

Surface Water Drainage Strategy

Site Address

63 Knowsley Street
Cheetham Hill
Manchester
M8 8HX

Client

Andersen Textiles Ltd

Report Reference

SWDS - 2020 – 00039
Update June 2023

Prepared By

STM Environmental Consultants Ltd

Date

23/06/2023



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1 Document Control



Surface Water Drainage Strategy



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2 Abbreviations

Abbreviation	Description
STM	STM Environmental Consultants Limited
BGS	British Geological Survey
EA	Environment Agency
OS	Ordnance Survey of Great Britain
FRA	Flood Risk Assessment
NPPF	National Planning Policy Framework
FWD	Floodline Warning Direct
FRMS	Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
SWMP	Surface Water Management Plan
SFRA	Strategic Flood Risk Assessment
CDA	Critical Drainage Area
SuDS	Sustainable Drainage Systems
GWSPZ	Groundwater Source Protection Zone

3 Disclaimer

This report and any information or advice which it contains, is provided by STM Environmental Consultants Ltd (STM) and can only be used and relied upon by Andersen Textiles Ltd (Client).

STM has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant when undertaking works of this nature. However, STM gives no warranty, representation or assurance as to the accuracy or completeness of any information, assessments or evaluations presented within this report. Furthermore, STM accepts no liability whatsoever for any loss or damage arising from the interpretation or use of the information contained within this report. Any party other than the Client using or placing reliance upon any information contained in this report, do so at their own risk.



4 Executive Summary

Location	63 Knowsley Street, Cheetham Hill, Manchester, M8 8HX Grid reference: 383871, 399753		
Proposed Development	7 wholesale units at ground floor with ancillary storage at first and second floor, and car parking.		
Current Use	Car parking.		
Hydrology	River Irwell 580m SW.		
Geology	Diamicton Till superficial deposits and the bedrock is classified as belonging to the Chester Pebble Bed (Sandstone). The BGS also identifies the site has been covered by infilled land (artificial deposits).		
Hydrogeology	Unproductive superficial and principal bedrock aquifer.		
Permeability	Highly variable superficial and freely draining bedrock.		
Infiltration Potential	Good potential.		
Fluvial Flood Risk	Low.		
Surface Water Flood Risk	Low.		
Groundwater Flood Risk	Low.		
Site Area	1,160m ² (0.116ha)		
Existing and Proposed Site Layout	Ground Cover	Existing	Proposed (Without SuDS)
	Buildings	0	581
	Driveways/Patio	1160	579
	Gardens/ Soft landscaping	0	0
	Total Impermeable Area	1160	1160
Run-Off Rates	Greenfield (GF) (l/s)	Pre - Development (PD) (l/s)	Post Development (PD) (l/s)
Qbar	0.4022	0.8771	0.8771
1 in 1	0.3418	0.7456	0.7456
1 in 30	0.9250	2.0174	2.0174
1 in 100	1.2829	2.7981	2.7981
1 in 100 + CC (40%)	1.9017	4.1480	4.1480
SuDS Target Requirement	As the development is taking place on an already developed site the non-statutory technical standards for sustainable drainage systems S3 (peak flow) and S5 and S6 (volume controls) apply. A discharge rate of 5l/s is utilised to prevent blockages as well as provide a significant reduction in the surface water runoff rate.		
Storage Required to meet Planning Requirement	Using the Microdrainage quick storage estimate method the total storage volume required to match greenfield discharges or pre-development rate was calculated to be 57 - 82m ³ .		

Infiltration Testing	Infiltration testing was not undertaken due to the evidence of infilled ground covering the site as indicated by the BGS.
SuDS Strategy	The use of permeable paving (P1 - 12.15m³) and geocellular storage (G1 - 38.0m³) will provide a total of 50.1m³ of interception and attenuation storage. A further 4m³ of storage will be available within the associated pipes and manholes. The permeable paving will reduce the “effective impermeable” area of the site by 136m; However, as it will be impermeable lined it will therefore contribute to the total positively drained catchment area. All excess surface waters will pass through a catchpit manhole before entering the Geocellular storage. Excess run-off will be discharged into the nearby United Utilities sewer at a limited rate of 5l/s using an Hydro-brake Orifice Vortex control via the existing on-site connection.
Conclusion	With the proposed SuDS mitigation measures in place, we believe that the proposed development will reduce local flood risk and therefore be in compliance with Condition 17 of the planning permission 127544/FO/2020, the LLFA's current planning policy and the NPPF.



5 Introduction

STM Environmental Consultants Limited have been appointed by Andersen Textiles Ltd to undertake a Surface Water Drainage Strategy for a proposed development at 63 Knowsley Street, Cheetham Hill, Manchester, M8 8HX.

5.1 Proposed Development

The SWDS is required to support a planning application (Reference: 127544/FO/2020) for the erection of a 3 storey building to create 7 wholesale units at ground floor with ancillary storage at first and second floor, and car parking.

The planning condition 17 states as follows:

Prior to the commencement of above ground development, the following details shall be submitted and approved in writing by the City Council with regard to flood risk:

-  Surface water drainage layout, including proposed overland flow routes for extreme events (up to 1 in 100 year including climate change allowance);
-  Details of any surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester, Trafford and Salford Strategic Flood Risk Assessment.
-  Hydraulic calculations to support the drainage proposals.
-  Details of how the scheme will be maintained and managed after completion.

Reason - To prevent the increased risk of flooding, to improve and protect water quality and ensure future maintenance of the surface water drainage system, pursuant to policy EN17 of the Manchester Core Strategy. Some elements of the drainage of the site have not yet been fully defined. The details are required prior to works commencing on site to ensure the most suitable and appropriate methods of drainage are installed prior to buildings being constructed on site.

Copies of the development plans and decision noticed are presented in [Appendix 1](#).

5.2 Report Aims and Objectives

This report sets out the proposed drainage strategy that will be employed in the designs to meet the requirements of the planning condition and the National Planning Policy Framework.

5.3 Legislative and Policy Context

5.3.1 Legislative Context

Section H3 of the Building Regulations 2010 requires that adequate provision is made for rainwater to be carried from the building roofs and paved areas, and be preferentially discharged to soakaways or some other adequate infiltration system. Where that is not reasonably practicable, a watercourse; or sewer can be used.

The Flood and Water Management Act was introduced in 2010. The Act defines the role of lead local flood authority (LLFA) for an area. All LLFA are required to develop, maintain, apply and monitor a strategy for local flood risk management in its area, called “local flood risk management strategy”.

Alongside the Act, Flood Risk Regulations (2009) outline the roles and responsibilities of the various authorities, which include preparing Flood Risk Management Plans and identifying how significant flood risks are to be mitigated.

5.3.2 Policy Context

The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social planning policies for England. The policies set out in this framework apply to the preparation of local and neighbourhood plans and to decisions on planning applications.

Paragraph 163 of the National Planning Policy Framework (NPPF) states that:

When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment
--



following the Sequential Test, and if required the Exception Test, it can be demonstrated that:

-  within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location
-  development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems.

Paragraph 165 states that:

Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

-  take account of advice from the lead local flood authority;
-  have appropriate proposed minimum operational standards;
-  have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
-  where possible, provide multifunctional benefits.

A major development is defined as:

-  a residential development: 10 dwellings or more or residential development with a site area of 0.5 hectares or more where the number of dwellings is not yet known
-  a non-residential development: provision of a building or buildings where the total floor space to be created is 1000 square metres or more or where the floor area is not yet known, a site area of 1 hectare or more.

Evidence that sustainable drainage (SuDS) has been considered should be submitted for Minor Developments.

5.3.3 Manchester City Council - Policy EN 17 - Water Quality

Development should avoid any adverse impact on water quality, including during the construction phase, and wherever possible should seek to enhance water quality, both chemical and ecological;

Development should minimise surface water run-off from development and associated roads, and maximise the use of appropriate sustainable drainage systems, to minimise groundwater contamination, and to avoid pollutants reaching watercourses;

Development close to a watercourse should also ensure that waste or litter cannot enter the watercourse from the site;

Development should, where feasible and appropriate, seek to open up any culverted or hidden watercourse beneath the site to improve the ecological status of that watercourse.

