lowest flood risk with the aim of preventing development in flood prone zones. If the development is to be carried out in the higher risk flood zones (2, 3a or 3b), then the Exception Test is to be carried out as explained in the following section.

6.2.3. The LLFA have been contacted to determine if their local policies differ from the NPPF or if they have imposed an altered criteria for the triggering of the Sequential Test and have responded stating the NPPF criteria is to be used for developments within Flood Zone 3a.

6.3. Sequential Test

6.3.1. The proposed development has varied uses at different floor levels. The ground floor is shown to be made up of turnstiles, an open courtyard with associated toilets and small bar areas, which form part of the entrance to the football stadium and is considered to be a leisure development. The first floor and upwards of the development consist of hotel overnight accommodation which would be considered a more vulnerable use. However, as the projected flood levels from the adjacent River Colne (59.940mAOD for the 0.1%AEP +20%) do not reach the level of the first floor (62.300mAOD) of the development and as such will serve as a safe refuge from any future flooding. The ground floor usage of the development falls within the less vulnerable classification.

6.3.2. The Development is located in Flood Zone 3a in which less vulnerable developments are permitted, therefore the Sequential Test is not required.

7. EXEMPTION TEST

7.1. Exception Testing (ET) Overview

7.1.1. If it is not possible for development to be relocated to an area with a lower risk of flooding, the exception test must be applied by offering mitigation measures.

7.1.2. The ET purpose as set out by the NPPF is to demonstrate that flood risk to people and property will be managed satisfactorily when sites of lower flood risk are not available. It must be demonstrated that:

- It will provide wider sustainability benefits to the community and wider area.
- it will be safe for its lifetime taking account of the vulnerability of its users without increasing flooding elsewhere and where possible, reduce flood risk overall.

7.2. ET & Elevated Flood Risks

7.2.1. As stated in 6.3, the ST is not required and as such, the ET is not required. There are some elevated flood risks and the Development needs to provide reasonable mitigation measures regardless with the goal of achieving the bullets listed above.

7.2.2. The elevated flood risks are from fluvial flooding, surface water flooding and groundwater flooding.

7.3. Flood Alert & Warning

7.3.1. Flood Alert Areas are geographical areas where it is possible for flooding of low-lying land and roads to occur from rivers, sea and in some location's groundwater. A single Flood Alert Area may cover the floodplain within the Flood Warning Service area or it may include multiple catchments of similar characteristics and contain one or more Flood Warning Areas. A Flood Alert is issued to warn people of the possibility of flooding and encourage them to follow their flood plan, have insurance documents and any medications ready if there is a need to leave quickly, avoid walking cycling or driving through flood water and move any livestock and farming equipment away from areas likely to flood. Flood Alerts are issued earlier than Flood Warnings to provide advance notice of the possibility of flooding and may be issued when there is less confidence that flooding will actually occur.

7.3.2. The Development has elevated fluvial, surface water and groundwater flood risks but is not located within a Flood Alert Area, therefore this is not applicable.

7.4. Impact of Flood Elsewhere/ Flood Compensation

7.4.1. Where Developments are located in Flood zone 2 or higher, the Development is not to displace flood water onto 3rd party land. Where there is flood water displacement due to raising of ground levels, new buildings or walls erected the displaced volume must be compensated elsewhere within the Development at equal volumes and levels. Additionally, the flood water must be allowed to drain freely away and not become a pool which cannot drain on its own.

7.4.2. The Development proposals are to retain the existing building footprint with the external hardstanding areas to remain as existing, causing no disruption to flood volumes & flood paths.

7.5. Flood Mitigation

7.5.1. All flood types have been assessed and classified as being medium-high risk and therefore mitigation measures have been implemented as below:

7.6. Flood Mitigation – Fluvial

7.6.1. Due to its location within flood zone 3a, the development is at an elevated risk of fluvial flooding from the adjacent River Colne. The risk posed from fluvial flooding has however been mitigated by ensuring that the overnight accommodation for the development is located at first floor level and above, ensuring that modelled flood levels do not reach occupants. Additionally, having the accommodation at a higher level provides a safe refuge if flooding if it occurs.

7.6.2. Fluvial flooding is reduced even further through the implementation of the proposed drainage scheme which includes the implementation of below ground attenuation with a flow control manhole to restrict surface water run-off from the building, providing a betterment to the existing unrestricted network. This lowers the strain on the adjacent surface water network and final discharge location during times of increased rainfall.

7.7. Flood Mitigation – Surface Water

7.7.1. The development is at medium risk from surface water flooding, as shown by the EA flood mapping, however this is to be mitigated much in the same way as above, through the implementation of the proposed network which is designed to accommodate all rainfall events up to and including the 1 in 100 year event + 45% climate change with no flooding.

7.7.2. As the building footprint is proposed to be retained, along with the existing topography, the existing levels are shown to fall away from the building slightly towards a localised depression where existing positive collection features are located (channel drain and gullies), therefore directing surface water away from the proposed development towards drainage features, mitigating flood risk.

7.8. Flood Mitigation – Ground Water

7.8.1. The proposed development is at risk of groundwater flooding due to the high ground levels in and around the site, as seen within the borehole logs previously completed for the site. This however has been mitigated as the development does not include any facilities below ground level, additionally infiltration features have not been utilised to ensure that ground water levels are not worsened following intense rainfall events.

8. SUDS HIERARCHY/ Standard 1

8.1. OVERVIEW

8.1.1. The National Standards for Sustainable Drainage provides details in Standard 1 of run-off destinations and the priority in which these should be considered. Run-off should be treated as a resource and managed in a way that a way to avoid negative impacts on flood risk as a result of the development.

8.1.2. Priorities are listed below in order of surface water hierarchy as detailed in the National Standards for Sustainable Drainage, with comment stating how each can be implemented or why they have been discounted based on the site specific characteristics & constraints.

8.2. Priority 1 – Collected For Non-potable Use

8.2.1. Rainwater harvesting shall be considered in all circumstances where any of the following apply :

8.2.2. There is a demand for non-potable water and available contributing catchment area that will deliver safe and efficient water savings.

8.2.3. There is a need for landscape irrigation.

8.2.4. The development is in an area identified as seriously water stressed

8.2.5. RWH can be used for landscape irrigation purposes, and it is proposed to utilise SUDSPOD raised planters underneath rainwater downpipes for the Development. The proposed drainage model and attenuation calculations however will exclude the RWH system for the following reason, providing a worst-case scenario:

- The RWH features may be at maximum capacity if there is a large storm event or if there are several rainfalls in quick succession resulting in flows bypassing the feature.

8.2.6. Therefore, this priority has been implemented.

8.3. Priority 2 – Infiltrated to Ground

8.3.1. As noted in Section 3.7 above, the site's geology is primarily made up of made ground that is underlain by varying mixtures of Sand, Gravel and Clay.

8.3.2. Infiltration testing has not been carried out at the development.

8.3.3. Despite the lack of infiltration testing, infiltration techniques are deemed unfeasible as a result of the potential high water table, in combination with the presence large depths of made ground.

8.3.4. Therefore, this priority has been discounted.

8.4. Priority 3 – Discharged To an Above Ground Surface Water Body

8.4.1. The topographical survey has identified there are watercourses in the vicinity of the site, the closest being the River Colne which is approximately 55m away from the proposed building footprint and is presently used as the ultimate drainage discharge location for the existing development. The proposed strategy will therefore include utilisation of this existing connection to avoid unnecessary additional pipework to the watercourse.

8.4.2. Therefore, this priority has been implemented.

8.5. Priority 4 – Discharged To a Surface Water Sewer, or Another Piped Surface Water Drainage System

8.5.1. The drainage asset plans indicate there are no a surface water sewers within close proximity to the site viable for connection, and priority 3 has been implemented.

8.5.2. Therefore, this priority has been discounted.

8.6. Priority 5 - Discharge to a Combined Sewer

8.6.1. The drainage asset plans indicate there is a combined sewer within close proximity to the site, approximately 80m Northeast within Bradley Mills Road, however priority 3 has been implemented.

8.6.2. Therefore, this priority has been discounted.

8.7. Summary of above Priorities

8.7.1. The follow summarises the above tiers and if they have or haven't been implemented.

Table 8.7-6 SuDS Hierarchy Implementation Summary

Priority	Implemented
1 – Collected for non-potable use	Yes
2 – Infiltrated to ground	No
3 – Discharged to an above ground surface water body	Yes
4 – Discharged to a surface water sewer, or another piped surface water drainage system	No
5 -Discharged to a combined water sewer	No

9. Management of Everyday Rainfall/ Standard 2

9.1.1. Standard 2 of the National Standards for SuDS requires that a SuDS approach is applied so that at least the first 5mm of rainfall for the majority of rainfall events is retained on-site.

9.2. Rainwater Harvesting

9.2.1. Standard 2 is deemed to have been satisfied if rainwater harvesting is incorporated within the proposals and no run-off leaves the site during lower order designed storm events.

9.2.2. The runoff from the Development consists only of runoff from the roof area, due to the rest of the development remaining unchanged. Where feasible and practical the roof drainage is to be captured via the implementation of SUDSPOD planters beneath rainwater downpipes, which provide a low level of attenuation, capturing the first 5mm of rainfall to facilitate the growth of the planting.

9.2.3. Therefore Standard 2 has been satisfied where feasible and practical.

9.3. SuDS Pillar/ Standard 4 – Water Quality

9.3.1. Water quality is defined as “Managing the quality of the runoff to prevent pollution.”

9.3.2. The runoff from the Development is purely from roof areas and is therefore a **low** level pollution hazard.

9.3.3. Below are tables taken from The SuDS Manual (CIRIA 2015), which use the simple indices method to define the pollution hazard indices for varying use classifications and mitigation indices to evidence that the mitigation meets or exceeds the hazard ensuring water quality is maintained. For this development, the applicable sections have been coloured green.

Table 9.3-7 - Pollution hazard indices for different land use classifications (source: The SuDS Manual 2015)

	Pollution hazard indices for different land use classification			
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g., cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change	Low	0.5	0.4	0.4

(e.g., schools, offices) i.e., < 300 traffic movements/day				
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g., haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used, or manufactured; industrial sites; trunk roads and motorways	High	0.8[2]	0.8[2]	0.9[2]

Table 9.3-9 - Mitigation hazard indices for discharges to surface water (source: The SuDS Manual 2015)

Type of SuDS component	Total suspended solids (TSS)	Metals	Hydro-carbons
Filter Strip	0.4	0.4	0.5
Filter Drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention System	0.8	0.8	0.8
Permeable Paving	0.7	0.6	0.7
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Proprietary Treatment System	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

9.3.4. As mentioned in section 9.3.2, the runoff for the development is purely from roof areas, and since the development is commercial that means the pollution hazard level is low. This results in 0.3 (total suspended solids), 0.2 (metals) and 0.05 (hydrocarbons) requiring mitigation.

9.3.5. Through the utilisation of SUDSPODS beneath rainwater planters, due to the planting within the features essentially acting as a bioretention layer, mitigation indices of 0.8 for all 3 pollution sources are provided. These figures heavily outweigh the proposed land use mitigation index figures.

9.3.6. Therefore, this pillar has been satisfied.

9.4. SuDS Pillar/ Standard 5 – Amenity

9.4.1. Amenity is defined as “Creating and sustaining better places for *people*.”

9.4.2. The drainage strategy proposes to utilise SUDSPOD planters which provide an area of planting in an otherwise nearly entirely hard paved area of the site. This brings a much-needed boost of greenspace in and around the building, making the development much more aesthetically pleasing for those using it.

9.4.3. Therefore, this pillar has been satisfied.

9.5. SuDS Pillar/ Standard 6 – Biodiversity

9.5.1. Biodiversity is defined as “Creating and sustaining better places for *nature*.”

9.5.2. The drainage strategy proposes to utilise SUDSPOD planters which again provide an additional area of planting to the development which can help encourage native and new wildlife species to flourish in and around the development by providing habitats and sustenance to facilitate this.

9.5.3. Therefore, this pillar has been satisfied.

9.6. Summary of above Tiers

9.6.1. The follow summarises the above pillars / tiers and if they have or haven’t been implemented.

Table 9.6-8 SuDS Hierarchy Implementation Summary

Pillar / Tier	Implemented
1a Water Quantity - Infiltration	No
1b Water Quantity – Body of Water	Yes
1c Water Quantity – Sewer (Surface Water)	No
1d Water Quantity – Sewer (Combined Water)	No
2 – Water Quality	Yes
3 – Biodiversity	Yes
4 - Amenity	Yes

10. PROPOSED SURFACE WATER DRAINAGE STRATEGY

10.1. Policy

10.1.1. The principal drainage design policies for this development are the NPPF and accompanying standards, The national standards for sustainable drainage systems & the Lead Local Flood Authority SuDS document summarised in Section 7 above and stated design intentions in Section 7 above. Secondary policies the design has adhered to, with this listed to be treated as not a full listing, include Sewers For Adoption and Building Regulations H.

10.2. Climate Change

10.2.1. The NPPF states that when demonstrating how a site will deal with flood risk, climate change is to be taken into account for the development's lifetime.

10.2.2. The EA provides guidance on the amount of climate change, to be applied to the 100yr event only, in the form of the table below for sites less than 5km2 (500ha).

Table 10.2-9 Climate Change Percentages

Applies across all of England	Total potential change anticipated for 2015 - 2039	Total potential change anticipated for 2040 - 2069	Total potential change anticipated for 2070 - 2115
Upper End	24%	40%	45%
Central	11%	25%	30%

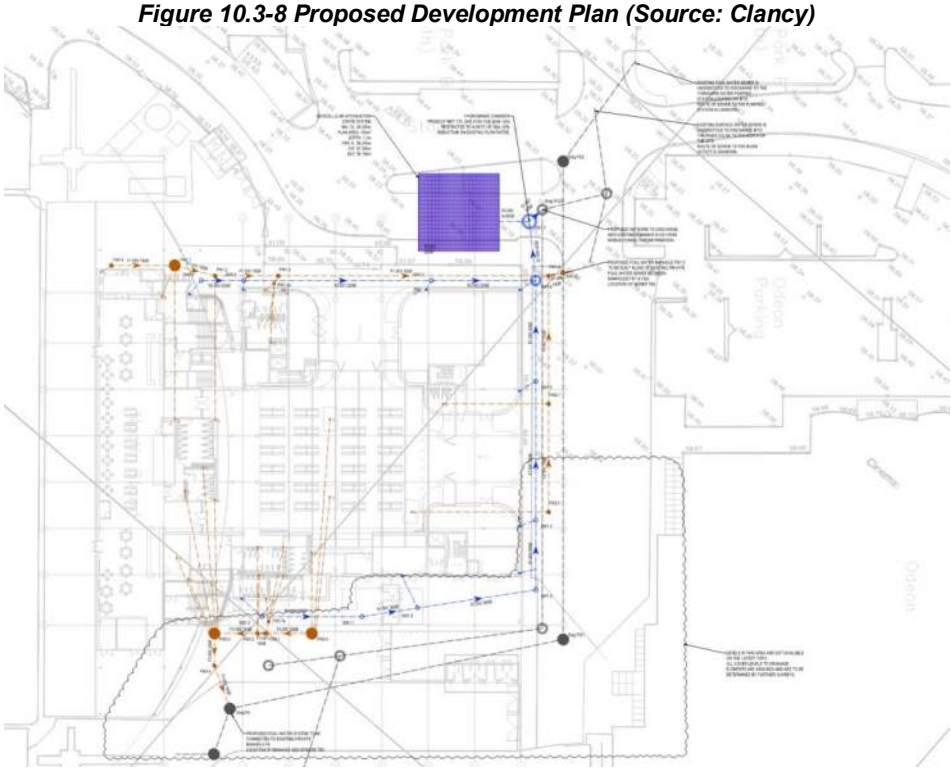
10.2.3. The design lifespan of the development is 100yrs and the Upper End value is to be used, therefore the climate change value to be applied to this development is 45%.

10.3. Strategy Overview

10.3.1. The drainage strategy is proposed to discharge to the adjacent River Colne at a restricted rate through the use of a flow restrictions device and below ground attenuation.

10.3.2. An extract of the proposed strategy (see Appendix E for the detailed drainage plan & Appendix F for other drainage related drawings) is provided in the image below.

Figure 10.3-8 Proposed Development Plan (Source: Clancy)



10.3.3. The drainage strategy for the development proposes to collect surface water runoff from the roof of the development through the use of rainwater downpipes which discharge into SUDSPOD planters that provide a low level of attenuation, in addition to a slight flow restriction and a high level of water cleansing.

10.3.4. Following this the water is transferred into the private below ground piped gravity network then discharging into the existing surface water network on site, which ultimately discharges to the adjacent River Colne.

10.3.5. A new flow restriction manhole has been utilised within the proposed surface water drainage network for the site to restrict flows to 50% of the existing 1 in 1 year brownfield rate, employing below ground attenuation crates to provide water storage capabilities.

10.4. Discharge Rates

Brownfield rates for the site have been calculated in accordance with the Wallingford Procedure and a copy of the calculations is provided in Appendix G & summarised in the table below. As required by the LLFA, a brownfield development it must provide a minimum 30% reduction in surface water run-off rates for a site where previous positive surface water connections can be proven.

10.4.1. It is proposed to provide a 50% reduction in flow rate to improve on the required 30% betterment, to ensure that the development is aligned more effectively with SUDS principles.

10.4.2. The following table lists the Greenfield, Brownfield, Design rates and resulting betterment.

Table 10.4-10 Discharge Rates & Betterment

Rate Type	Qbar	1yr	30yr	100yr
Greenfield	0.6l/s	0.6l/s	1.1l/s	1.3l/s
Brownfield	30.7l/s	30.7l/s	75.2l/s	97.0l/s
Design	15l/s	15l/s	15l/s	15l/s
Betterment	**51%**	**51%**	**80%**	**85%**

10.5. Discharge Volume

10.5.1. The discharge volume for the 100yr 6hr event for the proposed development will remain the same as the proposed development is not increasing or decreasing the level of impermeable area, and therefore the volume will stay the same.

10.5.2. Therefore, the discharge volume has remained at 237.6m3.

10.6. Attenuation

10.6.1. Attenuation is to be provided in the form of geocellular below ground attenuation tanks.

10.6.2. Refer to the drainage plan provided in Appendix E that states the provided attenuation volumes; Appendix F comprises the other drainage drawings.

10.7. Post-Development Flooding

10.7.1. The Development does not flood during the 100yr event plus climate change as shown in the calculations.

10.7.2. Levels from the topographical survey indicate that exceedance routes will take surface water away from the building into the slight depression in the centre of the car park area, where they are captured by the existing surface water system.

11. PROPOSED FOUL WATER DRAINAGE STRATEGY

11.1. Policy

11.1.1. The foul water strategy has been designed in accordance with Sewers For Adoption and Building Regulations H.

11.2. Strategy Overview

11.2.1. The site is to discharge to the public sewer, more specifically into the existing Yorkshire Water pumping station, via a piped gravity connection into the existing private foul water network on site, subject to approval from Yorkshire Water.

11.3. Capacity Check

11.3.1. A capacity check is to be submitted to Yorkshire Water to understand the capacity of the public network, confirmation will be required to verify the location of the connection and if there are any requirements for improvements to the existing foul network.

12. CONCLUSION

12.1. Existing Site

12.1.1. The Site usage is currently a leisure centre which is bounded by woodlands to the Southeast, car parking and a cinema to the North, and the Accu Stadium to the Southwest.

12.2. Existing Constraints

12.2.1. A review of the Site found that there is a lack of available space or suitability for the introduction of SUDS features, as well as the unfavourable infiltration conditions on site as a result of the presence of made ground and the high-water table.

12.3. Existing Flood Risks

12.3.1. A review of the Site found that fluvial flood risk was high, in addition to surface water flood risk, with ground water flooding being at a medium level.

12.4. Proposed Development & Constraints

12.4.1. The Development is proposed to be new 4 storey hotel with leisure use on the ground floor serving the football stadium.

12.4.2. Key constraints of the Development is the fluvial flood risk as the site is required to ensure due to being in flood zone 3 that the risk to occupants is mitigated. Additionally, the existing constraints of lack of space for SUDS and poor ground conditions still apply.

12.5. Sequential Test

12.5.1. As the site is in Flood Zone 3a, all less vulnerable developments are deemed suitable meaning the Sequential Test has been passed.

12.6. Exception Tests & Mitigation Measures

12.6.1. As the site is in Flood Zone 3a, all less vulnerable developments are deemed suitable meaning the Exception Test has been passed.

12.6.2. Despite this, measures have been put in place to reduce the risk of flooding from groundwater, surface water and fluvial. These being that the site proposes no basement level features, no infiltration features, existing external hardstanding levels have been retained and all living accommodation has been placed on the first floor up, also providing internal egress routes.

12.7. SuDS Hierarchy

12.7.1. The SuDS priorities listed in Standard 1 of the national SuDS standards have been reviewed and it is proposed to utilise SUDS priority 1 and 3. SUDS priority 1 has been utilised to provide a small benefit in terms of biodiversity, amenity, water quality and quantity, but due to the scale of the water re-use they are unable to act as the main form of discharge.

12.7.2. Therefore, priority 3 has been utilised providing a connection into the existing private surface water network which discharges to the River Colne. This was acceptable in the order or priority as infiltration (priority 2) has been deemed unsuitable for use due to high ground water levels and presence of made ground.

12.8. Surface Water Drainage Design

12.8.1. The design rates for the Development are proposed to be restricted to 15l/s for all design events, which provides a 51% betterment from the existing 1 in 1 year brownfield rate of 30.7l/s.

12.8.2. The site is to discharge to River Colne via a connection into the existing private surface water network on site which currently utilises this as it's form of discharge.

12.8.3. Implementation of the SuDS priorities are to be met by using SUDSPOD planters (priority 1) and a connection to the River Colne (priority 3).

12.8.4. Therefore the design has met the objectives of this report:

- Assess the Site's characteristics & constraints
- Apply the local LLFA SuDS hierarchy to the proposed development to ensure the Development does not adversely affect the surrounding area, taking into account Climate change as per the Environment Agency (EA) guidance and providing appropriate water quality treatment
- Provide a drainage design that follows the principles set out in the SuDS assessment

12.9. Foul Water Strategy

12.9.1. The site is to discharge to the public sewer, more specifically into the existing Yorkshire Water pumping station, via a piped gravity connection into the existing private foul water network on site, subject to approval from Yorkshire Water.

12.9.2. A capacity check is to be submitted to Yorkshire Water to understand the capacity of the public network. However, as the foul loads will likely increase significantly due to the nature of the development, confirmation will be required to verify the location of the connection and if there are any requirements for improvements to the existing foul network.

Appendix A – Location Plan

Appendix B – Topo Survey & Drainage Asset Plans

- Topographical Survey
- Public Sewer Records

Appendix C – Site Investigation Extracts

Appendix D – Flood Maps

- Product 4&8 data
- Groundwater flooding susceptibility mapping

Appendix E – Proposed Development & Drainage Plans

- Proposed Site Plan
- Proposed Drainage Plan

Appendix F – Drainage Related Drawings

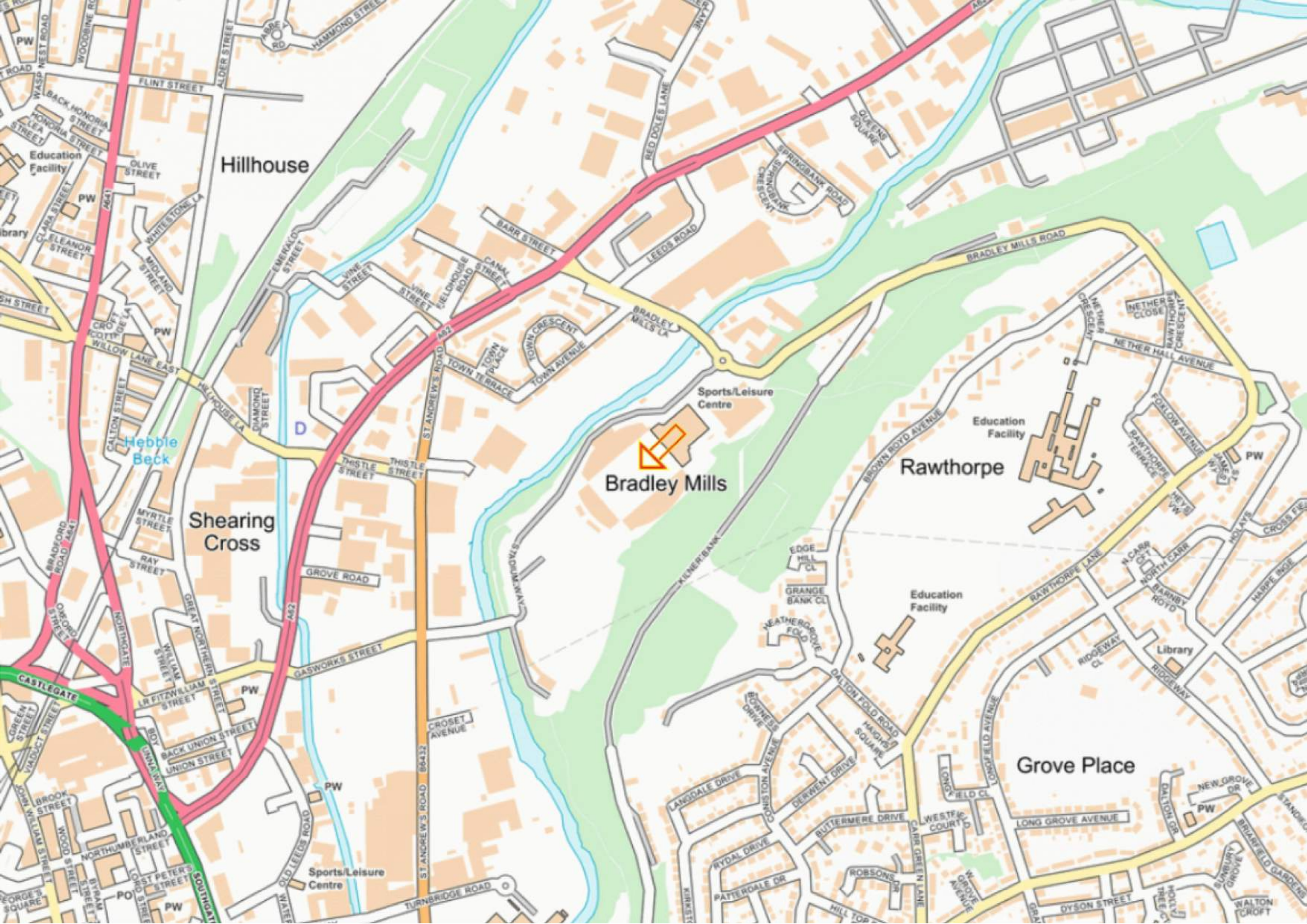
- Proposed Impermeable Areas Plan
- Proposed Drainage Details

Appendix G – Calculations and Drainage Modelling Reports

- Proposed Drainage Model Calculations
- Proposed Drainage Manhole Schedule

Appendix H – Drainage O&M Manual

Appendix A – Location Plan



Hillhouse
Shearing Cross
Bradley Mills
Rawthorpe
Grove Place
Sports/Leisure Centre
Education Facility
Hebble Beck
PW
Library
FLINT STREET
BRADLEY MILLS ROAD
LEEDS ROAD
ST ANDREW'S ROAD
GASWORKS STREET
THISTLE STREET
GROVE ROAD
KILNER BANK
RAWTHORPE LANE
BROWN ROYD AVENUE
CASTLEGATE
TURNBRIDGE ROAD
A62
A641
B6432

Appendix B – Topo Survey & Drainage Asset Plans

A	20.12.2017	Extent of existing works indicated increased	ASR	PS
Rev	Date	Description	Rev By	Chk'd By

Project Title	HD One John Smiths Stadium Huddersfield
Drawing Title	Existing Siteplan
Job-Dwg No	14597 1000
Rev	A
Client	CDP
Status	Planning
Scale	1:1000
Drawing Size	A1
Date	10.2017
Drawn By	CB
Checked	PS

2 St. Johns North, Wakefield, WF1 3QA t. 01924 291800

Carvers Warehouse, 77 Dale Street, Manchester, M1 2HG t. 0161 2388555

The Old Rectory, 79 High Street, Newport Pagnell, MK16 8AB t. 01908 211577

101 London Road, Reading, RG1 5BY t. 0118 9507700

10 Gees Court, St Christophers Place, London, W1U 1JJ t. 0207 4091215

THE HARRIS PARTNERSHIP ARCHITECTS

www.harrispartnership.com

CAD file reference J/14597/17.0 drawings/planning

Sewer Legend


Combined Sewer


S24 Combined Sewer


Surface Water Sewer


S24 Surface Water Sewer


Foul Sewer


S24 Foul Sewer


Section 104 Sewer

Public Rising Main


Pumping Station


Abandoned Sewer

Public Sewage Treatment Works


Syphon Sewer & Vacuum Sewer

\+ Property Identifier

Water Legend

Water Main 4" and below

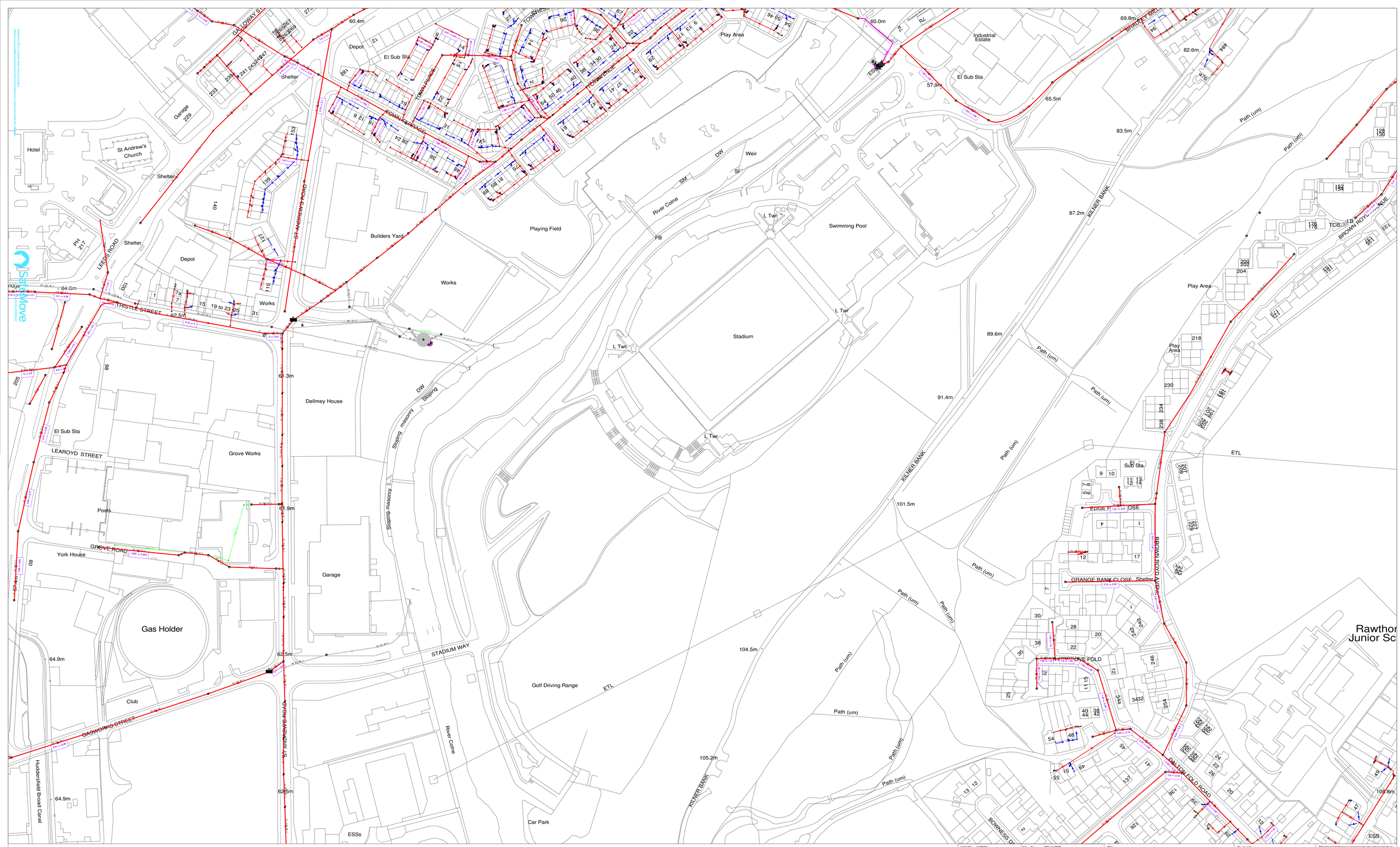
Water Main 4" and above

Raw Water Main

Private Water Main


Fire Hydrant


Pumping Station

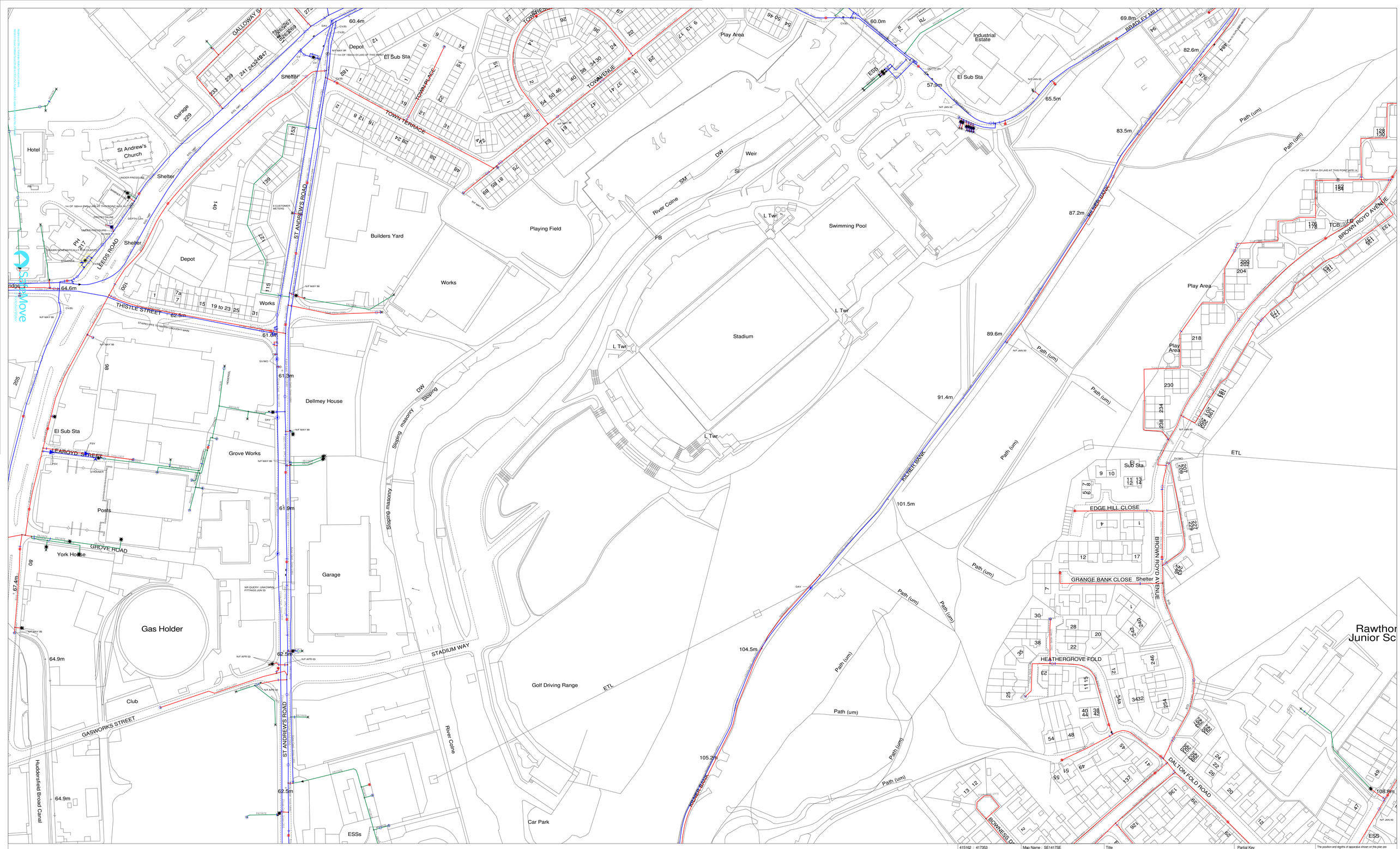


415162 : 417353	Map Name : SE1417SE	Title	Partial Key
	Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : Search Advisor L MULLOCK Contact Tel : 75 4506	Notes	Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS

This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.

Date Req : 03/06/2016, 10:12:49	Date Gen : 03/06/2016, 10:12:50
Source : Sewer Network Enquiry	

UPN: Undefined Originator: L MULLOCK, Safe-Move, 75 4506



415162 : 417353	Map Name : SE1417SE	Title	
YorkshireWater	Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : Search Advisor L MULLOCK Contact Tel : 75 4506	Notes	

Partial Key

- Water mains up to 4" in diameter
- Water mains over 4" in diameter
- Raw water mains
- Private water mains

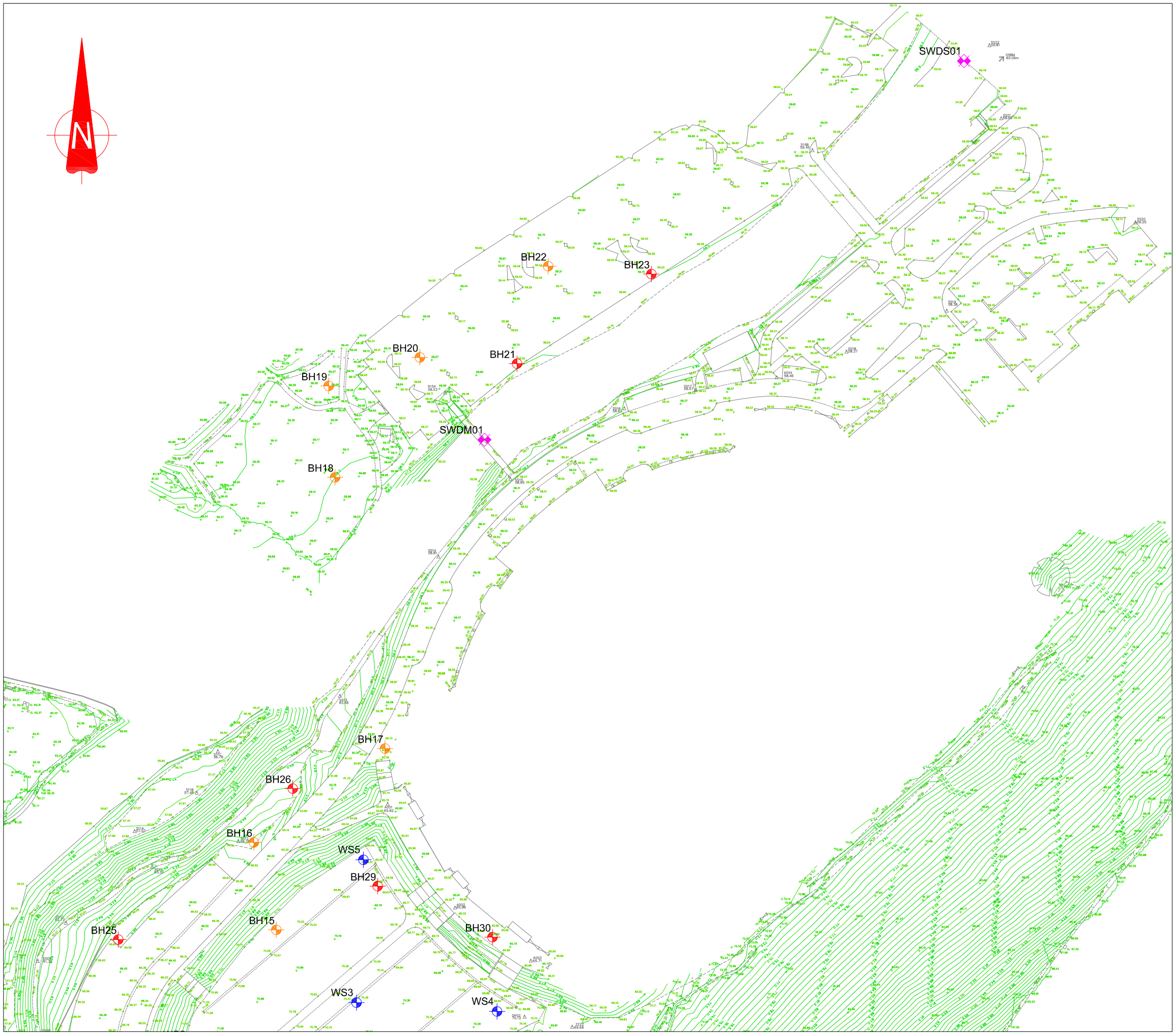
The position and depths of apparatus shown on this plan are approximate only. The exact positions and depths should be obtained by excavation trial holes.

