Benmore Road, Manchester

FLOOD RISK ASSESSMENT

30th June 2023

AJP Ref: 223-008

PREPARED BY John Marshall

0151 227 1462 info@ajpltd.co.uk www.ajpltd.co.uk 4th Floor, 1 Dale Street, Liverpool, L2 2ET

Flood Risk Assessment

Prepared for One Housing

Benmore Road, Manchester

Record of Approval	Originator:	Approved:	Date:
	J. Marshall - Engineer	J. Smith - Director	30.06.2023
Version	Author:	Change Description:	
01			

Contents

1.0 Introduction 5
2.0 site description 6
2.1 Geology 6
2.2 Hydrogeology 7
3.0 Proposed development 8
4.0 Planning Policy 9
4.1 Sequential Test 9
4.2 Exception Test 9
5.0 Assessment of Flood Risk 9
5.1 Flooding from Rivers 9
5.2 Flooding from the Sea 10
5.3 Flooding from Land 10
5.4 Flooding from Groundwater 10
5.5 Flooding from Sewers 10
5.6 Flooding from Reservoirs, Canals and Other Artificial Sources 11
5.7 Flood Mitigation Measures 11
6.0 Development and Drainage Strategy 12
6.1 Effect of Proposed Development on Flood Risk 12
6.2 Existing Drainage Systems 12
6.3 Proposed Drainage Strategy 13
6.3.1 Surface Water Drainage 13
6.3.2 SuDS Summary 17
6.3.3 Water Quality Assessment 18
6.3.4 Foul Water Drainage 19
6.4 Compliance with LASOO Non-Statutory Technical Standards for SUDS 19

6.4.1 Peak Flow Control 20

6.4.2 Volume Control 20

6.4.3 Flood Risk Within Development 21

6.5 Future Maintenance 21

6.6 Managing Residual Flood Risk 23

7.0 Conclusions 23

8.0 RECOMMENDATIONS 24

Appendix A Site Location Plan 25

Appendix B Aerial Photograph 26

Appendix C Topographic Survey 27

Appendix D Proposed Site Plan & Catchment Areas 28

Appendix E Flood Risk Maps 29

Appendix F UU Maps & Correspondence 30

Appendix G Existing & Proposed S.W Network Calculations 31

Appendix H Outline Drainage Strategy 32

Appendix I Phase II Geotechnical Report 33

30th June 2023

Alan Johnston Partnership Ltd.

Company No. 13204766

Benmore Road, Manchester

Flood Risk Assessment

consulting engineers

1.0 Introduction

This Flood Risk Assessment (FRA) has been prepared on behalf of One Housing for the development of the land off Benmore Road in Manchester. The site is less than 1 hectare in size and situated in Flood Zone 1, and shall provide twenty new dwellings For the local area. The site is currently a disused grassed area, following the demolition of the previously existing care home in excess of twelve months ago; the site is classed as Greenfield.

As the development is less than 1 hectare and lies within Flood Zone 1, in accordance with PPS25 a Flood Risk Assessment should not be required. However, the Manchester City Council (MCC) Strategic Flood Risk Assessment (SRFA) has identified the site as being situated in the Conurbation Core Critical Drainage Area (CDA). Therefore, in accordance with the SRFA, a FRA is required for all developments over 0.5 hectares situated in a CDA; regardless of the Flood Zone it is situated within.

This FRA has been prepared in accordance with the general requirements of the National Planning Policy Framework and the Technical Guidance to the National Planning Policy Framework, both published by the Department for Communities and Local Government. This involves the identification of flood risk to new development(s) on the site, the possible effect of this development on flood risk elsewhere and the investigation of the impact on the development as a result of increased sea levels, fluvial flows and larger pluvial events due to increased impermeable areas and climate change. It has also been prepared in accordance with the requirements of the Local Authority's SFRA.

The purpose of this report is to present a site-specific assessment of flood risk based on available information, to identify relevant flood levels affecting the site with respect to a particular probability of flooding. The flood levels identified are dependent on the correctness of the current conditions, as stated in this report and the prediction of future climatic conditions implicit in the National Planning Policy Framework.

For any size of storm event, the procedure will always yield a probability that the event will occur in any year, albeit the probability is smaller for larger events. The predicted storm event has a probability of occurrence in any year and the derived flood level has an

associated probability of exceedance. This means that there is always a risk that property flooding could occur one or more times in any year.

Therefore, this report should not be interpreted or relied upon as providing a guarantee against flooding. There is always a residual risk that flooding will occur, and it is not possible to predict a zero risk of flooding.

In accordance with National Planning Policy Framework (NPPF) and the associated Technical Guidance document, flood risk must be assessed for all sources including tidal (from the sea), fluvial (from rivers), pluvial (from land), groundwater, sewer and artificial water bodies (e.g. reservoirs, canals, major water supply infrastructure etc.).
More specifically, the development of any site must be carried out in such a way as to mitigate any potential flood risk, both on and off site from all sources of flooding.

2.0 site description

The proposed development site is located in the Manchester, to the north and east of Benmore Road, at National Grid Reference SJ 866658 03511 and postcode M8 6DN. To the north and west of the development area is existing terraced housing. The site is currently overgrown with grasses and a number of existing established trees sitting on the boundaries, around the extent of the previous Care Home position.

The location of the existing site is illustrated in Appendix A, showing the surrounding areas and the current site situation, the extent of the area to which the application relates is shown as a red line boundary.

The total site area available is 053ha with the topography of the site having the northern and eastern boundaries around the 101.50m AOD, the western boundary sitting at 100.50m AOD and the point of access set at 101m AOD; with levels uniformly falling east to west.

An aerial photo is included in Appendix B to illustrate the site at the present day and the topographic survey is included in Appendix C.

2.1 Geology

The British Geological Survey 1:50,000 geology maps show that the development site is underlain superficial deposits comprising of Till Devensian Diamicton of Sandy gravelly cobbly deposits, underlying bedrock is reported to be of Lower Coal Measures Formation, comprising of Mudstone, Siltstone and Sandstone.

This is supported by the Phase II Geotechnical investigation (Appendix I) which has boreholes and trial holes identifying the superficial deposits as firm clays, soft clays with sandy components and silts, beneath depths of made ground; with the bedrock encountered comprising of mudstone. The bedrock lies at circa 4.1m-4.7m below the ground level and the made ground has a range of depths across the site from 0.30-0.90m below the existing ground level.

2.2 Hydrogeology

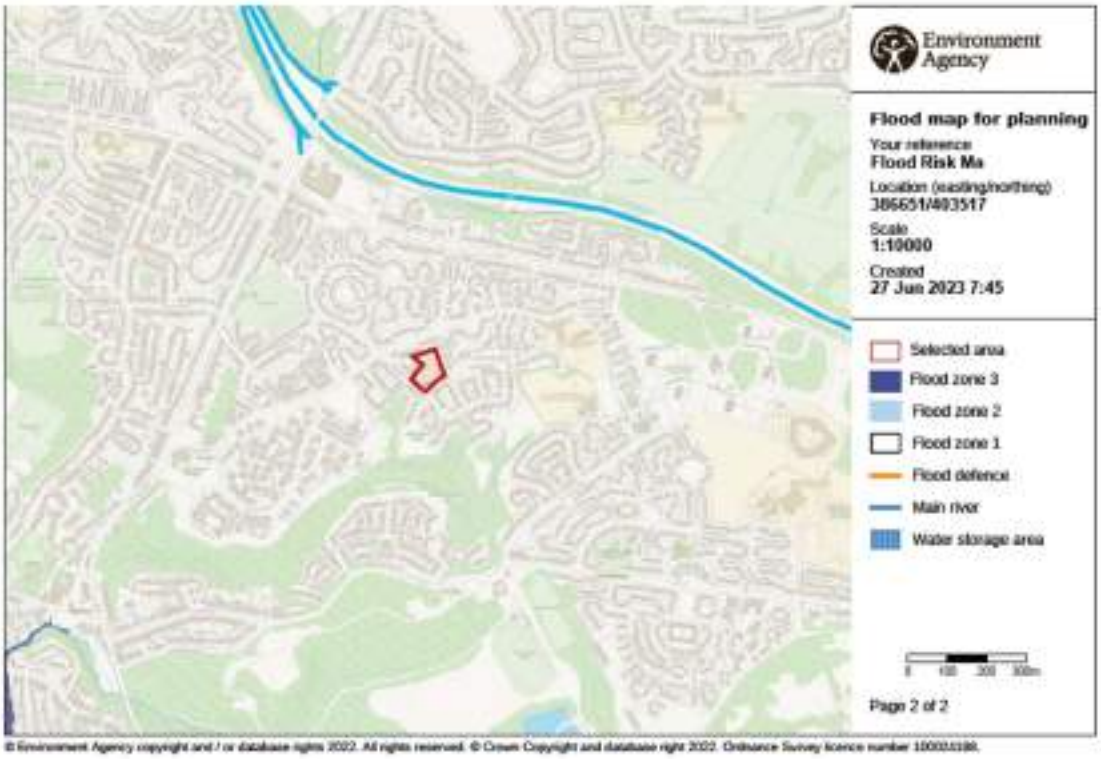
The DEFRA groundwater magic maps show that the Glacial Till superficial deposits are classified as a secondary undifferentiated aquifer, the groundwater maps also show that the underlying Lower Coal Measures is classified as a Secondary A aquifer.

There are no recorded groundwater / potable water abstraction licenses within 500m of the site and the site is not recorded to be within a Groundwater Source Protection Zone.

The development site is shown to be within an area of low-medium Groundwater vulnerability,

The Phase II exploratory logs in Appendix I show that the depths of made ground is not anticipated to contain contaminants ,therefore the risk to controlled waters is considered low to very low, as there is limited permeability within the sub strata; with perched water likely to sit lying within the made ground and at the interaction line with the cohesive materials.

The nearest watercourse feature is Boggart Hole Brook that lies 600m to the south of the proposed development. The site is located in Flood Zone 1, as an area identified by the Environment Agency (EA) not at risk of flooding from rivers and streams.



© Environment Agency copyright and / or database rights 2022. All rights reserved. © Crown Copyright and database right 2022. Ordnance Survey licence number 100031989.

3.0 Proposed development

The proposed development consists of circa 20 new dwellings consisting of 2 and 3 bedroom houses. These dwellings shall be accessed by a new proposed highway network, that shall be accessed off Benmore Road, with some dwellings fronting directly onto Benmore Road; with associated driveways. The proposed highways shall be accompanied by private parking provision off the highway and a shared drive to the north west of the site.

The proposed development site covers a total area of approximately 0.53ha (App D), the development layout is shown within Appendix D indicating the dwellings, proposed highway and associated parking provision.

The total impermeable area from the proposed development is 0.302ha, encompassing, the proposed houses and apartment buildings, alongside the associated driveways and proposed highway to facilitate the development, an impermeable percentage of 56% for the development area.

To enable a viable scheme, the proposed site levels are constrained by the surrounding highway and existing buildings to the north and east. A proposed site plan is attached in Appendix D.

4.0 Planning Policy

The National Planning Policy Framework (NPPF) sets out the Government's policy on meeting the challenges of climate change, flooding and coastal change. The NPPF states that:

"Planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impact of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimensions of sustainable development. Local planning authorities should adopt proactive strategies to mitigate and adapt to climate change taking full account of flood risk, coastal change and water supply and demand consideration."

This Flood Risk Assessment proposes recommendations to facilitate the proposed development so that it takes into account flood risk at all stages of the development.

4.1 Sequential Test

Based on the site's location in outside a flood zone, the development is deemed appropriate according to NPPF therefore the development is appropriately situated and the Sequential Test is not required.

4.2 Exception Test

NPPF classifies the residential element of the development as 'More Vulnerable' but as the site is located outside a flood zone the Exception Test is not required.

5.0 Assessment of Flood Risk

The Technical Guidance to the National Planning Policy Framework requires all forms of flooding to be considered.

5.1 Flooding from Rivers

The Flood Risk map is included in Appendix E.

It can be seen from the map that the site is located in Flood Zone 1 with a chance of flooding of less than 0.1% (or 1 in 1000).

The nearest designated main river is the Boggart Hole Brook which lies at least 600m to the south, therefore the risk of flooding to the new development from river is considered to be low.

5.2 Flooding from the Sea

The site is not at risk of flooding from the sea. The lowest level of the site is approximately 100.50m AOD, i.e., well above tidal flood levels, as demonstrated in Appendix E.

5.3 Flooding from Land

Intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in local flooding.

The Surface Water Flooding map is included in Appendix E. It can be seen from the map that the site is classified as having a low risk of surface water flooding within the middle of the development area, within a depression of levels sat in the site.

The Low risk identified across the site area shall be mitigated by the development that shall actively drain these areas, preventing the ponding of surface water.

Therefore, the risk of flooding from overland flows due to surface water flooding is considered to be low and as such the overall site is considered to be at low risk of flooding from surface water/surrounding land.

5.4 Flooding from Groundwater

As per the magic maps, and a Groundwater Risk Map in Appendix E, the risk of groundwater flooding can be considered to be low to medium, the medium flood risk suggests that there is a sub-surface risk of flooding, that would affect property where there are proposed basements and finished floor levels are set below the existing ground level.

To mitigate the flood risk from groundwater the development shall ensure that it has no proposals for basements and finished floor levels are to be set at or above existing ground levels, during detailed design the development, with adequate S.W drainage systems ensuring the surface run off from the development does not discharge to ground and end up perched.

5.5 Flooding from Sewers

A record of Public Sewers surrounding and serving the development site has been obtained from United Utilities and this is included in Appendix F.

There is an existing 225mm diameter Combined sewer which runs within Benmore Road to the south of the development, running east to west. This sewer drops into a 450mm diameter Combined sewer, also within Benmore More; running south to north; from manhole 6401 to manhole 6403.

There are no surface water sewers located within proximity to the site or in the surrounding locales.

No sewers are present within the boundary of the development site area.

There are no known flooding incidents for these sewers.

With all identified sewers outside the boundary of the development area, this means that should any flooding from sewers occur this should be contained within the highways and not encroach upon the proposed site dwellings.

Therefore, as a result of the public sewers being located outside the site itself and no recorded instances of flooding, is considered to be at low risk of flooding from sewers.

5.6 Flooding from Reservoirs, Canals and Other Artificial Sources

The Reservoir Flood Risk map is included in Appendix E. It can be seen from the map that the site is not as risk of flooding from reservoirs.

The reservoir flood maps are used to identify the extent of flooding caused in the event of a catastrophic failure event and therefore the site is considered to be at low risk of flooding from reservoirs.

Within the MCC SFRA, there is a historical culvert identified to the north of the development outside the bounds of the development area, running in White Moss Road; as shown in Appendix E. This culvert is identified on the SFRA Critical Drainage Areas Plan as a "Lost Watercourse" it is therefore considered defunct. Accordingly due to the identified position and status of said watercourse, it is considered that risk of flooding from this source is low.

5.7 Flood Mitigation Measures

As outlined above the only flood mitigation measures required for the proposed site are associated with the minimal risk of groundwater flooding. These are summarised below:

- No basement construction to be completed across the site.
- The external ground levels should fall away from the proposed building.
- Proposed building finished floor level should be set above the existing site levels.

6.0 Development and Drainage Strategy

6.1 Effect of Proposed Development on Flood Risk

As previously outlined in Section 2.0, the existing site covers a total area of 0.53ha and is a Greenfield site, As the existing site has active no drainage systems positively connecting to the UU sewer system, the introduction of the new roof area, access road and parking area, the development will need to assessed to determine if it leads to an increase in impermeable area.

Existing Impermeable Area (Ha)	Proposed Impermeable Area (Ha)
0.000	0.302

As demonstrated in the above table, for the proposed development, the changes to the existing site will increase the volume of impermeable areas and as such, the proposed development in these areas will lead to an increase in the;

- Volume of surface water ponding on the site
- Volume of surface water runoff leaving the site or discharging into surrounding areas
- Peak discharge rate from the site.

Accordingly, site-wide drainage systems are required to drain the foul and surface water flows arising from the proposed development. Where possible, any existing drainage networks should be utilised. Appropriate design and construction of these systems as set out in Section 6.3 should ensure that there is no increase in offsite flood risk that would otherwise impact downstream areas.

6.2 Existing Drainage Systems

As can be seen from the United Utilities maps, attached in Appendix F, there is an existing 450mm C.W public sewer located within Benmore Road. The MH 6401 on the south west tip of the site has an invert of 94.70m AOD. This sewer has been identified as a point of discharge for S.W & F.W flows from the proposed development.

6.3 Proposed Drainage Strategy

As outlined above in section 6.1, site-wide drainage systems are required to drain the foul and surface water flows arising from the proposed development. The proposed drainage systems must ensure that there is no increase in offsite for flood risk, for all storms up to the 1:100-year event with an allowance for climate change; that would otherwise impact downstream areas.

6.3.1 Surface Water Drainage

The Building Regulations - Approved Document H (2002) details a hierarchy of potential methods for disposing of surface water as shown below in order of preference:

- Discharge via infiltration
- Discharge to watercourse
- Discharge to sewer

Considering the hierarchy above, the surface water network for the proposed site should infiltrate to ground where viable.

As laid out within section 2.2 the site investigation information and the British Geological Survey (BGS) 1:50,000 superficial geology maps & Phase II logs show that that the site is underlain Till Devensian Diamicton of granular strata above a shallow bedrock and has areas of made ground above cohesive clays.

While no infiltration testing or falling head tests are noted within the Phase II Geotechnical report, the evidence of the subs strata material and numerous water strikes identified as perched water; identify the ground as having low permeability. Further investigation In accordance with the requirements of BRE 365 should be carried out to confirm this.

With the infiltration capacity within the ground initially dimissed, it is not considered a viable option for the discharge of surface water to utilise SuDS and infiltration systems.

As the possibility of infiltration is ruled out by at this point, the intention for the development would be to discharge to watercourse/ waterbody. The nearest waterbody is Boggart Hole Brooke.

Due to the location of the Watercourse, it is not considered viable to discharge S.W flows to this point, as it is separated from the development area, by third party land and is inaccessible to any proposed sewerage network in service purely of the proposed development.

With discharge via infiltration and to a watercourse ruled out. The only practical solution for discharge of the surface water and Foul drainage is to discharge to the public sewerage system.

To this effect, correspondence with United Utilities (Appendix F) has been sought for clarification of their preferred point of discharge and rate of S.W discharge from the development. UU have confirmed that they would accept flows limited to 5l/s from the development; discharging into the 450mm diameter Combined sewer within Benmore Road.

While every effort to utilise, any suitable existing systems should be made, the drainage systems should be designed to suit the proposed site layout and topography which aims to provide an efficient design.

In line with the Design & Construction Guidance (DCG) the requirements for the design of new surface water drainage systems are as follows:

Below ground piped drainage to be sized to accommodate the 1 in 2-year (50% AEP) design storm without surcharge.

System to be designed not to flood any part of the site in a 1 in 30-year (3% AEP) design storm.

For events in exceedance of the 1 in 30-year design storm and up to and including the 1 in 100-year event, site drainage and topography should be designed where practicable to route surface water run-off away from buildings to safe above-ground storage areas on site, thereby removing flood risk to properties and preventing this run-off from leaving the site and increasing flood risk elsewhere.

For each design case described above, the design storm is the critical storm duration for the site conditions. In the case of the 1 in 100-year design storm, a 45% increase in the peak rainfall intensity is applied to allow for the estimated worst-case impacts of climate change. This is in accordance with Table 5 of the Technical Guidance to the National Planning Policy Framework.

Suitable systems of below ground drainage will be required to contain as a minimum requirement, the 1 in 30-year event. Additionally, any surface water run-off from events that exceed the design capacity of the new drainage system, up to and including the 1 in 100-year (+45%) event, will be contained within the drainage network or retained on-site in safe storage areas.

Should they be required, measures to prevent oil and other contaminants being passed forward to the existing surface water sewer should also be incorporated into the design of the surface water system, through the use of appropriate oil separators or other appropriate pre-treatment methods.

In line with common practice and MCC LLFA guidelines, it is proposed the surface water discharge from the proposed development should discharge at rates not in excess of a value equivalent to the Greenfield Qbar rate or the minimum practicable rate of discharge, whichever is the greater; for all respective storm periods. A calculation of the Greenfield Run off can be found in Appendix E.

Return Period (yr.)	Existing Discharge Rate (l/s)
1 in 2 (Qbar)	3.3
1 in 30	5.6
1 in 100	6.9

An assessment of the existing Greenfield surface water run-off from the existing site area has been carried out and demonstrates that the Qbar value for the site with is 3.3l/s,. Therefore, in accordance with reducing flood risk and compliance with MCC LLFA requirements, a restricted flow rate equivalent to Qbar is recommended for the proposed development area for all storms up to and including the 1 in 100-year return period, with an allowance for climate change.

This should be considered in conjunction with the maintenance requirements of the proposed hydrobrake in service of limiting surface water flows from the development, which will require a minimum orifice size of 100mm in diameter; producing a minimum practicable rate of discharge from the development of 5l/s . Therefore in accordance with the requirements of UU, the LLFA and practical restrictions, the development should be limited to a maximum pass forward flow rate of 5l/s for all return periods and storm events.

Based on the above discharge limit, there shall be a new S.W network to serve the proposed development that shall discharge the combined sewer to the west of the development. Discharge into this sewer shall be agreed under with United Utilities Section 104 of the of the Water Industry Act 1991 and with MCC LLFA.

As shown in Appendix H outline drainage layout the proposed S.W Network shall discharge no more than 5l/s. This network shall consist of oversized pipes and manholes providing effective storage to accommodate all storm events, subject to control by a vortex flow control system prior to discharging to a new manhole constructed on the existing 450mm diameter combined sewer in Benmore Road.

Porous paving shall be installed as a source control measure to accommodate the first 5mm of rainfall, prior to discharging to the attenuation system.

The surface water drainage systems are to be designed to restrict the discharge to the required rate, up to and including a 1 in 100-year return period plus 45% climate change design storm, while ensuring that no flooding occurs within the 100-year return period and that any flood water for extreme events shall be appropriately accommodated away from proposed and existing dwellings. . This S.W network shall be designed in accordance with the below hydraulic criteria:

- Volumetric Run off Co-efficient - 0.84 (winter)
- Urban Creep factor - 10%
- Climate Change factor for 1:100 return event - 45%
- Maximum Storm duration up to - 1440 minutes
- M5-60 (mm) 18.8 Ratio R 0.302(suitable for the locale)

The hydraulic calculations demonstrating the system dynamics for the proposed network is shown in Appendix G, as are the calculations for the proposed network's operated in the scenario where the receiving sewer is surcharged.

The surface water drainage strategy and discharge rate should be confirmed via more detailed discussions with United Utilities and the Lead Local Flood Authority prior to the commencement of any works.

6.3.2 SuDS Summary

As outlined within the summary table below, all SuDS techniques have been considered for this development;

SuDS Technique	Suitable for This Development?	Reasoning
Green Roof	✗	Impractical due to roof pitch and domestic ownership
Rainwater Harvesting	✗	Impractical due to lack of demand for greywater.
Basins, Ponds & Swales	✗	Unsuitable due to lack of available space to south of site.
Filter Strips	✗	Unsuitable due to topography of site and lack of available areas to south of site.
Bio-retention Areas	✗	Suitable but only incorporated for small hardstanding areas due to impermeable strata and topography of site.
Infiltration Techniques	✗	Unsuitable due to impermeable strata.
Permeable Surfaces	✓	Suitable and incorporated where possible, but only as non-infiltration due to impermeable strata.
Tanked/Piped Systems	✓	Suitable and incorporated.

Green roof areas have not been included due to roof pitch being untenable for the installation and maintaining of sufficient support system for plant life.

Rainwater harvesting was also considered but due to a lack of greywater demand and the cost associated with tanks and pumping of the separate system, it has been deemed as impractical to include a rainwater harvesting system.

Due to the lack of available space across the south of the site it is envisaged that a pond, detention basin or swale would not be suitable for the proposed site.

Filter drains/strips were also considered but due to a lack of available areas, filter drains/strips areas have not been included. Due to a lack of available areas and the topography of the site, bio-retention areas have only been incorporated to drain small impermeable areas.

As previously stated infiltration is not feasible across the site and therefore the use of infiltration SuDS techniques is not possible. Despite this, the use of non-infiltration permeable surfaces such as permeable paving/porous tarmac has been considered and incorporated within the private and shared drives.

Finally, the use of oversized pipe networks is suitable and is therefore also incorporated.

As indicated within the Outline Drainage Strategy Drawing attached in Appendix H,

The use of SuDS solutions across the site is subject to change and is dependent upon the finalised site layout, detailed drainage design and the results of additional surveys.

However, the drainage strategy and proposed SuDS solutions should adhere as close as possible to the above outline drainage strategy and SuDS solutions.

6.3.3 Water Quality Assessment

Managing the water quality of the surface water runoff from the proposed development is important to ensure that the receiving surface waters or groundwater are well protected. Generally, this can be achieved through the use of well-designed SuDS systems which provide treatment and pollution removal to the surface water runoff.

Standard S3 of the Statutory National Standards for Sustainable Drainage Systems (2018) details the water quality management and addresses the drainage design requirements to minimise the potential pollution risk.

As the proposed development consists of roof areas, car park areas and low traffic roads, in accordance within Table G3.2 of the Statutory National Standards for Sustainable Drainage Systems (2018) the pollution hazard level is low and as such the simple index approach can be used to assess the treatment requirements for the low risk of pollution.

The simple index approach is outlined within Chapter 26 of CIRIA Report C753 - The SuDS Manual. Therefore, using Table 26.2 and applying the proposed site description above, results in a low pollution hazard level, with the pollution hazard indices being; TSS - 0.5, Metals - 0.4 and Hydrocarbons - 0.4.

Assessing this against Table 26.3 of CIRIA Report C753 - The SuDS Manual using the SuDS treatment train of green roofs and permeable paving results in the mitigation indices outweighing the pollution hazard indices identified above. The use of a porous paving itself results in mitigation indices of; TSS - 0.7, Metals - 0.6 and Hydrocarbons - 0.7, which would be sufficient.

Therefore, as the mitigation indices are equal to or greater than each of the pollution hazard indices the use of permeable paving is deemed acceptable from a pollution mitigation perspective and as such complies with the water quality requirements of Standard S3 of the Statutory National Standards for Sustainable Drainage Systems (2018).

6.3.4 Foul Water Drainage

Foul water drainage disposal is set out in Part H of the Building Regulations in order of priority the preferred methods are;

- Public sewer
- Septic tank
- Cesspool.

The foul water system shall be designed in accordance with;

BS EN 752:2008 (Drain and sewer systems outside buildings)

The Design & Construction Guidance (DCG)

Technical Guidance to the National Planning Policy Framework document (Department for Communities and Local Government, March 2012).

BS EN 12056-2:2000 (Drainage systems inside buildings)

Building Regulations Approved Document H, Drainage and waste disposal. (Office of the Deputy Prime Minister, December 2010).

Foul water shall discharge to the existing C.W sewer to west of the site in Benmore Road, via a new manhole, at an unrestricted rate.