6 Site Characteristics

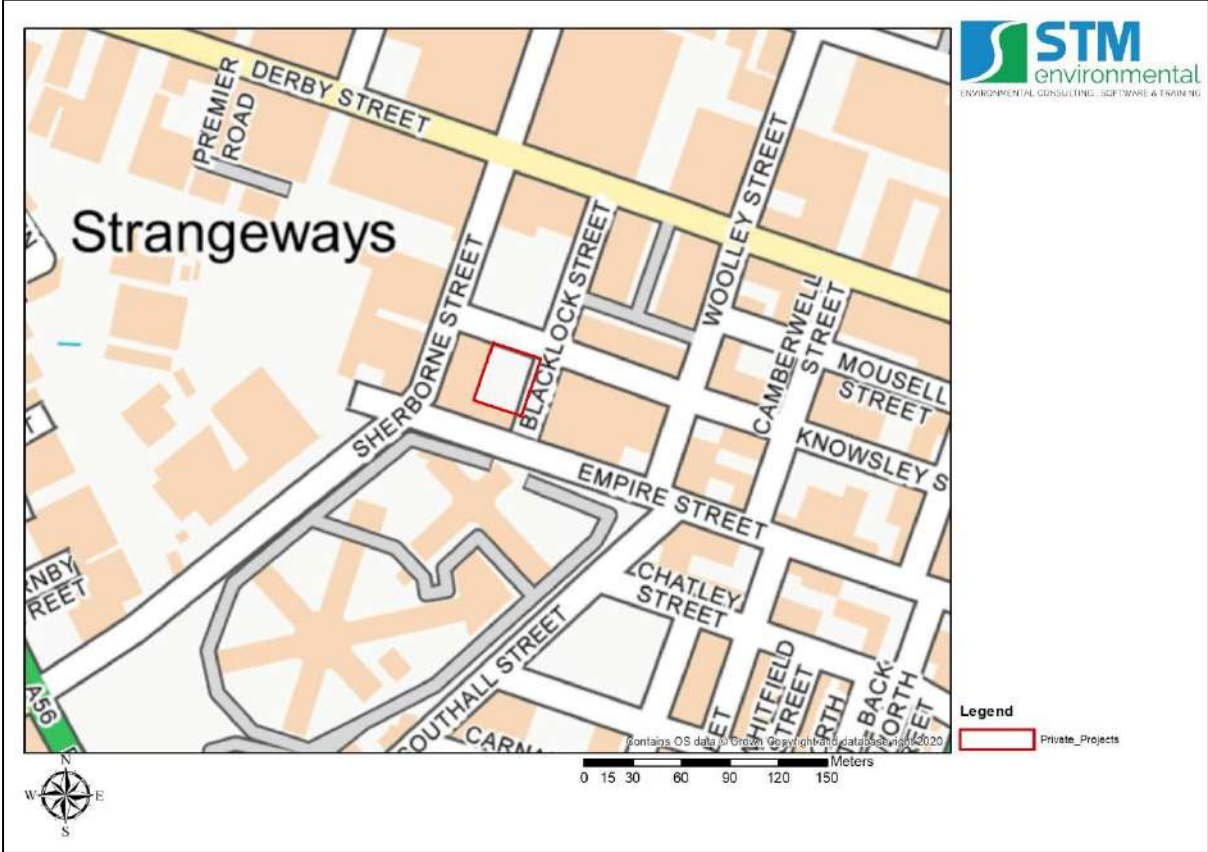
6.1 Location and Area

The site is centred at national grid reference 383871, 399753 and has an area of 1,160m².

It falls within the jurisdiction of Manchester City Council in terms of the planning consultation process on flood risk and surface water management. The LLFA is Manchester District Council.



Figure 1: Site location map and aerial photo



6.2 Current Site

The site is currently used as car parking.

6.3 Site Topography

The mapping provided in [Appendix 2](#) shows that the topography within the site.

The site is flat at 45.3 - 45.5mAOD.

6.4 Geology and Hydrology

The nearest main watercourse is the River Irwell, located 580m south west of the site.

[Appendix 2](#) presents BGS mapping showing the geology in the area of the site.

The BGS Geoindex indicates that the superficial deposits at the site consist of Diamicton till whilst the bedrock is classified as belonging to the Chester Pebble Bed (Sandstone). The BGS also identifies the site to be covered by infilled land (artificial deposits).

6.5 Hydrogeology

[Appendix 2](#) presents mapping from the BGS with indications of the hydrogeological characteristics of the site.

The permeability of the bedrock geology is considered to be freely draining while that of the superficial geology is considered to be highly variable.

The BGS infiltration potential map suggests that there is likely to be good potential for infiltration methods at the site.

The maps also indicate that the groundwater table is greater than 5mbgl.

The site lies upon a principal bedrock aquifer and an unproductive superficial aquifer. The site does not lie within a groundwater source protection zone.



6.6 Flood Risk

6.6.1 Fluvial Flood Risk

Fluvial and tidal risk is assessed using flooding maps produced by the Environment Agency (EA). These maps use available historic data and hydraulic modelling to define zones of flood risk. The maps allow a site to be defined in terms of its Flood Zone (e.g. 1, 2, 3a or 3b) and in terms of the overall flood risk (very low, low, medium or high).

The EA Flood Zones are defined as:

-  Flood zone 1: Less than a 1 in 1000 annual probability of fluvial and/or tidal flooding;
-  Flood zone 2: Between 1 in 100 and 1 in 1000 annual probability of fluvial flooding and/or between 1 in 200 and 1 in 1000 annual probability of tidal flooding;
-  Flood zone 3a: Greater than 1 in 100 annual probability of fluvial flooding and/or greater than 1 in 200 annual probability of tidal flooding;
-  Flood zone 3b: functional flood plain (definition specific to the LLFA). Less than a 1 in 20 annual probability of fluvial and/or tidal flooding.

The site is designated as being within flood zone 1 and is therefore considered to have a low risk of flooding. This equates to a potential yearly risk of flooding of less than 1 in 1000 annual probability of fluvial and/or tidal flooding (0.1 % Annual Expected Probability).

6.6.2 Surface Water Flood Risk

Surface water flooding occurs when high intensity rainfall leads to run-off which flows over the ground surface, causing ponding in low-lying areas when the precipitation rate or overland flow rate is greater than the rate of infiltration, or return into watercourses. Surface water flooding can be exacerbated when the underlying soil and geology is saturated (as a result of prolonged precipitation or a high-water table) or when the drainage network has insufficient capacity.

The chief mechanisms for flooding can be divided into the following categories:

-  Runoff from higher topography – the areas of greatest flood depths tend to be at the base of the steeper land;
-  Localised surface water runoff – within the central parts of the borough, surface water flooding tends to be a result of localised ponding of surface water;
-  Sewer Flooding – areas where extensive and deep surface water flooding is likely to be influenced by sewer flooding. Where the sewer network has reached capacity, and surcharged, this will exacerbate the flood risk in these areas.
-  Low Lying Areas – areas such as underpasses, subways and lowered roads beneath railway lines are more susceptible to surface water flooding;
-  Railway Cuttings – leading to internal ponding and transport disruption;
-  Railway Embankments – discrete surface water flooding locations along the up-stream side of the raised network rail embankments where water flows are interrupted and ponding can occur.

A map showing the site and the modelled prediction of surface water flood risk and depth provided by the EA is available in [Appendix 3](#). This indicates that the site is at low risk of flooding.

The site will not witness any surface water flooding during the 1 in 30 or 1 in 100-year rainfall return period.

The site will witness surface water flooding depth of up to 150mm during the 1 in 1000-year event.

6.6.3 Groundwater Flood Risk

Groundwater flooding occurs when water rises from the underlying aquifer at the location of a spring – where the underlying impermeable geology meets the ground surface. This tends to occur after much longer periods of intense precipitation, in often low-lying areas where the water table is likely to be at a shallow depth. Groundwater flooding is known to occur in areas underlain by principal aquifers, although

increasingly it is also being associated with more localised floodplain sands and gravels.

Groundwater susceptibility mapping provided by BGS is presented in [Appendix 3](#). This indicates that there is no significant potential for groundwater flooding to occur at the surface.

6.7 Existing Surface Water Drainage Features

The existing surface water runoff from the car park drains into the United Utilities (UU) sewer.

There is an existing combined connection into the UU combined sewer; Inspection Chamber manhole is located in the north of the site. It has a cover level of 45.49mAOD and a depth of 1.3m, resulting in an invert level of 44.19mAOD. It is 650mm by 900mm in size and formed from red brick. The location of the IC is shown on the topographic mapping available in [Appendix 2](#).

A utility search was undertaken which identified United Utilities as the waste water operator in the area.

United Utilities operates a combined sewer within the local area. The closest sewer run is located to the north of the site along Knowsley Street, flowing west to east across the northern boundary.

The closest asset ID is 8707, it's cover level is 45.80mAOD and its invert level is 42.40mAOD.

7 Hydrological Run-off Assessment

To minimise the impact of the new development on local flood risk, the NPPF requires that the water drainage arrangements for any development site are that the volumes and peak flow rates leaving the site post-development are improved upon those of the existing conditions. The following run-off assessment predicts the Greenfield, pre- and



post-development run-off rates and provides the required SuDS necessary for complying with the relevant planning policies.

7.1 Existing and Proposed Ground Cover

A summary of the existing and proposed site ground cover is shown below in Table 1 and Table 2 below.

Table 1: Breakdown of Ground Cover in the Proposed Development

Ground Cover	Existing Area (m ²)	Proposed Area (m ²) (Without SuDS)	Difference
Buildings	0	581	581
Driveways/Patio	1160	579	-581
Gardens/ Soft landscaping	0	0	0
Total	1160	1160	

Table 2: Summary of Permeable and Impermeable Areas

	Impermeable Area (m ²)	Permeable Area (m ²)	Total Area (m ²)
Existing Site	1160	0	1160
Proposed Site	1160	0	1160
Difference	0	0	

8 SuDS Requirements

8.1 Peak Flow Control

With regard to peak flow control, the non-statutory technical standards for sustainable drainage systems state that:

 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 must 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.

8.2 Volume Control Requirements

With regard to volume control, the non-statutory technical standards for sustainable drainage systems state that:

-  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.

8.3 Run-off and Storage Calculations

The IH124 method was applied to calculate the Greenfield and post-development run-off rates that include the 40% allowances for climate change. The full results are presented in [Appendix 4](#). Table 3 below provides a summary of the results.

Table 3: Calculation of post-development run-off rates for the site.