Scale :	1:1250
Drg No :	
Maris No :	
Date Req :	03/06/2016, 10:13:14
Date Gen :	03/06/2016, 10:13:16
Source :	Water Network Enquiry

UPN: Undefined

Originator: L MULLOCK, Safe-Move, 75 4506

Appendix C – Site Investigation Extracts



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web: www.dunelm.co.uk

NOT TO SCALE: Contractor to check all dimensions on site before commencement of any works. No dimensions to be scaled from this drawing.

NOTES:

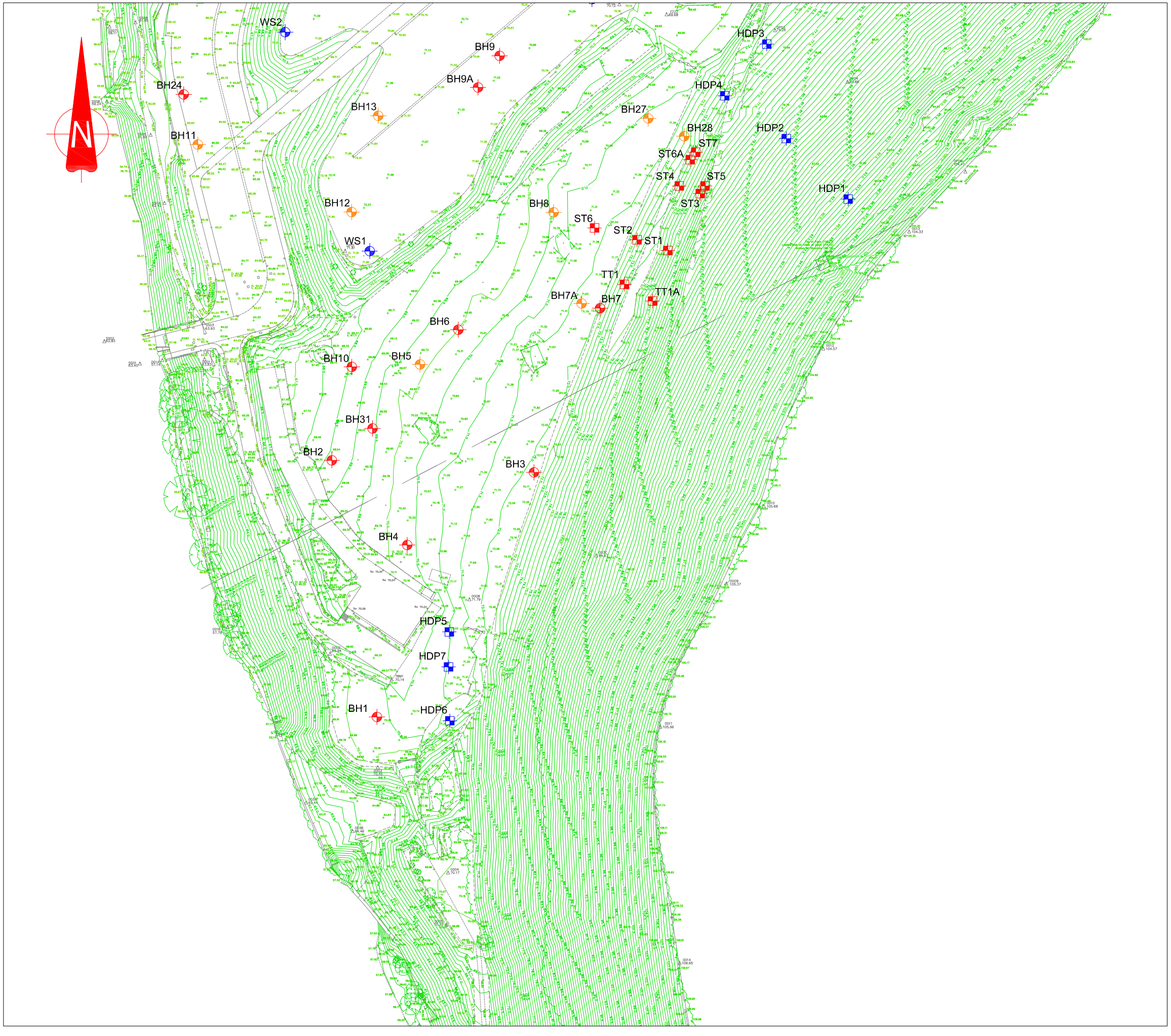
- BH — Location of Cable Percussive Borehole
- BH — Location of Cable Percussive Borehole with Rotary Core Drilling Follow On
- WS — Location of Windowless Sample Borehole
- ST — Location of Machine Excavated Slope Trench
- TT — Location of Machine Excavated Trial Trench
- HDP — Location of Hand Excavated Trial Pit
- SW — Location of Surface Water Sample Point

CLIENT:
MARSHALL HOLDINGS LTD

PROJECT TITLE:
HD1, HUDDERSFIELD

DRAWING TITLE:
Exploratory Hole Location Plan

DRAWING NUMBER:
D8279/02A



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- HDP — Location of Hand Excavated Trial Pit
- SW — Location of Surface Water Sample Point

CLIENT:

MARSHALL HOLDINGS LTD

PROJECT TITLE:

HD1, HUDDERSFIELD

DRAWING TITLE:

Exploratory Hole Location Plan

DRAWING NUMBER:

D8279/02B

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web: www.dunelm.co.uk

NOT TO SCALE: Contractor to check all dimensions on site before commencement of any works. No dimensions to be scaled from this drawing.

NOTES:

- BH Location of Cable Percussive Borehole
- BH Location of Cable Percussive Borehole with Rotary Core Drilling Follow On
- WS Location of Windowless Sample Borehole
- ST Location of Machine Excavated Slope Trench
- TT Location of Machine Excavated Trial Trench
- HDP Location of Hand Excavated Trial Pit
- SW Location of Surface Water Sample Point

CLIENT:
MARSHALL HOLDINGS LTD

PROJECT TITLE:
HD1, HUDDERSFIELD

DRAWING TITLE:
Exploratory Hole Location Plan

DRAWING NUMBER:
D8279/02C

INFORMATION GENERALLY RELATING TO ALL EXPLORATORY HOLE RECORDS

GENERAL

Borehole/Trial Pit No
The exploratory hole identity number used throughout the report.

Site
The ground investigation project name.

Client
Client's name responsible for funding the ground investigation project.

Ground Level and Location
The precise ground level in meters above Ordnance Datum at the exploratory hole location from which the reduced level for each stratigraphic boundary is calculated. The exploratory hole position is given as either national grid-coordinates or local grid as specified.

ABBREVIATIONS

Samples

B Bulk disturbed sample generally representative of the soil type for cohesive and fine granular soils.

D Small disturbed tub sample normally taken at intermediate depth between other sampling or testing operations. The sample is stored in an airtight container.

BRE Sample taken for electrochemical testing

ES Sample of potentially contaminated materials.

C Core sample.

SB Bulk disturbed sample subsampled from a liner sample

SD Small disturbed tub sample subsampled from a liner sample.

U 100mm diameter undisturbed thick walled sample (OS-TK/W)

UT 100mm diameter undisturbed thin walled sample (OS-T/W)

UF An attempted but failed 100mm undisturbed sample.

W Water sample.

In-situ Testing

CBR California Bearing Ratio mould sample or test.

SPT Standard Penetration Test (SPT) using the split barrel sampler (shoe). The corresponding 'N' value is given in the test result column.

Rock Quality and Core Recovery

TCR Total core recovery - The length of the recovered core expressed as a percentage of the length of core run.

SCR Solid Core Recovery - The sum length of all core pieces (measured along the centre of the core), expressed as a percentage of the length core run.

RQD Rock Quality Designation- The sum length of all core pieces that are 100mm or longer (measured along the centre of the core), expressed as a percentage of the length of core run.

FI Fracture Index- The number of fractures per 1000mm length of solid core.

NI Non-intact- The material recovered in a non-intact state.

NR No recovery from the core run.

AZCL Assessed Zone of Core Loss.

COBBLE CONTENT

Low <10%, medium 10 – 20%, high >20%

Exploratory Hole Log Legend

BOREHOLE LEGEND:

TOPSOIL

MADE GROUND

SILT

CLAY

SAND

GRAVEL

PEAT

MUDSTONE

SILTSTONE

SANDSTONE

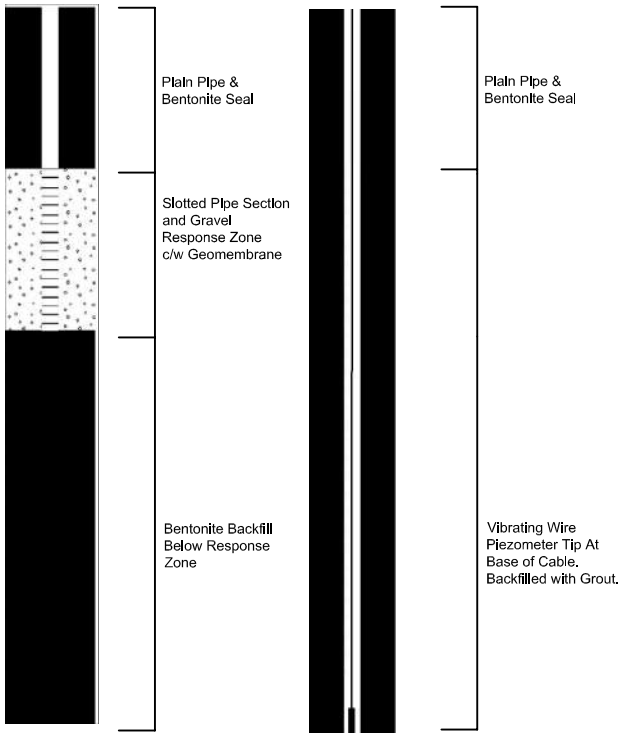
LIMESTONE

CHALK

COAL

BENTONITE/ GROUT

MONITORING INSTALLATION LEGEND:



NB Where strata consists of material of more than one soil or rock type the legends are appropriately combined.

Dunelm Geotechnical & Environmental Ltd
Foundation House, St John's Road, Meadowfield
Durham, DH78TZ
Tel: 0191 378 3151
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web: www.dunelm.co.uk

BH No.	Instrument Type	Instrument Dia. (mm)	Response Zone		Surface Protection	Remarks
			Top (m)	Base (m)		
BH05	SP	50	16.00	21.00	Flush Cover	
BH06	SP	50	3.00	10.00	Flush Cover	
BH07A	SP	50	6.00	9.80	Flush Cover	
BH08	SP	50	8.50	11.50	Flush Cover	
BH09	SP	50	1.00	10.00	Flush Cover	
BH11	SP	50	11.00	14.00	Flush Cover	
BH12	SP	50	17.00	20.00	Flush Cover	
BH15	SP	50	2.00	14.50	Flush Cover	
BH18	SP	50	10.00	15.00	Flush Cover	
BH20	SP	50	12.00	18.00	Flush Cover	
BH21	SP	50	1.00	5.00	Flush Cover	
BH22	SP	50	9.00	15.00	Flush Cover	
BH23	SP	50	2.00	6.00	Flush Cover	
BH24	SP	50	3.00	8.00	Flush Cover	
BH26	SP	50	9.00	11.00	Flush Cover	
BH27	SP	50	1.00	7.00	Flush Cover	
BH28	SP	50	3.00	25.00	Flush Cover	
BH30	SP	50	6.00	9.00	Flush Cover	
WS01	SP	50	1.00	2.00	Flush Cover	
WS02	SP	50	1.00	2.50	Flush Cover	
WS03	SP	50	1.00	5.00	Flush Cover	
WS04	SP	50	1.00	2.20	Flush Cover	
WS05	SP	50	1.00	1.70	Flush Cover	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TEL: 0191 378 3151
FAX: 0191 378 3157

Contract: HD1, Huddersfield

Contract No: D8279

Client: Marshall Holdings Ltd.

Table Title: Installation Summary

Table No: D8279/B1

Date: January 2018

Inputted by: DF

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH01

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.34 — Scale 1:50

Easting: 415259.01 — Northing: 417173.84

Client: Marshall Holdings Ltd — Driller: LI — Logged By: AH — Sheet 1 of 1

Method: Cable Percussive Drilling — Checked By: BL — Dates: 17/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark grey sandy angular, fine to coarse gravel of limestone.				
PID	0.00	PID: 1ppmv			(0.40)			
ES	0.25				0.40	69.94		
PID	0.25	PID: 1ppmv		MADE GROUND: Black sandy gravelly clay. Sand is fine to coarse with some ash. Gravel is angular to subangular, fine to coarse of brick, clinker, ash and concrete.	(0.35)			
B	0.50 - 1.00				0.75	69.59		
D	0.50			MADE GROUND: Black clayey very gravelly sand. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick, clinker, sandstone, metal and mudstone. Localised pockets of black sandy gravelly clay noted throughout.				
ES	0.50							
PID	0.50	PID: 3ppmv						
ES	0.75		1					
PID	0.75	PID: 0ppmv						
ES	1.00		(1.20) Dry					
PID	1.00	PID: 0ppmv						
D	1.20							
SPT (S)	1.20 - 1.65	N=26 (4,8/6,6,7,7)						
B	1.50 - 2.00							
D	1.50				(2.25)			
D	2.00		2 (2.00) Dry					
ES	2.00							
SPT (S)	2.00 - 2.45	N=30 (5,7/7,7,8,8)						
PID	2.00	PID: 1ppmv						
B	2.50 - 3.00							
D	2.50							
D	3.00		3 (3.00) Dry		3.00	67.34		
ES	3.00			MADE GROUND: Black sandy silty gravel Sand is fine to coarse with some ash. Gravel is angular to subangular, fine to coarse of brick, sandstone, clinker.				
SPT (S)	3.00 - 3.45	N=32 (3,6/8,10,7,7)		*3.00-7.00m: Contamination odour noted.*				
PID	3.00	PID: 2ppmv			(1.00)			
D	3.50							
D	4.00		4 (4.00) Dry		4.00	66.34		
ES	4.00			MADE GROUND: Black silty very gravelly sand. Sand is fine to coarse with some ash. Gravel is angular to subangular, fine to coarse of clinker, brick, sandstone and ash.				
SPT (S)	4.00 - 4.45	N=34 (7,7/10,7,9,8)						
PID	4.00	PID: 4ppmv						
B	4.50 - 5.00							
D	4.50							
D	5.00		5					
ES	5.00							
PID	5.00	PID: 0ppmv						
B	5.50 - 6.00							
D	5.50							
D	6.00		6		(4.00)			
ES	6.00							
PID	6.00	PID: 1ppmv						
B	6.50 - 7.00							
D	6.50							
D	7.00		7					
ES	7.00							
PID	7.00	PID: 3ppmv						
B	7.50 - 8.00							
D	7.50							
D	8.00		8 (8.00) Dry		8.00	62.34		
ES	8.00			Light brown slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone. (possible weathered rockhead).	(0.24)			
SPT (S)	8.00 - 8.24	N=50+ (8,17 for 60mm/27,23 for 30mm)			8.24	62.10		
PID	8.00	PID: 2ppmv		End of Borehole at 8.24 m				
			9					
			10					

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
					8.00	8.00	01:00	200	8.00	200	8.24

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

BOREHOLE RECORD

Borehole BH02

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 68.68 | Scale 1:50

Easting: 415242.58 | Northing: 417267.25

Client: Marshall Holdings Ltd | Driller: SR | Logged By: AH | Sheet 1 of 1

Method: Cable Percussive Drilling | Checked By: BL | Dates: 01/11/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark brown sandy gravelly topsoil. Gravel is angular to subangular, fine to coarse of sandstone and brick.	(0.20)			
PID	0.00	PID: 0ppmv			0.20	68.47		
ES	0.25			MADE GROUND: Orange brown clayey sandy gravel. Gravel is angular to subangular, fine to coarse of sandstone.	(0.20)			
PID	0.25	PID: 3ppmv			0.40	68.28		
ES	0.50			MADE GROUND: Dark brown gravelly clay. Gravel is angular to subangular, fine to coarse of slightly sandy mudstone.	(0.60)			
PID	0.50	PID: 1ppmv						
ES	0.75							
PID	0.75	PID: 8ppmv						
ES	1.00		1		1.00	67.68		
PID	1.00	PID: 13ppmv		MADE GROUND: Black silty very gravelly sand. Gravel is angular, fine to coarse of brick, sandstone and mudstone. Occasional plastic and metal fragments noted.				
B	1.20 - 1.70		(1.20) Dry					
D	1.20							
SPT (S)	1.20 - 1.35	N=50+ (25/50)			(1.50)			
D	1.85							
D	2.00		2	(2.00) Dry				
ES	2.00							
SPT (S)	2.00 - 2.45	N=25 (4,5/5,5,7,8)						
PID	2.00	PID: 1ppmv						
				End of Borehole at 2.50 m	2.50	66.18		
			3					
			4					
			5					
			6					
			7					
			8					
			9					
			10					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
1.30	1.60	00:45

Casing Depths

Diameter (mm)	Depth (m)
250	2.50

Hole Diameter

Diameter (mm)	Depth (m)
250	2.50

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Borehole terminated on metal obstruction.

Email received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH03

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 72.19 Scale 1:50

Easting: 415316.20 Northing: 417262.85

Client: Marshall Holdings Ltd

Driller: SR Logged By: AH

Sheet 1 of 1

Method: Cable Percussive Drilling

Checked By: BL

Dates: 02/11/2017 - 05/11/2017

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing						
ES	0.00			MADE GROUND: Dark brown slightly sandy, slightly gravelly clayey topsoil. Gravel is angular to subangular, fine to coarse of sandstone and concrete. Occasional metal fragments noted.	(0.20)			
PID	0.00	PID: 0ppmv			0.20	71.99		
ES	0.25				(0.50)			
PID	0.25	PID: 0ppmv		MADE GROUND: Yellowish brown sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of limestone.	0.70	71.49		
ES	0.50							
PID	0.50	PID: 0ppmv						
ES	0.75							
PID	0.75	PID: 0ppmv						
B	0.80		1					
ES	1.00			Firm very thinly laminated brown slightly sandy slightly gravelly CLAY of intermediate plasticity. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone. (Possible weathered mudstone).				
PID	1.00	PID: 0ppmv	(1.20) Dry		(1.30)			
B	1.20 - 1.70							
D	1.20							
SPT (S)	1.20 - 1.65	N=36 (5,8/9,9,8,10)						
D	1.85							
B	2.00 - 2.50		2		2.00	70.19		
D	2.00		(2.00) Dry	Very weak dark grey MUDSTONE recovered as clayey slightly sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone. (Possible rockhead).				
ES	2.00				(0.90)			
SPT (S)	2.00 - 2.45	N=48 (8,11/11,12,11,14)						
PID	2.00	PID: 0ppmv						
D	2.70		(2.70) Dry					
SPT (S)	2.70 - 2.90	N=50+ (20,5 for 5mm/30,20 for 50mm)		End of Borehole at 2.90 m	2.90	69.29		
			3					
			4					
			5					
			6					
			7					
			8					
			9					
			10					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)
200	2.70

Hole Diameter

Diameter (mm)	Depth (m)
200	2.90

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.
3. Unable to advance sample past 2.90m due to hard stratum.

Email Received 27 FEBRUARY 2018 Marshall (Mowy) Ltd

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL

BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH04

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.35 Scale 1:50

Easting: 415270.05 Northing: 417236.40

Client: Marshall Holdings Ltd

Driller: SR Logged By: AH

Sheet 1 of 1

Method: Cable Percussive Drilling

Checked By: BL

Dates: 02/11/2017

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing						
ES	0.00			MADE GROUND: Dark brown clayey sandy gravelly topsoil.	(0.10)	70.25		
PID	0.00	PID: 0ppmv		MADE GROUND: Orange brown sandy gravel. Gravel is angular to subangular, fine to coarse of sandstone.	0.10			
ES	0.25				(0.30)			
PID	0.25	PID: 0ppmv		MADE GROUND: Dark grey slightly sandy slightly gravelly clay of intermediate plasticity. Gravel is angular to subangular, fine to coarse of mudstone. Strong hydrocarbon odour noted.	0.40	69.95		
B	0.50 - 1.00							
ES	0.50							
PID	0.50	PID: 0ppmv						
PID	0.70	PID: 0ppmv						
ES	0.75							
ES	1.00		1					
PID	1.00	PID: 1ppmv		(1.20) Dry				
D	1.20							
SPT (S)	1.20 - 1.65	N=13 (3,3/3,3,3,4)						
					(2.60)			
D	1.85							
B	2.00 - 2.50		2	(2.00) Dry				
ES	2.00							
SPT (S)	2.00 - 2.45	N=15 (3,3/4,4,3,4)						
PID	2.00	PID: 0ppmv						
D	2.75							
B	3.00 - 3.50		3	(3.00) Dry	3.00	67.35		
D	3.00			MADE GROUND: Brown black silty gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, coal and clinker. Strong hydrocarbon odour noted.				
ES	3.00							
SPT (S)	3.00 - 3.30	N=50+ (5,7/20,30)						
PID	3.00	PID: 5ppmv						
D	3.75							
B	4.00 - 4.50		4	(4.00) Dry				
D	4.00							
ES	4.00							
SPT (S)	4.00 - 4.26	N=50+ (11,14 for 60mm/25,25 for 50mm)						
PID	4.00	PID: 9ppmv						
D	4.75							
B	5.00 - 5.50		5	(5.00) Dry				
D	5.00							
ES	5.00							
SPT (S)	5.00 - 5.45	N=43 (8,9/10,10,11,12)						
PID	5.00	PID: 9ppmv						
D	5.75							
B	6.00 - 6.50		6	(6.00) Dry				
D	6.00							
ES	6.00				(6.45)			
SPT (S)	6.00 - 6.45	N=25 (4,4/5,6,7,7)						
PID	6.00	PID: 6ppmv						
D	6.75							
B	7.00 - 7.50		7	(7.00) Dry				
D	7.00							
ES	7.00							
SPT (S)	7.00 - 7.45	N=30 (5,5/5,8,8,9)						
PID	7.00	PID: 2ppmv						
D	7.75							
B	8.00 - 8.50		8	(8.00) Dry				
D	8.00							
ES	8.00							
SPT (S)	8.00 - 8.45	N=27 (4,5/5,6,7,9)						
PID	8.00	PID: 1ppmv						
D	8.75							
D	9.00		9	(9.00) Dry				
ES	9.00							
SPT (S)	9.00 - 9.45	N=27 (4,4/5,8,6,8)						
PID	9.00	PID: 0ppmv						
				End of Borehole at 9.45 m	9.45	60.90		
			10					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
3.30	3.60	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	9.00

Hole Diameter

Diameter (mm)	Depth (m)
200	9.45

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.
3. Hole terminated on metal obstruction which jammed within the casing.

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH05

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 70.22 | Scale 1:50 | Easting: 415274.70 | Northing: 417302.13

Client: Marshall Holdings Ltd | Driller: LI/NH | Logged By: AH | Sheet 1 of 3

Method: Cable Percussive Drilling Rig with Rotary Core Drilling | Checked By: BL | Dates: 24/10/2017 - 01/11/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark brown sandy gravelly clayey topsoil. Gravel is angular to subangular, fine to coarse of mudstone.	(0.20)			
PID	0.00	PID: 0ppmv			0.20	70.02		
ES	0.25			MADE GROUND: Brown black sandy gravelly clay. Gravel is angular to subangular, fine to coarse of mudstone and sandstone.	(0.30)			
PID	0.25	PID: 8ppmv			0.50	69.72		
B	0.50 - 1.00			MADE GROUND: Dark brown sandy angular, fine to coarse of gravel and sandstone and brick.				
D	0.50				(0.90)			
ES	0.50							
PID	0.50	PID: 11ppmv						
ES	0.75		1					
PID	0.75	PID: 12ppmv						
D	1.00		(1.20) Dry					
ES	1.00							
PID	1.00	PID: 2ppmv						
D	1.20			MADE GROUND: Black sandy gravelly clay. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick, clinker and concrete.	1.40	68.82		
SPT (S)	1.20 - 1.40	N=50+ (18,7 for 5mm/23,27 for 40mm)						
D	1.50							
D	2.00		2 (2.00) Dry					
ES	2.00							
SPT (S)	2.00 - 2.45	N=18 (3,3/4,4,5,5)						
PID	2.00	PID: 18ppmv						
B	2.50 - 3.00							
D	2.50							
D	3.00		3 (3.00) Dry					
ES	3.00							
SPT (S)	3.00 - 3.45	N=21 (3,3/4,5,7,5)						
PID	3.00	PID: 8ppmv						
B	3.50 - 4.00							
D	3.50				(4.60)			
D	4.00		4 (4.00) Dry					
ES	4.00							
SPT (S)	4.00 - 4.45	N=21 (3,4/4,5,6,6)						
PID	4.00	PID: 3ppmv						
B	4.50 - 5.00							
D	4.50							
D	5.00		5 (5.00) Dry					
ES	5.00							
SPT (S)	5.00 - 5.45	N=23 (4,4/5,6,6,6)						
PID	5.00	PID: 8ppmv						
B	5.50 - 6.00							
D	5.50							
D	6.00		6 (6.00) Dry		6.00	64.22		
ES	6.00			MADE GROUND: Black silty gravelly sand. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick, and clinker.				
SPT (S)	6.00 - 6.45	N=19 (4,5/5,4,5,5)						
PID	6.00	PID: 1ppmv						
B	6.50 - 7.00							
D	6.50							
D	7.00		7 (7.00) Dry					
ES	7.00							
SPT (S)	7.00 - 7.45	N=18 (5,4/4,5,5,4)						
PID	7.00	PID: 11ppmv						
B	7.50 - 8.00							
D	7.50							
D	8.00		8 (8.00) Dry					
ES	8.00							
SPT (S)	8.00 - 8.45	N=22 (5,5/6,5,6,5)						
PID	8.00	PID: 11ppmv						
B	8.50 - 9.00				(4.80)			
D	8.50							
D	9.00		9 (9.00) Dry					
ES	9.00							
SPT (S)	9.00 - 9.45	N=24 (5,6/6,5,6,7)						
PID	9.00	PID: 1ppmv						
B	9.50 - 10.00							
D	9.50							
D	10.00		10 (10.00) Dry					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
14.50	14.90	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	14.90

Hole Diameter

Diameter (mm)	Depth (m)
150	14.90
131	21.30

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH05

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 70.22 | Scale 1:50 | Easting: 415274.70 | Northing: 417302.13

Client: Marshall Holdings Ltd | Driller: LI/NH | Logged By: AH | Sheet 2 of 3

Method: Cable Percussive Drilling Rig with Rotary Core Drilling | Checked By: BL | Dates: 24/10/2017 - 01/11/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES SPT (S) PID	10.00 10.00 - 10.45 10.00	N=23 (5,6/6,5,6,6) PID: 1ppmv		MADE GROUND: Black silty gravelly sand. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick, and clinker.				
B D	10.50 - 11.00 10.50				10.80	59.42		
D ES SPT (S) PID	11.00 11.00 11.00 - 11.45 11.00	N=24 (4,6/5,6,6,7) PID: 8ppmv	11 (11.00) Dry	MADE GROUND: Black sandy gravelly clay. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of mudstone, clinker and concrete. Black gravelly sand bands noted throughout.	(1.20)			
B D	11.50 - 12.00 11.50							
D ES SPT (S) PID	12.00 12.00 12.00 - 12.45 12.00	N=28 (5,6/6,7,7,8) PID: 4ppmv	12 (12.00) Dry	MADE GROUND: Dark brown sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone.	12.00	58.22		
B D	12.50 - 13.00 12.50							
D ES SPT (S)	13.00 13.00 13.00 - 13.45	N=31 (5,6/7,8,7,9)	13 (13.00) Dry		(2.50)			
B	13.50 - 14.00							
D ES	14.00 14.00		14					
D	14.50			Dark grey MUDSTONE recovered as clayey slightly sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone.	14.50	55.72		
D SPT (S)	14.90 14.90 - 15.10	N=50+ (13,12 for 20mm/29,21 for 30mm)	(14.90) Dry 15		(0.70)			
	15.20 - 16.00		15.20 - 16.00 50 % Water	Orange brown subrounded to rounded gravel of SANDSTONE.	15.20	55.02		
		100 80 0 NI 40		Weak partially weathered black carbonaceous MUDSTONE. Fractures are very closely spaced subhorizontal planar, tight, clean.	(0.10) 15.30	54.92		
	16.00 - 17.20		16 16.00 - 17.20 30 % Water		(1.10)			
		58 0 0 NI 40 AZC L	17	Extremely weak, partially weathered, black carbonaceous MUDSTONE. Fractures are planar, smooth, tight, clean.	16.40	53.82		
	17.20 - 17.80		17.20 - 21.30 80 % Water		(1.00)			
		100 100 0 20		Very weak to weak, partially weathered, carbonaceous MUDSTONE. Fractures are very closely spaced subhorizontal, planar, smooth, tight, clean.	17.40	52.82		
	17.80 - 18.80		18	*17.60-18.00m: Subvertical fracture planar smooth.*				
		100 80 0 20 NI		*18.55-16.60m: Subvertical fracture, planar smooth, no infill or staining.*				
	18.80 - 20.30		19		(3.90)			
		100 73 0 20 20						
		TCR% SCR% RQD% FI	20					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
14.50	14.90	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	14.90

Hole Diameter

Diameter (mm)	Depth (m)
150	14.90
131	21.30

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH05

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.22 Scale 1:50

Easting: 415274.70 Northing: 417302.13

Client: Marshall Holdings Ltd | Driller: LI/NH | Logged By: AH | Sheet 3 of 3

Method: Cable Percussive Drilling Rig with Rotary Core Drilling | Checked By: BL | Dates: 24/10/2017 - 01/11/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
	20.30 - 21.30		100	100	0	20						
								End of Borehole at 21.30 m	21.30	48.92		

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
					14.50	14.90	01:00	200	14.90	150	14.90
										131	21.30

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH06

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.00 — Scale 1:50

Easting: 415288.62 — Northing: 417314.80

Client: Marshall Holdings Ltd — Driller: TF — Logged By: AH — Sheet 1 of 2

Method: Cable Percussive Drilling — Checked By: BL — Dates: 20/10/2017 - 24/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark brown topsoil. Gravel is angular to subangular, fine to coarse of mudstone.	(0.20)			
PID	0.00	PID: 0ppmv			0.20	69.81		
ES	0.25			MADE GROUND: Dark brown sandy gravelly clay. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, brick and concrete. Metal fragments noted.				
PID	0.25	PID: 0ppmv						
B	0.50 - 1.00							
D	0.50							
ES	0.50							
PID	0.50	PID: 0ppmv						
ES	0.75							
PID	0.75	PID: 0ppmv	1					
D	1.00							
			(1.20) Dry					
ES	1.00							
PID	1.00	PID: 0ppmv						
D	1.20							
SPT (C)	1.20 - 1.65	N=29 (6,8/9,7,6,7)			(2.80)			
B	1.50 - 2.00							
ES	1.50							
PID	1.50	PID: 0ppmv						
D	1.70		2	(2.00) Dry				
D	2.00							
SPT (C)	2.00 - 2.45	N=26 (6,6/7,8,6,5)						
B	2.50 - 3.00							
D	2.50							
ES	2.50							
PID	2.50	PID: 1ppmv						
D	3.00		3	(3.00) Dry	3.00	67.00		
SPT (C)	3.00 - 3.45	N=31 (8,9/9,10,6,6)		MADE GROUND: Dark brown slightly sandy gravelly clay. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of sandstone, brick and concrete Strong hydrocarbon odour noted.				
B	3.50 - 4.00							
D	3.50							
ES	3.50							
PID	3.50	PID: 2ppmv						
D	4.00		4	(4.00) Dry				
SPT (C)	4.00 - 4.45	N=23 (8,6/5,7,6,5)						
B	4.50 - 5.00			*4.50m: Clay of intermediate plasticity.*				
D	4.50							
ES	4.50							
PID	4.50	PID: 7ppmv						
D	5.00		5	(5.00) Dry	(4.00)			
SPT (C)	5.00 - 5.45	N=8 (2,3/2,1,2,3)						
B	5.50 - 6.00							
D	5.50							
ES	5.50							
PID	5.50	PID: 16ppmv						
D	6.00		6	(6.00) Dry				
SPT (C)	6.00 - 6.45	N=15 (3,4/5,3,2,5)						
B	6.50 - 7.00							
D	6.50							
ES	6.50							
PID	6.50	PID: 13ppmv						
D	7.00		7	(7.00) Dry	7.00	63.00		
SPT (C)	7.00 - 7.45	N=22 (3,2/3,6,7,6)		MADE GROUND: Dark brown silty gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of clinker brick and concrete. Slight hydrocarbon odour noted.				
B	7.50 - 8.00							
D	7.50							
ES	7.50							
PID	7.50	PID: 1ppmv						
D	8.00		8	(8.00) Dry				
SPT (C)	8.00 - 8.45	N=25 (7,9/8,6,6,5)						
B	8.50 - 9.00				(3.00)			
ES	8.50							
PID	8.50	PID: 1ppmv						
D	9.00		9	(9.00) Dry				
SPT (C)	9.00 - 9.45	N=33 (6,8/9,9,8,7)						
B	9.50 - 10.00							
D	9.50							
ES	9.50							
PID	9.50	PID: 1ppmv						
D	10.00		10		10.00	60.00		

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
10.00	10.00	00:45

Casing Depths

Diameter (mm)	Depth (m)
200	10.00

Hole Diameter

Diameter (mm)	Depth (m)
200	10.15

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Borehole terminated on a sandstone obstruction.

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH06

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.00 — Scale 1:50

Easting: 415288.62 — Northing: 417314.80

Client: Marshall Holdings Ltd — Driller: TF — Logged By: AH — Sheet 2 of 2

Method: Cable Percussive Drilling — Checked By: BL — Dates: 20/10/2017 - 24/10/2017

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing						
SPT (C)	10.00 - 10.15	N=50+ (25 for 60mm/38,12 for 20mm)		MADE GROUND: Dark grey gravel. Gravel is angular to coarse of concrete. Strong hydrocarbon odour noted.	(0.15) 10.15	59.86		
				End of Borehole at 10.15 m				

11 12 13 14 15 16 17 18 19 20

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
10.00	10.00	00:45

Casing Depths

Diameter (mm)	Depth (m)
200	10.00

Hole Diameter

Diameter (mm)	Depth (m)
200	10.15

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Borehole terminated on a sandstone obstruction.

Email Received 27 FEBRUARY 2018 Marshall (Mc/WY) Ltd

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH07

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.97 — Scale 1:50

Easting: 415340.25 — Northing: 417322.61

Client: Marshall Holdings Ltd — Driller: LI — Logged By: AH — Sheet 1 of 1

Method: Cable Percussive Drilling — Checked By: BL — Dates: 26/10/2017 - 31/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark brown slightly sandy gravelly clayey topsoil. Gravel is angular to subangular, fine to coarse of mudstone. Slightly hydrocarbon odour noted.				
PID	0.00	PID: 1ppmv						
ES	0.25							
PID	0.25	PID: 0ppmv			(0.80)			
B	0.50 - 1.00							
D	0.50							
ES	0.50							
PID	0.50	PID: 1ppmv			0.80	71.17		
ES	0.75			MADE GROUND: Dark brown slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone, sandstone and coal. Slight hydrocarbon odour noted.	(0.20)			
PID	0.75	PID: 0ppmv	1		1.00	70.97		
ES	1.00				(0.20)			
PID	1.00	PID: 16ppmv		(1.20) Dry	1.20	70.77		
D	1.20			MADE GROUND: Black sandy gravel. Sand is fine to coarse. Gravel is angular, fine to coarse of mudstone. Strong hydrocarbon odour noted.				
SPT (S)	1.20 - 1.65	N=15 (2,2/3,3,4,5)						
B	1.50 - 2.00							
D	1.50							
				MADE GROUND: Dark brown slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone, sandstone and coal. Slight hydrocarbon odour noted.	(1.30)			
D	2.00		2	(2.00) Dry				
ES	2.00							
SPT (S)	2.00 - 2.45	N=16 (2,3/3,4,5,4)						
PID	2.00	PID: 1ppmv						
B	2.50 - 3.00				2.50	69.47		
D	2.50			MADE GROUND: Black slightly gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick, coal, sandstone and mudstone. Slight hydrocarbon odour noted.				
D	3.00		3	(3.00) Dry				
ES	3.00							
SPT (S)	3.00 - 3.45	N=25 (4,3/4,5,8,8)						
PID	3.00	PID: 0ppmv			(1.80)			
B	3.50 - 4.00							
D	3.50							
D	4.00		4	(4.00) Dry				
ES	4.00							
SPT (S)	4.00 - 4.16	N=50+ (20,5 for 5mm/50)						
PID	4.00	PID: 50ppmv						
				End of Borehole at 4.30 m	4.30	67.67		
			5					
			6					
			7					
			8					
			9					
			10					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
4.00	4.30	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	4.00

Hole Diameter

Diameter (mm)	Depth (m)
200	4.30

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Borehole terminated due to metal obstruction at 4.30m.