The F.W shall combined with the S.W flows, prior to discharging into the local combined sewer and the proposals shall be agreed with UU under a Section 104 Agreement. The proposed foul water drainage design can be found in Appendix H.

The foul water drainage strategy and discharge rate should be confirmed via more detailed discussions with United Utilities and the Lead Local Flood Authority prior to the commencement of any works.

6.4 Compliance with LASOO Non-Statutory Technical Standards for SUDS

In compliance with the runoff destinations guidance within the LASOO Non-Statutory Technical Standards for Sustainable Drainage: Best Practice Guidance, infiltration is not feasible; therefore, the surface water runoff is designed to discharge to the public sewer.

S1. Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface

water body (e.g., the sea or a large estuary) the peak flow control Standards (S2 and S3) and volume control Standards (S4 to S5) need not apply.

The site does not discharge to a surface water body that can accommodate uncontrolled surface water discharges, as it has only previously received greenfield run off and the culvert has been sized appropriately; therefore, Standards S2 - S5 shall apply.

6.4.1 Peak Flow Control

S2. For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event should never exceed the peak greenfield runoff rate for the same event.

The site is considered greenfield and the discharge rate for the 1 in 100-year return period has been restricted to a minimally practicable rate of 5l/s.

S3. For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100-year rainfall event should be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

The site is Greenfield and this standard does not apply.

6.4.2 Volume Control

S4. Where reasonably practicable, for greenfield development, the runoff volume from the *development to any highway drain, sewer or surface water body in the 1 in 100-year, 6-hour rainfall event should never exceed the greenfield runoff volume for the same event.*

S5. Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100-year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

S6. Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

SuDS components such as infiltration have been confirmed as feasible due to the ground conditions still subject to investigation. Other SUDS measures including green roofs or rainwater harvesting may assist in constraining the volume of surface water runoff, these

have not been feasible due to proposed construction methods for the development, therefore S5 cannot be complied with.

6.4.3 Flood Risk Within Development

S7. The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on part of the site for a 1 in 30-year rainfall event.

S8. The drainage system must be designed so that, unless an is designated to hold and/or convey as part of the design, flooding does not occur during a 1 in 100-year rainfall event in any part of: a building (including a basement) or in any utility plant susceptible to water (e.g., pumping station or electricity substation within the development)

S9. The design of the site must ensure that so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people or property.

The drainage system proposed in service of this development shall attenuate the Surface water flows for up to the 100-year storm event without any flooding occurring in compliance with S7 & S8.

The levels of the proposed highways and properties are such that flooding in excess of the 100-year storm event provide exceedance flow routes away from properties to proposed and existing highways; satisfying the requirements of S9.

6.5 Future Maintenance

It is proposed that the surface and foul water drainage systems and Surface water systems will be a mixture of adopted and private, therefore some elements (manholes and oversized pipes) will be the responsibility of United Utilities, while others will be maintained by a responsible organisation as nominated by the developer; in accordance with the CIRIA SUDS Manual C753. Accordingly.

The S.W run off from the roofs and hard surfaces shall discharge by gravity to S.W sewers adopted and maintained by UU.

The SUDS porous pavements systems shall remain private and therefore be the responsibility of a resident's maintenance manage company as appointed responsible organisation in accordance with the CIRIA SUDS Manual C753.

Accordingly, as stated in the SUDS Manual the operation and maintenance of the SuDS system shall be as the the maintenance requirements for permeable paving are outlined within Table 20.15 of the CIRIA SUDS Manual C753. An extract of that table is given below to set out the maintenance schedule for the permeable/porous tarmac component of the proposed drainage systems.

TABLE 20.15 Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

The remaining drainage systems (Hydrobrake unit) will be maintained in accordance with manufacturer's requirements which will be provided within the O&M manual which will be issued as a compliance requirement to the maintenance contractor on completion of the works.

The hard surfaces proposed for the development that are not the responsibility of the householder shall require regular annual sweep and suction brush following leaf fall in autumn. An annual inspection of control chamber, ACO channels and the inspection chambers shall be necessary to remove any silt build up and check the free flow use of the hydrobrake.

6.6 Managing Residual Flood Risk

With the impermeable area surface water run off explicitly considered and accommodated by the proposed drainage system a consideration must be given to the remaining permeable area within the bounds of the site, comprised of private garden areas. For the private garden areas surface water run-off will be mitigated by ensuring the top soil is freely draining and that at the lowest point of the garden a gravel trench should be in place to capture surface water for extreme events; with the surface water slowly dissipating post the storm event. Householders shall be responsible for ensuring these systems remain in situ.

There is a finite risk that the design flood conditions required by current design standards are exceeded by an extreme and rare event. However, with the design measures reported such a risk is low and the exceedance flow path routes required to channel flows around the development buildings will be such that no specific flood risk management procedures are envisaged to be necessary. A Flood routing plan can be seen in Appendix H, that identifies the likely flow routes in extreme events, demonstrating that existing or proposed dwellings are not put at risk

7.0 Conclusions

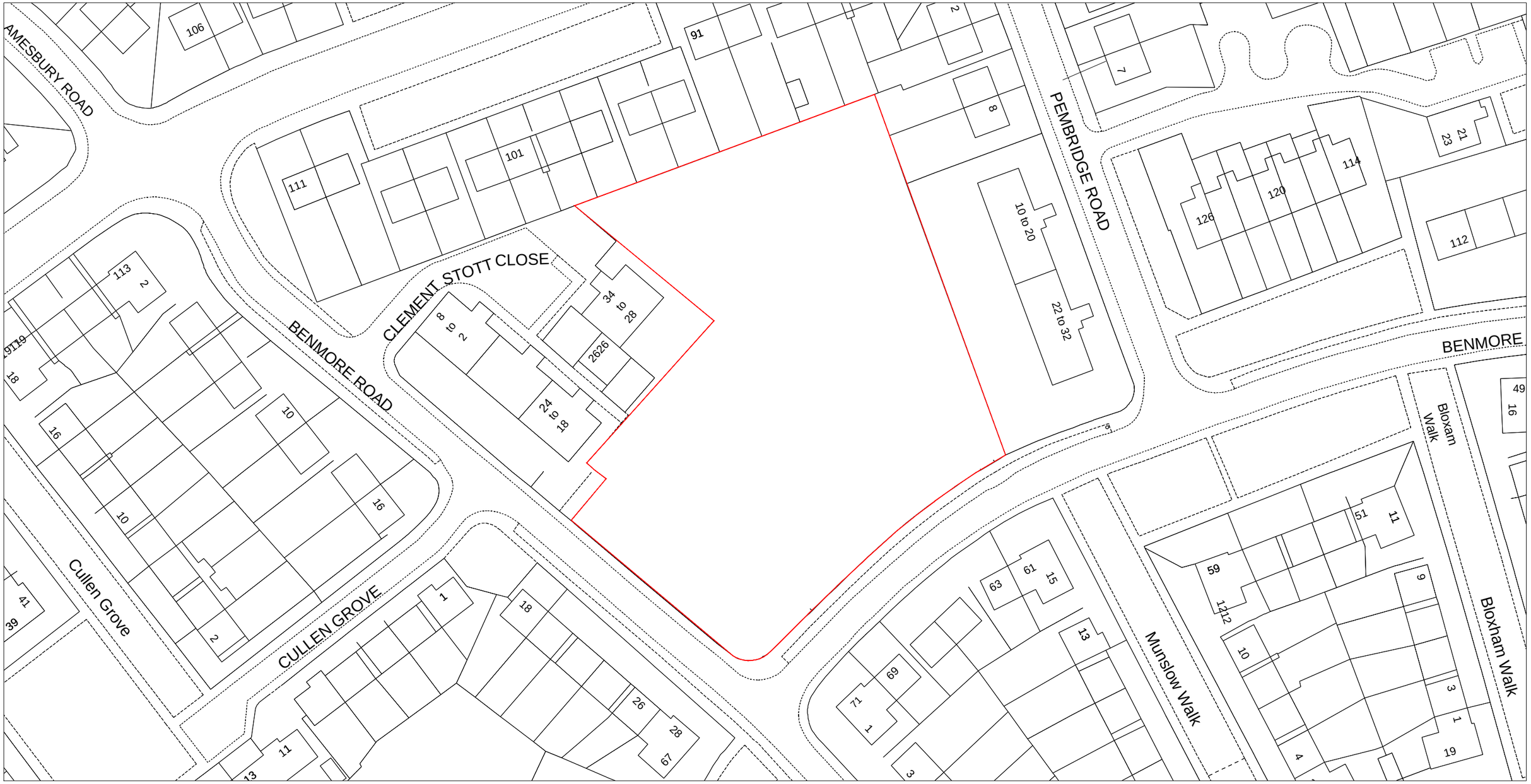
- The site is located within flood zone 1 and has been deemed to have a low risk of flooding from rivers.
- The site is at a low-medium risk of flooding from Groundwater at the surface.
- The site is at low risk of flooding from Surface water that's shall be mitigated through development.
- Infiltration is not viable due to the ground conditions and mobile contaminants.
- The surface water discharge from the proposed site should discharge at no more than the 5.0ls/ value for all storm events up to and including the 1 in 100-year event (+ 45% CC)

- The Surface water shall be contained within the attenuation system for the 1 in 100-year return period (+ 45% climate Change), ensuring that no properties are at risk of flooding and all flows are contained on site.
- The S.W network shall discharge into the 450mm diameter Combined sewer, with a 5.0l/s discharge from the network
- The S.W network represents the attenuation requirement based utilising online piped storage, to be adopted by United Utilities
- Foul water discharge from the proposed site should discharge, at unrestricted rate to the existing United Utilities Combined Water Sewer
- The F.W & S.W drainage systems shall combine within the development; prior to discharge to the Combined Sewer.
- Porous paving shall be installed on site, as a Source Control SuDS Measure.
- The proposed drainage systems comply with Standards contained within the LASOO Non-Statutory Technical Standards for Sustainable Drainage: Best Practice Guidance.

8.0 RECOMMENDATIONS

- The development shall have a S.W networks consisting of oversized pipes, manholes, a vortex flow control device should be utilised to restrict the surface water runoff and prevent any flooding for rainfall events up to and including the 1 in 100 year plus 45% climate change event.
- The external ground levels around the proposed buildings shall fall away from the proposed building with any new levels being designed to ensure overland flood routes, for events in excess of the 100 Year + 40% CC, exit towards the highway, allowing for surface water risk mitigation and groundwater risk mitigation.
- Infiltration testing in accordance with BRE 365 should be carried out on site, to confirm that the sub strata has low infiltration capacity.
- The proposed scheme should be submitted to UU for technical review and adoption under a Section 104 Agreement.

Appendix A Site Location Plan



REV	DATE	DESCRIPTION	BY	APP

SCALE @ A3:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
-	-	-	-	-	-

PROJECT: BENMORE DRIVE, MANCHESTER

TITLE: SITE LOCATION PLAN

STATUS:	PROJECT No:	DRAWING No:	REV:
-	223-008	**APPENDIX A**	-

AJP consulting engineers
0151 227 1462 info@ajpltd.co.uk 1 Dale Street, Liverpool, L2 2ET

Appendix B Aerial Photograph

REV	DATE	DESCRIPTION	BY	APP

SCALE @ A3:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
-	-	-	-	-	-

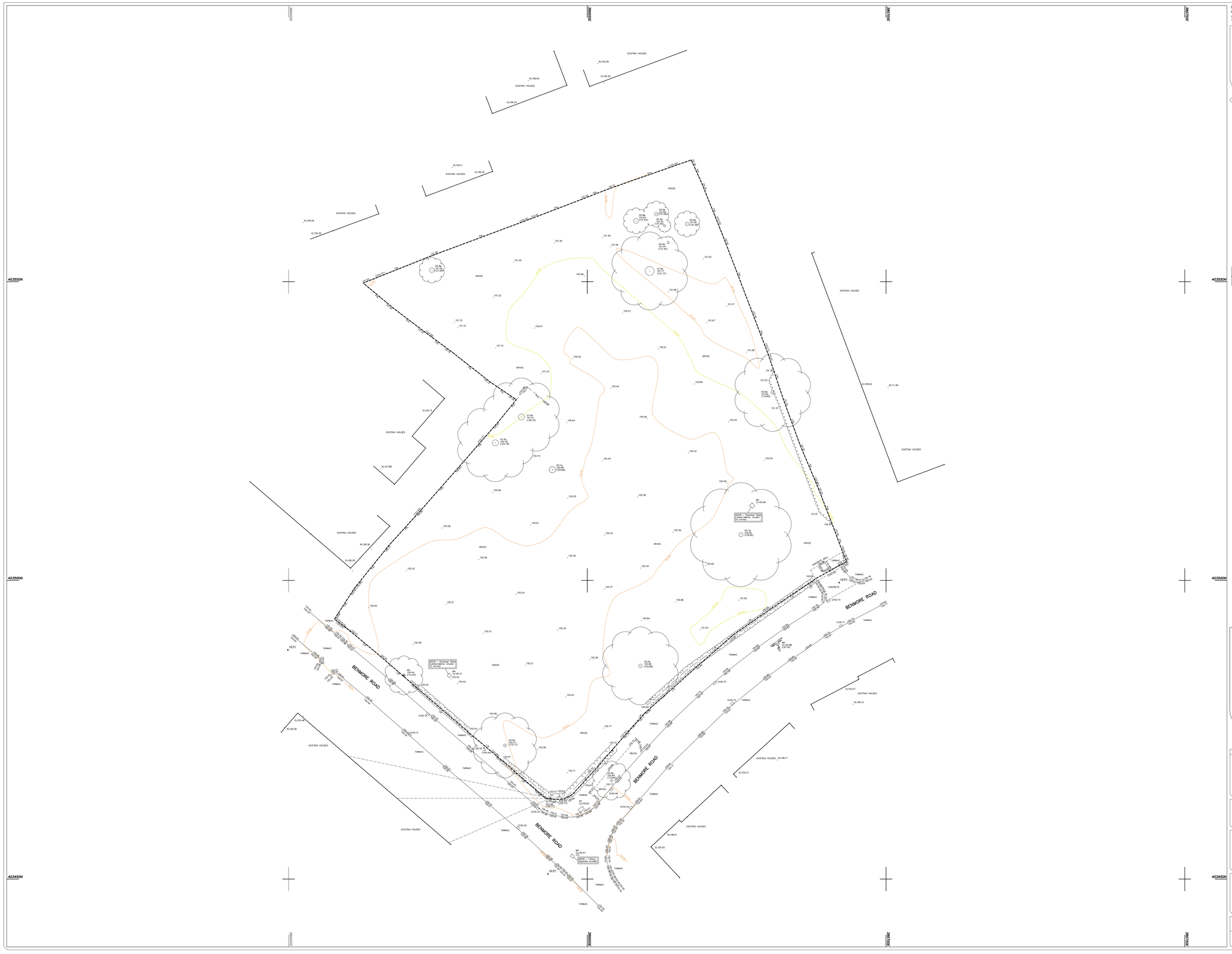
PROJECT: BENMORE DRIVE, MANCHESTER

TITLE: SIRE AERIAL PHOTOGRAPH

STATUS:	PROJECT No:	DRAWING No:	REV:
-	223-008	**APPENDIX B**	-

AJP consulting engineers
0151 227 1462 info@ajpltd.co.uk 1 Dale Street, Liverpool, L2 2ET

Appendix C Topographic Survey



© Survey & Engineering Projects Ltd. 2021
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey & Engineering Projects Ltd.
T. (0161) 729833 F. (0161) 725566 W. www.sepsurvey.com E. info@sepsurvey.com

N

PLAN GRID NORTH

File Name: S21437-T_3D.dwg

LEGEND

AV	AIR VALVE	LBY	LIFEBUOY
BB	BELOW BEACON	MH	MANHOLE
BD	BOLLARD	MP	MILE STONE
BH	BORE HOLE	MS	MOORING POINT
BM	BM	MP	MOORING WALL
BR	BRICK MARK	OP	OUTFALL PIPE
BS	BUS STOP	PB	POST OFFICE BOX
BT	BT INSPECTION COVER	PG	PIPE
CB	CONTROL BOX	PP	PETROL PUMP
CCV	CCTV CAMERA POST	PT	PEDESTAL
COM	COMMUNICATIONS COVER	RE	RODDING EYE
CSV	CAR SHARING STATION	RL	ROOF LEVEL
CTV	CABLE TV COVER	RS	RISING SAND
DC	DRAINAGE CHANNEL	RTW	RETAINING WALL
DP	DOWN PIPE	SP	SPRINKLER PIPE
DR	DRAIN	SAP	SAPLING
EC	ELEC. INSPECTION COVER	SNP	NAME PLATE
EL	ELECTRIC LOG	SP	SIGN POST
ELB	ELECTRIC BOX	SGP	SOFFIT LEVEL
EP	EARTH ROD	SV	STOP VALVE
FC	FLUSH CONTROL	TB	TRAFFIC BOLLARD
FL	FINISHED FLOOR LEVEL	TCB	TELEPHONE CALL BOX
FM	FIRE HYDRANT	TE	TE BOX
FP	FLAG POLE	TL	TRAFFIC LIGHT
GL	GRAVEL	TLB	TRAFFIC LIGHT BOX
GLT	GROUND LIGHT	TM	TRAFFIC MARK
GP	GATE POST	TP	TELEGRAPH POLE
GSV	GAS VALVE	VP	VENT PIPE
GSW	GAS VALVE	WM	WATER METER
IC	INSPECTION COVER	WO	WASH OUT
IL	INVERT LEVEL	WSV	WATER STOP TAP
KO	KERB OUTLET	WSV	WATER STOP VALVE
LAD	LADDER	GS Bar	TREE GIRTH (Dia.)
LD	LAND DRAIN	MG	TREE MULTI-GIRTH
LP	LAMP POST		
PAL	PALISADE		DRIP LINE
R/W	RAIL WITH		WATER COURSE
R/W	RAILING WIRE		HEDGE
ZCW	ZINC PANEL		FENCE
P/W	POST AND WIRE		SURFACE CHANGE
P/W	POST AND RAIL		RAIL
S/B	SIGN BOX		TOP BANK
S/B	SIGN BOX		BOTTOM BANK
CLFL	CLOSE BOARDED		BUILDING
CLFL	CHAIN LINK		BUILDING CANOPY
(SB.SP)	TOP OF FEATURE		SURVEY BOUNDARY
CT	CAT		OVER HEAD ELECTRICAL
	STATION		OVER HEAD TELECOM
	BOREHOLE		
	BATTER		HEDGE

NOTES:

All levels relate to O.S. (Newlyn) Datum. Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.

SURVEY STATIONS			
Name	Easting	Northing	Height
SEP1	386569.895	403448.200	100.722
SEP2	386643.420	403432.800	100.960
SEP3	386692.154	403499.827	100.802

SHEET LAYOUT

0 2m 4m 8m 12m 16m
SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Curtins Consulting Limited
Rose Wharf
78-80 East Street
Leeds
LS9 8EE

Project Title
Topographical Survey of Land at:
Former WhiteMoss Day Centre
Benmore Road
Manchester
M9 6EH

Surveyed	Drawn	Checked
S.Howard	M.Charlton	R.Critchley

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Apr' 21	S21437-T	01	A0	--

Appendix D Proposed Site Plan & Catchment Areas

Dimensions are to be checked on site. Report discrepancies to the Architect.

Proposed Site Plan

4 Proposed Site Plan 1:250

N

SITE BOUNDARY

SITE AREA : 5283m²

EXISTING TREES

EXISTING TREES TO BE REMOVED

PROPOSED SOFT LANDSCAPING (Subject to a detailed landscaping strategy)

PROPOSED TREES
(Subject to a detailed landscaping strategy)

EV 7kW Charge Point

DUAL ASPECT UNITS TO ADDRESS EACH CORNER

POTENTIAL PARTY WALL DISCUSSIONS NEEDED

6 METRE EASEMENT

	House Type	Total
	2B4P House Type 1 @ 79m²	4
	2B4P House Type 2 @ 79m²	6
	3B5P House Type 1 @ 93m²	10
		20

PROPOSED MASSING

Aerial image from Benmore Road

Aerial view of site entrance

PROJECT
Charlestown, Benmore Road - P500 Phase 1 Site Manchester

TITLE
Proposed Site Plan

SIZE A1

STATUS PLANNING

PROJECT No 1785

DRAWING No PL.003

DRAWN by HW

CHECKED DS

DATE NOV 22

SCALE (o.n.o) 1:250

JOHN McCALL ARCHITECTS LTD
No .1 Arts Village, Henry Street, Liverpool L1 5BS Tel: 0151 707 1818 Fax: 707 1819
4a Rock Mill Lane, New Mills, SK22 3BN e-mail: admin@John McCall.co.UK

GENERAL NOTES

1. SETTING OUT SHALL BE UNDERTAKEN USING ONLY THE INFORMATION GIVEN. DISTANCES SHOULD NOT BE SCALED FROM THIS DRAWING.
2. ALL SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 6TH EDITION AND UNITED UTILITIES DETAILS & GUIDELINES.
3. THE MINIMUM GRAVITY PIPE DIAMETER UNDER ADOPTABLE HIGHWAYS SHALL BE 150MM
4. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL INFORMATION GIVEN WITH REGARDS TO EXISTING SERVICES AND DRAINAGE CONNECTIONS ETC. PRIOR TO COMMENCING THE WORKS. THE RATES SHALL INCLUDE FOR HAND DIG AROUND SERVICES WHERE NECESSARY. THE CONTRACTOR SHALL ADHERE TO THE CDM REGULATIONS AT ALL TIMES
5. THE OUTSIDES OF ALL SEWERS SHALL BE A MINIMUM OF 1.0M FROM KERB LINES AND THE OUTSIDE OF MANHOLES SHALL BE A MINIMUM OF 0.5M FROM KERB LINES
6. EXISTING FLOWS IN WATERCOURSES, SEWERS AND LAND DRAINS SHALL BE MAINTAINED AT ALL TIMES 7. ONLY TRAINED PERSONNEL SHALL BE PERMITTED TO ENTER CONFINED SPACES
7. ALL MATERIALS TO BEAR THE RELEVANT B.S. KITEMARK AND COMPLY FULLY WITH THE SPECIFICATIONS. ALL CONCRETE & CONCRETE PRODUCTS MUST USE SULPHATE RESISTANT CEMENT (UNLESS THE SITE INVESTIGATION REPORT PROVES THAT SULPHATE ATTACK FROM SOILS AND GROUNDWATER WILL NOT OCCUR TO WITHSTAND A CLASS
8. ALL OPENING NOTICES ETC. AS REQUIRED UNDER HIGHWAYS ACTS ETC. ARE TO BE OBTAINED PRIOR TO COMMENCEMENT OF WORKS. ALL WORKS ARE TO BE INSPECTED BY L.A., NHBC OR THE NETWORK OPERATOR AS APPLICABLE.
9. WHERE "ULTRA RIB" UPVC PIPES (OR SIMILAR APPROVED) ARE USED IN ADOPTABLE DRAINAGE THEY SHALL STILL BE HANDLED AND LAID IN ACCORDANCE WITH THE SPECIFICATION AND GUIDANCE ISSUED BY THE HIGH PERFORMANCE PIPE ASSOCIATION.
10. A CLASS S BED AND SURROUND MUST BE USED FOR SUCH PIPES. TRENCH BACKFILL IN HIGHWAYS TO WITHIN 1M OF HIGHWAY SHALL, AS DIRECTED BY THE HIGHWAY AUTHORITY BE A SUITABLE GRANULAR MATERIAL ALL IN ACCORDANCE WITH SEWERS FOR ADOPTION CL 4.3.4. 12. SLAB LEVELS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE ENGINEER FOR GUIDANCE
11. DOMESTIC DRAINAGE SHALL BE TO BUILDING REGULATIONS APPROVED DOCUMENT H. 110MM U.P.V.C. PIPES LAID TO THE FOLLOWING MINIMUM FALLS UNLESS OTHERWISE SHOWN.

	FOUL	S.W.
HEAD RUN	1 IN 40	1 IN 60
ELSEWHERE	1 IN 80	1 IN 100

12. POLYPROPYLENE INSPECTION CHAMBERS TO BE PROVIDED TO ALL PRIVATE DRAINAGE LESS THAN 1.10m DEEP. WHERE PRIVATE DRAINAGE RUNS ARE DEEPER THAN 1.10m, REDUCED ACCESS CHAMBERS TO BE PROVIDED.
13. WHEREVER PLASTIC PIPES ARE TO BE USED FOR THE CONSTRUCTION OF ADOPTABLE DRAINAGE, STRUCTURED WALL PLASTIC PIPES MUST BE USED WHICH MUST COMPLY WITH BS EN 13476-1 AND WIS 4-35-01

TOTAL GREENFIELD AREA = 0.53 Ha

N

REV	DATE	DESCRIPTION	BY	CHK	APP
.	.	.	.	.	.

DRAWING STATUS: **PRELIMINARY**

CLIENT: CASEY

ARCHITECT: JOHN McCALLS

PROJECT: BENMORE DRIVE MANCHESTER

TITLE: GREENFIELD AREAS PLAN

STATUS:	PROJECT No.	PROJECT	ORIGINATOR	VOL/SYS	LEVEL	TYPE	ROLE	DRAWING No.	REV:
S2	223-008	BEN -	AJP -	ZZ -	00 -	DR -		**C - 1041**	**P01**

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:200	JCM	JCM	JLS	JLS	JUNE 2023

AJP consulting engineers
0151 227 1462 info@ajpltd.co.uk 91 Dale Street, Liverpool, L2 2ET

GENERAL NOTES

1. SETTING OUT SHALL BE UNDERTAKEN USING ONLY THE INFORMATION GIVEN. DISTANCES SHOULD NOT BE SCALED FROM THIS DRAWING.
2. ALL SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 6TH EDITION AND UNITED UTILITIES DETAILS & GUIDELINES.
3. THE MINIMUM GRAVITY PIPE DIAMETER UNDER ADOPTABLE HIGHWAYS SHALL BE 150MM
4. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL INFORMATION GIVEN WITH REGARDS TO EXISTING SERVICES AND DRAINAGE CONNECTIONS ETC. PRIOR TO COMMENCING THE WORKS. THE RATES SHALL INCLUDE FOR HAND DIG AROUND SERVICES WHERE NECESSARY. THE CONTRACTOR SHALL ADHERE TO THE CDM REGULATIONS AT ALL TIMES
5. THE OUTSIDES OF ALL SEWERS SHALL BE A MINIMUM OF 1.0M FROM KERB LINES AND THE OUTSIDE OF MANHOLES SHALL BE A MINIMUM OF 0.5M FROM KERB LINES
6. EXISTING FLOWS IN WATERCOURSES. SEWERS AND LAND DRAINS SHALL BE MAINTAINED AT ALL TIMES 7. ONLY TRAINED PERSONNEL SHALL BE PERMITTED TO ENTER CONFINED SPACES
7. ALL MATERIALS TO BEAR THE RELEVANT B.S. KITEMARK AND COMPLY FULLY WITH THE SPECIFICATIONS. ALL CONCRETE & CONCRETE PRODUCTS MUST USE SULPHATE RESISTANT CEMENT UNLESS THE SITE INVESTIGATION REPORT PROVES THAT SULPHATE ATTACK FROM SOILS AND GROUNDWATER WILL NOT OCCUR TO WITHSTAND A CLASS
8. ALL OPENING NOTICES ETC. AS REQUIRED UNDER HIGHWAYS ACTS ETC. ARE TO BE OBTAINED PRIOR TO COMMENCEMENT OF WORKS. ALL WORKS ARE TO BE INSPECTED BY L.A., NHBC OR THE NETWORK OPERATOR AS APPLICABLE.
9. WHERE "ULTRA RIB" UPVC PIPES (OR SIMILAR APPROVED) ARE USED IN ADOPTABLE DRAINAGE THEY SHALL STILL BE HANDLED AND LAID IN ACCORDANCE WITH THE SPECIFICATION AND GUIDANCE ISSUED BY THE HIGH PERFORMANCE PIPE ASSOCIATION.
10. A CLASS S BED AND SURROUND MUST BE USED FOR SUCH PIPES. TRENCH BACKFILL IN HIGHWAYS TO WITHIN 1M OF HIGHWAY SHALL, AS DIRECTED BY THE HIGHWAY AUTHORITY BE A SUITABLE GRANULAR MATERIAL AS ALL IN ACCORDANCE WITH SEWERS FOR ADOPTION CL. 4.3.4. 12. SLAB LEVELS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE ENGINEER FOR GUIDANCE
11. DOMESTIC DRAINAGE SHALL BE TO BUILDING REGULATIONS APPROVED DOCUMENT H. 110MM U.P.V.C. PIPES LAID TO THE FOLLOWING MINIMUM FALLS UNLESS OTHERWISE SHOWN.