	Greenfield (l/s)	Greenfield + CC	Pre - Development	Pre - Development + CC	Post Development	Post Development + CC
Qbar	0.4022	0.5962	0.8771	1.3003	0.8771	1.3003
1 in 1	0.3418	0.5067	0.7456	1.1053	0.7456	1.1053
1 in 30	0.9250	1.3712	2.0174	2.9907	2.0174	2.9907
1 in 100	1.2829	1.9017	2.7981	4.1480	2.7981	4.1480

As the development is taking place on an already developed site S3 (peak flow) and S5 and S6 (volume controls) apply. The target discharge rate to the sewer from this

site was set at 5.0l/s to allow for a significant reduction in the surface water discharge rate and to help prevent blockages.

United Utilities have agreed in principle to an allowable discharge rate of 5.0l/s to allow for a reduction in the required storage.

The quick storage estimate tool in Microdrainage was used to estimate the approximate storage required. The storage volume required to match greenfield rates is estimated to be **32 - 53m³**. Screenshots of the quick storage estimate and variables are available in [Appendix 4](#).

9 Site Investigation

A site investigation has not been undertaken due to the evidence that this site is located on infilled land as indicated by the BGS artificial deposits layer file.

10 SuDS Options

As mentioned above, planning policies require that SuDS strategies consider source control (i.e. disposal of runoff within the plot boundary), followed by site control (site wide disposal) and then regional control (appropriate for larger development with strategic drainage infrastructure). They also require that those methods that give the most benefits in terms of sustainability are prioritised for employment (generally known as the SuDS Hierarchy) as further described below.

10.1 SuDS Hierarchy

The SuDS Hierarchy sets out the preferred method of selecting which Sustainable Drainage System should be used. Generally, 'soft SuDS' such as ponds and swales are the preferred drainage systems as they mimic natural drainage and provide a number of benefits including attenuation of surface water flows and flow rates as well as pollution.

Smaller developments which may not have the physical room for pond and swales would need to consider other options. In these cases, preference should be given to infiltration systems. However, care should be taken if implementing infiltration systems



near aquifer protection zones, close to buildings or structural foundations or in areas where soils may be polluted.

The SuDS hierarchy is summarised in Figure 2 below.

Figure 2 SuDS Hierarchy

Most Sustainable	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
	Living roofs	✓	✓	✓
	Basins and ponds - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✓	✓	✓
	Filter strips and swales	✓	✓	✓
	Infiltration devices - soakaways - infiltration trenches and basins	✓	✓	✓
	Permeable surfaces and filter drains - gravelled areas - solid paving blocks - porous paviers	✓	✓	
	Tanked systems - over-sized pipes/tanks - storms cells	✓		
Least Sustainable				

10.2 Assessment of SuDS Options

An assessment was made of the suitability of a range of potential SuDS techniques that could be implemented as part of the development. The results of the assessment are summarised in [Appendix 5](#) and are further discussed below.

10.2.1 Living Roofs

Although buildings account for more than 581m² of the site cover, given the proposed pitched style roofs, living roofs will not be suitable option.

10.2.2 Basins, Ponds, Filter Strips and Swales

Basins, ponds, filters strips and swales are not suitable due to limited space.

10.2.3 Infiltration Devices

Infiltration techniques should be given priority in any SuDS design as they deal with discharge on the site returning water to the aquifer and subsequently rivers via baseflow.

However, care must be taken to ensure that contamination of groundwater is prevented. The Environment Agency publication 'Groundwater protection: Policy and practice (GP3) Section G, 2012', states that the Environment Agency will support sustainable drainage systems for new discharges to ground, subject to an appropriate risk assessment. This demonstrates that ground conditions are suitable and infiltration systems do not present an unacceptable risk of promoting mobilisation of contaminants or creating new pathways for contaminant migration.

Mapping provided by the BGS showing the infiltration potential of the site is presented in [Appendix 3](#). The map indicates that although there is good potential for infiltration SuDS in the area, given that the location is covered by infilled land, it is thought that infiltration is not suitable for this site location.

10.2.4 Permeable Surfaces and Filter Drains

Over 580m² of the development will consist of car parking and driveways which could be designed to be permeable.

10.2.5 Tanked Systems

A tanked system incorporating a hydro brake restricting flow to the sewer would be a viable option if infiltration is not suitable. However, this option is ranked as being the least sustainable in the SuDS hierarchy.

10.2.6 Rainwater Harvesting

The use of rainwater butts and or harvesting tanks could be employed within each individual building and patios, although they would have a limited storage capacity and will be required to be an active system.

Detailed descriptions of some of the proposed SuDS techniques are available in [Appendix 7](#).

11 SuDS Implementation

11.1 Proposed Drainage System

The proposed drainage system will convert the car parking spaces into permeable block paving with a sub-base. All surface waters will drain via the permeable paving and or catchpits before entering the geocellular storage system. It will be installed below the roadway to provide for stormwater control before discharging into the United Utilities sewer along Knowsley Street to the north at a controlled discharge rate.

The proposed scheme is described in more detail below.

11.1.1 Permeable Block Paving

The car parking area and part of the bin storage area accounts for 136m². Runoff from this area will be managed using permeable block paving.

Permeable Paving (Marshalls Prior or similar) combines hardstanding with SuDS and works in a very different way to traditional pavement. It is designed to allow rainfall to percolate immediately through the surface near to where the raindrop lands so surface ponding is completely eradicated without the need for an additional channel drainage system.

The construction will consist of 80mm interlocking concrete blocks with jointing, with a 50mm underlying bedding layer and a 300mm sub-base consisting of a graded aggregate (Marshalls Priora Aggregates or similar) with a porosity of 0.30.

This construction over 136m² will provide approximately 12.15m³ of interception, attenuation storage.

The water flows into a specially prepared sub-base, where the voids between the stones which make up the structure act as a temporary reservoir. During a rainstorm, the water is collected in the sub-base ('attenuated') before it is slowly released along the system into geocellular storage.



The permeable block paving will be lined and will drain into an interceptor catchment manhole to provide further protection to the geocellular storage and receiving drainage network. The inclusion of the permeable surface will reduce the effective impermeable area by 136m²; however, it remains part of the positively drained area

11.1.2 Geocellular Storage

The remaining hardstanding (460m²) forms the roadway and turning area of the site. This will remain as impermeable concrete to allow for heavy goods vehicles.

The surface water runoff from the roadway and the downpipes from the proposed building (581m²) will drain into geocellular attenuation via a catchpit manhole.

A large geocellular storage structure will be installed and cover an area of 100m² with a thickness of 0.40m. The geocellular storage crates ([Geocell Drainage Crates](#) or similar) will have a porosity of 95%, stacked together to create the desired storage volume of thus providing a total storage volume of 38.0m³.

The geocellular storage has been limited to a single layer thickness of crates to allow for the movement of heavy good vehicles and to maintain a suitable invert to connect with the existing on-site connection.

Excess stormwater from the geocellular units will be conveyed into a flow control manhole. It will be located close to the existing manhole which already establishes a connection into United Utilities combined sewer.

11.1.3 Discharge Control Device

A Hydrobrake flow control device chamber will be used to limit the discharge from the onsite surface water drainage network to 2.0l/s for all storm events. The surface water discharge will adjoin with the foul discharge on site before the existing chamber, ensuring a single new connection is required.

Details and examples of product specification sheets are available in [Appendix 7](#).



11.1.4 Microdrainage Modelling

Microdrainage Modelling was carried out to assess the performance of the proposed drainage system under a variety of modelled storm events. The designed system, including the proposed attenuation storage, provides a total storage of 72m³ when all pipes, manholes and storage structures are included.

No flooding was indicated during any of the modelled scenarios, including the 1 in 100 years plus 40% climate change event.

Full results, drainage layout including the proposed discharge point and exceedance flows of this are available in [Appendix 8](#).

11.1.5 Surface Water Discharge Points

As there is no nearby watercourse, run-off from the development will be conveyed via 375mm diameter lateral drains to the combined United Utilities sewer on Knowsley Street.

The system has been designed to allow for the existing connection to be utilised.

An agreement in principle has been agreed with United Utilities, a copy of the email chain is available in [Appendix 9](#).

A copy drainage asset search is available in [Appendix 9](#).

11.1.6 Treatment of Run-off

Treatment of roof water runoff will be provided through the provision of permeable paving and catchpits, and interceptors to intercept gross solids and sediment and potential contamination; guidance will be provided to the developer on appropriate maintenance requirements including regular cleaning of gullies.

11.1.7 Exceedance Flows

Upon completion, the pavement access will be raised to 45.65mAOD whilst the yard will have a general elevations ranging from 45.35mAOD (southwest) – 45.50mAOD (north).



The proposed development site may witness a maximum surface water flood depth of 150mm within the yard and car park. If an exceedance event caused a flood level greater than 45.50mAOD on site, overland flows would migrate to the north.

It can be seen from the design proposals that the proposed system includes approximately 69m³ of storage capacity. However, in the unlikely event that an inundation of the proposed system results in overland flows, then appropriate level design has been employed to ensure that flood waters are directed away from buildings.

A map displaying the exceedance flow is available in [Appendix 8](#).

11.2 Maintenance and Adoption of SuDS

All SuDS features will be properly installed by competent persons. They will be maintained regularly to ensure that their design capacity and attenuation characteristics provide the required storage volume.

Landscaping and adjacent areas will be designed such that they do not cause soil, mulch and other materials to be washed onto the permeable surfaces and into drains causing clogging.

Owners of the properties/persons responsible for maintenance of SuDS components will be provided with operation and maintenance manuals which will include information such as:

-  the location of SuDS components;
-  an explanation of design intent and objective of the SuDS;
-  the requirements for regular and occasional inspection and maintenance;
-  visual indicators that may trigger maintenance.