Email received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

BOREHOLE RECORD

Borehole BH07A

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.74 | Scale 1:50

Easting: 415333.52 | Northing: 417324.37

Client: Marshall Holdings Ltd | Driller: LI/NH | Logged By: AH | Sheet 1 of 1

Method: Cable Percussive Drilling with Rotary Coring Core Drilling | Checked By: BL | Dates: 26/10/2017 - 01/11/2017

SAMPLE DETAILS: Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark brown sandy gravelly topsoil. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick and concrete.	(0.40)			
ES	0.25				0.40	71.33		
B	0.50 - 1.00			MADE GROUND: Orange brown sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick, sandstone and concrete.				
D	0.50				(0.80)			
ES	0.50							
ES	0.75							
ES	1.00		1		1.20	70.54		
				Dark grey clayey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone, (Possible weathered rockhead) Strong solvent and hydrocarbon odour noted.				
ES	2.00		2					
					(2.60)			
ES	3.00		3					
	3.80 - 5.30				3.80			
	3.80 - 5.30			3.80 - 5.30 50 % Water				
D	4.00		4	Extremely weak, destructured dark grey MUDSTONE. Recovered as clay.	(0.50)	67.94		
					4.30	67.44		
		100 0 0 NI		Very weak dark grey/brown MUDSTONE. Orange staining.				
			5	*5.00m: Ironstone nodule noted.*	(1.10)			
	5.30 - 6.80	A...		5.30 - 6.80 60 % Water	5.40	66.33		
		20		Weak dark partially weathered grey locally stained orange stained MUDSTONE. Fractures are closely spaced subhorizontal planar, rough, with no infill.				
		93 63	6		(1.18)			
		12			6.58	65.16		
				Medium strong grey partially weathered SANDSTONE. Fractures are closely spaced subhorizontal planar rough with no infill.	(0.22)			
	6.80 - 8.30			6.80 - 8.30 30 % Water	6.80	64.94		
			7	*6.58m: Locally stained orange.*				
				Very weak, partially weathered, grey SANDSTONE. *7.10-7.45m: Subvertical fracture rough undulating with ironstone infill.*	(0.69)			
		100 64 64 12		Weak, partially weathered, grey SANDSTONE. Fractures are closely spaced subhorizontal non planar, rough, no infill.	7.49	64.24		
				7.57m: Subhorizontal fracture rough stepped with clay infill.				
			8		(1.01)			
	8.30 - 9.80	A...		8.30 - 9.80 0 % Water				
				Medium strong dark grey partially weathered SILTSTONE, interbedded sandstone. Fractures are closely spaced subhorizontal planar, rough with no infill.	8.50	63.24		
		89 62 44 15	9	*9.10-9.33m: Series of subvertical fractures closely spaced no infill with orange staining.*	(1.30)			
				End of Borehole at 9.80 m	9.80	61.94		
		TCR% SCR% RQD% FI	10					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
9.20	6.50			

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
4.00	4.20	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	4.00
131	4.20

Hole Diameter

Diameter (mm)	Depth (m)
200	4.00
131	9.80

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH08

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.62 — Scale 1:50

Easting: 415323.33 — Northing: 417357.50

Client: Marshall Holdings Ltd — Driller: SR/NH — Logged By: AH — Sheet 1 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling — Checked By: BL — Dates: 26/10/2017 - 30/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark brown clayey sandy topsoil.	(0.20)			
PID	0.00	PID: 1ppmv			0.20	70.42		
ES	0.25			MADE GROUND: Dark brown black sandy slightly gravelly clay. Sand is fine to coarse. Sand is fine to coarse of ash. Gravel is angular to subangular, fine to coarse of concrete and concrete. Fragments of metal noted.				
PID	0.25	PID: 1ppmv						
B	0.30							
ES	0.50							
PID	0.50	PID: 0ppmv						
ES	0.75							
PID	0.75	PID: 1ppmv						
ES	1.00		1					
PID	1.00	PID: 1ppmv						
B	1.20 - 1.70		(1.20) Dry					
D	1.20							
SPT (S)	1.20 - 1.65	N=11 (2,3/2,3,3,3)			(2.80)			
D	1.85							
D	2.00		2 (2.00) Dry					
ES	2.00							
SPT (S)	2.00 - 2.45	N=11 (2,2/3,2,3,3)						
PID	2.00	PID: 0ppmv						
D	2.75							
B	3.00 - 3.45		3 (3.00) Dry		3.00	67.62		
D	3.00			MADE GROUND: Black silty gravelly sand. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of clinker, brick, concrete, mudstone and sandstone. Strong hydrocarbon odour noted.				
ES	3.00							
SPT (S)	3.00 - 3.35	N=50+ (7,9/18,18,14 for 50mm)						
PID	3.00	PID: 6ppmv						
D	3.75							
B	4.00 - 4.50		4 (4.00) Dry					
D	4.00							
ES	4.00							
SPT (S)	4.00 - 4.45	N=17 (12,8/8,3,3,3)						
PID	4.00	PID: 2ppmv						
D	4.75							
B	5.00 - 5.50		5 (5.00) Dry					
D	5.00							
ES	5.00							
SPT (S)	5.00 - 5.45	N=14 (3,3/4,3,4,3)						
PID	5.00	PID: 0ppmv						
D	5.75							
B	6.00 - 6.50		6 (6.00) Dry					
D	6.00							
ES	6.00							
SPT (S)	6.00 - 6.45	N=13 (3,4/3,3,4,3)						
PID	6.00	PID: 1ppmv						
D	6.75							
B	7.00 - 7.50		7 (7.00) Dry		(8.00)			
D	7.00							
ES	7.00							
SPT (S)	7.00 - 7.45	N=17 (3,4/5,4,4,4)						
PID	7.00	PID: 1ppmv						
D	7.75							
B	8.00 - 8.50		8 (8.00) Dry					
D	8.00							
ES	8.00							
SPT (S)	8.00 - 8.45	N=13 (3,4/3,3,3,4)						
PID	8.00	PID: 0ppmv						
D	8.75							
B	9.00 - 9.50		9 (9.00) Dry					
D	9.00							
ES	9.00							
SPT (S)	9.00 - 9.45	N=13 (3,3/3,4,3,3)						
PID	9.00	PID: 1ppmv						
D	9.75							
B	10.00		10 (10.00) Dry					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
3.40	3.80	01:00
3.80	4.00	00:30
4.60	4.80	00:30
5.70	5.90	00:30
10.10	10.50	01:00
11.40	11.50	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	11.00
150	11.50

Hole Diameter

Diameter (mm)	Depth (m)
200	11.00
131	19.30

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH08

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 70.62 | Scale 1:50 | Easting: 415323.33 | Northing: 417357.50

Client: Marshall Holdings Ltd | Driller: SR/NH | Logged By: AH | Sheet 2 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 26/10/2017 - 30/10/2017

Type	Depth From-To (m)	Insitu Testing	TCR%	SCR%	RQD%	FI	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D ES SPT (S) PID	10.00 - 10.50 10.00 10.00 - 10.21 10.00	N=50+ (11,14 for 30mm/30,20 for 30mm) PID: 14ppmv						MADE GROUND: Black silty gravelly sand. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of clinker, brick, concrete, mudstone and sandstone. Strong hydrocarbon odour noted. *10.00m: Dark brown liquid tar noted.*				
D	10.75						11 (11.00) 10.80					
B D ES SPT (S) PID	11.00 11.00 11.00 11.00 - 11.45 11.00	N=38 (8,8/9,8,11,10) PID: 3ppmv						Dark brown clayey slightly sandy GRAVEL. Gravel is angular to subangular, of mudstone. (Weathered rockhead),	11.00 (0.50)	59.62		
D SPT (S) PID	11.50 11.50 - 11.70 11.50	N=50+ (25/30,20 for 45mm) PID: 17ppmv					(11.50) Dry		11.50	59.12		
PID	11.50 11.70 - 13.30	16.98	0	0	0	AZCL	10.30 - 13.30 80 % Water (11.00) 10.80 (11.50) Dry	Extremely weak to very weak partially weathered dark grey MUDSTONE. Fractures are extremely closely to very closely spaced subhorizontal planar, smooth, no infill or staining.				
	13.30 - 14.80		96	60	0	A... NI 40 NI	13.30 - 16.30 100 % Water	*14.40-14.80m: Subvertical planar smooth fracture, no infill with orange staining.*	(3.75)			
	14.80 - 16.30		100	46	21	30 NI 12		Weak partially weathered dark grey MUDSTONE. Fractures are very closely to closely spaced subhorizontal planar, smooth, no infill or staining. *15.50-15.70m: Subvertical planar smooth fracture, no infill or staining.* *15.85-15.95m: Subvertical planar smooth fracture, no infill or staining.* *16.15-16.25m: Subvertical planar smooth fracture, no infill or staining.*	15.25 (1.65)	55.37		
	16.30 - 17.50		100	93	14	NI 12	16.30 - 19.30 0 % Water	Weak black MUDSTONE. Fractures are very closely to closely spaced subhorizontal planar, smooth, no infill or staining.	16.90 (0.90)	53.72		
	17.50 - 19.30		80	66	7	NI 30 AZCL		Weak partially weathered dark grey MUDSTONE. Fractures are very closely to closely spaced subhorizontal planar, smooth, no infill or staining. *17.50-17.80m: Subvertical fracture, stained smooth no infill.* *17.90-18.30m: Subvertical planar smooth fracture, no infill or staining.* *18.30-18.50m: Subvertical planar smooth fracture, no infill or staining.*	17.80 (1.50)	52.82		
								End of Borehole at 19.30 m	19.30	51.32		

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
3.40	3.80	01:00
3.80	4.00	00:30
4.60	4.80	00:30
5.70	5.90	00:30
10.10	10.50	01:00
11.40	11.50	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	11.00
150	11.50

Hole Diameter

Diameter (mm)	Depth (m)
200	11.00
131	19.30

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH09

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.84 — Scale 1:50

Easting: 415303.68 — Northing: 417414.54

Client: Marshall Holdings Ltd — Driller: TF — Logged By: AH — Sheet 1 of 2

Method: Cable Percussive Drilling — Checked By: BL — Dates: 12/10/2017 - 16/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Black macadam.	(0.10)	70.74		
PID	0.00	PID: 0ppmv		MADE GROUND: Orange brown slightly sandy angular, fine to coarse gravel of limestone.	0.10			
ES	0.25				(0.50)			
PID	0.25	PID: 0ppmv						
B	0.50 - 1.00							
ES	0.50			MADE GROUND: Dark grey slightly sandy gravelly clay of intermediate plasticity. Gravel is angular to subangular, fine to coarse of sandstone, mudstone and brick.	0.60	70.24		
PID	0.50	PID: 0ppmv			(0.50)			
D	0.60							
ES	0.75							
PID	0.75	PID: 1ppmv	1		1.10	69.74		
D	1.00			MADE GROUND: Black silty slightly gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick, concrete and sandstone.				
ES	1.00		(1.20) Dry					
PID	1.00	PID: 1ppmv						
D	1.20							
SPT (C)	1.20 - 1.65	N=24 (6,7/8,7,5,4)						
B	1.50 - 2.00							
D	1.50							
ES	1.50							
PID	1.50	PID: 1ppmv	2 (2.00) Dry					
D	2.00							
SPT (C)	2.00 - 2.45	N=17 (3,5/4,4,4,5)			(2.40)			
B	2.50 - 3.00							
D	2.50							
ES	2.50							
PID	2.50	PID: 0ppmv						
D	3.00		3 (3.00) Dry					
SPT (C)	3.00 - 3.45	N=17 (6,5/4,4,6,3)						
B	3.50 - 4.00			MADE GROUND: Firm black sandy gravelly clay. Gravel is angular to subangular, fine to coarse of sandstone, brick and clinker.	3.50	67.34		
D	3.50							
ES	3.50							
PID	3.50	PID: 0ppmv						
D	4.00		4 (4.00) Dry					
SPT (C)	4.00 - 4.45	N=24 (7,8/7,6,4,7)						
B	4.50 - 5.00							
D	4.50							
ES	4.50							
PID	4.50	PID: 1ppmv						
D	5.00		5 (5.00) Dry		(3.00)			
SPT (C)	5.00 - 5.45	N=19 (6,5/4,3,5,7)						
B	5.50 - 6.00			*5.50-6.00m: Sand band noted.*				
ES	5.50							
PID	5.50	PID: 1ppmv						
D	6.00		6 (6.00) Dry					
SPT (C)	6.00 - 6.45	N=8 (3,2/,3,3,2)						
D	6.50			MADE GROUND: Black silty clayey sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick and concrete.	6.50	64.34		
ES	6.50							
PID	6.50	PID: 0ppmv						
D	7.00		7 (7.00) Dry					
SPT (C)	7.00 - 7.45	N=13 (2,1/3,3,4,3)						
B	7.50 - 8.00							
ES	7.50							
PID	7.50	PID: 0ppmv						
D	8.00		8 (8.00) Dry					
SPT (C)	8.00 - 8.45	N=24 (3,6/7,4,6,7)						
B	8.50 - 9.00							
D	8.50							
ES	8.50				(4.50)			
PID	8.50	PID: 0ppmv						
D	9.00		9 (9.00) Dry					
SPT (C)	9.00 - 9.45	N=21 (8,7/,7,8,6)						
B	9.50 - 10.00							
D	9.50							
ES	9.50							
PID	9.50	PID: 0ppmv						
D	10.00		10 (10.00) Dry					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
5.50	6.00	01:30
11.00	12.50	04:00

Casing Depths

Diameter (mm)	Depth (m)
200	11.00
150	12.50

Hole Diameter

Diameter (mm)	Depth (m)
200	11.00
150	12.50

General Remarks

1. Hand dug inspection pit to 1.20m
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH09

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.84 — Scale 1:50

Easting: 415303.68 — Northing: 417414.54

Client: Marshall Holdings Ltd — Driller: TF — Logged By: AH — Sheet 2 of 2

Method: Cable Percussive Drilling — Checked By: BL — Dates: 12/10/2017 - 16/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
SPT (C)	10.00 - 10.45	N=26 (10,6/5,6,6,9)		MADE GROUND: Black silty clayey sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick and concrete.				
B	10.50 - 11.00							
D	10.50							
ES	10.50							
D	11.00		11 (10.50) Dry	MADE GROUND: Red angular, fine to coarse gravel of brick.	11.00	59.84		
SPT (C)	11.00 - 11.45	N=25 (7,5/5,4,9,7)			(1.50)			
			12					
				End of Borehole at 12.50 m	12.50	58.34		
			13					
			14					
			15					
			16					
			17					
			18					
			19					
			20					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
5.50	6.00	01:30
11.00	12.50	04:00

Casing Depths

Diameter (mm)	Depth (m)
200	11.00
150	12.50

Hole Diameter

Diameter (mm)	Depth (m)
200	11.00
150	12.50

General Remarks

1. Hand dug inspection pit to 1.20m
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH09A

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.11 — Scale 1:50

Easting: 415295.80 — Northing: 417403.00

Client: Marshall Holdings Ltd — Driller: TF — Logged By: AH — Sheet 1 of 2

Method: Cable Percussive Drilling — Checked By: BL — Dates: 17/10/2017 - 19/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Black macadam.	(0.10)	71.02		
PID	0.00	PID: 0ppmv			0.10			
ES	0.25			MADE GROUND: Orange brown sandy angular, fine to coarse gravel. Gravel is angular, fine to coarse of sandstone and limestone.				
PID	0.25	PID: 1ppmv			(0.50)			
B	0.50 - 1.00							
ES	0.50				0.60	70.52		
PID	0.50	PID: 0ppmv		MADE GROUND: Dark brown slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of sandstone, mudstone, coal and clinker.				
D	0.60							
ES	0.75							
PID	0.75	PID: 1ppmv	1					
D	1.00							
			(1.20) Dry	*1.20-1.40m: Angular cobble of brick noted.*				
ES	1.00							
PID	1.00	PID: 1ppmv						
D	1.20							
SPT (C)	1.20 - 1.56	N=50+ (20,5 for 5mm/18,15,10,7 for 60mm)						
B	1.50 - 2.00							
ES	1.50							
PID	1.50	PID: 1ppmv	2 (2.00) Dry					
D	2.00							
SPT (C)	2.00 - 2.45	N=12 (6,5/4,3,2,3)			(3.40)			
B	2.50 - 3.00							
D	2.50							
ES	2.50							
PID	2.50	PID: 0ppmv						
D	3.00		3 (3.00) Dry	*3.00m: Strong hydrocarbon odour noted.*				
SPT (C)	3.00 - 3.45	N=16 (3,4/,7,4,5)						
B	3.50 - 4.00							
D	3.50							
ES	3.50							
PID	3.50	PID: 0ppmv						
D	4.00		4 (4.00) Dry		4.00	67.11		
SPT (C)	4.00 - 4.43	N=29 (8,9/9,7,5,8)		MADE GROUND: Dark brown sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone, sandstone and brick. Rare metal fragments noted.				
B	4.50 - 5.00							
D	4.50							
ES	4.50							
PID	4.50	PID: 0ppmv						
D	5.00		5 (5.00) Dry		(2.00)			
SPT (C)	5.00 - 5.45	N=29 (7,4/7,9,9,4)						
B	5.50 - 6.00							
D	5.50							
ES	5.50							
PID	5.50	PID: 0ppmv						
D	6.00		6 (6.00) Dry		6.00	65.11		
SPT (C)	6.00 - 6.45	N=21 (5,3/4,7,5,5)		MADE GROUND: Black silty clayey very gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of mudstone, coal and clinker.				
B	6.50 - 7.00							
D	6.50							
ES	6.50							
PID	6.50	PID: 0ppmv						
D	7.00		7 (7.00) Dry					
SPT (C)	7.00 - 7.45	N=22 (6,4/6,7,5,4)						
B	7.50 - 8.00							
D	7.50							
ES	7.50							
PID	7.50	PID: 0ppmv						
D	8.00		8 (8.00) Dry					
SPT (C)	8.00 - 8.45	N=21 (7,9/9,4,3,5)						
B	8.50 - 9.00							
D	8.50							
ES	8.50				(5.50)			
PID	8.50	PID: 1ppmv						
D	9.00		9 (9.00) Dry					
SPT (C)	9.00 - 9.45	N=14 (3,2/3,4,4,3)						
B	9.50 - 10.00							
D	9.50							
ES	9.50							
PID	9.50	PID: 0ppmv						
D	10.00		10					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
1.20	1.40	01:00
9.00	9.40	01:00
12.80	12.80	02:00

Casing Depths

Diameter (mm)	Depth (m)
200	12.50

Hole Diameter

Diameter (mm)	Depth (m)
200	12.93

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH09A

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.11 | Scale 1:50

Easting: 415295.80 | Northing: 417403.00

Client: Marshall Holdings Ltd | Driller: TF | Logged By: AH | Sheet 2 of 2

Method: Cable Percussive Drilling | Checked By: BL | Dates: 17/10/2017 - 19/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
B	10.50 - 11.00			MADE GROUND: Black silty clayey very gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of mudstone, coal and clinker.				
D	10.50							
ES	10.50							
PID	10.50	PID: 1ppmv						
D	11.00		11 (11.00) Dry					
SPT (C)	11.00 - 11.45	N=43 (4,15/12,10,11,10)						
B	11.50 - 12.00			MADE GROUND: Red slightly sandy, gravelly cobbles/ boulders. Sand is fine to coarse. Gravel is angular fine to coarse of brick.	11.50	59.62		
D	11.50							
ES	11.50							
PID	11.50	PID: 0ppmv						
D	12.00		12 (12.00) Dry					
SPT (C)	12.00 - 12.45	N=18 (3,6/3,7,4,4)			(1.43)			
D	12.50							
ES	12.50							
PID	12.50	PID: 1ppmv						
SPT (C)	12.80 - 12.93	N=50+ (25 for 40mm/35,15 for 15mm)		End of Borehole at 12.93 m	12.93	58.18		
			13					
			14					
			15					
			16					
			17					
			18					
			19					
			20					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
1.20	1.40	01:00
9.00	9.40	01:00
12.80	12.80	02:00

Casing Depths

Diameter (mm)	Depth (m)
200	12.50

Hole Diameter

Diameter (mm)	Depth (m)
200	12.93

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

BOREHOLE RECORD

Borehole BH10

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 68.53 Scale 1:50

Easting: 415249.84 Northing: 417301.24

Client: Marshall Holdings Ltd | Driller: LI/NH | Logged By: AH | Sheet 1 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 19/10/2017 - 25/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Yellowish brown silty sandy gravel. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of sandstone.				
PID	0.00	PID: 0ppmv						
ES	0.25							
PID	0.25	PID: 2ppmv						
ES	0.50							
PID	0.50	PID: 2ppmv			(1.30)			
ES	0.75							
PID	0.75	PID: 2ppmv						
ES	1.00		1					
PID	1.00	PID: 1ppmv						
SPT (S)	1.20 - 1.65	N=15 (3,4/2,3,3,7)	(1.20) Dry		1.30	67.23		
B	1.50 - 2.00			MADE GROUND: Dark brown clayey gravelly sand. Gravel is angular to subangular fine to coarse of brick, sandstone, mudstone, coal and concrete. Strong hydrocarbon odour noted.				
D	1.50							
D	2.00		2	(2.00) Dry				
ES	2.00							
SPT (S)	2.00 - 2.45	N=22 (3,4/4,6,6,6)						
PID	2.00	PID: 5ppmv						
B	2.50 - 3.00							
D	2.50				(3.00)			
D	3.00		3	(3.00) Dry				
ES	3.00							
SPT (S)	3.00 - 3.45	N=21 (3,4/3,6,6,6)						
PID	3.00	PID: 10ppmv						
B	3.50 - 4.00							
D	3.50							
D	4.00		4	(4.00) Dry				
ES	4.00							
SPT (S)	4.00 - 4.45	N=24 (4,4/5,6,6,7)						
PID	4.00	PID: 8ppmv			4.30	64.23		
B	4.50 - 5.00			MADE GROUND: Dark grey gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of clinker, sandstone and concrete. Slight hydrocarbon odour noted.	(0.40)			
D	4.50				4.70	63.83		
D	5.00		5	(5.00) Dry				
ES	5.00			MADE GROUND: Orange brown sandy gravel. Gravel is angular to subangular, fine to coarse of sandstone.				
SPT (S)	5.00 - 5.37	N=50+ (9,11/17,17,16 for 70mm)			(1.00)			
PID	5.00	PID: 0ppmv						
B	5.50 - 6.00							
D	5.50				5.70	62.83		
D	6.00		6	(6.00) Dry				
ES	6.00			MADE GROUND: Black silty very gravelly sand. Sand is fine to coarse with some ash. Gravel is angular to subangular, fine to coarse of sandstone, brick and clinker. Strong hydrocarbon odour noted.				
SPT (S)	6.00 - 6.45	N=26 (4,5/4,11,6,5)						
PID	6.00	PID: 1ppmv						
B	6.50 - 7.00							
D	6.50							
D	7.00		7	(7.00) Dry				
ES	7.00							
SPT (S)	7.00 - 7.45	N=24 (4,5/5,6,6,7)						
PID	7.00	PID: 6ppmv						
B	7.50 - 8.00							
D	7.50							
D	8.00		8	(8.00) Dry				
ES	8.00							
SPT (S)	8.00 - 8.45	N=25 (4,6/5,7,6,7)						
PID	8.00	PID: 1ppmv						
B	8.50 - 9.00							
D	8.50				(6.10)			
D	9.00		9	(9.00) Dry				
ES	9.00							
SPT (S)	9.00 - 9.45	N=32 (5,6/7,8,8,9)						
PID	9.00	PID: 0ppmv						
B	9.50 - 10.00							
D	9.50							
~~D~~	~~10.00~~		~~10~~	~~(10.00) Dry~~				

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
13.50	13.00	12.00	20	

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
4.70	5.70	01:30
14.30	15.00	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	15.00
131	17.20
100	40.73

Hole Diameter

Diameter (mm)	Depth (m)
200	15.00
131	28.10
100	42.70

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Rotary open hole drilled from 21.80m to 39.00m.

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH10

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 68.53 | Scale 1:50 | Easting: 415249.84 | Northing: 417301.24

Client: Marshall Holdings Ltd | Driller: LI/NH | Logged By: AH | Sheet 2 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 19/10/2017 - 25/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES SPT (S) PID	10.00 10.00 - 10.45 10.00	N=31 (5,6/7,7,8,9) PID: 0ppmv		MADE GROUND: Black silty very gravelly sand. Sand is fine to coarse with some ash. Gravel is angular to subangular, fine to coarse of sandstone, brick and clinker. Strong hydrocarbon odour noted.				
B D	10.50 - 11.00 10.50							
D ES SPT (S) PID	11.00 11.00 11.00 - 11.45 11.00	 N=38 (5,10/12,8,9,9) PID: 1ppmv	11 (11.00) Dry					
B D	11.50 - 12.00 11.50				11.80	56.73		
D ES SPT (S) PID	12.00 12.00 12.00 - 12.45 12.00	 N=44 (6,9/9,11,11,13) PID: 0ppmv	12 (12.00) Dry	Dense dark grey clayey sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone and sandstone.				
B D	12.50 - 13.00 12.50				(2.00)			
D ES SPT (S) PID	13.00 13.00 13.00 - 13.45 13.00	 N=35 (7,11/12,7,7,9) PID: 1ppmv	13 (13.00) Dry					
D W	13.50 13.50				13.80	54.73		
D ES PID	14.00 14.00 14.00	 PID: 1ppmv	14	Dark grey GRAVEL. Gravel is angular to subrounded, fine to coarse of sandstone.	(0.20) 14.00	54.53		
B D	14.50 - 15.00 14.50			Dark brown slightly clayey GRAVEL. Gravel is angular to subangular, fine to coarse of mudstone. (Weathered rockhead).	(1.30)			
ES SPT (S) PID	15.00 15.00 - 15.31 15.00	 N=50+ (10,15/16,24,10 for 8mm) PID: 0ppmv	15 (14.00) Dry		15.30			
	15.30 - 16.30	TCR% 60, SCR% 60, RQD% 0, FI 30, AZCL	13.30 - 28.70 100 % Water (14.00) Dry	Weak, partially weathered, thinly laminated black MUDSTONE. Fractures are extremely closely to very closely subhorizontal planar, smooth, tight, clean.	15.30	53.23		
	16.30 - 16.80	TCR% 60, SCR% 60, RQD% 0, FI 40, A…	16					
	16.80 - 17.30	TCR% 100, SCR% 100, RQD% 0, FI 40	17	*16.90-16.95m: Subvertical fracture planar, smooth no infill or staining.*	(3.50)			
	17.30 - 17.80	TCR% 80, SCR% 80, RQD% 0, FI 40, A…		*17.40-17.45m: Subvertical fracture planar, smooth no infill or staining.*				
	17.80 - 18.30	TCR% 100, SCR% 100, RQD% 0, FI 40	18					
	18.30 - 18.80	TCR% 50, SCR% 50, RQD% 0, FI 40, A…						
	18.80 - 19.80	TCR% 100, SCR% 100, RQD% 0	19	Weak partially weathered black MUDSTONE. Fractures are very closely to closely spaced subhorizontal planar, smooth, no infill or staining.	18.80	49.73		
	19.80 - 20.80			*18.80-21.00m: Subvertical fracture planar, smooth no infill or staining.*				
			20					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
13.50	13.00	12.00	20	

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
4.70	5.70	01:30
14.30	15.00	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	15.00
131	17.20
100	40.73

Hole Diameter

Diameter (mm)	Depth (m)
200	15.00
131	28.10
100	42.70

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Rotary open hole drilled from 21.80m to 39.00m.

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH10

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 68.53 Scale 1:50

Easting: 415249.84 Northing: 417301.24

Client: Marshall Holdings Ltd

Driller: LI/NH Logged By: AH

Sheet 3 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 19/10/2017 - 25/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
			100	100	0	20			(3.00)			
	20.80 - 21.80		70	70	0	AZCL		*21.40-21.58m: Subvertical fracture planar, smooth no infill or staining.*				
							21.80 - 38.70 100 % Water	Dark grey MUDSTONE. (Logged from flush returns).	21.80	46.73		

21 22 23 24 25 26 27 28 29 30

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
13.50	13.00			

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
4.70	5.70	01:30
14.30	15.00	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	15.00
131	17.20
100	40.73

Hole Diameter

Diameter (mm)	Depth (m)
200	15.00
131	28.10
100	42.70

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Rotary open hole drilled from 21.80m to 39.00m.

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH10

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 68.53 Scale 1:50

Easting: 415249.84 Northing: 417301.24

Client: Marshall Holdings Ltd

Driller: LI/NH Logged By: AH

Sheet 4 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 19/10/2017 - 25/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
									(17.20)			
							31					
							32					
							33					
							34					
							35					
							36					
							37					
							38					
								38.70 - 42.70 0 % Water				
	39.00 - 40.50					AZCL	39	AZCL.	39.00	29.53		
			62	62	52				(0.56)			
								Very strong unweathered grey fine grained SANDSTONE.	39.56	28.97		
							40		(0.69)			

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
13.50	13.00			

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
4.70	5.70	01:30
14.30	15.00	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	15.00
131	17.20
100	40.73

Hole Diameter

Diameter (mm)	Depth (m)
200	15.00
131	28.10
100	42.70

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Rotary open hole drilled from 21.80m to 39.00m.

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH10

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 68.53 Scale 1:50

Easting: 415249.84 Northing: 417301.24

Client: Marshall Holdings Ltd

Driller: LI/NH Logged By: AH

Sheet 5 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 19/10/2017 - 25/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
	40.50 - 41.70		100	100	79	3		Strong unweathered fine grained SANDSTONE. Fractures are closely spaced horizontal planar, smooth with no infill.	40.25	28.28		
							41	*41.21m: Subhorizontal horizontal fractures, stepped, smooth, discoloured black with mudstone infill.*	(1.41)			
	41.70 - 42.70		100	100	85		42	Strong unweathered grey SANDSTONE. Fractures are closely spaced subhorizontal, smooth, planar. with no infill.	41.66	26.87		
								42.19-42.49m: Subvertical quartz, veins.	(0.74)			
								Strong partially weathered grey SANDSTONE. Fractures are subhorizontal, smooth, planar, with no infill.	42.40	26.13		
								42.00m: Vertical fracture rough undulating no infill.	(0.30)			
								End of Borehole at 42.70 m	42.70	25.83		
							43					
							44					
							45					
							46					
							47					
							48					
							49					
							50					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
13.50	13.00			

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
4.70	5.70	01:30
14.30	15.00	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	15.00
131	17.20
100	40.73

Hole Diameter

Diameter (mm)	Depth (m)
200	15.00
131	28.10
100	42.70

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Rotary open hole drilled from 21.80m to 39.00m.

Email received 27 FEBRUARY 2018 Marshall (MGWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH11

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 65.77 | Scale 1:50

Easting: 415193.82 | Northing: 417382.21

Client: Marshall Holdings Ltd | Driller: LA/NH | Logged By: AH | Sheet 1 of 5

Method: Cable Percussive Drilling Rig with Rotary Core Drilling | Checked By: BL | Dates: 12/10/2017 - 16/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
PID	0.00	PID: 0ppmv		MADE GROUND: Black bituminous macadam.	(0.10)	65.67		
				MADE GROUND: Orange brown clayey sandy gravel. Gravel is angular, fine to coarse of sandstone.	0.10 (0.40)			
ES	0.25							
PID	0.25	PID: 0ppmv						
B	0.50 - 1.00			MADE GROUND: Dark brown black slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of sandstone, mudstone and brick. Glass fragments noted.	0.50	65.27		
ES	0.50							
PID	0.50	PID: 0ppmv						
ES	0.75							
PID	0.75	PID: 0ppmv						
D	1.00		1					
ES	1.00							
PID	1.00	PID: 0ppmv	(1.20) Dry					
D	1.20							
SPT (S)	1.20 - 1.65	N=19 (3,4/4,5,5,5)						
B	1.50 - 2.00							
D	1.50							
D	2.00		2 (2.00) Dry					
ES	2.00							
SPT (S)	2.00 - 2.45	N=18 (3,3/5,4,5,4)						
PID	2.00	PID: 1ppmv						
B	2.50 - 3.00							
D	2.50							
D	3.00		3 (3.00) Dry					
ES	3.00							
SPT (S)	3.00 - 3.45	N=22 (4,6/8,5,5,4)						
PID	3.00	PID: 1ppmv						
B	3.50 - 4.00							
D	3.50							
D	4.00		4 (4.00) Dry					
ES	4.00							
SPT (S)	4.00 - 4.45	N=20 (3,5/4,5,6,5)						
PID	4.00	PID: 1ppmv						
B	4.50 - 5.00							
D	4.50							
PID	4.50	PID: 0ppmv			(8.50)			
D	5.00		5 (5.00) Dry					
ES	5.00							
SPT (S)	5.00 - 5.45	N=25 (4,5/6,6,6,7)						
PID	5.11	PID: 0ppmv						
B	5.50 - 6.00							
D	5.50							
D	6.00		6 (6.00) Dry					
ES	6.00							
SPT (S)	6.00 - 6.45	N=26 (4,5/6,5,6,9)						
D	6.50							
PID	6.50	PID: 1ppmv						
D	7.00		7 (7.00) Dry					
ES	7.00							
SPT (S)	7.00 - 7.44	N=50+ (3,6/5,15,16,14 for 70mm)						
B	7.50 - 8.00							
D	7.50							
D	8.00		8 (8.00) Dry					
ES	8.00							
SPT (S)	8.00 - 8.45	N=27 (7,7/4,5,8,10)						
PID	8.00	PID: 1ppmv						
B	8.50 - 9.00							
D	8.50							
D	9.00		9 (9.00) Dry					
ES	9.00							
SPT (S)	9.00 - 9.23	N=50+ (6,8/37,13 for 5mm)		MADE GROUND: Dark orange brown silty sandy gravel. Gravel is angular to subangular, fine to coarse of sandstone.	9.00	56.77		
PID	9.00	PID: 1ppmv						
B	9.50 - 10.00				(1.00)			
D	9.50							
D	10.00		10 (10.00) Dry		10.00	55.77		

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
7.00	7.60	01:00
9.00	9.80	01:30

Casing Depths

Diameter (mm)	Depth (m)
200	11.00

Hole Diameter

Diameter (mm)	Depth (m)
200	11.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m
2. No groundwater encountered.
3. Open hole drilling between 21.60 and 50.00m.

Email received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH11

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 65.77 | Scale 1:50 | Easting: 415193.82 | Northing: 417382.21

Client: Marshall Holdings Ltd | Driller: LA/NH | Logged By: AH | Sheet 2 of 5

Method: Cable Percussive Drilling Rig with Rotary Core Drilling | Checked By: BL | Dates: 12/10/2017 - 16/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	TCR%	SCR%	RQD%	FI	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES SPT (S) PID	10.00 10.00 - 10.45 10.00	N=36 (5,7/7,11,9,9) PID: 1ppmv						Very stiff black slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone.	(0.50)			
B D	10.50 - 11.00 10.50							Dark grey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone. (possible weathered rockhead).	10.50 (0.54)	55.27		
D ES ES SPT (S) SPT (S) PID	11.00 11.00 11.00 11.00 - 11.04 11.00 - 11.04 11.00	N=50+ (25 for 21mm/50 for 17mm) N=50+ (25 for 21mm/50 for 17mm) PID: 0ppmv	0	0	0		11 (11.00) Dry (11.00) Dry 11.04 - 16.10 90 % Water	AZCL.	11.04	54.73		
PID	11.00 11.04 - 12.00	0.41										
	12.00 - 12.50		0	0	0		12					
	12.50 - 13.00		0	0	0	AZCL			(2.96)			
	13.00 - 13.50		0	0	0		13					
	13.50 - 14.00		0	0	0							
	14.00 - 15.00		100	100	20	AZCL	14	Weak partially weathered grey thinly laminated MUDSTONE. Fractures are extremely closely to very closely spaced subhorizontal planar, smooth, no infill or staining.	14.00	51.77		
						30						
	15.00 - 15.50		100	100	0	30	15					
	15.50 - 16.10		100	100	0	30						
	16.10 - 16.60		80	80	0	40	16 16.10 - 33.00 95 % Water					
	16.60 - 17.00		100	100	0	40						
	17.00 - 17.70		100	10	0	40 NI	17	*Below 17.00m: Fractures becoming predominantly subhorizontal.*				
	17.70 - 18.60		100	100	0		18		(7.60)			
	18.60 - 19.70		100	100	0	40	19					
	19.70 - 21.60						20					

Continued on next sheet

Ground Water (m) Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata From (m)	To (m)	Time (hr)
7.00	7.60	01:00
9.00	9.80	01:30

Casing Depths Diameter (mm)	Depth (m)
200	11.00

Hole Diameter Diameter (mm)	Depth (m)
200	11.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m
2. No groundwater encountered.
3. Open hole drilling between 21.60 and 50.00m.

Email received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

BOREHOLE RECORD

Borehole BH11

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 65.77 | Scale 1:50

Easting: 415193.82 | Northing: 417382.21

Client: Marshall Holdings Ltd | Driller: LA/NH | Logged By: AH | Sheet 3 of 5

Method: Cable Percussive Drilling Rig with Rotary Core Drilling | Checked By: BL | Dates: 12/10/2017 - 16/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
			100	100	0							
								Dark grey MUDSTONE. (Logged from flush returns).	21.60	44.17		
									(11.40)			

21 22 23 24 25 26 27 28 29 30

Continued on next sheet

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
					7.00	7.60	01:00	200	11.00	200	11.00
					9.00	9.80	01:30			131	50.00

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m
2. No groundwater encountered.
3. Open hole drilling between 21.60 and 50.00m.

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH11

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 65.77 — Scale 1:50

Easting: 415193.82 — Northing: 417382.21

Client: Marshall Holdings Ltd — Driller: LA/NH — Logged By: AH — Sheet 4 of 5

Method: Cable Percussive Drilling Rig with Rotary Core Drilling — Checked By: BL — Dates: 12/10/2017 - 16/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
							33.00 - 50.00 90 % Water	Grey MUDSTONE. (Logged from flush returns).	33.00	32.77		
									(1.00)			
								Dark grey MUDSTONE. (Logged from flush returns).	34.00	31.77		

31 32 33 34 35 36 37 38 39 40

Continued on next sheet

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
					7.00	7.60	01:00	200	11.00	200	11.00
					9.00	9.80	01:30			131	50.00

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m
2. No groundwater encountered.
3. Open hole drilling between 21.60 and 50.00m.

