

Gorton Community Hub

Flood Risk Assessment and Detailed Drainage Strategy

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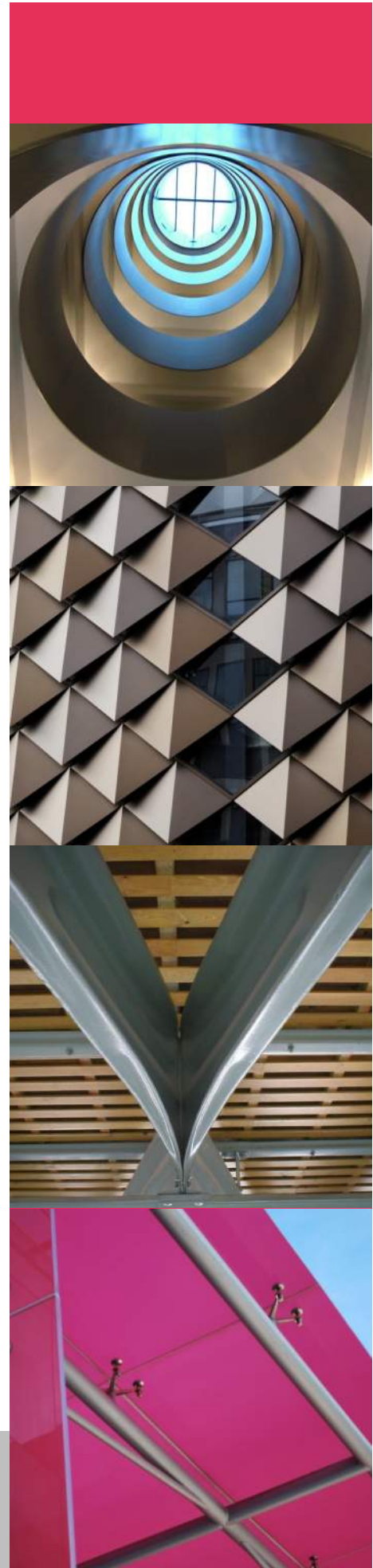
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Appendix A

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Appendix B

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CCTV Survey

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1.0 Introduction

1.1 Project Background

Curtins was appointed by Morgan Sindall to provide a Flood Risk Assessment and Detailed Drainage Strategy for the proposed development of a brown field site on the corner of Garratt Way and Whitwell Way, Manchester. The nearest postcode to the site is M18 8HE, and the site is centred around Grid Ref: 388414, 396186.

The report provides information on the nature of flood risk at the site and follows Government guidance with regards to development and flood risk.

The report is based on currently available information and historic discussions.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

1.2 Scope of Assessment

The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance to the National Planning Policy Framework (NPPF).

The redline site area is approximately 0.69 hectares (Ha). This area is split across three individual construction sites separated by an access road to Tesco's delivery yard. For the remainder of this report, these will be identified as the Public Carpark (0.18 hectares) and the Primary Building Site (0.51 hectares) as shown in Figure 1 below. Following scrutiny of the Environment Agency flood zone maps it has been identified that the existing site lies entirely within an area classified as Flood Zone 1 indicating that the probability of flooding from rivers or sea is low (less than 0.1% annual probability of river or sea flooding). Since the site is greater than 1.0 Ha in Flood Zone 1, a Flood Risk Assessment is required to support a planning application, all sources of potential flood risk, and taking into account the management of surface water run-off, should be considered.



Figure 1.1 Existing Site (reproduced from Google Maps, Imagery ©2019, Google)

In July 2018, the Government made changes to the National Planning Policy Framework which made Sustainable Urban Drainage Systems (SuDS) a requirement for the determination of planning applications for 'major' developments.

A Detailed Drainage Strategy will therefore be required as part of the Full Planning Application for the development, as the site is considered to be 'major' development by the Town and Country Planning Order 2015 as total floor space will exceed 1000m².

The assessment will:

- Investigate all potential risks of flooding to the site,
- Consider the impact the development may have elsewhere with regards to flooding,
- Consider proposals to mitigate any potential risk of flooding determined to be present; and
- Consider detailed drainage proposals to mitigate flood risk from the site.

This assessment has referenced the following information:

- Environment Agency flood maps for rivers and sea flooding.
- UK Government Long Term Flood Risk Information for surface water flooding and reservoir flooding.
- Manchester City, Salford City and Trafford Councils Level 1 Strategic Flood Risk Assessment (SFRA) Stage 1 dated December 2007.
- Greater Manchester Sub-Regional SFRA completed in August 2008
- Manchester City, Salford City and Trafford Councils Level 2 Strategic Flood Risk Assessment (SFRA) Stage 1 dated December 2007.
- Topographic Survey by Survey & Engineering Projects, dated April 2019.
- Underground Utilities Survey by Survey & Engineering Projects, dated April 2019.

- CCTV Drainage Survey by Survey & Engineering Projects, dated November 2018.
- Phase 2 Site Investigation Report by Curtins, dated April 2019.
- United Utilities Public Sewer Records, dated March 2019.

1.3 Proposed Development

The proposal comprises of:

- Demolition of the existing buildings on the three sites. This includes the existing Eastland Homes building on the main building site, demolition of the dilapidated Suburban Pub on the public carpark site and demolition of the existing Library on the staff carpark site
- Construction of a new 2800m², 3 storey community hub building with a small area of carparking on the main building site
- Construction of a 76 patient/visitor carparking area on the public carpark site

2.0 Existing Site Details

2.1 History and Current Use

The two sites are located along Garratt Way in Gorton. The adjacent area around the development comprises high density residential properties and associated amenities.

The sites themselves are currently occupied by an abandoned Eastland Homes building and a dilapidated suburban pub.

The existing site is illustrated in Figure 1-1 above. The approximate site boundary is identified in red. The centre of the main building site is located at National Grid Reference: 388424mE,396166mN (SD884961).

The main building site and public carpark are bordered by Whitwell Way to the west, Garratt Way to the north, Tesco Extra to the east and Hyde road to the south. Hyde road forms part of the A57 and is the main route through Gorton. Hyde road accommodates a number of retail shops at street level. The main building site is separated from the public carpark site by an access road to Tesco's delivery yard that will remain in service during construction and following inhabitation of the building.

The wider area consists of the Gorton Lower Reservoir 1.0km to the east followed by Audenshaw reservoir 2.5km to the east, Gorton train station 1.0km to the north-east and the intersection of the Manchester-Glossop and Hope Valley train Lines 1.5km to the north-west.

2.2 Topography

A topographic Survey was carried out in November 2018 and is included in *Appendix B*.

The main site is occupied by the existing Eastland Homes building, carparking and soft landscaping. Survey points indicate that the existing finished floor level is 65.59mAOD. Overall the site levels vary from a low point on the south western corner of 64.75mAOD to a high point diagonally opposite on the edge of Tesco's access road of 66.34mAOD. The topographic survey also identifies the existence of a brick wall along the eastern perimeter of the site.

The proposed public carparking site is occupied by an existing Pub building. The finished floor level of which is 66.70mAOD. An existing tarmacked carpark covers half of the remaining site area and has levels ranging from 66.14mAOD to 66.36mAOD. The soft landscaped area levels also vary from a minimum of 66.44mAOD to a maximum of 67.33mAOD. The soft landscaped area is undulating but levels generally decrease across the site when moving from east to west.

Externally, Garratt Way, Hyde road and Engell Close generally fall from east to west, Whitwell Way falls north to south and the Tescos access road and Sybley Street fall south to north.

2.3 Geology and Hydrogeology

Intrusive ground investigation was undertaken in December 2018 and the Investigative Report, dated April 2019 by Curtins, included in *Appendix B* summarises the geological sequence as follows:

- Made Ground - Made Ground typically comprising of dark brown to brown very gravelly cobbly sandy clay to a depth of 0.8-2.0m bgl.
- Glacial Till – Beneath the Made Ground, firm to very stiff brown very gravelly sandy clay was encountered.
- Bedrock – Bedrock was not encountered during the investigation but is believed to comprise of the Chester Formation (gravelly pebbly Sandstone and Mudstone)
- Window Sample WS05 also identified a deposit of very soft sandy gravelly organic rich clay from 2.00m-3.20mbgl interbedded with a 0.40m thick layer of spongy brown fibrous peat

The intrusive ground investigation also identified groundwater strikes in two boreholes between 2.30m-5.50m bgl. Groundwater monitoring showed groundwater levels varied from 0.70m-14.13m bgl. It was recorded that this was likely to be a result of surface water infiltrating into the boreholes rather than representative of standing groundwater levels.

Aquifer Classification

The shallow superficial deposits underlying the site (glacial till) are classified as Secondary (undifferentiated) Aquifer, while the deeper bedrock is classified as a Principal Aquifer

Source Protection Zone (SPZ)

The site is not located in a Source Protection Zone.

2.4 Existing Watercourses

No above ground watercourses have been identified within the site.

The following watercourses have been identified within the vicinity of the site:

- Gore Brook, a watercourse that runs 300m to the south of the site. The watercourse is designated as a main river and therefore falls under the jurisdiction of the EA. The watercourse flows in a westerly direction through the urban area to discharge at the intersections of Chorlton and Fallowfield brook. These watercourses are part of the Upper Mersey Catchments.
- Ashton Canal and Peak Forest Canal runs 2.0km to the north of the site. The canal runs east to west through urban area to discharge into the Rochdale Canal.



Figure 2 Existing Watercourses

2.5 Sewer Records

The United Utilities (UU) public sewer records have been obtained for the development site, and are enclosed in *Appendix B*. The records indicate that the following public sewers are recorded within the site:

- There is a 900mm diameter public surface water gravity sewer entering the main building site from the north-west corner from UU MH 4202. This pipe runs north-south along the western boundary towards UU MH 3103 on the south-west corner of the site. The 900mm diameter pipe then flows west-east along the southern site boundary towards UU MH4106 on the adjacent Tesco site. The pipe has a 6m easement (measured 3m either side from the centreline of the pipe).
- A second 375mm diameter public combined gravity sewer, enters the site from the eastern boundary from UU MH 4110 flowing south-west towards UU MH 4112.

The public sewer records indicate that public sewers are recorded in all roads surrounding the development.

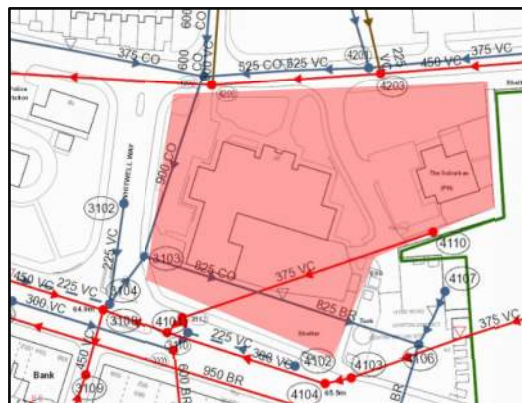


Figure 3 Public Sewer Records

The results of these surveys are included in Appendix B.

3.0 Development and Flood Risk

3.1 National Planning Policy Framework (NPPF) and Planning Practice Guidance

In July 2018, the Ministry of Housing, Communities & Local Government published the revised National Planning Framework (NPPF). This document replaces the first National Planning Policy Framework published in March 2012 by the Department of Communities and Local Government. The Planning Practice Guidance was published in March 2014 which provides guidance on how flood risk should be assessed during the planning and development process. This guidance remains current.

Table 3-1: (Extract from Planning Practice Guidance) Flood Zone Classifications

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's [Flood Map for Planning \(Rivers and Sea !\[\]\(3211b5d1d968fc1665909b34f9f16010_img.jpg\)](#)), available on the Environment Agency's web site, as indicated in the table below.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 3-2: (Extract from Planning Practice Guidance) Flood Risk Vulnerability Classification

Essential Infrastructure

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.
- Wind turbines.

Highly Vulnerable

- Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring **hazardous substances consent**. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').

More Vulnerable

- Hospitals
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Less Vulnerable

- Police, ambulance and fire stations which are **not** required to be operational during flooding.
- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'More Vulnerable' class; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill* and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.

Water-Compatible Development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 3-3: (Extract from Planning Practice Guidance) Flood Risk Vulnerability and Flood Zone Compatibility

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

Notes to table 3:

- This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† 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.

3.2 Site Specific NPPF Flood Risk Categorisation

To assess the NPPF flood risk classification for the site, the first step was to inspect the Environment Agency web-based flood mapping data for flooding from rivers and seas, surface water and reservoirs.

The rivers and sea flood map is used to inform planning of a sites Flood Zone(s), however the surface water and reservoir flood maps should also be used to identify other flood risks.

From the Environment Agency flooding from rivers and seas map, the proposed site and the surrounding area are entirely located within an area classified as Flood Zone 1 (low risk of flooding from rivers or sea).

3.3 Site Specific Flood Zone Compatibility

The proposals for the development site are considered to fall within the following category:

- 'Non-residential uses for health services, nurseries and educational establishments'

This type of development is classed as 'More Vulnerable' development in the Flood Risk Vulnerability Classification (Table 3-2).

The site is located within Flood Zone 1, for which 'More Vulnerable' development is deemed to be appropriate, and neither the sequential nor the exception test is required (refer to Table 3-3 for the Flood Zone compatibility table taken from NPPF technical guidance).

4.0 Assessment of Flood Risk

4.1 Sources of Flood Risk

This study assesses the risk from different types of flooding to the development and the risk of flooding from the development, taking into consideration climate change, as well as how flood risks should be managed. The approach to assessing flood risk at the development site was informed by the requirements of NPPF in conjunction with the client and Environment Agency requirements.

4.2 Fluvial Flooding (Watercourses)

From the Environment Agency flooding from rivers and seas map:

- Where a site is located in a dark blue shaded zone, this indicates that the site is within Flood Zone 3b where there is a chance of flooding of greater than 1 in 30 (3.3%).
- Where a site is located in a blue shaded zone, this indicates that the site is within Flood Zone 3a where there is a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).
- Where a site is located in a turquoise shaded zone; this indicates that the site is within Flood Zone 2 where there is a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%).
- Where a site is located in a white (unshaded) area, it is generally deemed to be classified as Flood Zone 1 where there is a chance of flooding of less than 1 in 1000 (0.1%).

Flooding to the site from rivers and seas is indicated in Figure 4-1 and it can be seen that the entire proposed site is located within an area classified as Flood Zone 1, therefore the site is considered to be at low risk from fluvial flooding.

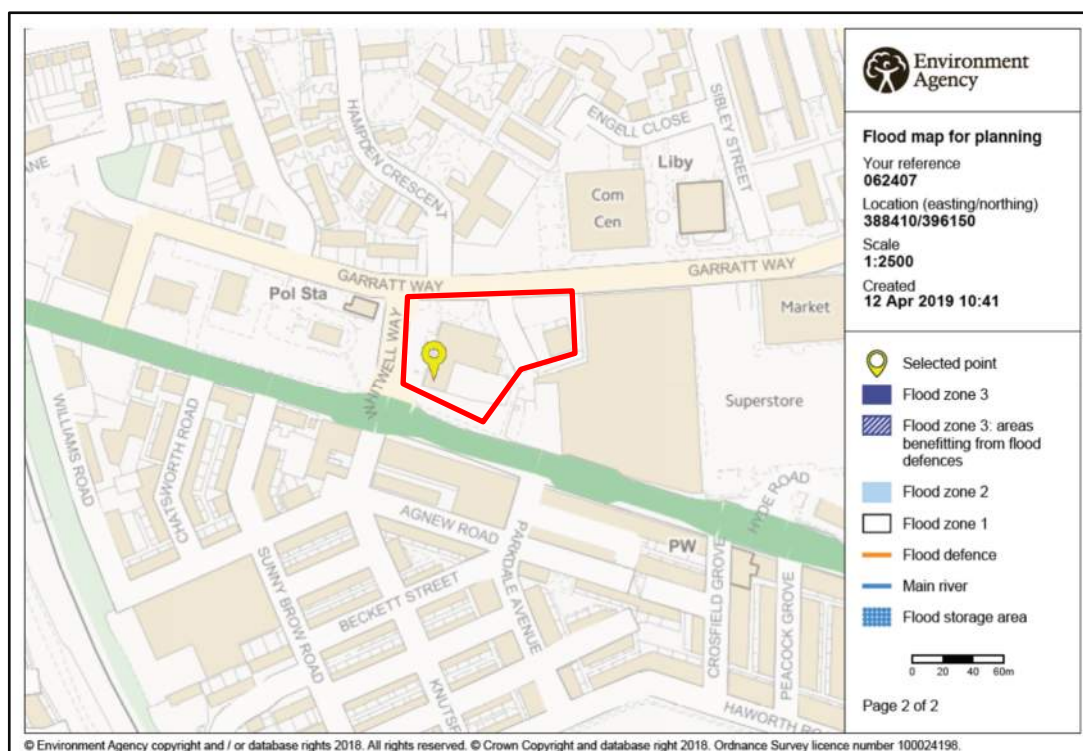


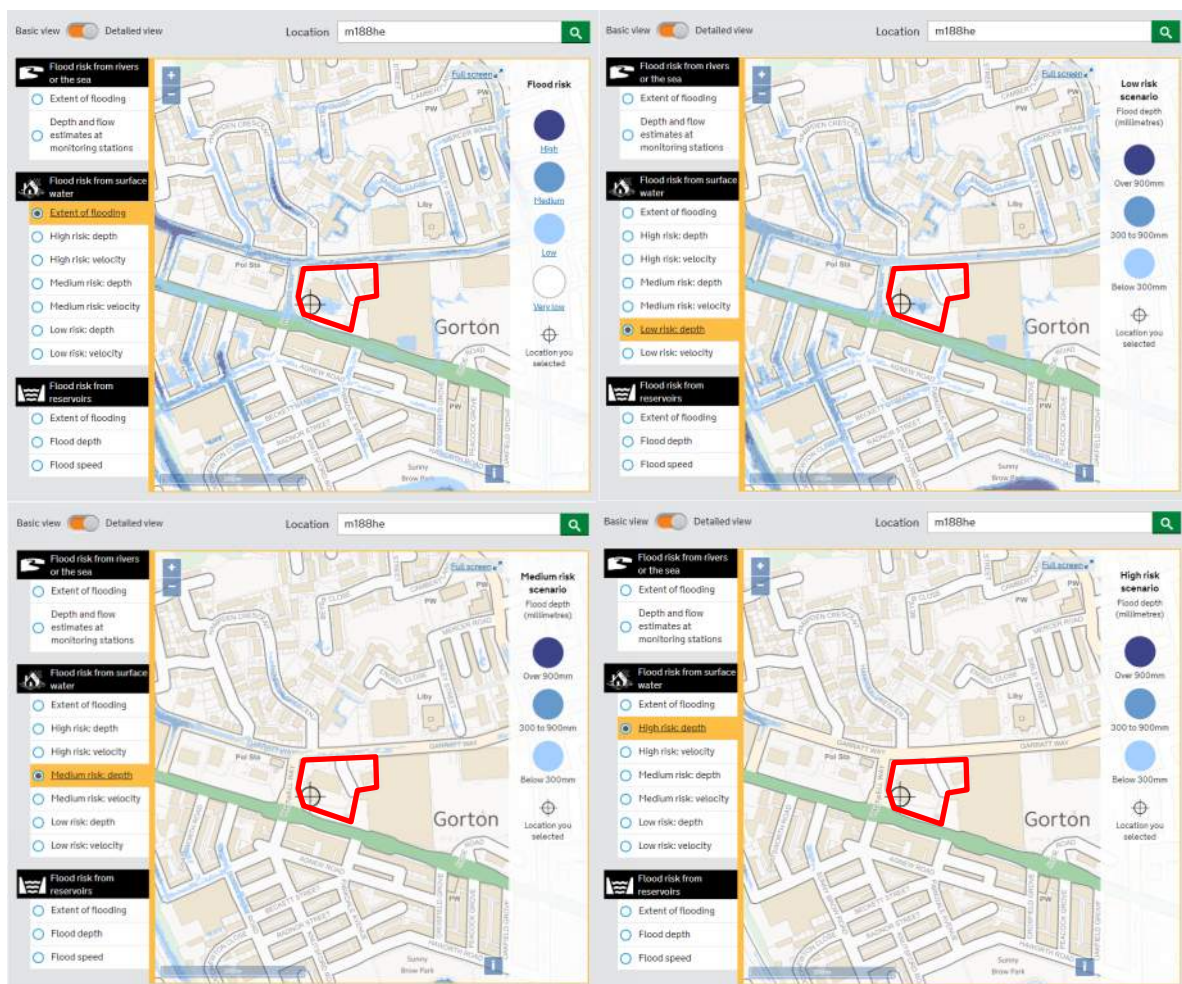
Figure 4.1: Environment Agency Map – Flood Map for Planning (Rivers and Sea)

4.3 Tidal Flooding (Coastal or Estuarine)

There is currently no flood risk identified on the Environment Agency flood maps for the site and it is therefore regarded to be at low risk from tidal flooding.

4.4 Surface Water Flooding to the Site

Extracts of the Environment Agency 'Flood Risk from Surface Water' maps showing overall extent of flood risk, together with Low Risk (annual chance of flooding of between 0.1% and 1%), Medium Risk (annual chance of flooding of between 1% and 3.3%) and High Risk (annual chance of flooding of greater than 3.3%) are shown in Figure 4-2 following with the site area outlined **RED**.


Figure 4.2: Environment Agency Flood Risk from Surface Water

Map A indicates the overall flood risk from surface water to the site and indicates the site to be have a low risk of flooding from this source.

Maps B through C indicate the potential flood depths associated with each risk category. In each scenario flood risk is limited to the south east corner of the main building site. When reviewed against the existing site layout, it can be seen that this area is currently tarmacked parking with falls to gullies within an enclosed courtyard and could experience depths of 300-900mm in rainfall events less frequent than a 1% Annual Exceedance Probability (AEP) (1 in 100-yr Event).

However, the surface water flood map only makes a broad assessment of the urban drainage infrastructure in the mapping process. In this case, as confirmed by both the UU Sewer Records and site survey data, the area is well served by both gulleys and large diameter sewers.

Based on this site-specific information, it is considered that the site is at Low Risk of Flooding from Surface Water.

Further mitigation against flood risk from this source is discussed in Section 5 of this report

4.5 Surface Water Flooding from the Site

Developers are responsible for ensuring that new development does not increase the flood risk elsewhere. The proposed surface water drainage network shall be designed to not flood for the critical 1 in 30-year storm event and flood water generated up to the critical 1 in 100-year plus climate change storm event shall be constrained within areas on site so as not to cause damage to buildings, essential services or adjoining developments and services.

The development has the potential to increase flood risk where any increase in impermeable areas results in additional run-off from proposed roads, car parks and building roofs being discharged freely into the downstream drainage network. It is therefore encouraged to propose permeable areas, landscaping areas and incorporate sustainable drainage features utilising infiltration or attenuation where possible.

Mitigation measures to ensure the risk remains low are proposed in Section 5 and an assessment of the proposed surface water flows is carried out within the drainage strategy within Section 6 of this report.

4.6 Reservoir Flooding

Reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Environment Agency is the enforcement authority and ensures that reservoirs are inspected regularly, and essential safety work is carried out.

The Long-Term Flood Risk from Reservoirs map, Figure 4-3, shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. Since this is a prediction of a worst-case scenario, it is very low risk that a reservoir flood would be this large.

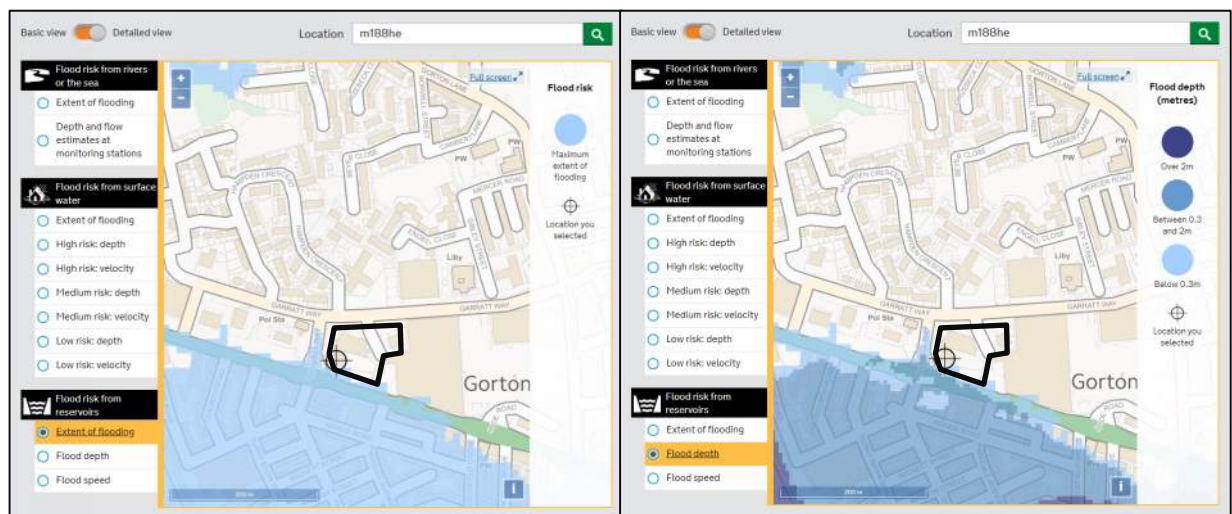


Figure 4.3: Risk of Flooding from Reservoirs - Extent of Flooding

The map indicates the site is on the borderline of areas at risk of flooding from this source. Given the risk of flooding from these events being this large, the site is at low risk of flooding from reservoirs. The closest Reservoir to the site is the Gorton Lower and Upper (Debdale) reservoirs which are located 1.0km to the east of the site.

4.7 Flooding from Canals

The closest canal is the Ashton Canal, 2.0km to the north of the site and traverses in a generally east-west route. The site is not at risk of flooding from this source. The Level 1 SFRA by Manchester, Salford and Trafford Councils identified the main risks for the Ashton canal are due to potentially high inflows with flow towards Manchester, exceeding the canal capacity at Manchester and possible blockage at Ancoats. Both scenarios are not expected to impact the proposed site.

4.8 Flooding from Groundwater

The Invasive ground investigation identified groundwater strikes at 2.30m to 5.50m bgl during the borehole investigations. Post investigations groundwater monitoring showed groundwater levels varied from 0.70m to 14.13m bgl believed to be the result of surface water infiltrating into the boreholes. Generally, the risk of groundwater flooding to the site is likely to be low. There are no basements proposed and the proposed site topography will generally tie into the existing topography. However, to ensure that the risk remains low, mitigation measures are proposed in Section 5.

4.9 Flooding from Sewers

There are various public sewers contained within the development site as discussed above.

A Pre-Development Enquiry has been made to United Utilities and they have not confirmed that there are any flooding incidents at the site.

Providing United Utilities and Manchester City Council maintain their drainage assets in the vicinity of the site, the risk of flooding to the proposed development site from public sewers or highway drainage is considered as low.

United Utilities have also confirmed that capacity is available within the surrounding combined public sewers to take unrestricted foul flows from the development and further agreed to a surface water discharge from the site to the surface water sewer, restricted to maximum flow rate of 11 l/s, given the site is known to be underlain by clay preventing infiltration. The United Utilities correspondence is included in *Appendix C*.

4.10 Historic Flooding

The Level 1 SFRA for Manchester City, Salford City and Trafford Councils reports broadly on historical flooding across the Greater Manchester City study area. It identifies that the main source of flood risk in Manchester is from the Grey Irwell, the Rivers Irk, Medlock and Mersey and Corn Brook. The rivers Irwell, Irk, Medlock, Corn Brook and numerous “hidden” watercourses meet in Manchester City Centre and drain into the Manchester Ship Canal.

According to Greater Manchester sub-regional SFRA, there are no known reports of groundwater flooding in the Manchester authority.

Table 2-5 from the Level 1 SFRA identified one event in 1981 where the upper Mersey catchment including Chorlton, Baguley, Sinderland and Timperley Brooks causes flooding, including areas in Gorton. It is likely that these flooded sites are located further south than the proposed development due to its proximity to these watercourses.

Historic fluvial floods are identified as being best represented in data collected from the Environment Agency Mapping, Figure 4-4. Flooding from lesser sources, with stakeholder responses from United Utilities and the Highways Agency indicating sporadic flooding hotspots across the study area.

The EA Historic Flood Map confirms no historic fluvial flooding on the site.

A Pre-Development Enquiry has been submitted to United Utilities and they have not confirmed that there are any flooding incidents at the site.

4.11 Summary of Flood Risk

From the evidence collated, the main types of flooding that may apply to the proposed development site are as follows:

- Fluvial/Tidal (Very Low)
- Reservoir flooding to the site (Very Low)
- Canals (Very Low)
- Groundwater flooding to the site (Low)
- Surface water flooding to the site (Low)
- Surface water flooding from the site.

- Sewers (Low)

5.0 Mitigation

5.1 Fluvial/Tidal Mitigation

The development site lies entirely within Flood Zone 1 and therefore is at low risk of fluvial and tidal flooding. No specific measures are required at this location to mitigate against fluvial and tidal flooding.

5.2 Reservoir Flooding Mitigation

The site is considered as being at very low risk of reservoir flooding. No specific measures are required at this location to mitigate against fluvial and tidal flooding.

5.3 Groundwater Flood Mitigation

Groundwater flooding tends to be more persistent than other sources of flooding, typically lasting for weeks or months rather than hours or days. Groundwater flooding does not generally pose a significant risk to life due to the slow rate at which the water level rises; however, it can cause significant risk to property.

The site is considered at low risk of groundwater flooding, with recorded levels between 0.7m-14.13m bgl

Finished floor levels for the proposed development at to be set above the highest groundwater level.

External ground levels across the site will fall away from the proposed buildings and ensure that the creation of low points are avoided (other than those used intentionally for drainage features) in order that in the unlikely event of groundwater flooding, the flood water is safely routed away from the buildings on site.

Providing the above mitigation measures are imposed, the risk from groundwater flooding would be considered low post development.

5.4 Surface Water Flooding to the site Mitigation

The UK Government surface water flood maps indicate that there are localised areas of low risk of surface water flooding within the existing enclosed parking areas of the main building site, when reviewed against topographic survey ground levels are considered to be caused by localised low points within the site containing surface water. However, it is known that the site is well served by existing positive drainage features.

The depth of flooding is generally less than 300mm, very localised and does not appear to extend greatly within the existing site or encroach into the existing buildings on the site.

It is recommended that proposed external ground levels across the site should fall away from the proposed buildings in a manner which does not create low points where water might collect unintentionally. This will ensure that any surface water will not flow towards the proposed buildings.

Providing the above measures are implemented the flooding risk to the development site from surface water is therefore considered low post development.

5.5 Surface Water Flooding from the site Mitigation

Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated from up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments & services.

In February 2016, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Table 5-1 demonstrates the climate change allowances with central and upper end allowances being considered.

Based on the nature of the proposed development, a lifespan in excess of 60 years is anticipated. Therefore, the potential climate change allowance for 2070-2115 ranges between 20% for the central allowance and 40% for the upper end allowance. As such, a conservative allowance of 40% for climate change on peak rainfall intensity will be included in calculations which is consistent with Manchester City Council's requirements in its role of Lead Local Flood Authority.

Table 5-1: (Extract Environment Agency Guidance) Peak Rainfall Intensity Allowance in small and urban catchments

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration.

Section 6 reviews the surface water discharge options, and it anticipated that an infiltration-based solution is not an option for this site due to the underlying clay strata. It is proposed that the surface water discharges into the surface water sewer crossing the site at a restricted rate.

To minimise localised flooding within the site, the drainage design should ensure that gullies, drainage channels and drains are all suitably sized to accommodate peak storm flows. Also, all inlet features should have suitably sized sumps to catch silts and should be subject to a documented routine maintenance and cleansing regime.

For any sustainable drainage systems employed in the development, an appropriate management and maintenance plan for the sustainable drainage system for the lifetime of the development should be submitted which should include:

- Any arrangements for adoption by an appropriate public body or statutory undertaker, management and maintenance by a Site' Management Company.
- Arrangements concerning appropriate funding mechanisms for its on-going maintenance of all elements of the sustainable drainage system (i.e. inspections, regular maintenance).
- Means of access for maintenance and easements where applicable.

Assuming that the proposed drainage system is designed to provide adequate capacity, and that the private and adopted sewers will be maintained by their adopted authority, it can be assumed risk of flood from blockage or overloading is minimal.

The final design of the drainage networks shall be in accordance with the legislation set by Manchester City Council and United Utilities.

6.0 Drainage Strategy

6.1 Existing Site Drainage

A number of drainage surveys of the site have been carried out in conjunction with a detailed topographical survey which has identified existing drainage features within the site and within the vicinity of the site. All existing known drainage features are identified in Drawing 062407-CUR-00-XX-DR-D-92001-P03, included in *Appendix B*.

The existing on-site drainage for both the main site and the public carpark is largely developed as a combined system. Both of these sites connect to the public combined sewer that is running diagonally through the site from north-east to south-west.

6.2 Public Sewers

The public sewers recorded within the site are detailed in the following table and in normal accordance with United Utilities, easements will be required:

Table 6-1: Recorded Public Sewers

Public Sewer	Easement	Additional Notes
MH4202 to MH3103. A 900mm public surface water sewer flowing into the north to south along the western sit boundary at a depth of ~ 4.8m bgl.	6 metre easement which is offset 3 metres either side of the centre line.	Based on recent CCTV survey of the site, the sewer has been confirmed to be a 900 diameter circular concrete pipe. A MH chamber was confirmed 12.18m downstream of MH4202. Based on the location from the surveys, the proposed building is on the boundary of these easement.
MH3103 to MH4106. A 900mm public surface water sewer which enters the site at the south west corner and runs along the southern boundary	6 metre easement which is offset 3 metres either side of the centre line.	Based on recent CCTV survey of the site, the sewer has been confirmed to be a 900mm diameter circular concrete pipe. Based on the location from the surveys, the proposed building is on the boundary of these easement.
MH4110 to MH4112. A 375mm combined sewer flowing diagonally from the eastern side of the main site to the south western boundary	Once the Eastland Homes building and the Suburban Pub are demolished, this section of public asset is no longer in use and abandonment has been agreed in principle with UU	Based on recent CCTV survey of the site, the sewer was confirmed to be U-shaped with a flat top and approximate diameter of 375mm.

6.3 Proposed Foul Water Drainage

A separate foul and surface water system is proposed.

The foul drainage from the new building is proposed to discharge via a single new connection to UU MH4200 within Garratt Way. The proposed pipe will be thrust bored into MH4200.

Based on known invert levels of the existing public sewer a gravity connection is achievable.

The peak foul flow rate for the development has been calculated based on above ground drainage proposals provided by the project Mechanical and Electrical (M&E) consultant, FutureServ, dated April 2019. These layouts are included in Appendix B. These calculations are based on expected number of appliances and are in accordance with BS EN 12056.

The peak flow rate is estimated as 8.4 l/s from the new community hub building utilising a Frequency factor of 1.0 for appliances open to the public. The flow rate calculation provided in *Appendix D*.

A Pre-Development Enquiry has been issued to United Utilities and they have confirmed that foul will be allowed to drain to the combined public sewer at an unrestricted rate.

The United Utilities Correspondence is enclosed in *Appendix C*.

Any connection to the public sewer will require a Section 106 Agreement with United Utilities.

The proposed drainage strategy is shown on the separate drawing GCH-CUR-XX-XX-DR-C-92002.

6.4 Proposed Surface Water Drainage Options

Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated for up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments and services.

In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration.

Infiltration

The findings of Phase 2 Site Investigation published in April 2019 confirmed that Made Ground is underlain by Glacial Till which is described as firm to very stiff brown occasional grey mottling very gravelly sandy clay.

The Phase 2 Site Investigation reports, exploratory hole plan and logs are provided in *Appendix B*.

Based in the results of these intrusive works it is therefore considered that an infiltration-based discharge is unsuitable for the proposed development surface water discharge.

Watercourse

The nearest recorded waterbody to the site is Gore Brook, indicated to lie 300m to the south of the site, running through Sunny Brow Park.

The area in the vicinity of the site is highly urbanised and heavily serviced with below ground utilities, making a route through, to connect to this watercourse unviable.

Surface Water Sewer

A Pre-Development Enquiry has been issued to United Utilities for the main site and the public car park as a combined development. United Utilities have confirmed that surface water can be discharged to the 900mm surface water sewer crossing the site at a restricted discharge rate of 11 l/s given infiltration is not a viable option

The rate of 11l/s is a significant improvement on existing brownfield rates as shown in calculations in Appendix D. These discharge rates satisfy the requirement by Manchester City Council in its role of Lead Local Flood Authority (LLFA) that brownfield sites provide a betterment ratio of 0.5, i.e. reduce runoff by 50%.

The United Utilities Correspondence is enclosed in *Appendix C*.

Table 6 below summarises the options for surface water disposal following site assessment, and on-site investigations and discussions with United Utilities.

Table 6-2: Summary of Surface Water Disposal

Surface Water Disposal Method	Potential	Description
Infiltration	X	Clay strata identified full depth of boreholes. Ground water was encountered 2.3-5.0m below ground level making infiltration unsuitable.
Watercourse	X	Discharge to a nearby watercourse is not a viable option as too far away, no information on capacity or levels and no suitable route through highly developed area.
Surface Water Sewer	✓	There are appropriate surface water networks within the vicinity of the site.

7.0 Surface Water Drainage Strategy

7.1 Peak Flow Control

The limiting discharge for the proposed development is determined by United Utilities requirements. The proposed discharge rates also satisfy the requirement set by the LLFA that brownfield sites apply a betterment ratio of 0.5, to reduce runoff by 50%.

As such the peak allowable runoff from the main site and the proposed public carpark is 11 l/s.

In order to restrict flows, it will be necessary to provide storage or attenuation of the surface water to restrict the peak run off from the sites in excess of 11l/s. The requirements for attenuation are discussed in Section 7.2.

7.2 Attenuation Requirements

The surface water drainage system is designed in accordance with Non-statutory technical standards for sustainable drainage systems (March 2015). This guidance recommends that:

- Flooding does not occur on any part of the site for a 1 in 30 annual probability rainfall event, unless an area is designed to hold and/or convey water as part of the design;
- Flooding does not occur in any part of a building during a 1 in 100 annual probability event; and
- Flows resulting from rainfall in excess of a 1 in 100 annual probability rainfall event are managed in exceedance routes that minimise the risks to people and property, so far as is reasonably practicable.

Based on the proposed site plans, the carparks will accommodate storage above and between the 30-yr and 100-yr rainfall events using kerbs and high entry points into the carpark. Therefore, underground storage is only required for the 30-yr plus 40% climate change event within the parking areas. The main building site however will not be able to provide above ground storage due to the proposed levels of the carparking and therefore will provide underground storage for the 100-yr plus 40% climate change event.

The main site and public parking area will be one network with a single outfall. Proposed Drainage Layout drawing GCH-CUR-XX-XX-DR-C-92002 includes the attenuation volumes.

The surface water attenuation requirements have been calculated using the Causeway Flow software package, provided in *Appendix D*.

7.3 Exceedance Flow

The two proposed (public and staff) carparks have sufficient capacity to store exceedance flows due to the large open area and presence of kerbed edges.

Based on the proposed main site levels, once the capacity of the attenuation tank is reached, the small carpark on the north west corner of the site will begin to flood. The immediate entry to the building is sloped to prevent exceedance flows from entering the internal space.

No significant raising of ground levels are proposed beyond the existing building footprint, therefore there will be no displacement of potential floodwater within the site.

7.4 Water Quality

Surface water run-off from hard paved areas at risk of contamination should receive water quality treatment. Parking for hospitals and retail is considered medium hazard in terms of contamination.

Table 7-1 illustrates the pollution hazard indices for different land use classifications from The CIRIA SuDS Manual C753 (2015).

Table 7-1: Pollution Hazard indices for land use classification (Table 26.2 the CIRIA SuDS manual 2015)

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 (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg 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 ¹	High	0.8 ²	0.8 ²	0.9 ²

Treatment could be provided using sustainable methods such as: filter strips, filter drains, swales, bio-retention systems, and/or permeable paving. Table 7-2 illustrates the SuDS Component mitigation indices from The CIRIA SuDS Manual C753 (2015).

Table 7-2: Indicative SuDS mitigation indices (Table 26.3 the CIRIA SuDS manual 2015)

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters			
Type of SuDS component	Mitigation indices¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ³	0.7 ⁴	0.7	0.5
Wetland	0.8 ⁴	0.8	0.6
Proprietary treatment systems ^{5,6}	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.		

Notes

- 1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.
- 2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.
- 3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.
- 4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.
- 5 See Chapter 14 for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: <http://tinyurl.com/qf7yuj7>
- 6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

The selection of treatment should ensure that the SuDS mitigation component index (Table 7-2) exceeds the pollution hazard index (Table 7-1). Where two stages of treatment are required, the second stage of treatment should account for reduced performance due to lower inflows; therefore 0.5 (mitigation index) should be used.

Given the proposed development layout and site constraints, treatment will be provided in the form of a proprietary bypass separator downstream of the proposed hydrobrakes and prior to entry into the Public network.

The proposals for pollution protection should be agreed with Manchester City Council and the Lead Local Flood Authority.

Any connection to the public sewer will require a Section 106 Agreement with United Utilities.

7.5 Maintenance

SuDS elements within the curtilage of the site would be the responsibility of the owner of the development.

Pipe network, designed to Sewers for Adoption (7th edition) standard, may be adopted by UU, including the attenuation tanks and hydrobrake(s) subject to agreement. Other SuDS features, should these be incorporated may be maintained by a management company.

An indicative maintenance schedule for the attenuation system is presented in Table 7-3.

Table 7-3: Maintenance Requirements

Schedule	Required action	Frequency
Attenuation Structure		
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial maintenance	Repair/rehabilitation of inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually and after large storms
	Survey inside of tank for sediment build up and remove if necessary	Every 5 years or as required
Flow Control Devices – Vortex and Orifice flow controls		
Routine maintenance	Inspection	Quarterly
	Litter / debris removal	Monthly or as required
Occasional maintenance	Sediment removal	6 monthly
Remedial maintenance	Repair (as a result of damage or vandalism)	As required
Oil Bypass Separator		
Routine maintenance	Inspection	Monthly during first half year of operation, then every six months

Schedule	Required action	Frequency
	Litter/Debris removal	Monthly for 3 months, then biannually
Occasional maintenance	Remove sediment, oil, grease and floatables	Annually
	Change filter media	As recommended by manufacturer
Remedial Actions	Repair/replace malfunctioning parts or structures	As required

7.6 Summary

The purpose of this FRA and Drainage Strategy is to demonstrate that flood risk is managed appropriately, and a surface water drainage strategy is feasible for the site given the development proposals and the land available. The proposals provide the opportunity for the inclusion of SuDS elements, ensuring that there will be no increase in surface water runoff from the proposed development. The storage calculations may be refined at the detailed design stage and a final decision made on the types of storage to be provided.

Appendices

Appendix A

Empty. See Document Transmittal register, ref: 062407-CUR-00-XX-Z-0001.