Regular maintenance of SuDS components is relatively straightforward with the main tasks consisting of:

-  Regular visual inspections – checking inlets are not blocked and verifying that clogging has not occurred;
-  Litter and debris removal;
-  Grass cutting;
-  Preventive sweeping;
-  Weeding and invasive plant control;
-  Oil and stain removal.

Occasional maintenance activities to ensure the long-term performance of the SuDS features include:

-  Sediment removal
-  Vegetation and plant replacement

These simple measures will ensure that the storage capacity of the system is maintained and that the need for reconstruction and replacement of components is minimised.

Further details on SuDS maintenance measures that will be employed at the site can be found in [Appendix 8](#).

12 Conclusion and Recommendations

With the proposed SuDS mitigation measures in place, it is considered that the proposed development will reduce local flood risk and enhance the local environment and will therefore be in compliance with the LLFA's current planning policy and the NPPF.

13 References

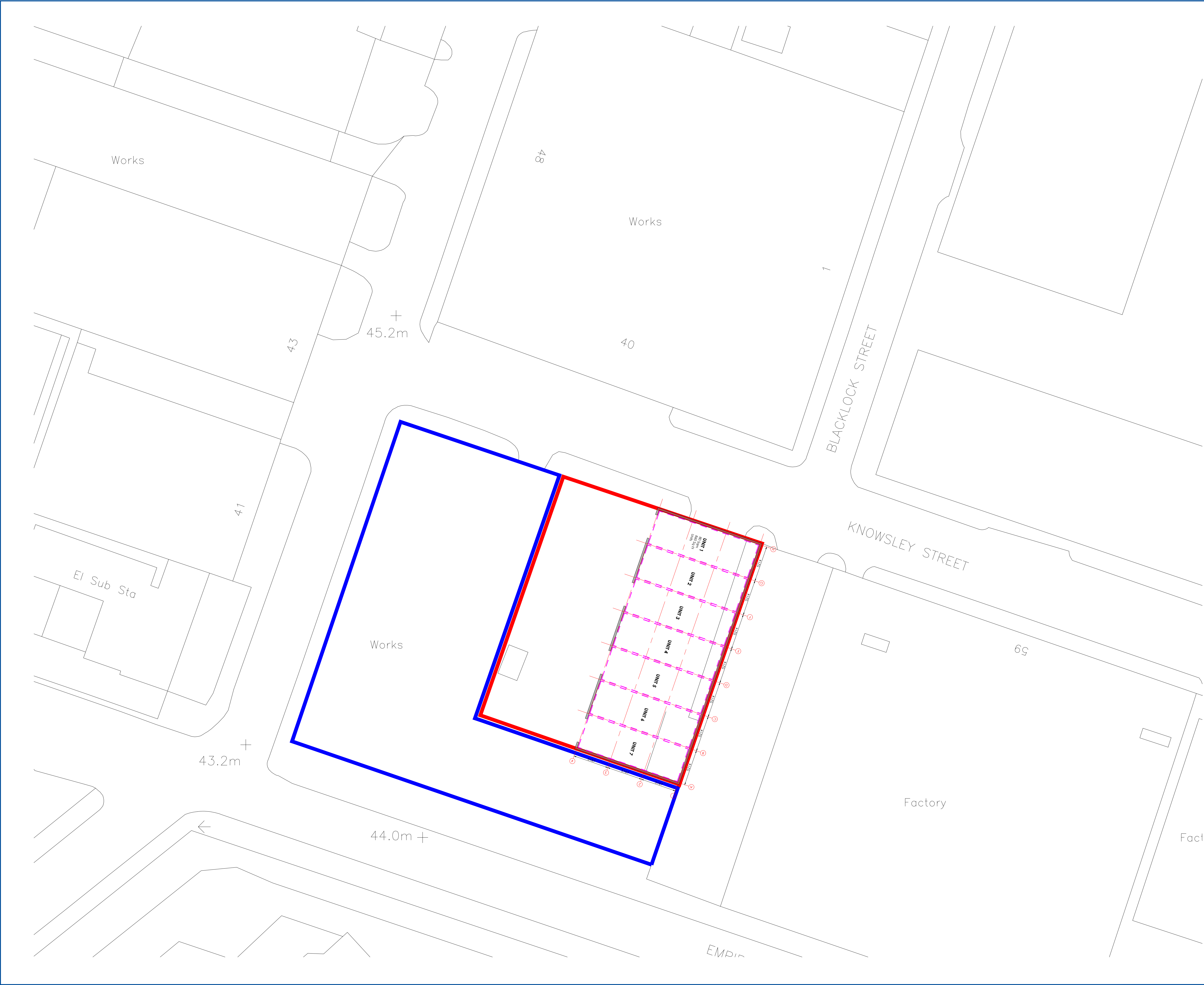
1. Communities and Local Government - National Planning Policy Framework NPPF, March 2012.
2. Manchester City Council – Local Plan, 2018.
3. CIRIA, Defra, Environment Agency – UK SuDS Manual, 2015.



14 Appendices

14.1 Appendix 1 – Development Plans





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LOCATION PLAN

SCALE 1:250

REV:	DESCRIPTION:	BY:	DATE:
STATUS:			

gsmindustrial

0161 203 45410161 205 1980

Providence Works, Norton St, Manchester, M40 8EHwww.gsmindproperties.co.uk

CLIENT:

Amir
Andersen Textiles
63 Knowsley St
Manchester

SITE:

Style House
Knowsley St / Blacklock St
Manchester, M8 8HX

TITLE:

SCALE AT A1:	DATE:	DRAWN:	CHECKED:
AS SHOWN	07.10.15	BWM	
PROJECT NO:	DRAWING NO:	REVISION:	