	FOUL	S.W.
HEAD RUN	1 IN 40	1 IN 60
ELSEWHERE	1 IN 80	1 IN 100

12. POLYPROPYLENE INSPECTION CHAMBERS TO BE PROVIDED TO ALL PRIVATE DRAINAGE LESS THAN 1.10m DEEP. WHERE PRIVATE DRAINAGE RUNS ARE DEEPER THAN 1.10m, REDUCED ACCESS CHAMBERS TO BE PROVIDED.
13. WHEREVER PLASTIC PIPES ARE TO BE USED FOR THE CONSTRUCTION OF ADOPTABLE DRAINAGE, STRUCTURED WALL PLASTIC PIPES MUST BE USED WHICH MUST COMPLY WITH BS EN 13476-1 AND WIS 4-35-01

S.W CATCHMENT PLAN

Pipe No	Area (ha)	Hatch
1.000	0.073	
1.001	0.040	
1.002	0.158	
1.003	0.000	
1.004	0.031	
1.005	0.000	
1.006	0.000	
TOTAL	0.3020	

REV	DATE	DESCRIPTION	BY	CHK	APP

DRAWING STATUS: **PRELIMINARY**

CLIENT: CASEY

ARCHITECT: JOHN McCALLS

PROJECT: BENMORE DRIVE MANCHESTER

TITLE: SURFACE WATER CATCHMENT PLAN

STATUS:	PROJECT No.	PROJECT	ORIGINATOR	VOL/SYS	LEVEL	TYPE	ROLE	DRAWING No.	REV:
S2	223-008	BEN -	AJP -	ZZ -	00 -	DR -	C -	1040	P01

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:200	JCM	JCM	JLS	JLS	JUNE 2023

AJP consulting engineers
0151 227 1462 info@ajpltd.co.uk 91 Dale Street, Liverpool, L2 2ET

Appendix E Flood Risk Maps

Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**386651/403517**	**27 Jun 2023 7:44**

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

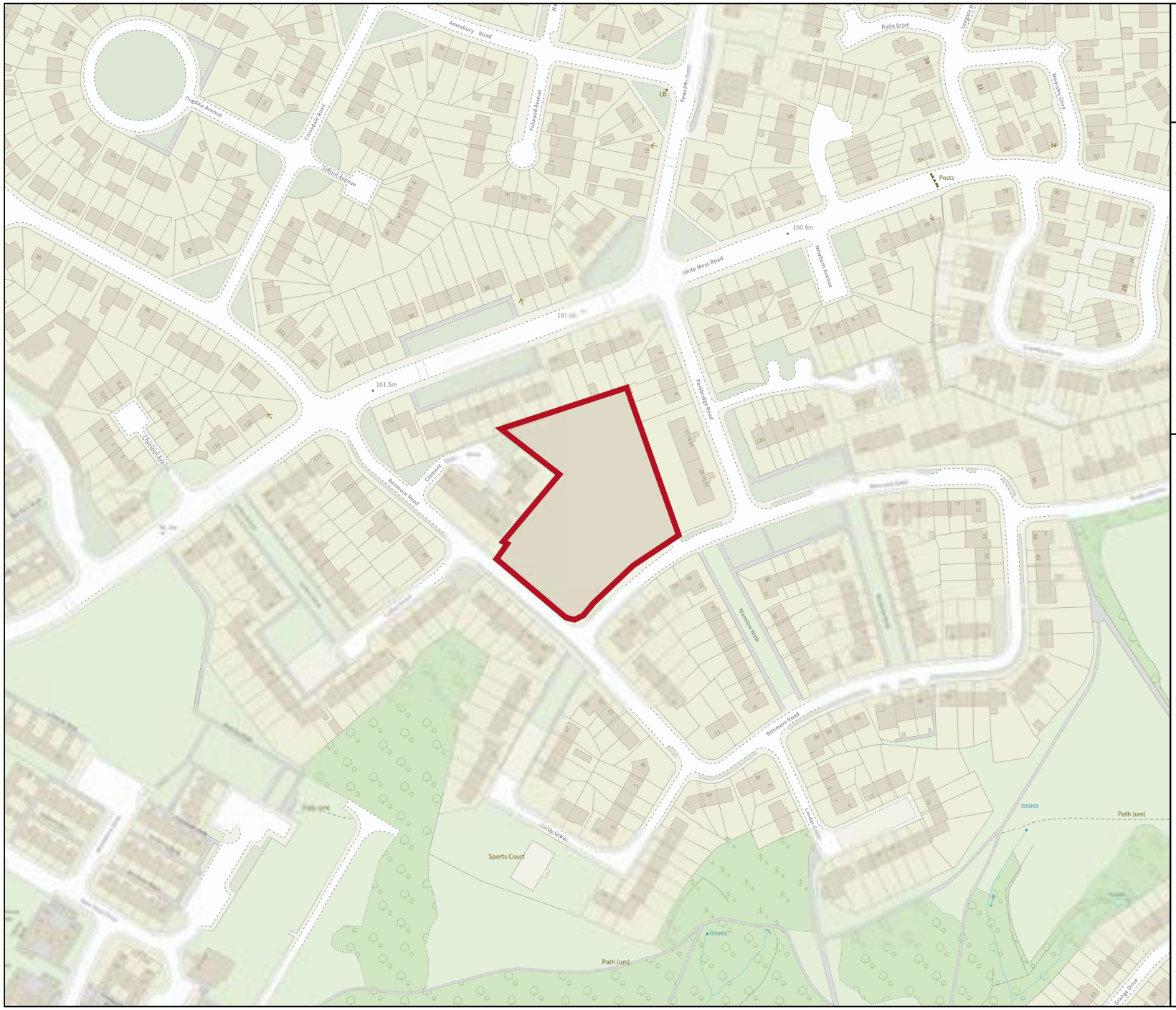
Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2022 OS 100024198. https://flood-map-for-planning.service.gov.uk/os-terms



Environment Agency

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
386651/403517

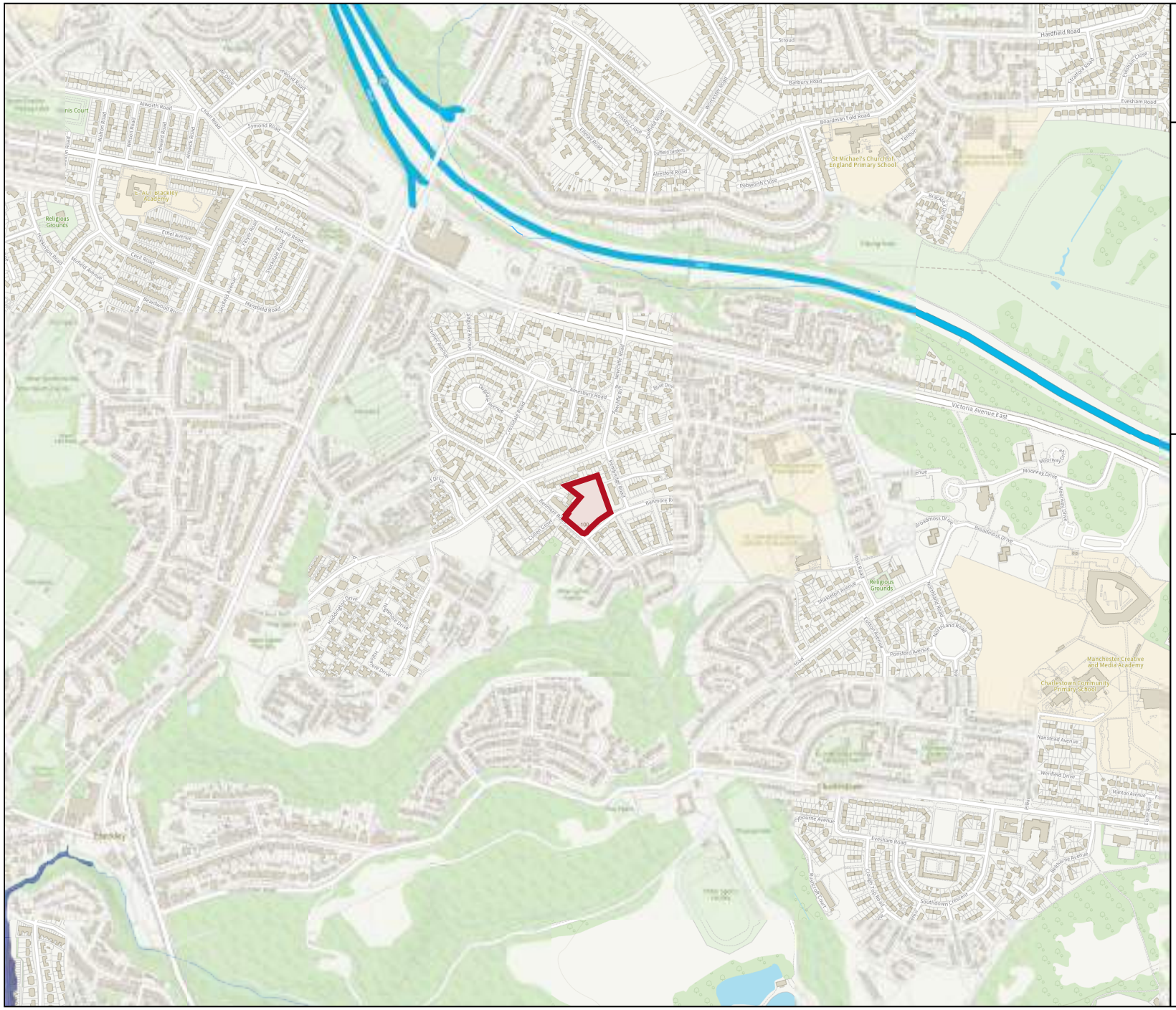
Scale
1:2500

Created
27 Jun 2023 7:44

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

© Environment Agency copyright and / or database rights 2022. All rights reserved. © Crown Copyright and database right 2022. Ordnance Survey licence number 100024198.



Environment Agency

Flood map for planning

Your reference
Flood Risk Ma

Location (easting/northing)
386651/403517

Scale
1:10000

Created
27 Jun 2023 7:45

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 100 200 300m

© Environment Agency copyright and / or database rights 2022. All rights reserved. © Crown Copyright and database right 2022. Ordnance Survey licence number 100024198.

Select the type of flood risk information you're interested in. The map will then update.

Flood risk

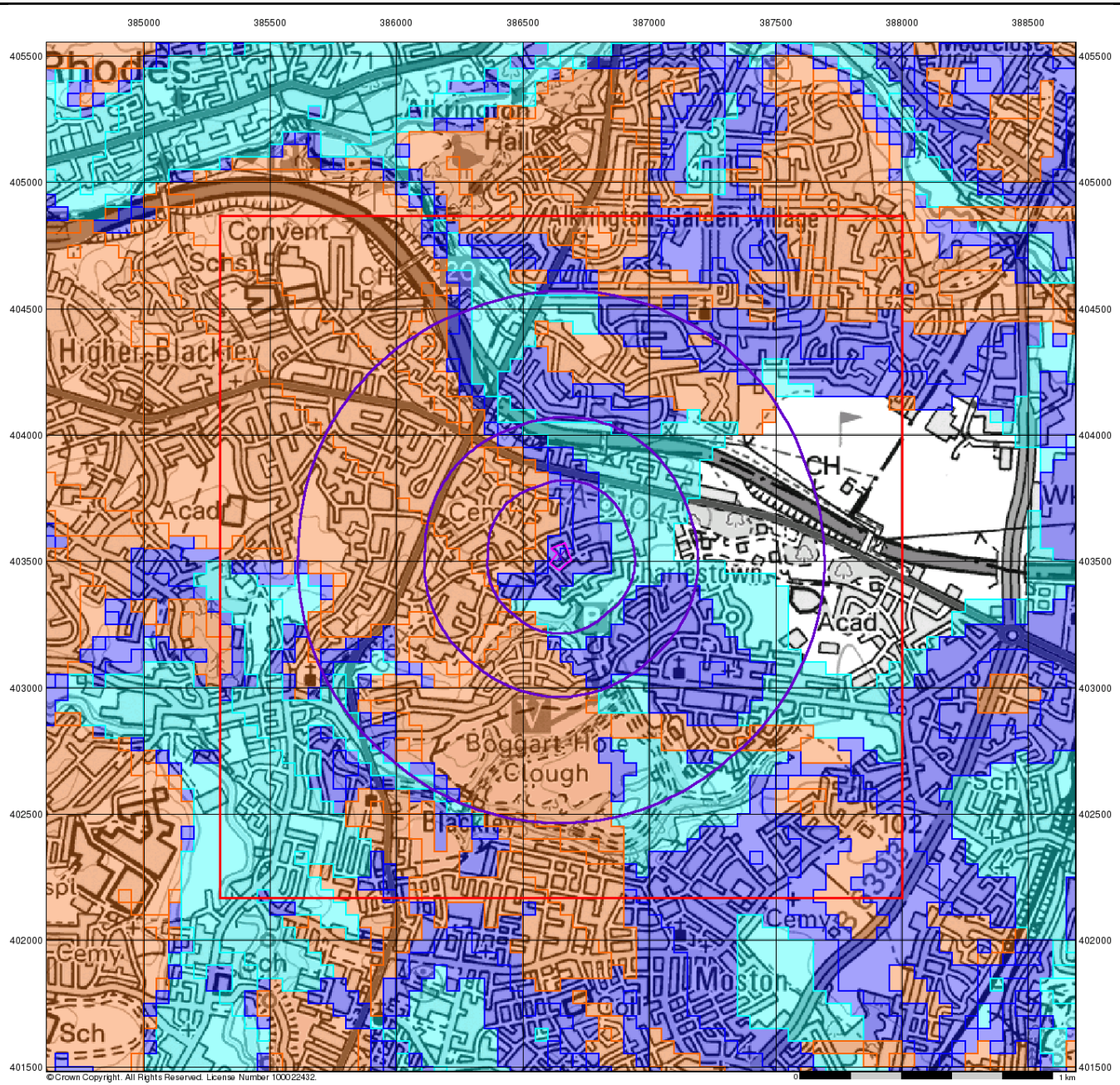
Extent of flooding

Location

Enter a place or postcode

Extent of flooding from surface water

High Medium Low Very low Location you selected



Envirocheck®

LANDMARK INFORMATION GROUP

BGS Flood GFS Data

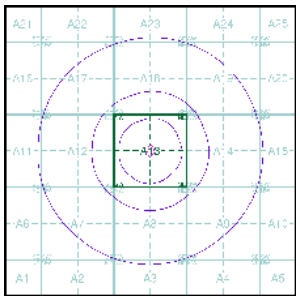
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice

Agency and Hydrological (Flood)

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice A



Order Details

Order Number:	273938638_1_1
Customer Ref:	EBMA2711
National Grid Reference:	386650, 403520
Slice:	A
Site Area (Ha):	0.53
Search Buffer (m):	1000

Site Details

Whitemoss Community Resource Centre, Benmore Road, Manchester, M9 6EH

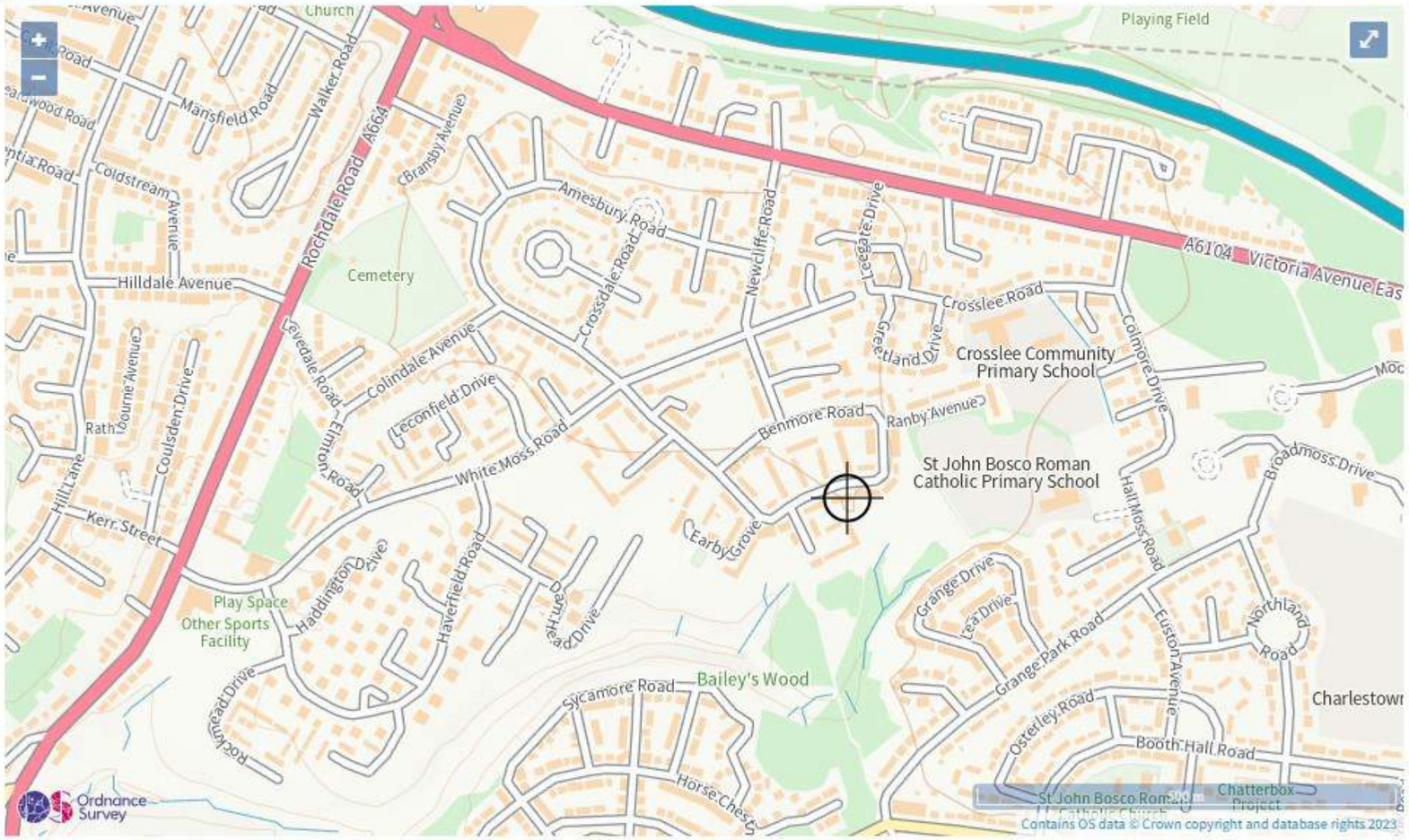
Select the type of flood risk information you're interested in. The map will then update.

Flood risk

Extent of flooding

Location

Enter a place or postcode

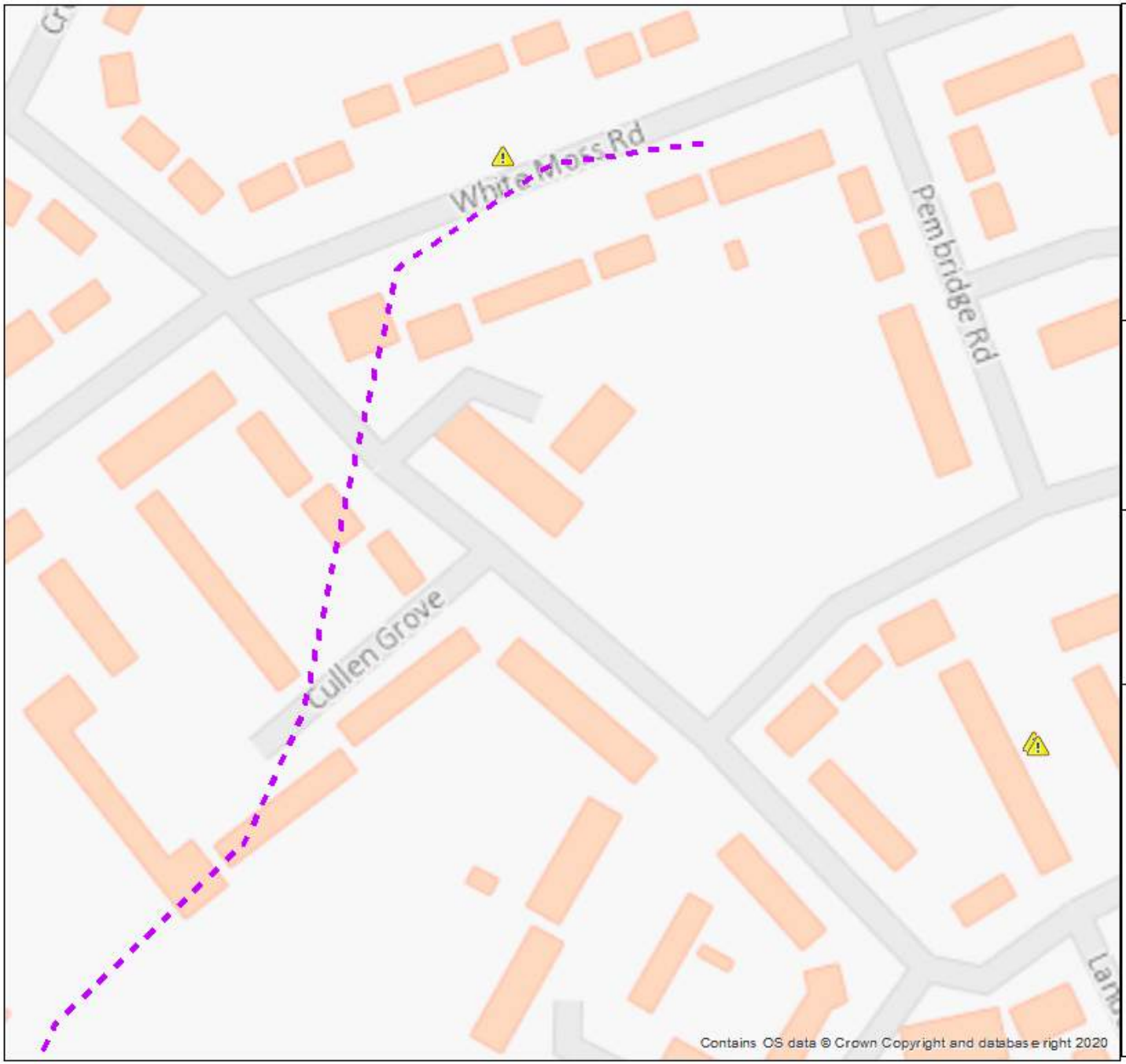


Maximum extent of flooding from reservoirs:

when river levels are normal

when there is also flooding from rivers

Location you selected



MANCHESTER CITY COUNCIL

LLFA DATA SCREEN

Address/Site Ref:
Benmore Road, M9 6DN

Our Ref: **MCC004B/01/2023**

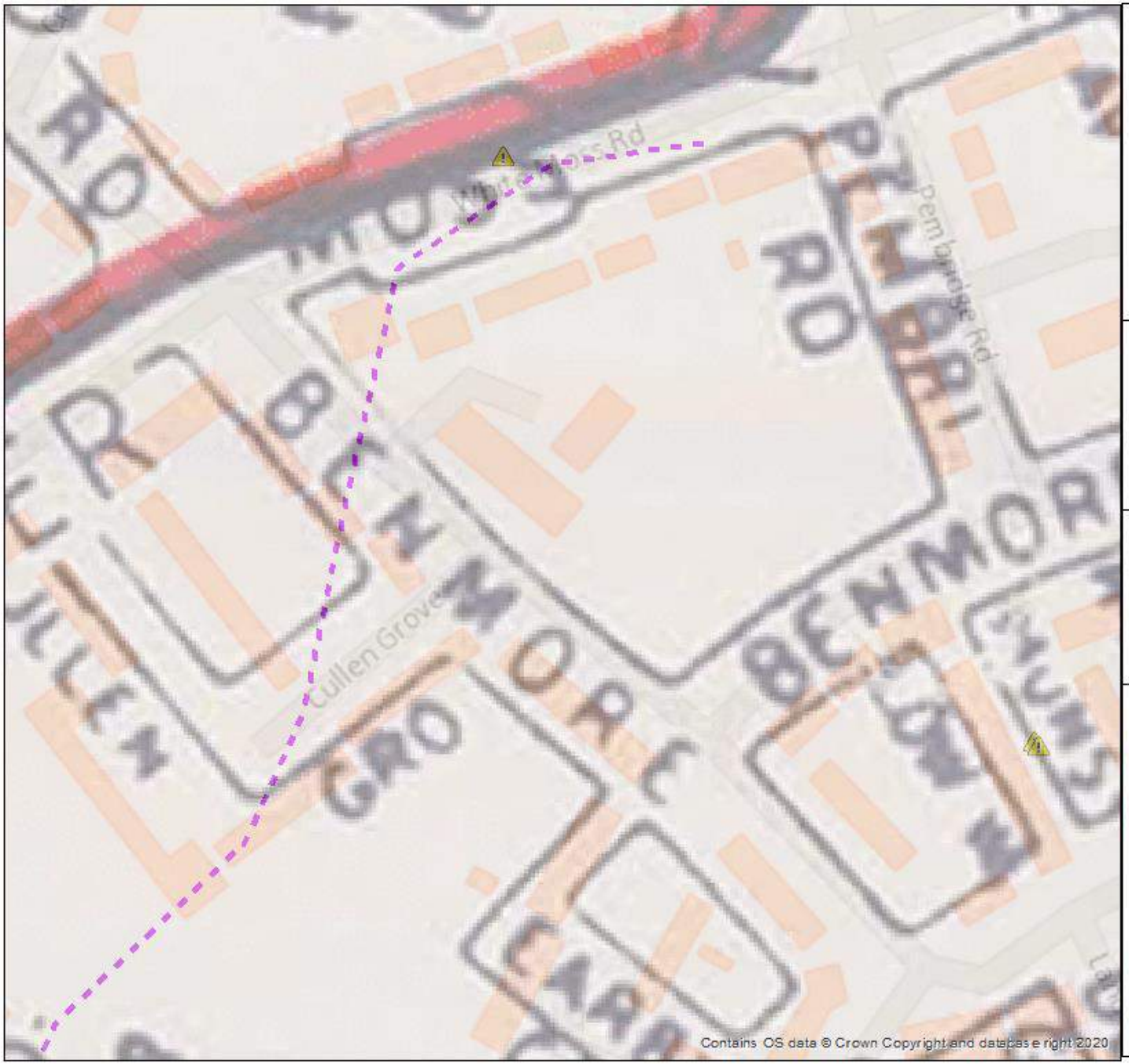
Author: Manchester City Council LLFA
Date: 04/01/2023
Scale: 1:1,250

The position of features shown on this plan is approximate only and is given in accordance with the best information currently available. Manchester City Council will not accept liability for any loss or damage caused by the actual position being different from those shown.