Appendix B

Topographic & Below Ground Drainage Survey

CCTV Survey

Phase 2 Site Investigation

Public Sewer Records



SEP Drainage Surveys Ltd
Unit 6 Holland Business Park,
Spa Lane, Lathom
Tel: 01695 713349
Fax: 01695 713349
Email: steve.scholes@sepltd.com

Project-information

Project name :
Gorton Hub Full Report

Project Number :

Contact :

Date :
22/11/2018

Client: **Morgan Sindall**
Contact Name: **Dan**
Department: **Site Contact**
Road: **Anchorage Way**
Town: **Salford Quays**
County: **Lancashire**
Telephone:
Fax:
Mobile: **07973 886284**
E-mail: **Jason.Ward@morgansindall.com**

Site: **Gorton Hub**
Contact Name: **Dan**
Department: **Site Contact**
Road: **Off Garrett Way**
Town: **Gorton**
County: **Lancashire**
Telephone:
Fax:
Mobile:
E-mail:

Contractor **SEP Drainage Surveys Ltd**
Contact Name: **Steve Scholes**
Department: **Director**
Road: **Unit 6 Holland Business Park,**
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Telephone: **01695 713349**
Fax: **01695 713349**
Mobile: **01695 713349**
E-mail: **steve.scholes@sepltd.com**

Inspection report

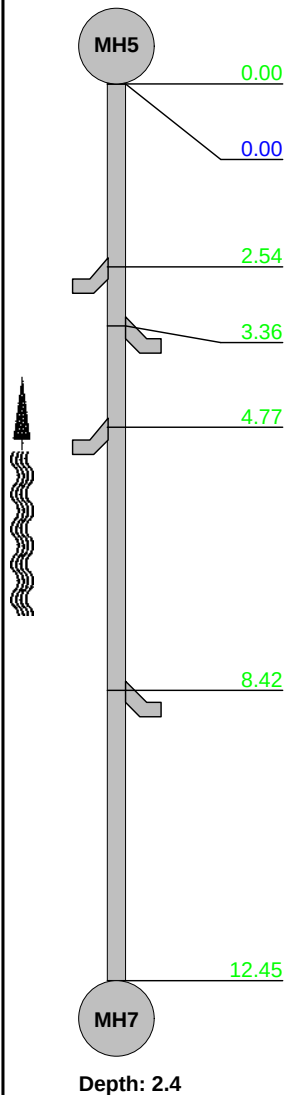
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Weather no rain or snow	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings MH5 (U/S) MH7	Location details: Catchment: Pipe Shape : Pipe Length	U-shaped with flat top	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH7 2.4 MH5 2.3
Use: Year laid : Purpose : Total length :	Combined Z Sample survey to determine asset condition 12.45 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	375 mm Brick		

Comment :

1:105 Position
Depth: 2.3

Observation



Start node type, manhole, reference number : MH5

Water level, 10% of the vertical dimension

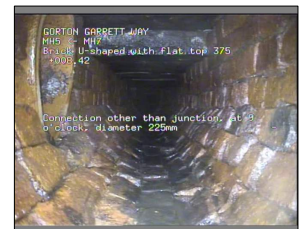
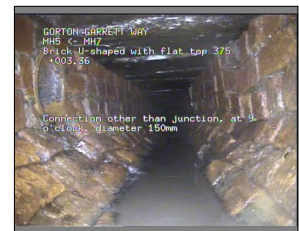
Connection other than junction, at 3 o'clock, diameter 150mm

Connection other than junction, at 9 o'clock, diameter 150mm

Connection other than junction, at 3 o'clock, diameter 150mm

Connection other than junction, at 9 o'clock, diameter 225mm

Finish node type, manhole reference number: MH7



Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
1

PLR Suffix :
X

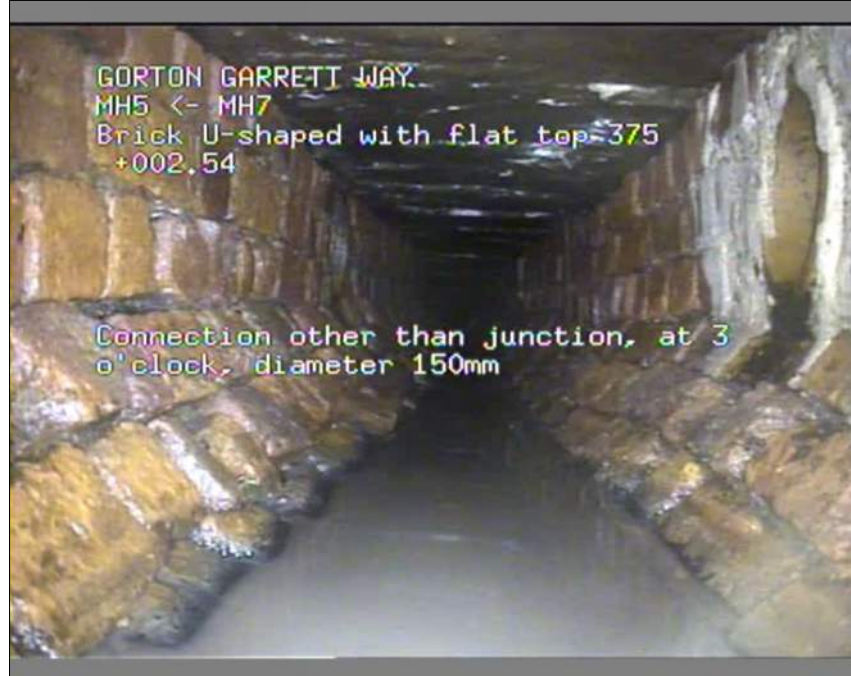


Photo: 1_1_9_A.JPG

2.54m, Connection other than junction, at 3 o'clock, diameter 150mm



Photo: 1_1_10_A.JPG

3.36m, Connection other than junction, at 9 o'clock, diameter 150mm

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
1

PLR Suffix :
X



Photo: 1_1_11_A.JPG

4.77m, Connection other than junction, at 3 o'clock, diameter 150mm



Photo: 1_1_12_A.JPG

8.42m, Connection other than junction, at 9 o'clock, diameter 225mm



Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
1

PLR Suffix :
X



Photo: 1_1_13_A.JPG
12.45m, Finish node type, manhole reference number: MH7

Inspection report

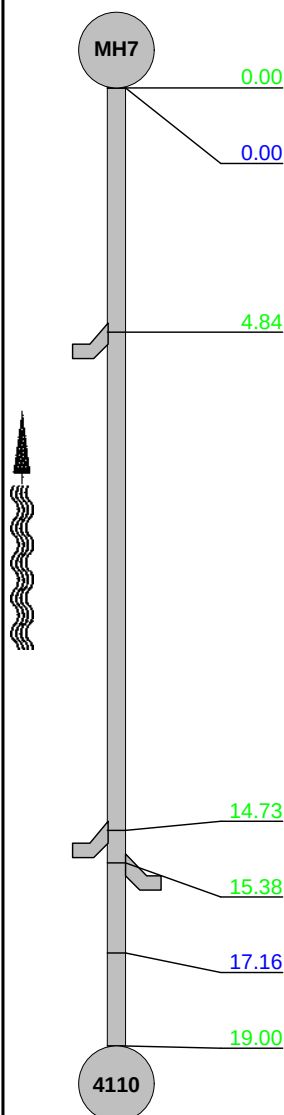
Date : 22/11/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 2	PLR SUFFIX: X
Weather no rain or snow	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings MH7 (U/S) 4110	Location details: Catchment: Pipe Shape : Pipe Length	U-shaped with flat top	U/S MH : U/S Depth : D/S MH : D/S Depth :	4110 MH7 MH7 2.4
Use: Year laid : Purpose : Total length :	Combined Z Sample survey to determine asset condition 19.00 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	375 mm Brick Brick		

Comment :

1:150 Position
Depth: 2.4

Observation



Start node type, manhole, reference number : MH7

Water level, 05% of the vertical dimension

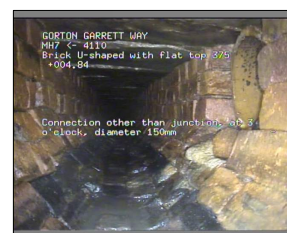
Connection other than junction, at 3 o'clock, diameter 150mm

Connection other than junction, at 3 o'clock, diameter 150mm

Connection other than junction, at 9 o'clock, diameter 150mm

Settled deposits, fine, 10% cross-sectional area loss

Finish node type, manhole reference number: 4110



4.84 m



14.73 m



15.38 m



19 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	1	2	0.11	2	3



Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
2

PLR Suffix :
X

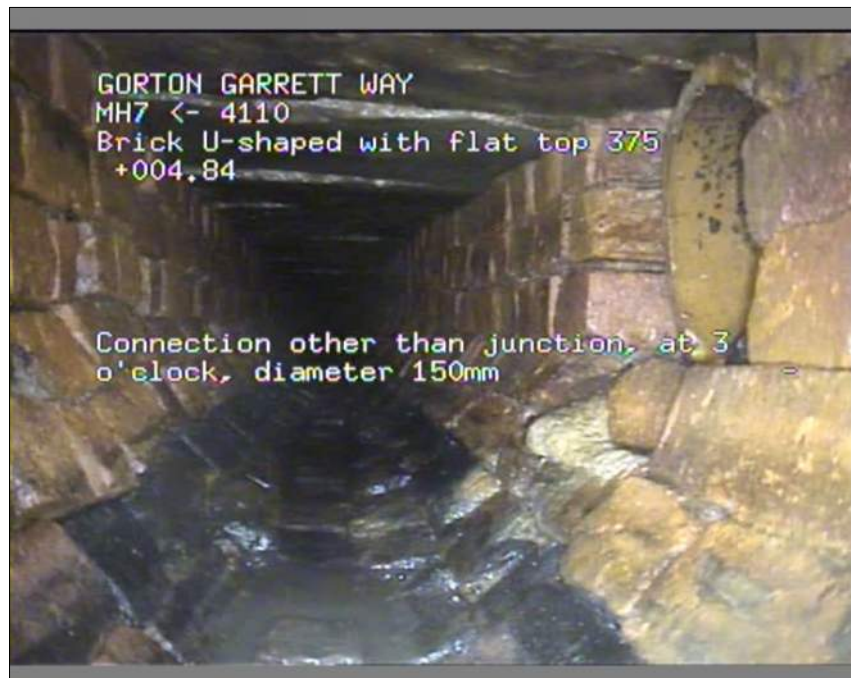


Photo: 3_3_16_A.JPG

4.84m, Connection other than junction, at 3 o'clock, diameter 150mm



Photo: 3_3_17_A.JPG

14.73m, Connection other than junction, at 3 o'clock, diameter 150mm

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
2

PLR Suffix :
X



Photo: 3_3_18_A.JPG
15.38m, Connection other than junction, at 9 o'clock, diameter 150mm



Photo: 3_3_20_A.JPG
19m, Finish node type, manhole reference number: 4110

Inspection report

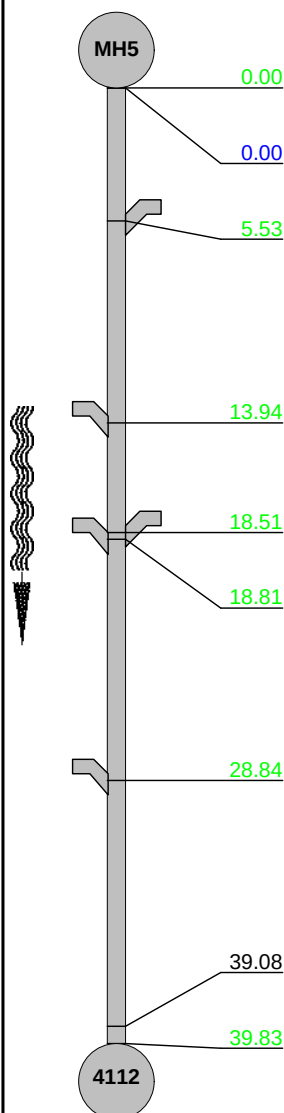
Date : 22/11/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 3	PLR SUFFIX: X
Weather no rain or snow	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings MH5 (D/S) 4112	Location details: Catchment: Pipe Shape : Pipe Length	U-shaped with flat top	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH5 2.3 4112
Use: Year laid : Purpose : Total length :	Combined Z Sample survey to determine asset condition 39.83 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	375 mm Brick		

Comment :

1:315 Position
Depth: 2.3

Observation



Start node type, manhole, reference number : MH5

Water level, 05% of the vertical dimension

Connection intruding, at 9 o'clock, diameter 225mm, intrusion 10%

Connection other than junction, at 3 o'clock, diameter 225mm

Connection other than junction, at 9 o'clock, diameter 225mm

Connection other than junction, at 3 o'clock, diameter 150mm Remarks: CAPPED OFF

Connection other than junction, at 3 o'clock, diameter 150mm

Material changes, vitrified clay

Finish node type, manhole reference number: 4112



5.53 m



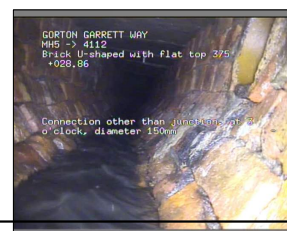
13.94 m



18.51 m



18.81 m



28.84 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	1	2	0.05	2	3

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
3

PLR Suffix :
X



Photo: 4_4_23_A.JPG

5.53m, Connection intruding, at 9 o'clock, diameter 225mm, intrusion 10%



Photo: 4_4_24_A.JPG

13.94m, Connection other than junction, at 3 o'clock, diameter 225mm

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
3

PLR Suffix :
X



Photo: 4_4_25_A.JPG

18.51m, Connection other than junction, at 9 o'clock, diameter 225mm



Photo: 4_4_26_A.JPG

18.81m, Connection other than junction, at 3 o'clock, diameter 150mm

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
3

PLR Suffix :
X



Photo: 4_4_27_A.JPG
28.84m, Connection other than junction, at 3 o'clock, diameter 150mm



Photo: 4_4_28_A.JPG
39.08m, Material changes, vitrified clay



Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
3

PLR Suffix :
X

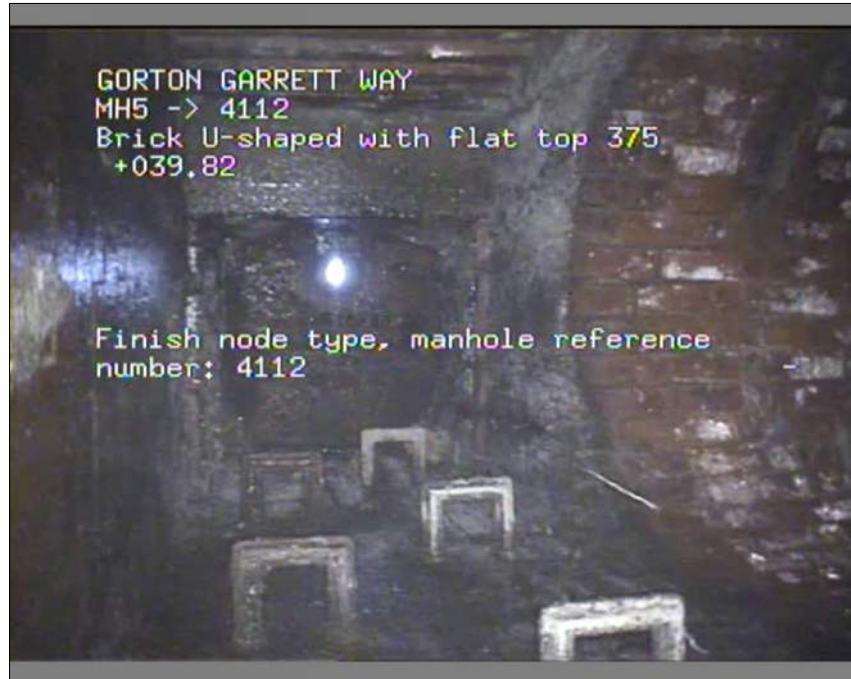


Photo: 4_4_29_A.JPG
39.83m, Finish node type, manhole reference number: 4112



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Inspection report

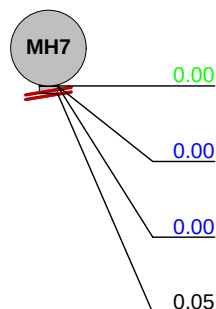
Date : 23/11/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 4	PLR SUFFIX: X
Weather no rain or snow	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings MH7 (U/S) UNKNOWN	Location details: Catchment: Pipe Shape : Pipe Length	U-shaped with flat top	U/S MH : U/S Depth : D/S MH : D/S Depth :	UNKNOWN MH7 2.4
Use: Year laid : Purpose : Total length :	Combined Z Sample survey to determine asset condition 0.05 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 375 mm Brick		

Comment :

1:50 Position
Depth: 2.4

Observation



Start node type, manhole, reference number : MH7

Water level, 05% of the vertical dimension

Attached deposits, encrustation, from 12 to 12 o'clock, 95% cross-sectional area loss Remarks: CAPPED OFF

Survey abandoned Remarks: CAPPED OFF WITH CONCRETE



0 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	1	10	20	10	5



Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
23/11/2018

Section number :
4

PLR Suffix :
X



Photo: 5_5_33_A.JPG

0m, Attached deposits, encrustation, from 12 to 12 o'clock, 95% cross-sectional area loss



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Inspection report

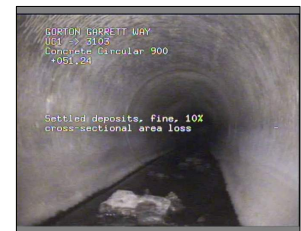
Date : 23/11/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 5	PLR SUFFIX: X
Weather no rain or snow	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings UC1 (D/S) 3103	Location details: Catchment: Pipe Shape : Pipe Length	Circular	U/S MH : U/S Depth : D/S MH : D/S Depth :	UC1 4.8 3103
Use: Year laid : Purpose : Total length :	Surface water Z Sample survey to determine asset condition 60.47 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	900 mm Concrete		

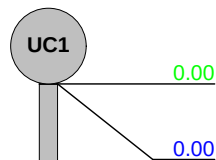
Comment :

1:480 Position
Depth: 4.8

Observation



51.24 m



Start node type, manhole, reference number : UC1

Water level, 05% of the vertical dimension

51.24

Settled deposits, fine, 10% cross-sectional area loss

60.47

Finish node type, manhole reference number: 3103

UNABLE TO SET UP ON THIS

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	1	2	0.03	2	3



Inspection pictures

Place : GORTON	Road : GARRETT WAY	Date : 23/11/2018	Section number : 5	PLR Suffix : X
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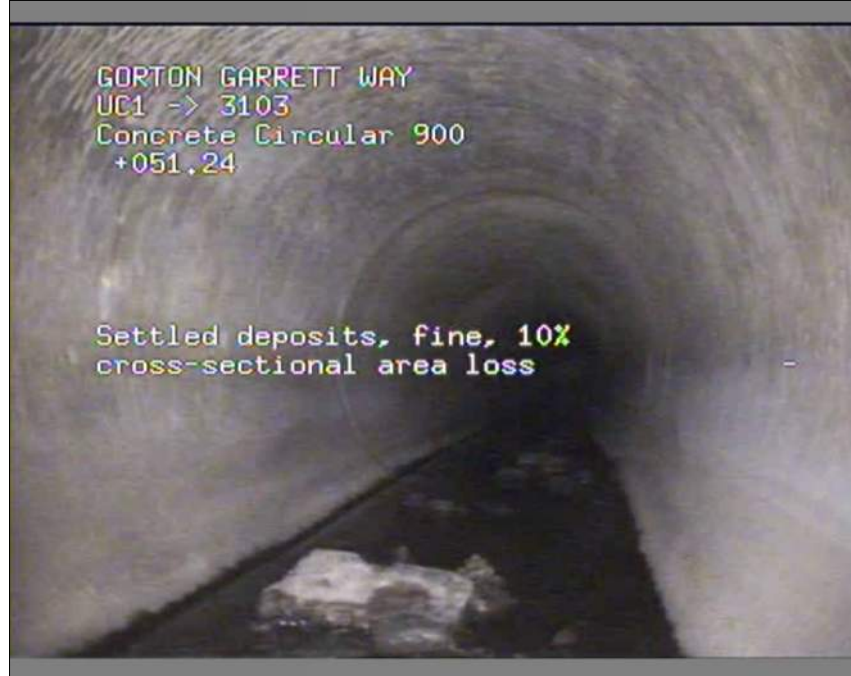


Photo: 6_6_38_A.JPG
 51.24m, Settled deposits, fine, 10% cross-sectional area loss



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Inspection report

Date : 23/11/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 6	PLR SUFFIX: X
Weather no rain or snow	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings UC1 (U/S) 4202	Location details: Catchment: Pipe Shape : Pipe Length	Circular	U/S MH : U/S Depth : D/S MH : D/S Depth :	4202 4202 UC1 4.8
Use: Year laid : Purpose : Total length :	Surface water Z Sample survey to determine asset condition 12.18 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	900 mm Concrete Concrete		

Comment :

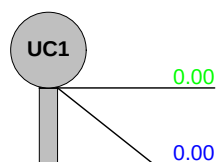
1:105 Position

Depth: 4.8

Observation



12.18 m



Start node type, manhole, reference number : UC1

Water level, 05% of the vertical dimension

Finish node type, manhole reference number: 4202

UNABLE TO SET UP ON THIS

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1



Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
23/11/2018

Section number :
6

PLR Suffix :
X

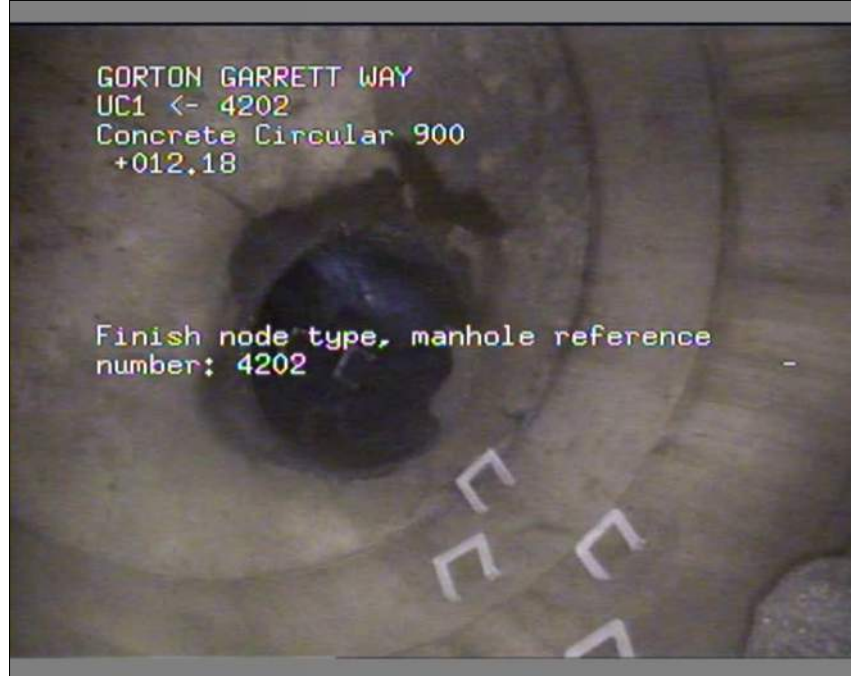


Photo: 7_7_42_A.JPG
12.18m, Finish node type, manhole reference number: 4202



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Inspection report

Date : 03/12/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 7	PLR SUFFIX: X
Weather rain	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

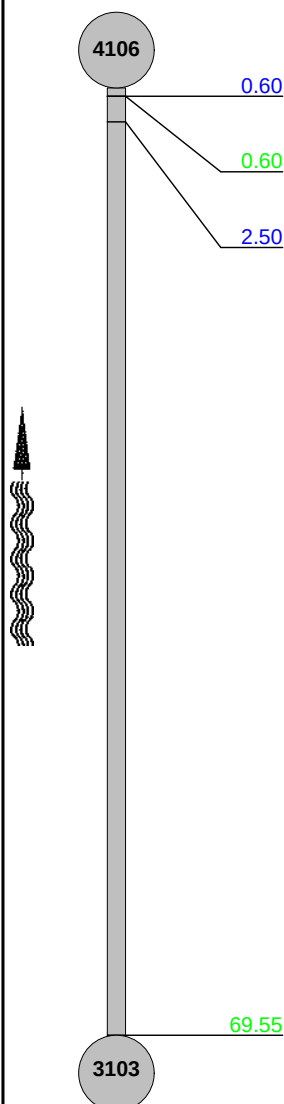
Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings 4106 (U/S) 3103	Location details: Catchment: Pipe Shape : Pipe Length	Circular	U/S MH : U/S Depth : D/S MH : D/S Depth :	3103 4106 4106 6.55
Use: Year laid : Purpose : Total length :	Surface water Z Sample survey to determine asset condition 69.55 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	900 mm Concrete Concrete		

Comment :

1:555 Position

Depth: 6.55

Observation

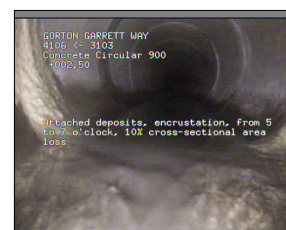


Water level, 15% of the vertical dimension

Start node type, manhole, reference number : 4106

Attached deposits, encrustation, from 5 to 7 o'clock, 10% cross-sectional area loss

Finish node type, manhole reference number: 3103



2.5 m



69.55 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	1	2	0.03	2	3



Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
03/12/2018

Section number :
7

PLR Suffix :
X

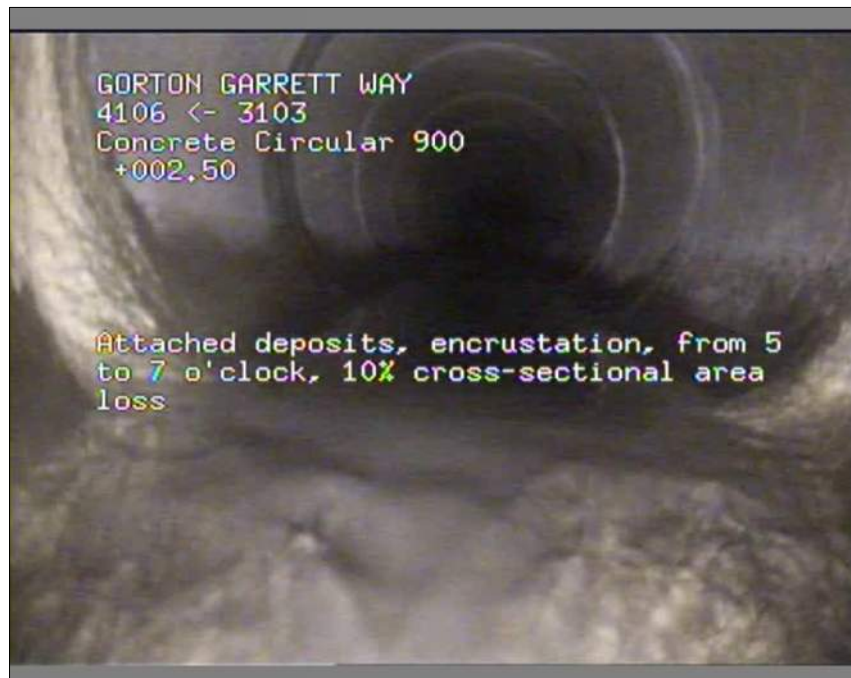


Photo: 8_8_46_A.JPG

2.5m, Attached deposits, encrustation, from 5 to 7 o'clock, 10% cross-sectional area loss



Photo: 8_8_47_A.JPG

69.55m, Finish node type, manhole reference number: 3103



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Inspection report

Date : 04/12/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 8	PLR SUFFIX: X
Weather rain	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings UC2 (D/S) UC3	Location details: Catchment: Pipe Shape : Pipe Length	Circular	U/S MH : U/S Depth : D/S MH : D/S Depth :	UC2 1.48 UC3 2.1
Use: Year laid : Purpose : Total length :	Surface water Z Sample survey to determine asset condition 22.87 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	225 mm Polyvinyl chloride		

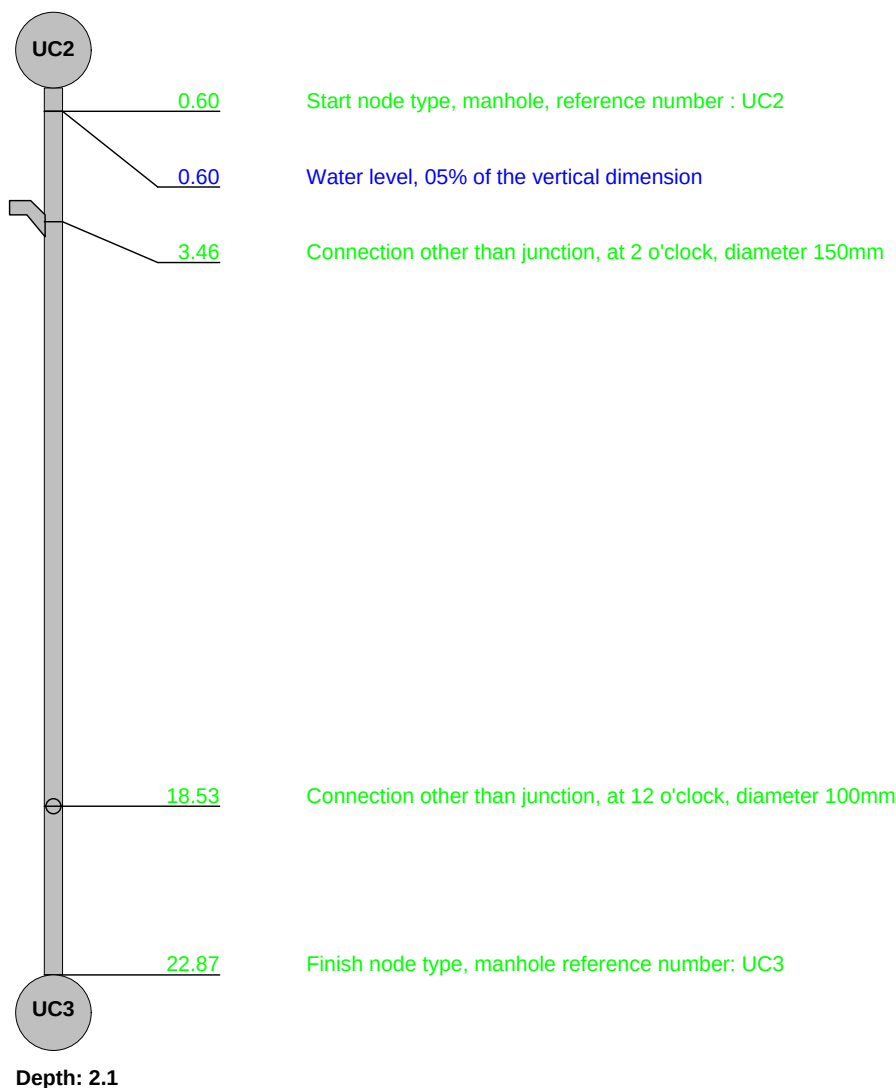
Comment :

1:195 Position
Depth: 1.48

Observation



22.87 m



Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1



Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
04/12/2018

Section number :
8

PLR Suffix :
X



Photo: 9_9_57_A.JPG
22.87m, Finish node type, manhole reference number: UC3

Inspection report

Date : 04/12/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 9	PLR SUFFIX: X
Weather rain	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

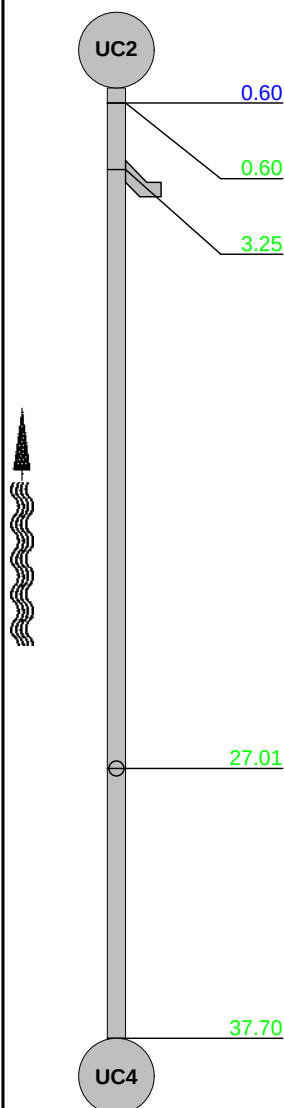
Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings UC2 (U/S) UC4	Location details: Catchment: Pipe Shape : Pipe Length	Circular	U/S MH : U/S Depth : D/S MH : D/S Depth :	UC4 UC2 UC2 1.48
Use: Year laid : Purpose : Total length :	Surface water Z Sample survey to determine asset condition 37.70 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	225 mm Polyvinyl chloride		

Comment :

1:300 Position

Depth: 1.48

Observation



Water level, 05% of the vertical dimension

Start node type, manhole, reference number : UC2

Connection other than junction, at 10 o'clock, diameter 150mm



3.25 m



27.01 m



37.7 m

Junction, at 12 o'clock, diameter 100mm Remarks: capped off

Finish node type, manhole reference number: UC4

IN TESCO NO ACCESS

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
04/12/2018

Section number :
9

PLR Suffix :
X



Photo: 10_10_62_A.JPG

3.25m, Connection other than junction, at 10 o'clock, diameter 150mm



Photo: 10_10_63_A.JPG

27.01m, Junction, at 12 o'clock, diameter 100mm



Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
04/12/2018

Section number :
9

PLR Suffix :
X



Photo: 10_10_64_A.JPG
 37.7m, Finish node type, manhole reference number: UC4



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Inspection report

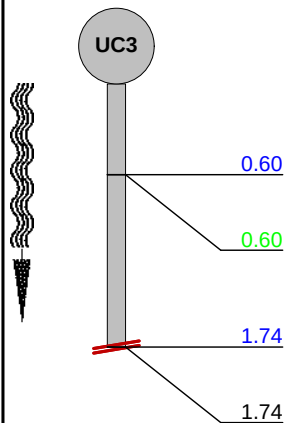
Date : 04/12/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 10	PLR SUFFIX: X
Weather rain	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings UC3 (D/S) 4106	Location details: Catchment: Pipe Shape : Pipe Length	Circular	U/S MH : U/S Depth : D/S MH : D/S Depth :	UC3 2.1 4106 6.55
Use: Year laid : Purpose : Total length :	Surface water Z Sample survey to determine asset condition 1.74 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	225 mm Polyvinyl chloride		

Comment :

1:50 Position
Depth: 2.1

Observation



Water level, 05% of the vertical dimension

Start node type, manhole, reference number : UC3

Line deviates down Remarks: DROP SHAFT

Survey abandoned Remarks: UNABLE TO GO DOWN DROP SHAFT



1.74 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1



Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
04/12/2018

Section number :
10

PLR Suffix :
X



Photo: 11_11_61_A.JPG
1.74m, Survey abandoned

Inspection report

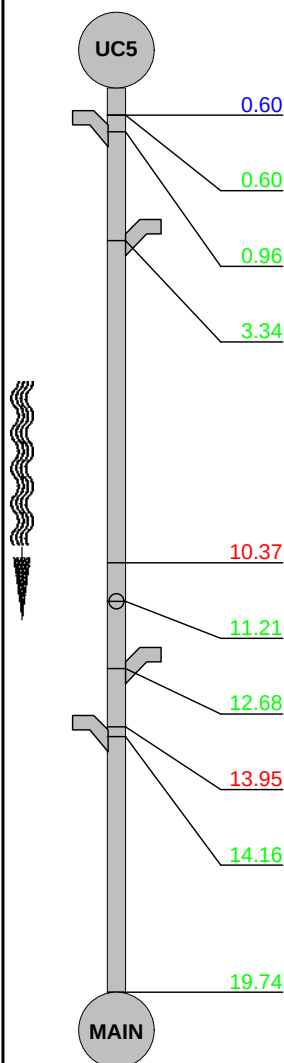
Date : 04/12/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 11	PLR SUFFIX: X
Weather rain	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings UC5 (D/S) MAIN	Location details: Catchment: Pipe Shape : Pipe Length	Circular	U/S MH : U/S Depth : D/S MH : D/S Depth :	UC5 2.9 MAIN
Use: Year laid : Purpose : Total length :	Combined Z Sample survey to determine asset condition 19.74 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	225 mm Vitrified clay		

Comment :

1:165 Position
Depth: 2.9

Observation



Water level, 05% of the vertical dimension

Start node type, manhole, reference number : UC5

Junction, at 3 o'clock, diameter 150mm

Junction, at 10 o'clock, diameter 150mm

Fracture, multiple, from 12 to 12 o'clock

Junction, at 12 o'clock, diameter 150mm Remarks: BROKEN

Junction, at 10 o'clock, diameter 150mm

Joint displaced, medium

Junction, at 3 o'clock, diameter 100mm

Finish node type, major connection without manhole reference number: MAIN



0.96 m



3.34 m



10.37 m



11.21 m



12.68 m

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
2	80	4.1	81	4	0	0	0	0	1

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
04/12/2018

Section number :
11

PLR Suffix :
X

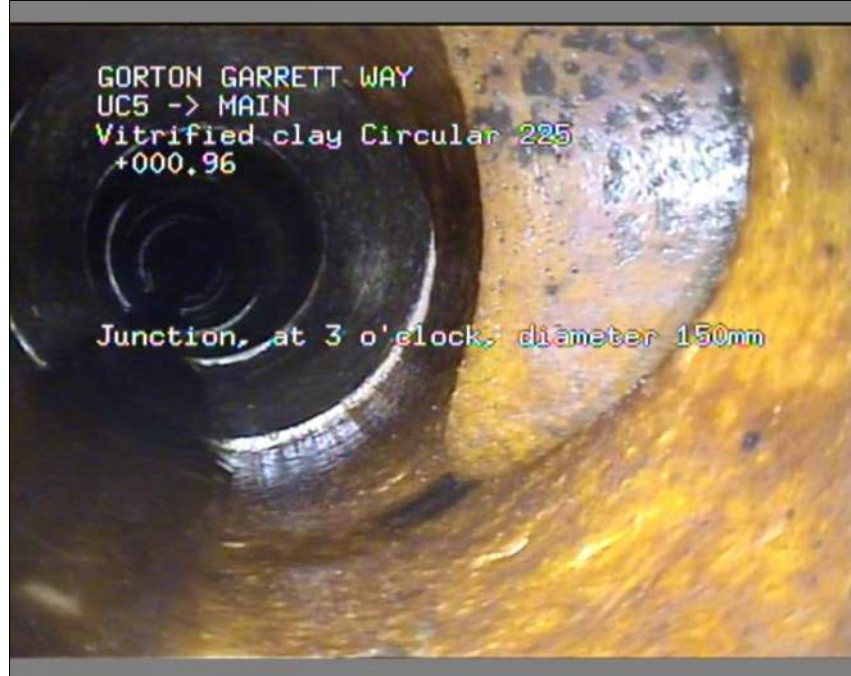


Photo: 12_12_67_A.JPG
0.96m, Junction, at 3 o'clock, diameter 150mm

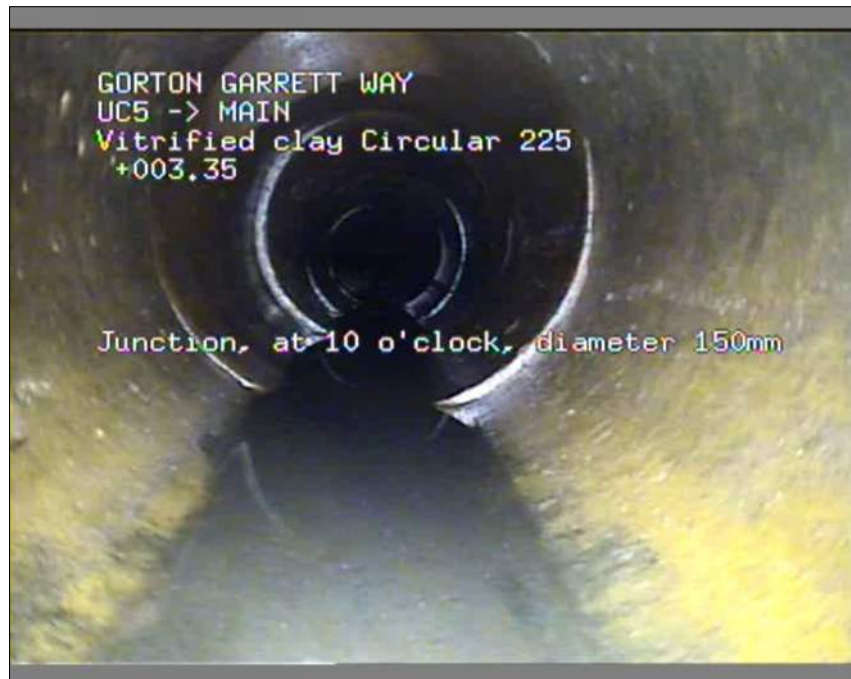


Photo: 12_12_68_A.JPG
3.34m, Junction, at 10 o'clock, diameter 150mm

Inspection pictures

Place : GORTON	Road : GARRETT WAY	Date : 04/12/2018	Section number : 11	PLR Suffix : X
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Photo: 12_12_69_A.JPG
10.37m, Fracture, multiple, from 12 to 12 o'clock

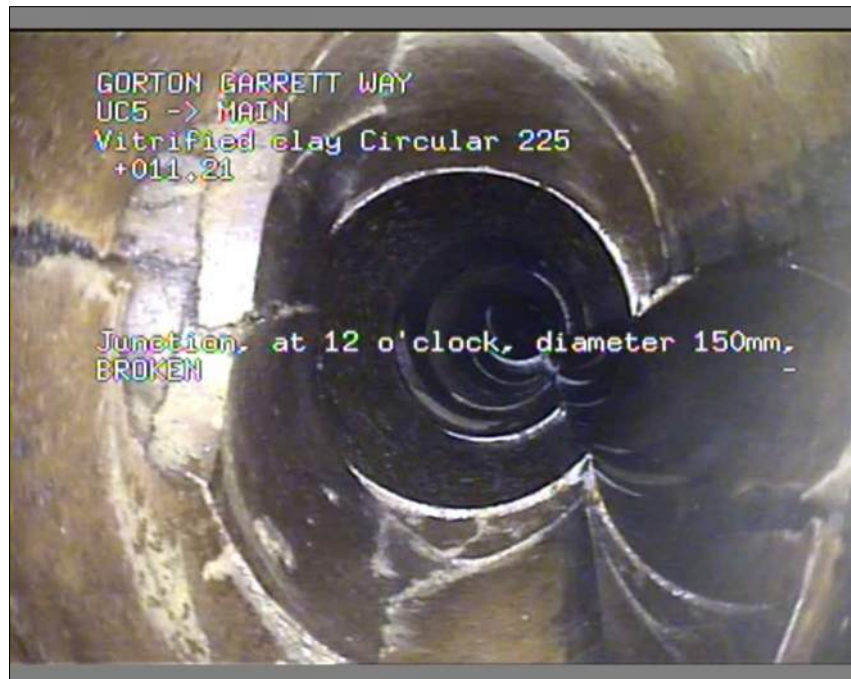


Photo: 12_12_70_A.JPG
11.21m, Junction, at 12 o'clock, diameter 150mm

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
04/12/2018

Section number :
11

PLR Suffix :
X



Photo: 12_12_71_A.JPG
12.68m, Junction, at 10 o'clock, diameter 150mm

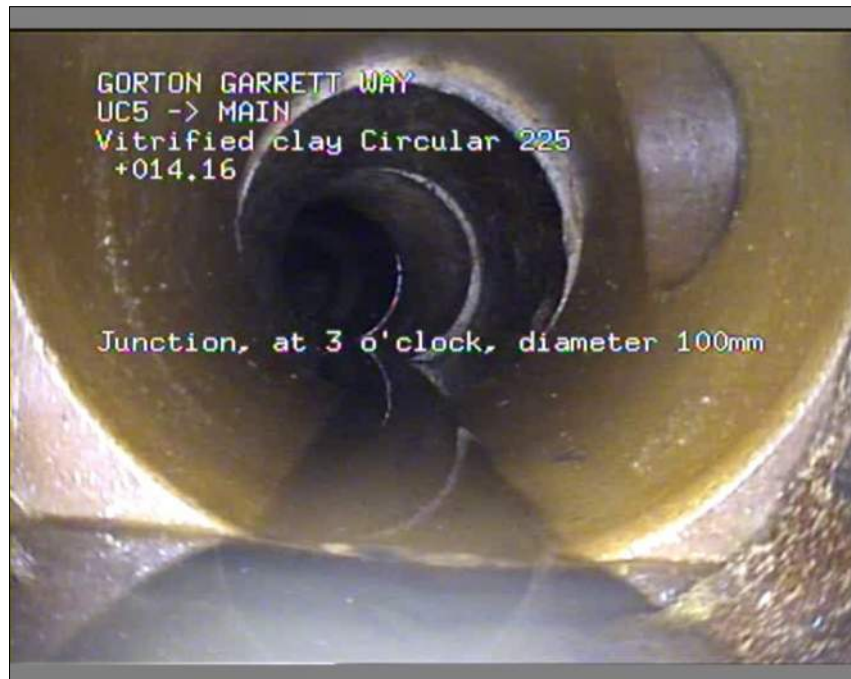


Photo: 12_12_73_A.JPG
14.16m, Junction, at 3 o'clock, diameter 100mm



Inspection pictures

Place : GORTON	Road : GARRETT WAY	Date : 04/12/2018	Section number : 11	PLR Suffix : X
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Photo: 12_12_74_A.JPG

19.74m, Finish node type, major connection without manhole reference number: MAIN

Inspection report

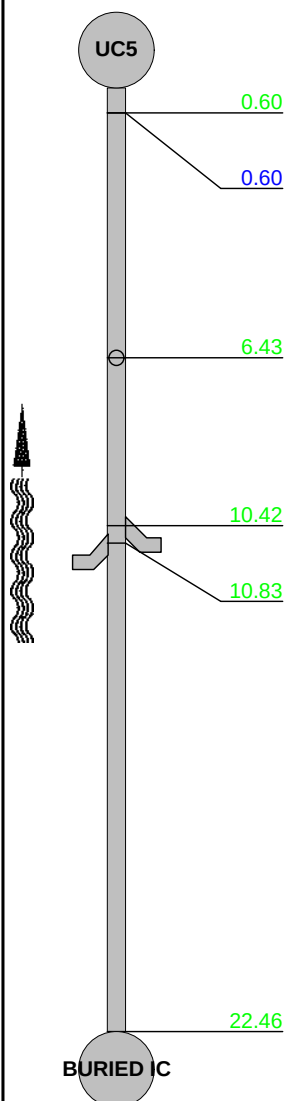
Date : 04/12/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 12	PLR SUFFIX: X
Weather rain	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings UC5 (U/S) BURIED IC	Location details: Catchment: Pipe Shape : Pipe Length	Circular	U/S MH : U/S Depth : D/S MH : D/S Depth :	BURIED IC UC5 2.9
Use: Year laid : Purpose : Total length :	Combined Z Sample survey to determine asset condition 22.46 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	225 mm Vitrified clay		

Comment :

1:180 Position
Depth: 2.9

Observation



Start node type, manhole, reference number : UC5

Water level, 15% of the vertical dimension

Junction, at 12 o'clock, diameter 150mm

Junction, at 10 o'clock, diameter 150mm

Junction, at 2 o'clock, diameter 150mm

Finish node type, inspection chamber reference number: BURIED IC
Remarks: UPSTREAM CAPPED OFF



6.43 m



10.42 m



10.83 m



22.46 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0	0	0	1	0	0	0	0	1

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
04/12/2018

Section number :
12

PLR Suffix :
X



Photo: 13_13_79_A.JPG
6.43m, Junction, at 12 o'clock, diameter 150mm



Photo: 13_13_80_A.JPG
10.42m, Junction, at 10 o'clock, diameter 150mm

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
04/12/2018

Section number :
12

PLR Suffix :
X



Photo: 13_13_81_A.JPG
 10.83m, Junction, at 2 o'clock, diameter 150mm



Photo: 13_13_82_A.JPG
 22.46m, Finish node type, inspection chamber reference number: BURIED IC

Inspection report

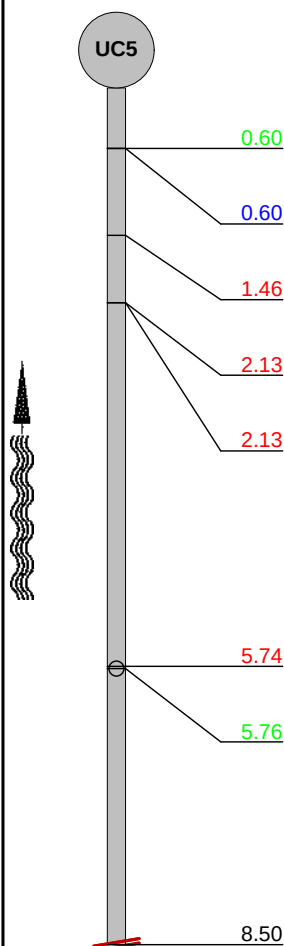
Date : 04/12/2018	Job number :	Section Type :	Operator : L ROBERTS	Section number : 13	PLR SUFFIX: X
Weather rain	Vehicle : MT16 XMO	Camera : camera 1	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	GORTON GARRETT WAY Property with buildings UC5 (U/S) UC7	Location details: Catchment: Pipe Shape : Pipe Length	Circular	U/S MH : U/S Depth : D/S MH : D/S Depth :	UC7 UC5 UC5 2.9
Use: Year laid : Purpose : Total length :	Combined Z Sample survey to determine asset condition 8.50 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	225 mm Vitrified clay		

Comment :

1:75 Position
Depth: 2.9

Observation



Start node type, manhole, reference number : UC5

Water level, 05% of the vertical dimension

Crack, longitudinal, at 2 o'clock

Hole in drain/sewer, from 1 to 2 o'clock

Crack, longitudinal, at 9 o'clock

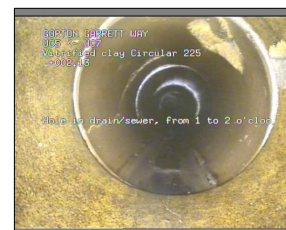
Fracture, multiple, from 12 to 12 o'clock

Junction, at 12 o'clock, diameter 150mm

Survey abandoned Remarks: DUE TO DEBRIS



1.46 m



2.13 m



2.13 m



5.74 m



5.76 m

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
4	100	21.18	180	4	0	0	0	0	1

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
04/12/2018

Section number :
13

PLR Suffix :
X



Photo: 15_15_85_A.JPG
 1.46m, Crack, longitudinal, at 2 o'clock



Photo: 15_15_86_A.JPG
 2.13m, Hole in drain/ sewer, from 1 to 2 o'clock

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
04/12/2018

Section number :
13

PLR Suffix :
X



Photo: 15_15_88_A.JPG
2.13m, Crack, longitudinal, at 9 o'clock



Photo: 15_15_89_A.JPG
5.74m, Fracture, multiple, from 12 to 12 o'clock

Inspection pictures

Place :
GORTON

Road :
GARRETT WAY

Date :
04/12/2018

Section number :
13

PLR Suffix :
X



Photo: 15_15_90_A.JPG
 5.76m, Junction, at 12 o'clock, diameter 150mm



Photo: 15_15_91_A.JPG
 8.5m, Survey abandoned



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Inspection report

Date : 22/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 14	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

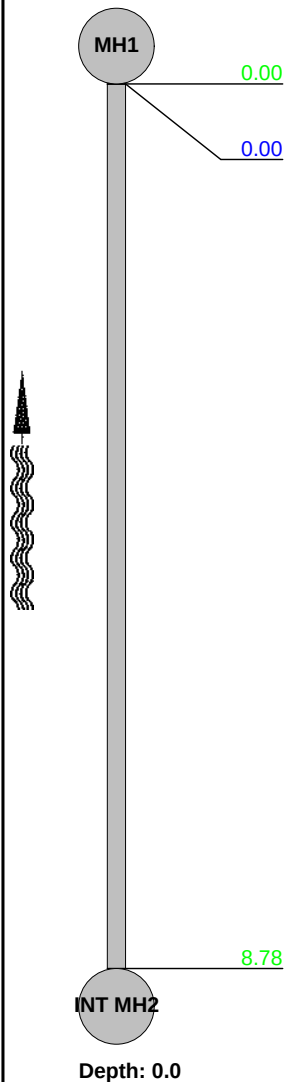
Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH1 (U/S) INT MH2	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	INT MH2 0.0 MH1 0.0
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Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 8.78 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 150 mm Vitrified clay
--	--	--	--

Comment :

1:75 Position
Depth: 0.0

Observation



0 m



8.78 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
14

PLR Suffix :



Photo: 20181122-101845-snap0000.jpg
 0m, Start node type manhole reference number: MH1



Photo: 20181122-101845-snap0001.jpg
 8.78m, Finish node type manhole reference number: INT MH2

Inspection report

Date : 22/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 15	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