KNOWSLEY STREET

BLA

BLACKLOCK STREET

UNIT 1

UNIT 2

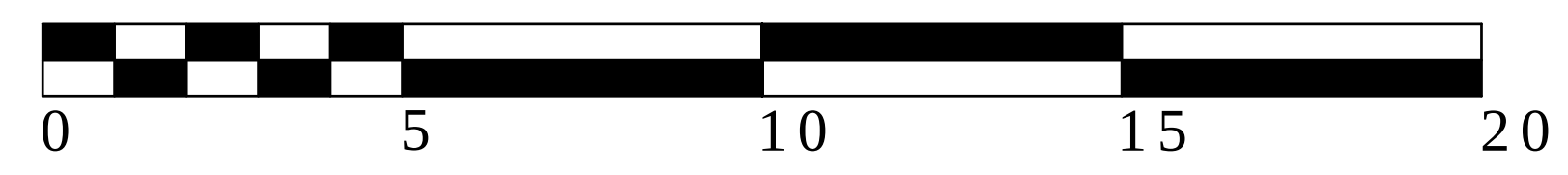
UNIT 3

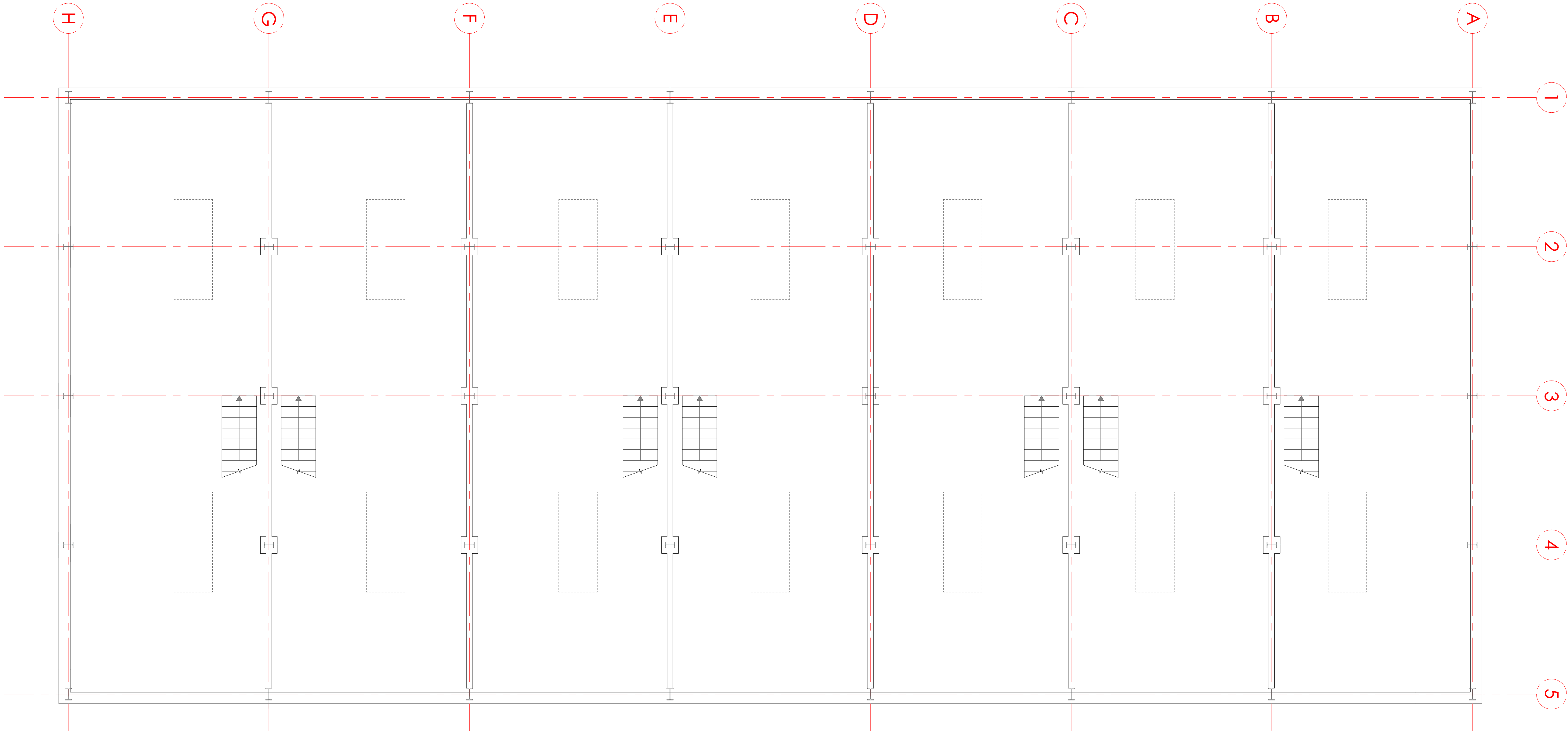
UNIT 4

UNIT 5

UNIT 6

UNIT 7





SECOND FLOOR PLAN

SCALE 1:50

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STATUS: PLANNING			



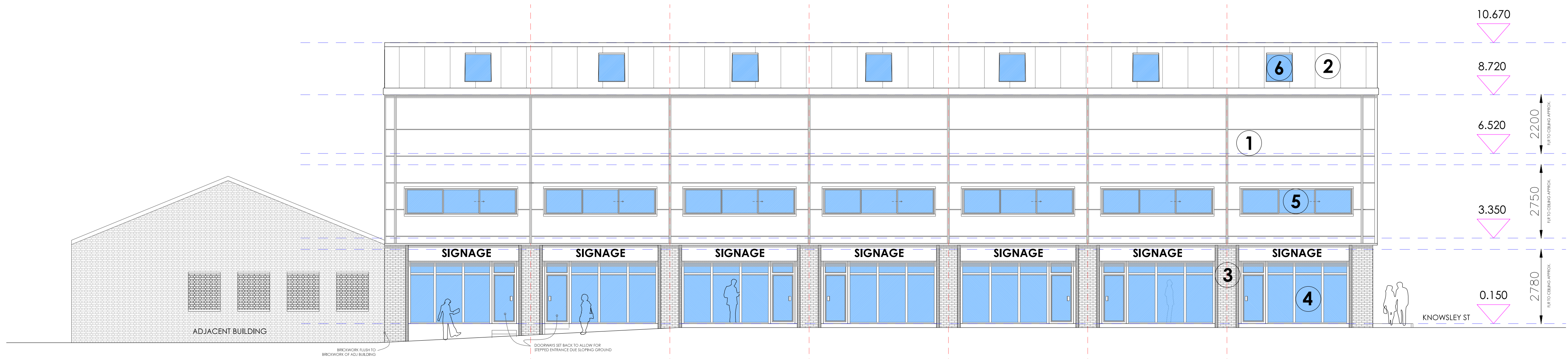
0161 203 4541 0161 205 1980

Providence Works, Norton St, Manchester, M40 8EH www.gsmindproperties.co.uk

CLIENT:

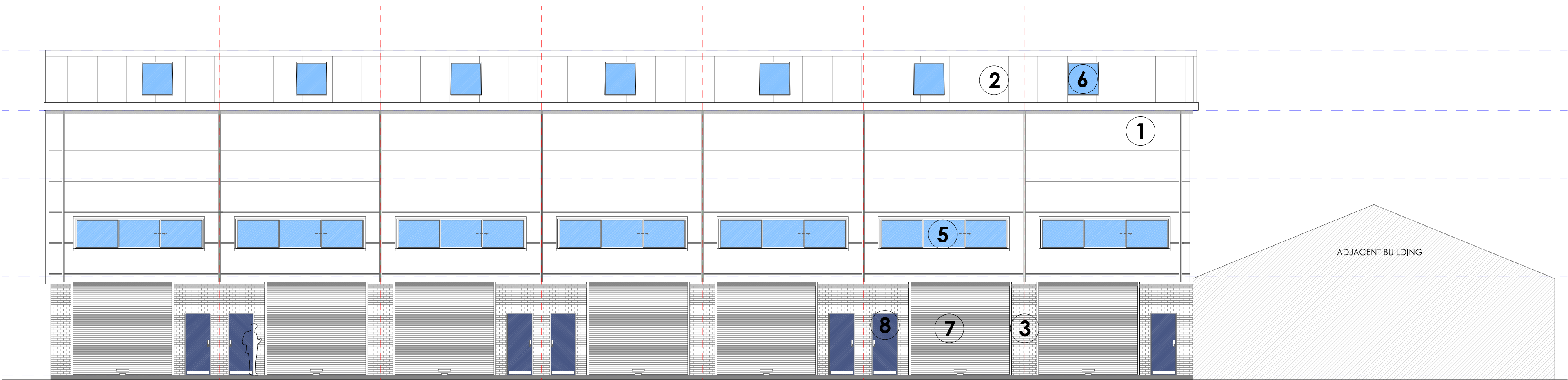
Amir
Andersen Textiles
63 Knowsley St
Manchester

SITE: Style House Knowsley St / Blocklock St Manchester, M8 8HX			
TITLE: FLOOR PLANS			
SCALE AT A1: AS SHOWN	DATE: 07.10.15	DRAWN: BWM	CHECKED:
PROJECT NO:	DRAWING NO: 04	REVISION:	