BOREHOLE RECORD

Borehole BH11

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 65.77 Scale 1:50

Easting: 415193.82 Northing: 417382.21

Client: Marshall Holdings Ltd

Driller: LA/NH Logged By: AH

Sheet 5 of 5

Method: Cable Percussive Drilling Rig with Rotary Core Drilling

Checked By: BL

Dates: 12/10/2017 - 16/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
								41				
								42	(16.00)			
								43				
								44				
								45				
								46				
								47				
								48				
								49				
								50				
									End of Borehole at 50.00 m	50.00	15.77	

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
7.00	7.60	01:00
9.00	9.80	01:30

Casing Depths

Diameter (mm)	Depth (m)
200	11.00

Hole Diameter

Diameter (mm)	Depth (m)
200	11.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m
2. No groundwater encountered.
3. Open hole drilling between 21.60 and 50.00m.

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH12

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 72.23 — Scale 1:50

Easting: 415249.78 — Northing: 417357.63

Client: Marshall Holdings Ltd — Driller: TF/ID — Logged By: AH — Sheet 1 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling — Checked By: BL — Dates: 09/10/2017 - 17/10/2017

Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Black macadam.	(0.10)	72.13		
PID	0.00	PID: 0ppmv		MADE GROUND: Brown sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone.	0.10			
ES	0.25							
PID	0.25	PID: 0ppmv						
B	0.50 - 1.00							
D	0.50				(1.00)			
ES	0.50							
PID	0.50	PID: 0ppmv						
ES	0.75							
PID	0.75	PID: 0ppmv	1					
D	1.00			MADE GROUND: Dark brown slightly sandy gravelly clay of intermediate plasticity. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, brick and limestone.	1.10	71.13		
ES	1.00		(1.20) Dry					
PID	1.00	PID: 0ppmv						
B	1.20 - 1.70							
D	1.20							
SPT (S)	1.20 - 1.65	N=16 (3,4/4,3,4,5)						
ES	1.50				(1.40)			
PID	1.50	PID: 1ppmv						
D	1.70		2 (2.00) Dry					
D	2.00							
SPT (C)	2.00 - 2.45	N=19 (8,4/5,4,5,5)						
B	2.50 - 3.00			MADE GROUND: Black silty very gravelly sand. Sand is fine to coarse with some ash. Gravel is angular to subangular, fine to coarse of brick, sandstone, limestone and coal.	2.50	69.73		
D	2.50							
ES	2.50							
PID	2.50	PID: 7ppmv						
D	3.00		3 (3.00) Dry					
SPT (C)	3.00 - 3.45	N=21 (6,5/4,6,6,5)						
B	3.50 - 4.00							
D	3.50							
ES	3.50							
PID	3.50	PID: 2ppmv						
D	4.00		4 (4.00) Dry		(3.00)			
SPT (C)	4.00 - 4.45	N=24 (5,4/7,6,6,5)						
B	4.50 - 5.00							
D	4.50							
ES	4.50							
PID	4.50	PID: 5ppmv						
D	5.00		5 (5.00) Dry					
SPT (C)	5.00 - 5.45	N=24 (6,7/6,7,7,4)						
ES	5.50			MADE GROUND: Dark brown clayey very sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick sandstone and mudstone.	5.50	66.73		
PID	5.50	PID: 0ppmv						
D	6.00		6 (6.00) Dry		(1.00)			
SPT (C)	6.00 - 6.45	N=26 (7,8/6,8,6,6)						
D	6.50			MADE GROUND: Orange brown silty gravelly sand. Gravel is angular to subangular, fine to coarse of sandstone.	6.50	65.73		
ES	6.50							
PID	6.50	PID: 1ppmv						
B	6.60 - 7.00							
D	6.60							
ES	6.60		7 (7.00) Dry		(1.00)			
D	7.00							
SPT (C)	7.00 - 7.45	N=29 (8,7/8,8,6,7)						
ES	7.50			MADE GROUND: Dark black silty very gravelly sand. Gravel is angular to subangular, fine to coarse of sandstone.	7.50	64.73		
PID	7.50	PID: 0ppmv						
B	7.60 - 8.00							
D	7.60							
D	8.00		8 (8.00) Dry					
SPT (C)	8.00 - 8.45	N=20 (6,5/5,4,6,5)						
B	8.50 - 9.00							
D	8.50							
ES	8.50							
PID	8.50	PID: 0ppmv						
D	9.00		9 (9.00) Dry	*9.00-12.00m: Slight hydrocarbon odour noted.*	(3.00)			
SPT (C)	9.00 - 9.45	N=21 (4,5/7,4,5,5)						
B	9.50 - 10.00							
ES	9.50							
PID	9.50	PID: 2ppmv						
D	10.00		10 (10.00) Dry					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
17.50	17.70	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	10.50
150	17.00
131	20.50

Hole Diameter

Diameter (mm)	Depth (m)
200	17.00
150	17.70
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 25.00m and 50.00m.

Email received 27 FEBRUARY 2018 Marshall (MOWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH12

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 72.23 | Scale 1:50 | Easting: 415249.78 | Northing: 417357.63

Client: Marshall Holdings Ltd | Driller: TF/ID | Logged By: AH | Sheet 2 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 09/10/2017 - 17/10/2017

Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
SPT (C)	10.00 - 10.45	N=25 (6,7/5,6,6,8)		MADE GROUND: Dark black silty very gravelly sand. Gravel is angular to subangular, fine to coarse of sandstone.				
B	10.50 - 11.00			MADE GROUND: Dark brown slightly sandy gravelly CLAY. Sand is fine to coarse with some ash. Gravel is angular to subangular, fine to coarse of brick, clinker and concrete. Slight hydrocarbon odour noted.	10.50	61.73		
D	10.50							
ES	10.50							
PID	10.50	PID: 3ppmv						
D	11.00		11 (10.50) Dry					
SPT (C)	11.00 - 11.45	N=27 (6,7/8,8,5,6)						
B	11.50 - 12.00							
D	11.50							
ES	11.50							
PID	11.50	PID: 1ppmv						
D	12.00		12 (10.50) Dry	*12.00m: Slight hydrocarbon odour noted.*				
SPT (C)	12.00 - 12.45	N=27 (7,7/8,7,6,6)						
B	12.50 - 13.00				(4.00)			
D	12.50							
ES	12.50							
PID	12.50	PID: 2ppmv						
D	13.00		13 (10.50) Dry					
SPT (C)	13.00 - 13.45	N=28 (9,7/8,6,7,7)						
B	13.50 - 14.00							
D	13.50							
ES	13.50							
PID	13.50	PID: 3ppmv						
D	14.00		14 (10.50) Dry					
SPT (C)	14.00 - 14.45	N=30 (8,8/6,9,7,8)						
B	14.50 - 15.00			MADE GROUND: Orange, brown silty very gravelly sand. Gravel is angular to subangular, fine to coarse of sandstone and brick.	14.50	57.73		
D	14.50							
ES	14.50							
PID	14.50	PID: 0ppmv						
D	15.00		15 (10.50) Dry					
SPT (C)	15.00 - 15.38	N=50+ (25/13,18,18,13)						
B	15.50 - 16.00				(2.30)			
D	15.50							
ES	15.50							
D	16.00		16 (10.50) Dry					
SPT (C)	16.00 - 16.45	N=37 (9,11/10,11,8,8)						
B	16.50 - 17.00							
D	16.50							
ES	16.50							
PID	16.50	PID: 1ppmv		Dark grey slightly clayey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone. (possible weathered rockhead),	16.80	55.43		
D	16.90		17		(0.90)			
B	17.00 - 17.45							
D	17.00							
U	17.00 - 17.45	100 blows						
D	17.45		(17.00) Dry					
ES	17.45							
SPT (S)	17.45 - 17.60	N=50+ (18,7 for 0mm/37,13 for 5mm)	(17.00) Dry					
PID	17.50	PID: 0ppmv		Very stiff dark black very gravelly CLAY. Gravel if angular to subangular, fine to coarse of mudstone. (Weathered rockhead).	17.70	54.53		
SPT (C)	17.70 - 17.85	N=50+ (20,5 for 0mm/40,10 for 3mm)	18		(1.10)			
	18.80 - 19.80				18.80			
		100 50 0 NI	19 18.80 - 50.00 90 % Water	Very weak partially weathered dark grey MUDSTONE. Fractures are extremely closely to very closely spaced subhorizontal planar, smooth, no infill with orange staining.		53.43		
		30		*19.30-19.50m: Subvertical fracture planar, smooth, no infill orange staining.*				
	19.80 - 21.30	NI						
		TCR% SCR% RQD% FI	20	Continued on next sheet				

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
17.50	17.70	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	10.50
150	17.00
131	20.50

Hole Diameter

Diameter (mm)	Depth (m)
200	17.00
150	17.70
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 25.00m and 50.00m.

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL

BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH12

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 72.23 Scale 1:50

Easting: 415249.78 Northing: 417357.63

Client: Marshall Holdings Ltd

Driller: TF/ID Logged By: AH

Sheet 3 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 09/10/2017 - 17/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
			100	80	0	20		*20.52-21.30m: Series of subvertical fractures, smooth planar, no infill with orange staining.*				
	21.30 - 22.65		100	66	0	NI 30 NI 30	21 22		(6.20)			
	22.65 - 24.15		100	0	0	NI 20	23					
	24.15 - 25.00		100	23	0	NI 20 NI 20 NI	24					
							25	Dark grey MUDSTONE. (Logged from flush returns).	25.00	47.23		
							26					
							27					
							28					
							29					
							30					

Continued on next sheet

Ground Water (m)				
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata		
From (m)	To (m)	Time (hr)
17.50	17.70	01:00

Casing Depths	
Diameter (mm)	Depth (m)
200	10.50
150	17.00
131	20.50

Hole Diameter	
Diameter (mm)	Depth (m)
200	17.00
150	17.70
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 25.00m and 50.00m.

BOREHOLE RECORD

Borehole BH12

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 72.23 Scale 1:50

Easting: 415249.78 Northing: 417357.63

Client: Marshall Holdings Ltd

Driller: TF/ID Logged By: AH

Sheet 4 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 09/10/2017 - 17/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
							31					
							32					
							33					
							34					
						OH	35					
							36					
							37		(23.50)			
							38					
							39					
							40					

Continued on next sheet

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
					17.50	17.70	01:00	200	10.50	200	17.00
								150	17.00	150	17.70
								131	20.50	131	50.00

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 25.00m and 50.00m.

BOREHOLE RECORD

Borehole BH12

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 72.23 Scale 1:50

Easting: 415249.78 Northing: 417357.63

Client: Marshall Holdings Ltd

Driller: TF/ID Logged By: AH

Sheet 5 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 09/10/2017 - 17/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
								41				
								42				
								43				
								44				
								45				
								46				
								47				
								48				
									Grey MUDSTONE. (Logged from flush returns).	48.50	23.73	
								49		(1.50)		
								50	End of Borehole at 50.00 m	50.00	22.23	

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
					17.50	17.70	01:00	200	10.50	200	17.00
								150	17.00	150	17.70
								131	20.50	131	50.00

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 25.00m and 50.00m.

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH13

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 71.64 | Scale 1:50 | Easting: 415259.47 | Northing: 417392.68

Client: Marshall Holdings Ltd | Driller: TF/ID | Logged By: AH | Sheet 1 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 12/10/2017 - 19/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
PID	0.00	PID: 0ppmv		MADE GROUND: Black macadam.	(0.10)	71.54		
ES	0.10			MADE GROUND: Orange brown slightly sandy silty gravel. Sand is fine to coarse. Gravel is angular, fine to coarse of sandstone. Cobbles of sandstone noted.	0.10			
PID	0.10	PID: 0ppmv						
ES	0.25							
B	0.50 - 1.00							
PID	0.50	PID: 0ppmv						
D	0.55				(1.20)			
ES	0.55							
ES	0.75							
ES	1.00		1					
PID	1.00	PID: 0ppmv	(1.20) Dry					
ES	1.20							
SPT (S)	1.20 - 1.65	N=24 (3,5/5,6,6,7)		MADE GROUND: Brown slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of sandstone, brick and mudstone. Slight hydrocarbon odour noted.	1.30	70.34		
B	1.50 - 2.00							
D	1.50							
PID	1.50	PID: 0ppmv						
D	2.00		2					
ES	2.00		(2.00) Dry					
SPT (S)	2.00 - 2.45	N=17 (6,5/4,5,4,4)						
PID	2.00	PID: 0ppmv						
B	2.50 - 3.00							
D	2.50							
D	3.00		3					
ES	3.00		(3.00) Dry		(3.70)			
SPT (S)	3.00 - 3.45	N=24 (4,6/6,5,6,7)						
PID	3.00	PID: 0ppmv						
B	3.50 - 4.00			*3.50m: Clay of intermediate plasticity.*				
D	3.50							
D	4.00		4					
ES	4.00		(4.00) Dry					
SPT (S)	4.00 - 4.45	N=24 (5,6/6,5,6,7)						
PID	4.00	PID: 0ppmv						
B	4.50 - 5.00							
D	4.50							
D	5.00		5		5.00	66.64		
ES	5.00		(5.00) Dry	MADE GROUND: Dark brown grey slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of mudstone, sandstone and brick. Occasional metal and plastic fragments noted.				
SPT (S)	5.00 - 5.45	N=29 (4,6/7,7,8,7)						
PID	5.00	PID: 0ppmv						
D	5.50							
D	6.00		6		(2.00)			
ES	6.00		(6.00) Dry					
SPT (S)	6.00 - 6.45	N=28 (6,7/7,6,7,8)						
PID	6.00	PID: 0ppmv						
B	6.50 - 7.00							
D	6.50							
D	7.00		7		7.00	64.64		
ES	7.00		(7.00) Dry	MADE GROUND: Dark brown silty slightly gravelly sand. Gravel is angular to subangular, fine to coarse of brick and sandstone.	(0.50)			
SPT (S)	7.00 - 7.45	N=43 (7,10/10,9,12,12)						
PID	7.00	PID: 0ppmv						
B	7.50 - 8.00			MADE GROUND: Black silty slightly gravelly sand. Sand is fine to coarse with much ash. Gravel is angular, fine to coarse of brick, sandstone and concrete.	7.50	64.14		
D	7.50							
D	8.00		8					
ES	8.00		(8.00) Dry					
SPT (S)	8.00 - 8.42	N=39 (14,11 for 70mm/11,12,16)						
PID	8.00	PID: 0ppmv						
B	8.50 - 9.00							
D	8.50				(2.50)			
D	9.00		9					
ES	9.00		(9.00) Dry					
SPT (S)	9.00 - 9.45	N=30 (4,5/7,7,8,8)						
PID	9.00	PID: 1ppmv						
D	9.50 - 10.00							
D	10.00		10 (10.00) Dry		10.00	61.64		

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
0.60		0.50	20	

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
7.00	7.50	01:00
16.00	17.00	01:30

Casing Depths

Diameter (mm)	Depth (m)
200	16.00
150	17.00
131	19.00

Hole Diameter

Diameter (mm)	Depth (m)
200	16.00
150	17.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Rotary open hole drilled between 22.80 and 50.00m.

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH13

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 71.64 | Scale 1:50 | Easting: 415259.47 | Northing: 417392.68

Client: Marshall Holdings Ltd | Driller: TF/ID | Logged By: AH | Sheet 2 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 12/10/2017 - 19/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES SPT (S) PID B D	10.00 10.00 - 10.45 10.00 10.50 - 11.00 10.50	N=17 (3,4/4,5,4,4) PID: 1ppmv		MADE GROUND: Medium dense dark red silty slightly gravelly fine to coarse sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick				
D ES SPT (S) PID B D	11.00 11.00 11.00 - 11.45 11.00 11.50 - 12.00 11.50	N=16 (3,4/4,3,4,5) PID: 0ppmv	11 (11.00) Dry		(3.60)			
D ES SPT (S) PID B D	12.00 12.00 12.00 - 12.45 12.00 12.50 - 13.00 12.50	N=18 (5,5/4,5,5,4) PID: 0ppmv	12 (12.00) Dry					
D ES SPT (S) PID B D	13.00 13.00 13.00 - 13.45 13.00 13.50 - 14.00 13.50	N=20 (4,3/6,5,5,4) PID: 20ppmv	13 (13.00) Dry	*13.00m: Hydrocarbon odour noted.*				
				MADE GROUND: Dark red, black silty slightly gravelly fine to coarse sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick and clinker.	13.60	58.04		
D ES SPT (S) PID B D	14.00 14.00 14.00 - 14.45 14.00 14.50 - 15.00 14.50	N=17 (3,6/4,4,5,4) PID: 0ppmv	14 (14.00) Dry					
D ES SPT (S) PID B D	15.00 15.00 15.00 - 15.45 15.00 15.50 - 16.00 15.50	N=22 (4,5/4,6,7,5) PID: 0ppmv	15 (15.00) Dry		(2.40)			
D ES SPT (S) PID B D	16.00 16.00 16.00 - 16.16 16.00 16.50 - 17.00 16.50	N=50+ (18,7 for 10mm/43,7 for 3mm) PID: 0ppmv	16 (16.00) Dry	Very dense, dark brown slightly sandy clayey GRAVEL. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone. (Weathered rockhead).	16.00 (0.80) 16.80	55.64		
	16.80 - 17.80	A... 90 90 0	17 16.80 - 17.80 70 % Water	Very weak partially weathered, thinly laminated dark grey MUDSTONE. Fractures are extremely closely to closely spaced, subhorizontal planar, smooth, with orange staining.	16.80	54.84		
	17.80 - 19.30	100 100 0 50	17.80 - 19.30 80 % Water 18	*17.80-18.20m: Subvertical fracture, smooth, planar, no infill.*				
	19.30 - 20.80		19 19.30 - 22.80 100 % Water	*19.15-19.20m: Subvertical fracture, smooth, planar, no infill.*	(4.80)			
		TCR% SCR% RQD% FI	20	Continued on next sheet				

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
0.60		0.50	20	

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
7.00	7.50	01:00
16.00	17.00	01:30

Casing Depths

Diameter (mm)	Depth (m)
200	16.00
150	17.00
131	19.00

Hole Diameter

Diameter (mm)	Depth (m)
200	16.00
150	17.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Rotary open hole drilled between 22.80 and 50.00m.

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL

BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH13

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.64 Scale 1:50

Easting: 415259.47 Northing: 417392.68

Client: Marshall Holdings Ltd

Driller: TF/ID Logged By: AH

Sheet 3 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 12/10/2017 - 19/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
			100	100	0							
	20.80 - 22.30		86	66	0	NI		Very weak partially weathered dark grey MUDSTONE. Fractures are extremely closely spaced subhorizontal planar, smooth, no infill or staining.	21.60	50.04		
						AZCL		*21.60m: Ironstone band noted.*				
	22.30 - 22.80		100	10	0	30		*22.30-22.50m: Subvertical fracture, smooth, planar, no infill or staining.*	(1.20)			
						NI						
							22.80 - 50.00 90 % Water	Dark grey MUDSTONE. (Logged from flush returns).	22.80	48.84		

21 22 23 24 25 26 27 28 29 30

Continued on next sheet

Ground Water (m)				
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
0.60				

Chiselling / Hard Strata		
From (m)	To (m)	Time (hr)
7.00	7.50	01:00
16.00	17.00	01:30

Casing Depths	
Diameter (mm)	Depth (m)
200	16.00
150	17.00
131	19.00

Hole Diameter	
Diameter (mm)	Depth (m)
200	16.00
150	17.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Rotary open hole drilled between 22.80 and 50.00m.

Email received 27 FEBRUARY 2018 Marshall (MOMY) Ltd

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL

BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH13

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.64 Scale 1:50

Easting: 415259.47 Northing: 417392.68

Client: Marshall Holdings Ltd | Driller: TF/ID | Logged By: AH | Sheet 4 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 12/10/2017 - 19/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						

31
32
33
34
35
36
(27.20)
37
38
39
40

Continued on next sheet

Ground Water (m)				
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
0.60				

Chiselling / Hard Strata		
From (m)	To (m)	Time (hr)
7.00	7.50	01:00
16.00	17.00	01:30

Casing Depths	
Diameter (mm)	Depth (m)
200	16.00
150	17.00
131	19.00

Hole Diameter	
Diameter (mm)	Depth (m)
200	16.00
150	17.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Rotary open hole drilled between 22.80 and 50.00m.

Email Received 27 FEBRUARY 2018 Marshall (MOMY) Ltd

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL

BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH13

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.64 Scale 1:50

Easting: 415259.47 Northing: 417392.68

Client: Marshall Holdings Ltd

Driller: TF/ID Logged By: AH

Sheet 5 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 12/10/2017 - 19/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
								41				
								42				
								43				
								44				
								45				
								46				
								47				
								48				
								49				
								50	End of Borehole at 50.00 m	50.00	21.64	

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
0.60				

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
7.00	7.50	01:00
16.00	17.00	01:30

Casing Depths

Diameter (mm)	Depth (m)
200	16.00
150	17.00
131	19.00

Hole Diameter

Diameter (mm)	Depth (m)
200	16.00
150	17.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Rotary open hole drilled between 22.80 and 50.00m.

Email received 27 FEBRUARY 2018 Marshall (MOMY) Ltd

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH15

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.47 — Scale 1:50

Easting: 415257.37 — Northing: 417464.71

Client: Marshall Holdings Ltd — Driller: TF/ID — Logged By: AH — Sheet 1 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling — Checked By: BL — Dates: 12/10/2017 - 27/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Black bituminous macadam.	(0.10)	70.37		
PID	0.00	PID: 0ppmv		MADE GROUND: Orange brown silty sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone.	0.10			
ES	0.25				(0.55)			
PID	0.25	PID: 0ppmv						
ES	0.50							
PID	0.50	PID: 1ppmv			0.65	69.82		
ES	0.75			MADE GROUND: Dark brown slightly sandy gravelly clay of intermediate plasticity. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, coal, brick and concrete. Occasional plastic, metal, wood, and timber fragments noted.				
PID	0.75	PID: 1ppmv						
ES	1.00		1					
PID	1.00	PID: 0ppmv						
U	1.20 - 1.65	69 blows						
B	1.50 - 2.00							
ES	1.50							
PID	1.50	PID: 0ppmv						
D	1.65				(2.35)			
D	2.00		2 (2.00) Dry					
SPT (C)	2.00 - 2.45	N=30 (7,6/5,10,8,7)						
B	2.50 - 3.00							
D	2.50							
ES	2.50							
PID	2.50	PID: 1ppmv						
D	3.00		3 (3.00) Dry		3.00	67.47		
SPT (C)	3.00 - 3.45	N=9 (3,4/2,3,2,2)		MADE GROUND: Dark grey sandy angular, fine to coarse gravel of sandstone, brick and concrete. Occasional metal fragments noted. Strong hydrocarbon odour noted.				
B	3.50 - 4.00							
D	3.50							
ES	3.50				(1.50)			
PID	3.50	PID: 6ppmv						
D	4.00		4 (4.00) Dry					
SPT (C)	4.00 - 4.45	N=12 (7,4/3,4,3,2)						
B	4.50 - 5.00				4.50	65.97		
D	4.50			MADE GROUND: Dark brown slightly sandy gravelly clay. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, coal, brick and concrete. Occasional plastic, metal, wood and timber fragments noted.				
ES	4.50							
PID	4.50	PID: 3ppmv						
D	5.00		5 (5.00) Dry					
SPT (C)	5.00 - 5.45	N=24 (6,5/8,7,5,4)						
B	5.50 - 6.00							
D	5.50							
ES	5.50							
PID	5.50	PID: 5ppmv						
D	6.00		6 (6.00) Dry		(3.00)			
SPT (C)	6.00 - 6.45	N=14 (4,7/3,4,2,5)						
B	6.50 - 7.00			*6.50m: Clay of intermediate plasticity.*				
D	6.50							
ES	6.50							
PID	6.50	PID: 1ppmv						
D	7.00		7 (7.00) Dry					
SPT (C)	7.00 - 7.45	N=25 (6,7/5,7,7,6)						
B	7.50 - 8.00				7.50	62.97		
D	7.50			MADE GROUND: Black slightly clayey gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick, sandstone and mudstone.				
ES	7.50							
PID	7.50	PID: 1ppmv						
D	8.00		8 (8.00) Dry					
SPT (C)	8.00 - 8.45	N=25 (6,6/5,8,7,5)						
B	8.50 - 9.00							
D	8.50							
ES	8.50							
PID	8.50	PID: 0ppmv						
D	9.00		9					
B	9.50 - 10.00				(4.00)			
D	9.50							
ES	9.50							
PID	9.50	PID: 1ppmv						
D	10.00		10 (10.00) Dry					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
17.20	17.40	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	10.50
150	17.40
131	19.40

Hole Diameter

Diameter (mm)	Depth (m)
200	16.00
150	17.40
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 24.40m and 50.00m.

Email Received 27 FEBRUARY 2018 Marshall (MOWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH15

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 70.47 | Scale 1:50 | Easting: 415257.37 | Northing: 417464.71

Client: Marshall Holdings Ltd | Driller: TF/ID | Logged By: AH | Sheet 2 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 12/10/2017 - 27/10/2017

Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
SPT (C)	10.00 - 10.45	N=18 (6,5/3,4,5,6)		MADE GROUND: Black slightly clayey gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick, sandstone and mudstone.				
B	10.50							
ES	10.50							
PID	10.50	PID: 1ppmv						
D	11.00		11 (10.50) Dry					
SPT (C)	11.00 - 11.45	N=26 (7,6/7,5,7,7)						
B	11.50 - 12.00			MADE GROUND: Dark brown slightly sandy gravelly clay of intermediate plasticity. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, coal and brick, Occasional plastic, metal, wood and timber fragments noted.	11.50	58.97		
D	11.50				(1.00)			
ES	11.50							
PID	11.50	PID: 12ppmv						
D	12.00		12 (10.50) Dry					
SPT (C)	12.00 - 12.45	N=16 (6,5/4,4,3,5)						
B	12.50 - 13.00			MADE GROUND: Brown sandy slightly gravelly clay. Gravel is angular to subangular, fine to coarse of sandstone.	12.50	57.97		
D	12.50				(1.00)			
ES	12.50							
PID	12.50	PID: 14ppmv						
D	13.00		13 (10.50) Dry					
SPT (C)	13.00 - 13.45	N=20 (5,3/4,5,5,6)						
B	13.50 - 14.00			MADE GROUND: Dark brown sandy clay of intermediate plasticity. Sand is fine to coarse.	13.50	56.97		
D	13.50				(1.10)			
ES	13.50							
PID	13.50	PID: 1ppmv						
D	14.00		14 (10.50) Dry					
SPT (C)	14.00 - 14.45	N=13 (6,5/3,3,4,3)						
PID	14.15	PID: 1ppmv						
B	14.50 - 15.00			MADE GROUND: Dark brown very silty fine to medium sand.	14.60	55.87		
D	14.50				(0.10)	55.77		
ES	14.50			MADE GROUND: Dark brown very sandy gravelly clay of low plasticity. Gravel is angular to subangular, fine to coarse of sandstone and mudstone.	14.70			
D	15.00		15 (10.50) Dry					
SPT (C)	15.00 - 15.45	N=14 (3,2/3,3,4,4)			(1.30)			
B	15.50 - 16.00							
ES	15.50							
PID	15.50	PID: 1ppmv						
D	16.00		16	Dark grey slightly sandy gravelly CLAY of low plasticity. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone (Weathered rockhead).	16.00	54.47		
D	16.50							
ES	16.50		(10.50) Dry		(1.40)			
PID	16.50	PID: 1ppmv						
SPT (S)	16.60 - 16.77	N=50+ (20,5 for 0mm/33,17 for 20mm)						
B	17.00 - 17.40		17 (17.00) Dry					
D	17.00							
ES	17.00							
SPT (S)	17.00 - 17.16	N=50+ (17,5 for 3mm/39,11 for 50mm)	(17.40) Dry		17.40			
SPT (C)	17.40 - 17.53	N=15 (25 for 50mm/0,15)	(17.40) Dry	AZCL.	17.40	53.07		
SPT (C)	17.40 - 17.90	N=19 (25 for 50mm/0,15)	17.50 - 17.50 75 % Water					
PID	17.50	2.42						
	17.90 - 18.40		18					
	18.40 - 18.90				(2.00)			
	18.90 - 19.40		19					
	19.40 - 19.90			Very weak partially weathered thinly laminated dark grey MUDSTONE. Fractures are very closely spaced subhorizontal planar, smooth no infill or staining.	19.40	51.07		
	19.90 - 20.40		20					

TCR%	SCR%	RQD%	FI	
0	0	0		
0	0	0		
0	0	0	AZCL	
0	0	0		
100	100	0		

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
17.20	17.40	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	10.50
150	17.40
131	19.40

Hole Diameter

Diameter (mm)	Depth (m)
200	16.00
150	17.40
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 24.40m and 50.00m.

Email received 27 FEBRUARY 2018 Marshall (MOWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH15

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.47 Scale 1:50

Easting: 415257.37 Northing: 417464.71

Client: Marshall Holdings Ltd

Driller: TF/ID Logged By: AH

Sheet 3 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 12/10/2017 - 27/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
			100	100	0							
	20.40 - 21.40		100	100	0	40						
							21					
	21.40 - 22.90		100	80	0	NI 20	22	*21.40-22.20m: Subvertical fracture, planar, undulating smooth tight clean.*	(5.60)			
	22.90 - 24.40		100	100	0	30	23	*23.30-24.20m: Subvertical fracture, planar smooth, tight, clean.*				
							24	*24.40-24.60m: Subvertical fracture, planar smooth, tight, clean.*				
	24.40 - 25.60		100	100	60	10	25	*24.90: Weak.*	25.00	45.47		
								Dark grey MUDSTONE. (Logged from flush returns).				
							26					
							27					
							28		(6.60)			
							29					
							30					

Continued on next sheet

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
					17.20	17.40	01:00	200	10.50	200	16.00
								150	17.40	150	17.40
								131	19.40	131	50.00

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 24.40m and 50.00m.

BOREHOLE RECORD

Borehole BH15

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.47 Scale 1:50

Easting: 415257.37 Northing: 417464.71

Client: Marshall Holdings Ltd | Driller: TF/ID | Logged By: AH | Sheet 4 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 12/10/2017 - 27/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
							31					
								Light brown MUDSTONE. (Logged from flush returns).	31.60	38.87		
							32					
							33					
							34					
						OH	35					
							36		(9.50)			
							37					
							38					
							39					
							40					

Continued on next sheet

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
					17.20	17.40	01:00	200	10.50	200	16.00
								150	17.40	150	17.40
								131	19.40	131	50.00

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 24.40m and 50.00m.

DUNELM GEOTECHNICAL & ENVIRONMENTAL

BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH15

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.47 Scale 1:50

Easting: 415257.37 Northing: 417464.71

Client: Marshall Holdings Ltd

Driller: TF/ID Logged By: AH

Sheet 5 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 12/10/2017 - 27/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
									41			
								Dark grey SILTSTONE. (Logged from flush returns).	41.10	29.37		
									42			
									43			
									44			
									(7.20)			
									45			
									46			
									47			
									48			
								Dark grey MUDSTONE. (Logged from flush returns).	48.30	22.17		
									49			
									(1.70)			
								End of Borehole at 50.00 m	50.00	20.47		
									50			

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
					17.20	17.40	01:00	200	10.50	200	16.00
								150	17.40	150	17.40
								131	19.40	131	50.00

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 24.40m and 50.00m.

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH16

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 66.40 — Scale 1:50

Easting: 415249.27 — Northing: 417496.36

Client: Marshall Holdings Ltd — Driller: SR/ID — Logged By: AH — Sheet 1 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling — Checked By: BL — Dates: 24/10/2017 - 26/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subangular, fine to coarse of mudstone and sandstone.	(0.20)			
PID	0.00	PID: 0ppmv			0.20	66.20		
ES	0.25			MADE GROUND: Dark brown slightly clayey sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone, mudstone and brick. Cobbles of brick and sandstone noted. Band of dark brown sandy slightly gravelly clay noted.				
PID	0.25	PID: 0ppmv			(1.00)			
B	0.30							
ES	0.50							
PID	0.50	PID: 0ppmv						
ES	0.75							
PID	0.75	PID: 0ppmv						
ES	1.00		1					
PID	1.00	PID: 0ppmv						
B	1.20 - 1.70		(1.20) Dry		1.20	65.20		
D	1.20			MADE GROUND: Dark brown sandy slightly gravelly clay. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of sandstone, brick and clinker.				
SPT (S)	1.20 - 1.65	N=8 (1,1/2,2,2,2)						
D	1.85							
B	2.00 - 2.50		2 (2.00) Dry					
D	2.00				(1.80)			
ES	2.00							
SPT (S)	2.00 - 2.45	N=15 (3,4/4,4,3,4)						
PID	2.00	PID: 0ppmv						
D	2.75							
B	3.00 - 3.50		3 (3.00) Dry		3.00	63.40		
D	3.00			MADE GROUND: Black slightly gravelly very silty sand. Gravel is angular to subangular, fine to coarse of brick, clinker and sandstone.				
ES	3.00							
SPT (S)	3.00 - 3.45	N=9 (2,3/3,2,2,2)						
PID	3.00	PID: 0ppmv						
D	3.75							
B	4.00 - 4.50		4 (4.00) Dry					
D	4.00							
ES	4.00							
SPT (S)	4.00 - 4.45	N=10 (2,2/2,3,2,3)						
PID	4.00	PID: 0ppmv						
D	4.75							
B	5.00 - 5.50		5 (5.00) Dry					
D	5.00							
ES	5.00							
SPT (S)	5.00 - 5.45	N=9 (2,3/2,2,2,3)						
PID	5.00	PID: 0ppmv			(5.00)			
D	5.75							
B	6.00 - 6.50		6 (6.00) Dry					
D	6.00							
ES	6.00							
SPT (S)	6.00 - 6.45	N=10 (3,2/3,3,2,2)						
PID	6.00	PID: 0ppmv						
D	6.75							
B	7.00 - 7.50		7 (7.00) Dry					
ES	7.00							
SPT (S)	7.00 - 7.45	N=12 (3,3/2,3,3,4)						
PID	7.00	PID: 0ppmv						
D	7.75							
B	8.00 - 8.50		8 (8.00) Dry		8.00	58.40		
D	8.00			MADE GROUND: Dark brown slightly sandy gravelly clay of intermediate plasticity. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick, clinker and sandstone.				
ES	8.00							
SPT (S)	8.00 - 8.45	N=13 (3,4/3,3,3,4)						
PID	8.00	PID: 0ppmv			(1.00)			
D	8.75							
B	9.00 - 9.50		9 (9.00) Dry		9.00	57.40		
D	9.00			MADE GROUND: Orange brown silty gravelly sand. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone. Sandstone cobbles noted.				
ES	9.00							
SPT (S)	9.00 - 9.45	N=25 (4,6/6,7,6,6)						
PID	9.00	PID: 1ppmv						
D	9.75							
B	10.00 - 10.50		10 (10.00) Dry					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
13.45	13.60	00:30
13.60	13.80	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	13.00
150	13.60
131	19.00

Hole Diameter

Diameter (mm)	Depth (m)
200	13.00
150	13.90
131	20.10

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH16

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 66.40 | Scale 1:50 | Easting: 415249.27 | Northing: 417496.36

Client: Marshall Holdings Ltd | Driller: SR/ID | Logged By: AH | Sheet 2 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 24/10/2017 - 26/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
D ES SPT (S) PID	10.00 10.00 10.00 - 10.45 10.00	 N=22 (5,6/5,5,6,6) PID: 2ppmv		MADE GROUND: Orange brown silty gravelly sand. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone. Sandstone cobbles noted.				
D	10.75							
B D ES SPT (S) PID	11.00 - 11.50 11.00 11.00 11.00 - 11.45 11.00	 N=22 (4,5/5,6,6,5) PID: 0ppmv	11 (11.00) Dry		(4.00)			
D	11.75							
B D ES W SPT (S) PID	12.00 - 12.50 12.00 12.00 12.00 12.00 - 12.45 12.00	 N=17 (4,5/5,4,4,4) PID: 1ppmv	12 (12.00) 11.40					
D	12.75							
B D ES SPT (S) PID W	13.00 - 13.50 13.00 13.00 13.00 - 13.35 13.00 13.30	 PID: 0ppmv 	13 (13.00) Dry	Very dense orange brown slightly sandy angular, fine to coarse GRAVEL of sandstone and mudstone.	13.00 (0.70) 13.70	53.40		
D D SPT (S)	13.75 13.80 13.80 - 14.04 13.90 - 14.40	 N=50+ (11,14/40 ,10 for 10mm)	(13.80) 11.80 13.80 - 21.10 70 % Water	Extremely weak very thinly laminated black MUDSTONE.	13.70 (0.10)	52.70 52.60		
	14.40 - 15.90	TCR% 100 SCR% 100 RQD% 0 FI 40	14	Weak partially weathered thinly black mudstone. Fractures are extremely closely to very closely spaced subhorizontal planar, smooth, no infill or staining. *14.10-14.40m: Subvertical fracture planar, smooth, no infill or staining.*	13.80 (1.80)			
		TCR% 100 SCR% 100 RQD% 0 FI	15	*15.20-15.30m: Subvertical fracture planar, smooth, no infill or staining.* *15.40-15.50m: Subvertical fracture planar, smooth, no infill or staining.*	15.60	50.80		
	15.90 - 17.40	TCR% 100 SCR% 100 RQD% 0 FI 30	16	Very weak partially weathered thinly laminated dark grey MUDSTONE. Fractures are very closely spaced subhorizontal planar, smooth, no infill or staining. *15.70-15.90m: Subvertical fracture planar, smooth, no infill or staining.* *16.20-16.25m: Subvertical fracture planar, smooth, no infill or staining.* *16.22m: Weak.* *16.70-16.90m: Subvertical fracture planar, smooth, no infill or staining.*				
		TCR% 100 SCR% 100 RQD% 0 FI	17	*17.10-17.15m: Subvertical fracture planar, smooth, no infill or staining.* *17.15-17.70m: Subvertical fracture planar, smooth, no infill or staining.*	(2.90)			
	17.40 - 18.50	TCR% 100 SCR% 90 RQD% 0 FI NI FI 20	18	*17.70-18.20m: Subvertical fracture planar, smooth, no infill or staining.* *18.30-18.60m: Subvertical fracture planar, smooth, no infill or staining.*				
	18.50 - 20.10	TCR% 100 SCR% 100 RQD% 13 FI 12	19	Weak partially weathered dark grey MUDSTONE. Discontinuities are very closely to closely spaced subhorizontal planar, smooth, no infill or staining. *19.05-19.90m: Subvertical fracture planar, smooth, no infill or staining.*	18.50 (1.60)	47.90		
			20					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
13.45	13.60	00:30
13.60	13.80	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	13.00
150	13.60
131	19.00

Hole Diameter

Diameter (mm)	Depth (m)
200	13.00
150	13.90
131	20.10

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL

BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH16

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 66.40 Scale 1:50

Easting: 415249.27 Northing: 417496.36

Client: Marshall Holdings Ltd

Driller: SR/ID Logged By: AH

Sheet 3 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 24/10/2017 - 26/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
								End of Borehole at 20.10 m	20.10	46.30		

21 22 23 24 25 26 27 28 29 30

Ground Water (m)				
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata		
From (m)	To (m)	Time (hr)
13.45	13.60	00:30
13.60	13.80	01:00

Casing Depths	
Diameter (mm)	Depth (m)
200	13.00
150	13.60
131	19.00

Hole Diameter	
Diameter (mm)	Depth (m)
200	13.00
150	13.90
131	20.10

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH17

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 59.92 | Scale 1:50 | Easting: 415296.71 | Northing: 417530.30

Client: Marshall Holdings Ltd | Driller: TF/ID | Logged By: AH | Sheet 1 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 25/10/2017 - 02/11/2017

Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
PID	0.00	PID: 0ppmv		MADE GROUND: Block paving.	(0.10)	59.82		
ES	0.10			MADE GROUND: Orange brown sandy gravel. Gravel is angular to subangular, fine to coarse of sandstone and mudstone.	0.10			
PID	0.10	PID: 0ppmv			(0.50)			
ES	0.25							
PID	0.25	PID: 0ppmv			0.60	59.32		
B	0.50 - 1.00			MADE GROUND: Brown black sandy gravelly clay. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, limestone, concrete and brick. Occasional metal and timber fragments noted.				
D	0.50							
ES	0.50							
PID	0.50	PID: 0ppmv						
ES	0.75		1					
D	1.00							
ES	1.00		(1.20) Dry					
PID	1.00	PID: 0ppmv						
D	1.20							
SPT (C)	1.20 - 1.65	N=7 (2,1/1,2,3,1)			(1.90)			
B	1.50 - 2.00							
ES	1.50							
D	1.70							
D	2.00		2	(2.00) Dry				
SPT (C)	2.00 - 2.45	N=5 (1,1/,2,1,2)						
B	2.50 - 3.00			MADE GROUND: Black gravelly clay. Gravel is angular to subangular, fine to coarse of mudstone.	2.50	57.42		
D	2.50							
ES	2.50							
PID	2.50	PID: 0ppmv						
D	3.00		3	(3.00) Dry	(1.00)			
SPT (C)	3.00 - 3.45	N=7 (1/3,2,1,1)						
B	3.50 - 4.00			MADE GROUND: Dark brown clayey slightly gravelly fine to coarse sand. Gravel is angular to subangular, fine to coarse of mudstone and sandstone.	3.50	56.42		
D	3.50							
ES	3.50							
PID	3.50	PID: 0ppmv						
D	4.00		4	(4.00) Dry	(1.00)			
SPT (C)	4.00 - 4.45	N=15 (3,2/4,3,3,5)						
B	4.50 - 5.00			MADE GROUND: Dark brown sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone, mudstone, concrete and brick.	4.50	55.42		
D	4.50							
ES	4.50							
PID	4.50	PID: 0ppmv						
D	5.00		5	(5.00) Dry	(1.00)			
SPT (C)	5.00 - 5.45	N=26 (6,7/8,6,7,5)						
B	5.50 - 6.00			MADE GROUND: Black sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone and concrete	5.50	54.42		
D	5.50							
ES	5.50							
PID	5.50	PID: 0ppmv						
D	6.00		6	(6.00) Dry	(1.00)			
SPT (C)	6.00 - 6.45	N=23 (5,6/6,7,5,5)						
PID	6.50	PID: 0ppmv		Very stiff black very gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone. (Weathered rockhead).	6.50	53.42		
B	6.60 - 7.00							
D	6.60							
ES	6.60							
D	7.00		7	(7.00) Dry				
SPT (C)	7.00 - 7.16	N=50+ (20,5 for 0mm/37,13 for 8mm)		(7.10) Dry	(1.10)			
				Very thinly laminated from 7.10m.				
SPT (C)	7.10 - 7.20	N=50+ (25 for 20mm/47,3 for 0mm)						
	7.60 - 8.10				7.60			
	7.60 - 8.10		0 0 0	7.10 - 7.60 80 % Water				
				7.60 - 8.10 90 % Water				
SPT (C)	8.10 - 8.26	N=50+ (19,6 for 5mm/47, 3 for 1mm)		8 (8.00) Dry				
	8.10 - 8.60		0 0 0 AZCL	8.10 - 8.60 90 % Water				
	8.60 - 9.10		100 100 0	8.60 - 9.10 90 % Water	8.60	51.32		
				Weak partially weathered dark brown MUDSTONE. Fractures are very closely space, planar smooth with no infill or straining.				
	9.10 - 9.60		100 100 0 40	9 9.10 - 9.60 90 % Water				
				9.30: Subvertical fracture, planar smooth no infill or staining.				
	9.60 - 10.60			9.60 - 10.60 90 % Water				
	10.00 - 11.60		TCR% SCR% RQD% FI	10				

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
5.00	5.00	4.90	20	

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
6.80	7.00	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	6.50
150	7.00
131	8.60

Hole Diameter

Diameter (mm)	Depth (m)
200	6.50
150	7.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 14.60 and 50.00m.