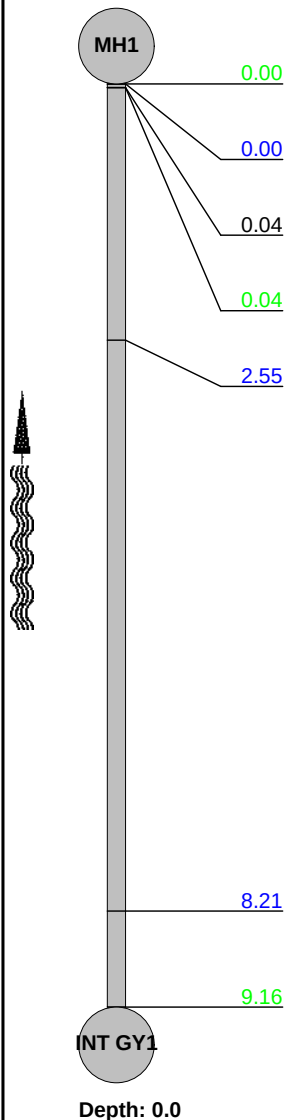
Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH1 (U/S) INT GY1	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	INT GY1 0.0 MH1 0.0
---	--	--	----------------------------	--	--

Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 9.16 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay
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Comment :

1:75 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH1

Water level 05 % of the vertical dimension

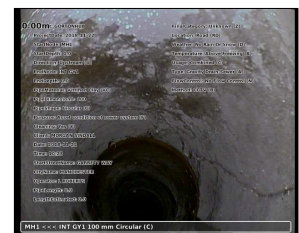
General photograph taken at this point

Junction from/at 06 o'clock diameter: 100 mm Remarks: DROP SHAFT

Line deviates left

Line deviates up

Finish node type gully reference number: INT GY1



Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
15

PLR Suffix :



Photo: 20181122-102339-snap0000.jpg
 0m, Start node type manhole reference number: MH1



Photo: 20181122-102339-snap0001.jpg
 0.04m, General photograph taken at this point

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 15	PLR Suffix :
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Photo: 20181122-102339-snap0002.jpg
 0.04m, Junction from/at 06 o'clock diameter: 100 mm



Photo: 20181122-102339-snap0003.jpg
 2.55m, Line deviates left

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 15	PLR Suffix :
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Photo: 20181122-102339-snap0004.jpg
 8.21m, Line deviates up



Photo: 20181122-102339-snap0005.jpg
 9.16m, Finish node type gully reference number: INT GY1



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Inspection report

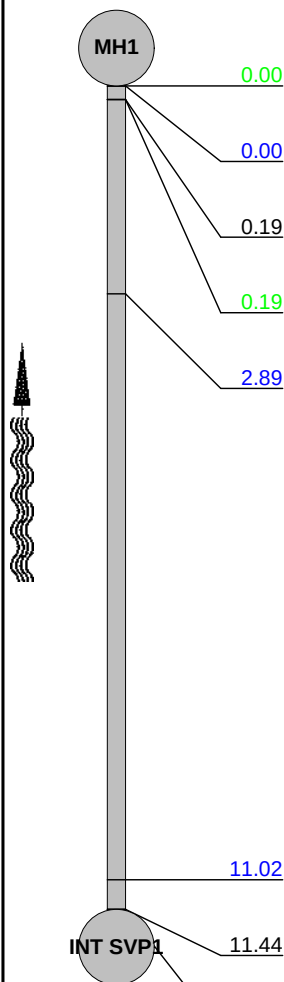
Date : 22/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 16	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH1 (U/S) INT SVP1	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	INT SVP1 0.0 MH1 0.0
Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 11.44 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay 		

Comment :

1:105 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH1

Water level 05 % of the vertical dimension

General photograph taken at this point

Junction from/at 06 o'clock diameter: 100 mm Remarks: DROP SHAFT

Line deviates left

Line deviates up

General photograph taken at this point

Finish node type other special chamber reference number: INT SVP1
Remarks: INT SVP1

Depth: 0.0



0 m



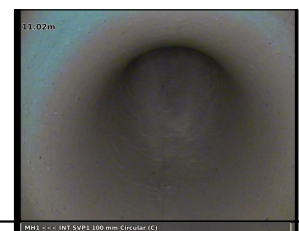
0.19 m



0.19 m



2.89 m



11.02 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade

Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
16

PLR Suffix :



Photo: 20181122-102650-snap0000.jpg
 0m, Start node type manhole reference number: MH1



Photo: 20181122-102650-snap0001.jpg
 0.19m, General photograph taken at this point

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 16	PLR Suffix :
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Photo: 20181122-102650-snap0002.jpg
 0.19m, Junction from/at 06 o'clock diameter: 100 mm



Photo: 20181122-102650-snap0003.jpg
 2.89m, Line deviates left



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 16	PLR Suffix :
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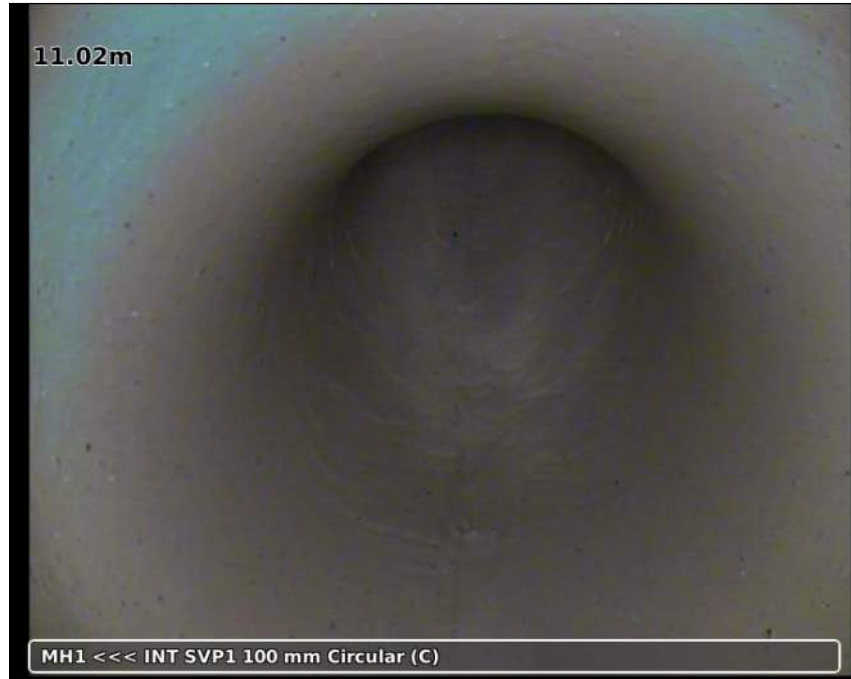


Photo: 20181122-102650-snap0004.jpg
 11.02m, Line deviates up



Photo: 20181122-102650-snap0005.jpg
 11.44m, General photograph taken at this point



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 16	PLR Suffix :
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Photo: 20181122-102650-snap0006.jpg

11.44m, Finish node type other special chamber reference number: INT SVP1



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Inspection report

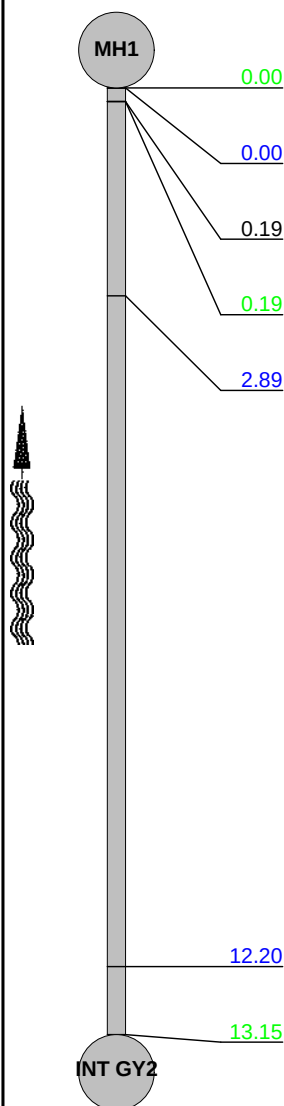
Date : 22/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 17	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH1 (U/S) INT GY2	Location details: Catchment: Pipe Shape : Pipe Length	 Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	INT GY2 0.0 MH1 0.0
Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 13.15 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay		

Comment :

1:105 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH1

Water level 05 % of the vertical dimension

General photograph taken at this point

Junction from/at 06 o'clock diameter: 100 mm Remarks: DROP SHAFT

Line deviates left

Line deviates up

Finish node type gully reference number: INT GY2



0 m



0.19 m



0.19 m



2.89 m



12.2 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 17	PLR Suffix :
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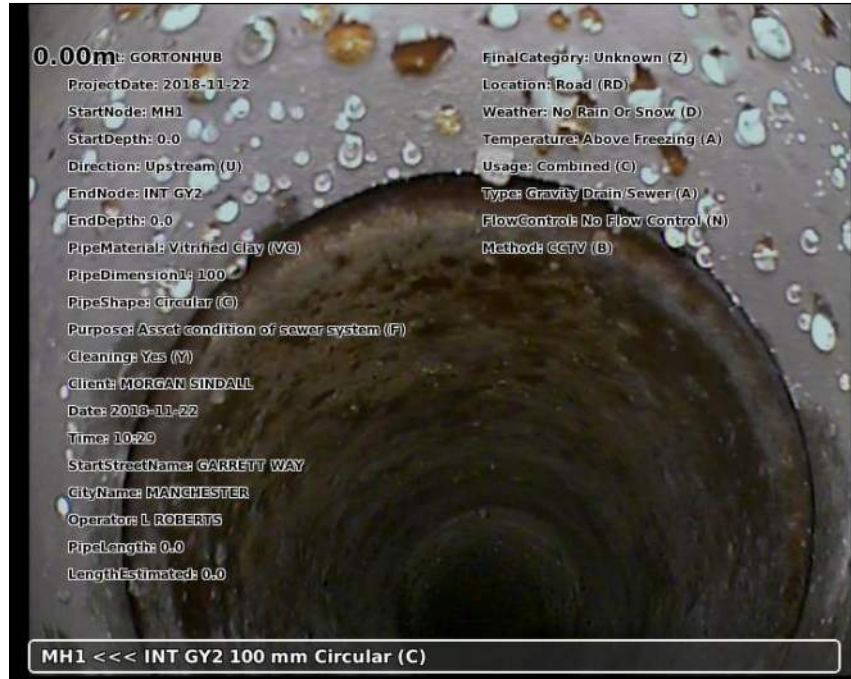


Photo: 20181122-103009-snap0000.jpg
 0m, Start node type manhole reference number: MH1



Photo: 20181122-103009-snap0001.jpg
 0.19m, General photograph taken at this point



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 17	PLR Suffix :
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Photo: 20181122-103009-snap0002.jpg
 0.19m, Junction from/at 06 o'clock diameter: 100 mm



Photo: 20181122-103009-snap0003.jpg
 2.89m, Line deviates left



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 17	PLR Suffix :
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Photo: 20181122-103009-snap0004.jpg
 12.2m, Line deviates up



Photo: 20181122-103009-snap0005.jpg
 13.15m, Finish node type gully reference number: INT GY2



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Inspection report

Date : 22/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 18	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

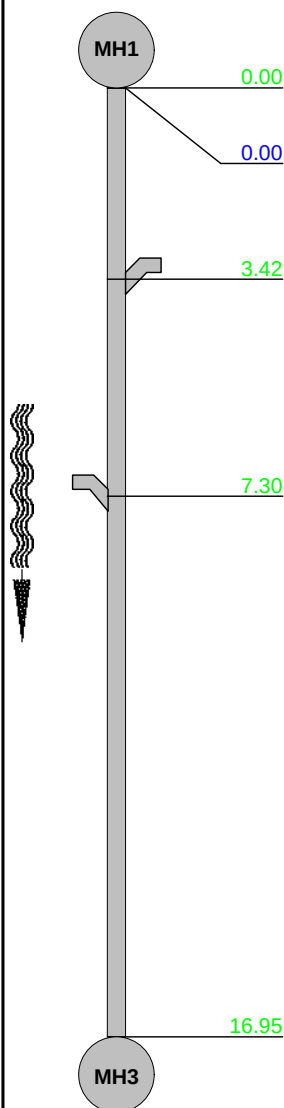
Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH1 (D/S) MH3	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH1 0.0 MH3 0.0
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Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 16.95 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 150 mm Vitrified clay
--	---	--	--

Comment :

1:135 Position
Depth: 0.0

Observation



0.00

Start node type manhole reference number: MH1

0.00

Water level 05 % of the vertical dimension

3.42

Junction from/at 10 o'clock diameter: 100 mm

7.30

Junction from/at 02 o'clock diameter: 100 mm

16.95

Finish node type manhole reference number: MH3

Depth: 0.0



0 m



3.42 m



7.3 m



16.95 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 18	PLR Suffix :
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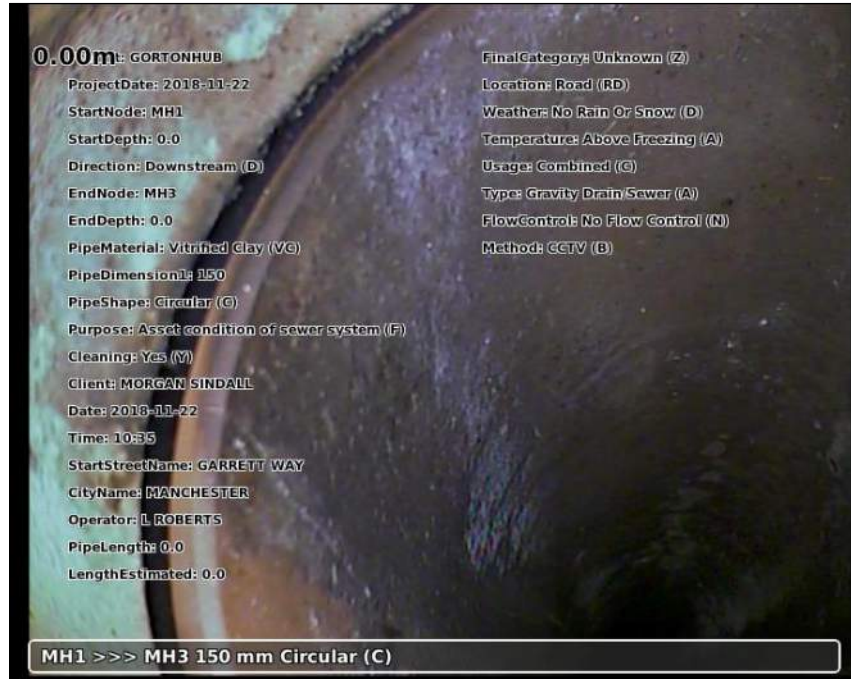


Photo: 20181122-103541-snap0000.jpg
 0m, Start node type manhole reference number: MH1



Photo: 20181122-103541-snap0001.jpg
 3.42m, Junction from/at 10 o'clock diameter: 100 mm

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 18	PLR Suffix :
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Photo: 20181122-103541-snap0002.jpg
 7.3m, Junction from/at 02 o'clock diameter: 100 mm



Photo: 20181122-103541-snap0003.jpg
 16.95m, Finish node type manhole reference number: MH3

Inspection report

Date : 22/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 19	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH3 (U/S) MH4	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH4 0.0 MH3 0.0
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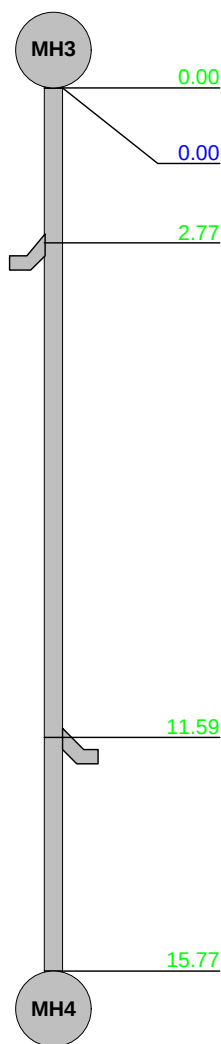
Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 15.77 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 150 mm Vitrified clay
--	---	--	--

Comment :

1:135 Position

Depth: 0.0

Observation



0.00

0.00

2.77

11.59

15.77

Start node type manhole reference number: MH3

Water level 05 % of the vertical dimension

Junction from/at 03 o'clock diameter: 150 mm

Junction from/at 10 o'clock diameter: 100 mm

Finish node type manhole reference number: MH4



0 m



2.77 m



11.59 m



15.77 m

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
19

PLR Suffix :



Photo: 20181122-105400-snap0000.jpg
 0m, Start node type manhole reference number: MH3



Photo: 20181122-105400-snap0001.jpg
 2.77m, Junction from/at 03 o'clock diameter: 150 mm

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 19	PLR Suffix :
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Photo: 20181122-105400-snap0002.jpg
 11.59m, Junction from/at 10 o'clock diameter: 100 mm



Photo: 20181122-105400-snap0003.jpg
 15.77m, Finish node type manhole reference number: MH4



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Inspection report

Date : 22/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 20	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

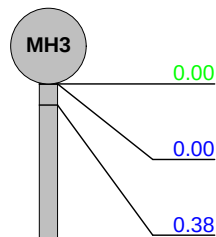
Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH3 (U/S) GY3	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	GY3 0.0 MH3 0.0
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Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 17.10 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 150 mm Vitrified clay
--	---	--	--

Comment :

1:135 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH3

Water level 05 % of the vertical dimension

Line deviates up

16.57

Line deviates up

17.10

Finish node type gully reference number: GY3



0 m



0.38 m



16.57 m



17.1 m

Depth: 0.0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 20	PLR Suffix :
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Photo: 20181122-114351-snap0000.jpg
 0m, Start node type manhole reference number: MH3



Photo: 20181122-114351-snap0001.jpg
 0.38m, Line deviates up



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 20	PLR Suffix :
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Photo: 20181122-114351-snap0002.jpg
 16.57m, Line deviates up



Photo: 20181122-114351-snap0003.jpg
 17.1m, Finish node type gully reference number: GY3

Inspection report

Date : 22/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 21	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

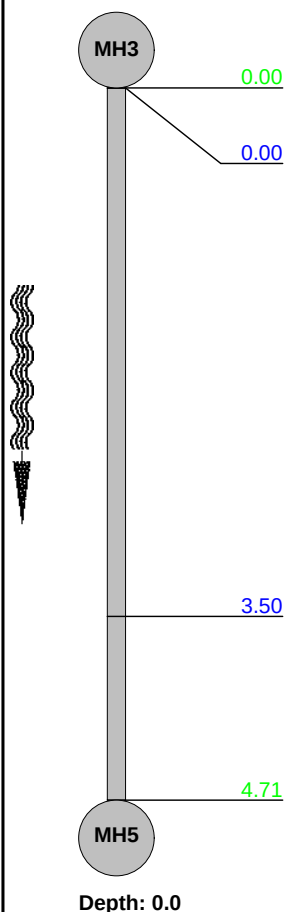
Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH3 (D/S) MH5	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH3 0.0 MH5 0.0
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Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 4.71 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 150 mm Vitrified clay
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Comment :

1:50 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH3

Water level 05 % of the vertical dimension

Line deviates right

Finish node type manhole reference number: MH5



0 m



3.5 m



4.71 m

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
21

PLR Suffix :



Photo: 20181122-114728-snap0000.jpg
 0m, Start node type manhole reference number: MH3



Photo: 20181122-114728-snap0001.jpg
 3.5m, Line deviates right



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 21	PLR Suffix :
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Photo: 20181122-114728-snap0002.jpg
 4.71m, Finish node type manhole reference number: MH5



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Inspection report

Date : 22/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 22	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

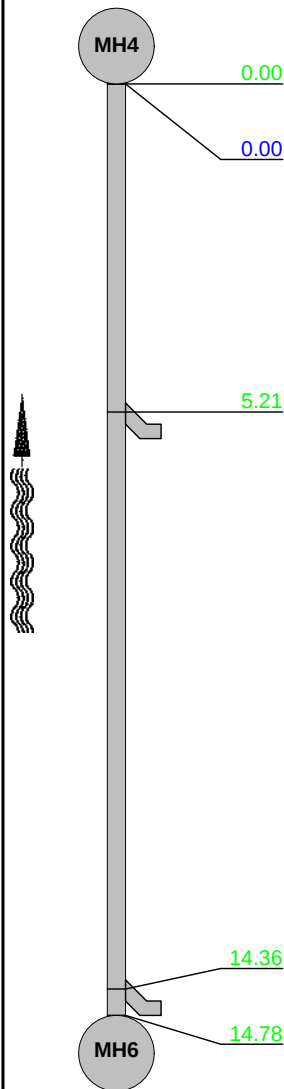
Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH4 (U/S) MH6	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH6 0.0 MH4 0.0
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Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 14.78 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay
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Comment :

1:120 Position
Depth: 0.0

Observation



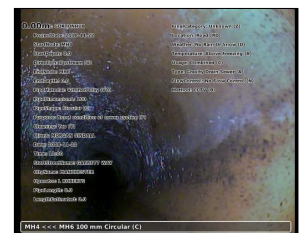
Start node type manhole reference number: MH4

Water level 05 % of the vertical dimension

Junction from/at 09 o'clock diameter: 100 mm

Junction from/at 09 o'clock diameter: 100 mm

Finish node type manhole reference number: MH6



0 m



5.21 m



14.36 m



14.78 m

Depth: 0.0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
22

PLR Suffix :



Photo: 20181122-120037-snap0000.jpg
 0m, Start node type manhole reference number: MH4



Photo: 20181122-120037-snap0001.jpg
 5.21m, Junction from/at 09 o'clock diameter: 100 mm

Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
22

PLR Suffix :



Photo: 20181122-120037-snap0002.jpg
 14.36m, Junction from/at 09 o'clock diameter: 100 mm



Photo: 20181122-120037-snap0003.jpg
 14.78m, Finish node type manhole reference number: MH6

Inspection report

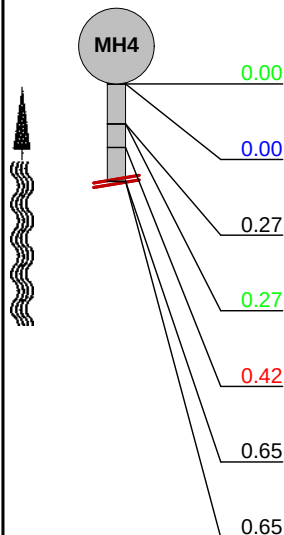
Date : 22/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 23	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH4 (U/S) CAP END	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	CAP END 0.0 MH4 0.0
Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 0.65 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay		

Comment :

1:50 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH4

Water level 05 % of the vertical dimension

General photograph taken at this point

Junction from/at 06 o'clock diameter: 100 mm Remarks: DROP SHAFT

Crack circumferential from/at 12 o'clock to 12 o'clock

General photograph taken at this point

Survey abandoned Remarks: CAP END



0 m



0.27 m



0.27 m



0.42 m



0.65 m

Structural Defects

Service Defects

Constructional Features

Miscellaneous Features

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
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Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
23

PLR Suffix :



Photo: 20181122-120552-snap0000.jpg
 0m, Start node type manhole reference number: MH4



Photo: 20181122-120552-snap0001.jpg
 0.27m, General photograph taken at this point

Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
22/11/2018

Section number :
23

PLR Suffix :



Photo: 20181122-120552-snap0002.jpg
 0.27m, Junction from/at 06 o'clock diameter: 100 mm



Photo: 20181122-120552-snap0003.jpg
 0.42m, Crack circumferential from/at 12 o'clock to 12 o'clock



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 22/11/2018	Section number : 23	PLR Suffix :
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Photo: 20181122-120552-snap0004.jpg
 0.65m, General photograph taken at this point



Photo: 20181122-120552-snap0005.jpg
 0.65m, Survey abandoned



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Inspection report

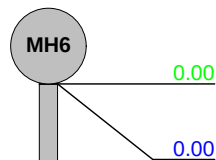
Date : 23/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 24	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH6 (U/S) MH8	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH8 0.0 MH6 0.0
Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 11.93 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay 		

Comment :

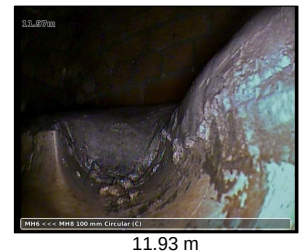
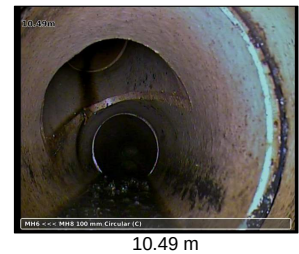
1:105 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH6

Water level 05 % of the vertical dimension



Junction from/at 01 o'clock diameter: 100 mm

Junction from/at 11 o'clock diameter: 100 mm

Finish node type manhole reference number: MH8

Depth: 0.0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
23/11/2018

Section number :
24

PLR Suffix :



Photo: 20181123-082335-snap0000.jpg
 0m, Start node type manhole reference number: MH6



Photo: 20181123-082335-snap0001.jpg
 10.22m, Junction from/at 01 o'clock diameter: 100 mm

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 24	PLR Suffix :
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Photo: 20181123-082335-snap0002.jpg
 10.49m, Junction from/at 11 o'clock diameter: 100 mm



Photo: 20181123-082335-snap0003.jpg
 11.93m, Finish node type manhole reference number: MH8



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Inspection report

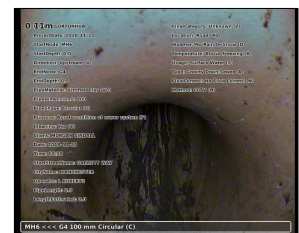
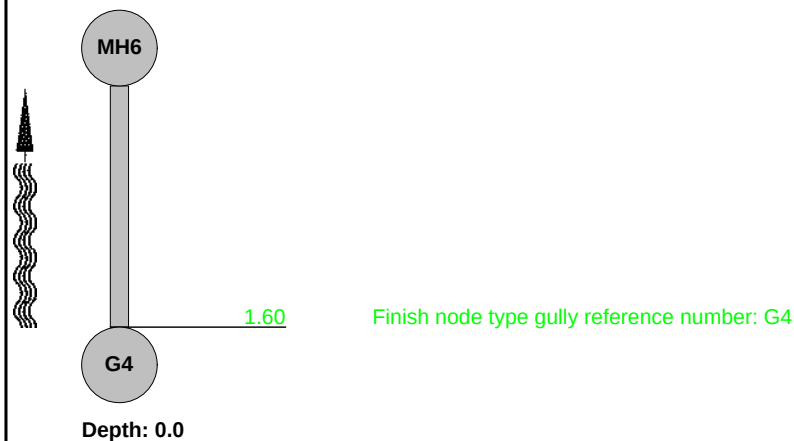
Date : 23/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 25	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : MANCHESTER	Location details:	U/S MH : G4
Road : GARRETT WAY	Catchment:	U/S Depth : 0.0
Location Road	Pipe Shape : Circular	D/S MH : MH6
Inspection MH6 (U/S) G4	Pipe Length 0.00 m	D/S Depth : 0.0

Use: Surface water	Pipe Width : 100 mm
Year laid : Sample survey to determine asset condition	Pipe Diameter : Vitrified clay
Purpose : 1.60 m	Pipe material : Lining :
Total length : 1.60 m	Lining :

Comment :

1:50 Position Observation
Depth: 0.0



Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
23/11/2018

Section number :
25

PLR Suffix :

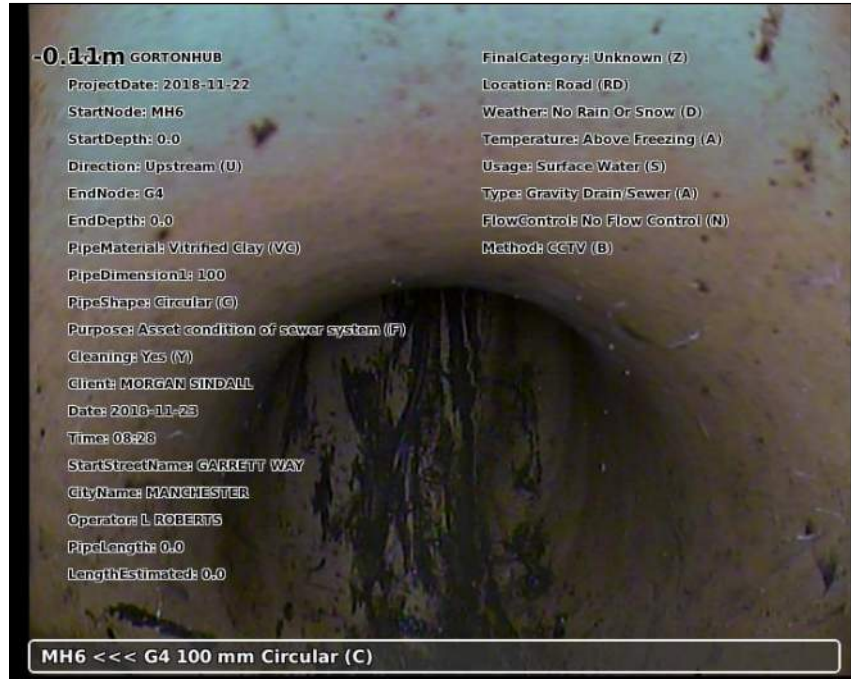


Photo: 20181123-082900-snap0000.jpg
 -0.11m, Start node type manhole reference number: MH6



Photo: 20181123-082900-snap0001.jpg
 -0.11m, Line deviates up



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
23/11/2018

Section number :
25

PLR Suffix :



Photo: 20181123-082900-snap0002.jpg
1.6m, Finish node type gully reference number: G4

Inspection report

Date : 23/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 26	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

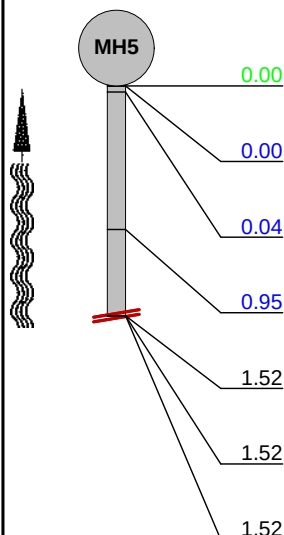
Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH5 (U/S) CAP END	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	CAP END 0.0 MH5 0.0
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Use: Year laid : Purpose : Total length :	Surface water Sample survey to determine asset condition 1.52 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay
--	---	--	--

Comment :

1:50 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH5

Water level 05 % of the vertical dimension

Line deviates up

Attached deposits encrustation from/at 05 o'clock to 07 o'clock 10 % cross-sectional area loss

General photograph taken at this point

General photograph taken at this point

Survey abandoned Remarks: CAPPED OFF



0 m



0.04 m



0.95 m



1.52 m



1.52 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 26	PLR Suffix :
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Photo: 20181123-100650-snap0000.jpg
 0m, Start node type manhole reference number: MH5



Photo: 20181123-100650-snap0001.jpg
 0.04m, Line deviates up

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 26	PLR Suffix :
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Photo: 20181123-100650-snap0002.jpg
 0.95m, Attached deposits encrustation from/at 05 o'clock to 07 o'clock 10 % cross-sectional area loss



Photo: 20181123-100650-snap0003.jpg
 1.52m, General photograph taken at this point

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 26	PLR Suffix :
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Photo: 20181123-100650-snap0004.jpg
 1.52m, General photograph taken at this point



Photo: 20181123-100650-snap0005.jpg
 1.52m, Survey abandoned



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Inspection report

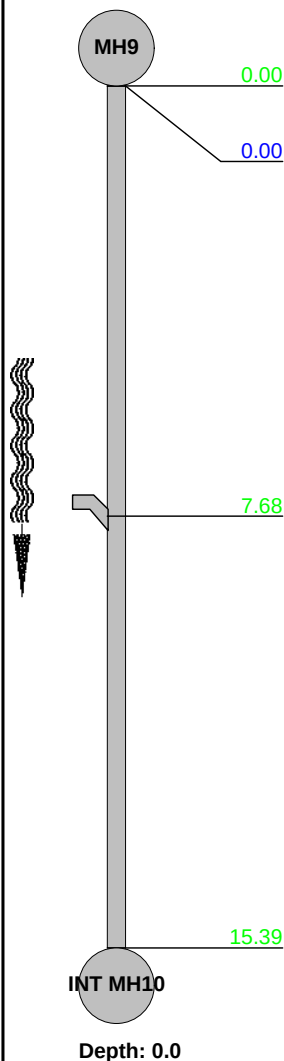
Date : 23/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 27	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH9 (D/S) INT MH10	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH9 0.0 INT MH10 0.0
Use: Year laid : Purpose : Total length :	Surface water Sample survey to determine asset condition 15.39 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 150 mm Vitrified clay		

Comment :

1:135 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH9

Water level 05 % of the vertical dimension

Junction from/at 03 o'clock diameter: 100 mm

Finish node type manhole reference number: INT MH10



0 m



7.68 m



15.39 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade

Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
23/11/2018

Section number :
27

PLR Suffix :



Photo: 20181123-111344-snap0000.jpg
 0m, Start node type manhole reference number: MH9



Photo: 20181123-111344-snap0001.jpg
 7.68m, Junction from/at 03 o'clock diameter: 100 mm



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 27	PLR Suffix :
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Photo: 20181123-111344-snap0002.jpg
15.39m, Finish node type manhole reference number: INT MH10



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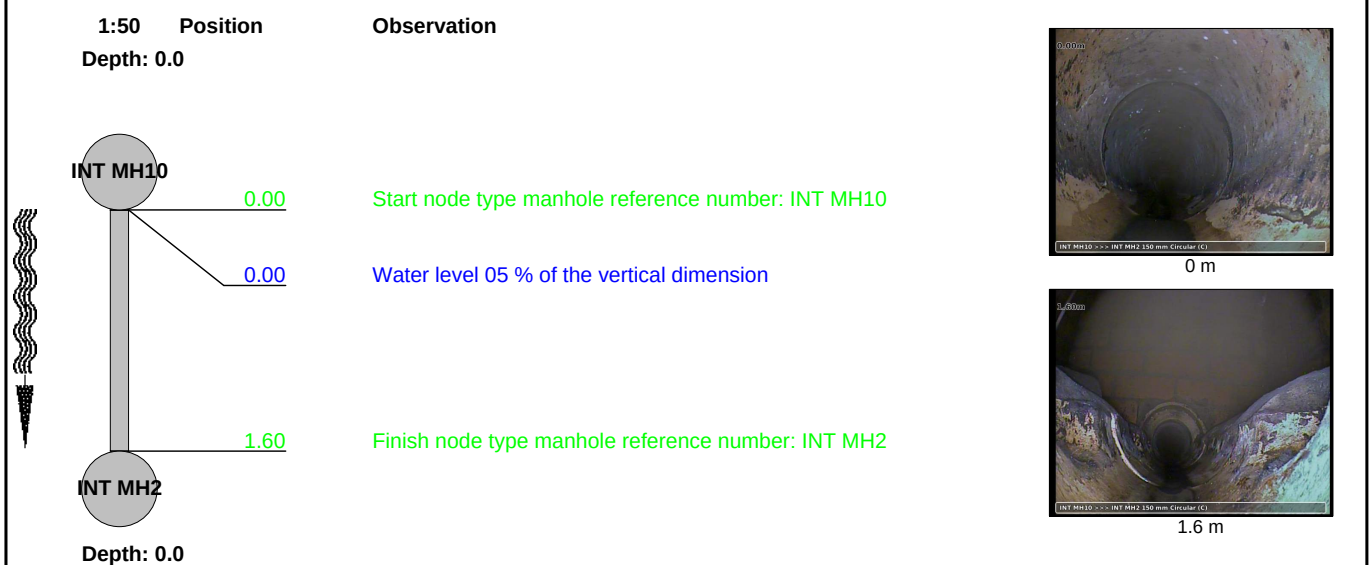
Inspection report

Date : 23/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 28	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : MANCHESTER	Location details:	U/S MH : INT MH10
Road : GARRETT WAY	Catchment:	U/S Depth : 0.0
Location Road	Pipe Shape : Circular	D/S MH : INT MH2
Inspection INT MH10 (D/S) INT MH2	Pipe Length 0.00 m	D/S Depth : 0.0

Use: Surface water	Pipe Width : 150 mm
Year laid :	Pipe Diameter : 150 mm
Purpose : Sample survey to determine asset condition	Pipe material : Vitrified clay
Total length : 1.60 m	Lining :

Comment :



Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 28	PLR Suffix :
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Photo: 20181123-111622-snap0000.jpg
 0m, Start node type manhole reference number: INT MH10



Photo: 20181123-111622-snap0001.jpg
 1.6m, Finish node type manhole reference number: INT MH2



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Inspection report

Date : 23/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 29	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

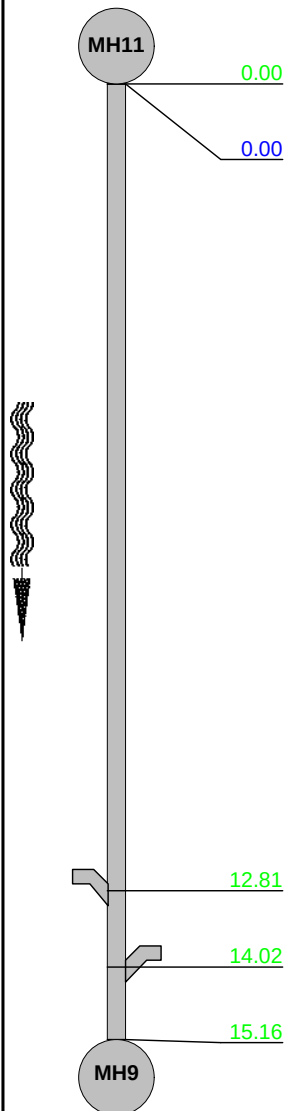
Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH11 (D/S) MH9	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	MH11 0.0 MH9 0.0
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Use: Year laid : Purpose : Total length :	Surface water Sample survey to determine asset condition 15.16 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 150 mm Vitrified clay
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Comment :

1:120 Position
Depth: 0.0

Observation



0.00

0.00

Start node type manhole reference number: MH11

Water level 05 % of the vertical dimension



0 m



12.81 m



14.02 m



15.16 m

12.81

Junction from/at 03 o'clock diameter: 100 mm

14.02

Junction from/at 09 o'clock diameter: 100 mm

15.16

Finish node type manhole reference number: MH9

Depth: 0.0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
23/11/2018

Section number :
29

PLR Suffix :

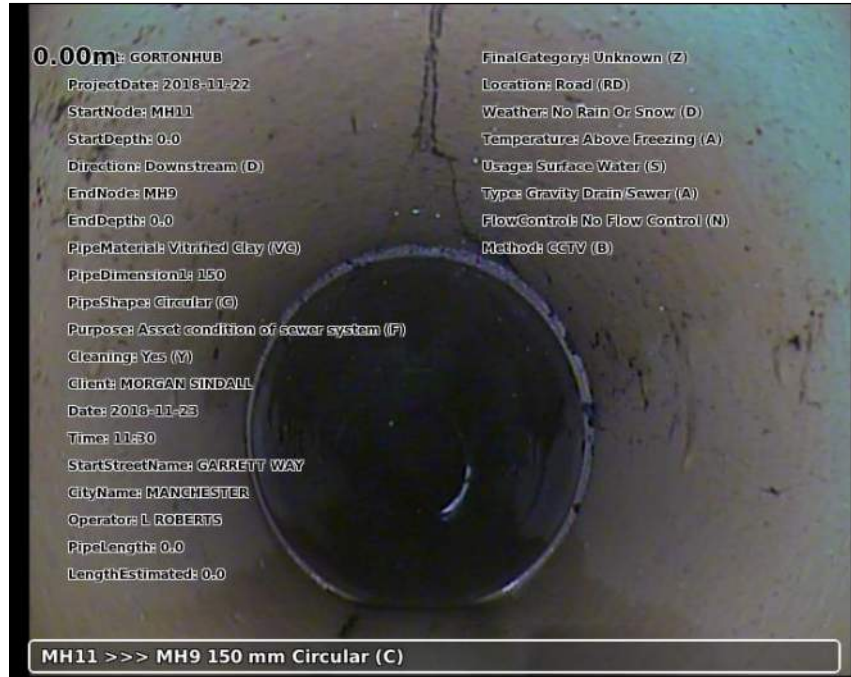


Photo: 20181123-113047-snap0000.jpg
 0m, Start node type manhole reference number: MH11



Photo: 20181123-113047-snap0001.jpg
 12.81m, Junction from/at 03 o'clock diameter: 100 mm

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 29	PLR Suffix :
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Photo: 20181123-113047-snap0002.jpg
 14.02m, Junction from/at 09 o'clock diameter: 100 mm



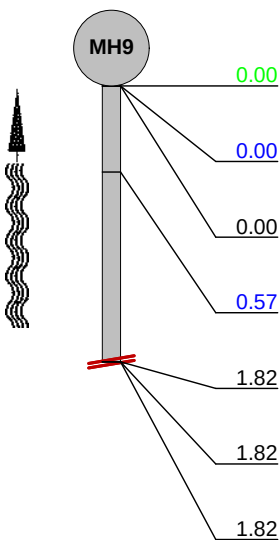
Photo: 20181123-113047-snap0003.jpg
 15.16m, Finish node type manhole reference number: MH9

Inspection report

Date : 23/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 30	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH9 (U/S) CAP END	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	CAP END 0.0 MH9 0.0
Use: Year laid : Purpose : Total length :	Surface water Sample survey to determine asset condition 1.82 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	150 mm Vitrified clay		

Comment :

1:50 Position Depth: 0.0	Observation	
	Start node type manhole reference number: MH9 Water level 05 % of the vertical dimension Size changes new size(s) 100 mm high 100 mm wide Line deviates up General photograph taken at this point General photograph taken at this point Survey abandoned Remarks: CAPPED OFF	 0 m  0 m  0.57 m  1.82 m  1.82 m
Structural Defects Service Defects		Constructional Features Miscellaneous Features
STR no def	STR peak	STR mean
STR total	STR grade	SER no def
SER peak	SER mean	SER total
SER grade		



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 30	PLR Suffix :
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Photo: 20181123-115736-snap0000.jpg
 0m, Start node type manhole reference number: MH9



Photo: 20181123-115736-snap0001.jpg
 0m, Size changes new size(s) 100 mm high 100 mm wide



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 30	PLR Suffix :
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Photo: 20181123-115736-snap0002.jpg
 0.57m, Line deviates up



Photo: 20181123-115736-snap0003.jpg
 1.82m, General photograph taken at this point



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 30	PLR Suffix :
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Photo: 20181123-115736-snap0004.jpg
 1.82m, General photograph taken at this point



Photo: 20181123-115736-snap0005.jpg
 1.82m, Survey abandoned



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Inspection report

Date : 23/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 31	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

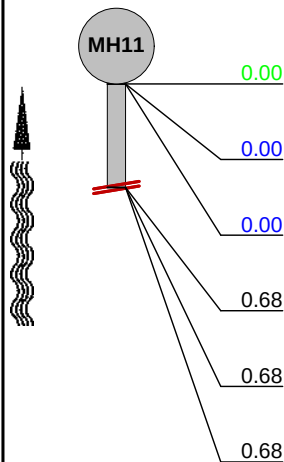
Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH11 (U/S) CAPPED OFF	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	CAPPED OFF 0.0 MH11 0.0
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Use: Year laid : Purpose : Total length :	Surface water Sample survey to determine asset condition 0.68 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay
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Comment :

1:50 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH11

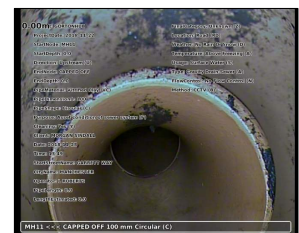
Water level 05 % of the vertical dimension

Line deviates up

General photograph taken at this point

General photograph taken at this point

Survey abandoned Remarks: CAPPED OFF



0 m



0 m



0.68 m



0.68 m



0.68 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade

Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
23/11/2018

Section number :
31

PLR Suffix :



Photo: 20181123-135029-snap0000.jpg
 0m, Start node type manhole reference number: MH11



Photo: 20181123-135029-snap0001.jpg
 0m, Line deviates up

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 31	PLR Suffix :
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Photo: 20181123-135029-snap0002.jpg
 0.68m, General photograph taken at this point



Photo: 20181123-135029-snap0003.jpg
 0.68m, General photograph taken at this point



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 31	PLR Suffix :
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Photo: 20181123-135029-snap0004.jpg
 0.68m, Survey abandoned



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Inspection report

Date : 23/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 32	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

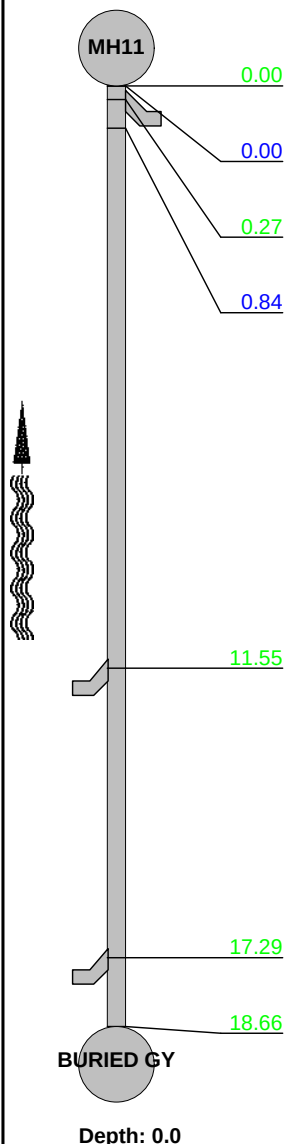
Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH11 (U/S) BURIED GY	Location details: Catchment: Pipe Shape : Pipe Length	 Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	BURIED GY 0.0 MH11 0.0
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Use: Year laid : Purpose : Total length :	Surface water Sample survey to determine asset condition 18.66 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay
--	--	--	--------------------------------------

Comment :

1:150 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH11

Water level 05 % of the vertical dimension

Junction from/at 09 o'clock diameter: 100 mm

Line deviates left

Junction from/at 03 o'clock diameter: 100 mm

Junction from/at 03 o'clock diameter: 100 mm

Finish node type gully reference number: BURIED GY



0 m



0.27 m



0.84 m



11.55 m



17.29 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
23/11/2018

Section number :
32

PLR Suffix :



Photo: 20181123-141150-snap0000.jpg
 0m, Start node type manhole reference number: MH11



Photo: 20181123-141150-snap0001.jpg
 0.27m, Junction from/at 09 o'clock diameter: 100 mm

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 32	PLR Suffix :
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Photo: 20181123-141150-snap0002.jpg
 0.84m, Line deviates left



Photo: 20181123-141150-snap0003.jpg
 11.55m, Junction from/at 03 o'clock diameter: 100 mm

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 32	PLR Suffix :
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Photo: 20181123-141150-snap0004.jpg
 17.29m, Junction from/at 03 o'clock diameter: 100 mm



Photo: 20181123-141150-snap0005.jpg
 18.66m, Finish node type gully reference number: BURIED GY

Inspection report

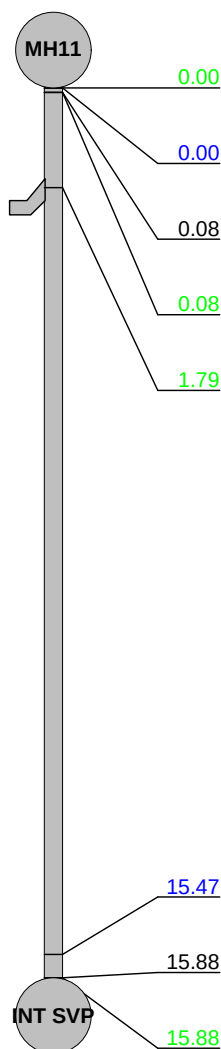
Date : 23/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 33	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH11 (U/S) INT SVP	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	INT SVP 0.0 MH11 0.0
Use: Year laid : Purpose : Total length :	Foul Sample survey to determine asset condition 15.88 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay		

Comment :

1:135 Position
Depth: 0.0

Observation



Start node type manhole reference number: MH11

Water level 05 % of the vertical dimension

General photograph taken at this point

Junction from/at 06 o'clock diameter: 100 mm Remarks: DROP SHAFT

Junction from/at 03 o'clock diameter: 100 mm

Line deviates up

General photograph taken at this point

Finish node type other special chamber reference number: INT SVP
Remarks: INT SVP