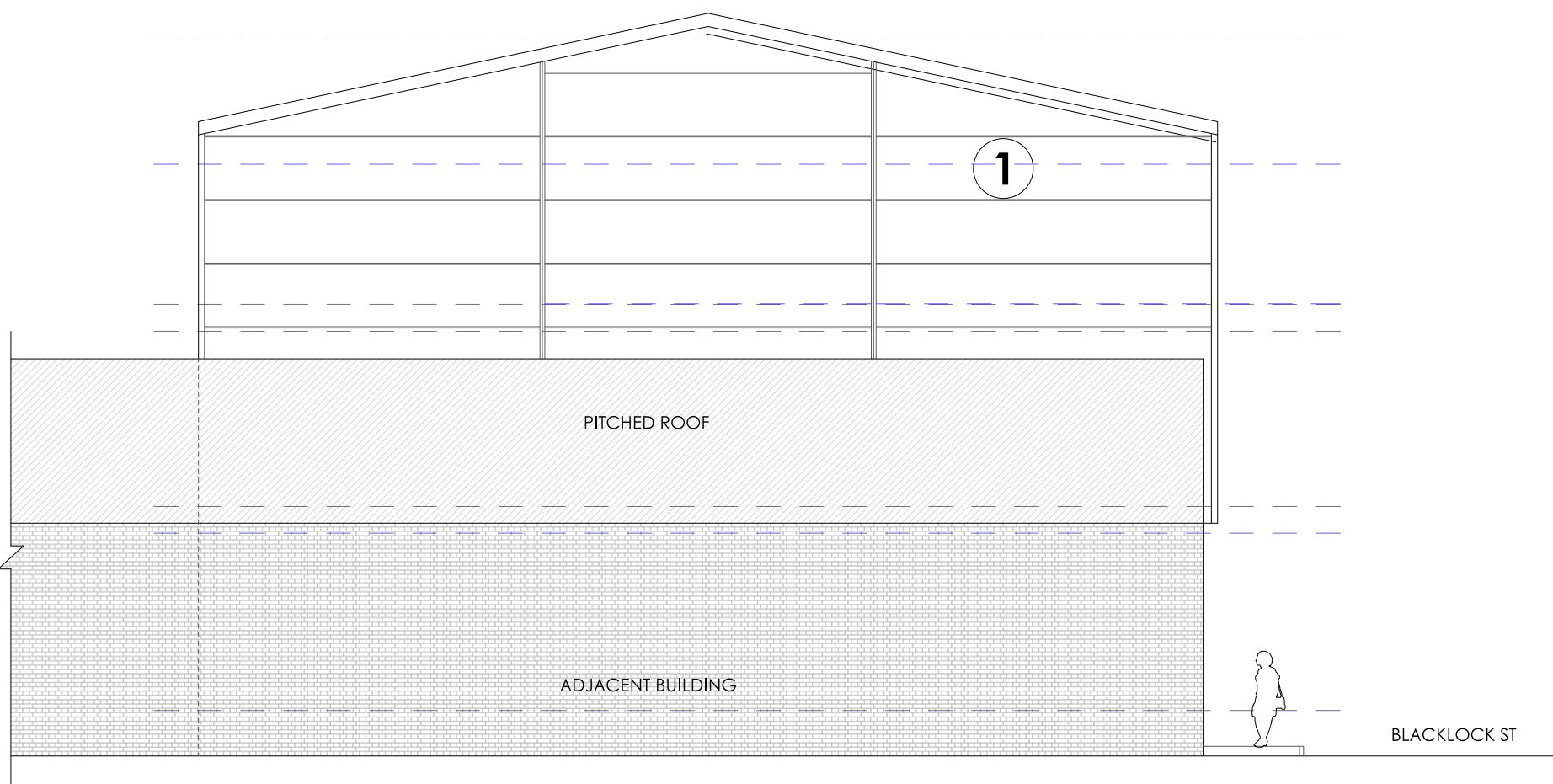
EAST (BLACKLOCK ST) ELEVATION

SCALE 1:100



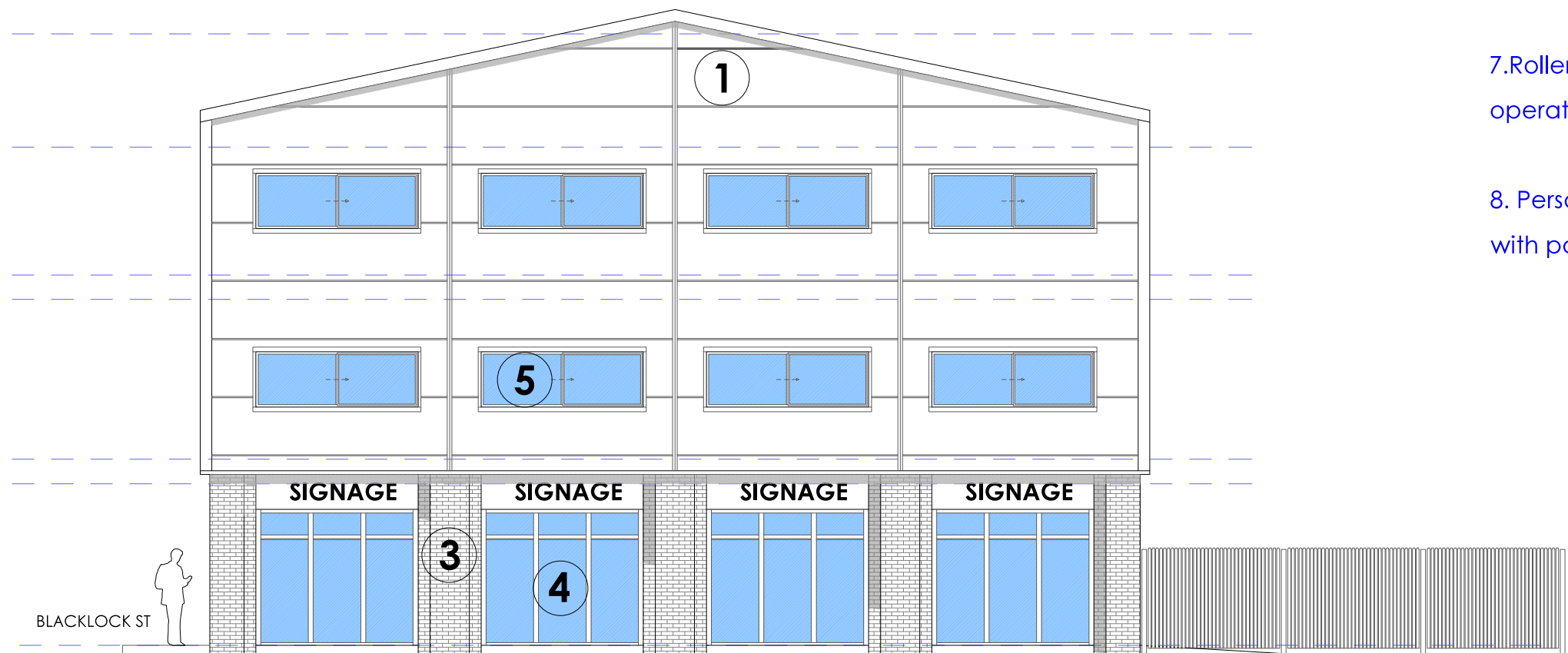
WEST (COURTYARD) ELEVATION

SCALE 1:100



RETURN (SOUTH) ELEVATION

SCALE 1:100



KNOWSLEY ST (NORTH) ELEVATION

SCALE 1:100

MATERIAL KEY

CONDITIONAL APPROVAL OF MATERIALS TO BE DISCHARGED

1. Horizontal insulated composite wall panels, smooth outside finish colour: metallic silver/grey fbc , Kingspan Optimo KS600-1000 or similar approved with A+ green rating (BRE global)
2. Trapezoidal insulated composite roof panels, colour: goosewing/merlin grey. KS 1000/2000RW or similar approved with A+ rating.
- 3.Red facing brick at ground floor level to all exposed elevations. Facing brick to match existing adjacent buildings as far as practically possible.
4. Shop front glazing system - aluminum/UPVC framed glazing front and public access door. Double glazed low emissive Pilkington K safety glass. Framing colour and specification to be confirmed.
5. Window units - similar style and specification to that off adjacent building located on Knowsley St. Aluminum/UPVC double glazed units, horizontal sash casements, framing colour to match shop front glazing.
6. Rooflight - Trapezoidal GRP composite panels
- 7.Roller Shutter Doors - 3.2m Width 3.2m height 3 Phase electrically operated shutter doors, galvanized finish.
8. Personnel Doors - Rear access personnel doors / fire doors complete with panic bar and emergency ironmongery. Colour to be confirmed.

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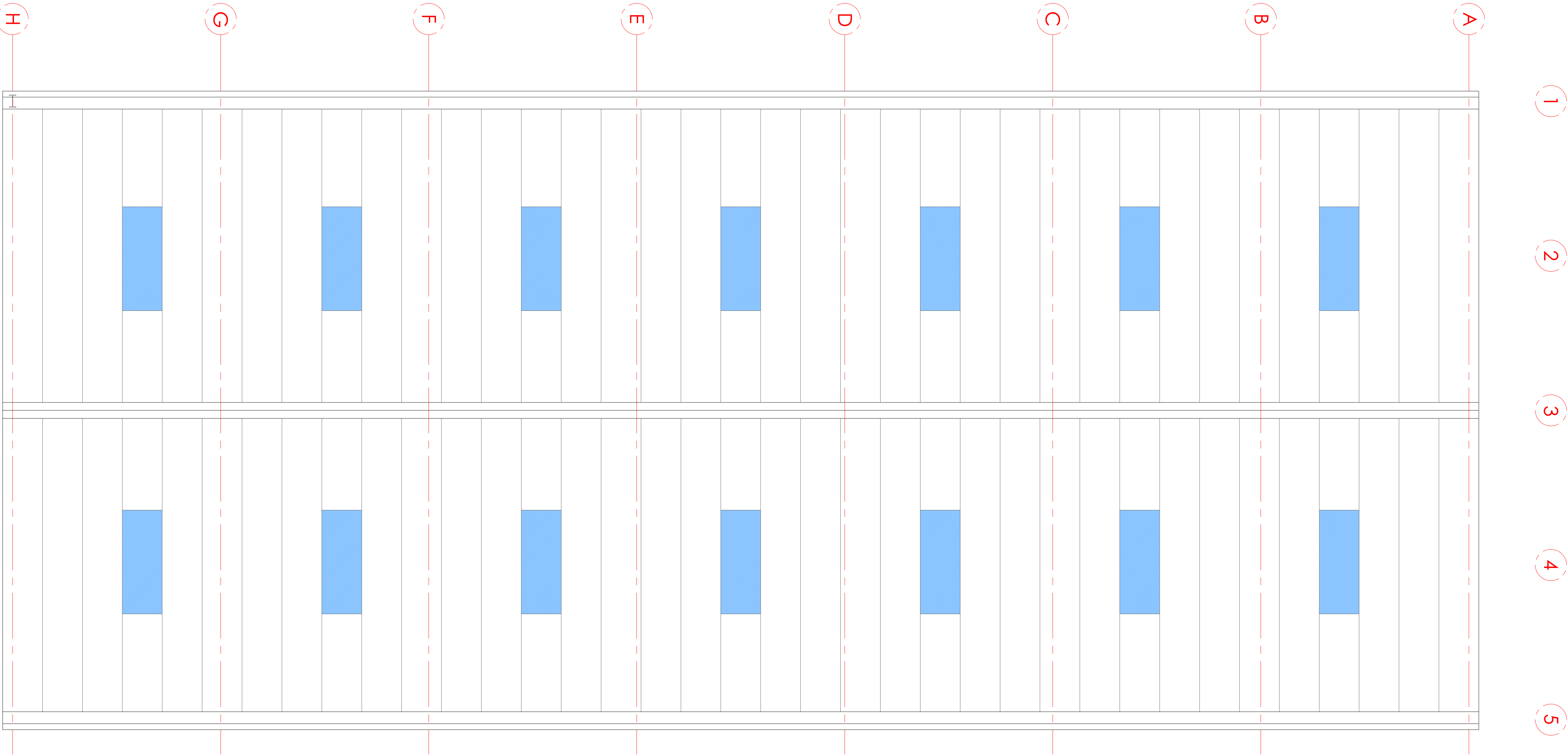
REV:	DESCRIPTION:	BY:	DATE:
STATUS: PLANNING			



CLIENT:	Amir Andersen Textiles 63 Knowsley St Manchester
---------	--

SITE:	Style House Knowsley St / Blacklock St Manchester, M8 8HX
TITLE:	

SCALE AT A1:	DATE:	DRAWN:	CHECKED:
AS SHOWN	07.10.15	BWM	
PROJECT NO:	DRAWING NO:	REVISION:	
	06		



ROOF PLAN
SCALE 1:50

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REV:	DESCRIPTION:	BY:	DATE:
STATUS: PLANNING			

gsm

industrial

0161 203 4541

0161 205 1980

Providence Works, Norton St, Manchester, M40 8EH

www.gsmindproperties.co.uk

CLIENT:

Amir
Andersen Textiles
63 Knowsley St
Manchester

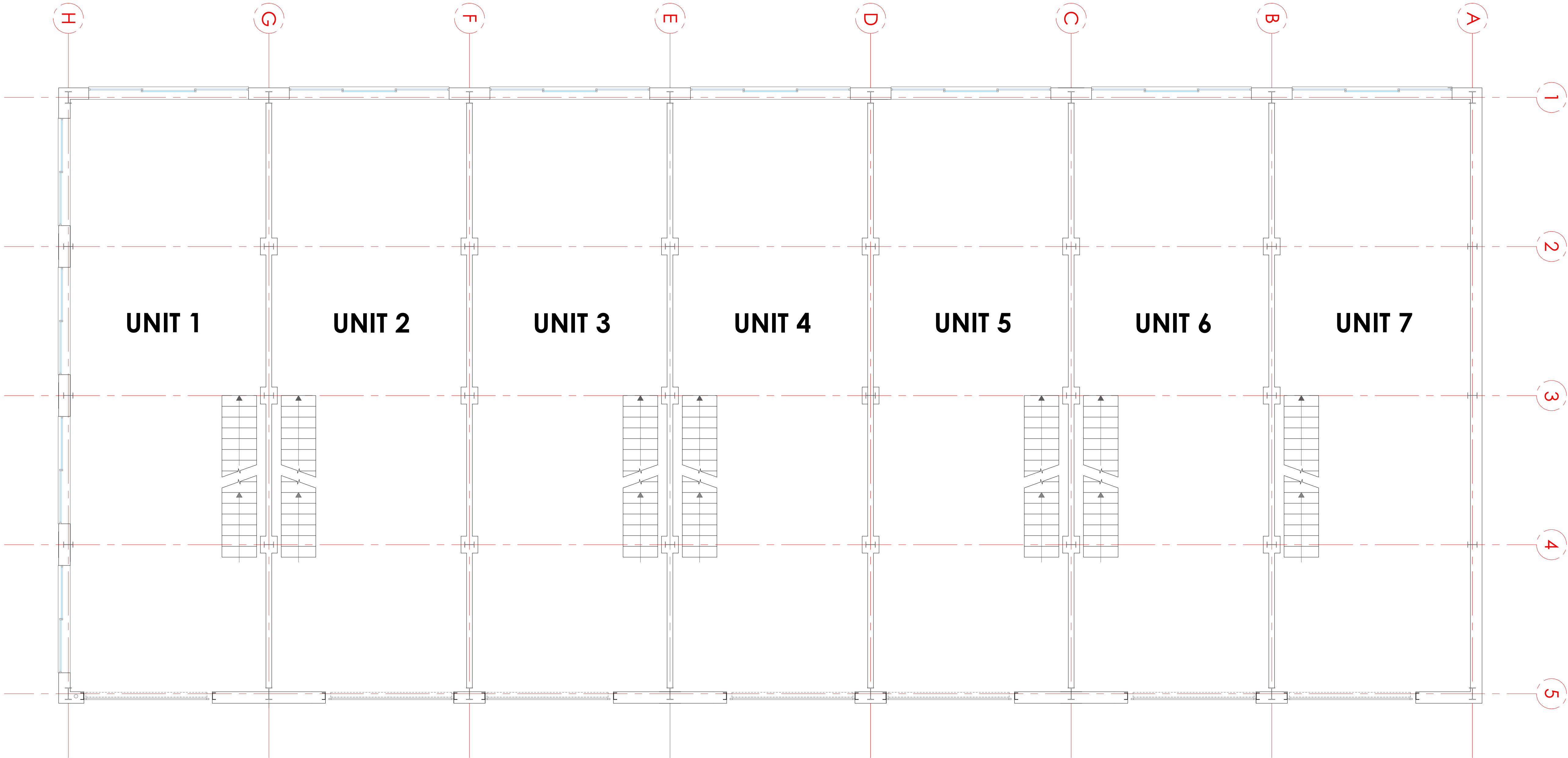
SITE:

Style House
Knowsley St / Blocklock St
Manchester, M8 8HX

TITLE:

FLOOR PLANS

SCALE AT A1:	DATE:	DRAWN:	CHECKED:
AS SHOWN	07.10.15	BWM	
PROJECT NO:	DRAWING NO:	REVISION:	
	05		



FIRST FLOOR PLAN
SCALE 1:50

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REV:	DESCRIPTION:	BY:	DATE:
STATUS: PLANNING			



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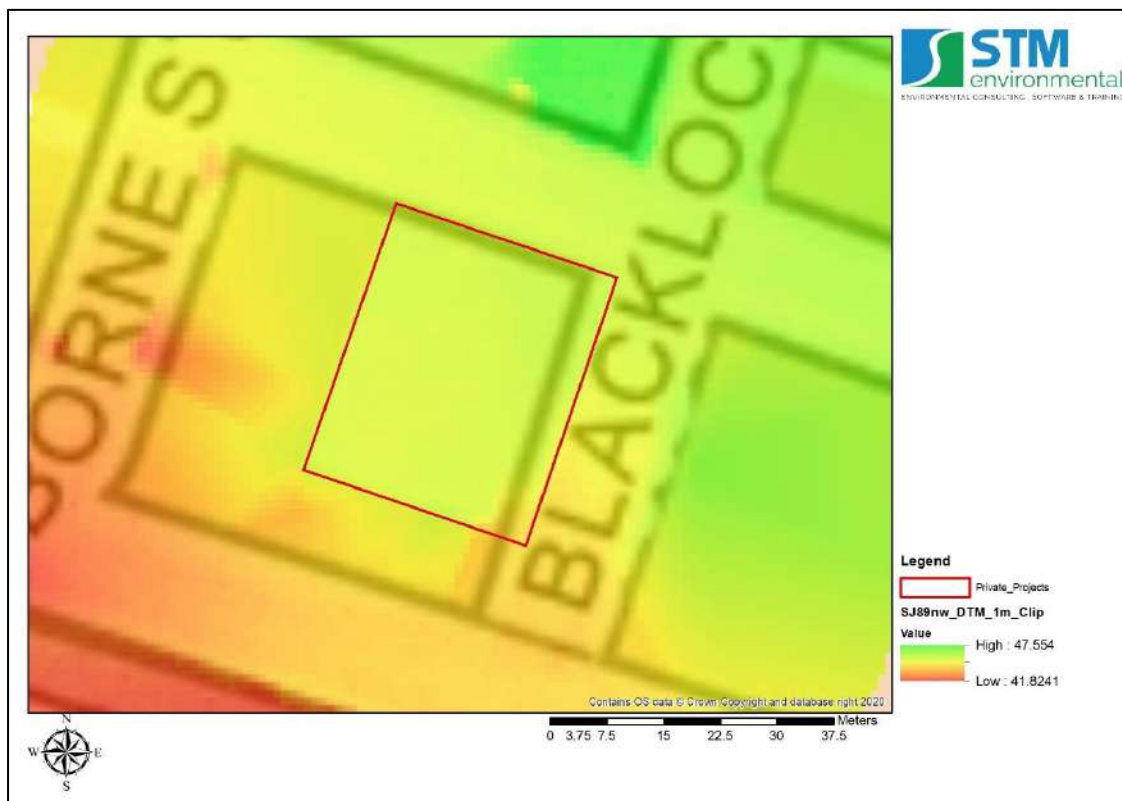
Providence Works, Norton St, Manchester, M40 8EH www.gsmindproperties.co.uk

CLIENT:	Amir Andersen Textiles 63 Knowsley St Manchester
---------	---

SITE:		Style House Knowsley St / Blocklock St Manchester, M8 8HX	
TITLE:		FLOOR PLANS	
SCALE AT A1: AS SHOWN	DATE: 07.10.15	DRAWN: BWM	CHECKED:
PROJECT NO:	DRAWING NO: 03	REVISION:	

14.2 Appendix 2– Site Topography and Drainage Characteristics

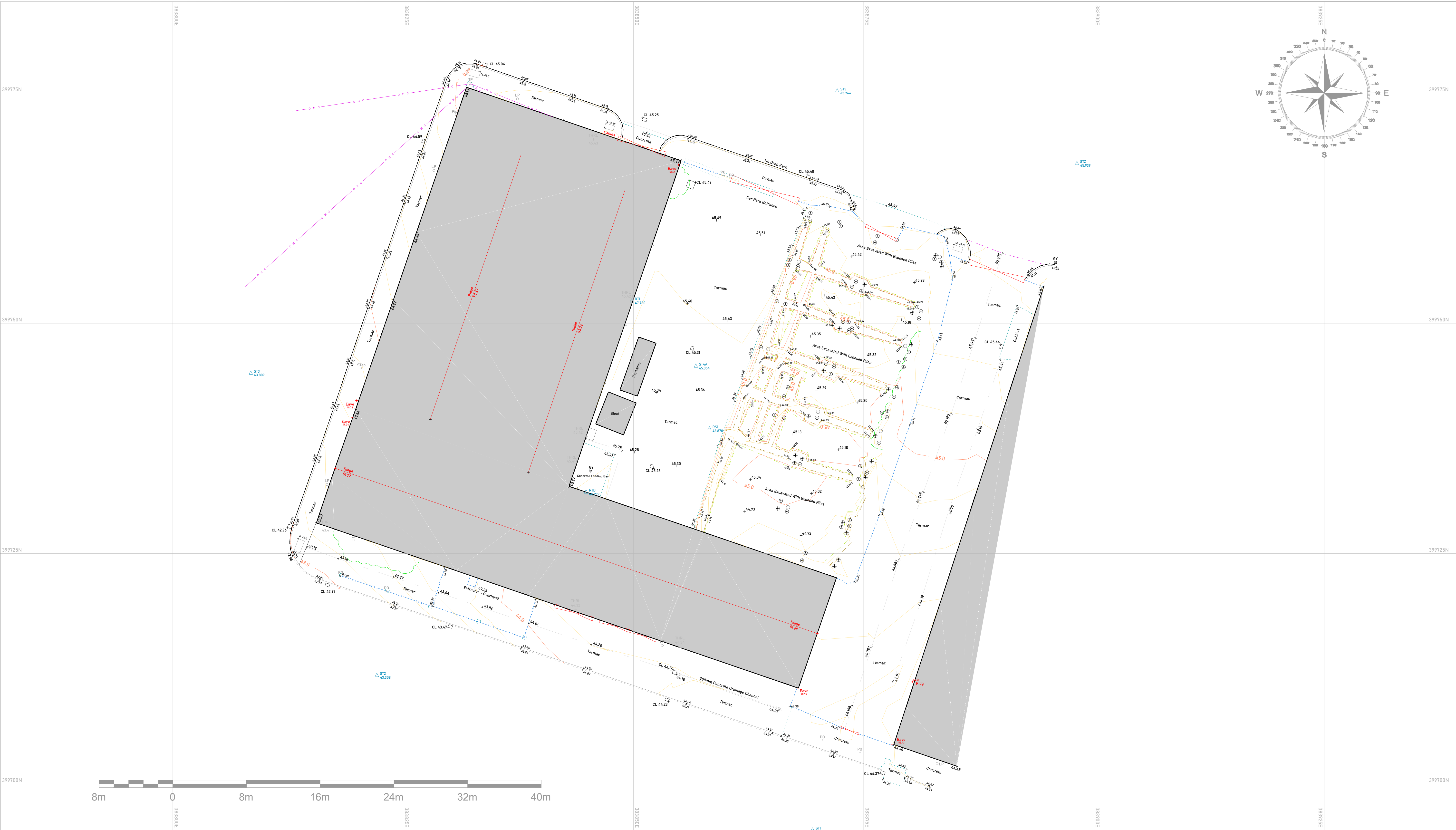
14.2.1 LIDAR Mapping showing Site Topography - (Source: OS 2017)