0 5 10 20
Meters

N

Contains OS data © Crown Copyright and database right 2022.



MANCHESTER CITY COUNCIL

LLFA DATA SCREEN

Address/Site Ref:
Benmore Road, M9 6DN

Our Ref: **MCC004B/01/2023**

Author: Manchester City Council LLFA
Date: 04/01/2023
Scale: 1:1,250

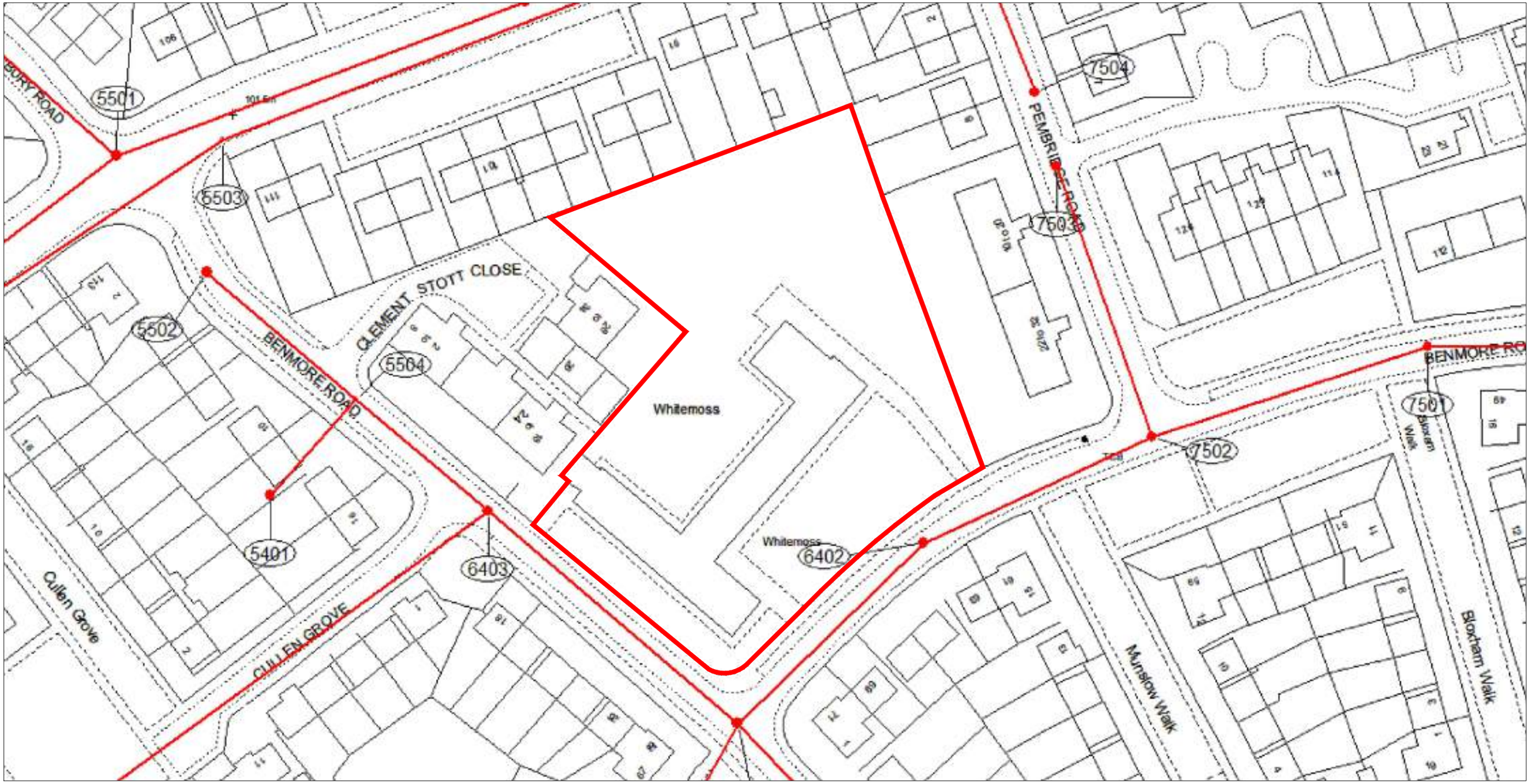
The position of features shown on this plan is approximate only and is given in accordance with the best information currently available. Manchester City Council will not accept liability for any loss or damage caused by the actual position being different from those shown.

0 5 10 20
Meters

N

Contains OS data © Crown Copyright and database right 2022.

Appendix F UU Maps & Correspondence



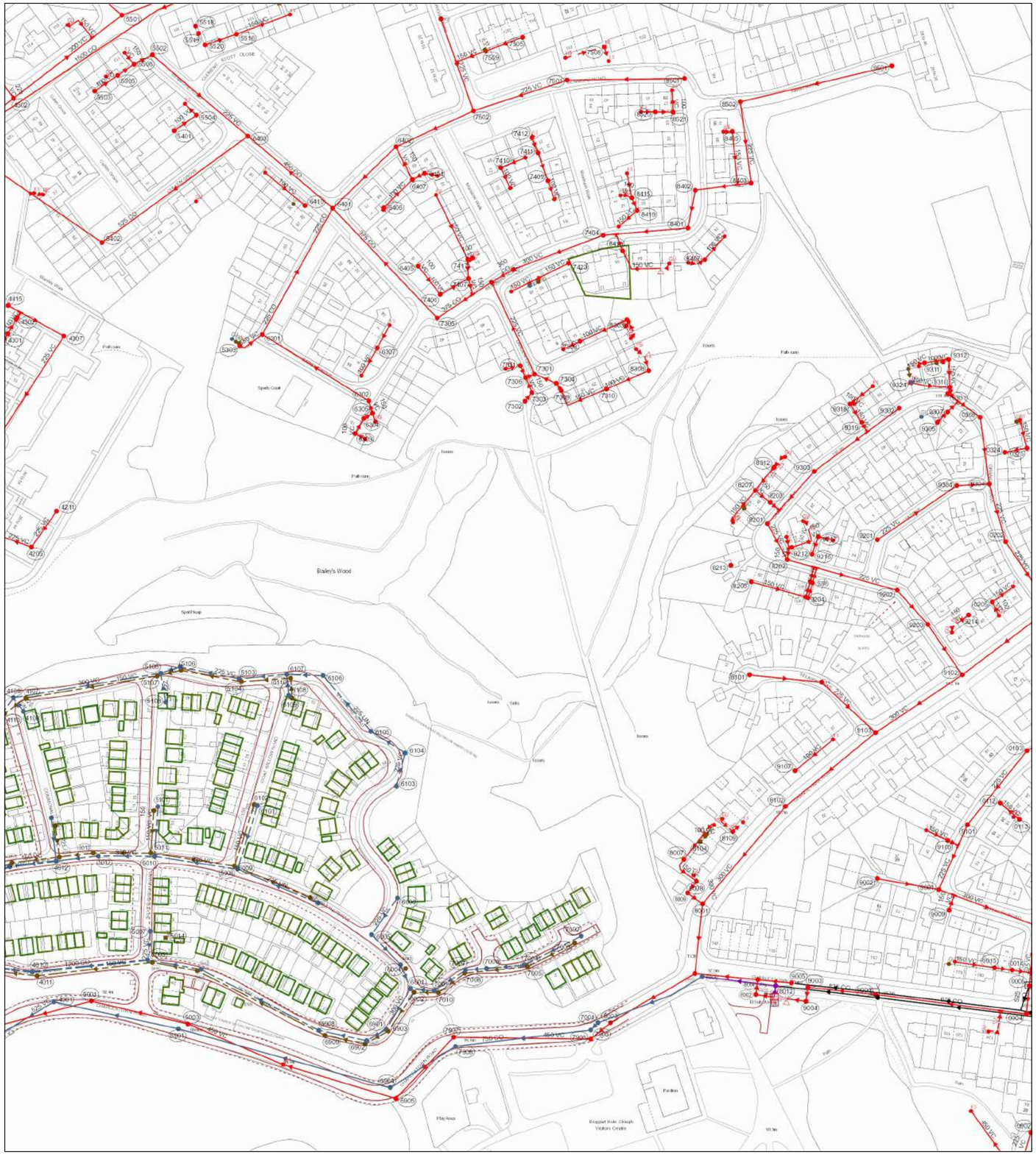
REV	DATE	DESCRIPTION	BY	APP

PROJECT:	BENMORE DRIVE, MANCHESTER
TITLE:	EXISTING UU INFORMATION

STATUS:	PROJECT No:	DRAWING No:	REV:
S2	223-008		-

SCALE @ A3:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
-	-	-	-	-	-

AJP consulting engineers
0151 227 1462 info@ajpltd.co.uk 91 Dale Street, Liverpool, L2 2ET



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.

Crown copyright and database rights 2017 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
7503	100.95	CO	99.06	225			VC	54.08327	1 in 61
7503	100.95	CO	99.06	225			VC	54.08327	1 in 61
8501	100.86	CO	98.96	225			VC	65.00769	1 in 155
8501	100.86	CO	98.96	225			VC	65.00769	1 in 155
8521		CO		100			VC	12.20286	
8521		CO		100			VC	12.20286	
8401	99.95	CO	95.62	225			VC	47.16991	1 in 197
8401	99.95	CO	95.62	225			VC	47.16991	1 in 197
8419		CO		150			VC	13.55874	
8419		CO		150			VC	13.55874	
7410		CO		100			VC	12.53881	
7410		CO		100			VC	12.53881	
7411		CO		100			VC	16.46323	
7411		CO		100			VC	16.46323	
7407		CO		150			VC	9.340865	
7306		CO		150			VC	5.32906	
7310		CO		150			VC	32.11576	
8502	99.39	CO	96.33	225			VC	45.39824	
8502	99.39	CO	96.33	225			VC	45.39824	
0305	102.19	CO	99.04	225			VC	37.33631	1 in 162
8203		CO		100			VC	6.629276	
9212		CO		150			VC	1.748377	
9318		CO		150			VC	12.15961	
9319		CO		150			VC	6.139215	
8101	100.34	CO	98.74	225			VC	40.1995	1 in 74
8202	101.36	CO	98.56	225			VC	63.32852	1 in 90
9205		CO		150			VC	8.494842	
0202	102.68	CO	98.51	225			VC	44.65423	1 in 93
9203	102.3	CO	0	225			VC	33.83785	
0103	101.67	CO	98.96	225			VC	52.63079	1 in 170
9103	101.88	CO	96.51	300			VC	64.66065	1 in 67
7005	97.69	FO	95.38	150			VC	34.92458	1 in 109
8007	97.26	CO	0	150			VC	17.31303	
0004	99.7	CO	94.68	675			CO	84.43276	1 in 384
6406		CO		100			VC	22.21425	
6406		CO		100			VC	22.21425	
6407		CO		150			VC	20.41142	
6407		CO		150			VC	20.41142	
7502	100.3	CO	98.15	225			VC	47.42362	1 in 139
7502	100.3	CO	98.15	225			VC	47.42362	1 in 139
6303		CO		100			VC	9.759541	
5303		CO		100			VC	15.1608	
4013	94.83	FO	93.41	150			VC	26.4552	1 in 38
4013	94.83	FO	93.41	150			VC	26.4552	1 in 38
4105	94.98	SW	93.28	225			VC	24.01859	1 in 100
4105	94.98	SW	93.28	225			VC	24.01859	1 in 100
5101	97.17	SW	95.44	225			VC	27.6055	1 in 41
5011	96.52	FO	95.17	150			VC	31.94857	1 in 31
5102	97.11	FO	95.55	150			VC	23.63441	1 in 62
6104	98.35	SW	96.63	225			UN	22.50688	1 in 102
5201	96.6	SW	94.25	300			VC	11.33377	1 in 162
5505		CO		100			VC	10.9223	
5505		CO		100			VC	10.9223	
5505		CO		100			VC	10.9223	
5505		CO		100			VC	10.9223	
4211	88.74	CO	82.65	225			VC	24.41311	1 in 32
4211	88.74	CO	82.65	225			VC	24.41311	1 in 32
4408	99.14	CO	97.91	225			VC	32.01562	1 in 100
4408	99.14	CO	97.91	225			VC	32.01562	1 in 100
4110	94.65	FO	92.75	150			VC	24.53574	1 in 30
4110	94.65	FO	92.75	150			VC	24.53574	1 in 30
7607	96.64	SW	93.23	450			VC	46.69047	1 in 467
6904	96.3	SW	91.86	750			CO	121.9622	1 in 35
6901	97.21	SW	94.15	300			VC	12.45122	1 in 138
6902	97.08	SW	94.06	300			VC	27.00791	1 in 135
6002	97.4	FO	94.83	150			VC	25.84607	1 in 136
6003	97.62	SW	95.89	225			VC	14.51794	1 in 104
5004	94.7	FO	93.36	150			VC	25.22019	1 in 38
5002	94.72	FO	92.93	300			VC	29.74408	1 in 73
6005	97.81	SW	96.17	225			VC	23.1041	1 in 83
6006	98.12	SW	96.4	225			VC	24.74664	1 in 108
6007	98.17	SW	96.45	225			UN	48.4753	1 in 81
7505		CO		150			VC	21.788	
7505		CO		150			VC	21.788	
8402	100.26	CO	95.8	225			VC	21.37756	1 in 126
8402	100.26	CO	95.8	225			VC	21.37756	1 in 126
8403		CO	0	225			VC	31.257	
8403		CO	0	225			VC	31.257	
8407		CO		100			VC	16.98481	
8410		CO		150			VC	9.983336	
8415		CO		150			VC	7.554543	
8415		CO		150			VC	7.554543	
8520		CO		100			VC	9.935346	
8520		CO		100			VC	9.935346	
7409		CO		100			VC	10.87592	
7409		CO		100			VC	10.87592	
7406		CO		100			VC	17.97115	
7309		CO		150			VC	4.820855	
7308		CO		100			VC	10.27675	
9311		CO		100			VC	13.72915	
9307		CO		150			VC	8.219264	
9207		CO		150			VC	8.712391	
7008	97.86	FO	95.06	150			VC	18.16098	1 in 140
7905	97.6	SW	92.46	750			CO	79.53807	1 in 216
7006	97.86	SW	94.86	300			VC	11.64263	1 in 129
8006	97.61	SW	92.7	750			CO	63.44416	1 in 1269
8004	97.63	CO	94.43	450			VC	35.0201	1 in 168
8012		OV	93.86	750			CO	41.14534	1 in 37
8002	97.34	CO	94.3	375			CO	8.320986	1 in 139
0005		CO	94.82	525			CO	15.85146	
6402	100.78	CO	97.8	225			CO	48.79549	1 in 17
6402	100.78	CO	97.8	225			CO	48.79549	1 in 17
7205	98.16	CO	94.91	375			CO	84.17244	1 in 443
6307		CO		100			VC	17.6909	
5502	101.8	CO	99.62	225			VC	69.52783	1 in 82
5502	101.8	CO	99.62	225			VC	69.52783	1 in 82
5401	93.45	CO		100			VC	15.00425	
5401	93.45	CO		100			VC	15.00425	
5520		CO		150			VC	18.40527	
5520		CO		150			VC	18.40527	
6101	98.29	SW	96.48	225			VC	36.93183	1 in 59
5012	95.52	SW	93.72	300			VC	23.35398	1 in 31
5012	95.52	SW	93.72	300			VC	23.35398	1 in 31
5013	95.43	FO	94.13	150			VC	18.9196	1 in 26
5013	95.43	FO	94.13	150			VC	18.9196	1 in 26
5010	96.48	SW	94.68	300			VC	31.2879	1 in 33
6105	98.14	SW	96.41	225			UN	40.55509	1 in 68
5108	97.08	SW	94.81	225			VC	16.39001	1 in 29
5107	96.86	FO	94.59	150			VC	74.11088	1 in 56
6109	97.6	FO	95.85	150			VC	11.05889	1 in 79
6108	97.59	SW	95.47	225			VC	11.64977	1 in 97
6110	97.53	FO	95.72	150			VC	27.45913	1 in 45
6107	97.48	SW	95.35	225			VC	26.54256	1 in 41
5103	96.97	SW	94.7	225			VC	33.31285	1 in 88
6605		CO	0	1500			CO	273.5814	
5506		CO		100			VC	11.40675	
5506		CO		100			VC	11.40675	
4307	96.05	CO	92.61	225			VC	77.38863	1 in 16
4307	96.05	CO	92.61	225			VC	77.38863	1 in 16
4301		CO		150			VC	9.114041	
4301		CO		150			VC	9.114041	
4415	95	CO	93.15	225			VC	35.35534	1 in 68
4415	95	CO	93.15	225			VC	35.35534	1 in 68
4014	93.95	SW	88.59	1200			CO	31.19089	1 in 312
4014	93.95	SW	88.59	1200			CO	31.19089	1 in 312
0902	100.23	CO	97.61	225			VC	25	1 in 125
6905	96.33	CO	92.57	450			VC	122.6986	1 in 44
7908	96.64	SW	92.16	750			CO	42.72002	1 in 171
6903	97.18	FO	94.64	150			VC	14.7616	1 in 134
6908	96.71	SW	93.86	300			VC	73.72286	1 in 79
7010	97.6	FO	94.93	150			VC	13.49169	1 in 135
7007	97.84	SW	94.77	300			VC	20.73881	1 in 138
7009	97.56	SW	94.62	300			VC	13.28559	1 in 133
5006	94.05	FO	92.7	150			VC	64.48949	1 in 57
4010	92.85	SW	88.36	1200			CO	21.32987	1 in 305
4010	92.85	SW	88.36	1200			CO	21.32987	1 in 305
6008	98.17	SW	96.85	150			VC	45.40752	1 in 70
8405		CO		150			VC	29.5629	
8405		CO		150			VC	29.5629	
7402	99.2	CO	95.18	300			CO	13.89244	1 in 232
7401	98.76	CO	95.02	375			CO	36.05551	1 in 400.615808
7301	96.45	CO	95.39	225			VC	56.36488	1 in 282
7302		CO		150			VC	6.185668	
7303		CO		150			VC	8.783695	
7304		CO		150			VC	13.07121	
9301	101.66	CO	99.36	225			VC	22.2036	1 in 85
9312		CO		150			VC	15.58287	
9201	102.17	CO	100.41	225			VC	53.25411	1 in 118
8312		CO		150			VC	3.706493	
9217		CO		150			VC	10.36651	
9302	101.24	CO	99.82	225			VC	58.60034	1 in 120
9204		CO		150			VC	8.713991	
8205		CO		150			VC	31.30603	
9208		CO		150			VC	8.700858	
0113		CO		150			VC	14.04936	
9102	102.17	CO	97.2	300			VC	57.68862	1 in 85
9202	102.52	CO	97.79	225			VC	25.4951	1 in 88
9105		CO		150			VC	6.506974	
0205		CO		150			VC	14.43913	
9004	97.34	CO	94.38	825			CO	10.66257	1 in 1066
9003	97.49	CO	94.4	825			CO	7.758256	1 in 388
9006	98.26	CO	94.46	825			CO	37.69028	1 in 628
7004	97.67	SW	95.01	300			VC	20.86746	1 in 139
7003	97.39	FO	95.74	150			VC	29.2675	1 in 81
8001	97.41	CO	94.74	300			VC	38.80078	1 in 75
8102	99.68	CO	95.53	300			VC	70.93659	1 in 95
9002	101.1	CO	99.31	225			VC	34.52535	1 in 69
9101	100.95	CO	98.63	225			VC	39.39571	1 in 127
0015		CO		150			VC	9.876177	
6405		CO		100			VC	19.98461	
6304		CO		100			VC	5.641041	
6503	101.51	CO	97.57	300			VC	82.28001	1 in 187
6301	97.93	CO	95.62	225			CO	80.13114	1 in 116
5008	97.52	SW	95.85	225			VC	46.49523	1 in 43
4012	94.77	SW	88.68	1200			CO	26.01248	1 in 289
4012	94.77	SW	88.68	1200			CO	26.01248	1 in 289
5009	97.45	FO	96.2	150			VC	46.97147	1 in 46
6102	98.3	FO	96.65	150			VC	35.7537	1 in 79
4108	95.2	SW	93.07	225			UN	9.477607	1 in 14
4108	95.2	SW	93.07	225			UN	9.477607	1 in 14
5104	97	FO	95.11	150			VC	34.00753	1 in 81
4502	99.92	CO	97.57	300			VC	75.60423	1 in 154
4502	99.92	CO	97.57	300			VC	75.60423	1 in 154
4502	99.92	CO	97.57	300			VC	75.60423	1 in 154
4502	99.92	CO	97.57	300			VC	75.60423	1 in 154
5501	101.71	CO	97.07	375			VC	66.60332	1 in 416
5501	101.71	CO	97.07	375			VC	66.60332	1 in 416
5501	101.71	CO	97.07	375			VC	66.60332	1 in 416
4302		CO		150			VC	4.692246	
4302		CO		150			VC	4.692246	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4015	93.98	FO	92.71	150			VC	35.13228	1 in 32
4015	93.98	FO	92.71	150			VC	35.13228	1 in 32
4109	94.97	SW	92.34	300			VC	32.64607	1 in 42
4109	94.97	SW	92.34	300			VC	32.64607	1 in 42
4001		SW	86.79	525			VC	29.06233	
4001		SW	86.79	525			VC	29.06233	
5001	92.04	CO	88.46	450			VC	53.7785	
5001	92.04	CO	88.46	450			VC	53.7785	
5003	93.55	CO	89.01	450			VC	55.0726	1 in 106
5007	94.92	SW	93.33	225			VC	24.6391	1 in 40
4011	92.9	FO	91.56	150			VC	24.6391	1 in 40
5005	94.12	SW	88.58	1200			CO	64.63882	1 in 294
5007	94.92	SW	93.33	225			VC	16.02256	1 in 22
7509		CO		150			VC	17.56493	
7509		CO		150			VC	17.56493	
7501	101.24	CO	98.51	225			VC	54.70832	1 in 166
7501	101.24	CO	98.51	225			VC	54.70832	1 in 166
7404	100.19	CO	95.37	300			VC	53.48832	1 in 297
7404	100.19	CO	95.37	300			VC	53.48832	1 in 297
8303		CO		100			VC	28.68926	
8308		CO		100			VC	25.70632	
9501	101.24	CO	99.35	225			VC	86.34813	1 in 29
9501	101.24	CO	99.35	225			VC	86.34813	1 in 29
9310		CO		150			VC	5.1038	
9304	102.37	CO	99.94	225			VC	18.02776	1 in 139
0304	102.46	CO	98.79	225			VC	33.24154	1 in 128
8207		CO		150			VC	10.69763	
9303	100.93	CO	99.32	225			VC	38.94868	1 in 73
8201	100.74	CO	98.74	225			VC	22.82542	1 in 163
9104	101.77	CO	98.19	225			VC	41.03657	1 in 95
9005		CO	94.43	450			VC	18.68521	1 in 168
7906	97.54	CO	93.88	450			VC	76.00658	1 in 123
7002	97.3	SW	95.27	300			VC	35.70357	1 in 137
7001	97.51	SW	92.6	750			CO	5.656854	1 in 26
8003	97.46	CO	93.36	450			VC	14.21267	1 in 25
8005	97.62	CO	94.05	450			VC	54.32558	1 in 84
8008	97.66	CO	0	300			VC	8.1990775	
8009	97.53	CO	0	300			VC	10.27011	
9001	100.59	CO	98.31	300			VC	57.58472	1 in 180
9009		CO		150			VC	8.663988	
0014		CO		150			VC	10.23413	
6404		CO		100			VC	7.551493	
6404		CO		100			VC	7.551493	
5504		CO		100			VC	8.943911	
5504		CO		100			VC	8.943911	
5516		CO		150			VC	31.64024	
5516		CO		150			VC	31.64024	
6403	100.52	CO	94.51	525			CO	100.2098	1 in 1432
6403	100.52	CO	94.51	525			CO	100.2098	1 in 1432
6401	100.39	CO	94.7	450			CO	61.7171	1 in 363
6401	100.39	CO	94.7	450			CO	61.7171	1 in 363
6302	97.74	CO	96.07	225			CO	69.64194	1 in 170
4106	94.95	FO	93.63	150			VC	17.40154	1 in 79
4106	94.95	FO	93.63	150			VC	17.40154	1 in 79
6103	98.55	SW	96.82	225			VC	19.13797	1 in 101
4107	95.16	FO	93.27	150			VC	14.54713	1 in 28
4107	95.16	FO	93.27	150			VC	14.54713	1 in 28
5105	96.83	SW	94.18	300			VC	62.78629	1 in 45
5106	96.59	FO	94.69	150			VC	13.40705	1 in 134
6106	97.72	SW	95.81	225			VC	20.25471	1 in 44
4205	87.32	CO	81.72	225			VC	18.02776	
4205	87.32	CO	81.72	225			VC	18.02776	
5402	98.4	CO	94.43	525			CO	97.08244	
5402	98.4	CO	94.43	525			CO	97.08244	
5402	98.4	CO	94.43	525			CO	97.08244	
5402	98.4	CO	94.43	525			CO	97.08244	
4501	100.14	CO	98.21	225			VC	50.21952	1 in 173
4501	100.14	CO	98.21	225			VC	50.21952	1 in 173
6907	97.04	FO	94.53	150			VC	22.89256	1 in 135
6909	96.76	FO	94.36	150			VC	79.26721	1 in 79
6001	97.47	SW	94.35	300			VC	26.37988	1 in 132
5901	93.47	SW	88.93	525			VC	70.7922	1 in 33

LEGEND

Abandoned · Foul · Surface Water · Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined · blue - surface water
brown - foul · purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
CSB	Concrete Segment Bolted
CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass Reinforced Plastic
DI	Ductile Iron
PVC	Polyvinyl Chloride
CI	Cast Iron
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

1 LINDSIDE WALK,
MANCHESTER,
M9 6DH

OS sheet Number: SD8603SE
Scale: 1:1250 **Date:** 08/12/2022
Nodes: 273
Sheet: 3 of 4

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

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.