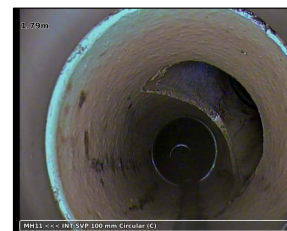
0 m



0.08 m



0.08 m



1.79 m



15.88 m

Depth: 0.0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 33	PLR Suffix :
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Photo: 20181123-142115-snap0000.jpg
 0m, Start node type manhole reference number: MH11



Photo: 20181123-142115-snap0001.jpg
 0.08m, General photograph taken at this point

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 33	PLR Suffix :
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Photo: 20181123-142115-snap0002.jpg
 0.08m, Junction from/at 06 o'clock diameter: 100 mm



Photo: 20181123-142115-snap0003.jpg
 1.79m, Junction from/at 03 o'clock diameter: 100 mm

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 33	PLR Suffix :
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Photo: 20181123-142115-snap0004.jpg
 15.47m, Line deviates up



Photo: 20181123-142115-snap0005.jpg
 15.88m, General photograph taken at this point



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
23/11/2018

Section number :
33

PLR Suffix :



Photo: 20181123-142115-snap0006.jpg

15.88m, Finish node type other special chamber reference number: INT SVP



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Inspection report

Date : 23/11/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 34	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARRETT WAY Road MH11 (U/S) GY5	Location details: Catchment: Pipe Shape : Pipe Length	 Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	GY5 0.0 MH11 0.0
Use: Year laid : Purpose : Total length :	Surface water Sample survey to determine asset condition 7.56 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay		

Comment :

1:60	Position	Observation							
Depth: 0.0									
	MH11	0.00	Start node type manhole reference number: MH11						
		0.00	Water level 05 % of the vertical dimension						
		0.53	Line deviates up						
		3.72	Hole in drain or sewer from/at 11 o'clock to 01 o'clock						
		5.51	Broken pipe at joint from/at 10 o'clock to 02 o'clock						
	GY5	7.56	Finish node type gully reference number: GY5						
Depth: 0.0									
Structural Defects		Constructional Features							
Service Defects		Miscellaneous Features							
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



0 m



0.53 m



3.72 m



5.51 m



7.56 m



Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 34	PLR Suffix :
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Photo: 20181123-144743-snap0000.jpg
 0m, Start node type manhole reference number: MH11



Photo: 20181123-144743-snap0001.jpg
 0.53m, Line deviates up

Inspection pictures

Place : MANCHESTER	Road : GARRETT WAY	Date : 23/11/2018	Section number : 34	PLR Suffix :
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Photo: 20181123-144743-snap0002.jpg
 3.72m, Hole in drain or sewer from/at 11 o'clock to 01 o'clock



Photo: 20181123-144743-snap0003.jpg
 5.51m, Broken pipe at joint from/at 10 o'clock to 02 o'clock



Inspection pictures

Place :
MANCHESTER

Road :
GARRETT WAY

Date :
23/11/2018

Section number :
34

PLR Suffix :



Photo: 20181123-144743-snap0004.jpg
7.56m, Finish node type gully reference number: GY5

Inspection report

Date : 04/12/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 35	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARETT WAY Verge UC5 (U/S) G6	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	G6 0.0 UC5 0.0
---	---	--	----------------------------	--	-----------------------------------

Use: Year laid : Purpose : Total length :	Surface water Sample survey to determine asset condition 5.81 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	150 mm Vitrified clay
--	---	--	----------------------------------

Comment :

1:60	Position	Observation							
Depth: 0.0									
	0.00	Start node type manhole reference number: UC5							
	0.00	Water level 05 % of the vertical dimension	0 m						
	0.00	Junction from/at 05 o'clock to 07 o'clock diameter: 150 mm Remarks: DROP SHAFT							
	1.79	Junction from/at 07 o'clock to 10 o'clock diameter: 150 mm	0 m						
	3.88	Fracture multiple from/at 12 o'clock to 12 o'clock							
	5.32	Line deviates up M	1.79 m						
	5.81	Finish node type gully reference number: G6							
Depth: 0.0									
Structural Defects			Constructional Features						
Service Defects			Miscellaneous Features						
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade

Inspection pictures

Place :
MANCHESTER

Road :
GARETT WAY

Date :
04/12/2018

Section number :
35

PLR Suffix :



Photo: 20181204-144214-snap0000.jpg
 0m, Start node type manhole reference number: UC5



Photo: 20181204-144214-snap0001.jpg
 0m, Junction from/at 05 o'clock to 07 o'clock diameter: 150 mm

Inspection pictures

Place :
MANCHESTER

Road :
GARETT WAY

Date :
04/12/2018

Section number :
35

PLR Suffix :



Photo: 20181204-144214-snap0002.jpg
 1.79m, Junction from/at 07 o'clock to 10 o'clock diameter: 150 mm



Photo: 20181204-144214-snap0003.jpg
 3.88m, Fracture multiple from/at 12 o'clock to 12 o'clock

Inspection pictures

Place : MANCHESTER	Road : GARETT WAY	Date : 04/12/2018	Section number : 35	PLR Suffix :
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Photo: 20181204-144214-snap0004.jpg
 5.32m, Line deviates up M



Photo: 20181204-144214-snap0005.jpg
 5.81m, Finish node type gully reference number: G6

Inspection report

Date : 04/12/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 36	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARETT WAY Verge UC5 (U/S) INT UC6	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	INT UC6 0.0 UC5 0.0
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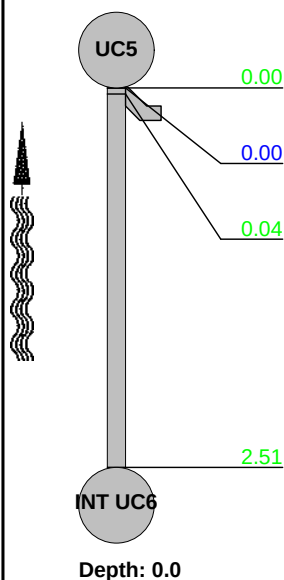
Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 2.51 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay
--	--	--	--

Comment :

1:50 Position

Depth: 0.0

Observation



Start node type manhole reference number: UC5

Water level 05 % of the vertical dimension

Junction from/at 05 o'clock to 07 o'clock diameter: 100 mm

Finish node type manhole reference number: INT UC6



0 m



0.04 m



2.51 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place :
MANCHESTER

Road :
GARETT WAY

Date :
04/12/2018

Section number :
36

PLR Suffix :



Photo: 20181204-144708-snap0000.jpg
 0m, Start node type manhole reference number: UC5



Photo: 20181204-144708-snap0001.jpg
 0.04m, Junction from/at 05 o'clock to 07 o'clock diameter: 100 mm



Inspection pictures

Place : MANCHESTER	Road : GARETT WAY	Date : 04/12/2018	Section number : 36	PLR Suffix :
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Photo: 20181204-144708-snap0002.jpg
 2.51m, Finish node type manhole reference number: INT UC6



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Inspection report

Date : 04/12/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 37	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARETT WAY Verge UC5 (U/S) INT SVP	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	INT SVP 0.0 UC5 0.0
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Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 1.48 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay
--	--	--	--

Comment :

1:50 Position Depth: 0.0	Observation	
	Start node type manhole reference number: UC5 Water level 05 % of the vertical dimension Line deviates up M Finish node type other special chamber reference number: INT SVP	0 m 1.06 m 1.48 m

Structural Defects

Service Defects

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade

Constructional Features

Miscellaneous Features



Inspection pictures

Place :
MANCHESTER

Road :
GARETT WAY

Date :
04/12/2018

Section number :
37

PLR Suffix :



Photo: 20181204-145231-snap0000.jpg
 0m, Start node type manhole reference number: UC5



Photo: 20181204-145231-snap0001.jpg
 1.06m, Line deviates up M



Inspection pictures

Place : MANCHESTER	Road : GARETT WAY	Date : 04/12/2018	Section number : 37	PLR Suffix :
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Photo: 20181204-145231-snap0002.jpg

1.48m, Finish node type other special chamber reference number: INT SVP



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Inspection report

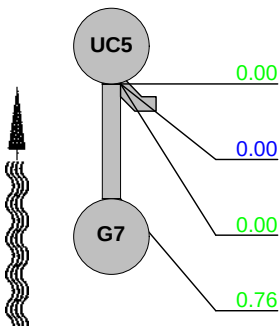
Date : 04/12/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 38	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

Place : Road : Location Inspection	MANCHESTER GARETT WAY Verge UC5 (U/S) G7	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	G7 0.0 UC5 0.0
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Use: Year laid : Purpose : Total length :	Combined Sample survey to determine asset condition 0.76 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay
--	--	--	--

Comment :

1:50 Position
Depth: 0.0



Observation

Start node type manhole reference number: UC5

Water level 05 % of the vertical dimension

Junction from/at 05 o'clock to 07 o'clock diameter: 100 mm

Finish node type gully reference number: G7



Depth: 0.0

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade



Inspection pictures

Place :
MANCHESTER

Road :
GARETT WAY

Date :
04/12/2018

Section number :
38

PLR Suffix :



Photo: 20181204-145924-snap0000.jpg
 0m, Start node type manhole reference number: UC5



Photo: 20181204-145924-snap0001.jpg
 0m, Junction from/at 05 o'clock to 07 o'clock diameter: 100 mm



Inspection pictures

Place :
MANCHESTER

Road :
GARETT WAY

Date :
04/12/2018

Section number :
38

PLR Suffix :



Photo: 20181204-145924-snap0002.jpg
0.76m, Finish node type gully reference number: G7



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Inspection report

Date : 04/12/2018	Job number :	Section Type : unknown	Operator : L ROBERTS	Section number : 39	PLR SUFFIX:
Weather no rain or snow	Vehicle :	Camera :	Preset :	Cleaned : yes	Type of Drain : Gravity drain/sewer

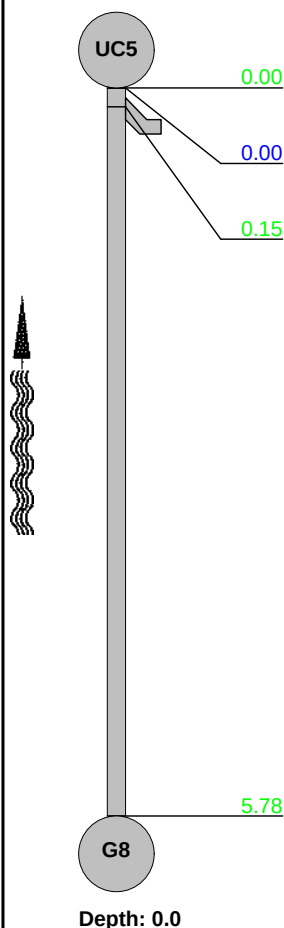
Place : Road : Location Inspection	MANCHESTER GARETT WAY Verge UC5 (U/S) G8	Location details: Catchment: Pipe Shape : Pipe Length	Circular 0.00 m	U/S MH : U/S Depth : D/S MH : D/S Depth :	G8 0.0 UC5 0.0
---	---	--	----------------------------	--	-----------------------------------

Use: Year laid : Purpose : Total length :	Surface water Sample survey to determine asset condition 5.78 m	Pipe Width : Pipe Diameter : Pipe material : Lining :	 100 mm Vitrified clay
--	---	--	--

Comment :

1:60 Position
Depth: 0.0

Observation



Start node type manhole reference number: UC5

Water level 05 % of the vertical dimension

Junction from/at 05 o'clock to 07 o'clock diameter: 100 mm Remarks: DROP SHAFT

Finish node type gully reference number: G8



0 m



0.15 m



5.78 m

Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade

Inspection pictures

Place :
MANCHESTER

Road :
GARETT WAY

Date :
04/12/2018

Section number :
39

PLR Suffix :



Photo: 20181204-150307-snap0000.jpg
 0m, Start node type manhole reference number: UC5



Photo: 20181204-150307-snap0001.jpg
 0.15m, Junction from/at 05 o'clock to 07 o'clock diameter: 100 mm



Inspection pictures

Place : MANCHESTER	Road : GARETT WAY	Date : 04/12/2018	Section number : 39	PLR Suffix :
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Photo: 20181204-150307-snap0002.jpg
 5.78m, Finish node type gully reference number: G8

Gorton Community Hub

Phase 2 Site Investigation

Curtins Ref: 070452-CUR-00-XX-RP-GE-002

Revision: V01

Issue Date: 09 April 2019

Client Name: Morgan Sindall

Client Address: 1 Anchorage Quay, Salford Quays, Manchester, M50 3YW

Site Address: Garret Way, Manchester M18 8LD

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Phase 2 Site Investigation

Rev	Description	Issued by	Checked	Date

This report has been prepared for the sole benefit, use, and information for the client. The liability of Curtins Limited with respect to the information contained in the report will not extend to any third party.

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Reviewed	Signature	Date
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Authorised	Signature	Date
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Executive Summary

Appointment	In November 2018 Curtins were instructed by Morgan Sindall to undertake a Phase 2 Site Investigation at the Gorton Community Hub site off Garratt Way, Gorton, Manchester M18 8HE. The site is centred on NGR 388510, 396220 and covers an area of approximately 1.16 Ha. This investigation aims to characterise the geo-environmental and geotechnical conditions prior to redevelopment for a proposed 3 to 4 storey Community Hub building on the Eastlands Homes site, with the disused pub and library sites to be surface car parking.
Current Site Status	The site is currently occupied by the former Eastland Homes Hub with an adjacent car park to the west, disused pub and area of hardstanding to the east, areas of soft landscaping and a gated carpark to the south.
Summary of Phase 1	From the mid-19th Century to the late 19th Century, the site was an undeveloped agricultural field. In 1893 Section 1 consisted of terraced houses and a hotel, whilst Section 2 remained an undeveloped agricultural field. In the early 20th Century terraced housing was built in all areas of the site and surrounding area with ponds in the surrounding area infilled when the houses were constructed. The houses in section 2 and north of Section 1 were demolished by 1978 and all were demolished by 1983. In the same year, Section 1 comprised of a community centre with associated car park and a hotel, and Section 2 comprises of Gorton Library and associated carpark which remains the same today. The site is indicated to be underlain by Glacial Till which overlies bedrock comprising the Chester Formation (gravelly, pebbly Sandstone and Mudstone). The bedrock is classified as a Principal Aquifer whilst the superficial Glacial Till deposits are classified as a Secondary Undifferentiated Aquifer. The nearest surface water feature is the Gore Brook located 250m to the southeast of the site flowing north. There is one groundwater abstraction located within 500m of the site, located 444m west of the site. There are no surface abstraction points within 1km of the site and no pollution incidents have been recorded within 250m of the site within the last 10 years. Primary potential risks to be investigated during the Phase 2, as well as establishing ground conditions for geotechnical design, included; potential for land gas and risks to human health from Made Ground soils.
Fieldworks Undertaken	Site investigation works were undertaken on the 5th and 12th December 2018 and comprised three cable percussive boreholes and ten window sample boreholes. Ground gas and groundwater monitoring standpipes/piezometers were installed within nine of the window sample and all three cable percussive boreholes. Selected soil samples were subjected to laboratory analysis and six ground gas monitoring visits were undertaken.
Encountered Ground Conditions	Surface Made Ground deposits consisting of grass over TOPSOIL were encountered from ground level to a depth of 0.80m-2.10m bgl and generally consisted of dark brown to brown very gravelly cobbly sandy CLAY. Gravel is fine to coarse angular of brick and concrete fragments. The MADE GROUND was a brown/grey very gravelly sandy CLAY, gravel fine to coarse and sub-rounded of sandstone, brick and concrete fragments. The deepest Made Ground was encountered in WS05, WS06, WS07 and WS10 at 2.00 to 2.10m bgl. The Made Ground was found to be underlain by Glacial Till which is generally described as firm to very stiff brown occasional grey mottling very gravelly sandy CLAY. Gravel is fine to coarse sub rounded to sub angular of mixed lithologies. In WS05 a deposit of very soft sandy gravelly organic rich CLAY was encountered from 2.00m – 3.20m bgl interbedded with a 0.40m thick layer of spongy brown fibrous PEAT. Boreholes reached their maximum required depth of 15.0m bgl, the depth highlighted in the scope. Groundwater strikes during the investigation were noted in the Till in two cable percussive borehole between 2.30m to 5.50m bgl. Post investigation groundwater monitoring showed groundwater levels to vary from 0.70m to 14.13m bgl.
Environmental Laboratory Testing and Ground Gas Monitoring Results	With respect to the proposed end-use of the site (<i>Commercial</i>) Tier 1 thresholds for human health have not been exceeded. Asbestos was identified in one sample, WS02 at 0.30m, with asbestos quantification analysis of the sample as <0.001%. During ground gas monitoring, a maximum carbon dioxide concentration of 6.8% v/v was recorded. Concentrations of methane (CH₄) have been recorded at or below the instruments limit of detection, carbon monoxide (CO) was recorded at a maximum of 18ppm in one location on the first monitoring visit. Hydrogen sulphide (H₂S) was recorded in peak concentrations of 1ppm in four locations during the fourth visit. Results for

Phase 2 Site Investigation

	the calculated gas screening value (GSV) within the footprint of the building were calculated as 0.057 l/hr, designating the site as a Characteristic Situation 1 (CS1).
Ground Contamination and Ground Gas Assessment	A Low risk rating is identified to end-users, construction workers and adjacent residents at this stage from direct contact, inhalation and ingestion of contaminants within Made Ground soils. A Low risk is identified to site end users from sources of ground gas (CS1 designation) with no specialist ground gas protection measures are required.
Preliminary Material Classification and Soils Reuse	For the purposes of disposal soil arisings offsite, an initial assessment of ten Made Ground, five natural soil was carried out using a proprietary waste characterisation assessment tool. Results indicated an initial classification of non-hazardous for all samples. It should also be noted that this information is for guidance only and if soil material is to be disposed offsite, further soil contaminant testing and position specific assessments, in line with WM3, is likely to be required. Further soil contaminant testing and assessments should be carried out and based on the WAC results. The Contractors should satisfy themselves regarding the classification of any waste arisings. Confirmation of acceptability should be sought from the receiving landfill or treatment facility via the issue of laboratory chemical testing results. Excavated soils should be suitable for reuse at the site following appropriate waste management regulations and/or under a Materials Management Plan (MMP).
Geotechnical Assessment	It is considered that shallow pad foundations could be adopted at the site to support the proposed development founding in the stiff Glacial Till Clays at a typical depth of 1.5m bgl with an estimated allowable bearing capacity of 230kN/m² for 2.50m wide strips with less than 25mm settlement. Due to the cohesive nature of the soils observed on site, suspended floor slabs should be adopted in accordance with NHBC guidelines. Laboratory test results indicate a Design Sulphate Class for concrete may be taken as DS-1 and ACEC class of AC-1s would be appropriate.
Recommendations	Based on the findings of the ground investigation, the following recommendations are made: 1. Further investigation should be undertaken within the area of identified organic peaty materials within WS05 to delineate and ensure it does not extend to the south within the development footprint; and 2. It is recommended that construction workers are provided with appropriate PPE and sanitary facilities, with reference to the environmental testing results presented herein and within <i>Appendix C</i>.

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Appendices

- Appendix A - Drawings (Proposed Development Plans and Exploratory Hole Location Plan)
- Appendix B - Exploratory Hole Logs
- Appendix C - Chemical Laboratory Testing Results
- Appendix D - Geotechnical Laboratory Testing Results
- Appendix E - Ground Gas Monitoring Results
- Appendix F - GAC Screening Thresholds
- Appendix G - Risk Assessment Methodology

1.0 Introduction

1.1 Project Background

In November 2018 Curtins were instructed by Morgan Sindall to undertake a Phase 2 Site Investigation at the Gorton Community Hub site off Garratt Way, Gorton, Manchester M18 8HE. The site is centred on NGR 388510, 396220, and covers an area of approximately 1.16 Ha.

The Gorton Community Hub development site is understood to comprise three separate plots located to the south and north of Garratt Way, Manchester:

- Eastlands Homes and East Hub site (vacant);
- a disused pub site; and
- to the north of Garratt Way, the Gorton Library site (operational).

At the time of writing this report, no intrusive investigation works had been undertaken at the Gorton Library site.

A site location plan is presented as *Figure 2.1*.

1.2 Scope of Services

This investigation aims to characterise the geo-environmental and geotechnical conditions prior to the proposed development which comprises of the demolition of the existing buildings and the construction of a 3 to 4 storey Community Hub building on the Eastlands Homes site, with the disused pub and library sites to be surface car parking.

This report is also produced in support of an associated planning application. The current development plans for which can be referred to within *Appendix A* of this report.

Specifically, the Phase 2 report is intended to determine:

- a) If there is a risk of the proposed end user being adversely impacted upon by potential contamination in shallow site soils that may be present on the site due to its known current, recent and historical use;
- b) If there is a risk of groundwater and/or surface water being adversely impacted upon by potential contamination that may be present on the site due to its known current, recent and historical use;
- c) If there is a risk to the end user from soil gases including methane, carbon dioxide, carbon monoxide and hydrogen sulphide;
- d) Recommendations for the design of foundations and building ground floor slabs; and
- e) Recommendations for the specification of sub-structure concrete and water supply pipes.

Consideration of detailed flood risk, ecology and archaeological issues are outside of the scope of this report.

2.0 Phase 1 Preliminary Site Assessment Summary

This section presents a summary of the current site setting, history, geology and hydrogeology/hydrology, as presented in the Curtins Phase 1 Report (Ref. 1). It is not the intention of this report to duplicate the Phase 1, with the information below providing the background information to support the revised post Phase 2 site works Conceptual Site Model (CSM), as presented in *Section 8.0*.

2.1 Current Setting

The site is located off Garrett Way, Gorton, Manchester as illustrated in *Figure 2.1* below. The site is currently occupied by the former Eastland Homes Hub with an adjacent car park to the west, disused pub and area of hardstanding to the east, areas of soft landscaping and a gated carpark to marginally to the south. The site is relatively level and is situated at approximately 68m AOD.

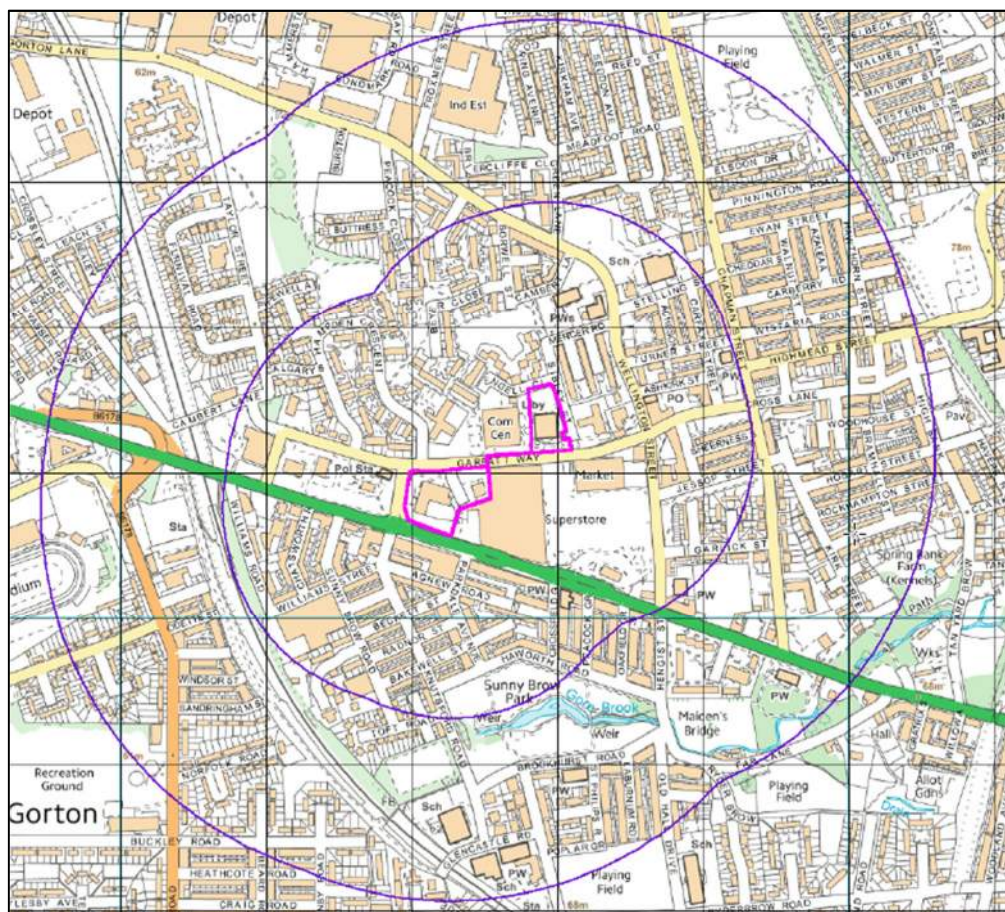


Fig 2.1 – Site Location Plan. Site boundaries shown in pink, 250m and 500m buffers in purple.
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2.2 Surrounding Area Details

The following information denoted the surrounding area details.

Table 2.2 – Surrounding Land Uses

Surrounding Area	N	Garrett Way and public open space with residential dwellings beyond.
	E	Commercial Supermarket and Gorton Market.
	S	Hyde Road and commercial properties.
	W	Whitwell Way, Gorton Police Station and a fast food dispensary.

2.3 Previous Site Use

A review of the available historical mapping information for the site, as presented within Curtins Phase 1 report (Ref. 1) has been undertaken with specific reference to potential sources of contamination.

From the mid-19th Century to the late 19th Century, the site was an undeveloped agricultural field. 1893 mapping depicts terraced properties located on the eastern half and the south west corner of the site.

In 1908 large scale development takes place as the whole site is occupied by terraced properties. No change is undertaken until 1978 when the properties in the north and centre are demolished. Redevelopment to the current site setting takes place in 1983.

2.4 Published Geology

A review of the Curtins Phase 1 (Ref. 1) BGS borehole records indicates the following geological succession underlying the site:

- Glacial Till, Devensian; overlying the
- Chester Formation.

2.4.1 Made Ground Deposits

Made Ground deposits are not indicated to be present on site but are considered likely to be present due to the historical development and geographical location.

2.4.2 Superficial Deposits

Superficial geological deposits are recorded as Devensian age Glacial Till and alluvium (to the west) consisting of Clays, sands, gravels, cobbles and silts.

2.4.3 Bedrock Deposits

Bedrock deposits are indicated to comprise of the Chester Formation, sedimentary rocks of the Triassic Period comprising of coarse to fine grained sandstone.

2.4.4 Mining and Quarrying

The site is within a coal mining reporting area. However, a review of the Coal Authority interactive mapping for the area indicates that the site is 1km southeast of the nearest mine entries, coal outcrops, areas of development high risk and probable shallow coal mining areas.

Therefore, the risk to the development from coal mine workings is Low and has not been considered further.

There are no BGS recorded mineral sites within 750m of the site.

2.4.5 Other Pertinent Geological Existing Geological Records

The Curtins Phase 1 Report (Ref. 1) confirms that there is a low risk to no hazard from the following ground stability hazards on and around the site; collapsible or compressible ground, running sands, landslides, shrinking or swelling clay and ground dissolution.

UK Radon Mapping confirms the site is situated in an area where <1% of homes are above the radon action level. Where the new development incorporates a basement the advice of a specialist Radon assessor must be obtained.

2.5 Hydrogeology and Hydrology

The bedrock is classified as a Principal Aquifer, defined as layers of rock or drift deposits that have high intergranular and/or fracture permeability – meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

The superficial deposits is classed as a Secondary Undifferentiated Aquifer. This is assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

The nearest surface water feature is the Gore Brook over 250m south, flowing in a southwest to northeast direction, river quality is not available.

The site is not situated within a Source Protection Zone (SPZ). There are no potable groundwater abstractions located within 1km of the site. There are no surface water abstractions recorded within 1km of the site.

2.6 Landfill & Pollution

There are no landfill sites recorded or registered within 500m of the site.

2.7 Unexploded Ordnance (UXO) Risk Assessment

Risk mapping for UXO's has placed the site in a Moderate risk area. Moderate risk areas are those that show a density of bombing hits of 11-50 bombs per 1000 acres and may contain potential WWII targets. Manchester generally escaped the worst of Britain's WWII bombing, particularly when compared with other major UK cities, such as Liverpool or London. Furthermore, the peripheries of Manchester were only bombed sporadically, with the major targets in the city consisting of the port, city centre and industry in Stretford.

A review of the available historic mapping shows no ruins on or within 250m of the site. Analysis of online bomb damage maps for Manchester shows that there was no fire bomb strikes, demolished/damaged buildings or ruins onsite or surrounding the site. It is therefore considered that the likelihood of encountering UXO on site as part of the ground investigation or development works is **Low**, and on this basis no further action is considered to be required.

If unexploded ordnance is discovered, stop immediately, prevent access to the area, and inform the police. If the site boundary or location changes then the UXO risk should be reassessed.

2.8 Summary of Phase 1 PCSM

A summary of potential pollutant linkages at the development site identified in the Curtins Phase 1 Report (Ref. 1) presented in *Table 2.8*, were identified as requiring further investigation to enable the safe redevelopment of the site.

Table 2.8 – Preliminary Conceptual Site Model

Source	Pathway	Receptor	Risk
Made Ground of unknown composition from uncontrolled deposition of construction / demolition onsite.	Direct contact/ ingestion and inhalation	Site End Users	Moderate/ Low
	Controlled Waters (groundwater)	Principal Aquifer	Moderate/ Low
Production of ground generating gases from Made Ground deposits containing organic/ putrescible content. Three potential infilled ponds, two located 46m and 72m northeast and north respectively and another 110m south from site, of unknown infill material	Asphyxiation	Site End Users/Buildings/Services	Moderate/ Low

Potential contaminants of concern associated with any Made Ground present include, amongst others; broad range aliphatic and aromatic hydrocarbons present within any fuel oils; inorganic compounds including heavy metals; and discarded building materials.

The qualitative risk assessment determined the above risks associated with the proposed development of the site warrant further investigation.

A **Low** risk was designated to Surface Water receptors, due to the distance to the nearest receptor, the Gore Brook over 250m south.

It was recommended that a ground investigation is conducted to both confirm this assessment and provide data in support of the structural and civil engineering design. The scope of the investigation undertaken in detailed in *Section 3.0*.

3.0 Phase 2 Investigation Scope of Works

Site investigation works were undertaken between 5th and 12th December 2018.

The scope of the ground investigation was designed in general accordance with current UK guidance including CLR11 (Ref. 2), BS10175 (Ref. 3), BS5930:2015 (Ref. 4) and BSEN1997-2:2007 Eurocode 7 (Ref. 5). A summary of the scope and rationale are summarised in *Table 3.0* below.

Table 3.0 – Scope and Rationale of Fieldwork Undertaken

Exploratory Hole Type	Exploratory Hole Reference	Exploratory Hole Depth (m bgl)	Rationale
Cable Percussive Boreholes	CP01 CP02 CP03	15.00	Confirm ground conditions. Collect soil and groundwater samples for chemical and geotechnical analysis. Undertake in-situ testing. Gas and groundwater level monitoring. Determine geotechnical parameters.
Window Sample Boreholes	WS01 WS02 WS03 WS04 WS05 WS06 WS07 WS08 WS09 WS10	5.00 4.45 4.00 0.90 5.45 5.00 4.00 3.00 4.00 4.00	Confirm shallow ground conditions. Collect soil samples for chemical and geotechnical analysis. Undertake in-situ testing. Gas and groundwater monitoring. Determine geotechnical parameters.

A copy of the exploratory hole plan for the investigation is included in *Appendix A*.

3.1 Soil Logging and Sampling

Exploratory borehole arisings were logged on site by a qualified Engineer. All exploratory holes were logged in accordance with the requirements of BS5930:2015 (Ref. 4) including recording observed visual and olfactory indications of contamination. Exploratory hole logs are provided in *Appendix B*.

3.2 Monitoring Well Installations

Ground gas and groundwater monitoring installations (50 mm diameter) were installed within all boreholes (three cable percussive and nine window sample boreholes) with the exception of WS04 which did not reach the required depth due to a concrete obstruction during hand pitting.

A bentonite seal was placed above and below the screened section of the borehole to minimise potential for downward migration of contaminants and the creation of a preferential migratory pathway. A gravel

aggregate surround was installed in the annulus between the sides of the borehole and the slotted sections of pipe.

The 50 mm diameter monitoring wells were primarily designed to assess the potential for ground gas in the window sample boreholes and for the collection of groundwater samples in the cable percussion boreholes. The screened sections therefore focused on the more permeable near surface deposits which are likely to be producing ground gas.

A summary of the response zones is presented in *Table 3.2* below.

Table 3.2 – Monitoring Well Response Zones

Borehole Ref.	Response Zone(s) (m bgl)	Strata Description(s)
CP01	11.00 - 14.50	GLACIAL TILL/INTERBEDDED SAND AND CLAY
CP02	10.00 - 14.50	GLACIAL TILL/SAND/COBBLES
CP03	6.00 - 13.00	SAND/GLACIAL TILL
WS01	1.00 - 2.00	GLACIAL TILL
WS02	1.00 - 2.00	GLACIAL TILL
WS03	0.50 - 1.50	GLACIAL TILL
WS05	1.00 - 2.50	MADE GROUND/ORGANIC RICH CLAY
WS06	1.00 – 2.00	MADE GROUND
WS07	1.00 – 2.00	MADE GROUND
WS08	0.50 – 1.00	MADE GROUND
WS09	1.00 – 2.00	GLACIAL TILL
WS10	1.00 – 2.00	MADE GROUND

Copies of borehole logs can be referred to in *Appendix B* of this report.

3.3 Post-Investigation Monitoring

3.3.1 Ground Gas Monitoring

Six ground gas monitoring visits were completed between 20/12/18 and 05/03/19 to assess ground gas conditions as identified in the Preliminary Conceptual Site Model in the Phase 1 Preliminary Site Assessment (Ref. 1).

4.0 Laboratory Analysis

Representative soil samples were selected for laboratory chemical analysis, based on field observations and to provide a characterisation of the Made Ground and natural strata encountered. Selected soil samples were placed in laboratory provided containers and stored in cool boxes prior to being transported to the nominated laboratory under the laboratory's chain of custody documentation. The laboratory selected by Curtins for chemical analysis was Envirolab (UKAS and MCERTS accredited) and for geotechnical testing were Structural Soils (UKAS accredited).

Given the lack of any obvious sources of potential contamination the sampling positions were generally located in a non-targeted, systematic array to give adequate and representative coverage of the site's proposed end use and the immediate environmental setting.

4.1 Soil Analysis

The contaminants of concern potentially present on the site were considered to include, amongst others; organic matter, fill, hydrocarbons (e.g. fuel/oils) the extent of which is captured by the broad environmental testing suite listed in *Table 4.1* below.

Table 4.1 – Environmental Chemistry Analysis Suite: Soils

Suite Ref.	Analyte	LOD
Soils Suite A	Asbestos Screen, pH and Soil Organic Matter (SOM)	-
	Arsenic, Chromium, Chromium VI, Copper, Lead, Selenium, Zinc, Nickel	5 mg/kg
	Boron (water soluble)	1 mg/kg
	Cadmium	0.5 mg/kg
	Mercury	0.1 mg/kg
	Cyanide (total)	10 mg/kg
	Sulphate (total)	200 mg/kg
	Sulphide	2 mg/kg
	Sulphur (elemental)	20 mg/kg
	Phenols (screen)	1 mg/kg
	PAHs (USEPA 16)	0.1 mg/kg
	TPH (Aro/Alk Split)	0.01 to 0.1 mg/kg

Ten soil samples were taken from within Made Ground and five from the natural ground and all tested for Curtins Suite A.

Copies of the environmental chemistry testing certificates are presented in *Appendix C*.

4.2 Geotechnical Analysis

Soil samples for testing were prepared in accordance with BS1377-1:2016 (Ref. 6) and representative sub-samples were taken for testing. The following tests were carried out:

- 12 No. Moisture content;
- 12 No. Atterberg Limits;
- 4 No. Particle Size Distribution by Wet Sieving;
- 1 No. Quick Undrained Triaxial Compression Test;
- 24 No. pH value; and
- 24 No. Water soluble sulphate.

Copies of the geotechnical testing certificates are presented in *Appendix D*.

5.0 Encountered Ground Conditions

5.1 General

A summary of the ground conditions encountered during the site investigation works is presented below, with detailed information presented in the exploratory hole logs included in *Appendix B* and a summary of each strata presented in subsequent sections.

Table 5.1 – Summary of Ground Conditions Encountered

Stratum	Depth to top of strata (m bgl)	Thickness (m)		Description
		Min	Max	
MADE GROUND	0.00	0.80	2.10	Grass over MADE GROUND: Dark brown to brown very gravelly cobbly sandy CLAY. Gravels are fine to coarse angular of brick fragments and concrete fragments. Includes ash and clinker. Cobbles of whole brick. Sand is fine to coarse. MADE GROUND: Brown with grey mottling very gravelly sandy CLAY. Gravels are fine to coarse angular to sub-rounded of sandstone, brick and concrete fragments and mixed lithologies. Sand is fine to coarse.
GLACIAL TILL	0.80 – 2.10	10.50	12.70	Firm to very stiff brown with grey and orange mottling very gravelly to gravelly sandy to very sandy CLAY.

* - Thickness not proved

5.2 Made Ground

Grass over Made Ground was encountered from ground level to depths of 0.80 – 2.10 m bgl generally comprised of a dark brown to brown very gravelly cobbly sandy CLAY. Gravel is fine to coarse angular fragments of brick and concrete, ash and clinker. Cobbles were of whole bricks. Which was overlying a Made Ground of brown with mottled grey very gravelly sandy CLAY with gravel being angular to sub-rounded of sandstone, brick and concrete fragments. There were three locations, WS09, WS10 and CP03, which were located on hardstanding and had a thin layer 0.10m - 0.20m of asphalt instead of topsoil, onto Made Ground.

Deeper Made Ground deposits were encountered in WS05, WS06, WS07 and WS10 at 2.00m to 2.10m bgl. WS04 was terminated in the Made Ground on concrete at 0.90m.

A summary of the geotechnical test results recorded within the Made Ground are presented in *Table 5.2*. Full details of the geotechnical results recorded are presented on the exploratory hole logs in *Appendix B* and geotechnical test result certificates in *Appendix D*.

Table 5.2 – Summary of Geotechnical Test Results – Made Ground

Parameter	No. of Tests	Minimum	Maximum	Average
pH	10	7.47	9.96	8.24
Water Soluble Sulphate (mg/l)	10	10	760	139

5.3 Superficial Deposits

Superficial deposits comprising Glacial Till were encountered underlying the Made Ground deposits in all exploratory holes except for WS04 which terminated in the made ground. The depth of the superficial deposits was not proven, the cable percussive boreholes reached the required depth of 15mbgl in all three boreholes CP01-CP03.

The Glacial Till was generally described as firm to very stiff brown with grey and orange mottling very gravelly to gravelly sandy to very sandy CLAY. Gravel is fine to coarse sub rounded to sub angular of mixed lithologies including sandstone, mudstone and coal. Occasional interbedded layers of dense brown fine to medium grained SAND was encountered in CP02 between 9.40m to 12.10m bgl and CP03 between 10.50m to 13.00 bgl. A layer of clayey slightly sandy COBBLES of mixed lithologies was encountered in CP02 only, from 12.10m bgl to the base of the borehole.

In WS05 a deposit of very soft sandy gravelly organic rich CLAY was encountered from 2.00m – 3.20m bgl interbedded with a 0.40m thick layer of spongy brown fibrous PEAT.

A summary of the geotechnical test results recorded within the superficial deposits are presented in *Table 5.3*. Full details of the in-situ geotechnical results recorded are presented on the exploratory hole logs in *Appendix B* and test result certificates in *Appendix D*.

Table 5.3 – Summary of Geotechnical Test Results – Superficial Deposits

Parameter	No. of Tests	Minimum	Maximum	Average
Moisture Content (%)	12	13	25	18
Liquid Limit (%)	12	30	48	40
Plastic Limit (%)	12	13	23	18
Plasticity Index (%)	12	17	27	22
Modified Plasticity Limit	12	16	25	21
pH	14	8.02	9.26	8.51
Water Soluble Sulphate (mg/l)	14	10	270	41

Parameter		No. of Tests	Minimum	Maximum	Average
PSD (%)	Cobbles	4	0	0	0
	Gravel		1	24	9
	Sand		55	74	65.3
	Silt/Clay		9	44	25.7
Undrained shear strength Cu (kPa)	Triaxial	1	80	103	92
	Hand Vane Peak	3	102	122	111
SPT 'N' Value		49			
Granular		4	16	37	30
Cohesive		43	8	46	22
Estimated Undrained Shear Strength Cu (kPa) ⁽¹⁾		43	40	230	110
Coefficient of volume compressibility, mv (m ² /MN) ⁽²⁾		43	0.04	0.25	0.09
Estimated Angle of Shearing Resistance (granular soil), Φ' (°) ⁽³⁾		4	30 - 36		
Unit Weight, γ (kN/m ³) ⁽⁶⁾		-	17 – 21		

(1) Cu estimated from SPT N value correlation with average Plasticity Index using a Factor of 5 (Stroud and Butler, 1975).

(2) mv estimated at from SPT N value correlation with average Plasticity Index using a Factor of 0.5 (Stroud and Butler, 1975).

(3) Estimated from the relationship between SPT 'N' Value and angle of shearing resistance (Peck et al, 1976).

(4) From published sources (BS8002).

One quick undrained single stage triaxial tests was undertaken on a sample taken from Glacial Till at 6.00m bgl. The average undrained shear strength from the triaxial was 92 kPa. Three Hand Vanes were undertaken on samples taken in the Glacial Till from 2.00m to 4.00m with the average reading for Hand Vane Peak recorded as 122kPa for CP01 at 3.00m, 102kPa for CP02 at 2.00m and 110kPa for CP03 at 4.00m. Indicating the clay to be of high strength. Based on published relationships, undrained shear strengths (Cu) may be estimated from SPT 'N' values where full penetration was achieved. Using a factor of 5, estimated Cu values range between 40kPa to 250kPa indicating medium to very high strength clay which is consistent with the description firm to very stiff.

Plasticity testing undertaken in the Glacial Till recorded the clay to be of low to intermediate plasticity. In accordance with NHBC Standards Part 4 Chapter 4.2 building near trees, the clay can be described as having a low volume change potential.

Figure 5.3 below shows the correlation between SPT 'N' values with depth for Cohesive material and Figure 5.4 for the correlation for Granular, which shows a general increase in 'N' value with depth for both cohesive and granular.

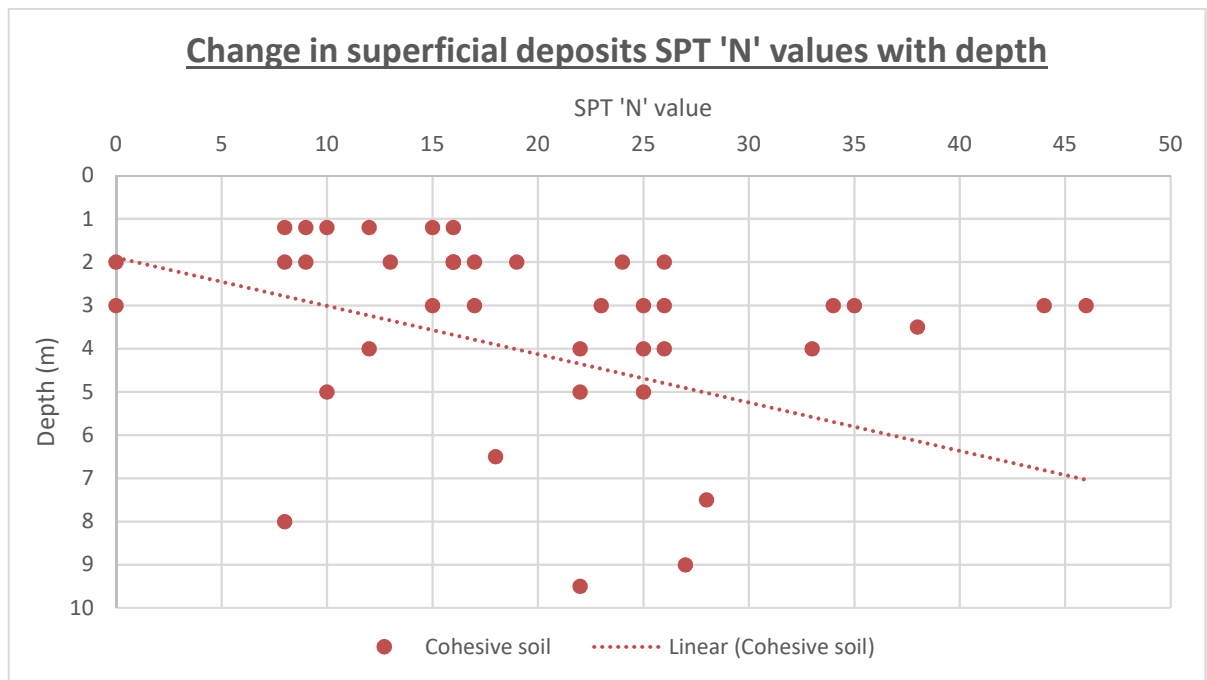


Figure 5.3 – SPT 'N' value versus depth for Glacial Till deposits (Cohesive).

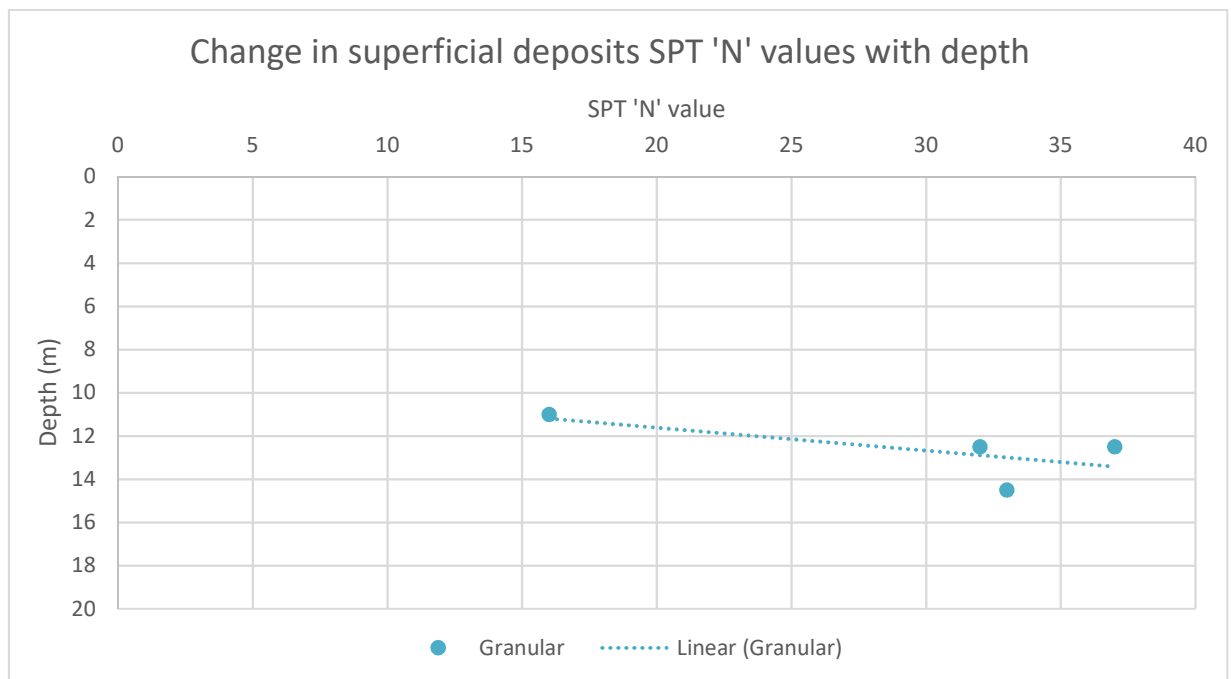


Figure 5.4 – SPT 'N' value versus depth for Glacial Till deposits (Granular).