Email received 27 FEBRUARY 2018 Marshall (MOWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH17

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 59.92 | Scale 1:50 | Easting: 415296.71 | Northing: 417530.30

Client: Marshall Holdings Ltd | Driller: TF/ID | Logged By: AH | Sheet 2 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 25/10/2017 - 02/11/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
			90	90	0							
			90	90	0	AZCL	10.60 - 11.60 90 % Water		(3.50)			
	11.60 - 12.10		100	100	0	40		*11.90m-12:20m: Sub vertical planar smooth, no infill or staining.*				
	12.10 - 13.10		100	100	40			Very weak partially weathered dark brown MUDSTONE. Discontinues are very closely space, planar smooth with no infill or straining.	12.10	47.82		
	13.10 - 14.60		100	100	13	20		*12.90m-13.10m: Sub vertical fracture smooth, planar no infill or staining.*	(2.50)			
							14.60 - 29.70 100 % Water 14.60 - 50.00 100 % Water	Dark grey MUDSTONE. (Logged from flush returns)	14.60	45.32		

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
5.00	5.00			

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
6.80	7.00	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	6.50
150	7.00
131	8.60

Hole Diameter

Diameter (mm)	Depth (m)
200	6.50
150	7.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 14.60 and 50.00m.

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH17

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 59.92 Scale 1:50

Easting: 415296.71 Northing: 417530.30

Client: Marshall Holdings Ltd | Driller: TF/ID | Logged By: AH | Sheet 3 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 25/10/2017 - 02/11/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
									(15.10)			
							29.70 - 34.50 100 % Water	Light brown MUDSTONE. (Logged from flush returns)	29.70	30.22		

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
5.00	5.00			

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
6.80	7.00	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	6.50
150	7.00
131	8.60

Hole Diameter

Diameter (mm)	Depth (m)
200	6.50
150	7.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 14.60 and 50.00m.

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH17

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 59.92 Scale 1:50

Easting: 415296.71 Northing: 417530.30

Client: Marshall Holdings Ltd | Driller: TF/ID | Logged By: AH | Sheet 4 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 25/10/2017 - 02/11/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
							31					
							32		(4.80)			
							33					
							34					
							34.50 - 36.00 100 % Water	Dark brown grey MUDSTONE. (Logged from flush returns)	34.50	25.42		
							35		(1.50)			
							36	36.00 - 50.00 100 % Water	Dark grey MUDSTONE. (Logged from flush returns)	36.00	23.92	
							37					
							38					
							39					
							40					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
5.00	5.00			

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
6.80	7.00	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	6.50
150	7.00
131	8.60

Hole Diameter

Diameter (mm)	Depth (m)
200	6.50
150	7.00
131	50.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 14.60 and 50.00m.

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL

BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH17

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 59.92 Scale 1:50

Easting: 415296.71 Northing: 417530.30

Client: Marshall Holdings Ltd

Driller: TF/ID Logged By: AH

Sheet 5 of 5

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 25/10/2017 - 02/11/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
								41				
								42				
								43	(14.00)			
								44				
								45				
								46				
								47				
								48				
								49				
								50				
									End of Borehole at 50.00 m	50.00	9.92	

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
5.00	5.00				6.80	7.00	01:00	200	6.50	200	6.50
								150	7.00	150	7.00
								131	8.60	131	50.00

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.
3. Rotary open hole drilled between 14.60 and 50.00m.

BOREHOLE RECORD

Borehole BH18

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 59.07 Scale 1:50

Easting: 415278.67 Northing: 417628.38

Client: Marshall Holdings Ltd | Driller: CS/ID | Logged By: BC | Sheet 1 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 28/09/2017 - 10/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
				MADE GROUND: Brown slightly sandy, gravelly clayey topsoil. Gravel is fine to coarse angular to subrounded of, brick sandstone, mudstone and limestone.	(0.21) 0.21	58.86		
B ES	0.20 - 0.50 0.20			MADE GROUND: Light brown mottled light grey, sandy slightly gravelly clay. Gravel is subangular to subrounded, fine to coarse of sandstone and brick.				
ES	0.50							
B ES	0.75 - 1.00 0.75							
D ES	1.00 1.00		1		(1.99)			
B	1.50 - 1.70							
B D ES	2.00 - 2.20 2.00 2.00		2		2.20	56.87		
				MADE GROUND: Light brown sandy slightly gravelly clay. Gravel is subangular to subrounded, fine to coarse of sandstone.				
D ES	3.00 3.00		3					
B	3.50 - 3.80			*3.50m: Clay of low plasticity.*				
D ES	4.00 4.00		4		(3.80)			
B	4.50 - 4.80							
D ES D	5.00 5.00 5.10 - 5.45		5					
D	6.00 - 7.00		6	MADE GROUND: Dark grey slightly sandy, gravelly clay. Gravel is fine to coarse subrounded of sandstone and limestone.	6.00	53.07		
B	6.50 - 6.80							
D ES	7.00 7.00		7		(2.40)			
B	7.50 - 7.80							
D ES	8.00 8.00		8					
D D	8.40 8.50				8.40 (0.10) 8.50	50.67		
D	8.50 - 9.70	16 0 0 AZCL	8.50 - 10.40 95 % Water	Very dense dark grey, slightly clayey, slightly sandy gravel. Gravel is of fine to coarse, angular to subangular mudstone. (Destructured MUDSTONE)		50.57		
			9	AZCL.	(1.00)			
	9.70 - 10.40	NI		Very weak dark grey MUDSTONE recovered as gravel.	9.50	49.57		
		AZCL			(0.55)			
		TCR% SCR% RQD% FI	10					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)
200	8.50
131	8.50

Hole Diameter

Diameter (mm)	Depth (m)
200	8.50
131	16.20

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH18

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 59.07 Scale 1:50

Easting: 415278.67 Northing: 417628.38

Client: Marshall Holdings Ltd | Driller: CS/ID | Logged By: BC | Sheet 2 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 28/09/2017 - 10/10/2017

Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
			57	14	0	NI		Very weak partially weathered thinly laminated MUDSTONE. Discontinuities extremely closely to very closely spaced subhorizontal, planar, smooth, no infill or staining.	10.05	49.02		
	10.40 - 10.80		100	25	0		10.40 - 16.20 80 % Water	*10.60-10.70m: Dark grey clayey angular fine to medium gravel noted.*				
	10.80 - 11.90		100	100	0	30		*10.80-10.85m: Subhorizontal fracture planar, smooth, no infill or staining.*				
								11.30-11.35m: Subhorizontal fracture planar, smooth, no infill or staining.				
								11.48-11.58m: Subhorizontal fracture stepped, smooth, no infill or staining.				
								11.66-11.68m: Subvertical fracture planar, smooth, no infill or staining.				
	11.90 - 13.05		100	91	0			*11.88-11.90m: Subvertical fracture stepped, smooth no infill or staining.*				
								11.98-12.02m: Subvertical fracture planar, smooth, no infill or staining.				
								12.42-12.46m: Subvertical fracture planar, smooth no infill or staining.				
						NI						
	13.05 - 13.40		0	0	0	AZCL			(6.15)			
	13.40 - 14.70		100	92	38	15		*13.40-13.45m: Subvertical fracture planar smooth no infill or staining.*				
								13.70-13.90m: Subvertical fracture undulating smooth, no infill or staining.				
								14.45-14.55m: Subhorizontal 40-60 degree fracture planar, smooth, no infill or staining.				
	14.70 - 16.20		100	60	13	NI		*14.50m: Becoming very strong.*				
						15		*15.30-15.50m: Subvertical fracture planar smooth, no infill or staining.*				
								15.70-15.85m: Subvertical fracture stepped smooth no infill or staining.				
								16.00-16.20m: Subvertical fracture planar, smooth, no infill or staining.				
								End of Borehole at 16.20 m	16.20	42.87		

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)
200	8.50
131	8.50

Hole Diameter

Diameter (mm)	Depth (m)
200	8.50
131	16.20

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH19

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 59.03 | Scale 1:50 | Easting: 415276.33 | Northing: 417661.44

Client: Marshall Holdings Ltd | Driller: CS/ID | Logged By: AH | Sheet 1 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 29/09/2017 - 13/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.25			MADE GROUND: Dark brown slightly sandy, slightly gravelly, slightly clayey topsoil. Gravel is subangular to rounded, fine to coarse, sandstone, mudstone, brick and coal.	(0.30)			
B	0.30 - 0.53				0.30	58.73		
ES	0.50			MADE GROUND: Light brown mottled, light grey, sandy, slightly gravelly clay of low plasticity. Gravel is subangular to rounded, fine to coarse, sandstone, brick and coal.				
ES	0.75							
D	1.00		1					
ES	1.00							
D	1.25 - 1.65				(1.80)			
B	1.65 - 2.00							
D	2.00		2					
ES	2.00			MADE GROUND: Grey, slightly gravelly, sandy clay of intermediate plasticity. Gravel is angular to subrounded, fine to coarse, sandstone, mudstone and coal.	2.10	56.93		
B	2.50 - 2.80				(0.95)			
D	3.00		3					
ES	3.00			MADE GROUND: Brown slightly sandy, gravelly clay. Gravel is subangular to rounded, fine to coarse, sandstone, coal and brick.	3.05	55.98		
B	3.50 - 3.80							
D	4.00		4					
ES	4.00			*4.10mbgl: Sandstone cobbles noted.*				
B	4.50 - 4.80							
D	5.00		5					
ES	5.00				(4.15)			
B	5.50 - 5.80							
D	6.00		6					
ES	6.00							
B	6.50 - 6.95							
D	7.00		7					
ES	7.00							
D	7.70 - 7.80			Grey MUDSTONE recovered as slightly sandy slightly clayey GRAVEL. Sand is fine to coarse. Gravel is angular, fine to coarse of mudstone.	7.20	51.83		
			8		(1.60)			
		OH						
	8.80 - 9.30				8.80	50.23		
		0 0 0 AZCL	9	8.80 - 9.30 40 % Water AZCL.				
	9.30 - 9.80			9.30 - 9.80 50 % Water				
		0 0 0 AZCL			(1.35)			
	9.80 - 10.10			9.80 - 10.10 60 % Water				
		0 0 0 A…	10					
		TCR% SCR% RQD% FI		Continued on next sheet				

Ground Water (m) Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata From (m)	To (m)	Time (hr)

Casing Depths Diameter (mm)	Depth (m)
200	7.20
150	7.80
131	10.00

Hole Diameter Diameter (mm)	Depth (m)
200	7.20
150	7.80
131	16.00

General Remarks

1.Hand dug inspection pit to 1.20m
2. No groundwater encountered.
3. Open hole drilled between 7.80 and 8.80m due to core barrel jamming up.

Email Received 27 FEBRUARY 2018 Marshall (MKWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH19

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 59.03 Scale 1:50

Easting: 415276.33 Northing: 417661.44

Client: Marshall Holdings Ltd

Driller: CS/ID Logged By: AH

Sheet 2 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 29/09/2017 - 13/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
	10.10 - 10.60		90	90	0		10.10 - 10.60 60 % Water	Very weak partially weathered thinly bedded grey MUDSTONE. Fractures are closely spaced subhorizontal, planar, smooth, no infill or staining.	10.15	48.88		
	10.60 - 11.10		100	100	0		10.60 - 11.10 60 % Water	*10.60-10.80m: Subvertical fracture planar smooth, no infill or staining.*				
	11.10 - 11.60		100	100	0		11	*10.90-11.00m: Subvertical fracture planar smooth, no infill or staining.*	(2.05)			
	11.60 - 13.00		100	93	0	40	11.60 - 16.00 100 % Water	*11.30-11.40m: Subvertical fracture planar smooth, no infill or staining.* *11.50-11.60m: Subvertical fracture planar, smooth, no infill or staining.* *11.70-12.20m: Subvertical fracture planar, smooth, no infill or staining.*				
	13.00 - 14.50		100	100	26		12	Very weak partially weathered dark grey MUDSTONE. Fractures are very closely spaced subhorizontal planar, smooth, no infill or staining. *12.40-12.50m: Subvertical fracture planar, smooth, no infill or staining.*	12.20	46.83		
	14.50 - 16.00		100	100	16	15	13	*13.00-13.25m: Subvertical fracture planar, smooth, no infill or staining.*	(3.80)			
							14	*14.00-14.25m: Subvertical fracture smooth, no infill or staining.*				
							15	*15.10-15.90m: Subvertical fracture planar, smooth, no infill or staining.*				
							16	End of Borehole at 16.00 m	16.00	43.03		
							17					
							18					
							19					
							20					

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
								200	7.20	200	7.20
								150	7.80	150	7.80
								131	10.00	131	16.00

Log last updated 26/01/2018

General Remarks

1.Hand dug inspection pit to 1.20m
2. No groundwater encountered.
3. Open hole drilled between 7.80 and 8.80m due to core barrel jamming up.

Email Received 27 FEBRUARY 2018 Marshall (CWY) Ltd

BOREHOLE RECORD

Borehole BH20

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 59.01 | Scale 1:50 | Easting: 415309.32 | Northing: 417671.78

Client: Marshall Holdings Ltd | Driller: CS/ID | Logged By: AH | Sheet 1 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 06/10/2017 - 11/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
				MADE GROUND: Black bituminous macadam.	(0.15) 0.15	58.86		
ES	0.25			MADE GROUND: Dark grey clayey slightly sandy gravel. Gravel is angular to subangular, fine to coarse of limestone.	(0.35) 0.50	58.51		
B	0.50 - 1.00			MADE GROUND: Sandy gravel. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of sandstone, mudstone, brick, concrete and clinker.				
D	0.50							
ES	0.50							
ES	0.75							
D	1.00		1		(1.00)			
ES	1.00							
D	1.20 - 1.65		(1.20) 0.45					
SPT (S)	1.20 - 1.65	N=11 (3,4/3,2,3,3)						
ES	1.50			MADE GROUND: Dark brown orange sand. Gravel is angular to subangular, fine to coarse of sandstone, concrete, brick and limestone.	1.50	57.51		
B	1.60 - 2.00							
D	1.70							
SPT (C)	2.00 - 2.45	N=12 (2,3/3,2,4,3)	2 (2.00) 0.45					
B	2.50 - 3.00				(2.00)			
D	2.50							
ES	2.50							
SPT (C)	3.00 - 3.45	N=31 (6,4/8,9,7,7)	3					
ES	3.50			MADE GROUND: Dark brown clayey, sandy gravel. Gravel is fine to coarse sand. Gravel angular to subangular, fine to coarse of sandstone.	3.50	55.51		
B	3.60 - 4.00							
D	3.60							
SPT (C)	4.00 - 4.45	N=19 (6,5/5,4,4,6)	4 (4.00) 0.45					
B	4.50 - 5.00				(2.20)			
D	4.50							
ES	4.50							
SPT (C)	5.00 - 5.45	N=25 (7,4/7,7,5,6)	5 (5.00) 0.45					
D	5.50							
ES	5.50							
B	5.80 - 6.30			MADE GROUND: Dark brown sandy slightly gravelly clay of low plasticity. Gravel is angular to subrounded, fine to coarse of limestone and sandstone.	5.70	53.31		
D	5.80							
SPT (C)	6.00 - 6.45	N=6 (3,2/,1,2,3)	6 (6.00) 0.45					
ES	6.50				(1.30)			
W	6.50							
B	7.00 - 7.70		7 (6.00) Dry		7.00	52.01		
D	7.00 - 7.45			Very dense grey, slightly sandy, slightly clayey GRAVEL. Gravel is of angular to subangular mudstone. (Weathered rockhead).				
SPT (S)	7.00 - 7.24	N=50+ (16,9 for 5mm/20,19,11 for 10mm)						
ES	7.50				(0.70)			
D	7.70 - 8.15		(7.70) Dry		7.70	51.31		
SPT (S)	7.70 - 7.92	N=50+ (20/22,23,5 for 0mm)	7.70 - 13.30 100 % Water	AZCL.				
	7.70 - 8.90		8					
	8.90 - 9.90		9		(2.80)			
	9.90 - 10.50		10					

TCR% | SCR% | RQD% | FI: 0 | 0 | 0 (7.70 - 7.92); 0 | 0 | 0 (8.90 - 9.90)

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
3.50	3.50	3.70	20	3.70
5.50	5.50	6.00	20	6.00

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
7.50	7.70	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	6.50
150	7.70
131	18.30

Hole Diameter

Diameter (mm)	Depth (m)
200	6.50
150	7.70
131	18.30

General Remarks

1. Hand dug inspection pit to 1.20m.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH20

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 59.01 Scale 1:50

Easting: 415309.32 Northing: 417671.78

Client: Marshall Holdings Ltd

Driller: CS/ID Logged By: AH

Sheet 2 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 06/10/2017 - 11/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
			0	0	0							
	10.50 - 11.30		0	0	0			AZCL. Mudstone cuttings noted in flush returns.	10.50	48.51		
	11.30 - 11.80		0	0	0	AZCL						
SPT (S)	11.80 - 12.22 11.80 - 12.30	N=50+ (2,3/13,21,16)	0	0	0		(11.80) Dry		(2.80)			
SPT (S)	12.30 - 12.64 12.30 - 12.80	N=50+ (3,8/9,19, 22 for 40mm)	0	0	0		(11.80) Dry					
	12.80 - 13.30		0	0	0							
SPT (S)	13.30 - 13.50 13.30 - 14.30	N=50+ (3,17/50 for 50mm)	100	100	0		(13.30) Dry 13.30 - 18.30 100 % Water	Very weak partially weathered thinly laminated dark grey MUDSTONE. Fractures are extremely closely to very closely subhorizontal planar, smooth, no infill or staining. *13.30-13.50m: Subvertical fracture planar, no infill or staining.* *13.55-14.00m: Subvertical fracture planar, no infill or staining.* *14.00-14.50m: Subvertical fracture planar, no infill or staining.*	13.30	45.71		
	14.30 - 15.80		93	93	0	30		*14.55-15.80m: Subvertical fracture planar, no infill or staining.*	(5.00)			
	15.80 - 17.30		100	100		15		*16.10-16.20m: Subvertical fracture planar smooth, no infill or staining.* *16.20-16.30m: Subvertical fracture planar, smooth, no infill or staining.* *16.49m: Medium Strong.* *16.50-16.55m: Subvertical fracture planar, smooth, no infill or staining.* *16.70-16.77m: Subvertical fracture planar, smooth, no infill or staining.* *16.98-17.02m: Subvertical fracture planar, smooth, no infill or staining.* *17.10-17.40m: Subvertical fracture planar, smooth, no infill or staining.*				
	17.30 - 18.30		100	100	0			*17.75-17.85m: Subvertical fracture planar, smooth., no infill or staining.* *18.10-18.28m: Subvertical fracture undulating smooth, no infill or staining.* End of Borehole at 18.30 m	18.30	40.71		

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
3.50	3.50			3.70	7.50	7.70	01:00	200	6.50	200	6.50
5.50	5.50			6.00				150	7.70	150	7.70
								131	18.30	131	18.30

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m.

BOREHOLE RECORD

Borehole BH21

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 58.61 Scale 1:50

Easting: 415344.51 Northing: 417669.53

Client: Marshall Holdings Ltd | Driller: LI | Logged By: AH | Sheet 1 of 1

Method: Cable Percussive Drilling | Checked By: BL | Dates: 18/10/2017 - 20/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
				MADE GROUND: Dark grey macadam.	(0.30)			
ES	0.25				0.30	58.31		
				MADE GROUND: Dark brown sandy gravel. Grave is angular, fine to coarse of sandstone.	(0.20)			
B	0.50 - 1.00				0.50	58.11		
D	0.50			MADE GROUND: Dark brown sandy clay. Sand is fine to coarse.				
ES	0.50							
ES	0.75							
ES	1.00		1					
D	1.20		(1.20) Dry					
SPT (S)	1.20 - 1.65	N=22 (4,5/5,6,5,6)						
B	1.50 - 2.00							
D	1.50							
D	2.00		2	(2.00) Dry				
ES	2.00							
SPT (S)	2.00 - 2.45	N=5 (1,1/1,1,1,2)			(3.50)			
B	2.50 - 3.00			*2.50m: Clay of intermediate plasticity.*				
D	2.50							
D	3.00		3	(3.00) Dry				
ES	3.00							
SPT (S)	3.00 - 3.45	N=6 (1,1/2,1,1,2)						
B	3.50 - 4.00							
D	3.50							
D	4.00		4	(4.00) Dry				
ES	4.00			MADE GROUND: Dark brown slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of sandstone and brick.	4.00	54.61		
SPT (S)	4.00 - 4.45	N=25 (3,10/11,6,4,4)			(0.50)			
D	4.20							
B	4.50 - 5.00			Stiff dark grey slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of sandstone.	4.50	54.11		
D	5.00		5	(5.00) Dry				
ES	5.00							
SPT (S)	5.00 - 5.45	N=37 (3,4/5,7,10,15)			(1.30)			
D	5.50							
D	5.80		(5.80) Dry		5.80	52.81		
SPT (S)	5.80 - 5.96	N=50+ (25 for 70mm/31,19 for 15mm)	6	Very dense, orange brown slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone. (Possible weathered rockhead).	(0.20)			
				End of Borehole at 6.00 m	6.00	52.61		
			7					
			8					
			9					
			10					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
5.80	6.00	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	5.80

Hole Diameter

Diameter (mm)	Depth (m)
200	5.80

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

BOREHOLE RECORD

Borehole BH22

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 59.45 Scale 1:50

Easting: 415355.77 Northing: 417704.76

Client: Marshall Holdings Ltd

Driller: TF/PS Logged By: AH

Sheet 1 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 05/10/2017 - 17/10/2017

Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
				MADE GROUND: Dark grey Macadam,	(0.30)			
ES	0.25				0.30	59.15		
PID	0.25	PID: 0ppmv		MADE GROUND: Dark grey gravel. Gravel is angular to subangular, fine to coarse of sandstone.	(0.30)			
W	0.40				0.60	58.85		
B	0.50 - 1.00			MADE GROUND: Dark grey slightly sandy gravel. Sand is fine to coarse with much ash. Gravel is subangular to subrounded, fine to coarse of sandstone and clinker.	(0.50)			
D	0.50				1.10	58.35		
PID	0.50	PID: 0ppmv		MADE GROUND: Dark brown slightly sandy, gravelly clay of intermediate plasticity. Sand is fine to coarse with much ash. Gravel is subangular to subrounded, fine to coarse of clinker, brick, concrete and sandstone.				
ES	0.75							
PID	0.75	PID: 1ppmv	1					
D	1.00							
ES	1.00		(1.20) Dry					
PID	1.00	PID: 0ppmv						
D	1.20 - 1.65							
SPT (S)	1.20 - 1.65	N=10 (3,2/3,2,2,3)						
B	1.50 - 2.00							
ES	1.50							
PID	1.50	PID: 0ppmv						
D	1.70		2 (2.00) Dry		(1.90)			
D	2.00 - 2.45							
SPT (S)	2.00 - 2.45	N=4 (1,1/1,1,1,1)						
B	2.50 - 3.00							
D	2.50							
ES	2.50							
PID	2.50	PID: 0ppmv						
D	3.00 - 3.45		3 (3.00) Dry		3.00	56.45		
SPT (S)	3.00 - 3.45	N=3 (1,1/1,1,1,0)		MADE GROUND: Dark grey brown sandy clay of intermediate plasticity. Sand is fine to coarse.				
B	3.50 - 4.00							
ES	3.50							
U	3.50 - 3.95	20 blows			(1.50)			
PID	3.50	PID: 0ppmv						
D	3.95							
D	4.00		4					
B	4.50 - 5.00		(4.50) Dry		4.50	54.95		
D	4.50 - 4.95			MADE GROUND: Dark brown subangular slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone.				
ES	4.50							
SPT (S)	4.50 - 4.86	N=50+ (6,9/15,15,20 for 60mm)						
PID	4.50	PID: 0ppmv						
D	5.00		5					
B	5.50 - 6.00		(5.50) Dry		(1.80)			
D	5.50 - 5.95							
ES	5.50							
SPT (S)	5.50 - 5.72	N=50+ (25 for 70mm/26,17,7 for 5mm)						
PID	5.50	PID: 0ppmv						
D	6.00		6					
B	6.50 - 7.00		(6.50) Dry		6.30	53.15		
D	6.50			MADE GROUND: Dark brown slightly sandy, gravelly clay of low plasticity. Gravel is angular to subangular, fine to coarse of sandstone and mudstone.				
SPT (C)	6.50 - 6.95	N=28 (8,6/7,8,8,5)						
PID	6.50	PID: 0ppmv			(1.20)			
			7					
D	7.70 - 8.15		(7.70) Dry	Very stiff dark brown, slightly sandy, gravelly CLAY. Sand is fine to coarse. Gravel angular to subangular, fine to coarse of mudstone. (Weathered rockhead)	7.50	51.95		
SPT (S)	7.70 - 8.09	N=50+ (4,7/10,13,20,7 for 10mm)						
B	7.80 - 8.00				(1.00)			
PID	8.20	PID: 0ppmv						
D	8.50 - 8.75		(8.50) Dry		8.50	50.95		
ES	8.50		8.50 - 11.20 100 % Water	Very weak partially weathered dark grey MUDSTONE. Fractures are extremely closely to very closely subhorizontal planar, smooth, no infill or staining.	(0.50)			
SPT (S)	8.50 - 8.73	N=50+ (21,4 for 0mm/20,21,9 for 5mm)	8.50 - 16.40 100 % Water					
	8.50 - 9.00				9.00	50.45		
	9.00 - 10.00		9	Very weak partially weathered thinly laminated dark grey MUDSTONE. Fractures are very closely spaced to closely subhorizontal planar, smooth, no infill or staining. *9.40-9.50m: Subvertical planar smooth, no infill or staining.*				
	10.00 - 10.50		10					

TCR%	SCR%	RQD%	FI
100	40	0	NI
			10
50	40	0	AZCL
			10
			NI

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
0.40		0.30	20	1.20

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)
200	7.50
150	8.50
131	16.40

Hole Diameter

Diameter (mm)	Depth (m)
200	8.50
150	8.50
131	16.40

General Remarks

1. Hand dug inspection to 1.20m bgl.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH22

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 59.45 Scale 1:50

Easting: 415355.77 Northing: 417704.76

Client: Marshall Holdings Ltd

Driller: TF/PS Logged By: AH

Sheet 2 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 05/10/2017 - 17/10/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
			100	100	0	20						
	10.50 - 11.20		42	14	14	20 NI 12						
	11.20 - 12.70		90	90	0	40 A…						
	12.70 - 13.70		75	75	0	AZC L 20		13.20-13.35m: Subvertical fracture planar, smooth, no infill or staining. 13.35-13.50m: Subvertical fracture planar smooth, no infill or staining. 13.40-13.70m: Subvertical fracture planar smooth, no infill or staining.	(7.40)			
	13.70 - 14.90		80	60	0	20 NI AZC L		14.00m: Weak.				
	14.90 - 16.40		100	100	0	20		15.45-15.56m: Subvertical fracture planar, smooth, no infill or staining. 15.85-15.90m: Subvertical fracture planar smooth tight clean.				
								End of Borehole at 16.40 m	16.40	43.05		

11 12 13 14 15 16 17 18 19 20

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
0.40				1.20				200	7.50	200	8.50
								150	8.50	150	8.50
								131	16.40	131	16.40

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection to 1.20m bgl.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

BOREHOLE RECORD

Borehole BH23

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 59.10 Scale 1:50

Easting: 415393.12 Northing: 417701.94

Client: Marshall Holdings Ltd | Driller: LI | Logged By: AH | Sheet 1 of 1

Method: Cable Percussive Drilling | Checked By: BL | Dates: 16/10/2017 - 17/10/2017

Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)
				MADE GROUND: Dark grey macadam.	(0.10)	59.00
ES	0.25			MADE GROUND: Dark brown sandy angular, fine to coarse gravel of limestone.	0.10	
PID	0.25	PID: 1ppmv			(0.30)	
B	0.50 - 1.00				0.40	58.70
D	0.50			MADE GROUND: Dense dark brown slightly clayey sandy gravel. Gravel is angular to subangular, fine to coarse of sandstone and brick.		
ES	0.50					
PID	0.50	PID: 0ppmv				
ES	0.75					
PID	0.75	PID: 0ppmv	1			
ES	1.00			(1.20) Dry		
PID	1.00	PID: 0ppmv				
D	1.20					
SPT (S)	1.20 - 1.65	N=34 (5,7/7,13,7,7)			(2.20)	
B	1.50 - 2.00					
D	1.50					
D	2.00		2	(2.00) Dry		
ES	2.00					
SPT (S)	2.00 - 2.45	N=31 (4,7/7,8,7,9)				
PID	2.00	PID: 0ppmv				
B	2.50 - 3.00					
D	2.50				2.60	56.50
				MADE GROUND: Dense dark brown black sandy gravel. Gravel is angular, fine to coarse of sandstone, clinker and ash.		
D	3.00		3	(3.00) Dry		
ES	3.00					
SPT (S)	3.00 - 3.38	N=50+ (12,13 for 70mm/16,16,10,8 for 10mm)				
PID	3.00	PID: 0ppmv				
B	3.50 - 4.00					
D	3.50					
D	4.00		4	(4.00) Dry		
ES	4.00					
SPT (S)	4.00 - 4.45	N=27 (3,5/6,7,7,7)				
PID	4.00	PID: 0ppmv				
B	4.50 - 5.00					
D	4.50					
D	5.00		5	(5.00) Dry		
ES	5.00					
SPT (S)	5.00 - 5.45	N=35 (5,7/7,9,9,10)			(5.10)	
PID	5.00	PID: 0ppmv				
B	5.50 - 6.00					
D	5.50					
ES	6.00		6	(6.00) Dry		
SPT (S)	6.00 - 6.38	N=50+ (8,12/15,17,18)				
PID	6.00	PID: 0ppmv				
B	6.50 - 7.00					
D	6.50					
D	7.00		7	(7.00) Dry		
ES	7.00					
SPT (S)	7.00 - 7.34	N=50+ (9,14/18,19,13 for 44mm)				
PID	7.00	PID: 0ppmv				
D	7.50					
				Very dense orange brown slightly sandy GRAVEL. Gravel is angular to subangular, fine to coarse of sandstone. (Possible weathered rockhead)	7.70	51.40
D	7.90			(7.90) Dry	(0.48)	
SPT (S)	7.90 - 8.18	N=50+ (14,11 for 50mm/19,24,7 for 3mm)	8			
				End of Borehole at 8.18 m	8.18	50.92
			9			
			10			

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
4.00	3.50	2.80	20	

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
3.00	3.30	01:00
7.70	7.90	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	7.90

Hole Diameter

Diameter (mm)	Depth (m)
200	8.18

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

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Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH24

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 65.98 Scale 1:50

Easting: 415188.68 Northing: 417400.48

Client: Marshall Holdings Ltd | Driller: TF | Logged By: AH | Sheet 1 of 1

Method: Cable Percussive Drilling | Checked By: BL | Dates: 01/11/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)
ES	0.00			MADE GROUND: Black macadam.	(0.10)	65.88
ES	0.25			MADE GROUND: Yellow slightly sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone.	0.10 (0.50)	
B	0.50 - 1.00					
D	0.50					
ES	0.50					
ES	0.75					
				MADE GROUND: Dark grey slightly sandy gravelly clay. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of limestone, mudstone, coal, clinker and brick.	0.60	65.38
ES	1.00		1			
D	1.20		(1.20) Dry			
SPT (C)	1.20 - 1.65	N=18 (3,4/3,5,6,4)				
B	1.50 - 2.00					
ES	1.50					
D	1.70		(1.70) Dry			
SPT (C)	1.70 - 2.15	N=12 (3,2/4,2,3,3)				
			2			
D	2.20		(2.00) Dry			
SPT (C)	2.20 - 2.65	N=24 (3,6/7,6,5,6)				
B	2.50 - 3.00					
ES	2.50					
D	2.70		(2.50) Dry			
SPT (C)	2.70 - 3.15	N=27 (6,8/6,6,7,8)				
			3			
D	3.20		(3.00) Dry			
SPT (C)	3.20 - 3.65	N=13 (3,4/3,3,2,5)				
B	3.50 - 4.00					
ES	3.50					
D	3.70		(3.50) Dry			
SPT (C)	3.70 - 4.15	N=13 (3,2/3,4,4,2)				
			4			
D	4.20		(4.00) Dry			
SPT (C)	4.20 - 4.65	N=11 (5,2/3,3,2,3)				
B	4.50 - 5.00					
ES	4.50					
D	4.70		(4.50) Dry			
SPT (C)	4.70 - 5.15	N=12 (4,5/3,5,2,2)			(8.60)	
			5			
D	5.20		(5.00) Dry			
SPT (C)	5.20 - 5.65	N=15 (5,4/5,5,3,2)				
B	5.50 - 6.00					
ES	5.50					
D	5.70		(5.50) Dry			
SPT (C)	5.70 - 6.15	N=18 (2,5/4,3,6,5)				
			6			
D	6.20		(6.00) Dry			
SPT (C)	6.20 - 6.65	N=18 (3,3/6,4,5,3)				
B	6.50 - 7.00					
ES	6.50					
D	6.70		(6.50) Dry			
SPT (C)	6.70 - 7.15	N=17 (6,3/6,4,4,3)				
			7			
D	7.20		(7.00) Dry			
SPT (C)	7.20 - 7.65	N=17 (5,6/5,5,4,3)				
B	7.50 - 8.00					
ES	7.50					
D	7.70		(7.50) Dry			
SPT (C)	7.70 - 8.15	N=13 (2,6/2,4,4,3)				
			8			
D	8.20		(8.00) Dry			
SPT (C)	8.20 - 8.65	N=18 (6,5/7,3,4,4)				
B	8.50 - 9.00					
ES	8.50					
D	8.70		(8.50) Dry			
SPT (C)	8.70 - 9.15	N=21 (7,5/4,5,6,6)				
			9			
D	9.20		(9.20) Dry		9.20	56.78
SPT (C)	9.20 - 9.38	N=50+ (25 for 50mm/41,9 for 50mm)		Very dense, brown slightly sandy GRAVEL. Sand is fine to coarse. Gravel is subangular, fine to coarse of sandstone. (Possible weathered sandstone).	(0.42)	
D	9.50		(9.50) Dry			
SPT (C)	9.50 - 9.62	N=50+ (25 for 45mm/50 for 70mm)		End of Borehole at 9.62 m	9.62	56.36
			10			