Crown copyright and database rights 2017 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
7002	98.3	CO	96.63	225			VC	3.298615	
9805	99.73	CO	98.06	300			VC	16.49242	1 in 412
9803	99.7	CO	98.02	300			VC	21.58703	1 in 166
9806	99.87	CO	97.94	300			VC	32.01562	1 in 246
9807	99.65	CO	98.22	225			VC	18.43955	1 in 142
7801	99.44	CO	95.21	825			CO	56.29387	1 in 217
7802	99.25	CO	96.61	225			VC	42.2019	1 in 90
7823		CO		150			VC	9.816127	
7814		CO		100			VC	5.749976	
9704	99.69	CO	95.83	300			VC	71.38628	1 in 1428
8713	100.61	FO	96.53	150			VC	3.022747	1 in 13
8801	99.99	CO	95.43	825			CO	14.30475	
9808		CO		150			VC	14.00795	
8711	100.68	FO	97.06	150			VC	34.93707	1 in 103
9701	99.4	CO	97.84	225			VC	27.85678	1 in 71
9712		CO		150			VC	10.27394	
9720		CO		150			VC	9.840399	
9727		CO		150			VC	12.57234	
8705	100.39	SW	98.17	225			VC	44.42126	1 in 91
9702	98.83	CO	97.43	225			VC	50	1 in 86
9723		CO		150			VC	8.693803	
8606	99.92	SW	97.76	375			CO	29.82026	1 in 229
7712		CO		100			VC	2.200838	
0616		FO		100			PVC	6.201232	
8610	99.7	FO	97.71	150			VC	21.96215	1 in 169
8604	99.72	SW	97.83	300			VC	18.89047	1 in 270
7602	100.69	CO	98.4	225			VC	5.385165	1 in 539
8612	99.94	FO	97.58	150			VC	29.26386	1 in 139
8506	100.64	FO	98.19	150			VC	10.25674	1 in 128
8508		FO		100			PE	14.33085	
7503	100.95	CO	99.06	225			VC	54.08327	1 in 61
7503	100.95	CO	99.06	225			VC	54.08327	1 in 61
8501	100.86	CO	98.96	225			VC	65.00769	1 in 155
8501	100.86	CO	98.96	225			VC	65.00769	1 in 155
8521		CO		100			VC	12.20286	
8521		CO		100			VC	12.20286	
8401	99.95	CO	95.62	225			VC	47.16991	1 in 197
8401	99.95	CO	95.62	225			VC	47.16991	1 in 197
8419		CO		150			VC	13.55874	
8419		CO		150			VC	13.55874	
7410		CO		100			VC	12.53881	
7410		CO		100			VC	12.53881	
7411		CO		100			VC	16.46323	
7411		CO		100			VC	16.46323	
8502	99.39	CO	96.33	225			VC	45.39824	
8502	99.39	CO	96.33	225			VC	45.39824	
6801	98.55	CO	95.95	225			VC	12.36932	1 in 155
6602	101.16	CO	98.79	225			VC	11.6619	1 in 78
7603	100.92	CO	98.37	300			VC	81.59657	1 in 204
6406		CO		100			VC	22.21425	
6406		CO		100			VC	22.21425	
6407		CO		150			VC	20.41142	
6407		CO		150			VC	20.41142	
7502	100.3	CO	98.15	225			VC	47.42362	1 in 139
7502	100.3	CO	98.15	225			VC	47.42362	1 in 139
6603	101.28	CO	97.93	300			VC	75.96052	1 in 230
6703	101.21	CO	99.88	225			VC	48.83646	1 in 119
5710		CO		150			VC	8.479527	
5710		CO		150			VC	8.479527	
5703		CO		150			VC	6.803391	
5703		CO		150			VC	6.803391	
5505		CO		100			VC	10.9223	
5505		CO		100			VC	10.9223	
5505		CO		100			VC	10.9223	
5505		CO		100			VC	10.9223	
4408	99.14	CO	97.91	225			VC	32.01562	1 in 100
4408	99.14	CO	97.91	225			VC	32.01562	1 in 100
4601	102.7	CO	96.8	450			VC	102.4158	1 in 201
4601	102.7	CO	96.8	450			VC	102.4158	1 in 201
4702	103.52	CO	101.25	225			VC	59.03389	1 in 54
4702	103.52	CO	101.25	225			VC	59.03389	1 in 54
6005		CO		150			VC	6.641957	
5803	97.47	CO	0	225			VC	64.84597	
6817	98	CO	3	225			PVC	4.195181	1 in 28
6813	98.4	SW	96.24	150			CO	17.05548	1 in 426
6812	98.74	SW	96.29	450			CO	17.70284	1 in 354
6811	98.93	SW	96.32	450			CO	13.47404	1 in 449
9002	101	CO	99.2	300			VC	40.16217	1 in 115
9018		SW		100			VC	30.93165	
9009		SW		100			VC	10.78834	
9814		CO		150			VC	13.23962	
9825		CO		100			VC	5.773371	
9822		CO		150			VC	2.676366	
8802	100.02	CO	95.66	300			VC	97.08244	1 in 237
7804	98.89	CO	94.94	825			VC	26.83282	
7825		CO		100			VC	8.370474	
0804	100.35	CO	98.28	300			VC	8.062258	1 in 115
0803	100.31	CO	98.53	225			VC	19.41649	1 in 324
8707	101	SW	97.32	375			VC	25.54382	1 in 32
8712	101.01	FO	96.72	150			VC	21.42799	1 in 113
9810		SW		750			CO	30.8707	
8706	100.74	SW	97.46	375			CO	34.45211	1 in 246
7703	101.31	SW	99.38	225			VC	34.17654	1 in 19
9705		CO		150			VC	16.94014	
9703	99.58	CO	96.84	225			VC	7.28011	1 in 23
8709	100.84	FO	97.15	150			VC	12.30162	1 in 137
9608		SW		600			CO	22.09066	
0607		FO		150			VC	8.891009	
0604		FO	0	225			CO	38.04004	
8609	99.91	FO	97.88	150			VC	29.14039	1 in 194
9605	99.3	FO	98.22	150			VC	40.13573	1 in 118
9604	99.55	FO	98.36	150			VC	25.63526	1 in 183
9601	99.54	SW	98.12	225			VC	29.76395	1 in 39
9602	99.31	SW	97.36	225			VC	24.84735	1 in 311
9714		CO		150			VC	18.19345	
7601	100.21	CO	98.62	225			VC	25.63201	1 in 117
8614		FO		100			VC	15.83312	
8615		FO		150			VC	9.098629	
8601	100.58	SW	98.41	225			VC	25.97802	1 in 200
8607	100.57	FO	98.11	150			VC	27.33399	1 in 210
8503	100.21	SW	98.7	225			VC	39.44288	1 in 179
7505		CO		150			VC	21.788	
7505		CO		150			VC	21.788	
8402	100.26	CO	95.8	225			VC	21.37756	1 in 126
8402	100.26	CO	95.8	225			VC	21.37756	1 in 126
8403		CO	0	225			VC	31.257	
8403		CO	0	225			VC	31.257	
8407		CO		100			VC	16.98481	
8410		CO		150			VC	9.983336	
8415		CO		150			VC	7.554543	
8415		CO		150			VC	7.554543	
8520		CO		100			VC	9.935346	
8520		CO		100			VC	9.935346	
7409		CO		100			VC	10.87592	
7409		CO		100			VC	10.87592	
7805	98.69	CO	95	300			VC	36.49657	1 in 192
6701	102.37	CO	99.78	225			VC	57.27129	1 in 62
6609		CO		150			VC	14.29379	
6402	100.78	CO	97.8	225			CO	48.79549	1 in 17
6402	100.78	CO	97.8	225			CO	48.79549	1 in 17
7305	98.16	CO	94.91	375			CO	84.17244	1 in 443
6501		CO		150			VC	26.60517	
6701	102.37	CO	100.45	225			VC	67.26812	1 in 67
5604		CO		150			VC	24.41815	
5502	101.8	CO	99.62	225			VC	69.52783	1 in 82
5502	101.8	CO	99.62	225			VC	69.52783	1 in 82
5401	93.45	CO		100			VC	15.00425	
5401	93.45	CO		100			VC	15.00425	
5520		CO		150			VC	18.40527	
5520		CO		150			VC	18.40527	
5701	102.02	CO	98.68	300			VC	41.14608	1 in 114
6605		CO	0	1500			CO	273.5814	
5506		CO		100			VC	11.40675	
5506		CO		100			VC	11.40675	
4608		CO		150			VC	12.25576	
4608		CO		150			VC	12.25576	
4602	103.59	CO	101.49	225			VC	32.31099	1 in 249
5717		CO		100			VC	1.533907	
5717		CO		100			VC	1.533907	
4709		CO		150			VC	8.167535	
4709		CO		150			VC	8.167535	
6802	98.45	CO	95.8	225			VC	103.1601	
6814	98.05	SW	96.2	225			PVC	2.756702	1 in 2
4803	102.98	CO	100.93	225			VC	44.92215	1 in 107
4825		CO		150			VC	7.727024	
4825		CO		150			VC	7.727024	
8002		SW	0	225			VC	60.87693	
9010		CO		100			VC	10.35077	
9830		CO		150			VC	17.34974	
9804	99.54	CO	98.24	225			VC	14.86607	1 in 149
9801	99.59	CO	97.8	300			VC	36.54834	1 in 183
9827		CO		150			VC	6.441765	
9802	99.59	CO	97.86	300			VC	10.81665	1 in 216
0805	100.36	CO	98.19	300			VC	37.36308	1 in 162
7813		CO		150			VC	8.571057	
8708	100.63	CO	96.3	375			CO	13.12221	1 in 131
9706	99.78	CO	97.94	225			VC	28.44292	
9826		CO	97.6	300			VC	31.32238	
9809		CO	0	300			VC	47.29694	
0702	99.46	CO	96.43	750			CO	75.70998	1 in 344
8710	100.44	FO	98.61	150			VC	43.60546	1 in 30
8703	100.79	SW	97.61	375			CO	23.38992	1 in 292
7713		CO		100			VC	5.428893	
7707		CO		100			VC	6.935621	
8704	100.9	SW	97.53	375			CO	11.89454	1 in 170
9606		SW	0	300			VC	26.41179	
0608		FO		150			VC	16.78935	
8605	99.45	SW	98.27	225			VC	27.66732	1 in 106
8603	99.91	SW	97.96	300			VC	29.1955	
8616		FO		100			VC	10.27036	
7604	100.97	CO	99.07	225			VC	27.51368	1 in 42
8504	100.64	SW	98.48	225			VC	11.70205	1 in 167
8608	100.23	FO	97.98	150			VC	16.17386	1 in 162
8405		CO		150			VC	29.5629	
8405		CO		150			VC	29.5629	
7803	98.73	CO	96.14	225			VC	25.31798	1 in 158
7829		CO		150			VC	7.971866	
6701	102.37	CO	0	225			VC	97.86214	
7504	101.04	CO	99.28	225			VC	40.8534	1 in 91
6601	102.12	CO	100.4	225			VC	16.0269	
6611		FO		100			VC	7.529234	
6601	102.12	CO		225			VC	33.0037	
6503	101.51	CO	97.57	300			VC	82.28001	1 in 187
5602	102.14	CO	98.06	375			VC	40.70626	1 in 83
5602	102.14	CO	98.06	375			VC	40.70626	1 in 83
6301	97.93	CO	95.62	225			CO	80.13114	1 in 116
6702	102.08	CO	99.43	225			VC	79.37884	1 in 112
5706		CO		150			VC	13.94907	
5706		CO		150			VC	13.94907	
4502	99.92	CO	97.57	300			VC	75.60423	1 in 154
4502	99.92	CO	97.57	300			VC	75.60423	1 in 154

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
5501	101.71	CO	97.07	375			VC	66.60332	1 in 416
5501	101.71	CO	97.07	375			VC	66.60332	1 in 416
5501	101.71	CO	97.07	375			VC	66.60332	1 in 416
5501	101.71	CO	97.07	375			VC	66.60332	1 in 416
6901	98.21	CO	96	225			VC	54.40588	1 in 101
7816		CO		150			VC	14.78748	
7001	98.97	CO	96.66	225			VC	106.7001	1 in 130
6803	98.38	CO	94.81	300			VC	40.20981	
6816	98.4	FO	95.94	150			PVC	20.21651	1 in 22
6804	97.54	CO	94.61	225			VC	6.324555	
5802	96.81	CO	94.37	225			VC	4.472136	
5802	96.81	CO	94.37	225			VC	4.472136	
5802	96.81	CO	94.37	225			VC	4.472136	
5804	97.44	CO	94.29	300			VC	92.34717	1 in 95
6815	98.75	FO	96.8	150			PVC	19.79689	1 in 23
5809		CO		150			VC	4.753512	
4804	96.59	CO	93.99	300			VC	89.15717	1 in 110
4804	96.59	CO	93.99	300			VC	89.15717	1 in 110
4822		CO		150			VC	15.19679	
4822		CO		150			VC	15.19679	
8001		CO	98.52	300			VC	105.6775	1 in 106
8009		CO		150			VC	15.33628	
0801	100.21	CO	98.61	300			VC	80.04999	1 in 148
9811		CO		150			VC	3.558741	
0704	99.5	CO	97.72	225			VC	73.97973	
9839		CO		150			VC	6.293564	
8804	100.46	CO	95.43	825			CO	55.12156	1 in 290
7806	99.24	CO	95.24	300			VC	44.14748	1 in 184
7826		CO		100			VC	26.00236	
0808		CO		150			VC	5.356706	
8701	100.05	CO	95.86	300			VC	21.2132	1 in 133
9842		CO		150			VC	0.9578412	
7704	101.26	FO	99.38	150			VC	29.65087	1 in 13
9719		CO		150			VC	5.780854	
9715		CO		150			VC	11.43629	
9709		CO		150			VC	12.11765	
9726		CO		100			VC	9.691854	
8613	100.78	FO	97.37	150			VC	27.52233	1 in 125
7718		CO		100			VC	3.432941	
7706		CO		100			VC	6.15064	
9603	99.57	SW	0	300			VC	29.49459	
9607		SW		600			CO	20.20811	
8611	99.46	FO	97.88	150			VC	22.58456	1 in 133
9610		CO		150			VC	12.54187	
8519		FO		100			VC	15.47445	
7610		CO		150			VC	9.652183	
8602	100.25	SW	98.25	300			VC	20.56788	1 in 71
8505	100.19	FO	98.45	150			VC	40.45533	1 in 156
7509		CO		150			VC	17.56493	
7509		CO		150			VC	17.56493	
7501	101.24	CO	98.51	225			VC	54.70832	1 in 166
7501	101.24	CO	98.51	225			VC	54.70832	1 in 166
7404	100.19	CO	95.37	300			VC	53.48832	1 in 297
7404	100.19	CO	95.37	300			VC	53.48832	1 in 297
9501	101.24	CO	99.35	225			VC	86.34813	1 in 29
9501	101.24	CO	99.35	225			VC	86.34813	1 in 29
7701	100.77	CO	97.68	225			VC	59.03389	1 in 87
6805		CO	0	1500			CO	219.3291	
6404		CO		100			VC	7.551493	
6404		CO		100			VC	7.551493	
5504		CO		100			VC	8.943911	
5504		CO		100			VC	8.943911	
5509		CO		150			VC	9.504189	
5516		CO		150			VC	31.64024	
5516		CO		150			VC	31.64024	
6403	100.52	CO	94.51	525			CO	100.2098	1 in 1432
6403	100.52	CO	94.51	525			CO	100.2098	1 in 1432
6401	100.39	CO	94.7	450			CO	61.7171	1 in 363
6401	100.39	CO	94.7	450			CO	61.7171	1 in 363
5601	101.27	CO	99.75	225			VC	32.64965	1 in 251
4701	102.29	CO	100.49	225			VC	86.33076	1 in 93
4701	102.29	CO	100.49	225			VC	86.33076	1 in 93
5705		CO		150			VC	9.284122	
5705		CO		150			VC	9.284122	
5402	98.4	CO	94.43	525			CO	97.08244	
5402	98.4	CO	94.43	525			CO	97.08244	
5402	98.4	CO	94.43	525			CO	97.08244	
5402	98.4	CO	94.43	525			CO	97.08244	
4501	100.14	CO	98.21	225			VC	50.21952	1 in 173
4501	100.14	CO	98.21	225			VC	50.21952	1 in 173
4508		CO		150			VC	8.061387	
4508		CO		150			VC	8.061387	
4704	103.62	CO	101.58	225			VC	33.52611	1 in 129
7901		CO		150			VC	9.898611	
6001	97.76	CO	95.84	225			VC	39.72459	1 in 107
5805		CO	0	1500			CO	200.3397	
5805		CO	0	1500			CO	200.3397	
5801	98.32	CO	95.93	225			VC	31.62278	1 in 31
5801	98.32	CO	95.93	225			VC	31.62278	1 in 31
6818	97.9	CO		300			VC	61.21972	
5815		CO		150			VC	9.49207	
5815		CO		150			VC	9.49207	
4905	96.59	CO	93.29	300			VC	66.70832	1 in 39
4905	96.59	CO	93.29	300			VC	66.70832	1 in 39

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined | blue - surface water
brown - foul | purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI Circular | TR Trapezoidal
EG Egg | AR Arch
OV Oval | BA Barrel
FT Flat Top | HO HorseShoe
RE Rectangular | UN Unspecified
SQ Square

SEWER MATERIAL

AC Asbestos Cement
BR Brick
PE Polyethylene
RP Reinforced Plastic Matrix
CO Concrete
CSB Concrete Segment Bolted
CSU Concrete Segment Unbolted
CC Concrete Box Culverted
PSC Plastic / Steel Composite
GRC Glass Reinforced Plastic
DI Ductile Iron
PVC Polyvinyl Chloride
CI Cast Iron
SI Spun Iron
ST Steel
VC Vitrified Clay
PP Polypropylene
PF Pitch Fibre
MAC Masonry, Coursed
MAR Masonry, Random
U Unspecified

Address or Site Reference:

1 LINDSIDE WALK,
MANCHESTER,
M9 6DH

OS sheet Number: SD8603NE
Scale: 1:1250 **Date:** 08/12/2022
Nodes: 294
Sheet: 4 of 4

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

Wilkinson, Ruth

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 03 October 2022 10:13
To: Wilkinson, Ruth
Subject: Pre Development Enquiry for: Former White Moss Day Care - Charlestown UU Reference Number : 02849952

Good Morning, Ruth

Pre Development Enquiry for: Former White Moss Day Care - Charlestown UU Reference Number : 02849952

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

https://www.unitedutilities.com/builders-developers/working-near-our-assets/

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 450mm diameter public combined sewer within Benmore Road located to the West of your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

In accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.
This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

For guidance, The **North West SuDS Pro-Forma** provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

https://www.gov.uk/government/publications/groundwater-protection-position-statements

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 450mm diameter public combined sewer within Benmnore Road located West of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s.

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the pubic sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design.

Please refer to the link below to obtain full details of the processes involved with sewer diversions:

https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/

Connection Application

Although we may discuss and agree discharge points and 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:

https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Sewer Adoptions

You have indicated on your application form that you intend to put the sewers forward for adoption (including any SuDS components that can come within the meaning of a sewer).

United Utilities assess adoption applications based on the current Design & Construction Guidance and local practices which have now replaced 'Sewers For Adoption 6th Edition'.

We recommend that you submit a pre design assessment to the sewer adoption mailbox (SewerAdoptions@uuplc.co.uk) stating pre design assessment in the title

Please refer to links below to obtain further guidance:

https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-adoptions/

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.

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 set out in the Design & Construction Guidance. The proposed design should give consideration to long term operability and give United Utilities a safe and cost effective proposal for the lifetime of the assets. In these cases, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 application, has been assessed and accepted in writing by United Utilities. Any work carried out prior to the technical assessment being approved is done entirely at the developer's own risk and could be subject to change.

SuDS

If your development proposal incorporates any SuDS component(s) which interact with a sewer network you plan on offering for adoption to United Utilities; contact should be made with our technical team at your earliest convenience, please complete the 'Section 104 pre-application form : ' and include as much relevant detail as you can. These discussions can help prevent delays later in the development process.

Section 104 Pre application form (1b)

As per the sewerage sector guidance, all SuDS should be designed in accordance with the standards within the Design & construction guidance & the CIRIA SuDS manual (C753)

Codes For Adoption

The new Codes for Adoption are outlined on the Water UK Website. The link below takes you to their webpage:

https://www.water.org.uk/technical-guidance/developers-services/codes-for-adoption/

A free copy of the new Design & Construction Guidance can be downloaded via the link below**:**

https://www.water.org.uk/sewerage-sector-guidance-approved-documents/

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Many thanks and kind regards,

Gary Jaundrell
Assistant Developer Engineer
Developer Services & Metering
Customer Services
T: 07388 715 589
unitedutilities.com

If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry https://www.unitedutilities.com/builders-developers/ or you can email us at WastewaterDeveloperServices@uuplc.co.uk

---------- Original Message ----------
From: wastewaterdeveloperservices@uuplc.co.uk [wastewaterdeveloperservices@uuplc.co.uk]
Sent: 26/09/2022 14:25
To: ruth.wilkinson@atkinsglobal.com
Subject: RE: Our reference - 02849952 Former White Mos Day Care Centre, Near Benmore Rd, Manchester

---------- Original Message ----------
From: wastewaterdeveloperservices@uuplc.co.uk [wastewaterdeveloperservices@uuplc.co.uk]
Sent: 26/09/2022 10:07
To: uth.wilkinson@atkinsglobal.com
Subject: Our reference - 02849952 Former White Mos Day Care Centre, Near Benmore Rd, Manchester

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Wilkinson, Ruth

From: GMMC Info Requests <InfoRequests.GMMC@environment-agency.gov.uk>
Sent: 19 October 2022 09:23
To: Wilkinson, Ruth
Subject: GMMC281028SW Response attached from the Environment Agency

Dear Ruth,

Thank you for your enquiry which was received on 23/09/22.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

The site proposal is located in Flood Zone 1, very low risk. Our nearest model is in Blackley, which has no impact to this site location.

We have no flood defences in the vicinity of this site.

We have no records of flooding affecting the site. However, this does not mean flooding has not occurred in the past or that it will not flood in future. We recommend that you also contact United Utilities and the lead local flood authority who may hold additional information (the former especially in relation to sewer flooding).

For further information on your property's flood risk, visit:
Long term flood risk website: https://flood-warning-information.service.gov.uk/long-term-flood-risk/
Flood Map for Planning: https://flood-map-for-planning.service.gov.uk/

For surface water information please use link: https://check-long-term-flood-risk.service.gov.uk/map?easting=362125.07&northing=388310.97&map=SurfaceWater

Please refer to the Open Government Licence which explains the permitted use of this information.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards,

Sarah

Sarah Walters | Customer and Engagement Officer
Greater Manchester, Merseyside and Cheshire

Direct email: **Inforequests.GMMC@environment-agency.gov.uk**
Office address: Richard Fairclough House, Knutsford Road, Latchford, Warrington, WA4 1HT

From: Wilkinson, Ruth <Ruth.Wilkinson@atkinsglobal.com>
Sent: 23 September 2022 10:50

This document was created by an application that isn't licensed to use novaPDF.
Purchase a license to generate PDF files without this notice.