5.4 Observed Potential Contamination

No olfactory or visual contamination was noted during the site works.

5.5 Obstructions Encountered

WS04 encountered a concrete obstruction at 0.90m. No other obstructions were recorded.

5.6 Groundwater

A summary of the groundwater levels recorded during the siteworks, and subsequent monitoring, is presented in *Table 5.6*. Full detail of the water strikes recorded during progression of the investigation positions are presented on the exploratory hole logs included in *Appendix B* and full details of the water levels recorded during the monitoring visits are presented in *Appendix E*.

Table 5.6 – Groundwater Noted During Site Investigation

Borehole Ref.	Water Strikes		Monitored Water Levels	
	Strike Depth (m bgl)	Strata	Installation (m bgl)	Depth to top of water level (m bgl)
CP01	5.50	CLAY	11.00 – 14.50	14.00 – 14.13
CP02	NR	NA	10.00 – 14.50	11.00 – 12.00
CP03	2.30	CLAY	6.00 – 13.00	9.02 – 11.90
WS01	NR	NA	1.00 – 2.00	0.70 – 1.10
WS02	NR	NA	1.00 – 2.00	0.70 – 1.25
WS03	NR	NA	0.50 – 1.50	1.17 – 1.50
WS04	NR	NA	N/A	N/A
WS05	NR	NA	1.00 – 2.50	0.90 – 1.10
WS06	NR	NA	1.00 – 2.00	0.80 – 1.40
WS07	NR	NA	1.00 – 2.00	1.20 – 1.25
WS08	NR	NA	0.50 – 1.00	0.89*
WS09	NR	NA	1.00 – 2.00	1.94 – 1.98
WS10	NR	NA	1.00 – 2.00	1.82 – 1.99

NR = no groundwater encountered

*monitored once due to access restrictions

Groundwater within the boreholes ranged from 2.30m to 5.50m bgl in only two locations. The groundwater monitoring undertaken has recorded groundwater between 0.70m to 14.13m bgl. This is likely to be a result of surface water infiltrating into the boreholes.

The following installs were dry on one or two occasions during gas monitoring:

- WS09 on the second and third visit;
- WS03 on the first visit;
- WS07 on the second and fourth visit;
- CP01 on the third and fourth visit; and
- CP03 on the last visit.

5.7 Aggressive Ground Conditions

The classification of the site in terms of concrete in aggressive ground is based on the guidance provided in Table C2 of the BRE Special Digest 1: 3rd Edition: 2005 (Ref. 7). *Table 5.7* details the classification.

Table 5.7 – Aggressive Chemical Environment for Concrete (ACEC) Site Classification

Stratum	Design Sulphate Class	ACEC Class ⁽¹⁾
Made Ground	DS-1	AC-1s
Superficial Deposits	DS-1	AC-1s

(1) ACEC assessment was based on the static groundwater condition for the scheme area

Based on the pH and the 2:1 sulphate, all samples are suitable for DS-1 AC-1s.

6.0 Ground and Groundwater Contamination Assessment

This section of the report includes the assessment of the potential contamination, solid, liquid and gas, identified on the subject site which may present a risk to the proposed end users, associated utilities and the wider environment.

In guidance published by the Environment Agency, the risk to human health or controlled waters is determined through an assessment of pollutant linkages between a source of contamination (within the ground or groundwater either on or off site) and a sensitive receptor such as end users of the site, building materials, edible plants grown in gardens or groundwater abstracted for drinking. This is termed a source-pathway-receptor relationship. The same model is applied to the assessment of risk arising from ground gases as detailed within BS8576:2013 (Ref. 8).

These models have a common approach, which is one of a tiered assessment. At each stage of the assessment further detail can be applied to the conceptual site model to provide a detailed interpretation on a site by site basis. As part of the planning process this approach is adopted to establish either if the site is 'suitable for use' or whether additional work or else remedial work is required for the site to be deemed so.

The sub-sections hereafter therefore incorporate the first tier (Tier 1) of this approach otherwise referred to as the Generic Quantitative Risk Assessment (GQRA). The GQRA builds on the qualitative risk assessment presented in the Phase 1 Desk Study (Ref. 1) conjunction with observations made during the ground investigation and is based solely on the results of the chemical and other testing data obtained as part of Curtins ground investigation. The GQRA is used to build/refine the Conceptual Site Model (CSM) for the site as detailed and presented in *Section 8.0* of this report.

The following sections present more detail on the risk assessment methodology rationale for the main receptors.

6.1 Human Health GQRA

Detailed guidance on human health risk assessment is available within several documents, published by both the Environment Agency and Defra. Guidance includes Contaminated Land Exposure Assessment (CLEA) v1.071 model (Ref. 9) Report SC050021/SR2: Human Health Toxicological Assessment of Contaminants in Soil (Ref. 10) and Report SC059921/SR3: Updated Technical Background to the CLEA Model (Ref. 11).

A generic quantitative risk assessment (GQRA) has been carried out for the Potential Contaminant Linkages (PCLs) investigated by screening of soil contamination data against relevant Generic Assessment Criteria (GAC) where available, including:

- i) **Soil Guideline Values (SGVs):** These have been published by the Environment Agency and are trigger values for screening out low risk areas of land contamination. SGV's give an indication of representative average concentrations of chemicals in soil, below which long-term health risks

are likely to be minimal. SGVs have been published for several contaminants including arsenic, cadmium, mercury, nickel, selenium, BTEX, phenols and dioxins, furans and dioxin-like PCB substances for land uses including residential, allotments and commercial. The SGVs have been developed for a sandy loam soil with 6% soil organic matter (SOM) content;

- ii) **Supplementary Screening Values (SSVs):** In addition to the SGVs developed by the EA, other third party organisations have derived SSVs for a wider range of contaminants and land uses using the CLEA Model. Curtins have adopted these numbers where applicable, including those developed by Atkins AtriskSoil™, the LQM/CIEH Suitable for Use Levels (S4UL) and EIC/AGS/CL:AIRE published thresholds;
- iii) **Category 4 Screening Levels (C4SLs):** In March 2014 Defra published C4SLs for arsenic, benzene, benzo(a)pyrene, cadmium, hexavalent chromium and lead. These values were derived to support the revised Part 2A Statutory Guidance issued in 2012 (Ref. 12) in which four categories of contaminated land are included, ranging from Category 1 (significant/high risk) to Category 4 (low risk). C4SLs are not representative of significant possibility of significant harm (SPoSH) and are low risk levels which, and therefore where the C4SLs are not exceeded, land can be demonstrated to be in Category 4 and cannot be determined as contaminated land.

6.1.1 Adopted Soil Human Health GACs Screening Methodology

The proposed use of the site, as single storey Fire station with training yard and an area for car parking; is most analogous with a *Commercial* end-use scenario and so assessment has been undertaken against the following GACs, in order of preference:

1. Environment Agency Soil Guideline Values,
2. CL:AIRE, AGS, EIC. Soil Generic Assessment Criteria for Human Health Risk Assessments,
3. LQM/CIEH 2015 S4ULs for Human Health Risk Assessment, and
4. DEFRA Category 4 Screening Levels.

The soil organic matter (SOM) content has an influence on the volatilisation of organic contaminants (i.e. the higher the SOM, the lower the volatilisation rate and therefore inhalation exposure risk). Soil organic matter (SOM) values for the site soils ranged from 1.4% to 8.2%.

A comparison against Tier 1 thresholds for a conservative SOM of 2.5% for the Made Ground and a SOM of 1.0% for the Natural samples has been adopted for *Commercial* end-use. The adopted GAC's are listed in *Appendix F*.

Many of the exposure pathways considered in the CLEA model assume that the adult or child is in contact with the contaminated ground or that such contamination is easily mobilised from the surface. However, plant uptake of chemicals and the release of soil vapour may occur from greater depths. Although, the highest density of roots occurs in the top 80 cm, many crop plant

root depths are between one and two metres. Although the transport potential decreases, vapours have the potential of migrating to the surface over distances of tens of metres (Updated technical background to the CLEA model - SC050021/SR3).

6.1.2 Generic Assessment Criteria Screening of Soil Laboratory Results

The results of the environmental testing can be referred to in *Appendix C*.

With respect to the proposed end-use of the site, no exceedances are noted within recovered soil samples. All soil samples were screened for asbestos with one sample, WS02 at 0.30m, identified positive for chrysolite loose fibres. This sample was quantified as being less than 0.001%. No suspected asbestos containing materials (ACMs) were identified.

6.2 Controlled Waters GQRA

Insufficient groundwater was available within the Cable Percussion boreholes to allow groundwater sample collection and environmental chemical analysis.

The site investigation recorded Glacial Till to minimum 15.0m bgl, with bedrock not encountered. It is considered that any groundwater within the Made Ground or granular superficial deposits is perched and therefore not in continuum with the bedrock aquifer through the low permeability clay.

6.3 Water Supply Pipe Assessment

Due to elevated levels of Mineral oil C21-C40, PE water supply pipes would not be considered suitable for the proposed development, however suitable for purpose materials could be used.

With reference to the UKWIR Report no. 10/WM/03/21 (Ref. 13) advice is given on the appropriate materials for these ground conditions. The exact requirements are to be confirmed with United Utilities.

6.4 Materials Management

6.4.1 Re-use of Site Soils

Based on the geochemical testing results presented as part of this investigation it is considered that there is no specific requirement to remove soils from site as they do not present an unacceptable risk to human health or the environment.

The re-use of site-won soils may therefore be undertaken if the following principles are met:

- i) the geotechnical suitability of the material needs to be confirmed;
- ii) the re-use of the material needs to be covered as part of the planning approval, e.g. site levels maintained within agreed limits;
- iii) the volume of the material being re-used needs to be confirmed and traceable; and

- iv) regulatory approval from the relevant authorities has been sought.

6.4.2 Material Classification

Where any site soils are to be disposed of off-site guidance on the disposal of contaminated soils is provided within the following document published by the Environment Agency: WM3 (1st Edition 2015) (Ref. 14).

Guidance states that the principal contractor (or any other sub-contractor undertaking excavations) should, in conjunction with the proposed disposal facility, use where possible the relevant environmental chemistry analyses results to classify any surplus material identified for off-site disposal. However, it should be noted that this information is for guidance only and material identified for disposal should be tested and assessed in accordance with WM3 to enable classification during the works.

An initial assessment for the waste classification of the shallow and deeper Made Ground soils encountered on site has been carried out through a comparison of the soil testing results against the Tier 1 Thresholds and using the Waste Soils Characterisation Assessment Tool, Cat-WasteSoil (Ref. 15), developed by McArdle and Atkins. This online tool gives a rapid assessment of contaminated soils and their classification as either hazardous or non-hazardous (stable non-reactive hazardous waste) waste, it should be noted that this tool does not classify inert waste. Persistent Organic Pollutants (POP's) were not tested for as part of the investigation, however based on the Conceptual Site Model the risk of these being present on the site is considered low.

The initial assessment revealed that of the 15 soil samples tested (ten of Made Ground and five of the sub soil and one natural), all were indicated to be non-hazardous with respect to Environment Agency waste classes, using the guidance given in WM3, for offsite disposal. Where natural soils are being considered for off-site disposal as inert waste, Waste Acceptance Criteria (WAC) testing should first be undertaken with confirmation of acceptability from the receiving landfill.

As discussed, preliminary waste classification is undertaken to offer indicative advice with respect to disposal requirements. Landfill operators are not obliged to accept waste and, if they were to do so, may have specific requirements beyond those outlined above prior to acceptance. Landfill operators should be contacted to confirm the above classifications or otherwise.

7.0 Ground Gas Assessment

The assessment of risk presented by ground gases is assessed with reference to guidance published by CIRIA (Assessing Risks Posed by Hazardous Ground Gases to Buildings, C665 (Ref. 16), BSI Publication Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings BS8485:2015 (Ref. 17) and other broadly accepted references such as the Ground Gas Handbook 2009 (Ref. 18).

The ground gas risk assessment adopts a tiered approach. In the first instance this involves a re-evaluation of the Conceptual Site Model described within the Phase 1 Preliminary Site Assessment and thereafter validating this conceptual model with the ground gas data, the semi-quantitative risk assessment.

7.1 Ground Gas Monitoring Results

To characterise the site's ground gas regime and validate the qualitative assessment of ground gas risk standpipe installations were incorporated within the twelve borehole locations as detailed in *Section 3.2*.

Three gas monitoring visits have been undertaken at the site and reviewed. The Phase 1 highlighted a Moderate to Low risk.

The gas monitoring visits have been undertaken between 20th December 2018 and 5th March 2019, with barometric pressure recorded between 980mb and 1022mb. Rising barometric pressure were recorded on the first, third (20/01 and 17/01) and last visit (05/03). Steady barometric pressure was recorded in the second (09/01) and the fifth visit (15/02) and a falling barometric pressure was recorded in the fourth visit (29/01). The results log sheets are contained within *Appendix E* and summarised in *Table 7.1a*, installs under the footprint of the building, and *7.1b*, installs where there is public open space (POS) and carparking area, below.

Table 7.1a – Summary of Ground Gas Monitoring Results - Installs Located within the Proposed Development Footprint

Exploratory Hole ID	Maximum Methane Concentration (%)	Maximum Carbon Dioxide Concentration (%)	Minimum Steady Oxygen Concentration (%)	Maximum Gas Flow (l/hr)
WS02	<0.0	3.8	13.5	1.5
WS03	<0.0	0.4	19.7	0.1
WS10	<0.0	0.7	19.8	-0.9
CP01	<0.0	2.0	17.8	-0.1
CP03	<0.0	0.4	5.9	-0.3

For the installs located within the proposed development footprint, methane (CH₄) was recorded at or below the instrument's detection limit within all the monitoring wells throughout the monitoring period.

Maximum carbon dioxide (CO₂) concentrations were recorded at 3.8% in WS02 on the last monitoring visit. The maximum recorded Carbon Monoxide (CO) was 18ppm in CP03 on the first monitoring visit on 20th December 2018 and Hydrogen Sulphide (H₂S) was recorded in peak concentrations of 1ppm. Gas flow was recorded at a maximum peak flow rate of 1.5 l/hr in WS01 on the fifth visit 15th February 2019.

Table 7.1b – Summary of Ground Gas Monitoring Results installs located on carparking and POS

Exploratory Hole ID	Maximum Methane Concentration (%)	Maximum Carbon Dioxide Concentration (%)	Minimum Steady Oxygen Concentration (%)	Maximum Gas Flow (l/hr)
WS01	<0.0	3.3	16.3	-39.1
WS05	<0.0	0.5	18.8	-0.6
WS06	<0.0	3.9	18.2	6.6
WS07	<0.0	6.8	3.9	1.2
WS08	<0.0	1.3	18.8	0.0
WS09	<0.0	1.4	18.7	-0.3
CP02	<0.0	4.6	1.0	9.2

In reference to the installs located on the carparking and POS area, Methane (CH₄) was recorded at or below the instrument's detection limit within all the monitoring wells throughout the monitoring period. Carbon dioxide (CO₂) was recorded between 6.0% to 6.8% in WS07 on all monitoring visits. The maximum recorded Carbon Monoxide (CO) was 12ppm in CP02 on the first monitoring visit on 20th December 2018 and Hydrogen Sulphide (H₂S) was recorded in peak concentrations of 1ppm. Gas flow was recorded at a maximum peak flow rate of -39.1 l/hr in WS01 on the second visit 9th January 2019.

7.2 Ground Gas Assessment

The Conceptual Site Model presented within the Phase I Preliminary Risk Assessment identified possible Made Ground and three infilled pond surrounding the site as a potential sources of ground gas generation. The report suggests no records of organic rich drift deposits (e.g. peat) being present. Noxious and asphyxiate gases were attributed to include, but not limited to, carbon dioxide, carbon monoxide, methane and hydrogen sulphide. The Phase 1 identified a **Moderate to Low Risk**.

Made Ground soils in the form of reworked glacial till were encountered to depths of up to 2.10m bgl. The ground investigation revealed a ground model generally consistent with the preliminary conceptual site model. Natural deposits were exclusively glacial till. One location recorded putrescible/organic content in WS05 with organic rich clay 2.00 to 2.70m and fibrous peat at 2.70 to 3.10m.

Consideration of the recorded soil gas flow rates, presented above, enables hazardous gas flow rates (Q_{hg}) to be evaluated. Q_{hg} can be derived for both 'representative' and 'worst case' scenarios and a

comparison made in support of an appropriate assessment of ground gas risk. For a 'representative' scenario (highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole) steady state flow rates and gas concentrations are adopted, whilst for a 'worst case' scenario (highest Q_{hg} across the entire dataset irrespective of location and discrete monitoring events) peak flows and gas concentrations are adopted.

Gas assessment for the carparking and POS area

Evaluation of the 'representative' scenario (highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole) records a maximum Q_{hg} 0.2508 l/hr for carbon dioxide.

Evaluation of the 'worst case' scenario (highest Q_{hg} across the entire dataset irrespective of location and discrete monitoring events) again records a maximum Q_{hg} of 0.4488 l/hr for carbon dioxide. However, peak flows recorded from WS01 have been discounted, as the well was flooded on all monitoring visits, likely causing the highly variable flow rates.

Given this area is only to be used for surface car parking, this area of the site has not been given a CS designation.

Gas assessment for the footprint of the building

Evaluation of the 'representative' scenario (highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole) records a maximum Q_{hg} of 0.00038 l/hr for carbon dioxide.

Evaluation of the 'worst case' scenario (highest Q_{hg} across the entire dataset irrespective of location and discrete monitoring events) again records a maximum Q_{hg} of 0.057 l/hr for carbon dioxide.

Given the targeted data set from within the immediate development footprint, the 'worse case' scenario has been adopted, indicating the site to be designated as CS1, with no specialist ground gas protection measures required.

The potential risks from ground gases to the excavations are to be dealt with by the Contractor, in accordance with the Confined Space Regulations, during construction. Appropriate ground gas monitoring and safety measures should be in place during the works, as the potential presence of ground gases could pose a risk in any confined spaces of deep excavations.

8.0 Revised Conceptual Site Model

The Preliminary Conceptual Site Model (PCSM) presented in the Phase 1 Report (Ref.1) and discussed in *Section 3.0* of this report has been revised following the GQRA in *Section 7.0* above. The Revised Conceptual Site Model (CSM) is summarised in the table overleaf.

The CSM details the source-pathway-receptor linkages or potential pollutant linkages (PPL) that have been identified as relevant for the site. The GQRA details the associated level of risk relating to these potential pollutant linkages.

The CSM follows the framework outlined within CIRIA C552 (Ref. 19) which is summarised within *Appendix G*.

The 'risk rating' within the CSM refers to the risk that the source, pathway, receptor linkage or PPL is complete. Unless specifically stated it does not necessarily refer to an immediate risk and is intended to be used as a tool to assess the necessity for further assessment/investigation.

Risks presented by Mining are discussed and assessed within *Section 2.4.4*.

Risks presented by Unexploded Ordnance are discussed and assessed in *Section 2.7*.

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations, 2015 (Ref. 20) which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk. It has been assumed that any future construction works on site will be undertaken in compliance with these requirements and therefore construction workers involved in the building works at the site have been discounted as a human receptor in the conceptual site model. Reference should be given to the environmental testing results discussed within *Section 6.0* and presented within *Appendix C*.

Qualitative Risk
AssessmentGeneric
Quantitative Risk
AssessmentDetailed
Quantitative Risk
Assessment or;
Remedial Action

- The table below represents the Second stage in the land quality risk assessment process; the Revised Conceptual Site Model following the Quantitative Risk Assessment.
- For a development site to be deemed 'suitable for use' the level of risk needs to be brought down to acceptable levels, i.e. low to very low risk. The purpose of each stage of risk assessment is ultimately to establish if there is a requirement for additional levels of assessment to be made to have sufficient confidence to support a risk characterisation or management decision, e.g. remedial action.

Conceptual Site Model			Qualitative Risk Assessment			Recommended Actions
Source	Pathway(s)	Receptor(s)	Consequence (with explanations, if applicable)	Likelihood of Occurrence (with explanations if applicable)	Risk Rating	
On-site sources of potential contamination: - Historical uncontrolled deposition of unknown Made Ground on site associated with the construction of the pub and Eastlands building. - No significant off-site sources have been identified considered likely to impact the site soils. - Asbestos identified in one sample from WS02 at 0.30m.	Direct contact, ingestion, inhalation (dust and vapours)	Site End Users (Commercial)	Medium Chronic health risk	Unlikely No exceedances of relevant threshold values noted from chemical testing of soil samples. Asbestos quantification identified the asbestos positive sample as <0.001% and thus a low risk.	Low	No further action recommended
	Vertical migration through the superficial deposits (soils) May occur due to existing service corridors and physical processes including; capillary action and downwards into the natural deposits through infiltration.	Controlled Waters (groundwater) Principal Aquifer (bedrock) & Secondary Undifferentiated Aquifer (superficial deposits). There is one groundwater abstraction point within 500m but is not for potable use and the site is not within a designated Source Protection Zone.	Medium Pollution of sensitive water resources	Unlikely Underlying low permeability Glacial Till to minimum, 15.0m bgl, with no bedrock encountered during the investigation. Perched water in the Made Ground not considered likely to permeate through the clay to the underlying aquifer in the bedrock.	Very Low	No further action recommended
Potential sources of ground gas: Made ground and/or organic matter within superficial soils.	Vertical and horizontal migration through existing service corridors and the underlying superficial deposits	Site End Users (Commercial)	Medium Human health risk	Unlikely For the footprint of the proposed development, the Q _{hg} was 0.057 l/hr, indicating the site to be CS1 with no specialist ground gas protection measures required.	Low	No further action recommended

9.0 Engineering Assessment and Recommendations

9.1 Introduction

This section will assess the relevant geotechnical issues for the proposed development of a 3 to 4 storey Community Hub building on the Eastlands Homes site, with the disused pub and library sites to be surface car parking. The proposed development plan is contained within *Appendix A*.

The engineering assessment considers foundation design, bearing capacity, settlement, excavations, ground floor slabs and pavement design for the site. Structural details and loadings have not yet been provided. It should be noted that detail may change in the development of designs beyond the issue of this Phase 2 Report and the Construction Designer should satisfy themselves regarding the adequacy of their design and proposed approach to construction by reference to the on-going project design proposals, the site investigation information and their own examination of the site.

9.2 Summary of Ground Conditions

The ground conditions at the site generally comprised MADE GROUND (Topsoil and Reworked Subsoil) underlain by Glacial Till comprising of a firm to stiff gravelly sandy CLAY with occasional intermittent sand beds. Groundwater conditions are generally considered to be near existing ground surface due to the impermeable nature of the Glacial Till and low rate of infiltration.

The geotechnical parameters recommended for use in the design based on the ground conditions encountered are summarised in *Table 9.2* below;

Table 9.2 - Geotechnical Parameters

Parameter	Glacial Till (Clay)
Unit Weight, γ (kN/m ³) ⁽¹⁾	20
Estimated Undrained Shear Strength C_u (kPa) ⁽²⁾ firm at 1.0m bgl stiff at 2.0m bgl	45 90
Coefficient of volume compressibility, m_v (m ² /MN) ⁽²⁾ firm at 1.0m bgl stiff at 2.0m bgl	0.20 0.11

(1) From published sources (BS8002)

(2) Typical value estimated from descriptions on borehole logs, insitu testing and from the correlation between SPT' N value and average plasticity index (Stroud and Butler, 1975).

9.3 Excavations

Based on observations on site, together with the results of in-situ and laboratory tests, it is considered that excavations to <1.20m bgl should stand unsupported in the short term (1-14 days). Side support

for safety purposes should of course be provided to all excavations which appear unstable, and those >1.20m deep, in accordance with Health and Safety Regulations.

Suitable side slope angles excavated the Made Ground and Glacial Till, described as a gravelly sandy CLAY encountered across the site, is likely to be in the region of 20-35 degrees when wet, increasing to 30-45 degrees when dry, based on guidance provided by CIRIA report 97 Trenching Practice (Ref. 21).

Groundwater may be encountered as seepages in shallow excavations for foundations or services as perched water. It is considered that groundwater inflows, if encountered, may be controlled by pumping from sumps.

Excavation through layers of Made Ground and Glacial Till encountered across the site should be feasible using conventional site plant. Following periods of heavy rainfall, the use of a tracked excavator may be required to prevent plant subsidence.

9.4 Foundation Design

It is understood that the proposed development is to consist of a 3 to 4 storey Community Hub building on the Eastlands Homes site, with the disused pub and library sites to be surface car parking. Column loadings expected to be generated by the proposed structure are; worst case - 1020kN dead load, and 570kN live load, typical case - 800kN dead load and 450kN live load and 1250kN.

The shallow ground conditions on site generally comprise Made Ground to a maximum depth of 2.10m bgl with an average thickness of 1.35m comprising Grass over TOPSOIL and reworked glacial till. The Made Ground is underlain by glacial till typically described as a firm to stiff brown very gravelly to gravelly sandy to very sandy clay.

Foundations should be placed beneath the made ground and outside the zone of influence of trees at the minimum founding depth of 0.75m based on low volume change potential of the clay in accordance with the NHBC guidance.

It is considered that shallow spread foundations would be suitable to support the proposed development founding within the stiff clays at typically 1.50 – 2.00m bgl which may need to be deepened locally to found beneath the maximum thickness of made ground encountered to 2.10m bgl and beneath the very soft organic Clay and Peat encountered in WS05 from 2.00 to 3.20m bgl.

Initial estimates indicate that for a 2.5m square pad founded at 1.50m bgl an allowable bearing capacity of 230kN/m² with less than 25mm settlement is estimated increasing to some 240kN/m² when founding at 2.0m bgl. If higher bearing capacities are required, then it is recommended that a piled foundation solution is adopted to transfer loads to a greater depth.

9.5 Ground Floor Slabs

The design of the ground floor slab will be dependent upon the foundation method adopted. Based on observation on site together with the results of laboratory tests it is recommended that, consideration is given to suspended floor slabs at the site due to the cohesive nature of the Glacial Till.

9.6 Chemical Attack on Buried Concrete

The site has been classified in accordance with BRE Special Digest (Ref. 7) and laboratory testing undertaken accordingly in *Section 5.7*. Based on the laboratory test results it is considered that a Design Sulphate Class may be taken as DS-1 and an ACEC class for the site of AC-1s would be appropriate.

10.0 Conclusions & Recommendations

10.1 Conclusions

A revised tabulated revised Conceptual Site Model has been derived following the findings on the Generic Quantitative Risk Assessment risk assessment and is presented in *Section 8.0*.

10.1.1 Ground Contamination

The environmental chemistry soil results have been compared with the Tier 1 criteria for soils with respect to human health against '*Commercial*' thresholds.

With respect to the proposed end-use of the site Tier 1 thresholds have not been exceeded. It is therefore considered that the risk presented to site end-users, construction workers and adjacent residents from Made Ground soils is **Low**.

10.1.2 Groundwater

Bedrock was not encountered during the investigation, which extended to 15.0m bgl.

It is considered unlikely that perched water within the Made Ground or granular superficial deposits will vertically migrate through the low permeability Glacial Till to the Principal Aquifer within the bedrock. Insufficient groundwater was available in the boreholes to allow groundwater sample collection and analysis.

It is therefore considered that the risk presented to the Principal Aquifer is **Very Low**.

10.1.3 Ground Gas Assessment

Six gas monitoring visits have been undertaken. For the carparking and POS area, no CS designation has been assigned as no buildings are currently proposed. If development plans change, this should be reviewed.

For the footprint of the proposed building, a maximum carbon dioxide concentration of 3.8% v/v was recorded in WS02. Given the targeted data set from within the immediate development footprint, the 'worse case' scenario has been adopted with a Q_{hg} of 0.057 l/hr, indicating CS1 gas regime. The risk to the end-user the development site from soil gases is therefore considered to be **Low** and no gas protection measures will be required.

The BGS Radon Mapping confirms the site is situated in an area where <1% of homes are above the radon action level. Radon protection measures are therefore not considered necessary within the proposed development. However, where the new development incorporates a basement the advice of a specialist Radon assessor must be obtained.

10.1.4 Geotechnical Assessment

It is considered that shallow pad foundations could be adopted at the site to support the proposed development founding in the stiff Glacial Till Clays at a typical depth of 1.50m bgl with an estimated allowable bearing capacity of 230kN/m² for 2.50m square pads with less than 25mm settlement.

Due to the cohesive nature of the soils observed on site suspended floor slabs should be adopted in accordance with NHBC guidelines.

Laboratory test results indicate a Design Sulphate Class for concrete may be taken as DS-1 and ACEC class of AC-1s would be appropriate.

10.2 Recommendations

Based on the findings of the ground investigation, the following recommendations are made:

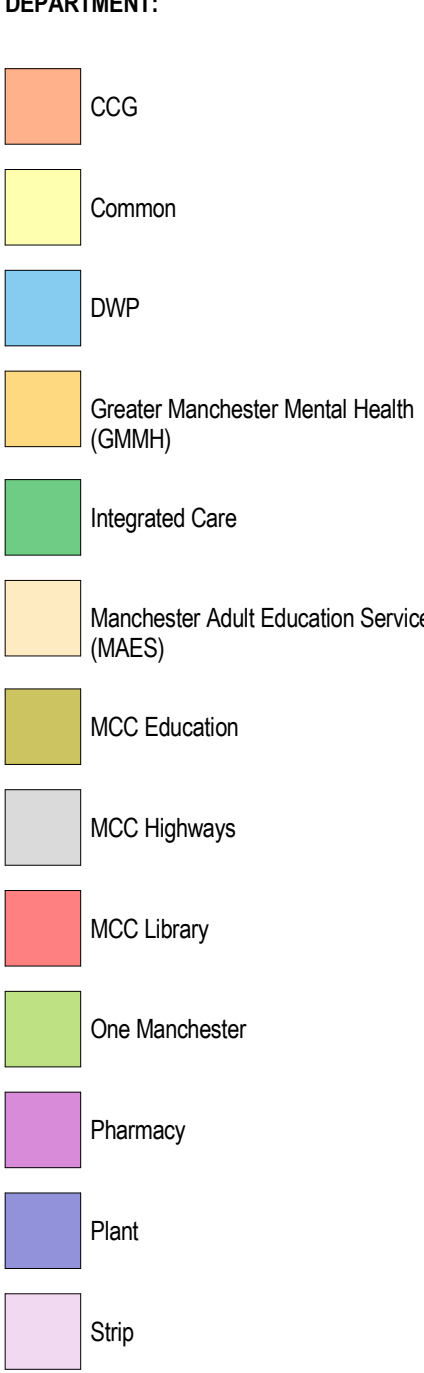
- 1) Further investigation should be undertaken within the area of identified organic peaty materials within WS05 to delineate and ensure it does not extend to the south within the development footprint; and
- 2) It is recommended that construction workers are provided with appropriate PPE and sanitary facilities, with reference to the environmental testing results presented herein and within *Appendix C*.

11.0 References

1. **Curtins**, Phase 1 Preliminary Risk Assessment for Gorton Community Hub, ref 070452-CUR-00-XX-RP-GE-001-V01 dated 21 December 2018
2. **Environment Agency**. (2004) Model Procedures for the management of land Contamination Contaminated Land Report 11 (CLR11).
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11. **Environment Agency**. (2009) *Updated Technical Background to the CLEA Model* (report no.SC050021/SR3).
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14. **Environment Agency**. (2015) Guidance on the Classification and Assessment of Waste Technical Guidance WM3.
15. **Atkins**. CatWaste Soil Assessment Tool. [Online] <http://catwastesoil.co.uk>.
16. **CIRIA**. (2007) C665 Assessing Risks Posed by Hazardous Ground Gases to Buildings.
17. **British Standards Institution**. (2015) BS8485 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings.
18. **Wilson S, Card G and Haines S. Ground Gas Handbook**. Caithness: Whittles Publishing, (2009).
19. **CIRIA C552**. (2001) Contaminated Land Risk Assessment. A Guide to Good Practice.
20. **CITB**. (2015) Construction (Design and Management) Regulations.
21. **CIRIA**. (1992) C97 Trenching Practice.

Appendix A – Drawings

- Morgan Sindall Gorton Community Hub; Level 0 – Ground Floor, ref 50786-IBI-XX-XX-PL-A-100-0001
- Morgan Sindall Gorton Community Hub; Level 1 – First Floor, ref 50786-IBI-XX-XX-PL-A-100-0002
- Morgan Sindall Gorton Community Hub; Level 2 – Second Floor, ref 50786-IBI-XX-XX-PL-A-100-0003
- Curtins drawing ref 070452-CUR-00-XX-DR-GE-001-V02 Diagrammatic Conceptual Site Model
- Curtins drawing ref 070452-CUR-00-XX-DR-GE-002-V01 Borehole Location Plan



Notes:

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- All dimensions on this drawing are to be reported to the architect.
- Do not modify any element of this drawing.
- Use drawings only for purposes listed.
- The drawing may contain colour.

Scale bar



Key Plan

Legend	Notes
	Warn of significant hazards or information that is to be read in conjunction with all other consultant's drawings

Refer to CDM Schedule XXXX-48-WX-SC-A-57

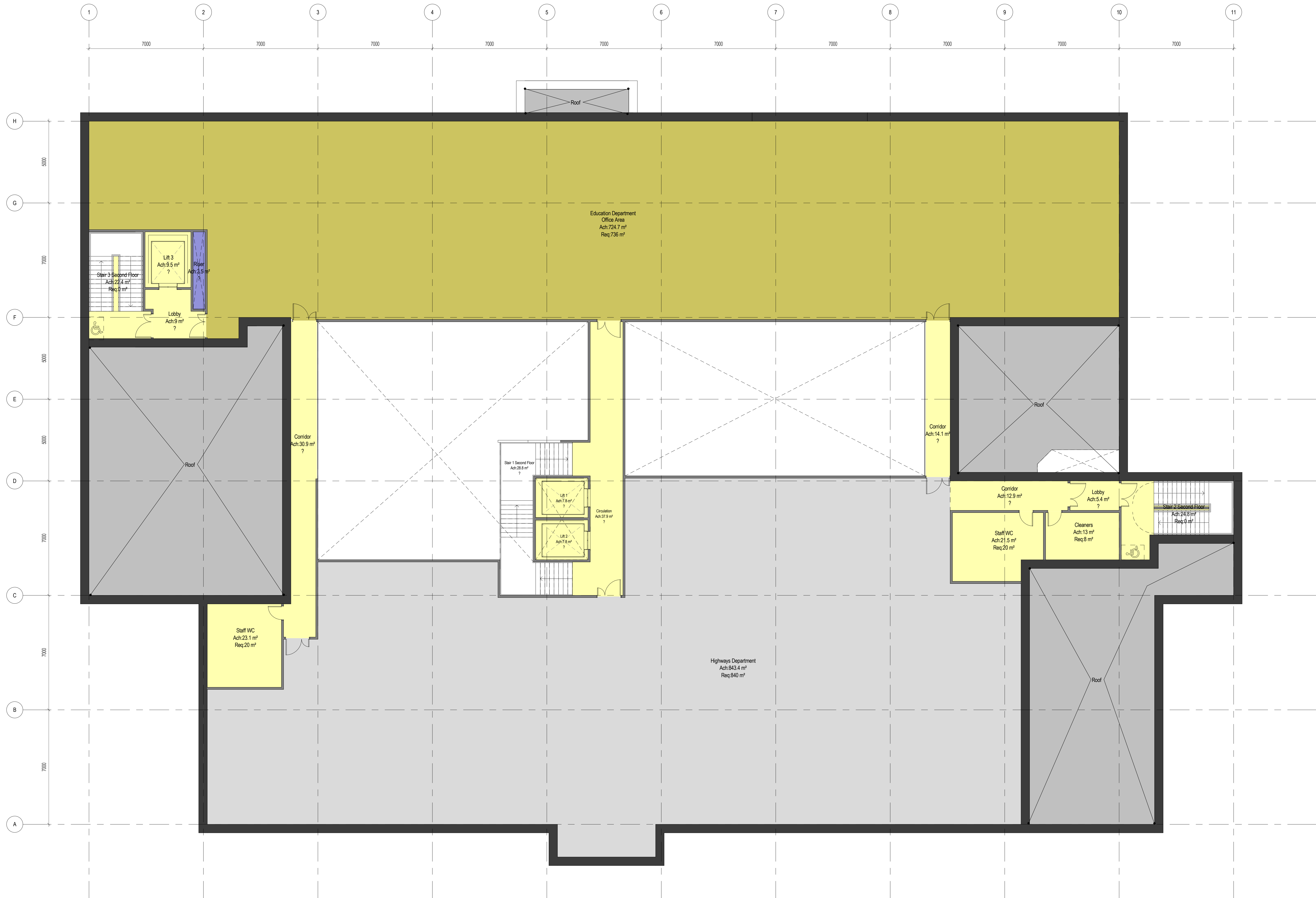
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	HAZ-xx To warn of significant hazards or information that is unusual To be read in conjunction with all other consultant's information Refer to CDM Schedule XXXX-IB-WB-XX-SC-A-572-0010
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The following external model files are included within this drawing:

The following external model files are included within this drawing:

Rev	Date	Revision Notes	Drawn	Reviewed
  www.ibigroup.com				
 Intelligence Buildings Infrastructure				
Project				
GORTON COMMUNITY HUB				
Drawing Title				
Level 0 - Ground Floor				
Job Number	Date	Security Classification	Drawn By	
50786	15/11/18			
Scale: IAD	Purpose			Reviewed By
1 : 100	PRELIMINARY FOR COMMENT			
Drawing Number		Revision	Submittal	
50786-IBI-XX-XX-PL-A-100-0001				



- DEPARTMENT:
- CCG
 - Common
 - DWP
 - Greater Manchester Mental Health (GMMH)
 - Integrated Care
 - Manchester Adult Education Service (MAES)
 - MCC Education
 - MCC Highways
 - MCC Library
 - One Manchester
 - Pharmacy
 - Plant
 - Stp

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Scale bar: 0 1m 2m 3m 4m 5m
Scale: 1:100

North Point

Key Plan

Warning: To warn of significant hazards or information that is unusual. To be read in conjunction with all other consultant's information. Refer to CDM Schedule 1500-1500-XX-SC-A-02-0010.

The following external model files are included within this drawing:

Rev: 001
Date: 15/11/18
Revision Notes:
Drawn By: [Name]
Checked By: [Name]
Reviewed By: [Name]

MORGAN SINDALL

Intelligence
Buildings
Infrastructure

Project: GORTON COMMUNITY HUB

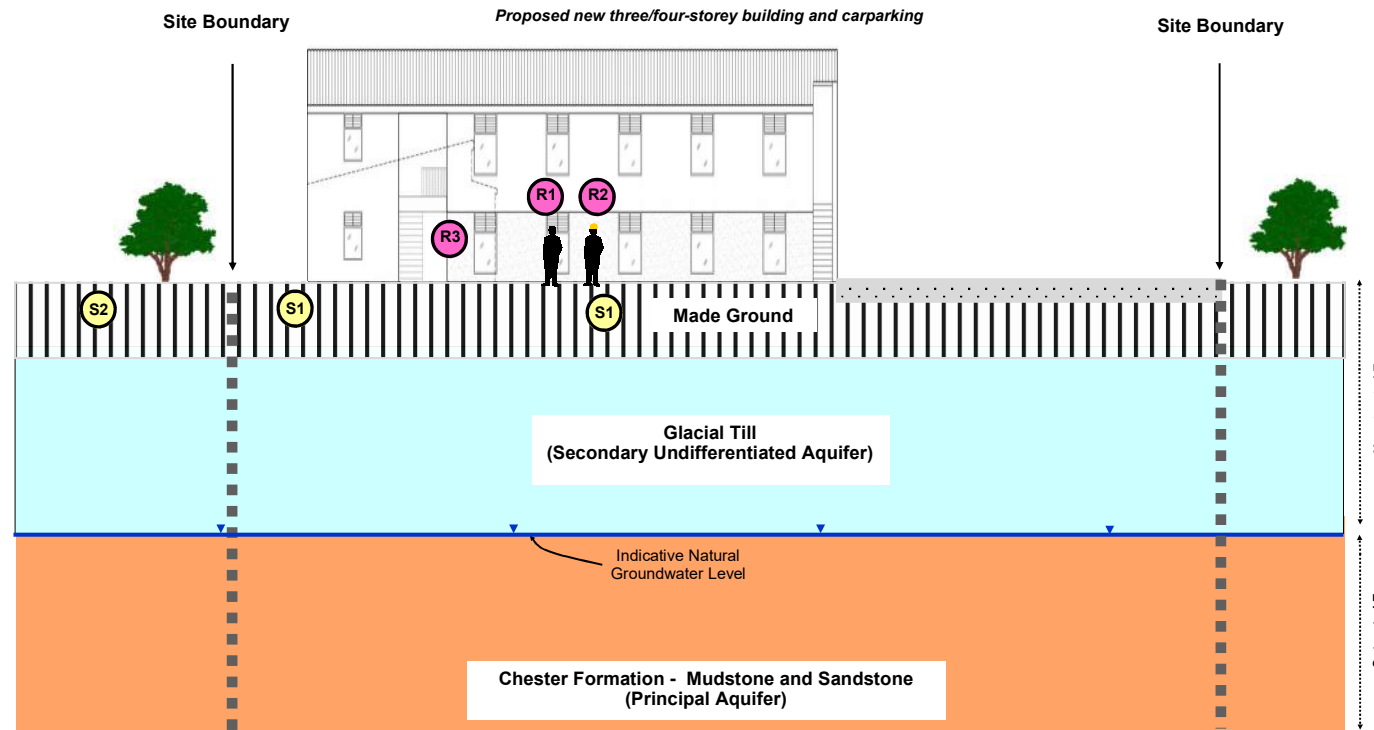
Drawing Title: Level 2 - Second Floor

Job Number: 50786
Date: 15/11/18
Security Classification: [Blank]
Drawn By: [Name]

Scale: 1:100
Purpose: PRELIMINARY FOR COMMENT
Reviewed By: [Name]

Drawing Number: 50786-IBI-XX-XX-PL-A-100-0003
Revision: [Blank]
Subsidiary: [Blank]

Gorton Community Hub



Sources

- S1 Made Ground (onsite)
- S2 Made Ground (offsite)
- S3 Historic infilled ponds
- S4 Ground gas sources

Pathways

- P1 Direct contact, ingestion and or inhalation
- P2 Vertical migration
- P3 Horizontal migration

Receptors

- R1 End-users
- R2 Construction workers
- R3 Construction materials
- R4 Groundwater

Not to scale

Project

Gorton Community Hub

Drawing Title

Diagrammatic Conceptual Site Model

Job Reference

070452.000

Date

02-04-2019

Author

RT

Checked

SH

Client

Morgan Sindall

Drawing Number

070452-CUR-00-XX-DR-GE-001-V02



WINDOW SAMPLE
BORHOLE LOCATIONS
(INSTALLATION*)



CABLE PERCUSSIVE
BOREHOLE LOCATION
(INSTALLATION*)



Rev.	Description:	Date:	By:	Chkd:
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Birmingham - Bristol - Cardiff - Douglas - Edinburgh - Kendal - Leeds - Liverpool - London - Manchester - Nottingham

Status:

INFORMATION

Project:

GORTON COMMUNITY HUB

Drg Title:

BOREHOLE
LOCATION PLAN

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	19/12/2018	ST	

Drg No:	Rev:
070452-CUR-00-XX-DR-GE-001-V01	/

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Appendix B – Exploratory Hole Logs

- Exploratory Borehole logs.



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Borehole Log

Borehole No.

CP01

Sheet 1 of 2

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
CP

Location: Garrett Way, Manchester M18 8HE

Level: 68.00

Scale
1:50

Client: Morgan Sindall

Dates: 11/12/2018 - 11/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.40	ES					Grass over MADE GROUND: Brown very gravelly cobbly sandy CLAY. Gravels are fine to coarse angular of brick and concrete fragments, clinker and ash. Cobbles of whole bricks. Sand is fine to coarse.	1
		1.20		N=6 (1,3/1,2,1,2)					
		1.80 - 1.90	D		1.70	66.30		Stiff brown with grey mottling gravelly slightly sandy CLAY. Gravels are fine to coarse subrounded to subangular of sandstone, mudstone and coal.	2
		2.00		N=17 (2,3/3,4,5,5)					
		2.00 - 2.10	ES						
		3.00 - 3.45	U						3
		3.45 - 3.70	D						
		4.00		N=25 (3,4/5,6,7,7)				Cobble in U100 shoe.	4
								At 4.20mbgl very gravelly.	
		5.00		N=24 (3,5/5,6,6,7)					5
		5.50 - 5.70	D						
		6.00 - 6.45	U						6
		7.50		N=28 (3,3/5,6,7,10)					7
		8.00 - 8.10	D						8
		9.00		N=27 (1,3/4,5,8,10)					9
									10

Continued on next sheet

Remarks

Hand excavated service inspection pit to 1.20mbgl. Groundwater encountered at 5.50mbgl. Ground level is an estimate made from Google Earth. SPT undertaken at 13.50 refused on potential cobble.





17-19 Whitworth Street West
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Borehole Log

Borehole No.

CP01

Sheet 2 of 2

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
CP

Location: Garrett Way, Manchester M18 8HE

Level: 68.00

Scale
1:50

Client: Morgan Sindall

Dates: 11/12/2018 - 11/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50		N=30 (3,3/5,6,9,10)					
		11.00 - 11.50	D						11
		12.00		N=26 (2,3/4,7,7,8)					12
		12.80 - 12.90	D		12.70	55.30		Stiff brown very sandy very gravelly CLAY. Sand is fine to medium. Gravels are fine to coarse rounded of mudstone.	13
		13.50		50 (8,9/50 for 295mm)	13.50	54.50		Inter-bedded stiff brown CLAY and medium dense SAND bands. Clay is sandy. Sand is light brownish yellow fine to medium.	14
		14.20 - 14.30	B						
					15.00	53.00		End of borehole at 15.00 m	15
									16
									17
									18
									19
									20

Remarks

Hand excavated service inspection pit to 1.20mbgl. Groundwater encountered at 5.50mbgl. Ground level is an estimate made from Google Earth. SPT undertaken at 13.50 refused on potential cobble.





17-19 Whitworth Street West
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Borehole Log

Borehole No.

CP02

Sheet 1 of 2

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
CP

Location: Garrett Way, Manchester M18 8HE

Level: 68.00

Scale
1:50

Client: Morgan Sindall

Dates: 06/12/2018 - 07/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.40	ES	N=8 (2,2/2,2,2,2)	0.50	67.50		Grass over MADE GROUND: Dark brown sandy gravelly CLAY. Sand is fine. Gravel is fine to coarse angular of sandstone and brick fragments.	1
		0.60 - 0.70	ES						
		1.10 - 1.20	ES		1.00	67.00		MADE GROUND: Brown very gravelly sandy CLAY. Gravels are fine to coarse angular of concrete and brick fragments. Sand is fine to coarse.	
		1.20 - 1.30	D	N=17 (3,4/3,4,5,5)	1.50	66.50			
		2.00 - 2.45	U				Firm brown with grey and orange mottling very gravelly sandy CLAY. Gravels are fine to medium rounded to subangular of chert. Sand is fine to medium.	2	
		2.45 - 2.70	D						
		3.00							
		3.70 - 3.80	D	N=12 (1,3/3,3,3,3)				Stiff brown with grey mottling slightly gravelly CLAY. Gravels are fine angular of coal and mudstone.	3
		4.00							
		5.00							
		6.20 - 6.30	D	N=10 (1,2/2,2,3,3)				Clay becomes firm.	4
		6.50 - 6.95	U						
		8.00							
		9.50 - 9.95	U	N=8 (1,2/2,2,2,2)	9.40	58.60		Medium dense brown very gravelly clayey SAND. Sand is fine to medium. Gravels are fine to coarse angular to subrounded of mixed	10
								Continued on next sheet.	

Continued on next sheet

Remarks

Hand excavated service inspection pit to 1.20mbgl. No groundwater encountered. Ground level is an estimate made from Google Earth. No recovery U100 at 9.0-9.45mbgl.