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
9.20	9.50	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	9.00
150	9.50

Hole Diameter

Diameter (mm)	Depth (m)
200	9.00
150	9.50

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

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DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH25

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 66.79 — Scale 1:50

Easting: 415200.18 — Northing: 417461.20

Client: Marshall Holdings Ltd — Driller: TF — Logged By: AH — Sheet 1 of 2

Method: Cable Percussive Drilling — Checked By: BL — Dates: 18/10/2017 - 20/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark brown sandy gravelly clay. Gravel is angular to subangular, fine to coarse of limestone.	(0.20)			
PID	0.00	PID: 0ppmv			0.20	66.59		
ES	0.25			MADE GROUND: Orange brown slightly sandy gravel. Gravel is subangular to subrounded, fine to coarse of limestone.				
PID	0.25	PID: 0ppmv			(0.60)			
B	0.50 - 1.00							
D	0.50							
ES	0.50							
PID	0.50	PID: 0ppmv		MADE GROUND: Brown clayey gravelly sand. Gravel is angular to subangular, fine to coarse of brick and clinker.	0.80	65.99		
ES	0.75		1					
PID	0.75	PID: 0ppmv			(0.70)			
D	0.90		(1.20) Dry					
ES	1.00							
PID	1.00	PID: 1ppmv						
B	1.20 - 1.70				1.50	65.29		
D	1.20			MADE GROUND: Dark brown sandy gravelly clay. Gravel is angular to subangular, fine to coarse of sandstone, clinker, ash and mudstone. Metal fragments noted.				
SPT (S)	1.20 - 1.65	N=14 (4,3/3,3,4,4)	(1.50) Dry		(0.50)			
ES	1.50							
PID	1.50	PID: 0ppmv			2.00	64.79		
D	1.70		2	MADE GROUND: Black silty clayey sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick and clinker. Metal fragments noted.				
SPT (S)	1.70 - 2.15	N=11 (3,2/2,4,2,3)						
D	2.00		(2.00) Dry					
B	2.20 - 2.70							
D	2.20							
SPT (S)	2.20 - 2.65	N=12 (2,3/3,2,4,3)						
ES	2.50							
PID	2.50	PID: 0ppmv	(2.50) Dry		(1.50)			
D	2.70							
SPT (S)	2.70 - 3.15	N=11 (3,2/1,3,4,3)	3					
D	3.00							
B	3.20 - 3.70		(3.00) Dry					
D	3.20							
SPT (S)	3.20 - 3.65	N=13 (8,7/4,3,4,2)						
PID	3.50	PID: 1ppmv			3.50	63.29		
D	3.70		(3.50) Dry	MADE GROUND: Brown slightly sandy gravelly clay. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of sandstone, clinker and mudstone. Rare metal fragments noted.				
SPT (S)	3.70 - 4.15	N=12 (1,2/2,3,4,3)						
D	4.00		4					
B	4.20 - 4.70		(4.00) Dry					
D	4.20			*4.20m: Clay of low plasticity.*				
SPT (S)	4.20 - 4.65	N=5 (1,2/2,1,1,1)						
ES	4.50							
PID	4.50	PID: 0ppmv						
D	4.70		(4.50) Dry		(2.50)			
SPT (S)	4.70 - 5.15	N=22 (3,4/5,6,7,4)						
D	5.00		5					
B	5.20 - 5.70		(5.00) Dry					
D	5.20							
SPT (S)	5.20 - 5.65	N=14 (4,3/4,1,5,4)						
ES	5.50							
PID	5.50	PID: 0ppmv						
D	5.70		(5.50) Dry					
SPT (S)	5.70 - 6.15	N=17 (3,2/3,4,7,3)						
D	6.00		6		6.00	60.79		
B	6.20 - 6.70		(6.00) Dry	MADE GROUND: Dark brown clayey gravelly fine to coarse of sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of sandstone, brick, concrete and clinker.				
D	6.20							
SPT (C)	6.20 - 6.65	N=8 (2,3/1,2,2,3)						
ES	6.50							
PID	6.50	PID: 0ppmv						
D	6.70		(6.50) Dry					
SPT (S)	6.70 - 7.15	N=10 (1,2/4,3,2,1)						
D	7.00		7		(2.00)			
B	7.20 - 7.70		(7.00) Dry					
D	7.20							
SPT (C)	7.20 - 7.65	N=16 (3,4/3,4,4,5)						
ES	7.50							
PID	7.50	PID: 0ppmv						
D	7.70		(7.50) Dry					
SPT (C)	7.70 - 8.15	N=18 (6,3/6,4,3,5)						
D	8.00		8		8.00	58.79		
B	8.20 - 8.70		(8.00) Dry	MADE GROUND: Dark grey slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of brick, sandstone, mudstone and sandstone. Occasional black brown gravelly sand bands noted throughout.				
D	8.20							
SPT (C)	8.20 - 8.65	N=22 (3,4/5,4,6,7)						
ES	8.50							
PID	8.50	PID: 0ppmv						
D	8.70		(8.50) Dry					
SPT (C)	8.70 - 9.15	N=19 (8,4/3,7,4,5)						
D	9.00		9					
B	9.20 - 9.70		(8.00) Dry					
D	9.20							
SPT (C)	9.20 - 9.65	N=31 (6,9/9,8,7,7)						
ES	9.50							
PID	9.50	PID: 0ppmv						
D	9.70		(9.50) Dry					
SPT (C)	9.70 - 10.15	N=28 (8,5/7,9,5,7)						
D	10.00		10					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
12.50	12.70	01:00
13.60	13.70	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	10.50
150	13.70

Hole Diameter

Diameter (mm)	Depth (m)
200	13.70
150	13.70

General Remarks

1. Hand dug inspection pit to 1.20m
2. No groundwater encountered.

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Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH25

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 66.79 Scale 1:50

Easting: 415200.18 Northing: 417461.20

Client: Marshall Holdings Ltd | Driller: TF | Logged By: AH | Sheet 2 of 2

Method: Cable Percussive Drilling | Checked By: BL | Dates: 18/10/2017 - 20/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
B	10.20 - 10.70		(10.00) Dry	MADE GROUND: Dark grey slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of brick, sandstone, mudstone and sandstone. Occasional black brown gravelly sand bands noted throughout.				
D	10.20							
SPT (C)	10.20 - 10.65	N=32 (13,12/7,10,8,7)						
ES	10.50							
PID	10.50	PID: 1ppmv						
D	10.70		(10.50) Dry					
SPT (C)	10.70 - 11.15	N=32 (10,8/7,9,8,8)			(5.60)			
D	11.00		11					
B	11.20 - 11.70		(10.50) Dry					
D	11.20							
SPT (C)	11.20 - 11.65	N=28 (7,9/6,8,9,5)						
ES	11.50							
PID	11.50	PID: 0ppmv						
D	11.70		(10.50) Dry					
SPT (C)	11.70 - 12.15	N=35 (10,11/9,7,9,10)						
D	12.00		12					
B	12.20 - 12.70		(10.50) Dry					
D	12.20							
SPT (C)	12.20 - 12.65	N=36 (10,8/11,7,9,9)						
ES	12.50							
PID	12.50	PID: 3ppmv						
D	12.70		(10.50) Dry					
SPT (C)	12.70 - 13.15	N=33 (11,8/10,9,7,7)						
D	13.00		13					
B	13.20 - 13.70		(10.50) Dry					
D	13.20							
SPT (C)	13.20 - 13.65	N=35 (6,7/9,8,10,8)						
ES	13.50							
PID	13.50	PID: 0ppmv						
D	13.70		(13.70) Dry					
SPT (S)	13.70 - 13.79	N=50+ (25 for 10mm/40,10 for 5mm)		Very dense, dark brown slightly sandy, clayey GRAVEL. Gravel is angular to subangular fine to coarse of mudstone. (Possible weathered rockhead).	13.60	53.19		
					(0.10)	53.09		
					13.70			
			14	End of Borehole at 13.70 m				
			15					
			16					
			17					
			18					
			19					
			20					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
12.50	12.70	01:00
13.60	13.70	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	10.50
150	13.70

Hole Diameter

Diameter (mm)	Depth (m)
200	13.70
150	13.70

General Remarks

1. Hand dug inspection pit to 1.20m
2. No groundwater encountered.

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Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH26

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 65.16 | Scale 1:50 | Easting: 415263.30 | Northing: 417515.80

Client: Marshall Holdings Ltd | Driller: TF | Logged By: AH | Sheet 1 of 2

Method: Cable Percussive Drilling | Checked By: BL | Dates: 31/10/2017 - 01/11/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subangular, fine to coarse of sandstone and brick.				
PID	0.00	PID: 0ppmv			(0.30)			
ES	0.25				0.30	64.86		
PID	0.25	PID: 0ppmv		MADE GROUND: Dark brown clayey sandy gravel. Gravel is angular to subangular, fine to coarse of sandstone and mudstone.				
B	0.50 - 1.00							
D	0.50							
ES	0.50							
PID	0.50	PID: 0ppmv						
ES	0.75							
PID	0.75	PID: 0ppmv	1		(1.20)			
D	1.00							
ES	1.00		(1.20) Dry					
PID	1.00	PID: 0ppmv						
D	1.20							
SPT (C)	1.20 - 1.65	N=20 (6,5/7,4,4,5)			1.50	63.66		
B	1.50 - 2.00		(1.70) Dry	MADE GROUND: Dark grey clayey gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of mudstone, brick, clinker and concrete.				
ES	1.50							
PID	1.50	PID: 0ppmv						
D	1.70		2					
SPT (C)	1.70 - 2.15	N=19 (3,4/4,5,7,3)						
D	2.20		(2.20) Dry					
SPT (C)	2.20 - 2.65	N=15 (3,2/4,2,6,3)						
B	2.50 - 3.00							
ES	2.50				(2.20)			
PID	2.50	PID: 1ppmv	(2.70) Dry					
D	2.70							
SPT (C)	2.70 - 3.15	N=12 (2,1/3,2,4,3)						
			3					
D	3.20		(3.20) Dry					
SPT (C)	3.20 - 3.65	N=13 (4,2/2,5,3,3)						
B	3.50 - 4.00							
ES	3.50							
PID	3.50	PID: 0ppmv						
D	3.70			MADE GROUND: Dark brown sandy gravelly clay. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, brick and clinker.	3.70	61.46		
SPT (S)	4.00 - 4.14	N=50+ (19,6 for 7mm/50 for 61mm)	4 (4.00) Dry		(0.60)			
D	4.20		(4.20) Dry					
SPT (C)	4.20 - 4.65	N=9 (3,2/1,3,3,2)			4.30	60.86		
B	4.50 - 5.00			MADE GROUND: Dark grey silty gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick, sandstone and clinker.				
ES	4.50							
PID	4.50	PID: 1ppmv	(4.50) Dry					
D	4.70							
SPT (C)	4.70 - 5.15	N=12 (4,1/2,4,3,3)						
			5					
D	5.20		(5.20) Dry					
SPT (C)	5.20 - 5.65	N=15 (4,3/5,2,4,4)						
B	5.50 - 6.00							
ES	5.50				(2.70)			
PID	5.50	PID: 1ppmv	(5.70) Dry					
D	5.70							
SPT (C)	5.70 - 6.15	N=16 (5,6/4,4,3,5)						
			6					
D	6.20		(6.20) Dry					
SPT (C)	6.20 - 6.65	N=17 (5,4/4,3,4,6)						
B	6.50 - 7.00							
ES	6.50							
PID	6.50	PID: 0ppmv	(6.50) Dry					
D	6.70							
SPT (C)	6.70 - 6.96	N=50+ (10,15 for 30mm/22,20,8 for 5mm)	7 (7.00) Dry		7.00	58.16		
D	7.00			MADE GROUND: Reddish brown gravel. Gravel is angular to subangular, fine to coarse of brick.				
SPT (C)	7.00 - 7.15	N=50+ (25 for 40mm/30,20 for 35mm)						
B	7.50 - 8.00							
D	7.50							
ES	7.50							
PID	7.50	PID: 0ppmv						
D	8.00		8 (8.00) Dry		(2.00)			
SPT (C)	8.00 - 8.45	N=21 (9,5/4,3,7,7)						
B	8.50 - 9.00		(8.50) Dry					
D	8.50							
ES	8.50							
SPT (C)	8.50 - 8.95	N=29 (8,3/7,7,9,6)						
PID	8.50	PID: 0ppmv						
D	9.00		9 (9.00) Dry		9.00	56.16		
SPT (C)	9.00 - 9.45	N=28 (8,10/6,9,7,6)		MADE GROUND: Dark grey gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick, clinker mudstone and sandstone.				
B	9.50 - 10.00		(9.50) Dry					
D	9.50							
ES	9.50							
SPT (C)	9.50 - 9.95	N=21 (9,7/4,5,6,6)						
PID	9.50	PID: 0ppmv			(1.90)			
D	10.00		10 (10.00) Dry					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
6.70	7.10	02:00

Casing Depths

Diameter (mm)	Depth (m)
200	10.00
150	11.00

Hole Diameter

Diameter (mm)	Depth (m)
200	11.00
150	11.00

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH26

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 65.16 Scale 1:50

Easting: 415263.30 Northing: 417515.80

Client: Marshall Holdings Ltd | Driller: TF | Logged By: AH | Sheet 2 of 2

Method: Cable Percussive Drilling | Checked By: BL | Dates: 31/10/2017 - 01/11/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
SPT (C)	10.00 - 10.45	N=40 (8,10/11,9,10,10)		MADE GROUND: Dark grey gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick, clinker mudstone and sandstone.				
B	10.50 - 11.00		(10.50) Dry					
D	10.50							
ES	10.50							
SPT (C)	10.50 - 10.95	N=35 (5,9/10,7,10,8)						
PID	10.50	PID: 0ppmv						
D	11.00		11 (11.00) Dry	Dark grey slightly clayey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone. (possible weathered rockhead).	10.90 (0.10)	54.26 54.16		
SPT (C)	11.00 - 11.13	N=50+ (25 for 40mm/39,11 for 15mm)		Very dense orange brown GRAVEL. Gravel is angular to subangular, fine to coarse of sandstone. (possible weathered sandstone).	11.00 (0.13)	54.03		
				End of Borehole at 11.13 m	11.13			
			12					
			13					
			14					
			15					
			16					
			17					
			18					
			19					
			20					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
6.70	7.10	02:00

Casing Depths

Diameter (mm)	Depth (m)
200	10.00
150	11.00

Hole Diameter

Diameter (mm)	Depth (m)
200	11.00
150	11.00

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

BOREHOLE RECORD

Borehole BH27

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.14 | Scale 1:50

Easting: 415357.78 | Northing: 417391.72

Client: Marshall Holdings Ltd | Driller: SR/CA | Logged By: AH | Sheet 1 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 27/10/2017 - 01/11/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark brown slightly sandy slightly gravelly clayey topsoil. Gravel is angular to subangular fine to coarse of clinker, sandstone and concrete.	(0.10) 0.10	71.04		
PID	0.00	PID: 0ppmv						
PID	0.20	PID: 1ppmv						
ES	0.25							
ES	0.50			MADE GROUND: Dark brown sandy, gravelly clay. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, siltstone, coal and brick.				
PID	0.50	PID: 0ppmv						
ES	0.75							
PID	0.75	PID: 0ppmv						
ES	1.00		1		(1.90)			
PID	1.00	PID: 0ppmv						
B	1.20 - 1.70							
U	1.20 - 1.65	100 blows						
D	1.85							
B	2.00 - 2.50		2 (2.00) Dry	MADE GROUND: Dark grey clayey gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of sandstone, clinker and brick.	2.00	69.14		
D	2.00							
ES	2.00							
SPT (S)	2.00 - 2.45	N=13 (3,3/4,3,3,3)						
PID	2.00	PID: 0ppmv						
D	2.75							
D	3.00		3 (3.00) Dry		(2.00)			
ES	3.00							
SPT (S)	3.00 - 3.45	N=14 (2,3/3,4,4,3)						
PID	3.00	PID: 0ppmv						
D	3.75							
B	4.00 - 4.50		4 (4.00) Dry	MADE GROUND: Dark brown sandy gravelly clay. Gravel is angular to subangular, fine to coarse of mudstone, siltstone and sandstone.	4.00	67.14		
D	4.00							
ES	4.00							
SPT (S)	4.00 - 4.45	N=12 (2,3/2,3,3,4)						
PID	4.00	PID: 0ppmv						
D	4.75				(1.00)			
B	5.00 - 5.50		5 (5.00) Dry	Stiff thinly laminated orange brown sandy clay. Sand is fine to coarse.	5.00	66.14		
D	5.00							
ES	5.00							
SPT (S)	5.00 - 5.45	N=27 (5,4/5,5,8,9)						
PID	5.00	PID: 0ppmv						
D	5.75				(1.00)			
D	6.00		6 (6.00) Dry		6.00			
ES	6.00							
SPT (S)	6.00 - 6.38	N=50+ (7,10/11,16,16,7 for 10mm)		Orangish brown GRAVEL. Gravel is angular to subangular, fine to coarse of mudstone. (Residual MUDSTONE). (6.00) Dry 6.00 - 7.50 90 % Water	6.00 (0.45)	65.14		
PID	6.00	PID: 0ppmv			6.45	64.68		
	6.00 - 7.50	0.22		Very soft brown sandy slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone. (Residual MUDSTONE).	(0.45)			
		100 40 0 NI	7	Extremely weak partially weathered orangish brown fine to medium grained SANDSTONE. Fractures are extremely closely to very closely spaced subhorizontal planar, smooth, no infill or staining.	6.90 (0.50)	64.24		
	7.50 - 8.25			7.50 - 8.25 60 % Water	7.40	63.74		
		100 80 26 12		Strong partially weathered orange brown fine to medium grained SANDSTONE. Fractures are very closely to closely spaced, subhorizontal planar, smooth, no infill or staining.	(0.85)			
			8					
	8.25 - 8.85	NI A...		8.25 - 8.85 50 % Water	8.25	62.88		
		91 91 0 40		Very weak partially weathered thinly laminated grey MUDSTONE. Fracturees are extremely closely to very closely spaced, subhorizontal planar, smooth, no infill or staining.	(0.80)			
	8.85 - 10.30			8.85 - 10.35 50 % Water				
		NI	9		9.05	62.08		
		100 80 0 40		Weak partially weathered dark brown MUDSTONE. Strong Hydrocarbon odour noted.				
		TCR% SCR% RQD% FI	10					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
5.80	6.00	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	6.00
131	12.15

Hole Diameter

Diameter (mm)	Depth (m)
200	6.00
131	12.15

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH27

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.14 | Scale 1:50

Easting: 415357.78 | Northing: 417391.72

Client: Marshall Holdings Ltd | Driller: SR/CA | Logged By: AH | Sheet 2 of 2

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 27/10/2017 - 01/11/2017

SAMPLE DETAILS							(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI						
	10.30 - 11.35		100	100	0	40	10.35 - 11.35 30 % Water		(3.10)			
	11.35 - 12.15		100	100	0		11.35 - 12.15 20 % Water					
								End of Borehole at 12.15 m	12.15	58.98		

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
					5.80	6.00	01:00	200	6.00	200	6.00
								131	12.15	131	12.15

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

BOREHOLE RECORD

Borehole BH28

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 72.23 Scale 1:50

Easting: 415370.89 Northing: 417385.23

Client: Marshall Holdings Ltd

Driller: SR/CA Logged By: AH

Sheet 1 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling

Checked By: BL

Dates: 30/10/2017 - 01/11/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES PID ES PID B ES PID ES PID ES PID B D SPT (S) PID	0.00 0.00 0.25 0.25 0.50 0.50 0.50 0.75 0.75 1.00 1.00 1.20 - 1.70 1.20 1.20 - 1.65 1.20	PID: 1ppmv PID: 0ppmv PID: 0ppmv PID: 0ppmv PID: 1ppmv N=22 (3,4/4,5,6,7) PID: 0ppmv	1 (1.20) Dry	MADE GROUND: Dark brown sandy slightly gravelly clay. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of coal, limestone and brick. Organic matter noted.	(0.40) 0.40	71.83		
				Medium dense dark grey slightly gravelly SAND. Sand is fine to coarse. Gravel is subangular to angular, fine to coarse of mudstone and coal.	(1.60)			
D PID B D ES SPT (S) PID	1.85 1.85 2.00 - 2.50 2.00 2.00 2.00 - 2.45 2.00	PID: 0ppmv N=30 (5,6/6,7,8,9) PID: 0ppmv	2 (2.00) Dry	Dark grey MUDSTONE recovered as slightly clayey sandy gravel. Gravel is angular to subangular, fine to coarse of mudstone.	2.00	70.23		
D PID ES SPT (S) PID	2.75 2.75 3.00 3.00 - 3.45 3.00	PID: 0ppmv N=48 (5,9/10,11,12,15) PID: 0ppmv	3 (3.00) Dry		(1.55)			
	3.50 - 5.00	A	3.50 - 5.00 100 % Water	Very stiff dark grey very thinly laminated slightly sandy gravelly CLAY. Gravel is angular, fine to medium of mudstone. (Destructured MUDSTONE).	3.55	68.68		
		96	4					
				4.80-4.85m: Weak dark brown ironstone.				
	5.00 - 6.50	NA	5 5.00 - 8.00 80 % Water		(2.95)			
		100	6					
	6.50 - 8.00	AZCL		Very stiff very thinly laminated black gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of mudstone. (Destrucutred MUDSTONE)	6.50 (0.30) 6.80	65.73 65.43		
			7	*6.50m to 8.50m: Rapid advancement of core barrel noted.*				
		80		Black COAL. Recovered as sandy gravel.	(0.90)			
		NA		Very stiff dark grey slightly sandy gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone. (Destructured MUDSTONE).	7.70	64.53		
	8.00 - 9.00		8 8.00 - 9.00 60 % Water		(0.80)			
		100		Stiff orange brown slightly gravelly CLAY. Gravel is angular to subangular, fine to coarse of mudstone. (Destructured MUDSTONE).	8.50 (0.30) 8.80	63.73 63.43		
	9.00 - 10.00	AZCL	9 9.00 - 10.00 100 % Water	Stiff thinly laminated brown mottled grey slightly sandy gravelly CLAY. Gravel is angular, fine to coarse of mudstone. (Destructured MUDSTONE).	(0.50)			
		70 50 13 20		Very weak partially weathered orange brown fine to medium grained SANDSTONE. Fractures are very closely spaced subhorizontal, planar, smooth, no infill or staining.	9.30 (0.40) 9.70	62.93 62.53		
		NI		*9.50-10.00m: Subvertical fracture planar with orange staining.*	(0.30)			
	10.00 - 11.50	TCR% SCR% RQD% FI	10		10.00	62.23		

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)
200	2.00
150	3.00
131	9.00

Hole Diameter

Diameter (mm)	Depth (m)
200	2.00
150	3.00
131	25.00

General Remarks

1. Hand dug inspection pit to 1.20m.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole BH28

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 72.23 | Scale 1:50 | Easting: 415370.89 | Northing: 417385.23

Client: Marshall Holdings Ltd | Driller: SR/CA | Logged By: AH | Sheet 2 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 30/10/2017 - 01/11/2017

SAMPLE DETAILS Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
						12	10.00 - 13.00 85 % Water	Very strong partially weathered orange brown fine to medium grained SANDSTONE. Fractures are very closely spaced subhorizontal, planar, smooth, no infill or staining.	(0.70)			
			100	100	0	20		Weak unweathered orange brown fine to medium grained SANDSTONE. Fractures are very closely to closely spaced, subhorizontal planar, smooth, no infill or staining.	10.70	61.53		
						12	11	Very weak unweathered dark grey SILTSTONE. Discontinuities are very closely to closely spaced subhorizontal planar, smooth, no infill or staining.	(0.40) 11.10	61.13		
	11.50 - 12.90		93	93	0	40	12	Weak partially weathered dark grey MUDSTONE. Fractures are very closely to closely spaced subhorizontal planar, smooth, no infill or staining. *11.10-11.50m: Subvertical fracture undulating smooth orange staining*				
						A...						
	12.90 - 14.40		100	83	53	20	13	13.00 - 20.50 90 % Water	(3.80)			
						12						
							14	*14.20-14.45m: Subvertical fracture planar smooth, no infill or staining.*				
	14.40 - 16.90		100	100	80	4		*14.70-14.90m: Subvertical fracture planar smooth, no infill or staining.*				
							15	Weak partially weathered dark grey MUDSTONE. Fractures are closely spaced subhorizontal, planar, smooth, no infill or staining.	14.90	57.33		
									(1.40)			
						NI	16					
								Extremely weak partially weathered thinly laminated dark grey MUDSTONE. Fractures are extremely closely to very closely spaced subhorizontal planar, smooth, no infill or staining.	16.30	55.93		
	16.90 - 17.50		100	100	53	40	17					
	17.50 - 19.00											
			100	100	46	20	18					
						40		*18.70-19.00m: Subvertical fracture planar, smooth, no infill or staining.*				
	19.00 - 20.50		100	86	46	20	19					
						NI			(6.35)			
						12						
						NI						
							20					

Continued on next sheet

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
								200	2.00	200	2.00
								150	3.00	150	3.00
								131	9.00	131	25.00

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m.

BOREHOLE RECORD

Borehole BH28

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 72.23 | Scale 1:50

Easting: 415370.89 | Northing: 417385.23

Client: Marshall Holdings Ltd | Driller: SR/CA | Logged By: AH | Sheet 3 of 3

Method: Cable Percussive Drilling with Rotary Core Drilling | Checked By: BL | Dates: 30/10/2017 - 01/11/2017

SAMPLE DETAILS Type	Depth From-To (m)	N (cu)	TCR %	SCR %	RQD %	FI	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
						12		*20.10-20.15m: Subvertical fracture planar smooth, no infill or staining.*				
	20.50 - 22.00					10	20.50 - 22.00 90 % Water					
						NI						
			100	40	33	20	21					
						NI						
						5						
						NI						
	22.00 - 23.50					A...	22	22.00 - 23.50 80 % Water				
						NI						
			93	47	40			Weak partially weathered dark grey MUDSTONE. Fractures are very closely to closely spaced subhorizontal planar, smooth, no infill or staining.	22.65	49.58		
							23	*23.10-23.80m: Subvertical fracture planar, smooth, no infill or staining.*				
	23.50 - 25.00					8	23.50 - 25.00 80 % Water		(2.35)			
			100	100	26		24	*24.20-24.60m: Subvertical fracture planar undulating smooth, no infill or staining.*				
								24.90-25.00m: Subvertical fracture planar, smooth, no infill or staining.				
							25	End of Borehole at 25.00 m	25.00	47.23		
							26					
							27					
							28					
							29					
							30					

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
								200	2.00	200	2.00
								150	3.00	150	3.00
								131	9.00	131	25.00

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20m.

BOREHOLE RECORD

Borehole BH29

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 69.65 | Scale 1:50 | Easting: 415294.07 | Northing: 417480.51

Client: Marshall Holdings Ltd | Driller: TF | Logged By: AH | Sheet 1 of 2

Method: Cable Percussive Drilling | Checked By: BL | Dates: 27/10/2017 - 31/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark grey macadam.	(0.10)	69.55		
PID	0.00	PID: 0ppmv		MADE GROUND: Yellow brown slightly sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of limestone and sandstone.	0.10			
ES	0.25							
PID	0.25	PID: 0ppmv			(0.75)			
B	0.50 - 1.00							
D	0.50							
ES	0.50							
PID	0.50	PID: 0ppmv			0.85	68.80		
ES	0.75		1	MADE GROUND: Dark brown slightly sandy gravelly clay. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, concrete, clinker and brick.				
PID	0.75	PID: 0ppmv						
D	1.00		(1.20) Dry					
ES	1.00							
PID	1.00	PID: 0ppmv						
D	1.20							
SPT (C)	1.20 - 1.65	N=14 (3,6/3,4,4,3)						
B	1.50 - 2.00							
ES	1.50							
PID	1.50	PID: 0ppmv			(2.15)			
D	1.70		2 (2.00) Dry					
D	2.00							
SPT (C)	2.00 - 2.45	N=15 (5,4/3,2,4,6)						
B	2.50 - 3.00							
D	2.50							
ES	2.50							
PID	2.50	PID: 0ppmv						
D	3.00		3 (3.00) Dry		3.00	66.65		
SPT (C)	3.00 - 3.43	N=49 (16,9 for 55mm/10,12,14,13)		MADE GROUND: Dark grey sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone and sandstone.				
B	3.50 - 4.00							
D	3.50							
ES	3.50							
PID	3.50	PID: 0ppmv						
D	4.00		4 (4.00) Dry					
SPT (C)	4.00 - 4.45	N=43 (10,10/9,11,10,13)			(2.40)			
D	4.50							
ES	4.50							
PID	4.50	PID: 0ppmv						
D	5.00		5 (5.00) Dry					
SPT (C)	5.00 - 5.21	N=50+ (25 for 60mm/30,17,3 for 0mm)						
					5.40	64.25		
B	5.50 - 6.00			MADE GROUND: Dark grey slightly silty gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of clinker, coal, concrete and sandstone.	(0.10)	64.15		
D	5.50				5.50			
ES	5.50							
PID	5.50	PID: 0ppmv						
D	6.00		6 (6.00) Dry	MADE GROUND: Dark grey slightly silty gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of clinker, coal, concrete and sandstone.				
SPT (C)	6.00 - 6.45	N=32 (8,7/9,8,7,8)						
B	6.50 - 7.00							
D	6.50							
ES	6.50							
PID	6.50	PID: 0ppmv						
D	7.00		7 (7.00) Dry					
SPT (C)	7.00 - 7.45	N=25 (6,5/7,5,9,4)						
B	7.50 - 8.00							
D	7.50							
ES	7.50							
PID	7.50	PID: 0ppmv						
D	8.00		8 (8.00) Dry		(4.95)			
SPT (C)	8.00 - 8.45	N=19 (6,4/3,4,6,6)						
B	8.50 - 9.00							
ES	8.50							
D	9.00		9 (9.00) Dry					
SPT (C)	9.00 - 9.45	N=23 (7,5/3,6,7,7)						
B	9.50 - 10.00							
D	9.50							
ES	9.50							
D	10.00		10 (10.00) Dry					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)
5.00	5.30	01:00

Casing Depths

Diameter (mm)	Depth (m)
200	10.00

Hole Diameter

Diameter (mm)	Depth (m)
200	10.00

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL

BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH29

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 69.65 Scale 1:50

Easting: 415294.07 Northing: 417480.51

Client: Marshall Holdings Ltd | Driller: TF | Logged By: AH | Sheet 2 of 2

Method: Cable Percussive Drilling | Checked By: BL | Dates: 27/10/2017 - 31/10/2017

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing						
SPT (C)	10.00 - 10.45	N=31 (9,6/7,8,9,7)		MADE GROUND: Dark grey slightly silty gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of clinker, coal, concrete and sandstone.	10.45	59.20		
				End of Borehole at 10.45 m				

11 12 13 14 15 16 17 18 19 20

Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
					5.00	5.30	01:00	200	10.00	200	10.00

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

BOREHOLE RECORD

Borehole BH30

Contract No: D8279 | **Site:** HD1, Huddersfield | GL (m AOD) 65.84 | Scale 1:50 | Easting: 415335.62 | Northing: 417462.05

Client: Marshall Holdings Ltd | Driller: TF | Logged By: AH | Sheet 1 of 2

Method: Cable Percussive Drilling | Checked By: BL | Dates: 26/10/2017 - 27/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.10			MADE GROUND: Block Paving.	(0.10)	65.74		
PID	0.10	PID: 0ppmv			0.10			
ES	0.25			MADE GROUND: Orange brown gravelly sand. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone.	(0.15)	65.59		
PID	0.25	PID: 0ppmv			0.25			
B	0.50 - 1.00							
D	0.50			MADE GROUND: Orange brown slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular, fine to coarse of sandstone.	(0.95)			
ES	0.50							
PID	0.50	PID: 0ppmv						
ES	0.75							
PID	0.75	PID: 0ppmv	1					
D	1.00		(1.20) Dry					
ES	1.00			MADE GROUND: Black clayey sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick, sandstone and concrete.	1.20	64.64		
PID	1.00	PID: 0ppmv						
D	1.20							
SPT (S)	1.20 - 1.58	N=6 (1/2,1,1,2)						
B	1.50 - 2.00							
ES	1.50							
PID	1.50	PID: 0ppmv						
D	1.70		2 (2.00) Dry					
D	2.00							
SPT (S)	2.00 - 2.38							
B	2.50 - 3.00							
ES	2.50							
PID	2.50	PID: 0ppmv						
D	3.00		3 (3.00) Dry					
SPT (S)	3.00 - 3.45	N=6 (1,3/1,2,2,1)						
B	3.50 - 4.00							
D	3.50							
ES	3.50							
PID	3.50	PID: 0ppmv						
D	4.00		4 (4.00) Dry					
SPT (S)	4.00 - 4.45	N=8 (3,2/3,1,1,3)			(5.80)			
B	4.50 - 5.00							
D	4.50							
ES	4.50							
PID	4.50	PID: 0ppmv						
D	5.00		5 (5.00) Dry					
ES	5.00							
SPT (S)	5.00 - 5.45	N=10 (2,1/3,1,3,3)						
B	5.50 - 6.00							
D	5.50							
PID	5.50	PID: 0ppmv						
D	6.00		6 (6.00) Dry					
SPT (S)	6.00 - 6.45	N=7 (1,2/3,2,1,1)						
B	6.50 - 7.00							
D	6.50							
ES	6.50							
PID	6.50	PID: 0ppmv						
D	7.00		7 (7.00) Dry		7.00	58.84		
SPT (S)	7.00 - 7.45	N=12 (3,2/4,2,3,3)		MADE GROUND: Firm dark grey gravelly sandy CLAY. Gravel is angular to subangular, fine to coarse of mudstone and sandstone.				
B	7.50 - 8.00							
D	7.50							
ES	7.50							
PID	7.50	PID: 0ppmv						
D	8.00		8 (8.00) Dry					
SPT (S)	8.00 - 8.45	N=12 (3,4/3,3,2,4)						
B	8.50 - 9.00							
D	8.50							
ES	8.50							
PID	8.50	PID: 0ppmv			(3.45)			
D	9.00		9 (9.00) Dry					
SPT (S)	9.00 - 9.45	N=13 (5,2/2,5,3,3)						
B	9.50 - 10.00							
D	9.50							
ES	9.50							
PID	9.50	PID: 0ppmv						
~~D~~	~~10.00~~		~~10 (10.00) Dry~~					

Continued on next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
7.50	7.50	7.40	20	7.60

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)
200	10.00

Hole Diameter

Diameter (mm)	Depth (m)
200	10.45

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BH30

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 65.84 — Scale 1:50

Easting: 415335.62 — Northing: 417462.05

Client: Marshall Holdings Ltd — Driller: TF — Logged By: AH — Sheet 2 of 2

Method: Cable Percussive Drilling — Checked By: BL — Dates: 26/10/2017 - 27/10/2017

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	Depth From-To (m)	Insitu Testing						
SPT (C)	10.00 - 10.45	N=23 (6,5/7,6,6,4)		MADE GROUND: Firm dark grey gravelly sandy CLAY. Gravel is angular to subangular, fine to coarse of mudstone and sandstone.				
				End of Borehole at 10.45 m	10.45	55.39		

11 12 13 14 15 16 17 18 19 20

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)
7.50	7.50	7.40	20	7.60

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)
200	10.00

Hole Diameter

Diameter (mm)	Depth (m)
200	10.45

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

BOREHOLE RECORD

Borehole BH31

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 69.40 | Scale 1:50

Easting: 415257.40 | Northing: 417278.86

Client: Marshall Holdings Ltd | Driller: SR | Logged By: AH | Sheet 1 of 1

Method: Cable Percussive Drilling | Checked By: BL | Dates: 02/11/2017 - 04/11/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.00			MADE GROUND: Dark brown sandy gravelly clayey topsoil. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, concrete.	(0.20)			
PID	0.00	PID: 0ppmv			0.20	69.20		
ES	0.25			MADE GROUND: Orangish brown sandy gravel. Gravel is angular to subangular, fine to coarse of sandstone. Cobbles of sandstone noted.	(0.50)			
PID	0.25	PID: 0ppmv			0.70	68.70		
ES	0.50			MADE GROUND: Black silty gravelly sand with bands of soft black gravelly sandy clay. Gravel is angular to subangular, fine to coarse of brick, concrete, coal, mudstone and sandstone. Metal and plastic fragments noted.				
PID	0.50	PID: 0ppmv						
ES	0.75							
PID	0.75	PID: 0ppmv	1					
B	0.80							
ES	1.00							
PID	1.00	PID: 0ppmv		(1.20) Dry				
B	1.20 - 1.70							
D	1.20							
SPT (S)	1.20 - 1.65	N=10 (2,2/3,2,3,2)						
D	1.85				(2.30)			
B	2.00 - 2.50		2	(2.00) Dry				
D	2.00							
ES	2.00							
SPT (S)	2.00 - 2.45	N=11 (2,2/3,3,2,3)						
PID	2.00	PID: 0ppmv						
D	2.75							
B	3.00 - 3.50		3	(3.00) Dry	3.00	66.40		
ES	3.00			MADE GROUND: Black silty gravelly sand. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone, coal, sandstone, brick and clinker. Occasional metal, timber and wood noted.				
SPT (S)	3.00 - 3.45	N=20 (4,5/5,4,5,6)						
PID	3.00	PID: 3ppmv						
D	3.75				(1.45)			
D	4.00		4	(4.00) Dry				
ES	4.00							
SPT (S)	4.00 - 4.45	N=22 (4,5/5,6,6,5)						
PID	4.00	PID: 3ppmv						
				End of Borehole at 4.45 m	4.45	64.95		
			5					
			6					
			7					
			8					
			9					
			10					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)
200	4.00

Hole Diameter

Diameter (mm)	Depth (m)
200	4.45

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. HDP01

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 93.85 Scale 1:25

Easting: 415430.56 Northing: 417362.33

Client: Marshall Holdings Ltd

Logged By: AH

Sheet 1 of 1

Method: Hand Excavated Trial Pit

Checked By: BL

Dates: 10/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
D ES	0.10 0.10			MADE GROUND: Dark brown silty slightly gravelly topsoil. Gravel is angular to subangular, fine to coarse of sandstone.	(0.20) 0.20	93.65		
B D ES PID	0.50 - 1.00 0.50 0.50 0.50	PID: 0ppmv		Light brown silty very gravelly SAND. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of sandstone.	(1.00)			
ES PID	1.00 1.00	PID: 2ppmv	1					
				End of Trial Pit at 1.20 m	1.20	92.65		
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.50m x 0.50m Stability: Unstable from ground level Weather: Dry Remarks: Hand Excavated Trial Pit	A B C D 360°