Appendix G Existing & Proposed S.W Network Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.517	Urban	0.000
SAAR (mm)	964	Region Number	Region 10

Results l/s

QBAR Rural	3.3
QBAR Urban	3.3
Q100 years	6.9
Q1 year	2.9
Q30 years	5.6
Q100 years	6.9

©1982-2019 Innovyze

Existing Network Details for 223-008 S.W NETWORK.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	14.235	0.084	169.5	0.073	5.00	0.600	o	225	Pipe/Conduit
1.001	6.377	0.016	398.6	0.040	0.00	0.600	o	1200	Pipe/Conduit
1.002	27.985	0.070	400.0	0.015	0.00	0.600	o	1200	Pipe/Conduit
1.003	9.770	0.024	400.0	0.000	0.00	0.600	o	1200	Pipe/Conduit
1.004	16.665	0.167	100.0	0.031	0.00	0.600	o	225	Pipe/Conduit
1.005	33.158	0.332	100.0	0.000	0.00	0.600	o	225	Pipe/Conduit
1.006	9.732	0.487	20.0	0.000	0.00	1.500	o	225	Pipe/Conduit

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
1.000	8	101.315	99.600	1.490	101.079	99.516	1.338		1350
1.001	7	101.079	98.541	1.338	101.000	98.525	1.275		2700
1.002	6	101.000	98.525	1.275	100.964	98.455	1.309		2700
1.003	5	100.964	98.455	1.309	100.867	98.431	1.236		2700
1.004	4	100.867	98.431	2.211	101.010	98.264	2.521	Hydro-Brake®	2700
1.005	3	101.010	98.264	2.521	100.675	97.932	2.518		1200
1.006	2	100.675	97.932	2.518	100.324	97.446	2.653		1200

Free Flowing Outfall Details for 223-008 S.W NETWORK.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006	1	100.324	97.446	94.725	1500	0

Simulation Criteria for 223-008 S.W NETWORK.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	M5-60 (mm) 18.800
Return Period (years)		2	Ratio R 0.302
Region	England and Wales	Profile Type	Summer

©1982-2020 Innovyze

Synthetic Rainfall Details

Cv (Summer) 0.750 Storm Duration (mins) 30
Cv (Winter) 0.840

©1982-2020 Innovyze

Online Controls for 223-008 S.W NETWORK.SWS

Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.004, Volume (m³): 21.9

Unit Reference	MD-SHE-0100-5000-1350-5000
Design Head (m)	1.350
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	98.431
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	5.0
Flush-Flo™	0.400	5.0
Kick-Flo®	0.829	4.0
Mean Flow over Head Range	-	4.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	1.200	4.7	3.000	7.3	7.000	10.9
0.200	4.6	1.400	5.1	3.500	7.8	7.500	11.2
0.300	4.9	1.600	5.4	4.000	8.3	8.000	11.6
0.400	5.0	1.800	5.7	4.500	8.8	8.500	11.9
0.500	5.0	2.000	6.0	5.000	9.2	9.000	12.2
0.600	4.8	2.200	6.3	5.500	9.7	9.500	12.6
0.800	4.2	2.400	6.5	6.000	10.1		
1.000	4.4	2.600	6.8	6.500	10.5		

©1982-2020 Innovyze

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 223-008 S.W NETWORK.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.302
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.800	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	8	15 Winter	2	+0%	100/15 Summer				99.693
1.001	7	60 Winter	2	+0%	100/120 Winter				98.767
1.002	6	60 Winter	2	+0%	100/120 Winter				98.767
1.003	5	60 Winter	2	+0%	100/120 Winter				98.767
1.004	4	60 Winter	2	+0%	2/15 Summer				98.767
1.005	3	60 Winter	2	+0%					98.312
1.006	2	60 Winter	2	+0%					97.967

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	8	-0.132	0.000	0.35			12.2	OK	
1.001	7	-0.974	0.000	0.01			9.4	OK	
1.002	6	-0.958	0.000	0.01			9.3	OK	
1.003	5	-0.888	0.000	0.01			4.8	OK	
1.004	4	0.112	0.000	0.11			5.0	SURCHARGED	
1.005	3	-0.177	0.000	0.10			5.0	OK	
1.006	2	-0.191	0.000	0.06			5.0	OK	

©1982-2020 Innovyze

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 223-008 S.W NETWORK.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.302
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.800	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	8	15 Winter	30	+0%	100/15 Summer				99.736
1.001	7	60 Winter	30	+0%	100/120 Winter				99.057
1.002	6	60 Winter	30	+0%	100/120 Winter				99.057
1.003	5	60 Winter	30	+0%	100/120 Winter				99.057
1.004	4	60 Winter	30	+0%	2/15 Summer				99.057
1.005	3	15 Summer	30	+0%					98.312
1.006	2	60 Winter	30	+0%					97.967

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	8	-0.089	0.000	0.66			23.1	OK	
1.001	7	-0.684	0.000	0.02			17.8	OK	
1.002	6	-0.668	0.000	0.01			16.8	OK	
1.003	5	-0.598	0.000	0.01			6.6	OK	
1.004	4	0.402	0.000	0.11			5.0	SURCHARGED	
1.005	3	-0.177	0.000	0.10			5.0	OK	
1.006	2	-0.191	0.000	0.06			5.0	OK	

©1982-2020 Innovyze

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 223-008 S.W NETWORK.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.302
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.800	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	8	15 Winter	100	+45%	100/15 Summer				99.866
1.001	7	120 Winter	100	+45%	100/120 Winter				99.801
1.002	6	120 Winter	100	+45%	100/120 Winter				99.801
1.003	5	120 Winter	100	+45%	100/120 Winter				99.801
1.004	4	120 Winter	100	+45%	2/15 Summer				99.801
1.005	3	120 Winter	100	+45%					98.312
1.006	2	120 Winter	100	+45%					97.967

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	8	0.041	0.000	1.24			43.0	SURCHARGED	
1.001	7	0.060	0.000	0.03			22.2	SURCHARGED	
1.002	6	0.076	0.000	0.01			20.6	SURCHARGED	
1.003	5	0.146	0.000	0.01			4.6	SURCHARGED	
1.004	4	1.146	0.000	0.11			5.0	SURCHARGED	
1.005	3	-0.177	0.000	0.10			5.0	OK	
1.006	2	-0.190	0.000	0.06			5.0	OK	

©1982-2020 Innovyze

Existing Network Details for 223-008 S.W NETWORK.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	14.235	0.084	169.5	0.073	5.00	0.600	o	225	Pipe/Conduit
1.001	6.377	0.016	398.6	0.040	0.00	0.600	o	1200	Pipe/Conduit
1.002	27.985	0.070	400.0	0.015	0.00	0.600	o	1200	Pipe/Conduit
1.003	9.770	0.024	400.0	0.000	0.00	0.600	o	1200	Pipe/Conduit
1.004	16.665	0.167	100.0	0.031	0.00	0.600	o	225	Pipe/Conduit
1.005	33.158	0.332	100.0	0.000	0.00	0.600	o	225	Pipe/Conduit
1.006	9.732	0.487	20.0	0.000	0.00	1.500	o	225	Pipe/Conduit

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
1.000	8	101.315	99.600	1.490	101.079	99.516	1.338		1350
1.001	7	101.079	98.541	1.338	101.000	98.525	1.275		2700
1.002	6	101.000	98.525	1.275	100.964	98.455	1.309		2700
1.003	5	100.964	98.455	1.309	100.867	98.431	1.236		2700
1.004	4	100.867	98.431	2.211	101.010	98.264	2.521	Hydro-Brake®	2700
1.005	3	101.010	98.264	2.521	100.675	97.932	2.518		1200
1.006	2	100.675	97.932	2.518	100.324	97.446	2.653		1200

Surcharged Outfall Details for 223-008 S.W NETWORK.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006	1	100.324	97.446	94.725	1500	0

Datum (m) 94.725 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
5	1.450	70	1.450	135	1.450	200	1.450	265	1.450	330	1.450
10	1.450	75	1.450	140	1.450	205	1.450	270	1.450	335	1.450
15	1.450	80	1.450	145	1.450	210	1.450	275	1.450	340	1.450
20	1.450	85	1.450	150	1.450	215	1.450	280	1.450	345	1.450
25	1.450	90	1.450	155	1.450	220	1.450	285	1.450	350	1.450
30	1.450	95	1.450	160	1.450	225	1.450	290	1.450	355	1.450
35	1.450	100	1.450	165	1.450	230	1.450	295	1.450	360	1.450
40	1.450	105	1.450	170	1.450	235	1.450	300	1.450	365	1.450
45	1.450	110	1.450	175	1.450	240	1.450	305	1.450	370	1.450
50	1.450	115	1.450	180	1.450	245	1.450	310	1.450	375	1.450
55	1.450	120	1.450	185	1.450	250	1.450	315	1.450	380	1.450
60	1.450	125	1.450	190	1.450	255	1.450	320	1.450	385	1.450
65	1.450	130	1.450	195	1.450	260	1.450	325	1.450	390	1.450

©1982-2020 Innovyze

Surcharged Outfall Details for 223-008 S.W NETWORK.SWS

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
395	1.450	570	1.450	745	1.450	920	1.450	1095	1.450	1270	1.450
400	1.450	575	1.450	750	1.450	925	1.450	1100	1.450	1275	1.450
405	1.450	580	1.450	755	1.450	930	1.450	1105	1.450	1280	1.450
410	1.450	585	1.450	760	1.450	935	1.450	1110	1.450	1285	1.450
415	1.450	590	1.450	765	1.450	940	1.450	1115	1.450	1290	1.450
420	1.450	595	1.450	770	1.450	945	1.450	1120	1.450	1295	1.450
425	1.450	600	1.450	775	1.450	950	1.450	1125	1.450	1300	1.450
430	1.450	605	1.450	780	1.450	955	1.450	1130	1.450	1305	1.450
435	1.450	610	1.450	785	1.450	960	1.450	1135	1.450	1310	1.450
440	1.450	615	1.450	790	1.450	965	1.450	1140	1.450	1315	1.450
445	1.450	620	1.450	795	1.450	970	1.450	1145	1.450	1320	1.450
450	1.450	625	1.450	800	1.450	975	1.450	1150	1.450	1325	1.450
455	1.450	630	1.450	805	1.450	980	1.450	1155	1.450	1330	1.450
460	1.450	635	1.450	810	1.450	985	1.450	1160	1.450	1335	1.450
465	1.450	640	1.450	815	1.450	990	1.450	1165	1.450	1340	1.450
470	1.450	645	1.450	820	1.450	995	1.450	1170	1.450	1345	1.450
475	1.450	650	1.450	825	1.450	1000	1.450	1175	1.450	1350	1.450
480	1.450	655	1.450	830	1.450	1005	1.450	1180	1.450	1355	1.450
485	1.450	660	1.450	835	1.450	1010	1.450	1185	1.450	1360	1.450
490	1.450	665	1.450	840	1.450	1015	1.450	1190	1.450	1365	1.450
495	1.450	670	1.450	845	1.450	1020	1.450	1195	1.450	1370	1.450
500	1.450	675	1.450	850	1.450	1025	1.450	1200	1.450	1375	1.450
505	1.450	680	1.450	855	1.450	1030	1.450	1205	1.450	1380	1.450
510	1.450	685	1.450	860	1.450	1035	1.450	1210	1.450	1385	1.450
515	1.450	690	1.450	865	1.450	1040	1.450	1215	1.450	1390	1.450
520	1.450	695	1.450	870	1.450	1045	1.450	1220	1.450	1395	1.450
525	1.450	700	1.450	875	1.450	1050	1.450	1225	1.450	1400	1.450
530	1.450	705	1.450	880	1.450	1055	1.450	1230	1.450	1405	1.450
535	1.450	710	1.450	885	1.450	1060	1.450	1235	1.450	1410	1.450
540	1.450	715	1.450	890	1.450	1065	1.450	1240	1.450	1415	1.450
545	1.450	720	1.450	895	1.450	1070	1.450	1245	1.450	1420	1.450
550	1.450	725	1.450	900	1.450	1075	1.450	1250	1.450	1425	1.450
555	1.450	730	1.450	905	1.450	1080	1.450	1255	1.450	1430	1.450
560	1.450	735	1.450	910	1.450	1085	1.450	1260	1.450	1435	1.450
565	1.450	740	1.450	915	1.450	1090	1.450	1265	1.450	1440	1.450

Simulation Criteria for 223-008 S.W NETWORK.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

©1982-2020 Innovyze

Simulation Criteria for 223-008 S.W NETWORK.SWS

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.302		

©1982-2020 Innovyze

Online Controls for 223-008 S.W NETWORK.SWS

Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.004, Volume (m³): 21.9

Unit Reference	MD-SHE-0100-5000-1350-5000
Design Head (m)	1.350
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	98.431
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	5.0
Flush-Flo™	0.400	5.0
Kick-Flo®	0.829	4.0
Mean Flow over Head Range	-	4.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	1.200	4.7	3.000	7.3	7.000	10.9
0.200	4.6	1.400	5.1	3.500	7.8	7.500	11.2
0.300	4.9	1.600	5.4	4.000	8.3	8.000	11.6
0.400	5.0	1.800	5.7	4.500	8.8	8.500	11.9
0.500	5.0	2.000	6.0	5.000	9.2	9.000	12.2
0.600	4.8	2.200	6.3	5.500	9.7	9.500	12.6
0.800	4.2	2.400	6.5	6.000	10.1		
1.000	4.4	2.600	6.8	6.500	10.5		

©1982-2020 Innovyze

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 223-008 S.W NETWORK.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.302
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.800	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	30, 100
Climate Change (%)	0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	8	15 Winter	30	+0%	100/15 Summer				99.736
1.001	7	60 Winter	30	+0%	100/120 Winter				99.057
1.002	6	60 Winter	30	+0%	100/120 Winter				99.057
1.003	5	60 Winter	30	+0%	100/120 Winter				99.057
1.004	4	60 Winter	30	+0%	30/15 Summer				99.057
1.005	3	15 Summer	30	+0%					98.312
1.006	2	60 Winter	30	+0%					97.967

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	8	-0.089	0.000	0.66			23.1	OK	
1.001	7	-0.684	0.000	0.02			17.8	OK	
1.002	6	-0.668	0.000	0.01			16.8	OK	
1.003	5	-0.598	0.000	0.01			6.6	OK	
1.004	4	0.402	0.000	0.11			5.0	SURCHARGED	
1.005	3	-0.177	0.000	0.10			5.0	OK	
1.006	2	-0.191	0.000	0.06			5.0	OK	

©1982-2020 Innovyze

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 223-008 S.W NETWORK.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.302
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.800	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	30, 100
Climate Change (%)	0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	8	15 Winter	100	+45%	100/15 Summer				99.866
1.001	7	120 Winter	100	+45%	100/120 Winter				99.801
1.002	6	120 Winter	100	+45%	100/120 Winter				99.801
1.003	5	120 Winter	100	+45%	100/120 Winter				99.801
1.004	4	120 Winter	100	+45%	30/15 Summer				99.801
1.005	3	120 Winter	100	+45%					98.312
1.006	2	120 Winter	100	+45%					97.967

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	8	0.041	0.000	1.24			43.0	SURCHARGED	
1.001	7	0.060	0.000	0.03			22.2	SURCHARGED	
1.002	6	0.076	0.000	0.01			20.6	SURCHARGED	
1.003	5	0.146	0.000	0.01			4.6	SURCHARGED	
1.004	4	1.146	0.000	0.11			5.0	SURCHARGED	
1.005	3	-0.177	0.000	0.10			5.0	OK	
1.006	2	-0.190	0.000	0.06			5.0	OK	

©1982-2020 Innovyze

FOUL SEWERAGE DESIGN

Design Criteria for 223-008 F.W NETWORK.FWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	225.00	Maximum Backdrop Height (m)	0.000
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for 223-008 F.W NETWORK.FWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	8.188	0.102	80.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.001	34.566	0.432	80.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.002	12.430	0.124	100.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.003	36.730	0.367	100.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	99.100	0.000	0.0	0	0.0	0	0.00	0.98	17.3	0.0
1.001	98.998	0.000	0.0	0	0.0	0	0.00	0.98	17.3	0.0
1.002	98.566	0.000	0.0	0	0.0	0	0.00	0.88	15.5	0.0
1.003	98.441	0.000	0.0	0	0.0	0	0.00	0.88	15.5	0.0

©1982-2020 Innovyze

Manhole Schedules for 223-008 F.W NETWORK.FWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
5	101.136	2.036	Open Manhole	1200	1.000	99.100	150				
4	101.106	2.108	Open Manhole	1200	1.001	98.998	150	1.000	98.998	150	
3	100.830	2.264	Open Manhole	1200	1.002	98.566	150	1.001	98.566	150	
2	101.000	2.559	Open Manhole	1200	1.003	98.441	150	1.002	98.441	150	
1	101.067	2.993	Open Manhole	1200		OUTFALL		1.003	98.074	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
5	386654.228	403533.804	386654.228	403533.804	Required	
4	386657.161	403526.159	386657.161	403526.159	Required	
3	386683.512	403503.789	386683.512	403503.789	Required	
2	386675.440	403494.336	386675.440	403494.336	Required	
1	386648.683	403469.173			No Entry	

©1982-2020 Innovyze

PIPELINE SCHEDULES for 223-008 F.W NETWORK.FWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	5	101.136	99.100	1.886	Open Manhole	1200
1.001	o	150	4	101.106	98.998	1.958	Open Manhole	1200
1.002	o	150	3	100.830	98.566	2.114	Open Manhole	1200
1.003	o	150	2	101.000	98.441	2.409	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	8.188	80.0	4	101.106	98.998	1.958	Open Manhole	1200
1.001	34.566	80.0	3	100.830	98.566	2.114	Open Manhole	1200
1.002	12.430	100.0	2	101.000	98.441	2.409	Open Manhole	1200
1.003	36.730	100.0	1	101.067	98.074	2.843	Open Manhole	1200

Free Flowing Outfall Details for 223-008 F.W NETWORK.FWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003	1	101.067	98.074	97.460	1200	0

©1982-2020 Innovyze

Appendix H Outline Drainage Strategy

GENERAL NOTES

1. SETTING OUT SHALL BE UNDERTAKEN USING ONLY THE INFORMATION GIVEN. DISTANCES SHOULD NOT BE SCALED FROM THIS DRAWING.
2. ALL SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 6TH EDITION AND UNITED UTILITIES DETAILS & GUIDELINES.
3. THE MINIMUM GRAVITY PIPE DIAMETER UNDER ADOPTABLE HIGHWAYS SHALL BE 150MM
4. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL INFORMATION GIVEN WITH REGARDS TO EXISTING SERVICES AND DRAINAGE CONNECTIONS ETC. PRIOR TO COMMENCING THE WORKS. THE RATES SHALL INCLUDE FOR HAND DIG AROUND SERVICES WHERE NECESSARY. THE CONTRACTOR SHALL ADHERE TO THE CDM REGULATIONS AT ALL TIMES
5. THE OUTSIDES OF ALL SEWERS SHALL BE A MINIMUM OF 1.0M FROM KERB LINES AND THE OUTSIDE OF MANHOLES SHALL BE A MINIMUM OF 0.5M FROM KERB LINES
6. EXISTING FLOWS IN WATERCOURSES, SEWERS AND LAND DRAINS SHALL BE MAINTAINED AT ALL TIMES 7. ONLY TRAINED PERSONNEL SHALL BE PERMITTED TO ENTER CONFINED SPACES
7. ALL MATERIALS TO BEAR THE RELEVANT B.S. KITEMARK AND COMPLY FULLY WITH THE SPECIFICATIONS. ALL CONCRETE & CONCRETE PRODUCTS MUST USE SULPHATE RESISTANT CEMENT UNLESS THE SITE INVESTIGATION REPORT PROVES THAT SULPHATE ATTACK FROM SOILS AND GROUNDWATER WILL NOT OCCUR TO WITHSTAND A CLASS
8. ALL OPENING NOTICES ETC. AS REQUIRED UNDER HIGHWAYS ACTS ETC. ARE TO BE OBTAINED PRIOR TO COMMENCEMENT OF WORKS. ALL WORKS ARE TO BE INSPECTED BY L.A., NHBC OR THE NETWORK OPERATOR AS APPLICABLE.
9. WHERE "ULTRA RIB" UPVC PIPES (OR SIMILAR APPROVED) ARE USED IN ADOPTABLE DRAINAGE THEY SHALL STILL BE HANDLED AND LAID IN ACCORDANCE WITH THE SPECIFICATION AND GUIDANCE ISSUED BY THE HIGH PERFORMANCE PIPE ASSOCIATION.
10. A CLASS S BED AND SURROUND MUST BE USED FOR SUCH PIPES. TRENCH BACKFILL IN HIGHWAYS TO WITHIN 1M OF HIGHWAY SHALL, AS DIRECTED BY THE HIGHWAY AUTHORITY BE A SUITABLE GRANULAR MATERIAL ALL IN ACCORDANCE WITH SEWERS FOR ADOPTION CL. 4.3.4. 12. SLAB LEVELS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE ENGINEER FOR GUIDANCE
11. DOMESTIC DRAINAGE SHALL BE TO BUILDING REGULATIONS APPROVED DOCUMENT H. 110MM U.P.V.C. PIPES LAID TO THE FOLLOWING MINIMUM FALLS UNLESS OTHERWISE SHOWN.

	FOUL	S.W.
HEAD RUN	1 IN 40	1 IN 60
ELSEWHERE	1 IN 80	1 IN 100

12. POLYPROPYLENE INSPECTION CHAMBERS TO BE PROVIDED TO ALL PRIVATE DRAINAGE LESS THAN 1.10m DEEP. WHERE PRIVATE DRAINAGE RUNS ARE DEEPER THAN 1.10m, REDUCED ACCESS CHAMBERS TO BE PROVIDED.
13. WHEREVER PLASTIC PIPES ARE TO BE USED FOR THE CONSTRUCTION OF ADOPTABLE DRAINAGE, STRUCTURED WALL PLASTIC PIPES MUST BE USED WHICH MUST COMPLY WITH BS EN 13476-1 AND WIS 4-35-01

LEGEND

- PROPOSED SURFACE WATER SEWER MANHOLE
- PROPOSED FOUL WATER SEWER MANHOLE
- PROPOSED COMBINED WATER SEWER MANHOLE
- EXISTING SURFACE WATER MANHOLE
- EXISTING COMBINED WATER MANHOLE
- PROPOSED FOUL 1050MMØ PCC DRAG OUT MH (TO BE AGREED WITH UU FIELD INSPECTOR)
- PROPOSED SURFACE WATER 1050MMØ PCC DRAG OUT MH (TO BE AGREED WITH UU FIELD INSPECTOR)
- PROPOSED FOUL WATER SEWER
- PROPOSED SURFACE WATER SEWER
- PROPOSED COMBINED SEWER
- PROPOSED SURFACE WATER DRAIN WITH 450mmØ INSPECTION CHAMBER
- PROPOSED FOUL WATER DRAIN WITH 450mmØ INSPECTION CHAMBER
- G — HIGHWAY GULLY
- 53.000 — FINISHED FLOOR LEVEL
- ACO — ACO CHANNEL (OR SIMILAR)
- RAIN WATER PIPE WITH TRAPPED GULLY
- SOIL VENT PIPE
- BACK INLET GULLY
- SOIL STACK
- POROUS DRIVEWAY TO ACT AS SOURCE CONTROL MEASURE NOT A INFILTRATION MEASURE - DUE TO IMPERMEABILITY OF RECEIVING STRATA STONE BASE TO BE ENCAPSULATED IN TANKING MEMBRANE AND ACTIVELY CONNECTED TO PROPOSED ATTENUATION SYSTEM

N

Control MH S4 2700mmØ PCC C.L 100.867m I.L 98.431 With Optimum type hydrobrake 1.35m head @ 5l/s discharge MD-SHE-0100-5000-1350-5000 Orifice Size (100mmØ)

3 metre sewer easement, either side of proposed S.W & F.W sewers

Previous connection for Care homes in situ to be investigated as point of discharge for F.W flows from plots fronting onto Benmore Road.

Plots fronting onto Benmore Road S.W flows to be taken into attenuation system via manhole S5.

S.W & F.W systems to combined at manhole C2.

New 1500mmØ PCC Manhole to be constructed on existing 450mmØ Combined sewer
Invert level to be confirm prior to the start of site works.

EX MH 6403
C.L 100.52m
I.L 94.51m

EX MH 6401
C.L 100.47m
I.L 94.70m

EX MH 6402
C.L 100.88m
I.L 97.93m

REV	DATE	DESCRIPTION	BY	CHK	APP

DRAWING STATUS: **PRELIMINARY**

CLIENT: CASEY

ARCHITECT: JOHN McCALLS

PROJECT: BENMORE DRIVE MANCHESTER

TITLE: OUTLINE DRAINAGE PLAN

STATUS:	PROJECT No.	PROJECT	ORIGINATOR	VOL/SYS	LEVEL	TYPE	ROLE	DRAWING No.	REV:
S2	223-008	BEN -	AJP -	ZZ -	00 -	DR -	C -	1000	P01

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:200	JCM	JCM	JLS	JLS	JUNE 2023

AJP consulting engineers
0151 227 1462 info@ajpltd.co.uk 91 Dale Street, Liverpool, L2 2ET

GENERAL NOTES

1. SETTING OUT SHALL BE UNDERTAKEN USING ONLY THE INFORMATION GIVEN. DISTANCES SHOULD NOT BE SCALED FROM THIS DRAWING.
2. ALL SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 6TH EDITION AND UNITED UTILITIES DETAILS & GUIDELINES.
3. THE MINIMUM GRAVITY PIPE DIAMETER UNDER ADOPTABLE HIGHWAYS SHALL BE 150MM
4. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL INFORMATION GIVEN WITH REGARDS TO EXISTING SERVICES AND DRAINAGE CONNECTIONS ETC. PRIOR TO COMMENCING THE WORKS. THE RATES SHALL INCLUDE FOR HAND DIG AROUND SERVICES WHERE NECESSARY. THE CONTRACTOR SHALL ADHERE TO THE CDM REGULATIONS AT ALL TIMES
5. THE OUTSIDES OF ALL SEWERS SHALL BE A MINIMUM OF 1.0M FROM KERB LINES AND THE OUTSIDE OF MANHOLES SHALL BE A MINIMUM OF 0.5M FROM KERB LINES
6. EXISTING FLOWS IN WATERCOURSES. SEWERS AND LAND DRAINS SHALL BE MAINTAINED AT ALL TIMES 7. ONLY TRAINED PERSONNEL SHALL BE PERMITTED TO ENTER CONFINED SPACES
7. ALL MATERIALS TO BEAR THE RELEVANT B.S. KITEMARK AND COMPLY FULLY WITH THE SPECIFICATIONS. ALL CONCRETE & CONCRETE PRODUCTS MUST USE SULPHATE RESISTANT CEMENT UNLESS THE SITE INVESTIGATION REPORT PROVES THAT SULPHATE ATTACK FROM SOILS AND GROUNDWATER WILL NOT OCCUR TO WITHSTAND A CLASS
8. ALL OPENING NOTICES ETC. AS REQUIRED UNDER HIGHWAYS ACTS,ETC. ARE TO BE OBTAINED PRIOR TO COMMENCEMENT OF WORKS. ALL WORKS ARE TO BE INSPECTED BY L.A., NHBC OR THE NETWORK OPERATOR AS APPLICABLE.
9. WHERE "ULTRA RIB" UPVC PIPES (OR SIMILAR APPROVED) ARE USED IN ADOPTABLE DRAINAGE THEY SHALL STILL BE HANDLED AND LAID IN ACCORDANCE WITH THE SPECIFICATION AND GUIDANCE ISSUED BY THE HIGH PERFORMANCE PIPE ASSOCIATION.
10. A CLASS S BED AND SURROUND MUST BE USED FOR SUCH PIPES. TRENCH BACKFILL IN HIGHWAYS TO WITHIN 1M OF HIGHWAY SHALL, AS DIRECTED BY THE HIGHWAY AUTHORITY BE A SUITABLE GRANULAR MATERIAL ALL IN ACCORDANCE WITH SEWERS FOR ADOPTION CL. 4.3.4. 12. SLAB LEVELS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE ENGINEER FOR GUIDANCE
11. DOMESTIC DRAINAGE SHALL BE TO BUILDING REGULATIONS APPROVED DOCUMENT H. 110MM U.P.V.C. PIPES LAID TO THE FOLLOWING MINIMUM FALLS UNLESS OTHERWISE SHOWN.

	FOUL	S.W.
HEAD RUN	1 IN 40	1 IN 60
ELSEWHERE	1 IN 80	1 IN 100

12. POLYPROPYLENE INSPECTION CHAMBERS TO BE PROVIDED TO ALL PRIVATE DRAINAGE LESS THAN 1.10m DEEP. WHERE PRIVATE DRAINAGE RUNS ARE DEEPER THAN 1.10m, REDUCED ACCESS CHAMBERS TO BE PROVIDED.
13. WHEREVER PLASTIC PIPES ARE TO BE USED FOR THE CONSTRUCTION OF ADOPTABLE DRAINAGE, STRUCTURED WALL PLASTIC PIPES MUST BE USED WHICH MUST COMPLY WITH BS EN 13476-1 AND WIS 4-35-01

LEGEND

FLOOD EXCEEDENCE POINT IN CASE OF STORM EVENT BEYOND DESIGN REQUIREMENTS

FLOOD EXCEEDENCE ROUTE IN CASE STORM EVENT BEYOND DESIGN REQUIREMENTS

FLOOD EXCEEDENCE ROUTE IN CASE OF FAILURE TO DWELLING S.W CAPTURE SYSTEMS OR STORMS IN EXCESS OF DESIGN CRITERIA

N

REV	DATE	DESCRIPTION	BY	CHK	APP

DRAWING STATUS: **PRELIMINARY**

CLIENT: CASEY

ARCHITECT: JOHN McCALLS

PROJECT: BENMORE DRIVE MANCHESTER

TITLE: FLOOD ROUTING PLAN

STATUS:	PROJECT No.	PROJECT	ORIGINATOR	VOL/SYS	LEVEL	TYPE	ROLE	DRAWING No.	REV:
S2	223-008	BEN -	AJP -	ZZ -	00 -	DR -		**C - 1070**	**P01**

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:200	JCM	JCM	JLS	JLS	JUNE 2023

AJP consulting engineers
0151 227 1462 info@ajpltd.co.uk 91 Dale Street, Liverpool, L2 2ET

Appendix I Phase II Geotechnical Report

17-19 Whitworth Street West
Manchester
M1 5WG

t: 0161 236 2394
e: manchester@curtins.com
w: www.curtins.com

Our reference: 077873-CUR-00-XX-RP-GE-041-P01

28th November 2022

Mr Aidan Jackson
The Guinness Partnership
Bower House
1 Stable Street
Hollinwood
Oldham
OL9 7LH

Dear Aidan,

Re: Phase 2 Geo-Environmental and Geotechnical Report for Former Whitemoss Community Resource Centre Project 500 Sites

1.0 Introduction

Curtins Consulting were instructed by The Guinness Partnership to undertake a ground investigation of Whitemoss Community Resource Centre, Manchester M9 6EH. The site is one of six sites currently being investigated on behalf of The Guinness Partnership, as part of Project 500, Manchester City Councils program to deliver affordable homes in the northeast of the city.