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Borehole Log

Borehole No.

CP02

Sheet 2 of 2

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
CP

Location: Garrett Way, Manchester M18 8HE

Level: 68.00

Scale
1:50

Client: Morgan Sindall

Dates: 06/12/2018 - 07/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		11.50 - 12.00	B		12.10	55.90		lithologies.	11
		12.50		N=32 (7,7/7,8,8,9)				Grey angular to subrounded coarse gravelly clayey slightly sandy COBBLES. Gravels are fine to coarse subangular to subrounded of mixed lithologies. Sand is fine to medium.	12
		14.50		N=33 (7,8/8,8,8,9)					13
					15.00	53.00		End of borehole at 15.00 m	14
									15
									16
									17
									18
									19
									20

Remarks

Hand excavated service inspection pit to 1.20mbgl. No groundwater encountered. Ground level is an estimate made from Google Earth. No recovery U100 at 9.0-9.45mbgl.





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Borehole Log

Borehole No.

CP03

Sheet 1 of 2

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
CP

Location: Garrett Way, Manchester M18 8HE

Level: 68.00

Scale
1:50

Client: Morgan Sindall

Dates: 07/12/2018 - 10/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10	67.90		MADE GROUND: Asphalt.	
		0.30 - 0.40	ES					MADE GROUND: Brown sandy fine to coarse angular GRAVEL of brick, cement and concrete fragments. Sand is fine to coarse.	
		0.80			0.80	67.20			
		1.00			1.00	67.00		MADE GROUND: Concrete.	
		1.20		N=16 (3,3/4,4,4,4)				Stiff brown with grey mottling very gravelly slightly sandy CLAY. Gravels are fine to medium angular to subrounded of mudstone and coal. Sand is fine. Decreasing gravel content with depth.	1
		1.60 - 1.70	D						
		2.00		N=16 (3,3/3,4,4,5)					2
		3.00		N=15 (3,3/3,4,4,4)					3
		4.00 - 4.45	U					<u>Slightly gravelly no mottling.</u>	4
		4.50 - 4.60	D						
		5.00		N=22 (2,4/4,5,6,7)					5
		6.00 - 6.10	D						6
		6.50		N=18 (2,3/4,4,5,5)					7
		8.00 - 8.45	U						8
		8.45 - 8.70	D						9
		9.50		N=22 (2,3/5,5,6,6)					10

Continued on next sheet

Remarks

Hand excavated service inspection pit to 1.20mbgl. Groundwater encountered at 2.30mbgl. Ground level is an estimate made from Google Earth.





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Borehole Log

Borehole No.

CP03

Sheet 2 of 2

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
CP

Location: Garrett Way, Manchester M18 8HE

Level: 68.00

Scale
1:50

Client: Morgan Sindall

Dates: 07/12/2018 - 10/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		10.50 - 11.00	B	N=16 (2,3/4,4,4,4)	10.50	57.50		Medium dense orange very gravelly slightly clayey SAND. Gravels are fine to medium subrounded to subangular of mixed lithologies.	11	
		11.00								12
		12.50 12.50 - 13.00	B	N=37 (2,2/5,7,10,15)	13.00	55.00		Very stiff brown very sandy slightly gravelly CLAY. Sand is fine to medium. Gravels are fine subrounded to subangular of mudstone.	13	
		13.00 - 13.50	D							14
		14.00		N=31 (4,5/7,7,8,9)	15.00	53.00		End of borehole at 15.00 m	15	
		15.00		N=32 (5,6/7,8,8,9)					16	
										17
										18
										19
										20

Remarks

Hand excavated service inspection pit to 1.20mbgl. Groundwater encountered at 2.30mbgl. Ground level is an estimate made from Google Earth.





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Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
WS

Location: Garrett Way, Manchester M18 8HE

Level:

Scale
1:50

Client: Morgan Sindall

Dates: 07/12/2018 - 07/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.40	ES		0.90			Grass over MADE GROUND: Dark brown sandy gravelly CLAY. Gravels are fine to medium subrounded to sub angular of brick and concrete fragments. Sand is fine to coarse.	1
		1.00 - 1.10 1.20	ES	N=10 (2,3/2,2,3,3)				Firm orangish brown with grey mottling slightly sandy CLAY. Gravels are fine angular to rounded of chert and coal.	
		1.60 - 1.70	D		2.40				2
		2.00		N=26 (3,4/5,6,7,8)					
		3.00		N=46 (9,10/8,12,12,14)				Very stiff brown with grey mottling gravelly slightly sandy CLAY. Gravels are fine to medium of coal, chert and mudstone. Sand is fine to coarse.	
		3.50		N=22 (10,9/5,5,5,7)				Clay becomes stiff.	3
		4.00		N=26 (7,8/7,8,5,6)					
					5.00			End of borehole at 5.00 m	4
									5
									6
									7
									8
									9
									10

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Sampler hammer bouncing at 2.50mbgl and at 3.50mbgl. No recovery from 4.0-5.0mbgl, sampler sent down twice.





17-19 Whitworth Street West
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Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
WS

Location: Garrett Way, Manchester M18 8HE

Level:

Scale
1:50

Client: Morgan Sindall

Dates: 07/12/2018 - 07/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20 - 0.30	ES		0.80			Grass over MADE GROUND: Brown very gravelly sandy CLAY. Gravel are fine to coarse angular to subrounded of brick fragments. Sand is fine to coarse. Includes a fabric liner.	
		1.20		N=12 (2,2/2,3,3,4)				Firm brown with grey mottling gravelly slightly sandy CLAY. Gravels are fine to medium subrounded to sub angular of coal, mudstone and sanstone. Sand is fine to coarse.	1
		2.00		N=16 (3,3/4,3,4,5)				Clay becomes stiff.	2
		3.00		N=26 (6,5/6,6,7,7)				Clay becomes very stiff.	3
		4.00		N=50 (7,10/50 for 275mm)	4.45			End of borehole at 4.45 m	4
									5
									6
									7
									8
									9
									10

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered.





17-19 Whitworth Street West
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Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
WS

Location: Garrett Way, Manchester M18 8HE

Level:

Scale
1:50

Client: Morgan Sindall

Dates: 10/12/2018 - 10/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.40	ES		0.50			Grass over MADE GROUND: Brown gravelly sandy cobbly CLAY. Gravels are fine to coarse subrounded to angular of brick fragments. Sand is fine to coarse. Cobbles of whole bricks.	1
		1.20		N=7 (1,1/2,2,1,2)				MADE GROUND: Brown gravelly clayey cobbly SAND. Sand is fine to coarse. Gravels are fine to coarse of brick and concrete fragments. Cobbles of whole bricks and angular sandstone.	
		1.50 - 1.60	ES		1.40				
		2.00		N=16 (2,3/3,4,4,5)				Stiff brown with grey mottling very gravelly slightly sandy CLAY. Gravels are fine to medium rounded to subangular of coal, mudstone and sandstone. Sand is fine.	2
		3.00		N=25 (3,5/5,6,6,8)					3
		3.00 - 3.20	D						
		4.00		N=50 (10,10/50 for 290mm)	4.00			End of borehole at 4.00 m	4
									5
									6
									7
									8
									9
									10

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered.





17-19 Whitworth Street West
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Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
WS

Location: Garrett Way, Manchester M18 8HE

Level:

Scale
1:50

Client: Morgan Sindall

Dates: 07/12/2018 - 07/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.40	ES		0.10 0.30 0.60 0.80 0.90		    	MADE GROUND: Asphalt. MADE GROUND: Concrete with re-bar (required coring). MADE GROUND: Brown sandy fine to coarse angular GRAVEL of concrete and brick fragments. Sand is fine to coarse. MADE GROUND: Yellow sandy fine to coarse angular GRAVEL of sandstone. Sand is fine to coarse. MADE GROUND: Concrete. End of borehole at 0.90 m	1 2 3 4 5 6 7 8 9 10

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Hole terminated at 0.90mbgl due to concrete.





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Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
WS

Location: Garrett Way, Manchester M18 8HE

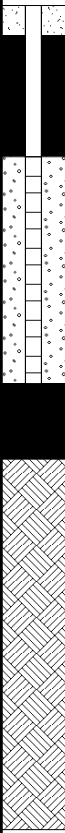
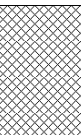
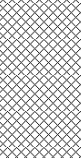
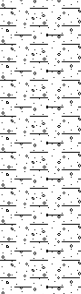
Level:

Scale
1:50

Client: Morgan Sindall

Dates: 07/12/2018 - 07/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20 - 0.30	ES					Grass over MADE GROUND: Dark brown very gravelly slightly sandy CLAY. Gravels are fine to coarse of coal and brick fragments. Includes plastic bags. Sand is fine to coarse.	
		1.00 - 1.10 1.20	ES	N=26 (2,9/9,6,6,5)	0.90			MADE GROUD: Brown with grey mottling very gravelly sandy CLAY. Gravels are fine to coarse angular to subrounded of brick fragments and mixed lithologies. Sand is fine to coarse. Includes plastic bags and silver foil.	1
		2.00		0 (/,,,)	2.00			Very soft greyish brown sandy gravelly organic rich CLAY. Gravels are fine subrounded to subangular of mixed lithologies. Sand is fine to coarse.	2
		2.50 - 2.60	ES		2.70			Spongy brown fibrous PEAT.	
		3.00		0 (/,,,)	3.10			Very soft brown slightly sandy organic rich CLAY. Sand is fine to medium.	3
		3.30 - 3.50	D		3.20			Stiff brown very gravelly slightly sandy CLAY. Gravels are fine to coarse angular to rounded of mixed lithologies. Sand is fine to coarse.	
		4.00		N=22 (2,4/4,5,6,7)					4
		5.00		N=25 (3,3/4,7,7,7)					5
					5.45				
								End of borehole at 5.45 m	6

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered.





17-19 Whitworth Street West
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Borehole Log

Borehole No.

WS06

Sheet 1 of 1

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
WS

Location: Garrett Way, Manchester M18 8HE

Level:

Scale
1:50

Client: Morgan Sindall

Dates: 05/12/2018 - 05/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.40	ES					Grass over MADE GROUND: Brown sandy gravelly cobbly CLAY. Sand is fine to medium. Gravels are fine to coarse rounded to subangular of brick fragments and mixed lithologies. Cobbles of whole brick. At 0.50mbgl siltstone flag obstruction. At 1.00mbgl fine to coarse angular slate layer.	1
		0.90 - 1.00	ES						
		1.20		N=3 (1,1/2,1,0,0)					
		2.00		N=8 (1,3/1,1,2,4)	2.00			Firm brown very gravelly CLAY. Gravels are fine to medium subrounded to subangular of sandstone, chert and coal.	2
		2.10 - 2.20 2.20 - 2.30	ES D						
		3.00		N=44 (7,7/8,11,11,14)	3.00			Very stiff brown with grey mottling gravelly slightly sandy CLAY. Gravels are fine angular of mixed lithologies including coal and sandstone. Sand is fine to medium.	3
		3.50		N=38 (5,3/7,10,10,11)					
		4.00		N=33 (3,4/7,8,8,10)					4
					5.00				
								End of borehole at 5.00 m	5

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. Sampler hammer bouncing at 3.50mbgl. SPT rod snapped extracting the fifth barrel.





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Borehole Log

Borehole No.

WS07

Sheet 1 of 1

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
WS

Location: Garrett Way, Manchester M18 8HE

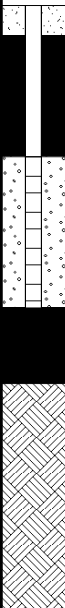
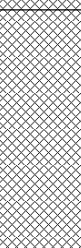
Level:

Scale
1:50

Client: Morgan Sindall

Dates: 05/12/2018 - 05/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15 - 0.20	ES		0.25 0.40			Grass over TOPSOIL: Dark brown very sandy CLAY. Sand is fine.	
		0.30 - 0.40	ES					MADE GROUND: Dark grey very sandy very gravelly cobbly CLAY. Sand is fine to coarse. Gravels are fine to coarse angular of brick and concrete fragments. Cobbles of whole bricks.	
		1.10 - 1.20 1.20	ES	N=10 (1,1/1,2,4,3)	2.00			MADE GROUND: Brown very gravelly sandy cobbly CLAY. Gravels are fine to coarse angular of brick fragments. Sand is fine to coarse. Cobbles of brick and concrete masonry.	1
		2.00 2.10 - 2.20	ES	N=13 (2,2/3,3,3,4)				Firm brown with grey mottling very gravelly slightly sandy CLAY. Gravels are fine to medium angular to subrounded of sandstone and chert. Sand is fine.	2
		2.70 - 2.80 3.00	D	N=34 (8,7/7,8,9,10)				Clay becomes very stiff. Gravels become fine subrounded to subangular.	3
		4.00		N=50 (8,10/50 for 285mm)	4.00			End of borehole at 4.00 m	4
									5
									6
									7
									8
									9
									10

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered.





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Borehole Log

Borehole No.

WS08

Sheet 1 of 1

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
WS

Location: Garrett Way, Manchester M18 8HE

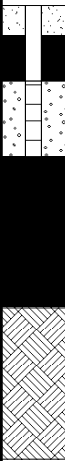
Level:

Scale
1:50

Client: Morgan Sindall

Dates: 10/12/2018 - 10/12/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.40	ES		0.20			Grass over MADE GROUND: Brown sandy gravelly cobbly CLAY. Sand is fine to coarse. Gravel is fine to coarse of brick and concrete fragments. Cobbles of whole bricks.	
					0.90			MADE GROUND: Brownish grey sandy clayey GRAVEL. Gravel is fine to coarse angular of concrete and brick fragments, glass, clinker and ash. Sand is fine to coarse.	1
		1.20 1.20	ES	N=9 (1,1/1,3,2,3)	1.50			Firm orange with grey mottling slightly silty slightly sandy CLAY. Sand is fine.	
		1.60 - 1.80	D					Stiff brown with grey mottling slightly silty slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravels are fine angular of mudstone and coal.	2
		2.00		N=19 (4,3/4,5,5,5)					
		3.00		N=50 (10,9/50 for 290mm)	3.00			End of borehole at 3.00 m	3
									4
									5
									6
									7
									8
									9
									10

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered.





17-19 Whitworth Street West
Merchants Exchange
Manchester
M1 5WG

Borehole Log

Borehole No.

WS09

Sheet 1 of 1

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
WS

Location: Garrett Way, Manchester M18 8HE

Level:

Scale
1:50

Client: Morgan Sindall

Dates: 12/07/2018 - 12/07/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10			MADE GROUND: Asphalt.	
		0.30 - 0.40	ES					MADE GROUND: Brown very sandy clayey GRAVEL. Gravel is fine to coarse angular to subrounded of sandstone, clinker and tile fragments. Sand is fine to coarse. Oily smell observed.	
		1.00 - 1.10	ES		0.80			Stiff brown with orange and black mottling very sandy slightly gravelly CLAY. Sand is fine. Gravels are fine angular of coal.	1
		1.20		N=15 (2,3/3,4,3,5)					
		1.20 - 1.40	D		1.50				
		2.00		N=24 (4,5/4,7,6,7)				Very stiff brown with grey mottling gravelly slightly sandy CLAY. Gravels are fine to medium angular to subrounded of mudstone, coal and pink sandstone. Sand is fine to coarse. Low organic content.	2
		3.00		N=35 (5,7/7,8,10,10)					3
					4.00			End of borehole at 4.00 m	4
									5
									6
									7
									8
									9
									10

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. SPT rod bounced on drop in, advised to stop.





17-19 Whitworth Street West
Merchants Exchange
Manchester
M1 5WG

Borehole Log

Borehole No.

WS10

Sheet 1 of 1

Project Name: Gorton Community Hub

Project No.
B070425

Co-ords: -

Hole Type
WS

Location: Garrett Way, Manchester M18 8HE

Level:

Scale
1:50

Client: Morgan Sindall

Dates: 12/10/2018 - 12/10/2018

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.60 - 0.70	ES	0 (,/,,,)	0.20			MADE GROUND: Asphalt.		
					0.50			MADE GROUND: Cream very sandy clayey fine to medium angular to subangular GRAVEL.		
					0.90			MADE GROUND: Black very sandy clayey fine to medium angular GRAVEL of ash, brick fragments and clinker.		
		1.20	ES	N=9 (1,1/2,1,3,3)	1.20		MADE GROUND: Brown very gravelly sandy cobbly CLAY. Gravels are fine to coarse angular of brick fragments, whole bricks and mixed lithologies.	1		
		2.00			2.10		MADE GROUND: Brown very soft sandy gravelly organic rich CLAY. Gravels are fine to medium angular to subrounded. Sand is fine. (Reworked)	2		
		2.40 - 2.50 2.50 - 2.60			ES D		N=23 (4,4/5,6,6,6)			Very stiff brown with grey mottling very gravelly slightly sandy CLAY. Gravels are fine to medium angular to subrounded of coal and mudstone.
		3.00	3.00	NO RECOVERY.						
					4.00			End of borehole at 4.00 m		4
										5
										6
							7			
							8			
							9			
							10			

Remarks

Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered. No recovery from 4.0-5.0mbgl sampler sent down twice.



Appendix C – Chemical Laboratory Testing Results

- Envirolab Environmental Chemistry Analysis Results (Soil)
 - Final Analytical Test Report 18/10379
 - Final Analytical Test Report 18/10546
 - Final Analytical Test Report 18/10600
 - Deviating Samples Report 18/10379
 - Deviating Samples Report 18/10546
 - Deviating Samples Report 18/10600

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/10379
Issue Number: 1

Date: 17 December, 2018

Client: Curtins Consulting
Merchant Exchange
17-19 Whitworth Street
Manchester
UK
M1 5WG

Project Manager: Matthew Holroyd/Samuel Thomas/Siobhán Hyde
Project Name: Gorton Community Hub
Project Ref: B070452
Order No: EBMA1590
Date Samples Received: 07/12/18
Date Instructions Received: 08/12/18
Date Analysis Completed: 17/12/18

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Richard Wong
Client Manager

Envirolab Job Number: 18/10379

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10379/1	18/10379/2	18/10379/3	18/10379/6	18/10379/7	18/10379/9	18/10379/10	18/10379/12	Units	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS09	WS05	WS05	WS06	WS06	WS07		
Depth to Top	0.30	1.00	0.30	1.00	2.50	0.90	2.10	0.30		
Depth To Bottom	0.40	1.10	0.40	1.10	2.60	1.00	2.20	0.40		
Date Sampled	06-Dec-18	06-Dec-18	07-Dec-18	07-Dec-18	07-Dec-18	05-Dec-18	05-Dec-18	05-Dec-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4E	5E	4A	6AE	6E	5AE	3	6AE		
% Stones >10mm _A	<0.1	<0.1	37.3	11.8	<0.1	6.7	<0.1	15.7	% w/w	A-T-044
pH _D ^{M#}	7.88	8.02	8.45	8.20	8.16	7.73	8.51	8.22	pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	<0.01	0.03	0.01	0.03	0.02	0.76	0.04	0.11	g/l	A-T-026s
Cyanide (total) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	40	mg/kg	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	A-T-050s
Organic matter _D ^{M#}	8.2	1.6	1.9	5.6	5.0	4.3	2.2	4.3	% w/w	A-T-032 OM
Arsenic _D ^{M#}	19	<1	<1	4	2	17	<1	6	mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	<1.0	<1.0	1.5	2.6	<1.0	<1.0	mg/kg	A-T-027s
Cadmium _D ^{M#}	1.6	2.1	0.9	1.3	2.0	2.1	1.7	1.6	mg/kg	A-T-024s
Copper _D ^{M#}	94	20	25	35	35	118	23	51	mg/kg	A-T-024s
Chromium _D ^{M#}	20	30	13	26	26	26	24	23	mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-040s
Lead _D ^{M#}	134	18	95	89	39	116	12	129	mg/kg	A-T-024s
Mercury _D	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	mg/kg	A-T-024s
Nickel _D ^{M#}	19	27	11	22	35	24	30	20	mg/kg	A-T-024s
Selenium _D [#]	1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-024s
Zinc _D ^{M#}	141	55	65	86	55	196	56	139	mg/kg	A-T-024s

Envirolab Job Number: 18/10379

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10379/1	18/10379/2	18/10379/3	18/10379/6	18/10379/7	18/10379/9	18/10379/10	18/10379/12	Units	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS09	WS05	WS05	WS06	WS06	WS07		
Depth to Top	0.30	1.00	0.30	1.00	2.50	0.90	2.10	0.30		
Depth To Bottom	0.40	1.10	0.40	1.10	2.60	1.00	2.20	0.40		
Date Sampled	06-Dec-18	06-Dec-18	07-Dec-18	07-Dec-18	07-Dec-18	05-Dec-18	05-Dec-18	05-Dec-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4E	5E	4A	6AE	6E	5AE	3	6AE		
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD		A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

Envirolab Job Number: 18/10379

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10379/1	18/10379/2	18/10379/3	18/10379/6	18/10379/7	18/10379/9	18/10379/10	18/10379/12	Units	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS09	WS05	WS05	WS06	WS06	WS07		
Depth to Top	0.30	1.00	0.30	1.00	2.50	0.90	2.10	0.30		
Depth To Bottom	0.40	1.10	0.40	1.10	2.60	1.00	2.20	0.40		
Date Sampled	06-Dec-18	06-Dec-18	07-Dec-18	07-Dec-18	07-Dec-18	05-Dec-18	05-Dec-18	05-Dec-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4E	5E	4A	6AE	6E	5AE	3	6AE		
PAH-16MS (MSD order)										
Naphthalene _A ^{M#}	0.25	<0.03	0.28	<0.03	<0.03	0.14	<0.03	0.05	mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	0.06	<0.01	0.07	<0.01	<0.01	0.08	<0.01	0.02	mg/kg	A-T-019s
Acenaphthene _A ^{M#}	0.38	<0.01	6.47	0.05	<0.01	0.14	<0.01	0.60	mg/kg	A-T-019s
Fluorene _A ^{M#}	0.33	<0.01	3.80	0.03	<0.01	0.13	<0.01	0.36	mg/kg	A-T-019s
Phenanthrene _A ^{M#}	3.40	<0.03	17.7	0.38	0.06	2.25	0.06	3.20	mg/kg	A-T-019s
Anthracene _A ^{M#}	0.69	<0.02	3.78	0.07	<0.02	0.49	<0.02	0.78	mg/kg	A-T-019s
Fluoranthene _A ^{M#}	3.88	<0.08	7.86	0.62	<0.08	3.21	<0.08	5.21	mg/kg	A-T-019s
Pyrene _A ^{M#}	3.65	<0.07	6.41	0.57	0.09	3.56	<0.07	4.47	mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	1.76	<0.04	1.56	0.29	0.05	1.93	<0.04	2.11	mg/kg	A-T-019s
Chrysene _A ^{M#}	1.97	<0.06	1.92	0.31	<0.06	1.92	<0.06	2.17	mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	1.84	<0.05	0.85	0.29	<0.05	1.39	<0.05	2.07	mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	0.56	<0.07	0.26	0.10	<0.07	0.48	<0.07	0.73	mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	1.58	<0.04	0.65	0.26	0.05	1.33	<0.04	1.74	mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	1.24	<0.03	0.36	0.20	0.04	0.76	<0.03	1.13	mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	0.29	<0.04	0.08	<0.04	<0.04	0.20	<0.04	0.23	mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	1.16	<0.05	0.32	0.19	<0.05	0.70	<0.05	0.96	mg/kg	A-T-019s
Total PAH-16MS (MSD order) _A ^{M#}	23	<0.08	52.4	3.36	0.29	18.7	<0.08	25.8	mg/kg	A-T-019s

Envirolab Job Number: 18/10379

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10379/1	18/10379/2	18/10379/3	18/10379/6	18/10379/7	18/10379/9	18/10379/10	18/10379/12	Units	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS09	WS05	WS05	WS06	WS06	WS07		
Depth to Top	0.30	1.00	0.30	1.00	2.50	0.90	2.10	0.30		
Depth To Bottom	0.40	1.10	0.40	1.10	2.60	1.00	2.20	0.40		
Date Sampled	06-Dec-18	06-Dec-18	07-Dec-18	07-Dec-18	07-Dec-18	05-Dec-18	05-Dec-18	05-Dec-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4E	5E	4A	6AE	6E	5AE	3	6AE		
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Ali >C8-C10 _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1	3	<1	<1	<1	1	<1	mg/kg	A-T-055s
Ali >C16-C21 _A ^{M#}	3	<1	6	<1	<1	2	1	1	mg/kg	A-T-055s
Ali >C21-C35 _A	13	<1	28	6	3	13	2	9	mg/kg	A-T-055s
Total Aliphatics _A	15	<1	37	6	3	15	5	10	mg/kg	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C8-C10 _A ^{M#}	<1	<1	<1	<1	<1	1	<1	<1	mg/kg	A-T-055s
Aro >C10-C12 _A ^{M#}	<1	<1	1	<1	<1	1	<1	<1	mg/kg	A-T-055s
Aro >C12-C16 _A	5	<1	113	1	<1	10	2	4	mg/kg	A-T-055s
Aro >C16-C21 _A ^{M#}	25	<1	223	8	3	79	2	24	mg/kg	A-T-055s
Aro >C21-C35 _A ^{M#}	98	5	168	28	10	224	5	68	mg/kg	A-T-055s
Total Aromatics _A	129	5	505	38	13	316	9	96	mg/kg	A-T-055s
TPH (Ali & Aro >C5-C35) _A	144	5	542	44	15	331	14	106	mg/kg	A-T-055s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s

Envirolab Job Number: 18/10379

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10379/16	18/10379/17	18/10379/18						Units	Method ref
Client Sample No										
Client Sample ID	CP02	CP02	CP03							
Depth to Top	0.60	1.10	0.30							
Depth To Bottom	0.70	1.20	0.40							
Date Sampled	06-Dec-18	06-Dec-18	07-Dec-18							
Sample Type	Soil - ES	Soil - ES	Solid							
Sample Matrix Code	6A	5	7							
% Stones >10mm _A	16.2	<0.1	<0.1						% w/w	A-T-044
pH _D ^{M#}	7.70	8.02	9.96						pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.03	0.09	0.11						g/l	A-T-026s
Cyanide (total) _A ^{M#}	<1	<1	<1						mg/kg	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2						mg/kg	A-T-050s
Organic matter _D ^{M#}	5.7	1.5	2.2						% w/w	A-T-032 OM
Arsenic _D ^{M#}	10	<1	<1						mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	1.8						mg/kg	A-T-027s
Cadmium _D ^{M#}	1.1	2.0	0.9						mg/kg	A-T-024s
Copper _D ^{M#}	52	18	16						mg/kg	A-T-024s
Chromium _D ^{M#}	18	29	16						mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1						mg/kg	A-T-040s
Lead _D ^{M#}	94	24	36						mg/kg	A-T-024s
Mercury _D	<0.17	<0.17	0.52						mg/kg	A-T-024s
Nickel _D ^{M#}	16	25	31						mg/kg	A-T-024s
Selenium _D [#]	<1	<1	<1						mg/kg	A-T-024s
Zinc _D ^{M#}	88	50	48						mg/kg	A-T-024s

Envirolab Job Number: 18/10379

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10379/16	18/10379/17	18/10379/18						Units	Method ref
Client Sample No										
Client Sample ID	CP02	CP02	CP03							
Depth to Top	0.60	1.10	0.30							
Depth To Bottom	0.70	1.20	0.40							
Date Sampled	06-Dec-18	06-Dec-18	07-Dec-18							
Sample Type	Soil - ES	Soil - ES	Solid							
Sample Matrix Code	6A	5	7							
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD	NAD							A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	N/A	N/A							

Envirolab Job Number: 18/10379

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10379/16	18/10379/17	18/10379/18						Units	Method ref
Client Sample No										
Client Sample ID	CP02	CP02	CP03							
Depth to Top	0.60	1.10	0.30							
Depth To Bottom	0.70	1.20	0.40							
Date Sampled	06-Dec-18	06-Dec-18	07-Dec-18							
Sample Type	Soil - ES	Soil - ES	Solid							
Sample Matrix Code	6A	5	7							
PAH-16MS (MSD order)										
Naphthalene _A ^{M#}	0.04	<0.03	<0.03						mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	0.01	<0.01	<0.01						mg/kg	A-T-019s
Acenaphthene _A ^{M#}	0.06	0.28	0.02						mg/kg	A-T-019s
Fluorene _A ^{M#}	0.04	0.21	0.01						mg/kg	A-T-019s
Phenanthrene _A ^{M#}	0.56	2.11	0.14						mg/kg	A-T-019s
Anthracene _A ^{M#}	0.11	0.47	0.03						mg/kg	A-T-019s
Fluoranthene _A ^{M#}	0.95	1.85	0.28						mg/kg	A-T-019s
Pyrene _A ^{M#}	0.94	1.52	0.33						mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	0.49	0.66	0.17						mg/kg	A-T-019s
Chrysene _A ^{M#}	0.57	0.63	0.30						mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	0.56	0.49	0.24						mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	0.20	0.21	0.08						mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	0.47	0.48	0.22						mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	0.42	0.29	0.16						mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	0.09	0.06	0.04						mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	0.40	0.26	0.19						mg/kg	A-T-019s
Total PAH-16MS (MSD order) _A ^{M#}	5.91	9.52	2.21						mg/kg	A-T-019s

Envirolab Job Number: 18/10379

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10379/16	18/10379/17	18/10379/18						Units	Method ref
Client Sample No										
Client Sample ID	CP02	CP02	CP03							
Depth to Top	0.60	1.10	0.30							
Depth To Bottom	0.70	1.20	0.40							
Date Sampled	06-Dec-18	06-Dec-18	07-Dec-18							
Sample Type	Soil - ES	Soil - ES	Solid							
Sample Matrix Code	6A	5	7							
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
Ali >C8-C10 _A ^{M#}	<1	<1	<5						mg/kg	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<5						mg/kg	A-T-055s
Ali >C12-C16 _A ^{M#}	1	<1	<5						mg/kg	A-T-055s
Ali >C16-C21 _A ^{M#}	3	<1	<5						mg/kg	A-T-055s
Ali >C21-C35 _A	11	1	310						mg/kg	A-T-055s
Total Aliphatics _A	15	1	310						mg/kg	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
Aro >C8-C10 _A ^{M#}	<1	<1	<5						mg/kg	A-T-055s
Aro >C10-C12 _A ^{M#}	<1	<1	<5						mg/kg	A-T-055s
Aro >C12-C16 _A	3	<1	<5						mg/kg	A-T-055s
Aro >C16-C21 _A ^{M#}	13	1	23						mg/kg	A-T-055s
Aro >C21-C35 _A ^{M#}	43	5	495						mg/kg	A-T-055s
Total Aromatics _A	61	6	519						mg/kg	A-T-055s
TPH (Ali & Aro >C5-C35) _A	76	7	828						mg/kg	A-T-055s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01						mg/kg	A-T-022s

REPORT NOTES

General:

This report shall not be reproduced, except in full, without written approval from Envirolab.

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed.

Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/10546
Issue Number: 1

Date: 24 December, 2018

Client: Curtins Consulting
Merchant Exchange
17-19 Whitworth Street
Manchester
UK
M1 5WG

Project Manager: Samuel Thomas
Project Name: Gorton Community Hub
Project Ref: B070452
Order No: EBMA1590
Date Samples Received: 07/12/18
Date Instructions Received: 13/12/18
Date Analysis Completed: 24/12/18

Prepared by:



Elisha Hartley
Admin Assistant

Approved by:



Georgia King
Admin & Client Services Supervisor

Envirolab Job Number: 18/10546

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10546/1								Units	Method ref
Client Sample No										
Client Sample ID	WS02									
Depth to Top	0.30									
Depth To Bottom	0.40									
Date Sampled	07-Dec-18									
Sample Type	Soil - ES									
Sample Matrix Code	4ABE									
% Stones >10mm _A	<0.1								% w/w	A-T-044
pH _D ^{M#}	7.47								pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.30								g/l	A-T-026s
Cyanide (total) _A ^{M#}	<1								mg/kg	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2								mg/kg	A-T-050s
Organic matter _D ^{M#}	3.7								% w/w	A-T-032 OM
Arsenic _D ^{M#}	8								mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0								mg/kg	A-T-027s
Cadmium _D ^{M#}	1.1								mg/kg	A-T-024s
Copper _D ^{M#}	35								mg/kg	A-T-024s
Chromium _D ^{M#}	13								mg/kg	A-T-024s
Chromium (hexavalent) _D	<1								mg/kg	A-T-040s
Lead _D ^{M#}	182								mg/kg	A-T-024s
Mercury _D	0.41								mg/kg	A-T-024s
Nickel _D ^{M#}	16								mg/kg	A-T-024s
Selenium _D [#]	<1								mg/kg	A-T-024s
Zinc _D ^{M#}	126								mg/kg	A-T-024s

Envirolab Job Number: 18/10546

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10546/1								Units	Method ref
Client Sample No										
Client Sample ID	WS02									
Depth to Top	0.30									
Depth To Bottom	0.40									
Date Sampled	07-Dec-18									
Sample Type	Soil - ES									
Sample Matrix Code	4ABE									
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	Chrysotile									A-T-045
Asbestos Matrix (microscope) ^A	Loose Fibres									A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A									
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing) ^D	<0.001								% w/w	A-T-054

Envirolab Job Number: 18/10546

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10546/1								Units	Method ref
Client Sample No										
Client Sample ID	WS02									
Depth to Top	0.30									
Depth To Bottom	0.40									
Date Sampled	07-Dec-18									
Sample Type	Soil - ES									
Sample Matrix Code	4ABE									
PAH-16MS (MSD order)										
Naphthalene _A ^{M#}	<0.03								mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	0.07								mg/kg	A-T-019s
Acenaphthene _A ^{M#}	0.10								mg/kg	A-T-019s
Fluorene _A ^{M#}	0.09								mg/kg	A-T-019s
Phenanthrene _A ^{M#}	0.94								mg/kg	A-T-019s
Anthracene _A ^{M#}	0.25								mg/kg	A-T-019s
Fluoranthene _A ^{M#}	1.53								mg/kg	A-T-019s
Pyrene _A ^{M#}	1.40								mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	0.74								mg/kg	A-T-019s
Chrysene _A ^{M#}	0.85								mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	0.78								mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	0.29								mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	0.65								mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	0.38								mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	0.08								mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	0.31								mg/kg	A-T-019s
Total PAH-16MS (MSD order) _A ^{M#}	8.46								mg/kg	A-T-019s

Envirolab Job Number: 18/10546

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10546/1								Units	Method ref
Client Sample No										
Client Sample ID	WS02									
Depth to Top	0.30									
Depth To Bottom	0.40									
Date Sampled	07-Dec-18									
Sample Type	Soil - ES									
Sample Matrix Code	4ABE									
TPH CWG										
Ali >C5-C6 _A [#]	<0.01								mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01								mg/kg	A-T-022s
Ali >C8-C10 _A ^{M#}	<1								mg/kg	A-T-055s
Ali >C10-C12 _A ^{M#}	<1								mg/kg	A-T-055s
Ali >C12-C16 _A ^{M#}	<1								mg/kg	A-T-055s
Ali >C16-C21 _A ^{M#}	3								mg/kg	A-T-055s
Ali >C21-C35 _A	25								mg/kg	A-T-055s
Total Aliphatics _A	27								mg/kg	A-T-055s
Aro >C5-C7 _A [#]	<0.01								mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01								mg/kg	A-T-022s
Aro >C8-C10 _A ^{M#}	<1								mg/kg	A-T-055s
Aro >C10-C12 _A ^{M#}	<1								mg/kg	A-T-055s
Aro >C12-C16 _A	1								mg/kg	A-T-055s
Aro >C16-C21 _A ^{M#}	7								mg/kg	A-T-055s
Aro >C21-C35 _A ^{M#}	38								mg/kg	A-T-055s
Total Aromatics _A	47								mg/kg	A-T-055s
TPH (Ali & Aro >C5-C35) _A	74								mg/kg	A-T-055s
BTEX - Benzene _A [#]	<0.01								mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01								mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01								mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01								mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01								mg/kg	A-T-022s
MTBE _A [#]	<0.01								mg/kg	A-T-022s

REPORT NOTES

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Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed.

Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/10600
Issue Number: 1

Date: 24 December, 2018

Client: Curtins Consulting
Merchant Exchange
17-19 Whitworth Street
Manchester
UK
M1 5WG

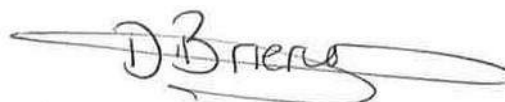
Project Manager: Samuel Thomas
Project Name: Gorton Community Hub
Project Ref: B070452
Order No: EBMA1590
Date Samples Received: 13/12/18
Date Instructions Received: 14/12/18
Date Analysis Completed: 24/12/18

Prepared by:



Elisha Hartley
Admin Assistant

Approved by:



Danielle Brierley
Client Manager

Envirolab Job Number: 18/10600

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10600/2	18/10600/3	18/10600/5						Units	Method ref
Client Sample No										
Client Sample ID	WS03	WS03	WS10							
Depth to Top	1.50	0.30	0.60							
Depth To Bottom	1.60	0.40	0.70							
Date Sampled	10-Dec-18	10-Dec-18	10-Dec-18							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6	4A	3							
% Stones >10mm _A	<0.1	20.0	<0.1						% w/w	A-T-044
pH _D ^{M#}	8.45	8.34	8.41						pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.02	<0.01	0.02						g/l	A-T-026s
Cyanide (total) _A ^{M#}	<1	5	10						mg/kg	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2						mg/kg	A-T-050s
Organic matter _D ^{M#}	1.4	4.5	2.3						% w/w	A-T-032 OM
Arsenic _D ^{M#}	2	36	<1						mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	<1.0						mg/kg	A-T-027s
Cadmium _D ^{M#}	1.4	1.6	1.1						mg/kg	A-T-024s
Copper _D ^{M#}	22	200	19						mg/kg	A-T-024s
Chromium _D ^{M#}	28	22	29						mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1						mg/kg	A-T-040s
Lead _D ^{M#}	13	1280	12						mg/kg	A-T-024s
Mercury _D	<0.17	0.30	<0.17						mg/kg	A-T-024s
Nickel _D ^{M#}	37	32	36						mg/kg	A-T-024s
Selenium _D [#]	1	<1	<1						mg/kg	A-T-024s
Zinc _D ^{M#}	59	316	54						mg/kg	A-T-024s

Envirolab Job Number: 18/10600

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10600/2	18/10600/3	18/10600/5						Units	Method ref
Client Sample No										
Client Sample ID	WS03	WS03	WS10							
Depth to Top	1.50	0.30	0.60							
Depth To Bottom	1.60	0.40	0.70							
Date Sampled	10-Dec-18	10-Dec-18	10-Dec-18							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6	4A	3							
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD	NAD							A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	N/A	N/A							

Envirolab Job Number: 18/10600

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10600/2	18/10600/3	18/10600/5						Units	Method ref
Client Sample No										
Client Sample ID	WS03	WS03	WS10							
Depth to Top	1.50	0.30	0.60							
Depth To Bottom	1.60	0.40	0.70							
Date Sampled	10-Dec-18	10-Dec-18	10-Dec-18							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6	4A	3							
PAH-16MS (MSD order)										
Naphthalene _A ^{M#}	<0.03	0.09	2.63						mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	0.07	0.12						mg/kg	A-T-019s
Acenaphthene _A ^{M#}	<0.01	0.33	10.3						mg/kg	A-T-019s
Fluorene _A ^{M#}	<0.01	0.28	7.77						mg/kg	A-T-019s
Phenanthrene _A ^{M#}	<0.03	3.43	64.6						mg/kg	A-T-019s
Anthracene _A ^{M#}	<0.02	0.68	11.9						mg/kg	A-T-019s
Fluoranthene _A ^{M#}	<0.08	4.55	97.8						mg/kg	A-T-019s
Pyrene _A ^{M#}	<0.07	3.91	75.3						mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	1.95	26.7						mg/kg	A-T-019s
Chrysene _A ^{M#}	<0.06	2.15	43.2						mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	1.87	30.3						mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	0.65	10.8						mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	1.63	21.3						mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	1.16	13.4						mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	0.19	2.66						mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	0.91	10.6						mg/kg	A-T-019s
Total PAH-16MS (MSD order) _A ^{M#}	<0.08	23.9	429						mg/kg	A-T-019s

Envirolab Job Number: 18/10600

Client Project Name: Gorton Community Hub

Client Project Ref: B070452

Lab Sample ID	18/10600/2	18/10600/3	18/10600/5						Units	Method ref
Client Sample No										
Client Sample ID	WS03	WS03	WS10							
Depth to Top	1.50	0.30	0.60							
Depth To Bottom	1.60	0.40	0.70							
Date Sampled	10-Dec-18	10-Dec-18	10-Dec-18							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	6	4A	3							
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01	0.06						mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	0.08						mg/kg	A-T-022s
Ali >C8-C10 _A ^{M#}	<1	<1	<1						mg/kg	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<1						mg/kg	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1	24						mg/kg	A-T-055s
Ali >C16-C21 _A ^{M#}	<1	4	29						mg/kg	A-T-055s
Ali >C21-C35 _A	<1	38	74						mg/kg	A-T-055s
Total Aliphatics _A	<1	44	126						mg/kg	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.05						mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.05						mg/kg	A-T-022s
Aro >C8-C10 _A ^{M#}	<1	<1	<1						mg/kg	A-T-055s
Aro >C10-C12 _A ^{M#}	<1	<1	14						mg/kg	A-T-055s
Aro >C12-C16 _A	<1	7	124						mg/kg	A-T-055s
Aro >C16-C21 _A ^{M#}	<1	36	576						mg/kg	A-T-055s
Aro >C21-C35 _A ^{M#}	1	132	2060						mg/kg	A-T-055s
Total Aromatics _A	1	176	2770						mg/kg	A-T-055s
TPH (Ali & Aro >C5-C35) _A	1	219	2900						mg/kg	A-T-055s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.05						mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.05						mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.05						mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.05						mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.05						mg/kg	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.05						mg/kg	A-T-022s

REPORT NOTES

General:

This report shall not be reproduced, except in full, without written approval from Envirolab.

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed.

Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	Curtins Consulting, Merchant Exchange, 17-19 Whitworth Street , Manchester, UK, M1 5WG	Project No:	18/10379
Project:	Gorton Community Hub	Date Instructions Received:	08/12/2018 (am)
Clients Project No:	B070452	Cool Box Temperatures (°C):	8.6, 8.5

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	Curtins Consulting, Merchant Exchange, 17-19 Whitworth Street , Manchester, UK, M1 5WG	Project No:	18/10546
Project:	Gorton Community Hub	Date Instructions Received:	13/12/2018 (am)
Clients Project No:	B070452	Cool Box Temperatures (°C):	9.2

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

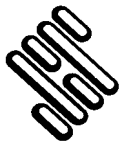
Client:	Curtins Consulting, Merchant Exchange, 17-19 Whitworth Street , Manchester, UK, M1 5WG	Project No:	18/10600
Project:	Gorton Community Hub	Date Instructions Received:	14/12/2018 (am)
Clients Project No:	B070452	Cool Box Temperatures (°C):	9.0

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Appendix D – Geotechnical Laboratory Testing Results

- Triaxial Compression test certificates; and
- Geotechnical laboratory test certificates.



STRUCTURAL SOILS LTD
TEST REPORT



Report No. 783605 R1

Date 15-January-2019 Contract 18/10851

Client Envirolab Ltd
Address Units 7 & 8 Sandpits Business Park
Mottram Road
Hyde
SK14 3AR

For the Attention of Iain Haslock

Samples submitted by client 03/01/2019
Testing Started 03/01/2019
Testing Completed 15/01/2019

Client Reference 18/10851
Client Order No. P0739855
Instruction Type Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests Undertaken

Moisture Content (oven drying method) BS1377:Part 2:1990,clause 3.2
Liquid Limit (definitive method) BS1377:Part 2:1990,clause 4.3
Plastic Limit BS1377:Part 2:1990,clause 5.3
Plasticity Index Derivation BS1377:Part 2:1990,clause 5.4
Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2
Undrained shear strength triaxial compression without pore pressure measurement
(multi-load Staging) BS1377: Part 7:1990, clause 8.5

Non UKAS Accredited Tests Undertaken

Hand Vane

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.

Test were undertaken on samples 'as received' unless otherwise stated.

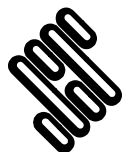
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd, The Potteries, Pottery Street, Castleford, WF10 1NJ Tel.01977 552255. E-mail mark.athorne@soils.co.uk

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
CP01	18/10851/18	D	3.45	16	42	19	23	91	Brown slightly gravelly CLAY
CP01	18/10851/21	D	8.00	16	37	15	22	93	Brown slightly gravelly CLAY
CP02	18/10851/10	D	1.20	23	48	21	27	94	Brown slightly sandy slightly gravelly CLAY
CP02	18/10851/13	D	6.20	17	33	14	19	92	Brown slightly gravelly CLAY
CP03	18/10851/1	D	1.60	16	40	19	21	90	Brown slightly sandy slightly gravelly CLAY
CP03	18/10851/4	D	6.00	20	45	19	26	96	Brown slightly gravelly CLAY
CP03	18/10851/9	D	13.00	13	30	13	17	94	Brown slightly sandy CLAY
WS03	18/10851/26	D	3.00	20	41	17	24	91	Brown slightly gravelly CLAY



**STRUCTURAL
SOILS LTD**

Contract:

18/10851

Contract Ref:

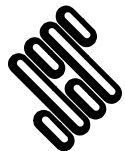
783605



SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
WS05	18/10851/27	D	3.30	17	41	18	23	91	Brown slightly gravelly CLAY
WS07	18/10851/28	D	2.70	16	40	18	22	97	Brown slightly gravelly CLAY
WS09	18/10851/30	D	1.20	19	46	20	26	97	Brown slightly sandy slightly gravelly CLAY
WS10	18/10851/31	D	2.50	25	41	23	18	92	Brown slightly sandy slightly gravelly CLAY



STRUCTURAL
SOILS LTD

Contract:

18/10851

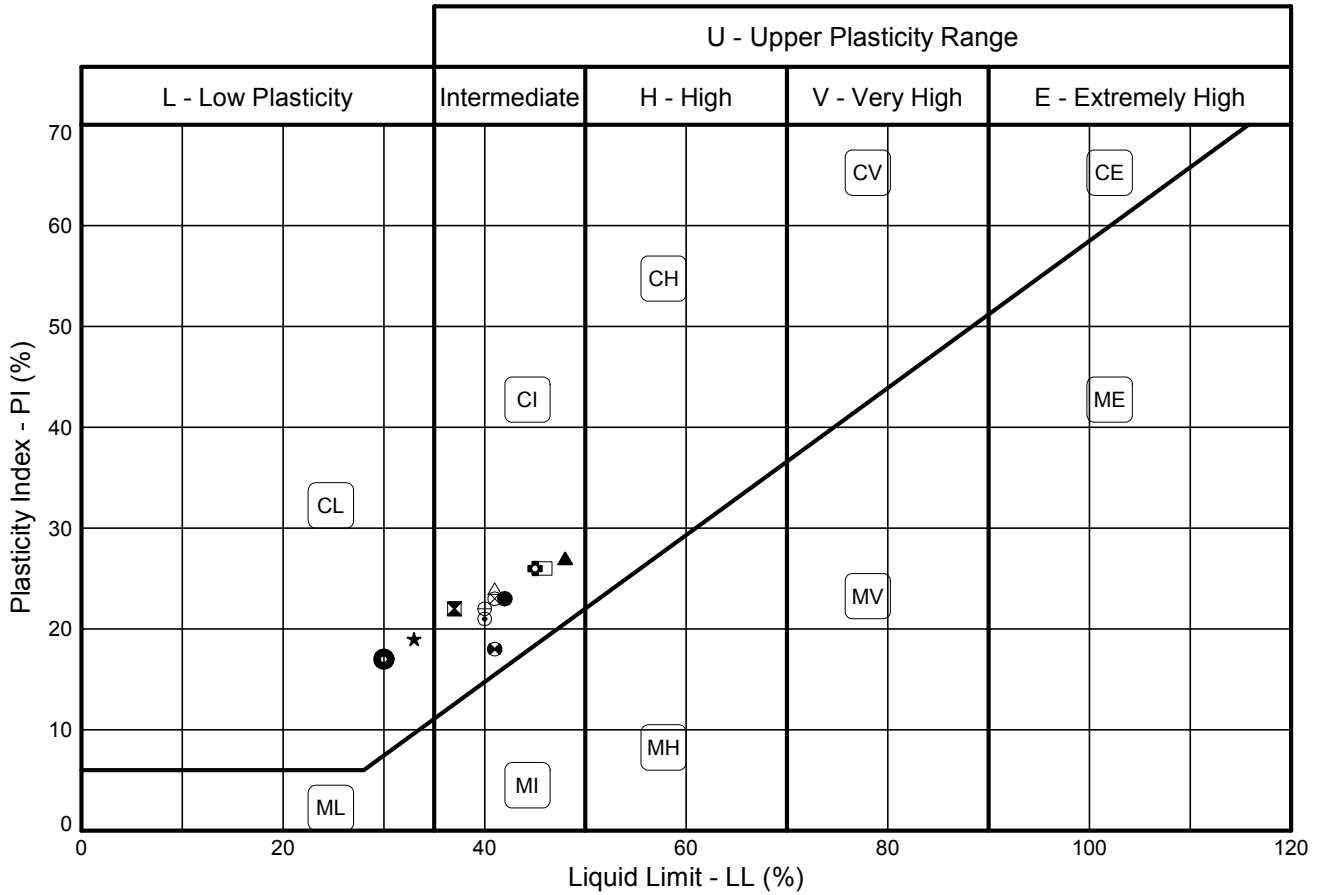
Contract Ref:

783605



PLASTICITY CHART - PI Vs LL

In accordance with BS5930:2015
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC %	LL %	PL %	PI %	<425um %	Lab location
Exploratory Position ID	Sample	Depth (m)									
●	CP01 18/10851/18D	3.45	3.2/4.3/5.3/5.4	4.2.4	16	42	19	23	91	C	
⊠	CP01 18/10851/21D	8.00	3.2/4.3/5.3/5.4	4.2.4	16	37	15	22	93	C	
▲	CP02 18/10851/10D	1.20	3.2/4.3/5.3/5.4	4.2.4	23	48	21	27	94	C	
★	CP02 18/10851/13D	6.20	3.2/4.3/5.3/5.4	4.2.4	17	33	14	19	92	C	
⊙	CP03 18/10851/1D	1.60	3.2/4.3/5.3/5.4	4.2.4	16	40	19	21	90	C	
⊕	CP03 18/10851/4D	6.00	3.2/4.3/5.3/5.4	4.2.4	20	45	19	26	96	C	
⊗	CP03 18/10851/9D	13.00	3.2/4.3/5.3/5.4	4.2.4	13	30	13	17	94	C	
△	WS03 18/10851/26D	3.00	3.2/4.3/5.3/5.4	4.2.4	20	41	17	24	91	C	
⊗	WS05 18/10851/27D	3.30	3.2/4.3/5.3/5.4	4.2.4	17	41	18	23	91	C	
⊕	WS07 18/10851/28D	2.70	3.2/4.3/5.3/5.4	4.2.4	16	40	18	22	97	C	
□	WS09 18/10851/30D	1.20	3.2/4.3/5.3/5.4	4.2.4	19	46	20	26	97	C	
⊗	WS10 18/10851/31D	2.50	3.2/4.3/5.3/5.4	4.2.4	25	41	23	18	92	C	

Tested in accordance with the following clauses of BS1377-2:1990.