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. HDP02

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 83.39 Scale 1:25

Easting: 415408.04 Northing: 417384.38

Client: Marshall Holdings Ltd

Logged By: AH

Sheet 1 of 1

Method: Hand Excavated Trial Pit

Checked By: BL

Dates: 10/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
D ES PID	0.10 0.10 0.10	PID: 0ppmv		Dark brown silty slightly gravelly sandy TOPSOIL. Gravel is angular to subangular, fine to coarse of sandstone.	(0.25)			
				Orangish brown silty slightly gravelly fine to coarse SAND. Gravel is angular to subangular, fine to coarse of sandstone.	0.25	83.14		
B D ES PID	0.50 - 1.00 0.50 0.50 0.50	PID: 0ppmv			(0.95)			
ES PID	1.00 1.00	PID: 0ppmv	1					
				End of Trial Pit at 1.20 m	1.20	82.19		
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.50m x 0.50m Stability: Unstable from ground level Weather: Dry Remarks: Hand Excavated Trial Pit	A B C D 360°

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. HDP03

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 74.30 Scale 1:25

Easting: 415400.93 Northing: 417418.76

Client: Marshall Holdings Ltd

Logged By: AH

Sheet 1 of 1

Method: Hand Excavated Trial Pit

Checked By: BL

Dates: 10/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
D ES PID	0.10 0.10 0.10	PID: 0ppmv		MADE GROUND: Dark brown silty sandy gravel. Gravel is angular to subangular, fine to coarse of sandstone.	(0.30)			
				Orangish brown silty gravelly SAND. Gravel is angular to subangular, fine to coarse of sandstone. (possible weathered rockhead).	0.30	74.00		
B D ES PID	0.50 0.50 0.50 0.50	PID: 0ppmv			(0.90)			
ES PID	1.00 1.00	PID: 0ppmv	1					
				End of Trial Pit at 1.20 m	1.20	73.10		
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.50m x 0.50m Stability: Unstable from ground level Weather: Dry Remarks: Hand Excavated Trial Pit	A B C D 360°

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. HDP04

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 74.25 | Scale 1:25

Easting: 415385.62 | Northing: 417399.96

Client: Marshall Holdings Ltd

Logged By: AH

Sheet 1 of 1

Method: Hand Excavated Trial Pit

Checked By: BL

Dates: 10/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
D ES	0.10 0.10			MADE GROUND: Dark brown gravelly clayey topsoil. Gravel is angular to subangular, fine to coarse of brick, coal and sandstone. Frequent rootlets noted.	(0.25)			
D ES	0.30 0.30			MADE GROUND: Dark grey slightly gravelly silty sand. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of coal and ash.	0.25 (0.15)	74.00		
B D ES PID	0.50 0.50 0.50 0.50	PID: 1ppmv		Orangish brown silty slightly gravelly SAND. Sand is fine to coarse. Gravel is angular to subangular. (Slight odour noted).	0.40 (0.80)	73.85		
ES PID	1.00 1.00	PID: 8ppmv	1					
				End of Trial Pit at 1.20 m	1.20	73.05		
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.50m x 0.50m Stability: Unstable from ground level Weather: Dry Remarks: Hand Excavated Trial Pit	D A C B 360°

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. HDP05

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.01 | Scale 1:25

Easting: 415285.37 | Northing: 417204.77

Client: Marshall Holdings Ltd

Logged By: AH

Sheet 1 of 1

Method: Hand Excavated Trial Pit

Checked By: BL

Dates: 20/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
ES PID	0.00 0.00	PID: 0ppmv		MADE GROUND: Dark grey sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of limestone.	(0.30)			
ES PID	0.25 0.25	PID: 0ppmv		MADE GROUND: Black silty very gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of brick, clinker, concrete and coal.	0.30	70.71		
B D ES PID	0.50 0.50 0.50 0.50	PID: 0ppmv			(0.60)			
ES PID	0.75 0.75	PID: 0ppmv		MADE GROUND: Yellow slightly sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of limestone.	0.90	70.11		
			1		(1.10)			
			2	End of Trial Pit at 2.00 m	2.00	69.01		
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered. 2. Depth achieved by benching out excavation.	Depth Strike	Remarks	Dimensions: 1.00m x 0.50m Stability: Stable Weather: Dry Remarks: Hand Excavated Trial Pit	D A C B 360°

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. HDP06

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.96 Scale 1:25

Easting: 415285.54 Northing: 417172.43

Client: Marshall Holdings Ltd

Logged By: AH

Sheet 1 of 1

Method: Hand Excavated Trial Pit

Checked By: BL

Dates: 20/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
				MADE GROUND: Dark grey sandy gravel. Sand is fine to coarse. Gravel is angular, fine to coarse of limestone.	(0.30)			
				MADE GROUND: Firm dark brown sandy gravelly clay. Gravel is angular to subangular, fine to coarse of mudstone, coal and brick.	0.30	70.66		
					(0.50)			
				MADE GROUND: Firm dark brown grey slightly sandy gravelly clay with low cobble content. Gravel is angular to subangular, fine to coarse of brick and concrete. Cobbles are subangular of brick and concrete.	0.80	70.16		
			1					
					(1.20)			
			2	End of Trial Pit at 2.00 m	2.00	68.96		
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered. 2. Depth achieved by benching out excavation.	Depth Strike	Remarks	Dimensions: 0.50m x 1.50m Stability: Stable Weather: Dry Remarks: Hand Excavated Trial Pit	A B C D 360°

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. HDP07

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.06 | Scale 1:25

Easting: 415285.08 | Northing: 417192.03

Client: Marshall Holdings Ltd | **Logged By:** AH | Sheet 1 of 1

Method: Hand Excavated Trial Pit | **Checked By:** BL | Dates: 20/10/2017

SAMPLE DETAILS Type	SAMPLE DETAILS Depth From-To (m)	SAMPLE DETAILS Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
				MADE GROUND: Dark grey sandy gravel. Sand is fine to coarse. Gravel is angular, fine to coarse of limestone.	(0.30)			
				MADE GROUND: Dark grey clayey gravel. Gravel is angular, fine to coarse of limestone.	0.30	70.76		
				MADE GROUND: Black silty gravelly sand with low cobble content. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of ash, brick, metal and concrete. Cobbles are subangular of concrete. Rare metal fragments noted.	(0.20)			
					0.50	70.56		
			1		(1.50)			
			2	End of Trial Pit at 2.00 m	2.00	69.06		
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered. 2. Depth achieved by benching out excavation.	Depth Strike	Remarks	Dimensions: 0.50m x 1.50m Stability: Unstable Weather: Dry Remarks: Hand Excavated Trial Pit	A B C D 360°

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. ST01

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 76.20 Scale 1:25

Easting: 415364.90 Northing: 417343.66

Client: Marshall Holdings Ltd

Logged By: EH

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 18/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
				MADE GROUND: Dark grey brown, slightly clayey TOPSOIL. Occasional rootlets noted.	(0.20) 0.20	76.00		
ES PID	0.25 0.25	PID: 0ppmv		MADE GROUND: Brown sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of limestone, brick and concrete.				
ES PID	0.50 0.50	PID: 0ppmv			(0.50) 0.70	75.50		
ES	0.75			Dark brown clayey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of mudstone. (Possible rockhead).				
B D ES PID	1.00 1.00 1.00 1.00	PID: 0ppmv	1		(0.50) 1.20	75.00		
				End of Trial Pit at 1.20 m				
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 2.50m x 0.70m	
			Stability: Stable	
			Weather: Dry	D A B C 104°
			Remarks: Machine Excavated Trial Pit	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. ST02

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 76.20 Scale 1:25

Easting: 415353.69 Northing: 417343.66

Client: Marshall Holdings Ltd

Logged By: EH

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 18/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
				MADE GROUND: Grey brown slightly clayey topsoil with occasional rootlets.	(0.25)			
D	0.25			MADE GROUND: Dark grey sandy gravel. Sand is fine to coarse. Gravel is angular to subangular of mudstone.	0.25	75.95		
ES	0.25				(0.10)			
PID	0.25	PID: 0ppmv		Dark grey slightly sandy clayey GRAVEL. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone. (Possible rockhead).	0.35	75.85		
D	0.50							
ES	0.50							
PID	0.50	PID: 0ppmv						
D	0.75				(0.85)			
ES	0.75							
PID	0.75	PID: 0ppmv						
B	1.00		1					
D	1.00							
ES	1.00							
PID	1.00	PID: 0ppmv						
				End of Trial Pit at 1.20 m	1.20	75.00		
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 2.50m x 0.70m	
			Stability: Stable	D A B C 102°
			Weather: Dry	
			Remarks: Machine Excavated Trial Pit	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. ST03

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 77.58 Scale 1:25

Easting: 415376.72 Northing: 417364.36

Client: Marshall Holdings Ltd

Logged By: EH

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 18/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
				MADE GROUND: Dark grey clayey topsoil. Occasional rootlets noted.	(0.30)			
ES PID	0.25 0.25	PID: 0ppmv		MADE GROUND: Dark brown to brownish black clayey sandy gravel. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone.	0.30	77.28		
D ES PID	0.50 0.50 0.50	PID: 0ppmv			(0.60)			
D ES PID	0.75 0.75 0.75	PID: 0ppmv			0.90	76.68		
B D ES PID	1.00 1.00 1.00 1.00	PID: 0ppmv	1	Dark grey clayey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone. (Possible rockhead).	(0.10) 1.00	76.58		
			2	End of Trial Pit at 1.00 m				
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 3.50m x 0.70m	
			Stability: Stable	D A B C 104°
			Weather: Dry	
			Remarks: Machine Excavated Trial Pit	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. ST04

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 74.11 Scale 1:25

Easting: 415369.11 Northing: 417367.15

Client: Marshall Holdings Ltd

Logged By: EH

Sheet 1 of 1

Method: ExMachine cavated Trial Pit

Checked By: BL

Dates: 18/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
				MADE GROUND: Dark grey clayey topsoil. Occasional rootlets noted.	(0.30)			
D	0.25							
ES	0.25				0.30	73.81		
PID	0.25	PID: 0ppmv		MADE GROUND: Dark grey slightly clayey slightly sandy gravel. Gravel is angular to subangular, fine to coarse of mudstone.	(0.10)			
					0.40	73.71		
B	0.50			Brown clayey slightly sandy GRAVEL. Gravel is angular to subangular, fine to coarse of mudstone.	(0.10)			
D	0.50				0.50	73.61		
ES	0.50			End of Trial Pit at 0.50 m				
PID	0.50	PID: 0ppmv						

1 2 3 4 5

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 2.60m x 0.70m	D A B C 104°
			Stability: Stable	
			Weather: Dry	
			Remarks: ExMachine cavated Trial Pit	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. ST05

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 76.68 Scale 1:25

Easting: 415378.47 Northing: 417373.47

Client: Marshall Holdings Ltd

Logged By: EH

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 18/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
				MADE GROUND: Dark grey brown clayey topsoil. Occasional rootlets noted.	(0.35)			
D	0.25							
ES	0.25							
PID	0.25	PID: 0ppmv		MADE GROUND: Dark brown clayey sandy gravel. Gravel is angular to subangular, fine to coarse of mudstone.	0.35	76.33		
ES	0.50				(0.30)			
PID	0.50	PID: 1ppmv						
B	0.70			Dark brown clayey slightly sandy GRAVEL. Gravel is angular to subangular, fine to coarse of mudstone. (Possible rockhead).	0.65	76.03		
D	0.70				(0.05)	75.98		
ES	0.70				0.70			
PID	0.75	PID: 1ppmv		End of Trial Pit at 0.70 m				
			1					
			2					
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 3.00m x 0.70m	
			Stability: Stable	D A C B 102°
			Weather: Dry	
			Remarks: Machine Excavated Trial Pit	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. ST06

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.48 Scale 1:25

Easting: 415338.22 Northing: 417351.83

Client: Marshall Holdings Ltd

Logged By: AH

Sheet 1 of 2

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 19/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
				MADE GROUND: Brown clayey sandy gravelly topsoil. Gravel is angular to subangular, fine to coarse with sandstone, limestone, mudstone, coal and brick.	(0.30)			
D	0.25							
ES	0.25				0.30	71.18		
PID	0.25	PID: 0ppmv		MADE GROUND: Dark grey slightly sandy gravel with medium cobble content. Sand is fine to coarse. Gravel is angular to subangular of concrete, brick and sandstone. Cobbles are angular to subangular of concrete.				
D	0.50							
ES	0.50							
PID	0.50	PID: 0ppmv						
D	0.75							
ES	0.75				(1.00)			
PID	0.75	PID: 0ppmv						
B	1.00		1					
D	1.00							
ES	1.00							
PID	1.00	PID: 0ppmv						
				MADE GROUND: Dark grey slightly sandy gravel with medium cobble content. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick, concrete, sandstone and mudstone. Cobbles are angular of sandstone.	1.30	70.18		
					(0.40)			
				MADE GROUND: Dark grey cobbles/boulders with much sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick, concrete and mudstone. Cobbles/boulders are angular of concrete.	1.70	69.78		
B	2.00		2		(0.60)			
D	2.00							
ES	2.00							
PID	2.00	PID: 0ppmv						
B	2.30				2.30	69.18		
D	2.30			MADE GROUND: Dark brown slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of brick, concrete, sandstone and mudstone. Occasional wood fragments noted.				
ES	2.30				(0.30)			
PID	2.30	PID: 0ppmv						
B	2.60				2.60	68.88		
D	2.60			MADE GROUND: Dark grey slightly sandy gravel with medium cobble content. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of macadam and brick. Cobbles are angular of brick and concrete.				
PID	2.60	PID: 2ppmv			(0.30)			
					2.90	68.58		
B	3.00		3	MADE GROUND: Dark grey slightly sandy gravel. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of sandstone, brick, concrete, bitumen and clinker. Hydrocarbon odour noted.				
D	3.00							
ES	3.00							
PID	3.00	PID: 0ppmv						
					(1.10)			
B	4.00		4		4.00	67.48		
D	4.00			MADE GROUND: Orangish grey slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of sandstone, brick, bitumen and concrete.				
ES	4.00							
PID	4.00	PID: 0ppmv						
					(1.00)			
B	5.00		5		5.00	66.48		
D	5.00			MADE GROUND: Light brown slightly sandy gravelly clay with medium				
ES	5.00							

Continued on next sheet

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.75m x 0.70m	
			Stability: Stable	D A C B 184False 360°
			Weather: Wet	
			Remarks: Machine Excavated Trial Pit	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. ST06

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.48 Scale 1:25

Easting: 415338.22 Northing: 417351.83

Client: Marshall Holdings Ltd

Logged By: AH

Sheet 2 of 2

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 19/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
PID	5.00	PID: 0ppmv		cobble/boulder content. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of concrete, brick, coal and mudstone. Cobbles/boulders are angular of concrete.	(0.50)			
				End of Trial Pit at 5.50 m	5.50	65.98		

6 7 8 9 10

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 0.75m x 0.70m	
			Stability: Stable	D A B C 184False 360°
			Weather: Wet	
			Remarks: Machine Excavated Trial Pit	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. ST06A

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 73.74 | Scale 1:25

Easting: 415373.06 | Northing: 417376.71

Client: Marshall Holdings Ltd

Logged By: AH

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 23/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
D PID	0.00 0.00	PID: 0ppmv		MADE GROUND: Dark brown slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of mudstone.	(0.30)			
B D ES PID D ES PID	0.30 0.30 0.30 0.30 0.50 0.50 0.50	PID: 0ppmv PID: 0ppmv		Dark brown clayey angular to subangular, fine to coarse GRAVEL. Gravel is angular to subangular, fine to coarse of mudstone. (Possible weathered rockhead).	0.30 (0.20) 0.50	73.44 73.24		
ES PID	1.00 1.00	PID: 0ppmv	1	Dark grey slightly clayey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone. (Possible weathered rockhead).	(1.50)			
B D	1.50 1.50							
			2	End of Trial Pit at 2.00 m	2.00	71.74		
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 2.50m x 0.60m	D A C B 184°
			Stability: Unstable	
			Weather: Wet	
			Remarks: Machine Excavated Trial Pit	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. ST07

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 74.08 Scale 1:25

Easting: 415375.06 Northing: 417379.39

Client: Marshall Holdings Ltd

Logged By: AH

Sheet 1 of 1

Method: Machine Excavated Trial Pi

Checked By: BL

Dates: 20/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
D PID	0.00 0.00	PID: 1ppmv		MADE GROUND: Dark brown slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of mudstone.	(0.25)			
B D ES PID ES PID	0.30 0.30 0.30 0.30 0.50 0.50	PID: 1ppmv PID: 1ppmv		Dark grey slightly sandy clayey GRAVEL. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone. (Possible weathered rockhead).	0.25	73.83		
ES PID	0.75 0.75	PID: 1ppmv						
B D ES PID	1.00 1.00 1.00 1.00	PID: 1ppmv	1		(1.75)			
B D	2.00 2.00		2	End of Trial Pit at 2.00 m	2.00	72.08		
			3					
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 2.50m x 0.60m	D A B C 190°
			Stability: Unstable	
			Weather: Wet	
			Remarks: Machine Excavated Trial Pi	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. TT01

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.74 Scale 1:25

Easting: 415349.12 Northing: 417331.33

Client: Marshall Holdings Ltd

Logged By: EH

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 20/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
				MADE GROUND: Brown slightly sandy gravelly topsoil. Gravel is angular to subangular, fine to coarse of sandstone and limestone. Rootlets noted.				
D	0.25				(0.50)			
ES	0.25							
PID	0.25	PID: 0ppmv						
D	0.50			MADE GROUND: Dark grey slightly sandy gravel with medium cobble content. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of brick, concrete, mudstone and slag.	0.50	71.24		
ES	0.50							
PID	0.50	PID: 0ppmv						
D	0.75							
ES	0.75							
PID	0.75	PID: 0ppmv						
ES	1.00		1					
PID	1.00	PID: 0ppmv						
D	1.20							
					(1.60)			
B	2.00		2					
D	2.00							
ES	2.00							
PID	2.00	PID: 0ppmv		MADE GROUND: Dark grey slightly sandy gravelly clay with medium cobble content. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of sandstone, brick, mudstone, coal and concrete. Pottery fragments noted.	2.10	69.64		
B	2.10							
D	2.10							
					(0.90)			
B	3.00		3	MADE GROUND: Firm light brown slightly sandy gravelly clay Gravel is angular to subangular, fine to coarse of mudstone.	3.00	68.74		
D	3.00							
ES	3.00							
					(0.40)			
B	3.40			MADE GROUND: Brown grey, slightly sandy gravelly clay. Gravel is angular to sub-angular fine to coarse of sandstone mudstone and coal. *Greenish grey from 3.40mbgl.*	3.40	68.33		
D	3.40							
B	3.60							
D	3.60							
PID	3.60	PID: 1ppmv						
B	4.00		4					
D	4.00							
ES	4.00							
PID	4.00	PID: 0ppmv			(1.60)			
PID	4.90	PID: 5ppmv						
B	5.00		5	End of Trial Pit at 5.00 m	5.00	66.74		
D	5.00							
ES	5.00							

Remarks

1. No groundwater encountered.

Ground Water (m)

Depth Strike	Remarks

Excavation Details

Dimensions: 5.50m x 0.70m

Stability: Stable

Weather: Dry

Remarks: Machine Excavated Trial Pit

Orientation

D A B C 160°

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TRIAL PIT RECORD

TP No. TT01A

Contract No.: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.73 | Scale 1:25

Easting: 415359.36 | Northing: 417375.22

Client: Marshall Holdings Ltd

Logged By: EH

Sheet 1 of 1

Method: Machine Excavated Trial Pit

Checked By: BL

Dates: 20/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
				MADE GROUND: Brown slightly sandy gravelly topsoil. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of limestone. Rootlets noted.	(0.35)			
D	0.25							
ES	0.25				0.35	71.38		
				MADE GROUND: Dark grey slightly clayey sandy gravel with medium cobble content. Gravel is angular to subangular of brick, sandstone, concrete and mudstone. Cobbles are angular of brick and concrete.				
D	0.50							
ES	0.50							
PID	0.50	PID: 1ppmv						
D	0.75				(0.85)			
ES	0.75							
PID	0.75	PID: 2ppmv						
B	1.00		1					
D	1.00							
ES	1.00							
PID	1.00	PID: 10ppmv						
B	1.20				1.20	70.53		
D	1.20			MADE GROUND: Light brown slightly sandy gravelly clay. Sand is fine to coarse with some ash. Gravel is angular to subangular, fine to coarse of sandstone, brick clinker and coal.				
ES	1.20							
PID	1.20	PID: 19ppmv						
					(1.00)			
B	2.00		2					
D	2.00							
ES	2.00							
PID	2.00	PID: 1ppmv						
B	2.20				2.20	69.53		
D	2.20			MADE GROUND: Brown slightly sandy gravel. Sand is fine to coarse with much ash. Gravel is angular to subrounded, fine to coarse of sandstone, coal and clinker.				
PID	2.20	PID: 0ppmv						
					(1.00)			
B	3.00		3					
D	3.00							
ES	3.00							
PID	3.00	PID: 1ppmv						
B	3.20				3.20	68.53		
D	3.20			MADE GROUND: Brown grey slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of mudstone, coal and clinker.				
ES	3.20							
PID	3.30	PID: 0ppmv						
					(0.60)			
B	3.80			End of Trial Pit at 3.80 m	3.80	67.93		
D	3.80							
ES	3.80							
			4					
			5					

Remarks	Ground Water (m)		Excavation Details	Orientation
1. No groundwater encountered.	Depth Strike	Remarks	Dimensions: 3.80m x 0.70m	
			Stability: Stable	D A B C 158°
			Weather: Dry	
			Remarks: Machine Excavated Trial Pit	

BOREHOLE RECORD

Borehole WS01

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 72.00 | Scale 1:50

Easting: 415256.39 | Northing: 417343.43

Client: Marshall Holdings Ltd | Driller: MD | Logged By: AH | Sheet 1 of 1

Method: Mini Percussive Drilling Rig | Checked By: BL | Dates: 24/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.10			MADE GROUND: Black macadam.	(0.10)	71.90		
PID	0.10	PID: 2ppmv		MADE GROUND: Dark brown slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of mudstone.	0.10 (0.40)			
D	0.20							
ES	0.25				0.50	71.50		
PID	0.25	PID: 1ppmv		MADE GROUND: Dark brown slightly sandy gravelly clay. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, brick and clinker.				
ES	0.50							
PID	0.50	PID: 2ppmv						
ES	0.75							
PID	0.75	PID: 2ppmv						
D	0.80		1					
ES	1.00							
PID	1.00	PID: 1ppmv	Dry					
B	1.20 - 2.00							
D	1.20				(1.85)			
SPT (S)	1.20 - 1.65	N=9 (2,2/3,2,2,2)						
D	1.70							
ES	2.00		2					
SPT (C)	2.00 - 2.35	N=50+ (3,2/4,23,23 for 52mm)	Dry					
PID	2.00	PID: 1ppmv						
				End of Borehole at 2.35 m	2.35	69.65		
			3					
			4					
			5					
			6					
			7					
			8					
			9					
			10					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)

Hole Diameter

Diameter (mm)	Depth (m)
87	2.35

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.
3. Unable to advance borehole past 2.35m due to hard stratum.

Email received 27 FEBRUARY 2018 Marshall (MGWY) Ltd

Log last updated 26/01/2018

BOREHOLE RECORD

Borehole WS02

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 71.24 | Scale 1:50

Easting: 415225.63 | Northing: 417423.12

Client: Marshall Holdings Ltd | Driller: MD | Logged By: AH | Sheet 1 of 1

Method: Mini Percussive Drilling Rig | Checked By: BL | Dates: 24/10/2017

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
Type	**Depth From-To (m)**	**Insitu Testing**						
				MADE GROUND: Black macadam.	(0.10)	71.14		
B	0.20 - 1.00			MADE GROUND: Orangish brown slightly clayey sandy gravel. Gravel is angular to subangular, fine to coarse of sandstone.	0.10			
ES	0.20				(0.70)			
ES	0.25							
PID	0.25	PID: 2ppmv			0.80	70.44		
ES	0.50			MADE GROUND: Dark brown slightly sandy slightly gravelly clay. Sand is fine to coarse with some ash. Gravel is angular to subangular, fine to coarse of sandstone, mudstone and clinker.				
PID	0.50	PID: 2ppmv						
ES	0.75							
PID	0.75	PID: 1ppmv	1					
D	0.80							
ES	1.00		Dry		(1.20)			
PID	1.00	PID: 2ppmv						
B	1.20 - 1.70							
D	1.20							
SPT (S)	1.20 - 1.65	N=8 (2,2/2,2,2,2)						
D	1.70							
ES	1.80							
PID	1.80	PID: 1ppmv						
D	2.00		2		2.00	69.24		
SPT (S)	2.00 - 2.45	N=17 (2,3/2,3,3,9)	Dry	MADE GROUND: Dark grey sandy gravel. Gravel is angular to subangular, fine to coarse of sandstone.				
SPT (C)	2.50 - 2.87	N=50+ (14,11/15,15,20 for 69mm)	Dry		(0.87)			
				End of Borehole at 2.87 m	2.87	68.37		
			3					
			4					
			5					
			6					
			7					
			8					
			9					
			10					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)

Hole Diameter

Diameter (mm)	Depth (m)
87	2.00
77	2.87

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

BOREHOLE RECORD

Borehole WS03

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.45 Scale 1:50

Easting: 415286.40 Northing: 417438.36

Client: Marshall Holdings Ltd

Driller: MD Logged By: AH

Sheet 1 of 1

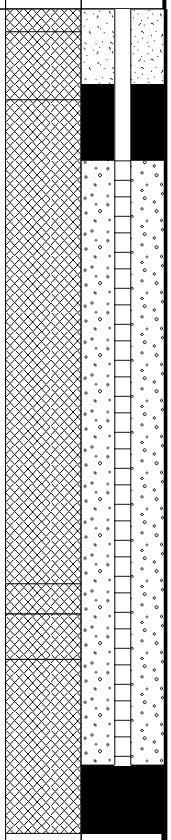
Method: Mini Percussive Drilling Rig

Checked By: BL

Dates: 24/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)
ES	0.10			MADE GROUND: Black macadam.	(0.15)	
PID	0.10	PID: 1ppmv		MADE GROUND: Orangish brown sandy gravel. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse of sandstone.	0.15	70.30
B	0.20 - 1.00				(0.45)	
ES	0.25			MADE GROUND: Dark brown slightly sandy gravelly clay. Sand is fine to coarse with some ash. Gravel is angular to subangular, fine to coarse of mudstone, sandstone, clinker, concrete, and coal.	0.60	69.85
PID	0.25	PID: 1ppmv				
ES	0.50					
PID	0.50	PID: 3ppmv				
D	0.75					
ES	0.75					
PID	0.75	PID: 3ppmv	1			
ES	1.00					
PID	1.00	PID: 3ppmv	Dry			
B	1.20 - 1.60					
D	1.20					
SPT (S)	1.20 - 1.65	N=9 (3,2/2,2,3,2)				
D	1.60					
ES	1.80					
PID	1.80	PID: 0ppmv				
B	2.00 - 2.60		2 Dry			
D	2.00					
SPT (S)	2.00 - 2.38	N=7 (2,2/1,2,2,2)			(3.20)	
D	2.70					
ES	2.80					
PID	2.80	PID: 1ppmv				
B	3.00 - 3.50		3 Dry			
D	3.00					
SPT (S)	3.00 - 3.45	N=7 (2,2/2,1,2,2)				
D	3.50					
ES	3.60					
PID	3.60	PID: 0ppmv				
D	3.80			MADE GROUND: Dark brown sandy clay. Sand is fine to coarse.	3.80 (0.20)	66.65
B	4.00 - 4.30		4 Dry		4.00	66.45
D	4.00			MADE GROUND: Brown slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of brick, sandstone and coal.	(0.30)	
SPT (S)	4.00 - 4.45	N=8 (2,1/2,2,2,2)			4.30	66.15
B	4.30 - 4.80			MADE GROUND: Black silty gravelly sand. Sand is fine to coarse with much ash. Gravel is angular to subangular, fine to coarse of clinker and brick.	(1.15)	
D	4.78					
PID	4.80	PID: 1ppmv				
D	5.00		5 Dry			
SPT (S)	5.00 - 5.45	N=12 (1,2/3,3,3,3)				
				End of Borehole at 5.45 m	5.45	65.00
			6			
			7			
			8			
			9			
			10			

Legend / Well/Backfill



Ground Water (m)					Chiselling / Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
										87	2.00
										77	4.00
										67	5.45

Log last updated 26/01/2018

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

BOREHOLE RECORD

Borehole WS04

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 70.11 | Scale 1:50

Easting: 415337.28 | Northing: 417435.18

Client: Marshall Holdings Ltd | Driller: MD | Logged By: AH | Sheet 1 of 1

Method: Mini Percussive Drilling Rig | Checked By: BL | Dates: 24/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.10			MADE GROUND: Black macadam.	(0.20)			
PID	0.10	PID: 0ppmv			0.20	69.91		
B	0.20 - 1.00			MADE GROUND: Orange brown silty sandy gravel. Gravel is angular to subangular, fine to coarse of mudstone.				
ES	0.25				(0.60)			
PID	0.25	PID: 0ppmv						
ES	0.50				0.80	69.31		
PID	0.50	PID: 0ppmv		MADE GROUND: Dark brown slightly sandy gravelly clay. Gravel is angular to subangular, fine to coarse of sandstone and concrete.				
ES	0.75							
PID	0.75	PID: 0ppmv						
D	0.80		1					
ES	1.00							
PID	1.00	PID: 1ppmv	Dry					
B	1.20 - 1.70							
D	1.20				(1.46)			
SPT (S)	1.20 - 1.65	N=8 (2,1/2,2,2,2)						
D	1.70							
D	1.80							
PID	1.80	PID: 1ppmv						
B	2.00 - 2.20		2	Dry				
D	2.00							
SPT (C)	2.00 - 2.26	N=50+ (10,13/25,25 for 38mm)		End of Borehole at 2.26 m	2.26	67.85		
			3					
			4					
			5					
			6					
			7					
			8					
			9					
			10					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)

Hole Diameter

Diameter (mm)	Depth (m)
87	2.26

General Remarks

1. Hand dug inspection pit to 1.20mbgl.
2. No groundwater encountered.

Log last updated 26/01/2018

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole WS05

Contract No: D8279

Site: HD1, Huddersfield

GL (m AOD) 69.63 — Scale 1:50

Easting: 415288.92 — Northing: 417490.04

Client: Marshall Holdings Ltd — Driller: MD — Logged By: AH — Sheet 1 of 1

Method: Mini Percussive Drilling Rig — Checked By: BL — Dates: 24/10/2017

SAMPLE DETAILS Type	Depth From-To (m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well/ Backfill
ES	0.10			MADE GROUND: Black macadam.	(0.18)			
PID	0.10	PID: 0ppmv			0.18	69.45		
B	0.20 - 1.00			MADE GROUND: Orange brown clayey sandy gravel. Gravel is angular, fine to coarse of sandstone.				
ES	0.25				(0.57)			
PID	0.25	PID: 1ppmv						
ES	0.50				0.75	68.88		
PID	0.50	PID: 0ppmv						
ES	0.75			MADE GROUND: Firm dark brown slightly sandy gravelly clay of intermediate plasticity. Gravel is angular to subangular, fine to coarse of sandstone, brick, mudstone, clinker and coal.				
PID	0.75	PID: 0ppmv						
D	0.80		1					
ES	1.00							
PID	1.00	PID: 2ppmv	Dry					
B	1.20 - 1.60				(1.33)			
D	1.20							
SPT (S)	1.20 - 1.65	N=9 (2,2/3,2,2,2)						
ES	1.60							
PID	1.60	PID: 0ppmv						
SPT (C)	2.00 - 2.08	N=50+ (25 for 48mm/50 for 37mm)	2 Dry		2.08	67.55		
				End of Borehole at 2.08 m				
			3					
			4					
			5					
			6					
			7					
			8					
			9					
			10					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water Level	Minutes	Water sealed (m)

Log last updated 26/01/2018

Chiselling / Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)

Hole Diameter

Diameter (mm)	Depth (m)
87	2.08

General Remarks

1. Hand dug inspection pit to 1.20m.
2. No groundwater encountered.

Email Received 27 FEBRUARY 2018 Marshall (MCWY) Ltd

Appendix D – Flood Maps

Flood risk assessment data

Location of site: 415490 / 417625 (shown as easting and northing coordinates)
Document created on: 16 January 2026
This information was previously known as a product 4.
Customer reference number: 4GRNAAWDD775

Map showing the location that flood risk assessment data has been requested for.

How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- past floods
- flood defences and attributes
- information to help you assess if there is a reduced flood risk from rivers and the sea because of defences
- modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Surface water and other sources of flooding

When using the surface water map on the check your long term flood risk service the following considerations apply:

- surface water extents are suitable for use in planning
- surface water climate change scenarios may help to inform risk assessments, but the available data fall short of what is required to assess planned development
- surface water depth information should not be used for planning purposes

To find out about other factors that might affect the flood risk of this location, you should also check:

- reservoir flood risk
- groundwater flood risk - you could use the British Geological Survey groundwater flooding data, groundwater: current status and flood risk and the guide on mining and groundwater constraints for development - further information may be available from the lead local flood authority (LLFA)
- your local planning authority's SFRA, which includes future flood risk

Your Lead Local Flood Authority is Kirklees District.

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: 2011 Huddersfield Study - Allison Dike and Blackhouse Dike
Scenario(s): No defences exist fluvial
Date: 31 March 2011

Model name: 2011 Huddersfield Study - Grimescar Beck / Clayton Dike
Scenario(s): No defences exist fluvial, no defences exist climate change fluvial
Date: 31 March 2011

Model name: 2019 Colne Model
Scenario(s): Defended fluvial, defences removed fluvial, defences removed climate change fluvial
Date: 1 August 2019

These models contain the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

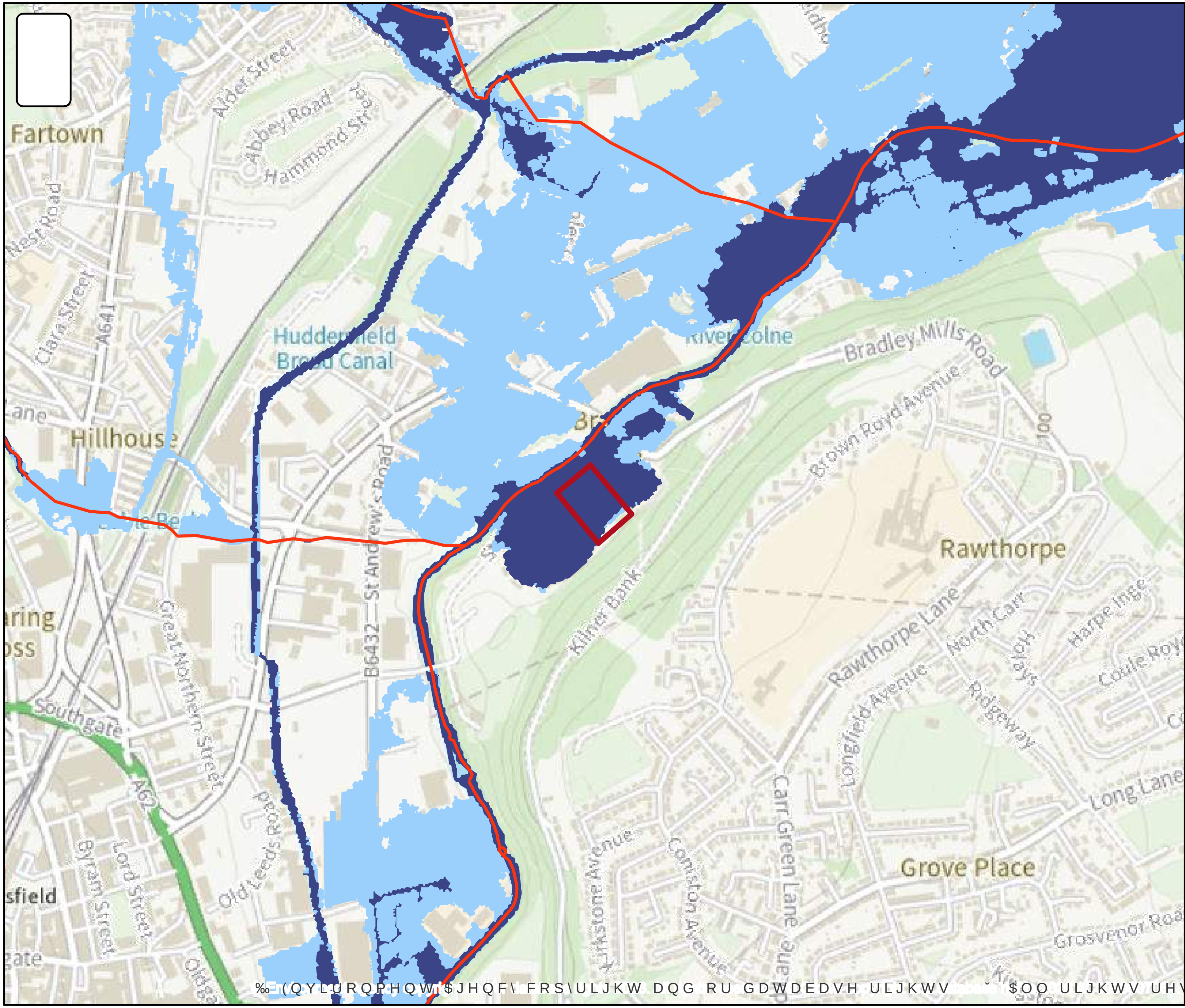
- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change



Environment Agency

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Past floods

Past flood events included in this document

The recorded flood outlines included in this document are for areas of land local to your site location that have been flooded by any of these sources:

- ephemeral water
- main rivers
- ordinary watercourses
- the sea
- unknown

Data limitations

The outlines do not include flooding from:

- drainage where rainfall has led to surface water ponding or overland runoff
- artificial, water-bearing sewer, water supply and wastewater treatment pipelines

Changes to flood defences

The defences (also known as assets) that were in place may also have changed. For example, assets may have been built more recently than the last recorded flood outline.