The site is located east of Benmore Road and encompasses an area of vacant land with grass surface cover. The sites topography is generally level with sparse vegetation across the land.

The ground investigation was undertaken to determine the ground conditions pertaining to the development site, and to aid contamination risk assessment and foundation design. It is understood that the site is to be developed for residential dwellings. At the time of witing, no proposed site plans were available for review.

2.0 Background Information

Residential development is proposed at a plot of land located east of Benmore Road. The site location plan is presented in Figure 1, overleaf.

Earliest mapping (1848) shows that the site was undeveloped and surrounded by farmland with several ponds noted within 250m of the site, all of which appear to be infilled by 1980. A farm is located 190m west of the site (demolished around 1975) and a large, wooded area from 65m southwest of the site.

Through the 1930s to 50s the site remains unchanged with continued residential development first to the north and northwest, then from 1954 in all other directions. An electric substation is noted 224m northeast of site, and several schools appear in the area. From 1963 an irregular shaped building occupies the majority of site, named Whitemoss, the home for the elderly. By present day the building is no longer on site, demolished sometime between 2016 and 2021.

Curtins Consulting Ltd registered in England No. 2054159
Registered Office: 51-55 Tithebarn Street, Liverpool, L2 2SB
Branch registered in Ireland No. 908625

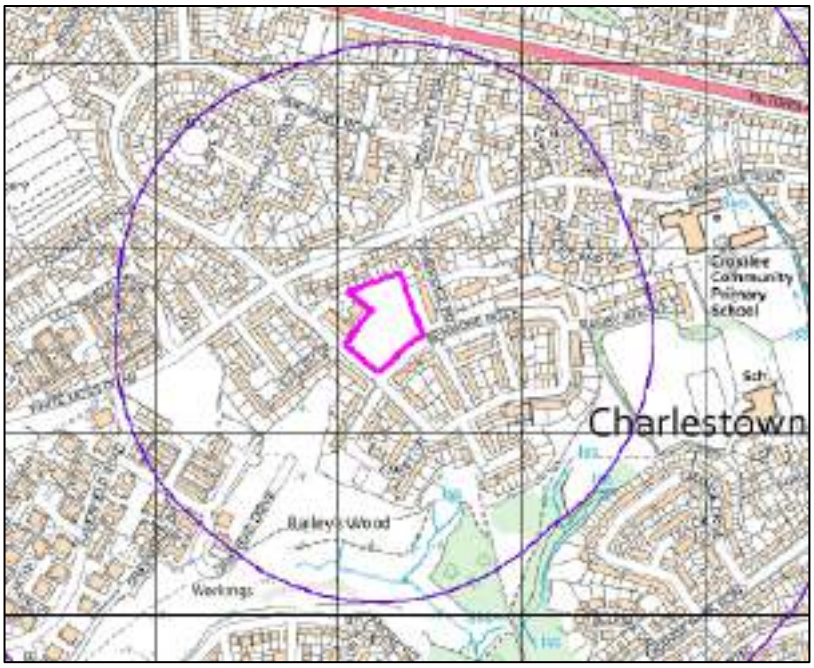


Figure 1 *– Site Location Plan (site boundary shown in pink and 250m buffer in purple). Crown Copyright. License Number 100022432.*

BGS mapping indicates the site is underlain by Glacial Till deposits (interbedded granular and cohesive soils), and the Pennine Lower Coal Measures Formation bedrock for the majority of the site and the Pennine Middle Coal Measures Formation bedrock in the southern corner of site. The BGS borehole scans close to the site encountered Topsoil/Made Ground overlying alternating bands of clay and sand.

The site is located within a Coal Mining reporting area. A review of available online data indicates the site is not located within the vicinity of recorded mine entries, or a development high risk area. The risk from shallow coal mining is therefore considered to be **Low**.

The site is underlain by a Secondary A Aquifer associated with the bedrock formation. The superficial deposits are designated as a Secondary Undifferentiated Aquifer. The site is not located within a Source Protection Zone (SPZ). There are no potable groundwater abstraction points within 1km. The nearest surface water feature is an issue 158m south of the site. There are no surface water abstractions within 1km. There is one discharge consent within 500m of the site located 432m north for the sewage storm overflow of public sewage.

The risk from UXO associated with WWII bombing to future intrusive investigation works is considered to be **Low**.

The risk from Made Ground posed to the site's end-users and construction workers is considered to be **Moderate / Low** due to the anticipated lack of contamination in the Made Ground. The risk posed to controlled water is considered to be **Low** and **Very Low** due to anticipated low permeability superficial soils and the distance to the nearest surface water feature. The risk posed to site end-users from ground generating gases arising from organic / putrescible soils near the site is considered to be **Moderate**.

3.0 Curtins Ground Investigation (2021)

Ground investigation works were undertaken on the 10th August 2022.

The scope of the ground investigation was designed in general accordance with current UK guidance including:

- Land Contamination Risk Management (LCRM) (Ref. 1);
- BS 10175:2011 + A2:2017 Investigation of Potentially Contaminated Sites (Ref. 2);
- BS 5930:2015 + A1:2020 Code of Practice for Ground Investigations (Ref. 3); and
- BS EN1997: Part 2:2007 Eurocode 7 (Ref. 4).

3.1 Scope of Works

The site works consisted of five window sample boreholes, WS01 to WS05, advanced to between to 5.45m bgl or refusal. In-situ testing, including Standard Penetration Tests (SPTs) were undertaken at, generally, 1m intervals within the superficial soils.

An exploratory hole plan is included at the end of this report, Ref. 077873-CUR-00-XX-DR-GE-80003-P02.

5 No. of soil samples, four from the Made Ground and one from the natural strata were takenand underwent environmental chemical testing, as detailed in Table 3.1. Analysis was undertaken to assess the contamination risk presented to site end users and construction works in this area of the site.

Table 3.1 - *Environmental testing suite (Soils)*

Suite Ref.	Analyte	LOD
Soils Suite A	Asbestos Screen	-
	pH Value	0.01 pH Units
	2:1 Water Soluble Sulphate	0.01 g/l
	Soil Organic Matter (SOM)	0.1 $\%^{w}/_{w}$
	Arsenic, Chromium, Chromium VI, Copper, Lead, Selenium, Nickel	1 mg/kg
	Zinc	5 mg/kg
	Boron (water soluble)	1 mg/kg
	Cadmium	0.5 mg/kg
	Mercury	0.17 mg/kg
	Cyanide (total)	1 mg/kg
	Phenols (screen)	0.2 mg/kg
	PAHs (USEPA 16)	0.01 to 0.08 mg/kg
	TPH (Aro/Ali Split)	0.01 to 1.0 mg/kg

The following laboratory geotechnical testing was undertaken in accordance with methods outlines in BS1377: Part 1:2016 (Ref. 5), to enable a foundation assessment for the proposed residential development:

- 4 No. 4pt Atterberg Tests
- 2 No. Particle Size Distribution Tests

- 6 No. 2:1 Water Soluble Sulphate & pH

3.2 Ground Conditions

A summary of the ground conditions encountered during the site investigation works is presented in *Table 3.2,* below, with detailed information presented in the exploratory hole logs included at the end of this report. A summary of each strata is presented below.

Table 3.2 - *Summary of encountered ground conditions:*

Stratum	Depth to Top of Strata m bgl (m AOD)	Thickness (m)		Description
		Min	Max	
MADE GROUND	0.00	0.30	0.90	Surface cover of grass over MADE GROUND: loose dark brown slightly gravelly sand with abundant rootlets. Gravel is angular to subangular, fine to coarse of mudstone, brick and concrete. **Overlying** MADE GROUND: Loose light grey gravelly sand. Gravel is subangular to subrounded fine to coarse of mudstone. **Or** MADE GROUND: Loose dark brown slightly clayey gravelly sand with rare cobbles. Gravel is angular to subrounded fine to coarse of brick, concrete and mudstone. Cobbles are angular to subangular of brick and concrete.
GLACIAL TILL	0.30 – 0.90 (100.60 – 98.80)	4.10[1]	4.70[1]	Soft to firm sandy CLAY. Sand is fine to medium. **Interbedded with:** Brown slightly clayey fine to medium SAND.

1 - Base of strata not encountered.

3.3 Groundwater

Groundwater was recorded as seepages within one borehole, WS03 during the site investigation. A summary is detailed below within *Table 3.3a*.

Table 3.3a – *Water Strikes Noted During Site Investigation*

Borehole Ref.	Water Strikes		
	Strike Depth m bgl (m AOD)	Strata	Notes
WS03	4.0 (96.50)	Glacial Till (granular)	N/A

Groundwater likely representing perched water within granular layers in the generally cohesive Glacial Till, was recorded during gas monitoring visits. The borehole response zones and recorded water levels are detailed in *Table 3.3b*.

Table 3.3b – *Monitoring Well Response Zones*

Borehole Ref.	Installation Strata	Response Zone m bgl (m AOD)	Depth to water level m bgl (m AOD)					
			24/08/22	01/09/22	21/09/22	28/09/22	14/10/22	28/10/22
WS01	Glacial Till	1.00 – 3.00 (100.00 – 98.00)	3.82 (97.18)	3.97 (97.03)	3.96 (97.04)	3.97 (97.03)	3.97 (97.03)	3.97 (97.03)
WS03	Glacial Till	1.00 – 4.00 (99.50 – 96.50)	3.13 (97.37)	3.20 (97.30)	3.32 (97.18)	3.35 (97.15)	1.83 (98.67)	1.34 (99.16)
WS05	Glacial Till	1.00 – 3.00 (99.9 – 97.90)	3.88 (97.02)	Dry	Dry	Dry	Dry	Dry

3.4 Obstructions

No obstructions were noted during the site investigation.

3.5 Observed Potential Contamination

No visual or olfactory contamination was observed during the intrusive investigation works.

4.0 Ground Contamination Assessment

Four soil samples from the Made Ground and one from the natural strata were taken and analysed according to the testing Suite A outlined in *Table 3.1*. The laboratory chosen by Curtins to undertake the analysis was Envirolab, a UKAS and MCERTS accredited laboratory.

Soil samples were obtained to provide adequate and representative coverage for the proposed end use, accounting for the site's history.

Considering the sites proposed end-use for residential dwellings were compared against adopted '*Residential with homegrown'* Generic Assessment Criteria (GACs).

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) value for the soils was 0.4% $^{w}/_{w}$ to 10.3% $^{w}/_{w}$. With consideration for a calculated geometric average, soil features determine an SOM of 2.34% $^{w}/_{w}$. As such, a comparison against Tier 1 thresholds for SOM of 1% $^{w}/_{w}$ for A '*Residential with homegrown produce'* end use has been adopted.

The full chemical testing results and adopted GAC's are listed in at the end of this report.

Exceedances were noted within the soil samples for Metals (Mercury). Exceedances are detailed below within *Table 4.0*.

Table 4.0 – *Exceedances within Made Ground*

Exploratory Hole I.D.	Depth m bgl (m AOD)	Strata	Determinant	Concentration (mg/kg)	GAC (mg/kg)
WS01	0.75 (100.25)	MADE GROUND	Mercury	3.57	1
WS02	0.40 (100.60)	MADE GROUND	Mercury	2.51	1

No suspected asbestos containing materials (AMCs) were identified in the exploratory hole logs and no asbestos fibres were positively identified during laboratory screening.

5.0 Geotechnical Laboratory Analysis

A programme of geotechnical testing was scheduled by Curtins to determine the ground model for the site based on the ground conditions, detailed in Section 3.1.

5.1 Geotechnical Testing and Engineering Properties

The program of geotechnical testing undertaken during this investigation is detailed in Section 3.1.

Where necessary, determination of characteristic parameters has been based on appropriate assessment of results derived from in-situ tests, laboratory analysis and published correlations, complemented with engineering judgement and consideration of the relevant limit state. The parameters are not considered to be absolute and should be referenced with the specific strata text in this section and reviewed when considering a specific area of the site.

5.1.1 Made Ground

A surface cover of grass was underlain by: Loose dark brown slightly gravelly sand with abundant rootlets. Gravel is angular to subangular, fine to coarse of mudstone, brick and concrete.

The underlying Made Ground soils comprise either: Loose light grey gravelly sand, loose dark brown slightly clayey gravelly sand with rare cobbles, or loose brown gravelly sand with rare cobbles.

The gravel fraction of the granular soils includes fine to coarse and angular to subrounded brick, concrete, and mudstone. Cobbles were angular to subangular of brick and concrete.

Due to inherent variability in the Made Ground, and it's compressible nature, it is not considered to be a suitable bearing stratum for the proposed residential development, and therefore only one geotechnical test has been undertaken in this stratum.

5.1.2 Glacial Till

Glacial Till was recorded underlying the Made Ground in all exploratory hole locations.

The Glacial Till comprises predominantly cohesive deposits described typically as a soft to firm sandy clay.

A thin layer of loose slightly clayey sand was recorded in WS03 only below the cohesive deposits, with a thickness of 2.65m, from a depth of 2.80m bgl.

The geotechnical test results recorded within the superficial deposits are summarised in *Table 5.1.2.*

Table 5.1.2 – *Summary of Glacial Till geotechnical test results*

Parameter		No. of tests	Minimum	Maximum	Average
pH		6	6.5	8.3	7.68
Water Soluble Sulphate (mg/l)		6	7	139	41.16
SPT 'N' Value		25	0	35	-
Moisture Content (%)		4	14	37	22.25
Atterberg Test	Liquid Limit (%)	4	24	38	31.25
	Plastic Limit (%)	4	13	18	15.5

Parameter		No. of tests	Minimum	Maximum	Average
	Plasticity Index (%)	4	11	20	15.75
	Modified Plasticity Index (%)	4	10.78	19.2	15.38
Particle Size Distribution		2	*See Appendix A5 for details – WS03 only*		

Cohesive Soils

A total of Twenty-two SPT 'N' values were recorded in cohesive Glacial Till, ranging from between 0 and 35, where full penetration was met. The SPT 'N' results generally increase with depth, summarised in Figure 5.1.2a.

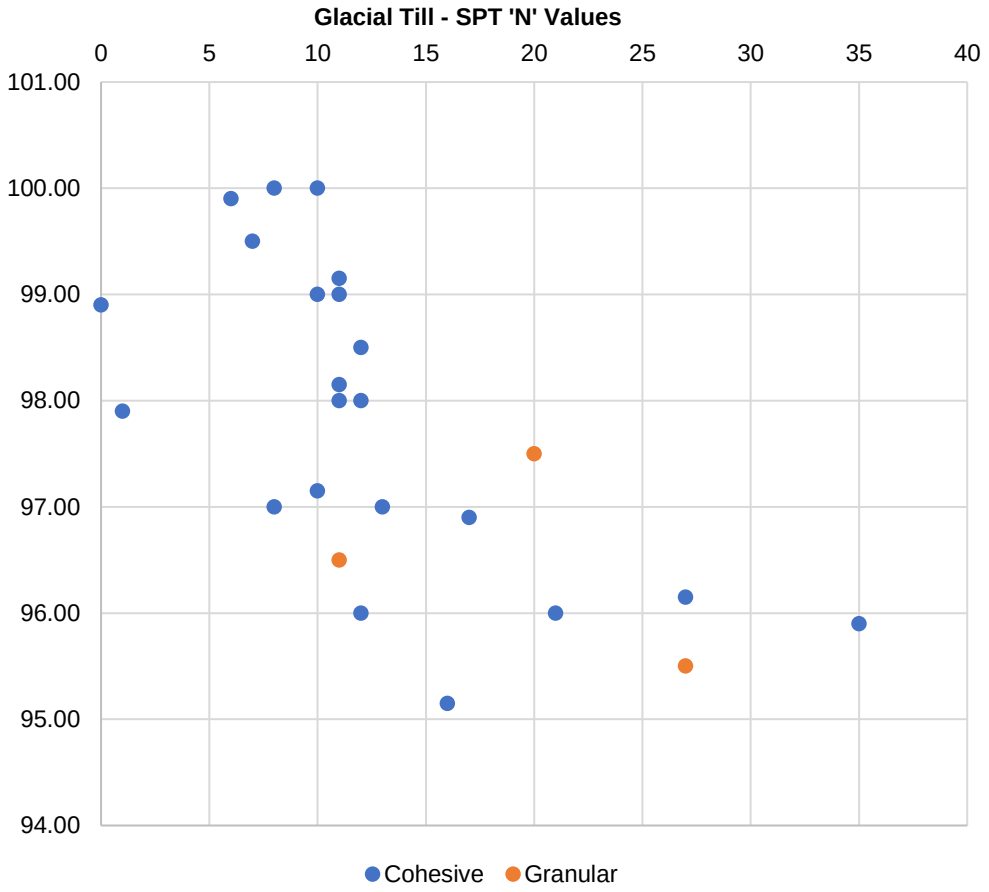


Figure 5.1.2a – *Summary of SPT 'N' Values in Glacial Till vs Depth (mAOD)*

Four Atterberg tests were undertaken during the ground investigation. All of these indicated the soils behave as low plasticity clays with a low volume change potential. The volume change potential of the cohesive soils has been determined in accordance with guidance from NHBC Standards Chapter 4.2 (Ref. 6).

The results of SPT can be correlated to an Undrained Shear Strength (c_u) when undertaken within cohesive deposits. For overconsolidated clays, Stroud (1974) reported good correlations between N and c_u, where:

$$c_u = f1 \; x \; SPT \; 'N' \; Value$$

where values of f_1 are the conversion factor based on the plasticity of the clay.

Based on an average plasticity Index of 15% and utilising f_1 factor of 6 undrained shear strengths ranged between 0kPa and 210kPa are estimated.

The undrained shear strength of the cohesive Glacial Till appears to show some increase in strength with depth, as illustrated on *Figure 5.1.2b*; however it should be noted than low SPT N values of 0 and 1 were recorded in WS04 at depths of 2.0m and 3.0m bgl respectively, and this cannot be ignored.

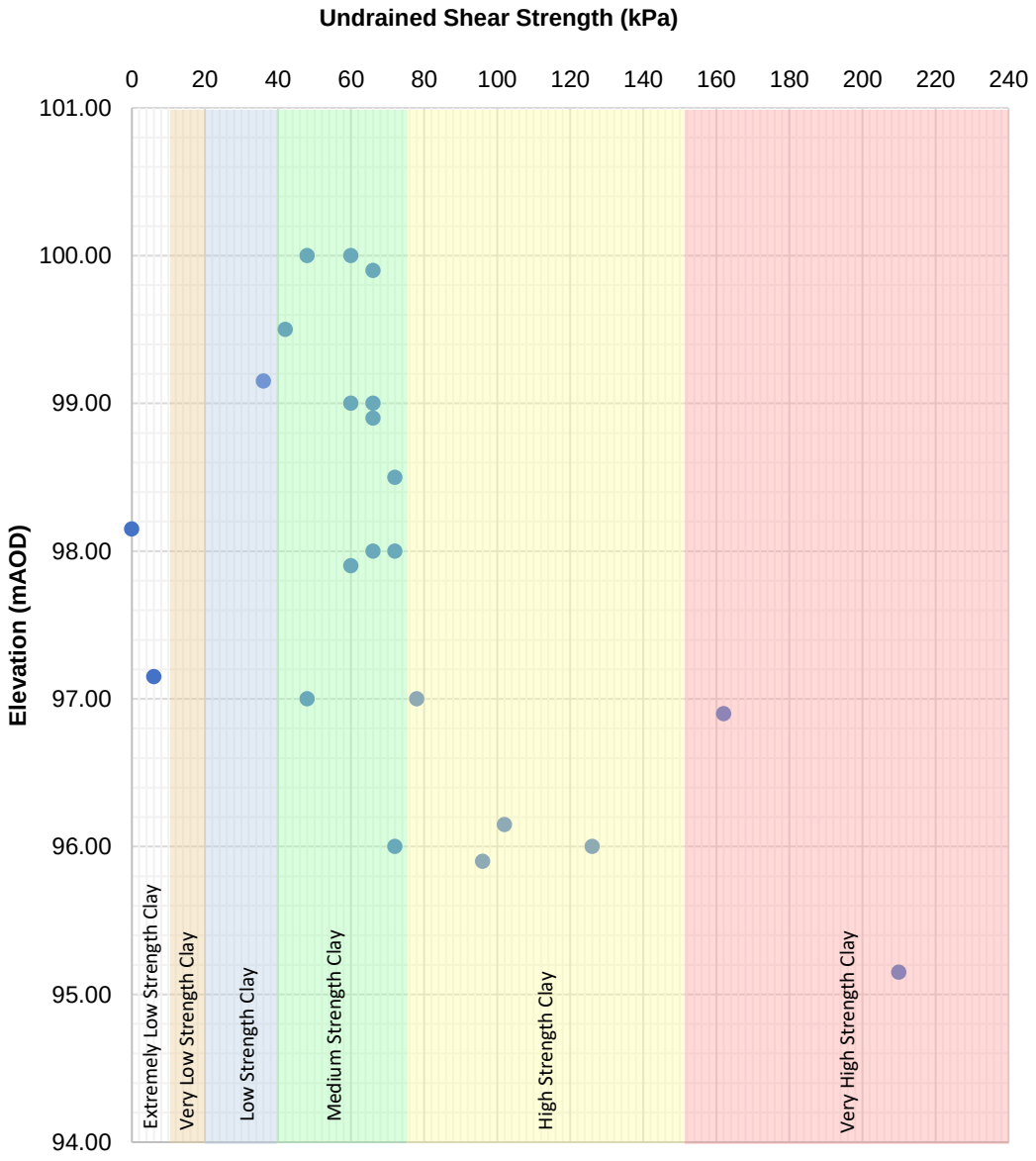


Figure 5.1.2b – *Derived Undrained Shear Strength versus Elevation Plot - Cohesive Glacial Till*

Moderately conservative characteristic unit weights of 17 - 20kN/m^3 for a medium strength clay above and below the water table, are deemed appropriate in accordance with BS8002 (Ref. 7).

The results of SPT can be correlated to the modulus of volume compressibility (m_v) when undertaken within cohesive deposits. For overconsolidated clays, Stroud (1974) reported correlations between N and m_v, where:

$$\mathbf{m}v = \frac{1}{f2 \; x \; SPT \; N}$$

where values of f_2 are a factor of the plasticity of the clay.

Based on an average plasticity index of 15% and utilising f_2 factor of 0.68, m_v values typically range between 0.042 and 0.245 m^2/MN (very low to medium compressibility), illustrated in *Figure 5.1.2c*.

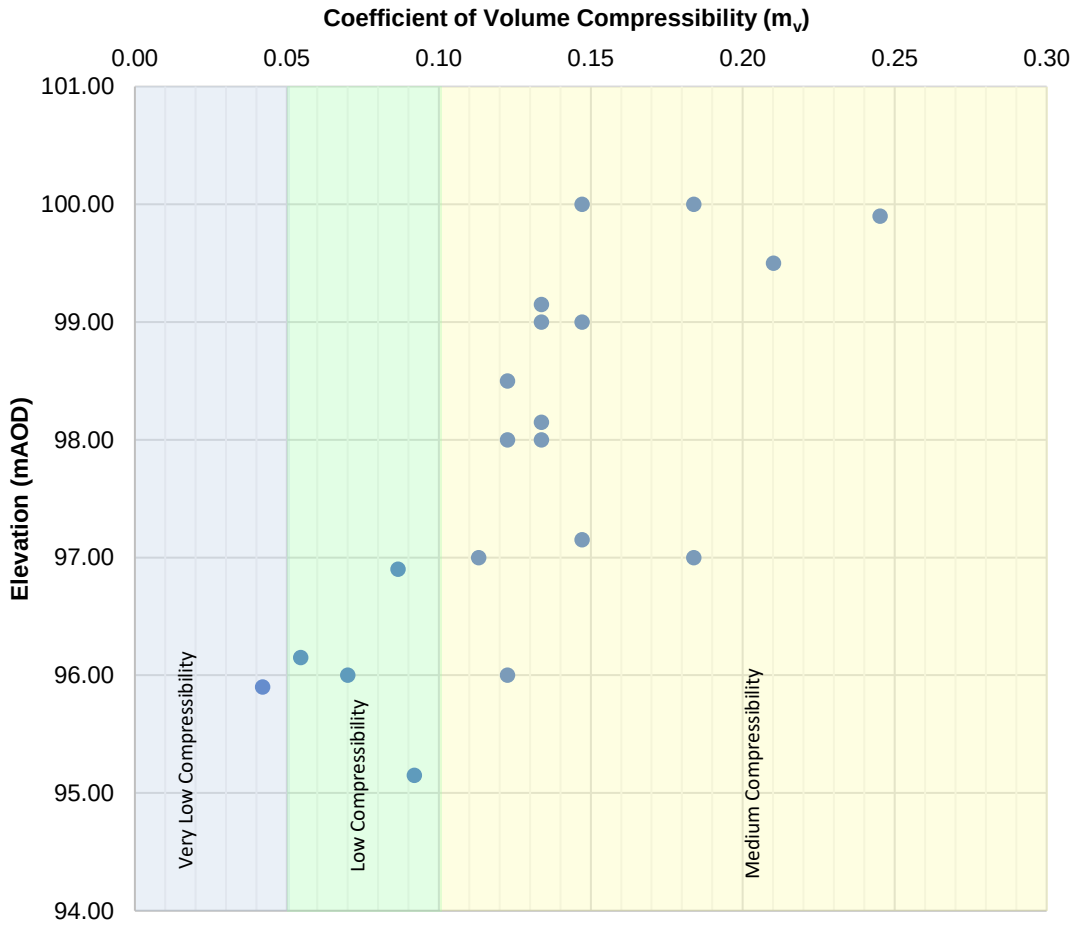


Figure 5.1.2c – *Coefficient of Volume Compressibility versus Elevation Plot – Cohesive Glacial Till*

The majority of exploratory hole logs, and laboratory testing results indicate generally laterally consistent ground conditions across the site, with the exception of borehole location WS04 where extremely low strength clay was encountered to at least 3.0m bgl.

Granular Soils

A total of three SPT 'N' values were recorded in granular Glacial Till and they ranged between 11 and 27 (medium dense). Two PSD tests were undertaken within the granular Glacial Till and the results confirm the soil descriptions on the borehole logs. Due to the limited granular material encountered, no further geotechnical assessment was undertaken within these soils.

6.0 Gas Risk Assessment

The conceptual site model concluded there was a Moderate risk from ground gas. There was potential for limited thicknesses of Made Ground, containing organic /putrescible content as a potential source of ground

gas generation. Noxious and asphyxiate gases were attributed to include, but not limited to, carbon dioxide, carbon monoxide, methane and hydrogen sulphide.

Three boreholes were installed with monitoring wells as detailed in *Table 3.3*.

Six rounds of gas monitoring were undertaken between 24th August 2022 and 28th October 2022. The results log sheets are contained within Appendix A6 and summarised in *Table 6.0.*

Barometric pressures ranging between 995mb and 1012mb were recorded during the monitoring period.