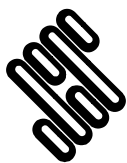
3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

15/01/19

Contract

18/10851

Contract Ref:

783605



PARTICLE SIZE DISTRIBUTION TEST

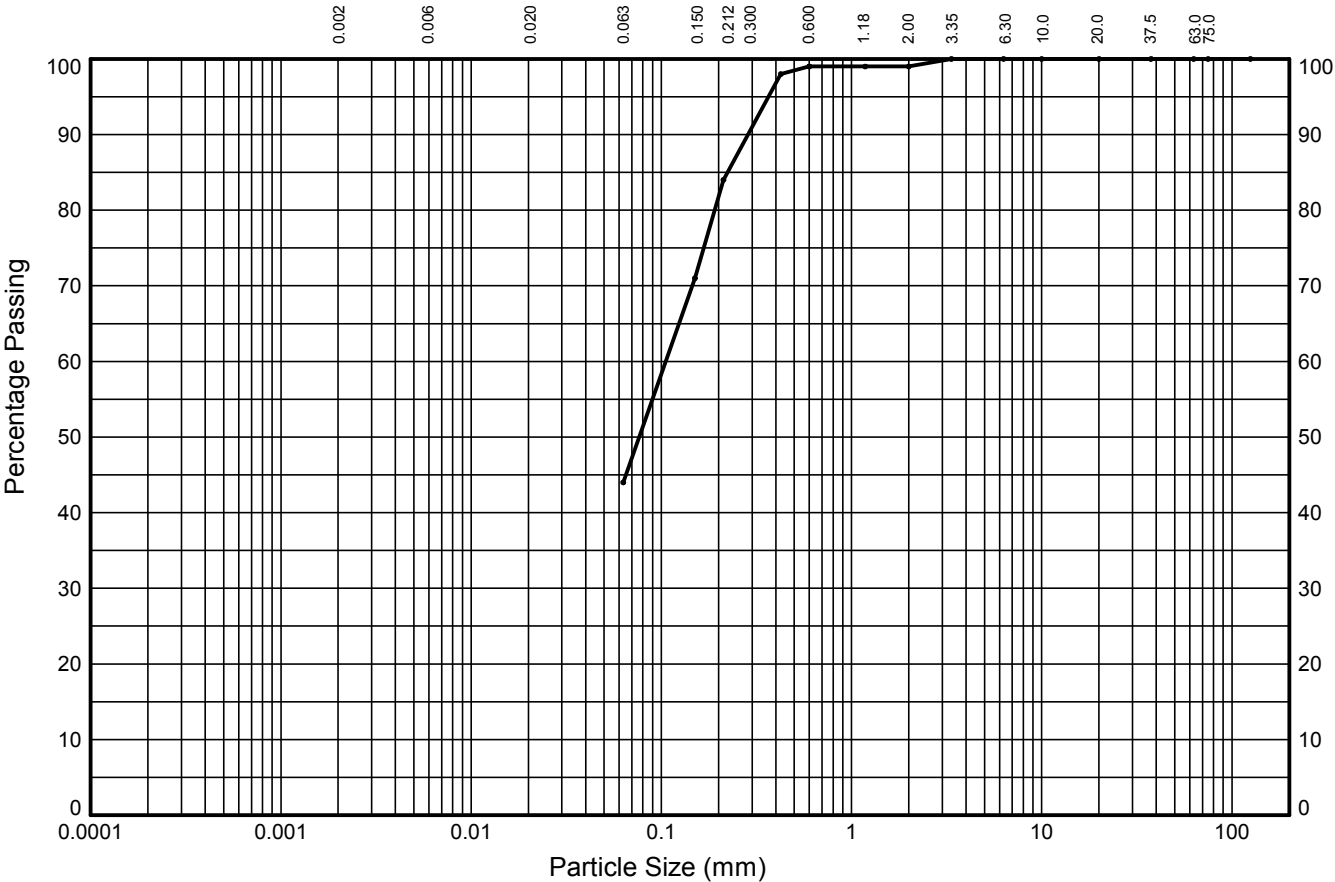
In accordance with clauses 9.2 of BS1377:Part 2:1990

Position ID: **CP01**

Sample Ref: **18/10851/24**

Sample Type: **B**

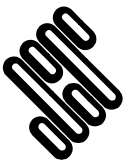
Depth (m): **14.20**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	37%	18%	0%	1%	0%	0%	
	SILT			SAND			GRAVEL			
44%				55%			1%			0%

Test Sieve (mm)	Percent Passing (%)	Particle Diameter (mm)	Percent Passing (%)	Coefficients	
125.0	100			D ₁₀ (mm)	NA
75.0	100			D ₁₅ (mm)	NA
63.0	100			D ₃₀ (mm)	NA
37.5	100			D ₅₀ (mm)	0.076
20.0	100			D ₆₀ (mm)	0.105
10.0	100			D ₈₅ (mm)	0.223
6.30	100			D ₉₀ (mm)	0.286
3.35	100			C _U	NA
2.00	99			C _C	NA
1.18	99			Soil Description: Brown slightly gravelly sandy CLAY	
0.600	99				
0.425	98				
0.212	84				
0.150	71				
0.063	44				
Sedimentation sample was not pre-treated					

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2



STRUCTURAL SOILS
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Pottery Street
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PARTICLE SIZE DISTRIBUTION TEST

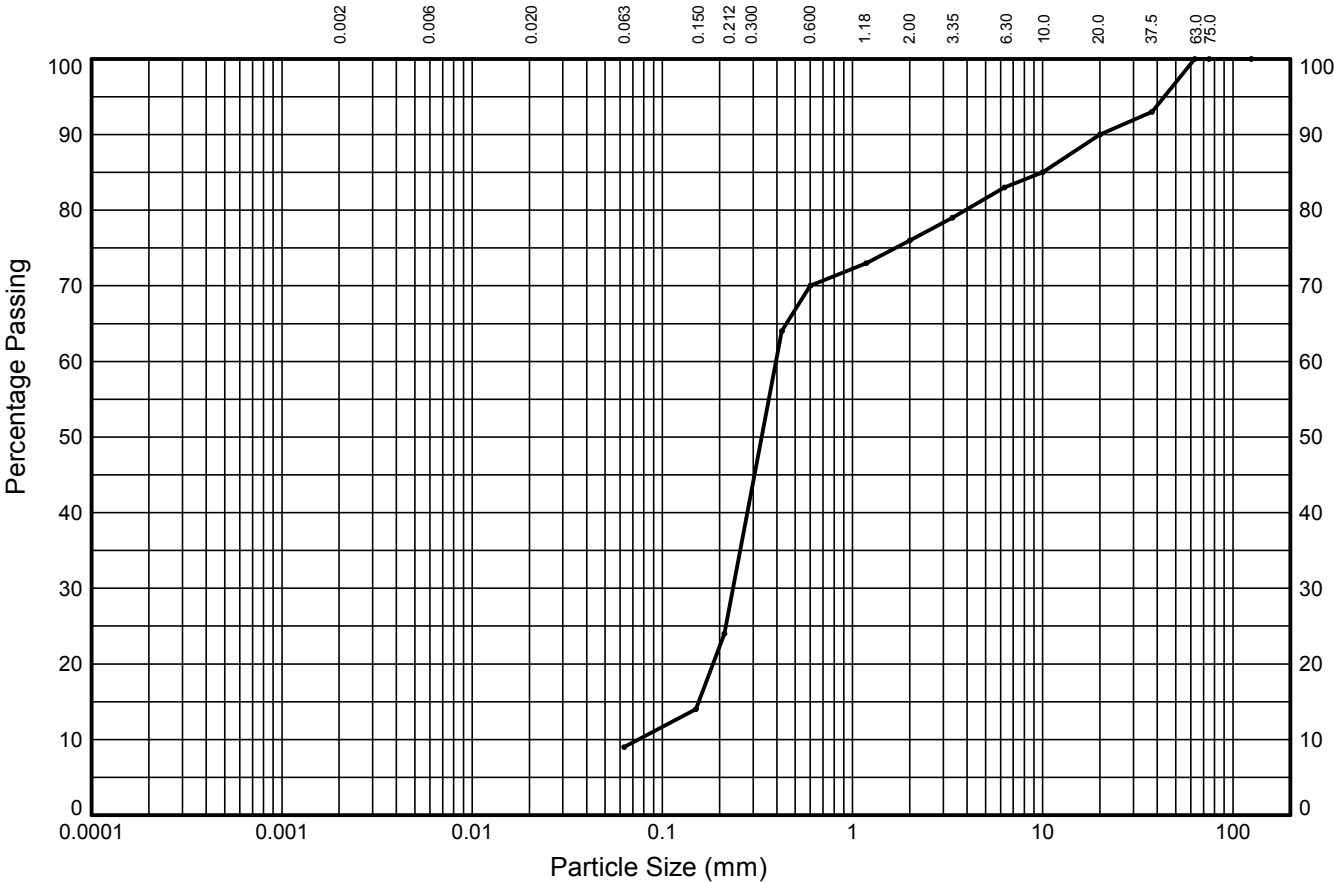
In accordance with clauses 9.2 of BS1377:Part 2:1990

Position ID: **CP02**

Sample Ref: **18/10851/15**

Sample Type: **B**

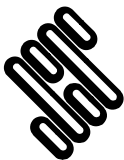
Depth (m): **11.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	13%	48%	6%	7%	7%	10%	
	SILT			SAND			GRAVEL			
9%				67%			24%			0%

Test Sieve (mm)	Percent Passing (%)	Particle Diameter (mm)	Percent Passing (%)	Coefficients	
125.0	100			D ₁₀ (mm)	0.075
75.0	100			D ₁₅ (mm)	0.155
63.0	100			D ₃₀ (mm)	0.235
37.5	93			D ₅₀ (mm)	0.333
20.0	90			D ₆₀ (mm)	0.396
10.0	85			D ₈₅ (mm)	10.000
6.30	83			D ₉₀ (mm)	20.000
3.35	79			C _U	5.3
2.00	76			C _C	1.9
1.18	73			Sedimentation sample was not pre-treated	
0.600	70				
0.425	64				
0.212	24				
0.150	14				
0.063	9			Soil Description: Brown slightly clayey very gravelly SAND	

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2



STRUCTURAL SOILS
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PARTICLE SIZE DISTRIBUTION TEST

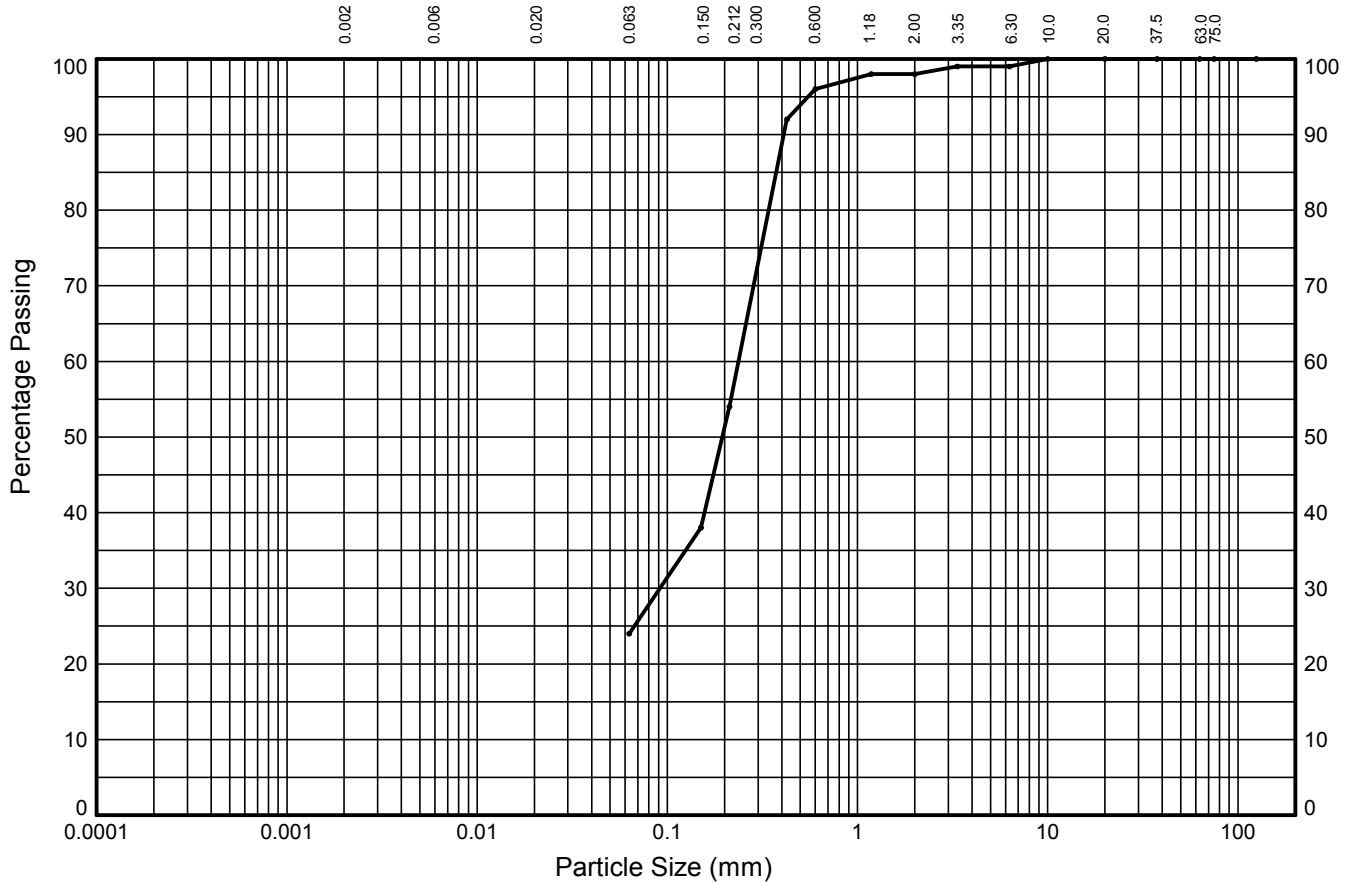
In accordance with clauses 9.2 of BS1377:Part 2:1990

Position ID: **CP03**

Sample Ref: **18/10851/7**

Sample Type: **B**

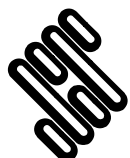
Depth (m): **10.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	27%	45%	2%	1%	1%	0%	
	SILT			SAND			GRAVEL			
24%				74%			2%			0%

Test Sieve (mm)	Percent Passing (%)	Particle Diameter (mm)	Percent Passing (%)	Coefficients	
125.0	100			D ₁₀ (mm)	NA
75.0	100			D ₁₅ (mm)	NA
63.0	100			D ₃₀ (mm)	0.091
37.5	100			D ₅₀ (mm)	0.194
20.0	100			D ₆₀ (mm)	0.237
10.0	100			D ₈₅ (mm)	0.374
6.30	99			D ₉₀ (mm)	0.410
3.35	99			C _U	NA
2.00	98			C _C	NA
1.18	98			Sedimentation sample was not pre-treated Soil Description: Brown slightly gravelly very clayey SAND	
0.600	96				
0.425	92				
0.212	54				
0.150	38				
0.063	24				

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2



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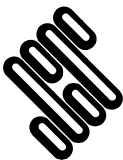
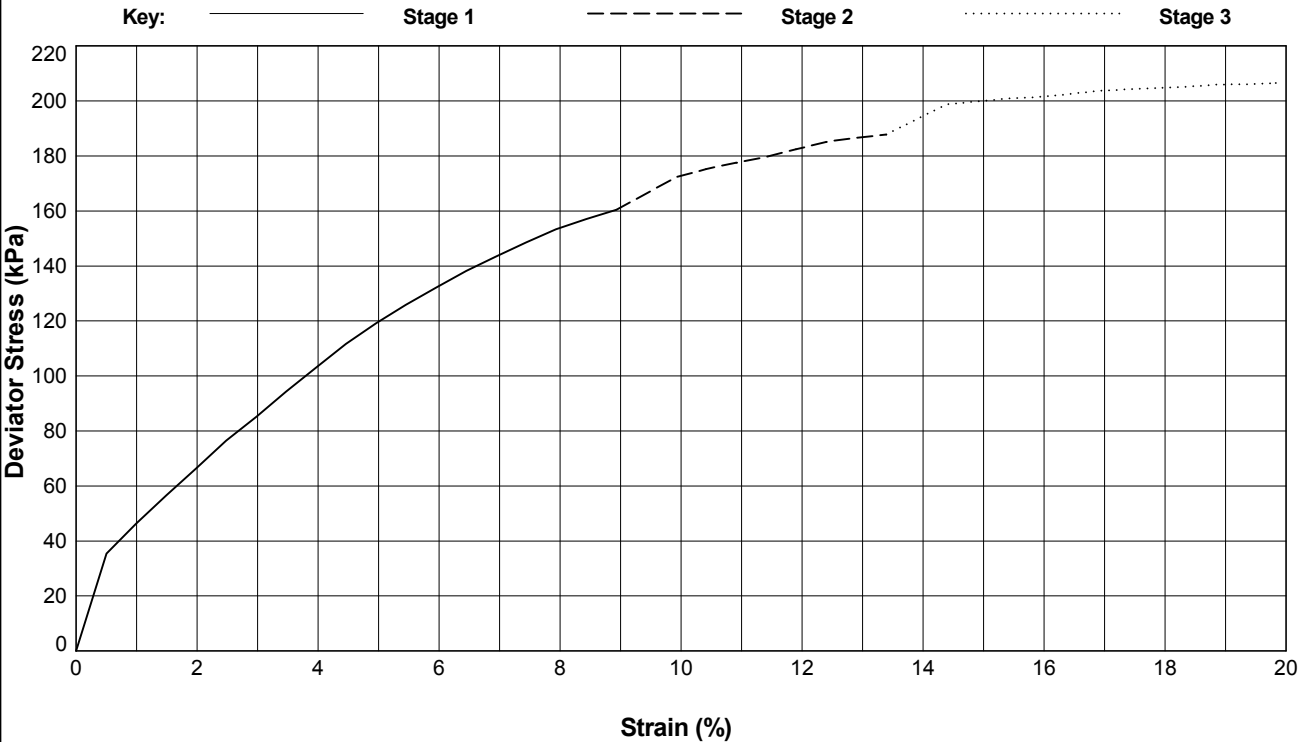
UNCONSOLIDATED QUICK UNDRAINED (MULTI-STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 9

Position ID: **CP01** Sample Ref: **18/10851/20** Sample Type: **U** Depth (m): **6.00**

Description : **Dark brown slightly sandy slightly gravelly CLAY**

STAGE NUMBER		1	2	3
SAMPLE DETAILS	Sample Condition	Undisturbed		
	Orientation of sample	Vertical		
	Diameter (mm)	99.67		
	Height (mm)	201.67		
	Moisture Content (%)	18		
	Bulk Density (Mg/m ³)	2.19		
	Dry Density (Mg/m ³)	1.85		
TEST DETAILS	Membrane Thickness (mm)	0.31	0.31	0.31
	Rate of Axial Displacement (%/min)	2.00	2.00	2.00
	Cell Pressure (kPa)	60	120	240
	Membrane Correction (kPa)	0.65	0.88	1.18
	Corrected Deviator Stress (kPa)	160	188	206
	Undrained Shear Strength (kPa)	80	94	103
	Strain at Failure (%)	8.9	13.4	19.8
	Mode of Failure			Plastic



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W. Yorkshire WF10 1NJ

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MAUREEN FISHER

Date

15/01/19

Contract

18/10851

Contract Ref:

783605

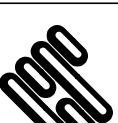


SUMMARY OF HAND PENETROMETER & HAND VANE TEST RESULTS

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content (%)	Vane Type	Average Reading (kPa)	Sample Description	Lab location
CP01	18/10851/17	U	3.00	16	HVP	122	Dark brown slightly sandy slightly gravelly CLAY	C
CP02	18/10851/11	U	2.00	19	HVP	102	Dark brown slightly gravelly CLAY	C
CP03	18/10851/2	U	4.00	19	HVP	110	Dark brown slightly gravelly CLAY	C

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

Key : HVP = Hand Vane (Peak), HVR = Hand Vane (Remoulded), PP = Pocket Penetrometer.

 STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	Compiled By		Date	Contract Ref: 783605
	<i>M. Fisher</i>	MAUREEN FISHER	15.01.19	
	Contract: 18/10851			

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

TESTING VERIFICATION CERTIFICATE



1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **15/01/2019 17:01:18**.

Testing reported after this date is not covered by this Verification Certificate.

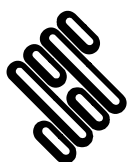
Approved Signatory
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**STRUCTURAL
SOILS LTD**

Contract:

18/10851

Job No:

783605



FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/10851
Issue Number: 1

Date: 16 January, 2019

Client: Curtins Consulting
Merchant Exchange
17-19 Whitworth Street
Manchester
UK
M1 5WG

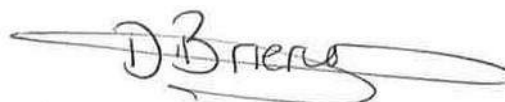
Project Manager: Samuel Thomas
Project Name: Gorton Community Hub
Project Ref: B070425
Order No: EBMA 1614
Date Samples Received: 14/12/18
Date Instructions Received: 21/12/18
Date Analysis Completed: 15/01/19

Prepared by:



Elisha Hartley
Admin Assistant

Approved by:



Danielle Brierley
Client Manager

Envirolab Job Number: 18/10851

Client Project Name: Gorton Community Hub

Client Project Ref: B070425

Lab Sample ID	18/10851/1	18/10851/2	18/10851/4	18/10851/7	18/10851/9	18/10851/10	18/10851/11	18/10851/12	Units	Method ref
Client Sample No										
Client Sample ID	CP03	CP03	CP03	CP03	CP03	CP02	CP02	CP02		
Depth to Top	1.60	4.00	6.00	10.50	13.00	1.20	2.00	2.45		
Depth To Bottom	1.70	4.50	6.10	11.00	13.50	1.30	2.45	2.70		
Date Sampled	07-Dec-18		11-Dec-18	10-Dec-18	10-Dec-18	06-Dec-18		06-Dec-18		
Sample Type	Soil - D	Soil - U	Soil - D	Soil - B	Soil - D	Soil - D	Soil - U	Soil - D		
Sample Matrix Code	5			4A				5		
% Stones >10mm _A	<0.1	-	-	<0.1	-	-	-	<0.1	% w/w	A-T-044
pH _D ^{M#}	8.71	-	-	9.26	-	-	-	8.62	pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	<0.01	-	-	<0.01	-	-	-	<0.01	g/l	A-T-026s
1.01 % Moisture BS1377 1990 pt2 cl3.2 _A [#]	Appended	-	Appended	-	Appended	Appended	-	-		Subcon SS
1.02 Atterburg 4Pt BS1377 1990 pt2 cl4.4,5.3+5.4 _A [#]	Appended	-	Appended	-	Appended	Appended	-	-		Subcon SS
1.10 PSD (Grading/63um/sand fraction/wet sieve) BS1377 pt 2 1990 cl 9.2 _A [#]	-	-	-	Appended	-	-	-	-		Subcon SS
5.05 QUT Multistage (100mm) BS1377 1990 pt7 cl9 (Undrained Shear Strength) _A [#]	-	Unsuitable Sample	-	-	-	-	Unsuitable Sample	-		Subcon SS
5.02 Hand Vane Test (Natural Shear Strength by Hand Vane) (3 measurements) _A	-	Appended	-	-	-	-	Appended	-		Subcon SS

Envirolab Job Number: 18/10851

Client Project Name: Gorton Community Hub

Client Project Ref: B070425

Lab Sample ID	18/10851/13	18/10851/15	18/10851/17	18/10851/18	18/10851/20	18/10851/21	18/10851/24	18/10851/26	Units	Method ref
Client Sample No										
Client Sample ID	CP02	CP02	CP01	CP01	CP01	CP01	CP01	WS03		
Depth to Top	6.20	11.50	3.00	3.45	6.00	8.00	14.20	3.00		
Depth To Bottom	6.30	12.00	3.45	3.70	6.45	8.10	14.30	3.20		
Date Sampled	06-Dec-18	07-Dec-18	11-Dec-18	11-Dec-18	11-Dec-18	11-Dec-18	12-Dec-18	10-Dec-18		
Sample Type	Soil - D	Soil - B	Soil - U	Soil - D	Soil - U	Soil - D	Soil - B	Soil - D		
Sample Matrix Code		4		5						
% Stones >10mm _A	-	<0.1	-	<0.1	-	-	-	-	% w/w	A-T-044
pH _D ^{M#}	-	9.03	-	8.71	-	-	-	-	pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	-	<0.01	-	<0.01	-	-	-	-	g/l	A-T-026s
1.01 % Moisture BS1377 1990 pt2 cl3.2 _A [#]	Appended	-	-	Appended	-	Appended	-	Appended		Subcon SS
1.02 Atterburg 4Pt BS1377 1990 pt2 cl4.4,5.3+5.4 _A [#]	Appended	-	-	Appended	-	Appended	-	Appended		Subcon SS
1.10 PSD (Grading/63um/sand fraction/wet sieve) BS1377 pt 2 1990 cl 9.2 _A [#]	-	Appended	-	-	-	-	Appended	-		Subcon SS
5.05 QUT Multistage (100mm) BS1377 1990 pt7 cl9 (Undrained Shear Strength) _A [#]	-	-	Unsuitable Sample	-	Appended	-	-	-		Subcon SS
5.02 Hand Vane Test (Natural Shear Strength by Hand Vane) (3 measurements) _A	-	-	Appended	-	-	-	-	-		Subcon SS

Envirolab Job Number: 18/10851

Client Project Name: Gorton Community Hub

Client Project Ref: B070425

Lab Sample ID	18/10851/27	18/10851/28	18/10851/29	18/10851/30	18/10851/31				Units	Method ref
Client Sample No										
Client Sample ID	WS05	WS07	WS08	WS09	WS10					
Depth to Top	3.30	2.70	1.60	1.20	2.50					
Depth To Bottom	3.50	2.80	1.80	1.40	2.60					
Date Sampled		05-Dec-18	10-Dec-18	07-Dec-18	10-Dec-18					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D					
Sample Matrix Code		5	5	5	5					
% Stones >10mm _A	-	<0.1	<0.1	<0.1	<0.1				% w/w	A-T-044
pH _D ^{M#}	-	8.41	8.33	8.17	8.79				pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	-	0.03	<0.01	0.27	<0.01				g/l	A-T-026s
1.01 % Moisture BS1377 1990 pt2 cl3.2 _A [#]	Appended	Appended	-	Appended	Appended					Subcon SS
1.02 Atterburg 4Pt BS1377 1990 pt2 cl4.4,5.3+5.4 _A [#]	Appended	Appended	-	Appended	Appended					Subcon SS

REPORT NOTES

General:

This report shall not be reproduced, except in full, without written approval from Envirolab.

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed.

Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Appendix E – Ground Gas Monitoring Results

- Visits 1 – 6.



GAS MONITORING LOG SHEET

Project: Gorton Community Hub **Date:** 20/12/2018
Job Number: 70452 **Visit:** 1
Client: Morgan Sindall **Weather:** Cloudy and rainy
Barometric State: Raising **Ground Conditions:** Wet

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	994	25.1	3.1	0.0	0.0	2.0	0.3	19.9	0	0	0.70	2.00	
WS02	994	-0.2	0.0	0.0	0.0	2.6	2.6	13.5	0	0	1.25	2.14	
WS03	994	0.0	0.0	0.0	0.0	0.2	0.2	20.1	0	0	Dry	2.10	
WS05	993	0.0	0.0	0.0	0.0	0.1	0.1	19.5	0	0	1.10	3.30	
WS06	993	6.6	6.6	0.0	0.0	3.9	3.8	18.2	0	0	0.90	2.00	
WS07													1
WS08													2
WS09	994	-0.2	-0.1	0.0	0.0	1.3	1.3	19.0	0	0			3
WS10													1
CP01	994	0.0	0.0	0.0	0.0	0.5	0.3	19.7	0	0	14.00	14.80	
CP02	994	0.0	0.0	0.0	0.0	2.7	2.7	1.0	0	12	11.00	12.00	
CP03	995	-0.1	0.0	0.0	0.0	0.0	0.0	18.8	0	18	10.00	12.40	

Notes

- 1 Can not open cover
2 No access
3 Bung stuck in install

Logged by

RT

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated



GAS MONITORING LOG SHEET

Project: Gorton Community Hub **Date:** 09/01/2019
Job Number: 70452 **Visit:** 2
Client: Morgan Sindall **Weather:** Cloudy
Barometric State: Steady **Ground Conditions:** Damp

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	1022	-39.1	0.0	0.0	0.0	2.2	2.2	17.20	0	0	1.0	2.08	1
WS02	1022	-0.1	0.0	0.0	0.0	1.8	1.7	18.30	0	0	1.12	2.20	
WS03	1022	0.0	0.0	0.0	0.0	0.3	0.3	19.70	0	0	1.33	2.10	
WS05	1022	0.0	0.0	0.0	0.0	0.5	0.5	18.80	0	0	1.08	2.86	
WS06	1021	0.0	0.0	0.0	0.0	1.2	1.2	18.40	0	0	1.09	2.00	
WS07	1021	0.0	0.0	0.0	0.0	6.6	6.6	3.9	0	0	Dry	1.80	
WS08													
WS09	1021	0.0	0.0	0.0	0.0	1.4	1.4	18.7	0	0	Dry	2.00	2
WS10	1022	-0.4	0.0	0.0	0.0	0.7	0.3	19.8	0	0	1.99	2.10	
CP01	1022										14.10	14.80	3
CP02	1022	-2.2	0.0	0.0	0.0	4.6	4.6	1.5	0	0	11.05	12.04	
CP03	1021	0.0	0.0	0.0	0.0	0.1	0.0	20.1	0	0	10.94	12.36	

Notes

- 1 Returned to steady state after 1 minute.
2 No access
3 Bung not properly fitted

Logged by

ST

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated



GAS MONITORING LOG SHEET

Project: Gorton Community Hub Date: 17/01/2019
Job Number: 70452 Visit: 3
Client: Morgan Sindall Weather: Sunny
Barometric State: Rising Ground Conditions: Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	1006	4.2	0.6	0.0	0.0	3.3	3.3	16.3	0	0	0.98	2.00	1
WS02	1005	0.1	0.0	0.0	0.0	1.6	1.5	19.0	0	0	0.74	2.05	
WS03	1006	0.0	0.0	0.0	0.0	0.3	0.3	20.0	0	0	1.18	2.00	
WS05	1005	-0.2	0.0	0.0	0.0	0.5	0.5	19.0	0	0	0.98	2.78	
WS06	1004	-0.3	-0.1	0.0	0.0	0.8	0.7	19.6	0	0	0.92	1.86	
WS07	1004	-0.4	0.0	0.0	0.0	6.8	6.8	4.6	0	0	1.20	1.74	
WS08	1005	0.0	0.0	0.0	0.0	1.3	1.3	18.8	0	0	0.89	1.50	
WS09	1005	0.0	0.0	0.0	0.0	1.0	1.0	19.3	0	0	Dry	2.00	
WS10	1005	-0.3	0.0	0.0	0.0	0.2	0.2	19.9	0	0	1.89	1.99	
CP01	1006	0.0	0.0	0.0	0.0	0.6	0.6	19.4	0	0	Dry	12.80	
CP02	1005	-4.0	-3.9	0.0	0.0	4.5	4.5	4.0	0	0	12.00	12.00	
CP03	1005	-0.1	0.0	0.0	0.0	0.4	0.1	18.1	0	0	9.02	11.30	

Notes

1 Took 2 minutes to get to steady flow.

Logged by

RT

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated



GAS MONITORING LOG SHEET

Project: Gorton Community Hub **Date:** 29/01/2019
Job Number: B070452 **Visit:** 4
Client: Morgan Sindall **Weather:** Heavy Rain
Barometric State: Falling **Ground Conditions:** Wet

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	985	11.2	0.5	0.0	0.0	3.2	3.2	16.8	1	0	0.78	1.00	1
WS02	985	0.6	0.0	0.0	0.0	0.9	0.8	20.4	1	1	0.70	2.00	
WS03	986	0.0	0.0	0.0	0.0	0.2	0.2	20.7	0	0	1.50	2.00	
WS05	983	-0.3	0.0	0.0	0.0	0.5	0.5	19.7	0	0	0.90	2.70	
WS06	983	-0.1	0.0	0.0	0.0	0.1	0.1	20.5	0	0	0.80	1.80	
WS07	985	1.2	0.0	0.0	0.0	6.5	6.5	5.1	0	0	Dry	1.78	
WS08													2
WS09	983										1.94	2.00	3
WS10	985	-0.6	0.0	0.0	0.0	0.0	0.0	20.7	0	0	1.90	2.00	
CP01	986	0.1	0.0	0.0	0.0	2.0	1.6	17.8	1	3	Dry	12.05	
CP02	985	9.2	7.5	0.0	0.0	1.2	1.2	17.6	1	1	11.90	12.05	1
CP03	983	0.0	0.0	0.0	0.0	0.1	0.1	18.4	0	0	11.90	12.00	

Notes

- 1 Took 2 minutes to reach steady flow.
2 No access.
3 Well flooded.

Logged by

RT

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated



GAS MONITORING LOG SHEET

Project: Gorton Community Hub **Date:** 15/02/2019
Job Number: B070452 **Visit:** 5
Client: Morgan Sindall **Weather:** Sunny
Barometric State: Steady **Ground Conditions:** Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	1014	-12.1	0.0	0.0	0.0	2.2	2.2	17.6	0	0	0.77	1.00	1
WS02	1014	1.5	0.0	0.0	0.0	0.6	0.6	20.6	0	0	0.89	2.01	
WS03	1017	0.0	0.0	0.0	0.0	0.2	0.2	20.7	0	0	1.17	1.96	
WS05	1015	-0.6	0.0	0.0	0.0	0.3	0.3	20.2	0	0	0.94	2.96	
WS06	1014	-0.2	0.0	0.0	0.0	0.5	0.5	20.6	0	0	0.82	1.26	
WS07	1015	-0.6	0.0	0.0	0.0	6.0	6.0	6.3	0	0	1.25	1.70	
WS08													
WS09	1014	-0.3	0.0	0.0	0.0	1.0	1.0	19.8	0	0	1.98	2.00	
WS10	1017	0.0	0.0	0.0	0.0	0.1	0.1	20.7	0	0	1.82	1.96	
CP01	1016	0.0	0.0	0.0	0.0	0.4	0.4	20.3	0	0	14.13	14.57	
CP02	1017	0.0	0.0	0.0	0.0	0.7	0.7	17.4	0	0	11.76	12.90	
CP03	1015	-0.3	0.0	0.0	0.0	0.2	0.2	15.7	0	0	10.85	12.29	

Notes

1 No access

Logged by

PN

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated



GAS MONITORING LOG SHEET

Project: Gorton Community Hub Date: 05/03/2019
Job Number: 70452 Visit: 6
Client: Morgan Sindall Weather: Overcast
Barometric State: Rising Ground Conditions: Damp

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	990										1.10	1.96	1
WS02	990	0.0	0.0	0.0	0.0	3.8	3.8	15.7	0	3	1.12	2.02	3
WS03	990	0.1	0.0	0.0	0.0	0.4	0.4	20.2	0	3	1.30	1.96	
WS05	990										0.93	2.99	1
WS06	980										1.40	1.84	1
WS07	980	0.1	0.0	0.0	0.0	6.6	6.6	5.9	0	3	1.25	1.70	
WS08													4
WS09	990												1,2
WS10	990	-0.9	0.0	0.0	0.0	0.2	0.2	20.4	0	3	1.90	1.97	
CP01	990	-0.1	-0.1	0.0	0.0	0.1	0.1	20.4	0	3	14.13	14.56	
CP02	990	0.0	0.0	0.0	0.0	0.0	0.0	20.5	0	3	11.70	11.90	
CP03	990	0.2	0.1	0.0	0.0	0.3	0.3	5.9	0	3	Dry	11.26	

Notes

- 1 Gas tap left open, could not monitor.
2 Bung stuck in install
3 Carbon dioxide slowly increasing, monitored for over 5 minutes.
4 No access

Logged by

RT

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

Appendix F – GAC Screening Thresholds

- Curtins GAC Tier 1 Thresholds.

Adopted Soil Generic Assessment Criteria
Sandy loam with 6% SOM



Contaminants	Residential <u>with</u> home grown produce	Residential <u>without</u> home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 220	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	6 21	6 21	1.8 170	33 49	7.7 21	220 250
Lead	200	310	80	2,300	630	1,300
Mercury (<i>elemental</i>)	1	1	26	26	16	26⁽⁸⁾ [30]
Mercury (<i>inorganic</i>)	170	240	80	3600	120	240
Nickel	130⁽¹⁰⁾	180⁽¹⁰⁾	53⁽¹¹⁾	980⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 79	170 170
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
<i>Aliphatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅₋₅ - EC ₆	160	160	3900	12000	600000	180000
EC ₅₋₆ - EC ₈	530	530	13000	40000	620000	320000
EC ₅₋₈ - EC ₁₀	150	150	1700	11000	13000	21000
EC ₁₀₋₁₀ - EC ₁₂	760	770	7300	47000	13000	24000
EC ₁₂₋₁₂ - EC ₁₆	4300	4400	13000	90000	13000	26000
EC ₅₋₁₆ - EC ₃₅	110000	110000	270000	1800000	250000	490000
EC ₃₅₋₃₅ - EC ₄₄	110000	110000	270000	1800000	250000	490000
<i>Aromatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅₋₅ - EC ₇	300	1400	57	86000	56000	92000
EC ₅₋₇ - EC ₈	660	3900	120	180000	56000	100000
EC ₅₋₈ - EC ₁₀	190	270	51	17000	5000	9300
EC ₁₀₋₁₀ - EC ₁₂	380	1200	74	34000	5000	10000
EC ₁₂₋₁₂ - EC ₁₆	660	2500	130	38000	5000	10000
EC ₅₋₁₆ - EC ₂₁	930	1900	260	28000	3800	7800
EC ₂₁₋₂₁ - EC ₃₅	1700	1900	1600	28000	3800	7900
EC ₃₅₋₃₅ - EC ₄₄	1700	1900	1600	28000	3800	7900
Aliph + Arom EC >44-70	1900	1900	3000	28000	3800	7900
Aromatic						
Benzene	0.33 0.87	1.0 3.3	0.07 0.18	95 98	73 140	110 230
Ethyl benzene	350	840	90	2800⁽⁸⁾ [66000]	2800⁽⁸⁾ [25000]	2800⁽⁸⁾ [27000]
Toluene	610	2700	120	4400⁽⁸⁾ [190000]	4400⁽⁸⁾ [56000]	4400⁽⁸⁾ [100000]
Xylene ⁽⁹⁾	230	290	160	2600⁽⁸⁾ [32000]	2600⁽⁸⁾ [43000]	2600⁽⁸⁾ [31000]
Phenol	420	520	280	3200⁽¹⁴⁾ (38000)	3200⁽¹⁴⁾ (10000)	3200⁽¹⁴⁾ (9300)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	13	13	24	1100	4900	3000
Acenaphthylene	920	6000	160	100000	15000	30000
Acenaphthene	1100	6000	200	100000	15000	30000
Fluorene	860	4500	160	71000	9900	20000
Phenanthrene	440	1500	90	23000	3100	6300
Anthracene	11000	37000	2200	540000	74000	150000
Fluoranthene	890	1600	290	23000	3100	6400
Pyrene	2000	3800	620	54000	7400	15000
Benz(a)anthracene	13	15	13	180	29	62
Chrysene	27	32	19	350	57	120
Benzo(b)fluoranthene	3.7	4.0	3.9	45	7.2	16.0
Benzo(k)fluoranthene	100	110	130	1200	190	440
Benzo(a)pyrene	3.0 5.0	3.2 5.3	3.5 5.7	36 77	5.7 10	13 21
Indeno(123cd)pyrene	41	46	39	510	82	180
Dibenzo(ah)anthracene	0.3	0.32	0.43	3.6	0.58	1.4
Benzo(ghi)perylene	350	360	640	4000	640	1600
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.0014	0.0015	0.0018	0.12	3.5	5.4
Trichloroethene (TCE)	0.075	0.08	0.21	5.7	120	120
1,1,1,2 Tetrachlorethane	6.4	8.2	4.4	560	1400	2100
Tetrachlorethane (PCE)	0.90	0.92	3.6	95	1400	1500
1,1,1 Trichlorethane	39	40	240	3000	140000	100000

Notes

- All values above are in mg/kg
- Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters, numbers in italics are S4ULs, numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters and underlined numbers are C4SLs**
- Soil organic matter (SOM) is assumed to be 6% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA / [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 2.5% SOM



Contaminants	Residential <u>with</u> home grown produce	Residential <u>without</u> home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 220	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	6 21	6 21	1.8 170	33 49	7.7 21	220 250
Lead	200	310	80	2,300	630	1,300
Mercury (elemental)	1	1	26	26	16	26⁽⁸⁾ [30]
Mercury (inorganic)	170	240	80	3600	120	240
Nickel	130⁽¹⁰⁾	180⁽¹⁰⁾	53⁽¹¹⁾	980⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 79	170 170
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
<i>Aliphatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅ - EC ₆	78	78	1700	5900	590000	130000
EC ₆ - EC ₈	230	230	5600	17000	610000	220000
EC ₈ - EC ₁₀	65	65	770	4800	13000	18000
EC ₁₀ - EC ₁₂	330	330	4400	23000	13000	23000
EC ₁₂ - EC ₁₆	2400	2400	13000	82000	13000	25000
EC ₁₆ - EC ₃₅	92000	92000	270000	1700000	250000	480000
EC ₃₅ - EC ₄₄	92000	92000	270000	1700000	250000	480000
<i>Aromatic risk banded hydrocarbons - TPHCWG method</i>						
EC ₅ - EC ₇	140	690	27	46000	56000	84000
EC ₇ - EC ₈	290	1800	51	110000	56000	95000
EC ₈ - EC ₁₀	83	110	21	8100	5000	8500
EC ₁₀ - EC ₁₂	180	590	31	28000	5000	9700
EC ₁₂ - EC ₁₆	330	2300	57	37000	5100	10000
EC ₁₆ - EC ₂₁	540	1900	110	28000	3800	7700
EC ₂₁ - EC ₃₅	1500	1900	820	28000	3800	7800
EC ₃₅ - EC ₄₄	1500	1900	820	28000	3800	7800
Aliph + Arom EC >44-70	1800	1900	2100	28000	3800	7800
<i>Aromatic</i>						
Benzene	0.16	0.49	0.035	50	72	100
Ethyl benzene	150	380	39	1200⁽⁸⁾ [35000]	1200⁽⁸⁾ [24000]	1200⁽⁸⁾ [22000]
Toluene	270	1300	51	1900⁽⁸⁾ [110000]	1900⁽⁸⁾ [56000]	1900⁽⁸⁾ [95000]
Xylene ⁽⁹⁾	98	120	70	1200⁽⁸⁾ [14000]	1200⁽⁸⁾ [42000]	1200⁽⁸⁾ [23000]
Phenol	290	420	140	1500⁽¹⁴⁾ (35000)	1500⁽¹⁴⁾ (10000)	1500⁽¹⁴⁾ (8300)
<i>Polycyclic Aromatic Hydrocarbons (PAH)</i>						
Naphthalene	5.6	5.6	10	460	4900	1900
Acenaphthylene	420	4600	69	97000	15000	30000
Acenaphthene	510	4700	85	97000	15000	30000
Fluorene	400	3800	67	68000	9900	20000
Phenanthrene	220	1500	38	22000	3100	6200
Anthracene	5400	35000	950	540000	74000	150000
Fluoranthene	560	1600	130	23000	3100	6300
Pyrene	1200	3800	270	54000	7400	15000
Benz(a)anthracene	11	14	6.5	170	29	56
Chrysene	22	31	9.4	350	57	110
Benzo(b)fluoranthene	3.3	4.0	2.1	44	7.2	15
Benzo(k)fluoranthene	93	110	75	1200	190	410
Benzo(a)pyrene	2.7	3.2	2	35	5.7	12
Indeno(123cd)pyrene	36	46	21	510	82	170
Dibenzo(ah)anthracene	0.28	0.32	0.27	3.6	0.57	1.3
Benzo(ghi)perylene	340	360	470	4000	640	1500
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.00087	0.001	0.001	0.077	3.5	5
Trichloroethene (TCE)	0.034	0.036	0.091	2.6	120	91
1,1,1,2 Tetrachlorethane	2.8	3.5	1.9	250	1400	1800
Tetrachlorethane (PCE)	0.39	0.4	1.5	42	1400	1100
1,1,1 Trichlorethane	18	18	110	1300	140000	76000

Notes

- All values above are in mg/kg
- Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters, numbers in italics are S4ULs, numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters and underlined numbers are C4SLs
- Soil organic matter (SOM) is assumed to be 2.5% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA / [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 1% SOM



Contaminants	Residential <u>with</u> home grown produce	Residential <u>without</u> home grown produce	Allotments	Commercial	Public open space near residential housing POS _{resi}	Public park POS _{park}
Metals						
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11,000	45	240,000	21,000	46,000
Cadmium	10⁽¹³⁾ 22	85⁽¹³⁾ 150	1.8 3.9	230 410	120 220	560 880
Chromium III	910	910	18,000	8,600	1,500	33,000
Chromium VI	6 21	6 21	1.8 170	33 49	7.7 21	220 250
Lead	200	310	80	2,300	630	1,300
Mercury (<i>elemental</i>)	1	1	26	26	16	26⁽⁸⁾ [30]
Mercury (<i>inorganic</i>)	170	240	80	3600	120	240
Nickel	130 ⁽¹⁰⁾	180 ⁽¹⁰⁾	53 ⁽¹¹⁾	980 ⁽¹⁰⁾	230	800
Vanadium	410	1200	91	9000	2000	5000
Copper	2400	7100	520	68000	12000	44000
Zinc	3700	40000	620	730000	81000	170000
Semi-Metals and non-metals						
Arsenic	32⁽¹²⁾ 37	35⁽¹²⁾ 40	43⁽¹²⁾ 49	640⁽¹²⁾ 640	79 79	170 170
Antimony		550		7500	1500	3300
Selenium	350	600	120	13000	1100	1800
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
EC ₅₋₅ - EC ₆	42	42	730	3200	570000	95000
EC ₆₋₆ - EC ₈	100	100	2300	7800	600000	150000
EC ₈₋₈ - EC ₁₀	27	27	320	2000	13000	14000
EC ₁₀₋₁₀ - EC ₁₂	130	130	2200	9700	13000	21000
EC ₁₂₋₁₂ - EC ₁₆	1100	1100	11000	59000	13000	25000
EC ₁₆₋₁₆ - EC ₃₅	65000	65000	260000	1600000	250000	450000
EC ₃₅₋₃₅ - EC ₄₄	65000	65000	260000	1600000	250000	450000
Aromatic risk banded hydrocarbons - TPHCWG method						
EC ₅₋₅ - EC ₇	70	370	13	26000	56000	76000
EC ₇₋₇ - EC ₈	130	860	22	56000	56000	87000
EC ₈₋₈ - EC ₁₀	34	47	8.6	3500	5000	7200
EC ₁₀₋₁₀ - EC ₁₂	74	250	13	16000	5000	9200
EC ₁₂₋₁₂ - EC ₁₆	140	1800	23	36000	5100	10000
EC ₁₆₋₁₆ - EC ₂₁	260	1900	46	28000	3800	7600
EC ₂₁₋₂₁ - EC ₃₅	1100	1900	370	28000	3800	7800
EC ₃₅₋₃₅ - EC ₄₄	1100	1900	370	28000	3800	7800
Aliph + Arom EC >44-70	1600	1900	1200	28000	3800	7800
Aromatic						
Benzene	0.08	0.3	0.017	28	72	90
Ethyl benzene	65	170	16	520⁽⁸⁾ [17000]	520⁽⁸⁾ [24000]	520⁽⁸⁾ [17000]
Toluene	120	610	22	860⁽⁸⁾ [59000]	860⁽⁸⁾ [56000]	860⁽⁸⁾ [87000]
Xylene ⁽⁹⁾	41	53	28	480⁽⁸⁾ [69000]	480⁽⁸⁾ [41000]	480⁽⁸⁾ [17000]
Phenol	180	310	66	760⁽¹⁴⁾ (31000)	760⁽¹⁴⁾ (10000)	760⁽¹⁴⁾ (7600)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	2.3	2.3	4.1	190	4900	1200
Acenaphthylene	170	2900	28	83000	15000	29000
Acenaphthene	210	3000	34	84000	15000	29000
Fluorene	170	2800	27	63000	9900	20000
Phenanthrene	95	1300	15	22000	3100	6200
Anthracene	2400	31000	380	520000	74000	150000
Fluoranthene	280	1500	52	23000	3100	6300
Pyrene	620	3700	110	54000	7400	15000
Benz(a)anthracene	7.2	11	2.9	170	29	49
Chrysene	15	30	4.1	350	57	93
Benzo(b)fluoranthene	2.6	3.9	0.99	44	7.1	13
Benzo(k)fluoranthene	77	110	37	1200	190	370
Benzo(a)pyrene	2.2	3.2	0.97	35	5.7	11
Indeno(123cd)pyrene	27	45	9.5	500	82	150
Dibenzo(ah)anthracene	0.24	0.31	0.14	3.5	0.57	1.1
Benzo(ghi)perylene	320	360	290	3900	640	1400
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	0.00064	0.00077	0.00055	0.059	3.5	4.8
Trichloroethene (TCE)	0.016	0.017	0.041	1.2	120	70
1,1,1,2 Tetrachlorethane	1.2	1.5	0.79	110	1400	1500
Tetrachlorethane (PCE)	0.18	0.18	0.65	19	1400	810
1,1,1 Trichlorethane	8.8	9	48	660	140000	57000

Notes

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- Soil organic matter (SOM) is assumed to be 1% - DEFAULT VALUE
- Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
- For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
- For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
- For classrooms consider increasing the dust loading factor in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m⁻³
- Based on vapour saturation limit as suggested by EA / [] model value
- Lowest of o-, m- and p-xylene
- Based on comparison of inhalation exposure with inhalation TDI
- Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
- Based on a comparison of oral and dermal soil exposure with oral Index Dose only
- Averaged over and based on lifetime exposure
- Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
- NA: Not applicable

Appendix G – Risk Assessment Methodology

The site-specific risk assessment, presented in this report, follows the principle of establishing whether there is a viable linkage between a contaminant source to a potential receptor, via an exposure pathway.