What the recorded flood outlines dataset is

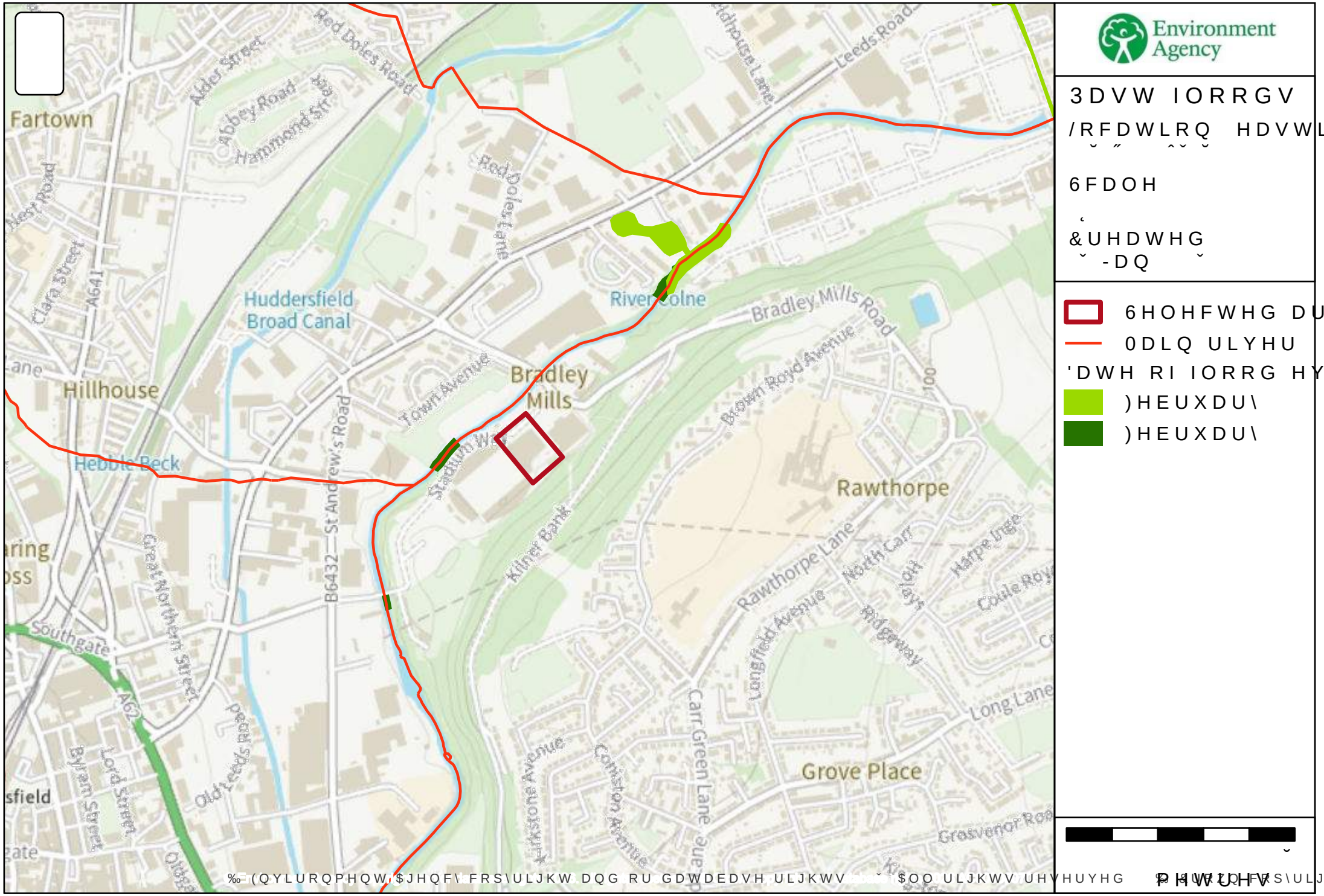
The recorded flood outlines are a geographical information system (GIS) data layer that show our verified records of areas that have flooded in the past from:

- rivers
- the sea
- groundwater
- surface water

Download the complete recorded flood outlines dataset, which includes data quality flags for outlines recorded after April 2020. This indicates the confidence we have in an outline.

Get flood information from other organisations

Contact Kirklees District Lead Local Flood Authority (LLFA) and your drainage board to get information about past flooding caused by surface water or drainage systems.



Data on past flood events

Start date	End date	Source of flood	Cause of flood	Affects location
20 February 2022	28 March 2022	main river	channel capacity exceeded (no raised defences)	No
15 February 2020	19 March 2020	main river	channel capacity exceeded (no raised defences)	No

Flood defences and attributes

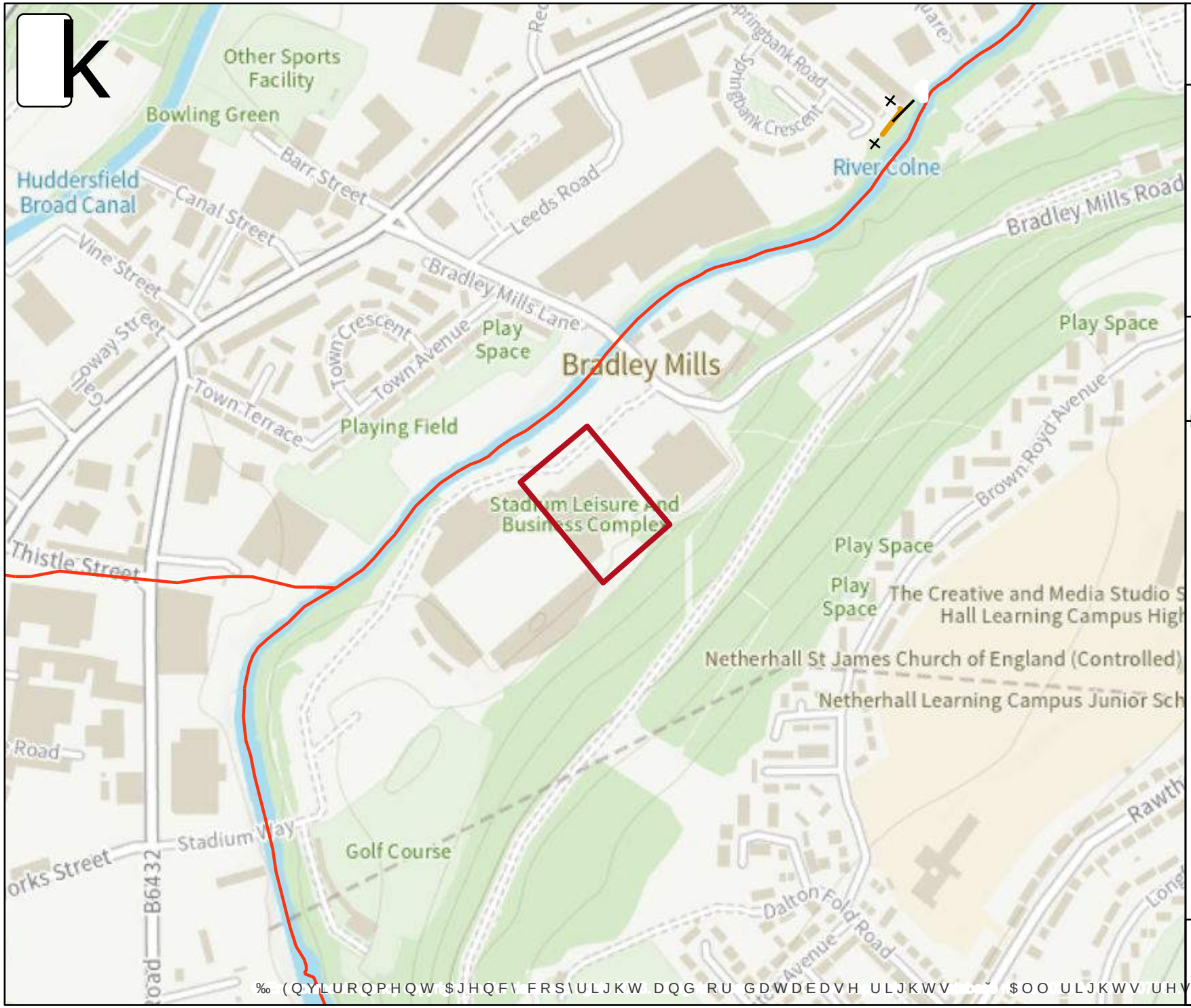
The flood defences map shows the location of the flood defences present.

The flood defences data table shows the type of defences, their condition and the standard of protection. It shows the height above sea level of the top of the flood defence (crest level). The height is In mAOD which is the metres above the mean sea level at Newlyn, Cornwall.

It's important to remember that flood defence data may not be updated on a regular basis. The information here is based on the best available data.

Use this information:

- to help you assess if there is a reduced flood risk for this location because of defences
- with any information in the modelled data section to find out the impact of defences on flood risk



Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	183943	Wall		Good	56.97	57.34	

Any blank cells show where a particular value has not been recorded for an asset.

Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- modelled node point map(s) showing the points used to get the data to model the scenarios and table(s) providing details of the flood risk for different return periods
- map(s) showing the approximate water levels for the return period with the largest flood extent for a scenario and table(s) of sample points providing details of the flood risk for different return periods

Climate change

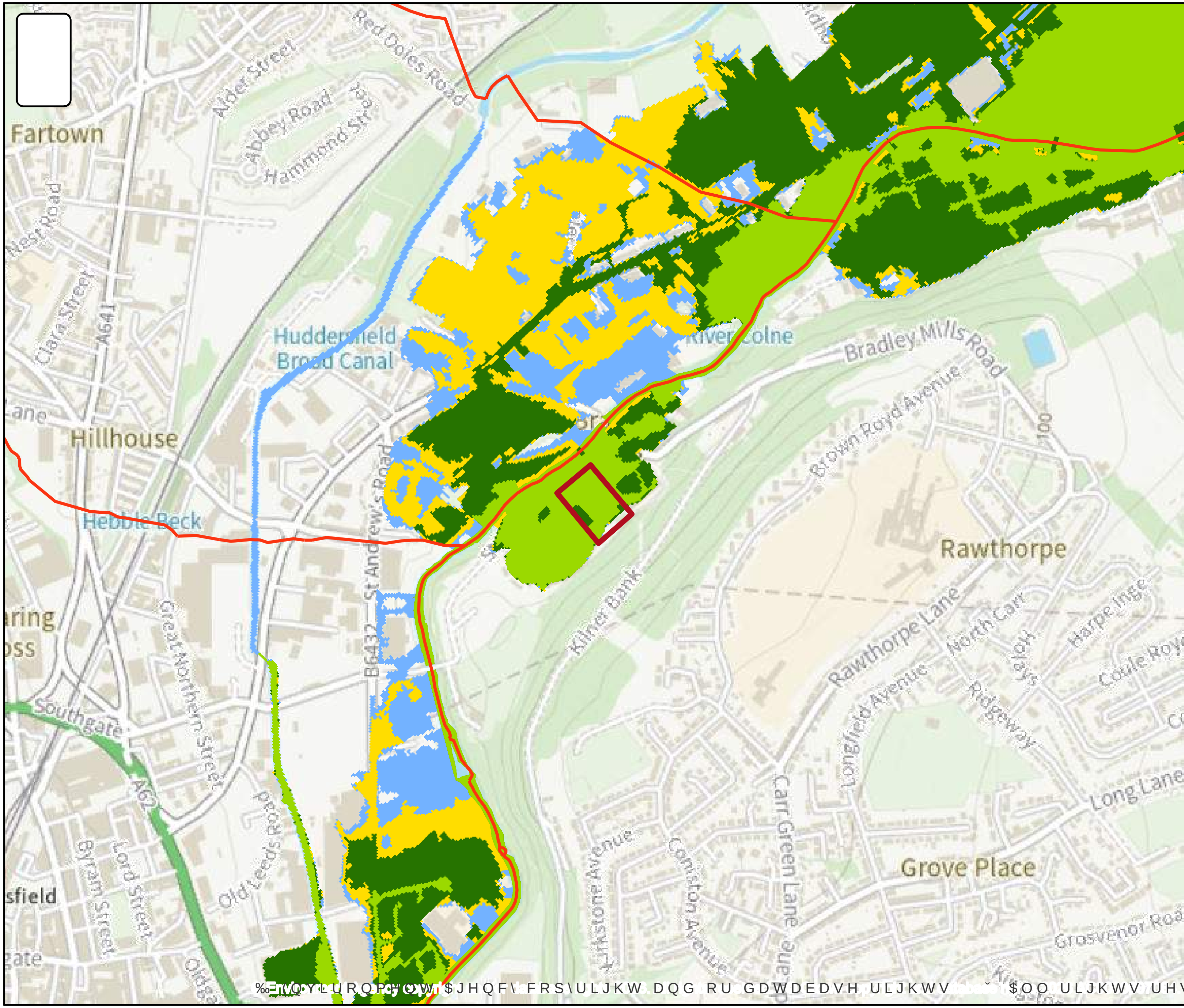
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- Defended modelled fluvial: risk of flooding from rivers where there are flood defences
- Defences removed modelled fluvial: risk of flooding from rivers where flood defences have been removed
- No defences exist modelled fluvial: risk of flooding from rivers where there are no flood defences
- Defences removed climate change modelled fluvial: risk of flooding from rivers where flood defences have been removed, including estimated impact of climate change
- No defences exist climate change modelled fluvial: risk of flooding from rivers where there are no flood defences, including estimated impact of climate change



Environment Agency

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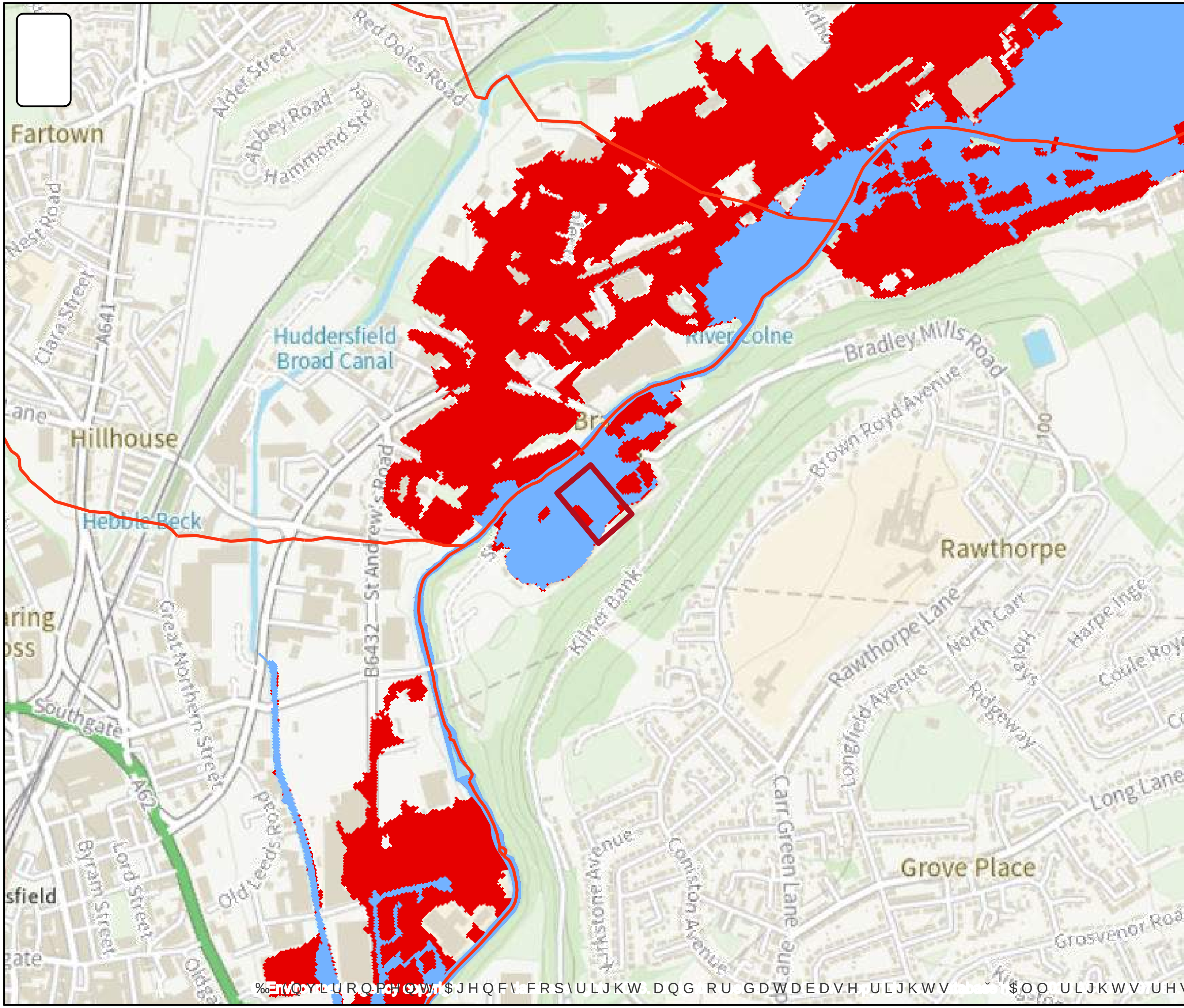

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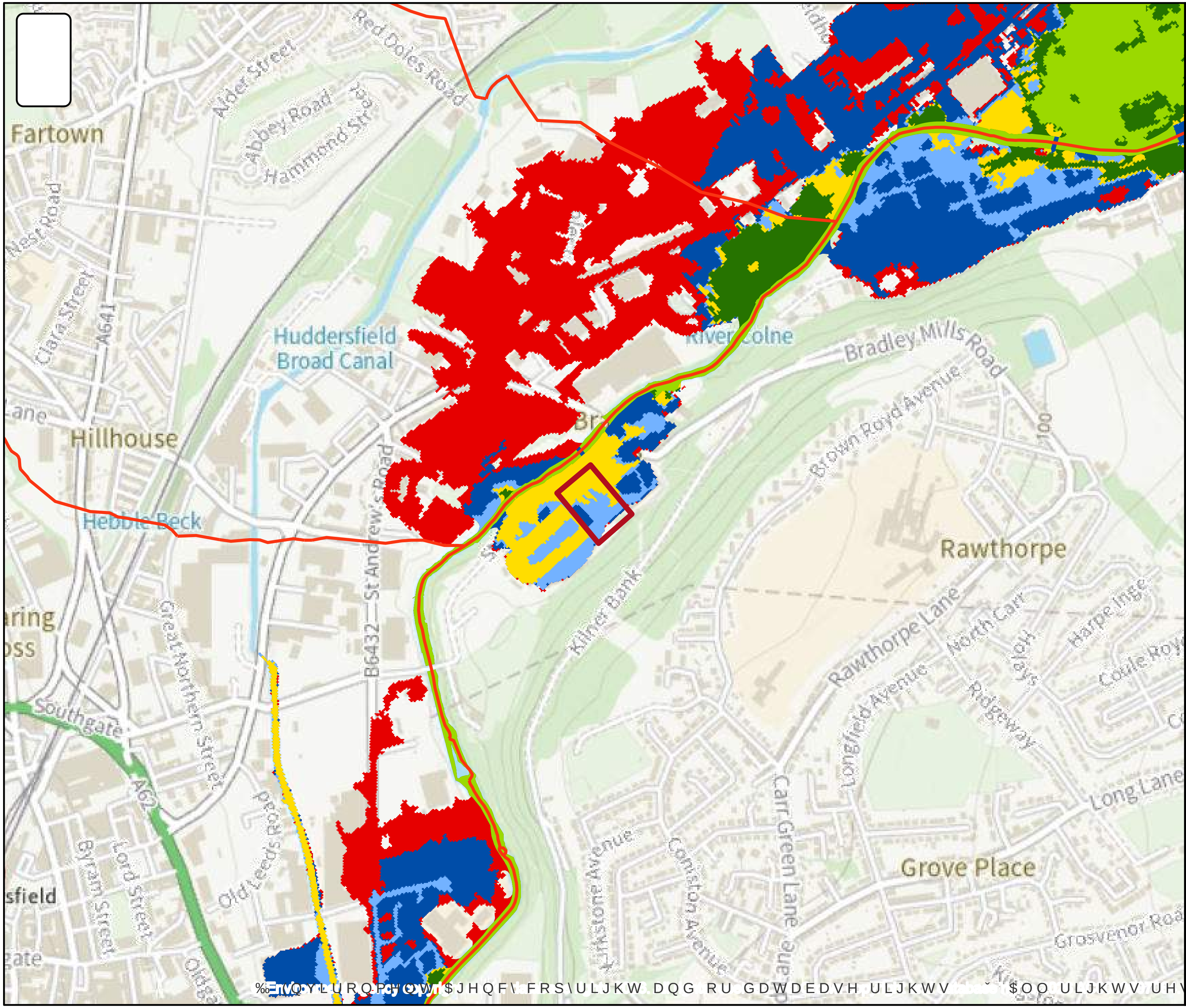

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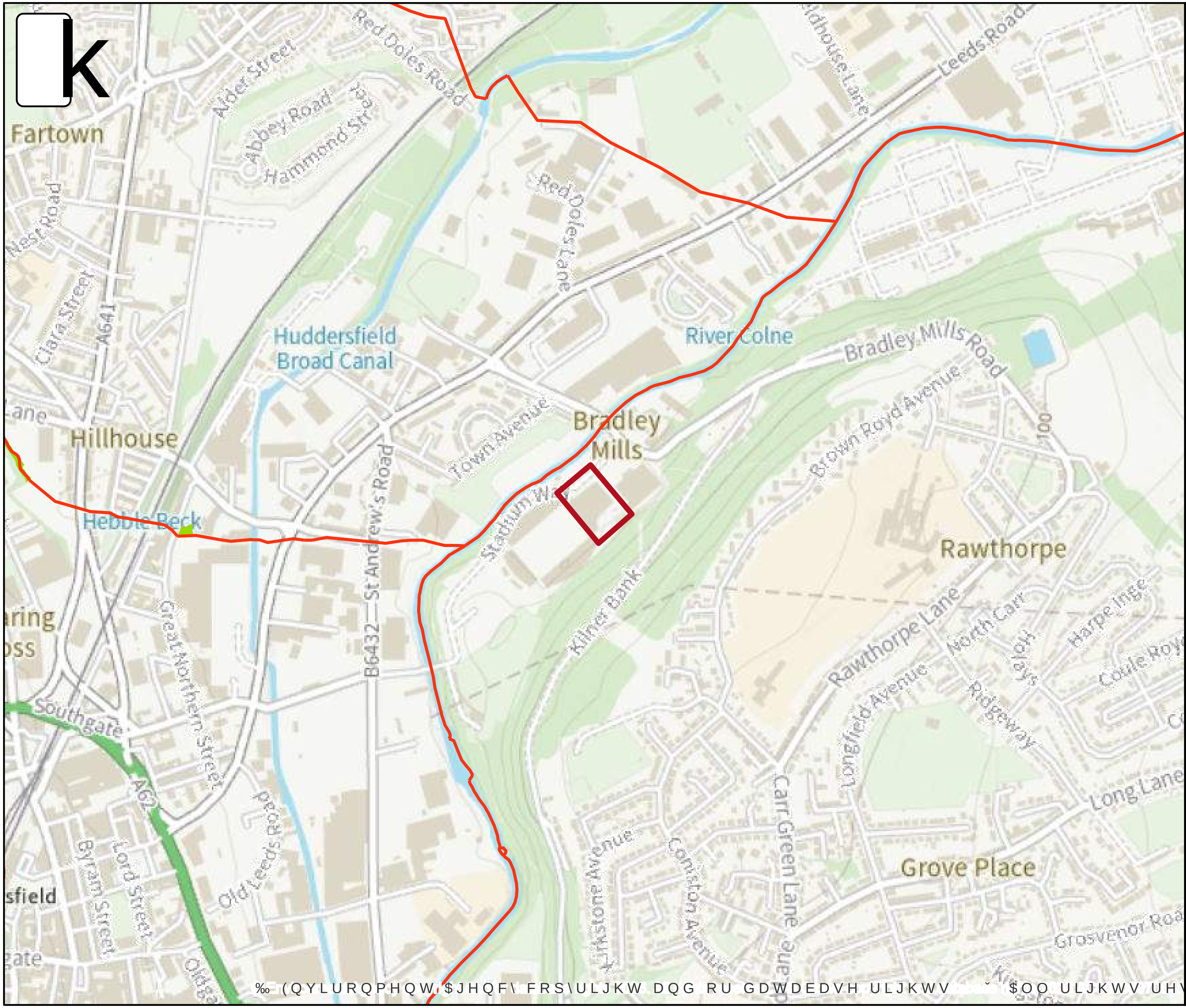

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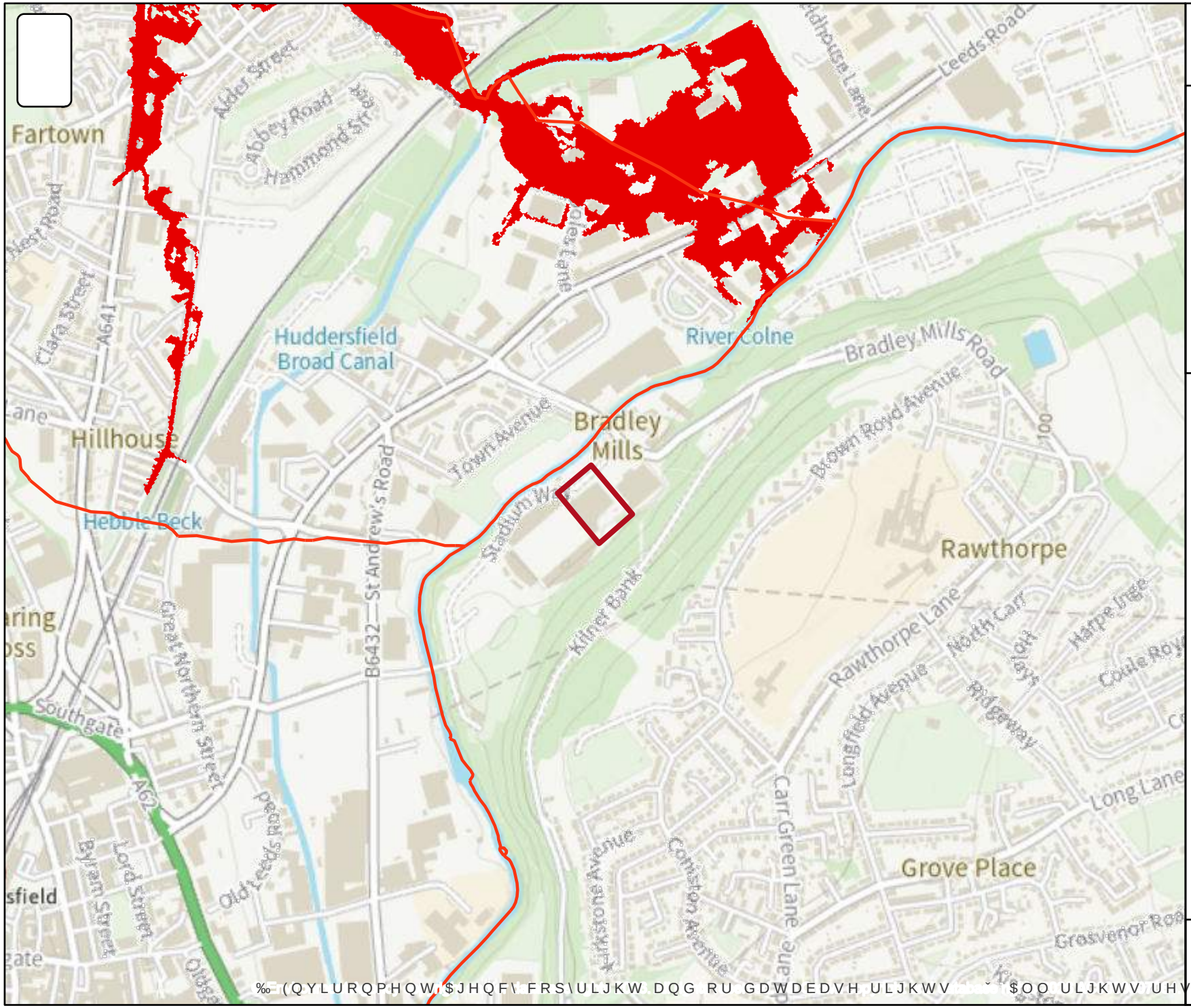

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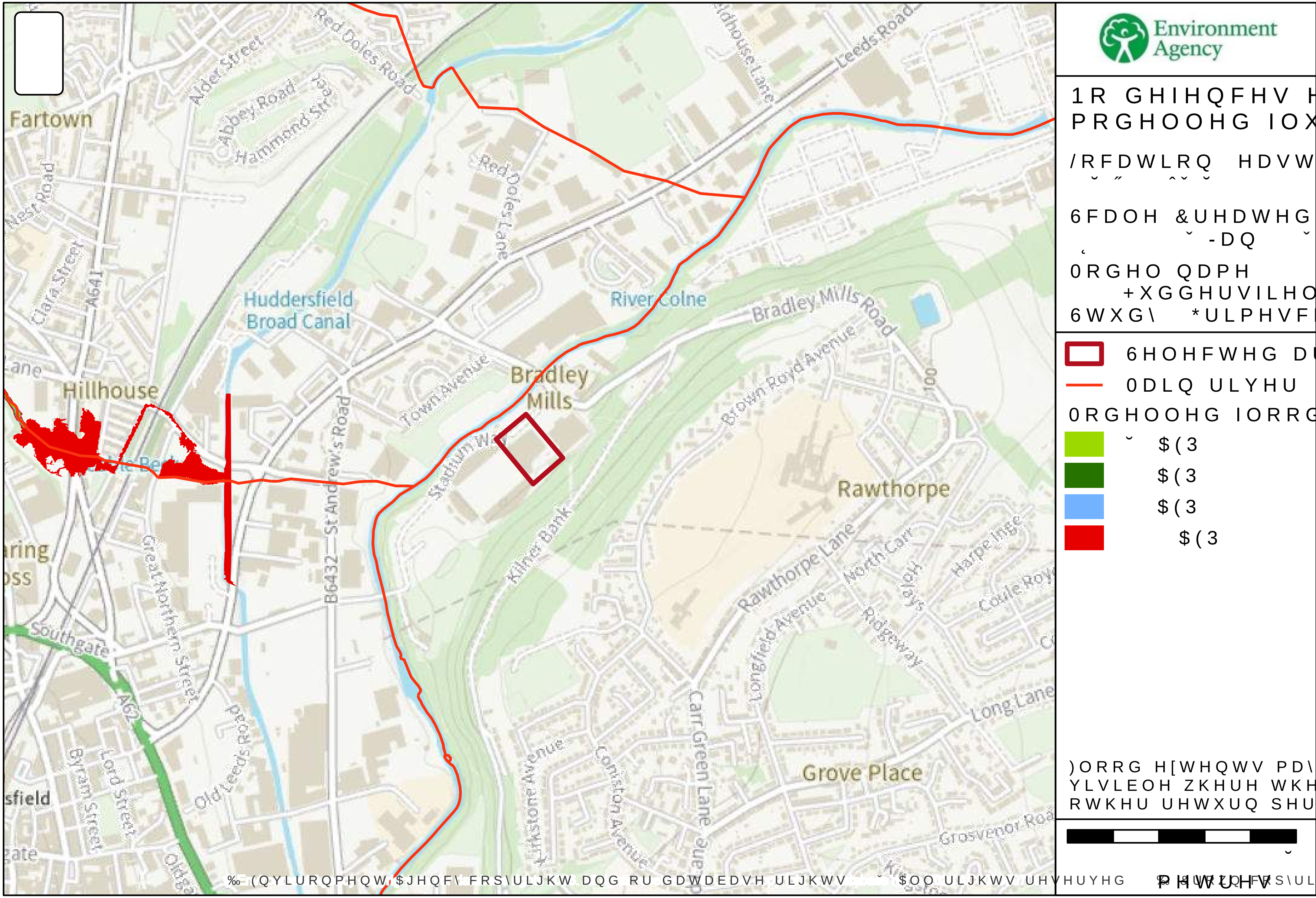

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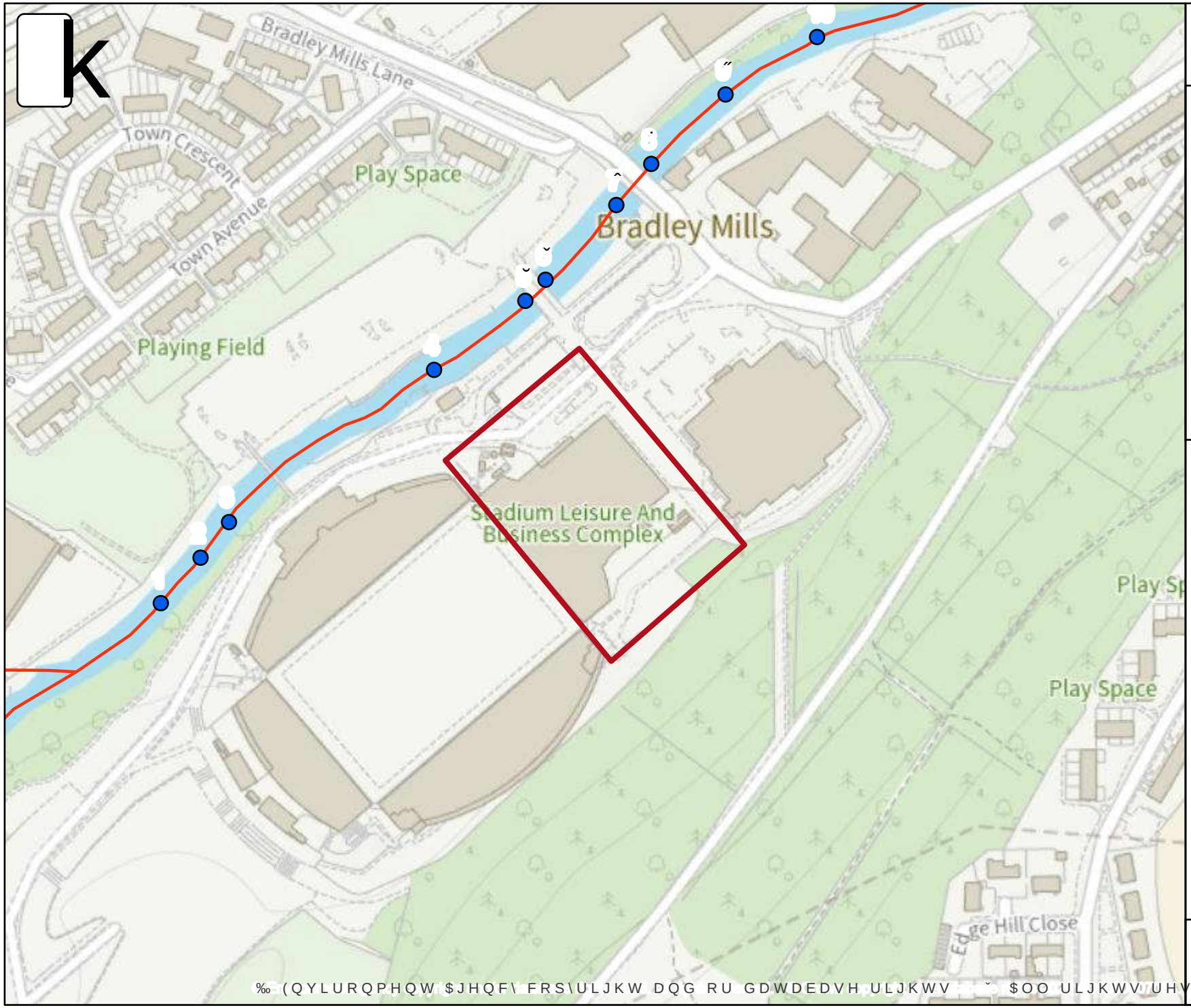
Hillhouse
Huddersfield Broad Canal
River Colne
Bradley Mills
Rawthorpe
Grove Place
Red Doles Road
Alder Street
Abbey Road
Hammond Street
Nest Road
Clara Street
A641
Leeds Road
Bradley Mills Road
Brown Royd Avenue
Town Avenue
Stadium Way
Kilner Bank
St Andrew's Road
B6432
Great Northern Street
Southgate
A62
Byram Street
Lord Street
Old Leeds Road
Rawthorpe Lane
North Carr
Longfield Avenue
Ridgeway
Harpe Inge
Long Lane
Carr Green Lane
Coniston Avenue
Kirkstone Avenue
Grosvenor Road



Environment Agency

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Modelled node locations data

Defended

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	1197958	415278	417577	57.32	57.56	58.01	58.11	58.28	58.37	58.62	58.83	59.02	59.54	59.86
2	1197805	415298	417599	57.18	57.44	57.92	58.02	58.21	58.30	58.56	58.79	58.99	59.51	59.74
3	1198055	415312	417616	57.13	57.39	57.86	57.97	58.16	58.25	58.52	58.76	58.98	59.59	59.94
4	1198272	415411	417690	56.89	57.14	57.60	57.70	57.81	57.89	58.13	58.31	58.46	59.29	59.67
5	1197951	415456	417724	56.73	56.98	57.44	57.53	57.64	57.71	57.94	58.12	58.27	59.21	59.64
6	1198269	415466	417734	56.73	56.98	57.44	57.53	57.64	57.71	57.94	58.12	58.27	59.01	59.49
7	1198273	415500	417771	56.61	56.86	57.31	57.41	57.52	57.59	57.83	58.01	58.17	58.88	59.36
8	1198238	415517	417791	56.59	56.83	57.25	57.34	57.44	57.50	57.69	57.83	57.95	58.24	58.67
9	1198004	415553	417824	56.42	56.65	57.07	57.16	57.26	57.32	57.51	57.65	57.76	58.06	58.45
10	1198025	415598	417852	56.24	56.46	56.87	56.96	57.05	57.12	57.30	57.42	57.53	57.84	58.22

Data in this table comes from the 2019 Colne Model model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defended

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	1197958	415278	417577	62.12	72.96	96.02	100.50	106.69	110.65	123.79	135.41	145.58	169.79	212.20
2	1197805	415298	417599	62.12	72.96	96.02	100.50	106.70	110.66	123.79	135.41	145.57	174.43	235.22
3	1198055	415312	417616	62.13	72.97	96.03	100.51	106.70	110.66	123.80	133.91	137.47	147.71	167.57
4	1198272	415411	417690	62.13	72.97	96.04	100.52	106.72	110.68	123.81	134.65	142.83	164.30	157.62
5	1197951	415456	417724	65.55	77.51	101.42	106.78	113.37	117.81	131.69	142.72	151.88	183.38	183.74
6	1198269	415466	417734	65.55	77.51	101.42	106.78	113.37	117.81	131.69	142.72	151.88	183.38	183.74
7	1198273	415500	417771	65.54	77.50	101.42	106.77	113.36	117.80	131.69	142.72	152.49	170.46	179.01
8	1198238	415517	417791	65.54	77.50	101.42	106.77	113.36	117.80	131.69	142.72	152.49	170.46	179.01
9	1198004	415553	417824	65.54	77.50	101.41	106.77	113.36	117.80	131.68	142.71	152.49	172.12	197.38
10	1198025	415598	417852	65.54	77.50	101.41	106.77	113.36	117.79	131.68	142.71	152.49	172.87	199.99

Data in this table comes from the 2019 Colne Model model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.