Table 6.0 – *Summary of Ground Gas Monitoring Results*

Exploratory Hole ID	Maximum Methane Concentration (%)	Maximum Carbon Dioxide Concentration (%)	Minimum Steady Oxygen Concentration (%)	Maximum Peak Gas Flow (l/hr)	Steady State Gas Flow (l/hr)
WS01	<0.1	9.8	0.0.	-5.3	0.8
WS03	<0.1	10.0	0.0	0.4	<0.1
WS05	<0.1	4.1	3.6	0.3	<0.1

Methane (CH_4) was recorded below the instrument's detection limit within all the monitoring wells.

Carbon Dioxide (CO_2) recorded a maximum concentration of 10.0% $^v/_v$ within WS03 during the sixth visit. Elevated concentrations (>5% $^v/_v$) were recorded in WS01 on the second, third, fourth and sixth visits, and WS03 on the first, second, third, fourth and sixth monitoring visits.

The greatest concentration of Carbon monoxide (CO) was recorded WS01 on the second monitoring visit (4ppm).

All monitoring visits for all wells recorded H_2S below the limit of detection of the monitoring instrument.

The maximum peak air flow rate was recorded in WS01, at -5.3 l/hr on the sixth visit, reducing to a steady state air flow rate of 0.8 l/hr. For the purposes of this assessment, the negative values are taken as absolute values, and it is assumed that a positive air flow rate of the same value may be achieved in natural ground conditions.

Two gas risk assessments have been undertaken, to account for the end use of the site.

Private residential dwellings, assumed to be built in accordance with the 'model' low-rise housing development and NHBC guidelines (Ref. 8), will be assessed in accordance with the NHBC Traffic Light Classification.

Hazardous gas flow rates (Q_{hg}) can be evaluated using peak air flow rates and maximum methane concentrations, and steady state air flow rates and steady state carbon dioxide concentrations. On the basis that methane concentrations were recorded below the limit of detection of the monitoring instrument throughout the monitoring period, the gas screening value (GSV) will be determined by the carbon dioxide concentrations recorded.

For carbon dioxide, the greatest steady state air flow rate was recorded in WS01 on the sixth visit (0.8 l/hr). The greatest steady state carbon dioxide concentration was recorded in WS03 on the sixth visit (10.0% v/v). On this basis, the calculated Q_{hg} for the site is taken as 0.080 l/hr.

Elevated carbon dioxide concentrations were recorded above 5% v/v in WS01 (second, third, fourth and sixth visit) and WS03 (first, second, third, fourth and sixth monitoring visits).

All monitoring wells were constructed in the Glacial Till. The exploratory hole logs indicate the Glacial Till is formed of similar materials across the site, with no observable increase in organic or putrescible content or changes in soil composition between these and other positions across the site. The worst case Q_{hg} value for carbon dioxide has been taken as the gas screening value for the site.

The assessment indicates the site is classified as Amber 1, where designs confirm with the NHBC 'model' low rise house. Gas protection measures will be required for an Amber 1 classification.

Developments which differ significantly from the 'model' construction will be assessed in accordance with BS8485:2019. This includes low rise apartments.

The dataset obtained is considered to be representative of site conditions beneath the proposed development footprint. A range of data has been collated which captures significant temporal variation including barometric variability and various ground saturation states. As such, the gas risk assessment will utilise steady state flow rates and maximum gas concentrations when determining the maximum Q_{hg}.

On the basis that methane concentrations were recorded below the limit of detection of the monitoring instrument throughout the monitoring period, the gas screening value (GSV) will be determined by the carbon dioxide concentrations recorded.

Evaluation of the 'borehole' scenario (highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole) records a maximum Q_{hg} of 0.075 l/hr for carbon dioxide in WS01 on the sixth visit, where maximum steady state flow reading of 0.8 l/hr is used, and maximum gas concentrations of 9.4% v/v recorded.

Evaluation of the 'worst case' check (highest hazardous gas flow rate irrespective of when the readings were taken within a single strata/zone), records a maximum Q_{hg} of 0.080 l/hr for carbon dioxide.

Elevated carbon dioxide concentrations were recorded above 5% v/v in WS01 (second, third, fourth and sixth visit) and WS03 (first, second, third, fourth and sixth monitoring visits).

All monitoring wells were constructed in the Glacial Till. The exploratory hole logs indicate the Glacial Till is formed of similar materials across the site, with no observable increase in organic or putrescible content or changes in soil composition between these and other positions across the site. The borehole Q_{hg} value for carbon dioxide has been taken as the gas screening value for the site, which is consistent with a Characteristic Situation 2 (CS-2) gas regime, where gas protection measures are 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.

7.0 Geotechnical Assessment and Recommendations

The recommendations provided within this section are based on a review of the encountered ground conditions across the site.

The ground conditions at site generally comprised Made Ground to depths of between 0.30 and 0.90m bgl, underlain by Glacial Till. The Glacial Till was encountered from depths between 0.30 and 0.90m bgl to the base of the borehole (maximum depth of 5.45m bgl). The thickness of the Glacial Till was not proven by this investigation.

7.2 Foundation Assessment

It is understood the proposed development comprises several two storey residential houses and residential apartments. The loadings of the proposed houses and apartments were not available at the time of writing this report. The loads will pre-determine the suitability of foundations adopted, though are not anticipated to be high.

Based on the ground and groundwater conditions encountered during the Curtins ground investigation, it is considered that shallow foundations are likely to be suitable for most of the site.

Foundations will be required to be taken down below any Made Ground and be placed in the firm to stiff cohesive Glacial Till that exhibits an undrained shear strength in excess of 50kPa and cast at a minimum depth of 1.0m bgl. Localised over excavation may be required where there is deep Made Ground and to ensure the minimum undrained shear strength criteria of 50kPa is achieved. To prevent differential settlement foundations should be placed wholly in one material i.e. clay and over excavation through granular sand layers in the Glacial Till may be required to achieve this.

Assuming a 0.6m wide strip foundation at a depth of 1.0m bgl, an allowable bearing capacity of 75kPa is likely to be achievable (limited to less than 25mm settlement). Any changes to the foundation width, depth or founding strata will change this capacity. Should excavation depths become excessive and uneconomical to meet the minimum undrained shear strength of 50kPa, a ground improvement (e.g. vibro) or mini-pile solution may be required.

Specialist contractors should be consulted with regards to the design of an appropriate ground improvement or piling scheme to identify the most feasible and economic technique and options.

A qualified experienced engineer should inspect the founding stratum prior to casting.

Groundwater ingress into shallow excavations is not anticipated, however if it does occur sump pumping is likely to be an effective dewatering technique.

Excavation instability associated with the Made Ground and superficial deposits cannot be discounted, especially in granular layers in the Glacial Till and in conjunction with groundwater ingress.

Due to the extremely low strength of the Glacial Till in borehole WS04, a supplementary ground investigation is recommended in this area to delineate the extent of the soft ground. Shallow foundations are unlikely to be feasible here due to a low bearing capacity and likelihood of excessive settlement. The extent and nature of additional ground investigation can be confirmed once the development layouts are fixed. Ground improvement or mini-piles are likely to be required.

7.3 Ground Floor Slab

In accordance with the NHBC Standards (2022) ground bearing floor slabs may only be used where the depth of Made Ground is less than 600mm deep and properly compacted. Any unsuitable or soft soils should be excavated out and replaced with a granular fill, and the formation thoroughly proof rolled prior to casting. Where Made Ground is greater than 600mm thick, excavating and replacing the Made Ground to an engineering specification may enable a ground bearing solution, however approval from the warranty provider should be obtained in advance. Alternatively ground improvement such as vibro would enable a ground bearing solution. A suspended floor slab would be required in conjunction with a piled solution.

7.3 Chemical Attack on Buried Concrete

The classification of the site in terms of concrete in aggressive ground is based on the guidance provided in Table C2 of the Building Research Establishment (BRE) Special Digest 1, 3rd edition of 2005. A summary of the results obtained during are summarised in *Table 7.3a*, and *Table 7.3b* details the classification.

Table 7.3a – *Aggressive Chemical Environment for Concrete (ACEC) Site Classification*

Stratum	Test Type	No. of Tests	Range
Made Ground	pH	4	5.92 – 9.94
	Water Soluble Sulphate (mg/l)	4	<10 – 150
Glacial Till	pH	7	6.37 – 8.3
	Water Soluble Sulphate (mg/l)	7	7 - 139

Table 7.3b – *Aggressive Chemical Environment for Concrete (ACEC) Site Classification*

Stratum	Design Sulphate Class	ACEC Class (1)
Made Ground	DS-1	AC-2z
Glacial Till	DS-1	AC-2z

(1) ACEC assessment was based on the *mobile* groundwater condition in a *brownfield* scheme area

In these conditions it is considered that deterioration of buried concrete due to sulphate or acid attack is unlikely to occur. The preliminary design of buried concrete according to Table C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-1 (AC-2z) conditions assuming mobile groundwater.

8.0 Conclusions

A **Moderate/Low** risk has been identified to site end-users from soil and dust inhalation, direct contact and ingestion of shallow site soils beneath the site due to the mercury exceedances recorded. A suitable thickness of clean and inert capping should be installed in all private gardens and areas of soft landscaping, detailed in a Remediation Strategy.

Construction workers should be provided with appropriate personal protection equipment (PPE) with consideration of the environmental testing results presented.

No gas protection measures will be required for the proposed residential development.

For most of the site shallow foundations are likely to be suitable. The cohesive Glacial Till at depths greater than 1.0m bgl and with an undrained shear strength in excess of 50kPa are likely to achieve an allowable bearing capacity of 75kPa, with settlement within acceptable limits. Over excavation through deep Made Ground and granular sand layers in the Glacial Till, and to ensure the minimum undrained shear strength of 50kPa is achieved may be required. Should excavation depths become excessive and uneconomical to meet

the minimum undrained shear strength of 50kPa, a ground improvement (e.g. vibro) or mini-pile solution may be required.

In accordance with the NHBC Standards (2022) ground bearing floor slabs may only be used where the depth of Made Ground is less than 600mm deep and properly compacted. Any unsuitable or soft soils should be excavated out and replaced with a granular fill, and the formation thoroughly proof rolled prior to casting. Where Made Ground is greater than 600mm thick, excavating and replacing the Made Ground to an engineering specification may enable a ground bearing solution, however approval from the warranty provider should be obtained in advance. Alternatively ground improvement such as vibro would enable a ground bearing solution. A suspended floor slab would be required in conjunction with a piled solution.

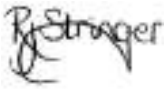
Due to the presence of extremely soft clay in borehole WS04 to at least 3.0m bgl, additional supplementary investigation is recommended in this area to delineate the extent of the soft ground, as ground improvement or piling is likely to be required.

A Design Sulphate class of DS-1 and ACEC Class of AC-2z are deemed suitable for the proposed development for Made Ground and Glacial Till.

If you have any queries with regard to this letter report, please do not hesitate to contact us.

Yours sincerely,

J Lord
Senior Geo-Environmental Engineer
For and on behalf of
Curtins Consulting Ltd

Author	Signature	Date
J Lord BSc (Hons) Senior Geo-Environmental Engineer		29 November 2022
Checked	**Signature**	**Date**
R Allen BSc (Hons) MSc MCIWEM C.WEM CEng Principal Engineer		29 November 2022
R Stringer BSc (Hons) CGeol EurGeol FGS Principal Geotechnical Engineer		29 November 2022
Authorised	**Signature**	**Date**
R Allen BSc (Hons) MSc MCIWEM C.WEM CEng Principal Engineer		29 November 2022

Rev	Description	Issued by	Checked	Date

Curtins Consulting Limited
17-19 Whitworth Street West, Manchester, M1 5WG
t: 0161 236 2394 e: manchester@curtins.com w: www.curtins.com

References

1. Environmental Agency (2020) Land Contamination Risk Management (LCRM)
2. British Standards Institution (2011) Investigation of Potentially Contaminated Sites: Code of Practice (report no. BS10175:2011+A2:2017).
3. British Standards Institution BSI (2015+2000) Code of Practice for Site Investigations (report no. BS5930).
4. British Standards Institution (2006) Eurocode 7: Geotechnical Design (report no. BSEN1997).
5. British Standard (2016) Methods of test for soils for civil engineering purposes. General requirements and sample preparation (report no. BS1377-1).
6. NHBC Standards (2021) Chapter 4.2
7. NHBC (2007) Guidance of Evaluation of Development Proposals on sites where methane and carbon dioxide are present. Report Edition No. 4

Appendices

Appendix A1 – Drawings

Appendix A2 – Exploratory Hole Logs

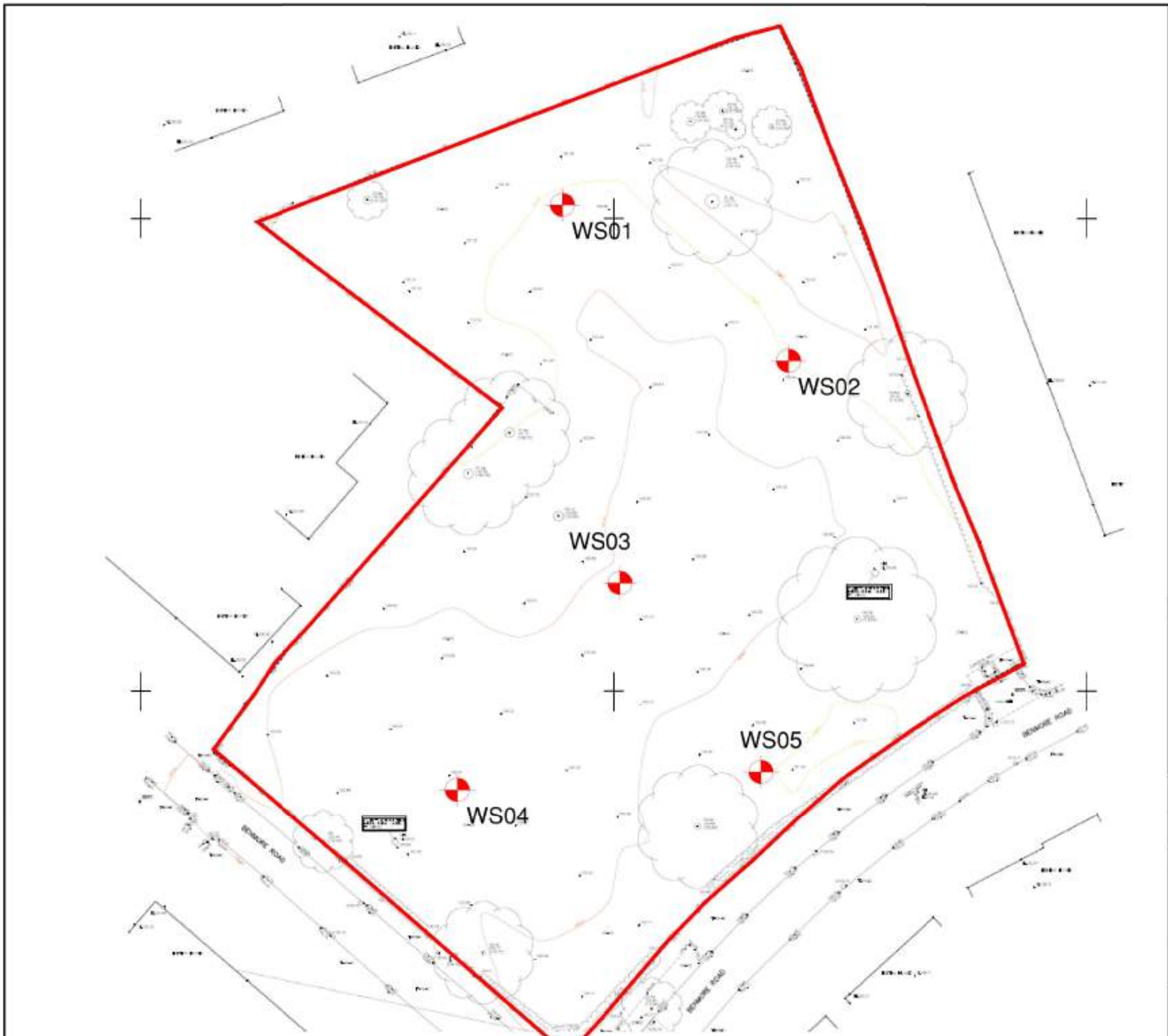
Appendix A3 – Geo-Environmental Laboratory Testing Results

Appendix A4 – Generic Assessment Criteria (GACs)

Appendix A5 – Geotechnical Laboratory Testing Results

Appendix A6 – Ground Gas Monitoring Results

Appendix A1 – Drawings



SITE INVESTIGATION

BOREHOLE LOCATIONS

Rev:	Description:	Date:	By:	Chkd:

curtins

Curtins Consulting Ltd,
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures · Civils · Environmental · Infrastructure · Transport Planning · Sustainability · Expert Advisory Services
Birmingham · Bristol · Cardiff · Douglas · Edinburgh · Kendal · Leeds · Liverpool · London · Manchester · Nottingham

Status:
INFORMATION

Project:
WHITEMOSS COMMUNITY RESOURCE CENTRE

Drg Title:
EXPLORATORY HOLE LOCATION PLAN

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	16/08/2022	JL	RA

Drg No: **077873-CUR-00-XX-DR-GE-80003** Rev: **P02**

© This drawing is the copyright of Curtins Consulting Ltd

Appendix A2 – Exploratory Hole Logs

Borehole Log

Borehole No. **WS01**

Sheet 1 of 2

Project Name:	Former Whitemoss Community Centre	Project No. 077873.02	Co-ords: -	Hole Type WS
Location:	Former Whitemoss Community Resource Centre, Blackley, M9 6EH		Level: 101.00	Scale 1:20
Client:	Guinness Partnership		Dates: 11/08/2022 - 11/08/2022	Logged By JP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	100.80		MADE GROUND: Grass cover over loose dark brown slightly gravelly sand with abundant rootlets. Gravel is angular to subangular, fine to coarse of mudstone, brick and concrete.
		0.30 - 0.40	D					MADE GROUND: Loose light grey gravelly sand. Gravel is subangular to subrounded fine to coarse of mudstone.
		0.40	ES					
					0.50	100.50		Firm dark brown mottled orangish brown slightly sandy CLAY. Fand is fine to medium.
		1.00		N=8 (2,2/2,2,2,2)				
		2.00		N=10 (2,2/2,2,3,3)				
		3.00		N=12 (3,2/3,2,3,4)				*From 3.2 to 3.28: Band of loose brown fine to medium sand.*
		3.50 - 3.60	D					*From 3.56 to 3.69: Band of loose brown fine to medium sand.*
		4.00		N=13 (2,2/3,2,4,4)				

Continued on next sheet

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. No groundwater encountered.

Borehole Log

Borehole No. **WS01**

Sheet 2 of 2

Project Name:	Former Whitemoss Community Centre	Project No. 077873.02	Co-ords: -	Hole Type WS
Location:	Former Whitemoss Community Resource Centre, Blackley, M9 6EH		Level: 101.00	Scale 1:20
Client:	Guinness Partnership		Dates: 11/08/2022 - 11/08/2022	Logged By JP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		5.00		N=12 (2,2/3,3,3,3)				
					5.45	95.55		End of borehole at 5.45 m

5

6

7

8

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. No groundwater encountered.

AGS

Borehole Log

Borehole No. **WS02**

Sheet 1 of 2

Project Name:	Former Whitemoss Community Centre	Project No. 077873.02	Co-ords: -	Hole Type WS
Location:	Former Whitemoss Community Resource Centre, Blackley, M9 6EH		Level: 101.00	Scale 1:20
Client:	Guinness Partnership		Dates: 11/08/2022 - 11/08/2022	Logged By JP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.15	100.85		TOPSOIL: Grass cover over loose dark brown slightly gravelly sand with abundant rootlets. Gravel is angular to subrounded, fine to coarse of mudstone, brick and concrete.
		0.40	ES					MADE GROUND: Loose dark brown slightly clayey gravelly sand with rare cobbles. Gravel is angular to subrounded fine to coarse of brick, concrete and mudstone. Cobbles are angular to subangular of brick.
					0.90	100.10		
		1.00		N=10 (1,1/2,2,3,3)				Firm to stiff dark brown slightly sandy CLAY. Sand is fine to medium.
								From 1.5 to 1.52: Small pebble of granite, 6cm.
		2.00		N=11 (2,1/2,2,4,3)				
					2.20	98.80		Soft to firm dark brown slightly sandy CLAY. Sand is fine to medium.
								From 2.4 to 2.43: Band of loose brown fine to medium sand.
		3.00		N=11 (2,3/2,3,3,3)				
		3.25	D					*From 3.35 to 3.4: Band of loose brown fine to medium sand.*
		4.00		N=8 (2,2/2,2,2,2)				Continued on next sheet

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl.

Borehole Log

Borehole No.
WS02
Sheet 2 of 2

Project Name:	Former Whitemoss Community Centre	Project No. 077873.02	Co-ords: -	Hole Type WS
Location:	Former Whitemoss Community Resource Centre, Blackley, M9 6EH		Level: 101.00	Scale 1:20
Client:	Guinness Partnership		Dates: 11/08/2022 - 11/08/2022	Logged By JP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		5.00		N=21 (3,2/3,4,7,7)				*From 4.54 to 4.65: Band of loose brown fine to medium sand.*
					5.45	95.55		End of borehole at 5.45 m

5
6
7
8

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl.

AGS

Borehole Log

Borehole No. **WS03**

Sheet 1 of 2

Project Name:	Former Whitemoss Community Centre	Project No. 077873.02	Co-ords: -	Hole Type WS
Location:	Former Whitemoss Community Resource Centre, Blackley, M9 6EH		Level: 100.50	Scale 1:20
Client:	Guinness Partnership		Dates: 11/08/2022 - 11/08/2022	Logged By JP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	100.30		MADE GROUND: Grass cover over loose dark brown slightly gravelly sand with abundant rootlets. Gravel is angular to subrounded, fine to coarse of mudstone, brick and concrete.
		0.50	ES					MADE GROUND: Loose brown gravelly sand with rare cobbles. Gravel is angular to subrounded fine to coarse of brick, concrete and mudstone. Cobbles are angular to subangular of brick and concrete.
					0.70	99.80		Firm dark brown slightly sandy CLAY. Sand is fine to medium.
		1.00		N=7 (1,1/1,2,2,2)				
								From 1.3 to 1.33: Band of loose brown fine to medium sand.
		2.00		N=12 (3,2/3,3,3,3)				
					2.80	97.70		Loose brown slightly clayey fine to medium SAND.
		3.00	ES					
		3.00		N=20 (5,5/3,5,6,6)				*From 3.15 to 3.2: Band of loose orangish brown fine to medium sand.*
		3.50 - 3.60	D					
	▼	4.00		N=11 (2,2/3,3,2,3)				

Continued on next sheet

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strike encountered at 4.00m bgl.

AGS

Borehole Log

Borehole No. **WS03**

Sheet 2 of 2

Project Name:	Former Whitemoss Community Centre	Project No. 077873.02	Co-ords: -	Hole Type WS
Location:	Former Whitemoss Community Resource Centre, Blackley, M9 6EH		Level: 100.50	Scale 1:20
Client:	Guinness Partnership		Dates: 11/08/2022 - 11/08/2022	Logged By JP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		4.10 - 4.20	D					
		5.00		N=27 (2,2/3,4,10,10)				
					5.45	95.05		End of borehole at 5.45 m

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Groundwater strike encountered at 4.00m bgl.

Borehole Log

Borehole No. **WS04**

Sheet 1 of 2

Project Name:	Former Whitemoss Community Centre	Project No. 077873.02	Co-ords: -	Hole Type WS
Location:	Former Whitemoss Community Resource Centre, Blackley, M9 6EH		Level: 100.15	Scale 1:20
Client:	Guinness Partnership		Dates: 11/08/2022 - 11/08/2022	Logged By JP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	99.85		TOPSOIL: Grass cover over loose dark brown slightly gravelly slightly clayey sand with abundant rootlets. Gravel is angular to subangular fine to medium of brick concrete and mudstone.
		0.50	ES					Soft light brown mottled light grey and orange sandy CLAY. Sand is fine to medium.
		1.00		N=6 (1,1/1,2,1,2)				
								From 1.5 to 1.55: Band of loose brown clayey sand.
		2.00		N=0 (0,0/0,0,0,0)				
		2.50	D					*From 2.5 to 2.55: Band of loose very dark grey clayey sand.*
		3.00		N=1 (0,0/0,0,0,1)				
		4.00		N=17 (3,3/4,4,4,5)				Continued on next sheet

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. No groundwater encountered.

Borehole Log

Borehole No. **WS04**

Sheet 2 of 2

Project Name:	Former Whitemoss Community Centre	Project No. 077873.02	Co-ords: -	Hole Type WS
Location:	Former Whitemoss Community Resource Centre, Blackley, M9 6EH		Level: 100.15	Scale 1:20
Client:	Guinness Partnership		Dates: 11/08/2022 - 11/08/2022	Logged By JP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		5.00		N=35 (5,6/8,8,9,10)				
					5.45	94.70		End of borehole at 5.45 m

5

6

7

8

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. No groundwater encountered.

AGS

Borehole Log

Borehole No. **WS05**

Sheet 1 of 2

Project Name:	Former Whitemoss Community Centre	Project No. 077873.02	Co-ords: -	Hole Type WS
Location:	Former Whitemoss Community Resource Centre, Blackley, M9 6EH		Level: 100.90	Scale 1:20
Client:	Guinness Partnership		Dates: 11/08/2022 - 11/08/2022	Logged By JP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.30	100.60		MADE GROUND: Grass cover over loose dark brown slightly gravelly slightly clayey sand with abundant rootlets. Gravel is angular to subangular fine to medium of brick concrete and mudstone.
		1.00		N=11 (2,3/2,3,3,3)				Firm to stiff light brown mottled light grey and orange sandy CLAY. Sand is fine to medium.
		2.00		N=11 (2,2/2,3,3,3)				
		2.50	ES					
		3.00	D		3.00	97.90		
		3.00		N=10 (2,2/2,3,2,3)				Firm to stiff dark brown sandy to very sandy CLAY. Sand is fine to medium.
		4.00		N=27 (5,5/5,8,7,7)				

Continued on next sheet

Remarks

Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Borehole installed with ground gas/water monitoring installation to m bgl.

Borehole Log

Borehole No.
WS05
Sheet 2 of 2

Project Name:	Former Whitemoss Community Centre	Project No. 077873.02	Co-ords: -	Hole Type WS
Location:	Former Whitemoss Community Resource Centre, Blackley, M9 6EH		Level: 100.90	Scale 1:20
Client:	Guinness Partnership		Dates: 11/08/2022 - 11/08/2022	Logged By JP

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		5.00		N=16 (4,3/4,4,4,4)				
					5.45	95.45		End of borehole at 5.45 m

5
6
7
8

Remarks
Location cleared with GPR and Cat & Genny. Hand dug service clearance pit excavated to 1.20m bgl. Borehole installed with ground gas/water monitoring installation to m bgl.

AGS