The risk assessment corresponds with the total site area and incorporates both descriptive (qualitative) and, where available, numerical (quantitative) lines of evidence.

Risk assessment is the process of collating known information on a hazard or set of hazards to estimate actual or potential risk to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem or future construction materials. Receptors can be connected to the source by one or several exposure pathways such as direct contact for example. Risks are generally managed by isolating the receptor or intercepting the exposure pathway or by isolating or removing the hazard.

Without the three essential components of a source, pathway and receptor there can be no risk. Therefore, the presence of contaminant source on a site does not necessarily mean there is a risk.

The risk assessment considers the likelihood of an event taking place (accounting for the presence of the source and receptor and the viability of the exposure pathway) in conjunction with the severity of the potential consequence (accounting for the potential severity of the hazard and the sensitivity of the receptor).

In the risk assessment, the consequence of the hazard has been classified as severe or medium or mild or minor and the probability (likelihood) of the circumstances occurring classified as high likelihood or likely or low likelihood or unlikely.

The consequences and probabilities are subsequently cross-correlated to give a qualitative estimation of the risk using Department of the Environment risk classifications as detailed in the table below and as referenced in CIRIA C552.

		Consequence			
		Severe	Medium	Mild	Minor
Probability (Likelihood)	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

In accordance with DoE guidance, the following categorisation of **consequence** has been developed.

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to an ecosystem or organisation forming part of such ecosystem.	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health. Pollution of sensitive water resources. A significant change in an ecosystem or organism forming part of such ecosystem.	Concentration of a contaminant from site exceeds the generic or site-specific assessment criteria. Leaching of contaminants from a site to a Principal or Secondary A aquifer. Death of a species within a designated nature reserve. Lesser toxic and asphyxiate effects
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater (inc. Secondary B aquifers). Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

In accordance with DoE guidance, the following categorisation of **probability** has been developed.

Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

In accordance with DoE guidance, the following categorisation of **risk** has been developed.

Classification	Definition
Very High Risk	There is a <i>high probability</i> that <i>severe harm</i> could arise to a designated receptor from an identified hazard at the site without appropriate further action.
High Risk	<i>Harm is likely to arise</i> to a designated receptor from an identified hazard at the site without appropriate further action.
Moderate Risk	<i>It is possible</i> that without appropriate further action <i>harm could arise</i> to a designated receptor. It is relatively <i>unlikely</i> that any such harm would be <i>severe</i> , and if any harm were to occur it is <i>more likely</i> that such harm would be <i>relatively mild</i> .
Low Risk	<i>It is possible</i> that <i>harm could arise</i> to a designated receptor from an identified hazard. It is <i>likely</i> that, at worst, if any harm was realised any effects would be <i>mild</i> .
Very Low Risk	The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

The term 'risk' in this instance refers to the risk that the source, pathway, receptor linkage for a given source of contamination is complete. It does not refer to immediate risk to individuals or features present on the site from potential contaminants and is intended to be used as a tool to assess the necessity of further investigation.

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The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad	Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad	
3029	CO	SW	60	150			VC	29.00477		3309	FO	SW	60	100			VC	3.213643		
70112	FO	SW	60	150			VC	7.167862		3308	SW	SW	62.76	100			VC	37.567356		
4202	65.46	CO	190				CO	64.19501		2910	FO	SW	62.91	100			VC	9.753661	1 n 30	
7000	60.49	CO	55.65				CO	41.05879	1 n 83	3303	64.58	CO	65.86	100			VC	36.56551	1 n 30	
2304	64.97	FO	62.06	225			VC	91.99429	1 n 139	3303	65.72	CO	69.91	300			CO	32.14032	1 n 214	
4101	SW	O	600				BR	7.01025		4203	CO	SW	65.86	150			VC	9.80338		
5910	CO	SW	62.45	225			VC	1.693015		7209	69.74	CO	65.86	450			VC	21.0238	1 n 28	
4005	65.33	SW	62.95	225			VC	18.97367		7208	64.76	SW	62.91	225			CO	59.8272	1 n 272	
3910	CO	O	225				VC	12.22117		7209	64.76	SW	62.91	225			VC	27.01851	1 n 32	
3910	CO	O	225				VC	23.34743		3009	64.66	SW	63.02	300			VC	37.18181	1 n 149	
6476	64.76	SW	62.95	225			VC	65.27634	1 n 38	6911	64.61	SW	62.72	150			VC	36.56551	1 n 30	
7207	70.04	SW	68.83	225			VC	44.20407	1 n 152	3104	64.58	SW	61.54	225			VC	20	1 n 14	
6476	64.76	SW	62.95	225			VC	34.59289	1 n 22	3001	65.16	FO	61.12	300			VC	21.0502	1 n 224	
6901	64.7	CO	61.81	300			VC	13.60147	1 n 36	4201	63.31	SW	62.75	225			VC	46.09772	1 n 184	
7313	66.62	CO	67.45	225			VC	7.28011	1 n 4	4802	69.92	FO	65.23	150			VC	3.305752		
7206	70.12	CO	66.38	300			VC	19.31321	1 n 80	7404	71.32	SW	69.87	225			VC	45.27662	1 n 11	
2205	64.83	SW	62.16	300			VC	42.77046	1 n 130	7404	71.32	SW	69.87	225			VC	44.01136	1 n 52	
7000	60.49	CO	55.65				VC	3.105454		4201	65.41	SW	61.12	300			VC	46.32484	1 n 129	
3201	65.57	SW	61.33	450			VC	29.01785		4209	66.69	SW	64.42	300			VC	42.54409	1 n 60	
SW	O	600					VC	2.229134		3005	63.31	SW	61.89	300			VC	22.46658		
5201	66.93	CO	61.33	450			VC	63.1981	1 n 40	3914			O	300			VC	28.56141		
6208	68.08	CO	64.48	450			VC	91.29885	1 n 90	3912	63.59	SW	61.37	300			VC	19.89772	1 n 131	
7008	67.52	CO	64.32	300			VC	20.98975	1 n 23	6912			O	300			VC	11.02106		
3309	65.46	CO	55.65				CO	57.2014	1 n 97	7107	68.7	SW	67.67	225			VC	63.3877	1 n 148	
7000	60.49	CO	55.65				VC	56.85947	1 n 3	7209	69.74	CO	66.89	375			VC	17.11724	1 n 15	
7215	69.26	CO	65.33	375			VC	27.16915	1 n 54	2403	64.71	FO	62.73	150			VC	53.19392	1 n 60	
7000	60.49	CO	55.65				VC	49.47727	1 n 112	4808	65.53	CO	62.81	300			VC	46.32484	1 n 129	
7208	69.48	CO	65.48	600			CO	51.26402	1 n 302	6304	69.34	CO	67.14	300			VC	57.58735	1 n 35	
62138	69.34	FO	65.48	600			VC	16.55256	1 n 59	4808	65.53	FO	150			VC	23.71474	1 n 100		
3213	FO	150					VC	13.31293		3005	64.53	CO	60.12	450			VC	74.24958	1 n 354	
4403	66.51	SW	64.18	225			VC	22.02271		4201	66.17	SW	62.44	100			VC	6.1378		
7008	67.52	CO	64.32	300			VC	34.3763	1 n 121	4201	66.17	SW	62.44	100			VC	28.01785	1 n 39	
4403	67.37	SW	62.76	225			VC	22.2036		6412	63.77	CO	64.46	700			BR	45.27662		
7205	70.14	CO	68.72	225			VC	71.5881		4201	65.12	CO	63.37	225			VC	29.61553	1 n 27,4837308	
7205	70.14	CO	68.72	225			VC	25.82301		2000	63.15	FO	67.72	300			VC	2.23608	1 n 224	
3804	63.94	CO	62.13	300			VC	14.16059		4201	64.08	SW	61.81	300			VC	102.6407	1 n 380	
3804	63.94	CO	62.13	300			VC	34.5383	1 n 72	7101	68.08	CO	65.71	225			VC	15.0333	1 n 20	
7000	60.49	CO	55.65				VC	30.67572		4201	65.74	FO	64.08	375			VC	38.9973	1 n 65	
7000	60.49	CO	55.65				VC	41.5196	1 n 14	4101			O	225			VC	17.92421		
7406	69.92	CO	65.33	300			VC	19.14146		3915			FO	0	225			VC	2.78269	
3400	64.92	CO	61.86	300			VC	14.86607	1 n 99	4201	65.82	SW	62.6	450			VC	12.54811	1 n 11	
7211	69.06	SW	67.07	300			VC	50.28917	1 n 62	7203	65.53	SW	63.03	300			VC	12.49528	1 n 67	
4418	FO	150					VC	38.22095	1 n 112	4203	65.12	CO	63.6	225			VC	12.20596	1 n 407	
4418	FO	150					VC	83.21901		7008	67.4	CO	65.11	375			VC	38.0526	1 n 13	
5304	67.51	FO	64.99	225			VC	41.81536		4201	65.03	FO	60.03	225			VC	21.84033	1 n 31	
6408	SW	O	225				VC	28.84441	1 n 67	7108	67.89	CO	64.34	375			VC	44.01136	1 n 880	
7300	69.31	CO	65.31	600			VC	20.6573		4201	65.74	SW	65.14	300			VC	31.38471	1 n 100	
2902	FO	O	225				VC	8.246211		7405	70.97	CO	66.85	300			VC	64.25729	1 n 35	
7307	70.3	CO	68.73	225			VC	18.94209	1 n 947	4800	64.67	CO	62.4	450			VC	100.6732	1 n 23	
2314	CO	100					VC	22.65877		4800	64.67	CO	62.4	450			VC	7		
4303	65.38	FO	63.99	150			VC	57.97413	1 n 17	4802	64.84	CO	59.64	450			VC	16.52359	1 n 67	
4303	65.38	FO	63.99	150			VC	103.4958	1 n 144	4409	66.9	FO	64.93	150			VC	10.03043		
2314	CO	100					VC	19.66747		5407			FO	0	225			VC	67.6757	1 n 101
4303	65.38	FO	63.99	150			VC	34.20526	1 n 489	4808	65.16	SW	65.14	300			VC	31.38471	1 n 100	
4303	65.38	FO	63.99	150			VC	24.18677	1 n 56	4421			FO	100			VC	33.20153		
4303	65.38	FO	63.99	150			VC	39.92403	1 n 181	4410	66.87	SW	64.76	150			VC	16.12452	1 n 16	
6900	64.64	CO	61.04	375			VC	25.01999	1 n 21	4424			SW	100			VC	27.52171		
3302	62.72	SW	61.68	525			VC	33.13608	1 n 221	5607	67.9	SW	66	225			VC	66.18913		
2428	FO	150					VC	27.22034		4423			FO	100			VC	10.03043		
2428	FO	150					VC	17.62741		4420			FO	100			VC	10.03043		
2408	FO	100					VC	11.7047		4418			SW	100			VC	5.08861		
7011	70.1	CO	68.64	225			VC	5.396787	1 n 51	4405	67.88	FO	62.41	300			VC	20.2132	1 n 193	
3018	CO	150					VC	28.35059		4418			FO	150			VC	7.47662		
7011	70.1	CO	68.64	225			VC	10.68563		6110			FO	100			PVC	26.2481		
4200	65.41	CO	59.96	450			VC	34.36568	1 n 123	6109			FO	100			PVC	20.39922		
4200	65.41	CO	59.96	450			VC	94.3008	1 n 144	6109			FO	100			PVC	13.78606		
3004	63.2	CO	60.16	300			VC	22.84752	1 n 59	6104			CO	100			VC	6.047248		
4107	66.1	SW	66.16	300			VC	97.14018	1 n 31	6105			FO	100			PVC	24.33157		
4107	66.1	SW	66.16	300			VC	94.84858		7223			CO	100			VC	24.97354		
4107	66.1	SW	66.16	300			VC	42.87634	1 n 237	7101			FO	150			VC	11.98609		
2315	CO	100					VC	26.33124		6111			FO	100			PVC	10.49774		
4103	CO	150					VC	10.59137		6912			FO	100			VC	8.627048		
6100	67.93	SW	64.72	300			VC	118.0042	1 n 207	2008	63.09	CO	60.08	300			VC	48.08326	1 n 20	
3000	64.41	CO	60.2	450			VC	32.29023	1 n 42	3000	63.09	CO	60.18	300			VC	30.46309	1 n 74	
4208	66	FO	60.32	300			VC	39.56008	1 n 495											
7104	67.5	SW	66.28	225			VC	25.14206	1 n 153											
2307	64.67	SW	62.98	225			VC	2.177425												
2307	64.67	SW	62.98	225			VC	37.48333	1 n 7											
4102	65.19	SW	62.95	225			VC	37.55204	1 n 139											
3908	63.49	CO	62.98	375			VC	26.2039	1 n 195											
4112	65.19	SW	62.95	225			VC	15.0333												
5402	67.71	CO	69.2	225			VC	7.071068	1 n 29											
3908	63.49</																			

Appendix C

United Utilities Correspondence

Sara Bailey

From: Glen Watson
Sent: 21 December 2018 09:25
To: Sara Bailey; Andy Roberts
Subject: FW: PDE CA28 due 14/12 -: 062407 - Gorton Community Hub - Predevelopment Enquiry
Attachments: 062407-GORTON HUB-20181126095346235_DRAIN SURVEY.PDF; 062407-GORTON HUB-IBI-XX-XX-PL-A_FLOOR PLANS.PDF; 062407-GORTON HUB-IBI-XX-XX-PL-A-100-0010_Rev1_Proposed Site Plan.pdf; 062407-GORTON HUB-UUWastewater pre-development enquiry.pdf

Sara/ Andy

FYI

Glen Watson Senior Engineer

Curtins

T. 01539 724 823 | glen.watson@curtins.com

From: Bethell, Thomas <Thomas.Bethell@uuplc.co.uk>
Sent: 14 December 2018 13:56
To: Glen Watson <Glen.Watson@curtins.com>
Cc: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: FW: PDE CA28 due 14/12 -: 062407 - Gorton Community Hub - Predevelopment Enquiry

Dear Glen,

We have carried out an assessment of your application which is based on the information provided; this pre development advice will be valid for 12 months:

Firstly, to answer your questions on buildovers/diversions: diversions are **always** preferential and United Utilities do not in fact permit build overs for new buildings.

As for easements:

We ask that minimum distances between buildings and sewers are in line with table 2.1 in Sewers for Adoption 6th edition, page 23. As an absolute minimum we require a 6m wide access strip (3m either side, from the centre line of the sewer) within which no building can be built without a build over agreement. Please note that in order to comply with building regulations part H4, no buildings can load weight onto the sewer. This means sometimes buildings must be further than the minimum 3m distance away from the sewer (depending on pipe depth and diameter).

Regarding discharge rates/points of connection:

Foul

Foul will be allowed to drain to the public combined sewer network at an unrestricted rate, and at a point convenient to yourself.

Surface Water

In order to follow the drainage hierarchy outlined in Building Regulations part H3 and National Planning Practice Guidance (NPPG), surface water should be drained via infiltration systems/soakaways. However, the British Geological Survey (BGS) website contains historical borehole logs that show the ground within the vicinity of the site to be made up of clay to a depth of 7m.

Due to this, and since there are no nearby watercourses, we will allow surface water connections into the surface water sewers (but **not** the combined). Surface water discharge for the overall site must be restricted to 11 l/s.

General information:

Connection Application

Although we may discuss and agree discharge points & rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below

<http://www.unitedutilities.com/connecting-public-sewer.aspx>

Sewer Adoption Agreement

You may wish to offer the proposed new sewers for adoption. United Utilities assess adoption application based on Sewers adoption 6th Edition and for any pumping stations our company addenda document. Please refer to link below to obtain further guidance and application pack:

<http://www.unitedutilities.com/sewer-adoption.aspx>

Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

Please note, if you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements of Sewers for adoption and United Utilities Asset Standards. The proposed design should give consideration to long term operability and give United Utilities a cost effective proposal for the life of the assets. Therefore, further to this enquiry should you wish to progress a Section 104 agreement, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 agreement, has been assessed and accepted in writing by United Utilities. Any works carried out prior to the technical assessment being approved is done entirely at the developers own risk and could be subject to change.

Kind regards,

Tom

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Thomas Bethell

Assistant Developer Engineer

United Utilities

01925 679 308

From: Glen Watson [<mailto:Glen.Watson@curtins.com>]

Sent: 30 November 2018 11:26

To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Subject: 062407 - Gorton Community Hub - Predevelopment Enquiry

Dear Sirs

Please find attached the following information with regards to a wastewater Predevelopment Enquiry:

- 062407-GORTON HUB-UUWastewater pre-development enquiry
- 062407-GORTON HUB-IBI-XX-XX-PL-A-100-0010_Rev1_Proposed Site Plan
- 062407-GORTON HUB-20181126095346235_DRAIN SURVEY
- 062407-GORTON HUB-IBI-XX-XX-PL-A_FLOOR PLANS

Please note that recent site investigations have established that the existing units (former Eastland Homes 27 Garratt Way and the adjacent former pub) appear to outfall (SW and FW) to the existing combined sewer, which crosses the site. Presumably the existing surface water brownfield discharge rate can be reused (less an amount of betterment) or would you sooner a connection to the surface water system, also crossing the site. Please could you confirm likely discharge rates for both SW and FW.

It is noted that there are several UU sewer assets which cross the site, 1no being a 900 surface water, 1no being a 875 surface water and 1no being a 375 combined. Please could you confirm likely easement widths. Could you also advise on the likelihood of 'build over' agreements for these and/ or diversions as a preference. I suspect diversions at best, but wish to receive an official line from you to report back to my client.

Thanking you in anticipation.

Regards

Glen Watson
Senior Engineer
T. 01539 724 823
glen.watson@curtins.com

28 Lowther Street
Kendal LA9 4DH



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Appendix D

Design Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	30	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.358	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SW02	0.090	4.00	66.427	1200	388485.628	396196.816	1.477
SW04	0.110	4.00	66.363	1200	388486.688	396183.155	1.463
SW05			66.476	1200	388486.250	396188.276	1.616
INT1			66.461		388481.833	396187.898	1.751
TANK 01-OUT		4.00	66.142		388467.529	396194.719	2.042
SW06			66.169	1200	388464.194	396194.445	2.104
SW07	0.154	4.00	65.450	1200	388457.326	396144.503	1.950
SW08	0.008	4.00	65.534	1200	388460.883	396155.707	2.094
SW09	0.025	4.00	65.450	1200	388456.824	396156.943	2.040
SW16			65.692	1200	388452.530	396174.408	2.372
SW17	0.061	4.00	65.477	1500	388443.174	396179.418	2.217
SW10			65.656	1200	388442.566	396190.555	2.606
SW11	0.076	4.00	65.400	1200	388394.568	396153.575	2.200
SW13	0.078	4.00	65.084	1200	388398.071	396170.789	2.109
SW12			65.010	1200	388403.132	396189.980	2.290
SW19	0.001	4.00	65.188	1200	388413.723	396189.878	2.713
SW15	0.038	4.00	65.232	1500	388413.756	396196.073	2.782
Outfall			65.311	1500	388408.470	396195.616	2.911
TANK 02-IN			65.382		388436.688	396190.612	2.882
TANK 02-OUT		4.00	65.200		388419.680	396189.856	2.700
TANK 01-IN			66.487		388478.149	396187.595	2.387

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SW02	SW05	8.563	0.600	64.950	64.860	0.090	95.1	225	4.11	50.0
2.000	SW04	SW05	5.140	0.600	64.900	64.860	0.040	128.5	225	4.07	50.0
1.001	SW05	INT1	4.433	0.600	64.860	64.810	0.050	88.7	225	4.16	50.0
1.002	INT1	TANK 01-IN	3.696	0.600	64.710	64.680	0.030	123.2	225	4.21	50.0
1.003	TANK 01-OUT	SW06	3.346	0.600	64.100	64.065	0.035	95.6	225	4.04	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	1.340	53.3	22.8	1.252	1.391	0.090	0.0
2.000	1.152	45.8	27.8	1.238	1.391	0.110	0.0
1.001	1.389	55.2	50.6	1.391	1.426	0.200	0.0
1.002	1.176	46.8	50.6	1.526	1.582	0.200	0.0
1.003	1.337	53.2	0.0	1.817	1.879	0.000	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.004	SW06	SW10	21.975	0.600	64.065	63.845	0.220	99.9	150	4.41	50.0
3.000	SW07	SW08	11.755	0.600	63.500	63.440	0.060	195.9	300	4.18	50.0
3.001	SW08	SW09	4.243	0.600	63.440	63.410	0.030	141.4	300	4.23	50.0
3.002	SW09	SW16	17.985	0.600	63.410	63.320	0.090	199.8	300	4.50	50.0
3.003	SW16	SW17	10.613	0.600	63.320	63.260	0.060	176.9	300	4.65	50.0
3.004	SW17	SW10	11.154	0.600	63.260	63.200	0.060	185.9	300	4.81	50.0
1.005	SW10	TANK 02-IN	5.878	0.600	63.200	63.174	0.026	226.1	300	4.90	50.0
4.000	SW11	SW13	17.567	0.600	63.200	63.050	0.150	117.1	225	4.24	50.0
4.001	SW13	SW12	19.847	0.600	62.975	62.870	0.105	189.0	300	4.53	50.0
4.002	SW12	SW19	6.672	0.600	62.870	62.475	0.395	16.9	300	4.56	50.0
1.006	SW19	SW15	6.195	0.600	62.475	62.450	0.025	247.8	300	4.67	50.0
1.007	SW15	Outfall	4.256	0.600	62.450	62.400	0.050	85.1	225	4.72	50.0
1.006A	TANK 02-OUT	SW19	5.957	0.600	62.500	62.475	0.025	238.3	300	4.10	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.004	1.005	17.8	0.0	1.954	1.661	0.000	0.0
3.000	1.119	79.1	39.0	1.650	1.794	0.154	0.0
3.001	1.320	93.3	41.0	1.794	1.740	0.162	0.0
3.002	1.108	78.3	47.3	1.740	2.072	0.187	0.0
3.003	1.179	83.3	47.3	2.072	1.917	0.187	0.0
3.004	1.150	81.3	62.7	1.917	2.156	0.248	0.0
1.005	1.041	73.6	62.7	2.156	1.908	0.248	0.0
4.000	1.207	48.0	19.2	1.975	1.809	0.076	0.0
4.001	1.140	80.6	39.0	1.809	1.840	0.154	0.0
4.002	3.843	271.7	39.0	1.840	2.413	0.154	0.0
1.006	0.994	70.3	39.2	2.413	2.482	0.155	0.0
1.007	1.418	56.4	48.8	2.557	2.686	0.193	0.0
1.006A	1.014	71.7	0.0	2.400	2.413	0.000	0.0

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	18.000	Additional Storage (m³/ha)	15.7
Ratio-R	0.358	Check Discharge Rate(s)	✓
Summer CV	1.000	100 year (l/s)	11.0
Winter CV	0.840	Check Discharge Volume	✓
Analysis Speed	Normal	100 year 360 minute (m³)	244

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	40	0	0
30	40	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Brownfield	CV	1.000
Brownfield Method	MRM	Time of Concentration (mins)	5.00
Contributing Area (ha)	0.410	Betterment (%)	0
PIMP (%)	100	Q 100 year (l/s)	203.4

Pre-development Discharge Volume

Site Makeup	Brownfield	CV	1.000	Betterment (%)	0
Brownfield Method	MRM	Return Period (years)	100	PR	1.000
Contributing Area (ha)	0.410	Climate Change (%)	0	Runoff Volume (m³)	244
PIMP (%)	100	Storm Duration (mins)	360		

Node SW06 Online Orifice Control

Flap Valve	x	Design Depth (m)	2.000	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	4.4		
Invert Level (m)	64.065	Diameter (m)	0.038		

Node SW15 Online ACO Q-Brake Control

Flap Valve	x	Design Depth (m)	2.470	Min Node Diameter (mm)	1050
Replaces Downstream Link	x	Design Flow (l/s)	11.0	Orifice Diameter (mm)	0.126
Invert Level (m)	62.450	Min Outlet Diameter (m)	0.145		

Node TANK 01-OUT Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.96	Main Channel Length (m)	10.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	64.100	Main Channel Slope (1:X)	99999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.010

Inlets

TANK 01-IN

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	100.0	0.0	1.075	100.0	0.0	1.076	0.0	0.0

Node SW08 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	65.000	Slope (1:X)	21.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.200
Safety Factor	2.0	Width (m)	14.000	Inf Depth (m)	
Porosity	0.30	Length (m)	4.000		

Node TANK 02-OUT Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.96	Main Channel Length (m)	17.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	62.500	Main Channel Slope (1:X)	99999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.010

Inlets

TANK 02-IN

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	119.0	0.0	1.600	119.0	0.0	1.601	0.0	0.0

Approval Settings

Node Size	✓	Minimum Full Bore Velocity (m/s)	1.000
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	30
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	90.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	x	Surcharged Depth	✓
Crossings	✓	Return Period (years)	2
Cover Depth	✓	Maximum Surcharged Depth (m)	0.100
Minimum Cover Depth (m)	1.200	Flooding	x
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)	0.200	100 year (l/s)	11.0
Maximum Backdrop Height (m)	1.500	Discharge Volume	x
Full Bore Velocity	✓		

Approval Results

The network has been designed for a 1 in 30 year storm using FSR rainfall
It contains 21 nodes (1 outfall) and 18 links
The total impermeable area is 0.641 ha
2 online controls have been defined
3 structures have been defined, providing 289m³ of storage below the flood risk level
Infiltration has not been utilised
Simulations have been completed using FSR summer and winter storms from 15 to 1440 minute duration

No manholes are smaller than that required by the library

No connections have combined exit and entry losses less than the recommended total

No circular links have diameters < 150mm

No links have lengths > 90.000m

The coordinates test has not been completed

2 links cross one or more other links

US Node	DS Node	Link	Network	Link	Easting (m)	Northing (m)
SW12	SW19	4.002	Proposed-FW	1.004	388408.831	396189.925
SW15	Outfall	1.007	Proposed-FW	1.004	388410.190	396195.765

No links have cover depth outside the range 1.200-3.000m

1 node has backdrops outside the range 0.200-1.500m

Node	US Link	DS Link	Backdrop (m)
INT1	1.001	1.002	0.100

2 links have full bore velocity outside the range 1.000-3.000m/s

US Node	DS Node	Link	Velocity (m/s)
SW12	SW19	4.002	3.843
SW19	SW15	1.006	0.994

4 links have peak proportional velocity outside the range 0.750-3.000m/s during the 30 year return period

US Node	DS Node	Link	Velocity (m/s)	Event
TANK 01-OUT	SW06	1.003	0.555	30 year +40% CC 30 minute summer
SW06	SW10	1.004	0.732	30 year +40% CC 480 minute summer
SW19	SW15	1.006	0.408	30 year +40% CC 15 minute summer
TANK 02-OUT	SW19	1.006A	0.416	30 year +40% CC 960 minute winter

3 links have a surcharged depth greater than 0.100m during the 2 year return period

US Node	DS Node	Link	Surcharged Depth (m)	Event
TANK 01-OUT	SW06	1.003	0.220	2 year +40% CC 360 minute summer
SW19	SW15	1.006	0.293	2 year +40% CC 180 minute summer
TANK 02-OUT	SW19	1.006A	0.269	2 year +40% CC 180 minute summer

The flooding test has not been completed

The time to half empty test has not been completed

No outfalls have a discharge rate greater than 11.0l/s during the 100 year return period

The discharge volume test has not been completed

Results for 2 year +40% CC Critical Storm Duration. Lowest mass balance: 87.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW02	10	65.186	0.236	28.0	0.4932	0.0000	SURCHARGED
15 minute summer	SW04	10	65.192	0.292	34.2	0.6743	0.0000	SURCHARGED
15 minute summer	SW05	10	65.146	0.286	60.0	0.3234	0.0000	SURCHARGED
15 minute summer	INT1	10	64.923	0.213	59.5	0.0000	0.0000	OK
360 minute summer	TANK 01-OUT	264	64.545	0.445	18.8	0.0000	0.0000	SURCHARGED
360 minute summer	SW06	264	64.545	0.480	3.8	0.5429	0.0000	SURCHARGED
15 minute summer	SW07	10	63.720	0.220	47.9	0.5212	0.0000	OK
15 minute summer	SW08	10	63.679	0.239	50.0	0.2845	0.0000	OK
15 minute summer	SW09	10	63.636	0.226	57.3	0.2991	0.0000	OK
15 minute summer	SW16	10	63.578	0.258	56.3	0.2921	0.0000	OK
15 minute summer	SW17	10	63.544	0.284	73.7	0.6250	0.0000	OK
15 minute summer	SW10	11	63.453	0.253	73.3	0.2860	0.0000	OK
15 minute summer	SW11	10	63.313	0.113	23.7	0.1892	0.0000	OK
15 minute summer	SW13	10	63.150	0.175	48.0	0.3000	0.0000	OK
180 minute summer	SW12	124	63.068	0.198	15.6	0.2244	0.0000	OK
180 minute summer	SW19	124	63.068	0.593	15.6	0.6746	0.0000	SURCHARGED
180 minute summer	SW15	124	63.066	0.616	11.3	1.2219	0.0000	SURCHARGED
120 minute summer	Outfall	128	62.467	0.067	11.0	0.0000	0.0000	OK
180 minute summer	TANK 02-IN	124	63.069	0.569	25.9	0.0000	0.0000	OK
180 minute summer	TANK 02-OUT	124	63.069	0.569	17.4	0.0000	0.0000	SURCHARGED
360 minute summer	TANK 01-IN	264	64.545	0.445	22.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW02	1.000	SW05	27.0	0.750	0.507	0.3406	
15 minute summer	SW04	2.000	SW05	33.0	0.829	0.720	0.2044	
15 minute summer	SW05	1.001	INT1	59.5	1.498	1.077	0.1707	
15 minute summer	INT1	1.002	TANK 01-IN	59.1	1.551	1.264	0.1407	
360 minute summer	TANK 01-OUT	1.003	SW06	3.8	0.319	0.072	0.1331	
360 minute summer	SW06	1.004	SW10	2.0	0.664	0.113	0.0666	
15 minute summer	SW07	3.000	SW08	47.5	0.848	0.601	0.6788	
15 minute summer	SW08	3.001	SW09	49.5	0.869	0.531	0.2485	
15 minute summer	SW09	3.002	SW16	56.3	0.977	0.719	1.0924	
15 minute summer	SW16	3.003	SW17	55.1	0.824	0.661	0.7087	
15 minute summer	SW17	3.004	SW10	72.4	1.091	0.891	0.7375	
15 minute summer	SW10	1.005	TANK 02-IN	73.7	1.259	1.002	0.3427	
15 minute summer	SW11	4.000	SW13	23.7	1.204	0.494	0.3461	
15 minute summer	SW13	4.001	SW12	48.0	1.575	0.596	0.6318	
180 minute summer	SW12	4.002	SW19	15.5	0.587	0.057	0.3998	
180 minute summer	SW19	1.006	SW15	10.8	0.347	0.154	0.4362	
180 minute summer	SW15	1.007	Outfall	11.0	1.002	0.195	0.0468	159.8
180 minute summer	TANK 02-IN	Flow through pond	TANK 02-OUT	9.4	0.044	0.013	65.0033	
180 minute summer	TANK 02-OUT	1.006A	SW19	10.2	0.413	0.143	0.4195	
360 minute summer	TANK 01-IN	Flow through pond	TANK 01-OUT	18.8	0.027	0.010	42.7378	

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 87.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW02	10	65.651	0.701	52.9	1.4647	0.0000	SURCHARGED
15 minute summer	SW04	10	65.671	0.771	64.7	1.7822	0.0000	SURCHARGED
15 minute summer	SW05	10	65.514	0.654	111.2	0.7393	0.0000	SURCHARGED
15 minute summer	INT1	10	65.072	0.362	109.9	0.0000	0.0000	SURCHARGED
480 minute summer	TANK 01-OUT	352	64.995	0.895	17.3	0.0000	0.0000	SURCHARGED
480 minute summer	SW06	352	64.994	0.929	4.4	1.0512	0.0000	SURCHARGED
15 minute summer	SW07	11	64.428	0.928	90.6	2.2010	0.0000	SURCHARGED
15 minute summer	SW08	11	64.325	0.885	88.5	1.0541	0.0000	SURCHARGED
15 minute summer	SW09	11	64.237	0.827	100.0	1.0944	0.0000	SURCHARGED
15 minute summer	SW16	11	64.042	0.722	98.5	0.8166	0.0000	SURCHARGED
15 minute summer	SW17	11	63.903	0.643	130.5	1.4145	0.0000	SURCHARGED
240 minute summer	SW10	240	63.882	0.682	40.0	0.7713	0.0000	SURCHARGED
240 minute summer	SW11	240	63.881	0.681	11.6	1.1401	0.0000	SURCHARGED
240 minute summer	SW13	240	63.881	0.906	23.5	1.5518	0.0000	SURCHARGED
240 minute summer	SW12	240	63.881	1.011	22.1	1.1438	0.0000	SURCHARGED
240 minute summer	SW19	240	63.881	1.406	21.8	1.5989	0.0000	SURCHARGED
240 minute summer	SW15	240	63.880	1.430	11.7	2.8347	0.0000	SURCHARGED
15 minute summer	Outfall	78	62.467	0.067	11.0	0.0000	0.0000	OK
240 minute summer	TANK 02-IN	240	63.882	1.382	40.0	0.0000	0.0000	OK
240 minute summer	TANK 02-OUT	240	63.882	1.382	28.3	0.0000	0.0000	SURCHARGED
480 minute summer	TANK 01-IN	352	64.995	0.895	18.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW02	1.000	SW05	49.9	1.255	0.936	0.3406	
15 minute summer	SW04	2.000	SW05	61.3	1.543	1.340	0.2044	
15 minute summer	SW05	1.001	INT1	109.9	2.763	1.989	0.1763	
15 minute summer	INT1	1.002	TANK 01-IN	109.5	2.754	2.341	0.1455	
480 minute summer	TANK 01-OUT	1.003	SW06	4.4	0.367	0.084	0.1331	
480 minute summer	SW06	1.004	SW10	2.8	0.732	0.160	0.0853	
15 minute summer	SW07	3.000	SW08	83.8	1.190	1.059	0.8278	
15 minute summer	SW08	3.001	SW09	85.3	1.212	0.915	0.2988	
15 minute summer	SW09	3.002	SW16	98.5	1.399	1.257	1.2665	
15 minute summer	SW16	3.003	SW17	99.4	1.412	1.193	0.7474	
15 minute summer	SW17	3.004	SW10	130.5	1.854	1.606	0.7855	
240 minute summer	SW10	1.005	TANK 02-IN	40.0	1.020	0.543	0.4139	
240 minute summer	SW11	4.000	SW13	11.6	0.953	0.241	0.6987	
240 minute summer	SW13	4.001	SW12	22.1	1.170	0.275	1.3976	
240 minute summer	SW12	4.002	SW19	21.6	0.654	0.080	0.4698	
240 minute summer	SW19	1.006	SW15	8.1	0.330	0.115	0.4362	
240 minute summer	SW15	1.007	Outfall	11.0	1.001	0.194	0.0466	205.9
240 minute summer	TANK 02-IN	Flow through pond	TANK 02-OUT	13.0	0.050	0.018	157.8788	
240 minute summer	TANK 02-OUT	1.006A	SW19	-16.7	-0.237	-0.233	0.4195	
480 minute summer	TANK 01-IN	Flow through pond	TANK 01-OUT	17.3	0.026	0.009	85.9016	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 87.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW02	11	66.066	1.116	68.4	2.3310	0.0000	SURCHARGED
15 minute summer	SW04	10	66.095	1.195	83.5	2.7627	0.0000	FLOOD RISK
15 minute summer	SW05	11	65.863	1.003	139.1	1.1340	0.0000	SURCHARGED
180 minute summer	INT1	140	65.211	0.501	49.7	0.0000	0.0000	SURCHARGED
480 minute summer	TANK 01-OUT	296	65.215	1.115	169.0	0.0000	0.0000	SURCHARGED
480 minute summer	SW06	320	65.211	1.146	5.4	1.2962	0.0000	SURCHARGED
15 minute summer	SW07	11	65.022	1.522	117.0	3.6080	0.0000	SURCHARGED
15 minute summer	SW08	11	64.853	1.413	112.1	1.6825	0.0000	SURCHARGED
15 minute summer	SW09	11	64.711	1.301	125.9	1.7213	0.0000	SURCHARGED
15 minute summer	SW16	11	64.397	1.077	124.5	1.2185	0.0000	SURCHARGED
120 minute summer	SW17	86	64.180	0.920	78.2	2.0228	0.0000	SURCHARGED
120 minute summer	SW10	86	64.177	0.977	80.1	1.1054	0.0000	SURCHARGED
120 minute summer	SW11	86	64.201	1.001	25.2	1.6740	0.0000	SURCHARGED
120 minute summer	SW13	86	64.184	1.209	48.9	2.0701	0.0000	SURCHARGED
120 minute summer	SW12	86	64.175	1.305	46.8	1.4764	0.0000	SURCHARGED
120 minute summer	SW19	86	64.174	1.699	48.7	1.9323	0.0000	SURCHARGED
120 minute summer	SW15	86	64.171	1.721	13.1	3.4104	0.0000	SURCHARGED
30 minute winter	Outfall	223	62.467	0.067	11.0	0.0000	0.0000	OK
120 minute summer	TANK 02-IN	86	64.176	1.676	79.8	0.0000	0.0000	OK
120 minute summer	TANK 02-OUT	86	64.175	1.675	213.7	0.0000	0.0000	SURCHARGED
360 minute summer	TANK 01-IN	232	65.216	1.116	29.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW02	1.000	SW05	62.4	1.568	1.170	0.3406	
15 minute summer	SW04	2.000	SW05	76.8	1.930	1.676	0.2044	
15 minute summer	SW05	1.001	INT1	137.5	3.459	2.490	0.1763	
180 minute summer	INT1	1.002	TANK 01-IN	49.6	1.410	1.060	0.1470	
480 minute summer	TANK 01-OUT	1.003	SW06	5.4	0.378	0.101	0.1331	
480 minute summer	SW06	1.004	SW10	4.2	0.735	0.239	0.2656	
15 minute summer	SW07	3.000	SW08	106.0	1.505	1.339	0.8278	
15 minute summer	SW08	3.001	SW09	107.5	1.526	1.152	0.2988	
15 minute summer	SW09	3.002	SW16	124.5	1.768	1.589	1.2665	
15 minute summer	SW16	3.003	SW17	125.2	1.778	1.503	0.7474	
120 minute summer	SW17	3.004	SW10	77.9	1.120	0.958	0.7855	
120 minute summer	SW10	1.005	TANK 02-IN	79.8	1.297	1.084	0.4139	
120 minute summer	SW11	4.000	SW13	23.1	1.104	0.482	0.6987	
120 minute summer	SW13	4.001	SW12	46.8	1.341	0.581	1.3976	
120 minute summer	SW12	4.002	SW19	45.5	0.953	0.167	0.4698	
120 minute summer	SW19	1.006	SW15	10.9	0.346	0.155	0.4362	
120 minute summer	SW15	1.007	Outfall	11.0	1.001	0.195	0.0468	165.6
120 minute summer	TANK 02-IN	Flow through pond	TANK 02-OUT	213.7	0.059	0.290	183.9497	
120 minute summer	TANK 02-OUT	1.006A	SW19	-47.4	-0.674	-0.662	0.4195	
360 minute summer	TANK 01-IN	Flow through pond	TANK 01-OUT	19.7	0.026	0.011	103.5767	

Design Settings

Frequency of use (kDU)	1.00	Minimum Velocity (m/s)	0.70
Flow per dwelling per day (l/day)	4000	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.200
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Units	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
4200	0.0	65.512	1 STANDARD	388412.023	396207.932	5.387
FW01	24.6	65.450		388409.640	396147.715	
FW02	5.2	65.451	1 STANDARD	388400.003	396150.722	1.711
FW03	1.9	65.286	1 STANDARD	388404.063	396164.282	1.780
FW04	21.1	65.286		388405.784	396170.028	
FW05	8.1	65.288		388406.845	396173.322	
FW06	4.6	65.287		388408.995	396180.625	
FW07	42.0	65.450	1 STANDARD	388445.944	396150.285	0.890
FW08	17.1	65.450	1 STANDARD	388448.154	396157.336	1.600
FW09	4.4	65.417	1 STANDARD	388451.519	396172.586	1.777
FW11	0.0	65.142	1 STANDARD	388407.661	396184.899	1.897
FW12	0.0	65.597	1 STANDARD	388411.271	396200.409	4.922
FW13	14.9	65.450		388451.013	396161.663	

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.000	FW07	FW08	7.389	1.500	64.560	63.850	0.710	10.4	100
1.001	FW08	FW09	15.617	1.500	63.850	63.640	0.210	74.4	150
1.002	FW09	FW11	30.745	1.500	63.640	63.245	0.395	77.8	150
1.004	FW11	FW12	15.924	1.500	63.245	63.130	0.115	138.5	150
1.005	FW12	4200	7.560	1.500	60.675	60.125	0.550	13.7	150
2.001	FW02	FW03	14.154	1.500	63.740	63.556	0.184	76.9	100
2.002	FW03	FW11	20.929	1.500	63.506	63.245	0.261	80.2	150

Name	Pro Vel @ 1/3 Q (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.418	2.072	16.3	6.5	0.790	1.500	0.000	0	42.0	0.0	44	1.956
1.001	0.716	1.016	18.0	7.7	1.450	1.627	0.000	0	59.1	0.0	69	0.978
1.002	0.712	0.993	17.6	8.0	1.627	1.747	0.000	0	63.5	0.0	71	0.971
1.004	0.589	0.743	13.1	8.4	1.747	2.317	0.000	0	70.6	0.0	87	0.788
1.005	1.339	2.371	41.9	8.4	4.772	5.237	0.000	0	70.6	0.0	45	1.843
2.001	0.518	0.759	6.0	2.3	1.611	1.630	0.000	0	5.2	0.0	43	0.704
2.002	0.503	0.979	17.3	2.7	1.630	1.747	0.000	0	7.1	0.0	40	0.708

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