14.2.2 Topographic Survey

PDF to follow this page.





Grid Contours (Minor) Contours (Major) Building Building Garage Building Canopy Embankment Top Embankment Bottom Change Of Surface Concrete Wall Channel Kerb Drop Kerb Road Edge Fence Fence Closed Board Fence Chain Link Fence Post & Rail Fence Post & Wire Gate Waters Edge Drain Overhead Cable Steps Manhole Inspection Chamber Road Gully BT Cover Electrical Cover Control Station Levels Spot Levels Eaves Levels Ridge Levels Invert Lamp Post Telegraph Pole Electrical Pole Stop Tap Gas Valve Pipe Down Pipe Borehole Bollard Trial Pit Tree Tree Canopy Vegetation Extents Hedge
Station RS1 RT1 RTD ST1 ST2 ST3 ST4 ST5 ST1A ST2 Easting 383858.247 383849.821 383844.857 383869.451 383822.153 383808.445 383835.849 383872.125 383856.778 383898.158 Northing 399738.537 399752.422 399731.677 399694.979 399711.764 399744.597 399788.298 399775.220 399743.351 399767.345 Level 46.870 47.780 48.277 44.397 43.308 43.809 45.346 45.744 45.354 45.939

Project	63 Knowsley Street
Drawing Title	Topographic Survey
Drawing Number	10363_001
Revision	-
Scale @ A1	1:200
Client	Fisher Commercial Construction LTD
Date	18th November 2022
Surveyor	JB & MS
Drawn by	JB
Checked by	NB

Revision notes		
Rev	Date	Comments
-	-	-

Drawing Notes

Survey undertaken on the 18th of November, 2022.

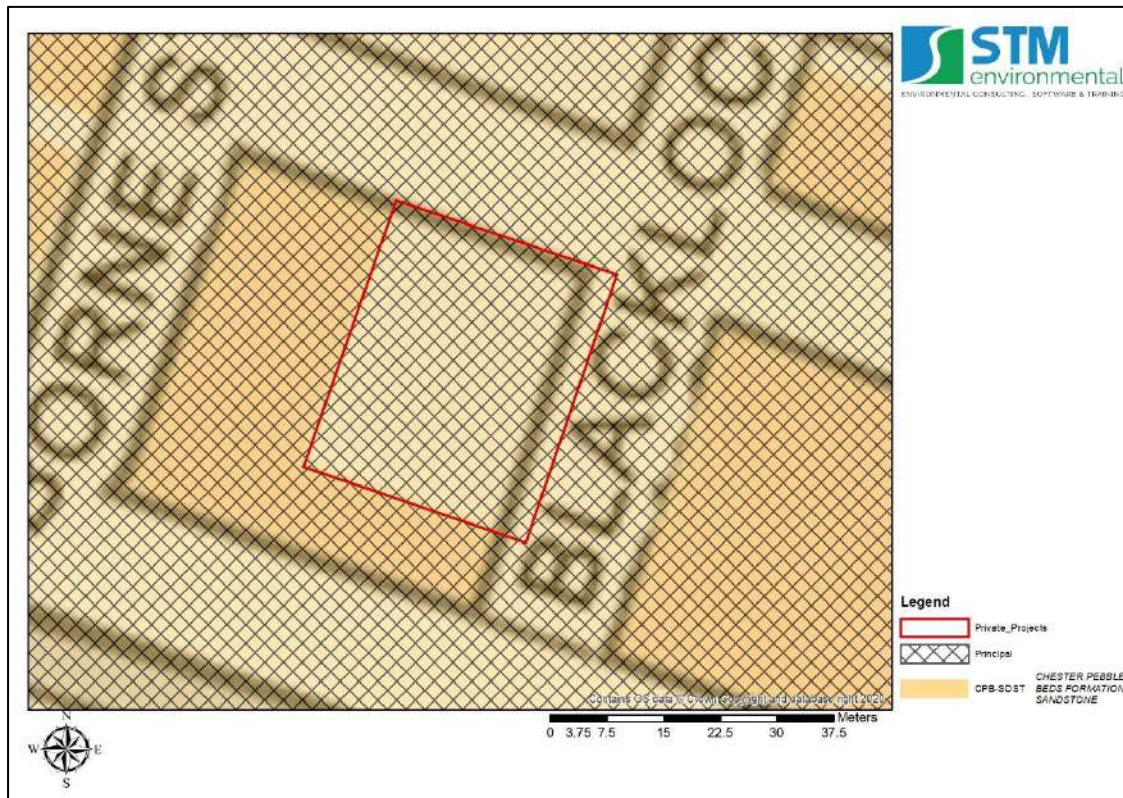
Coordinated to National Grid using GPS, Levels to OS Datum.

Sheet Layout

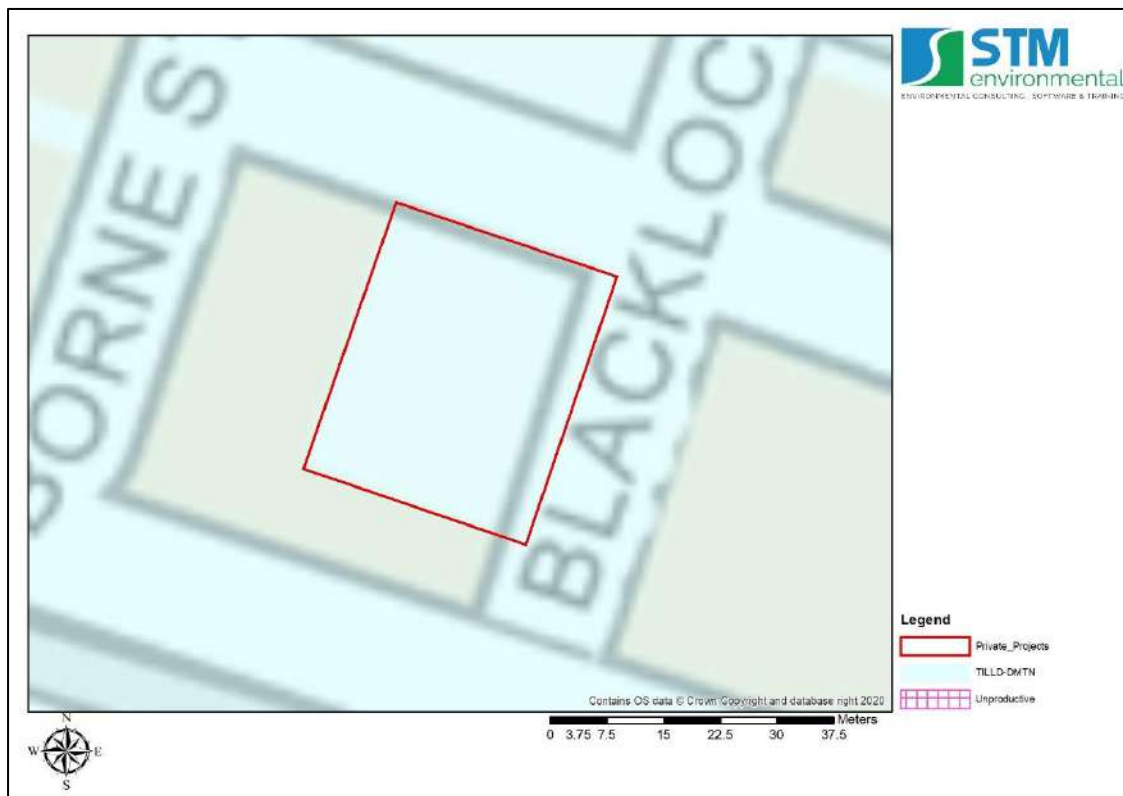


Email: info@ntbsurvey.com | www.ntbsurvey.com | Tel: 01254 496307

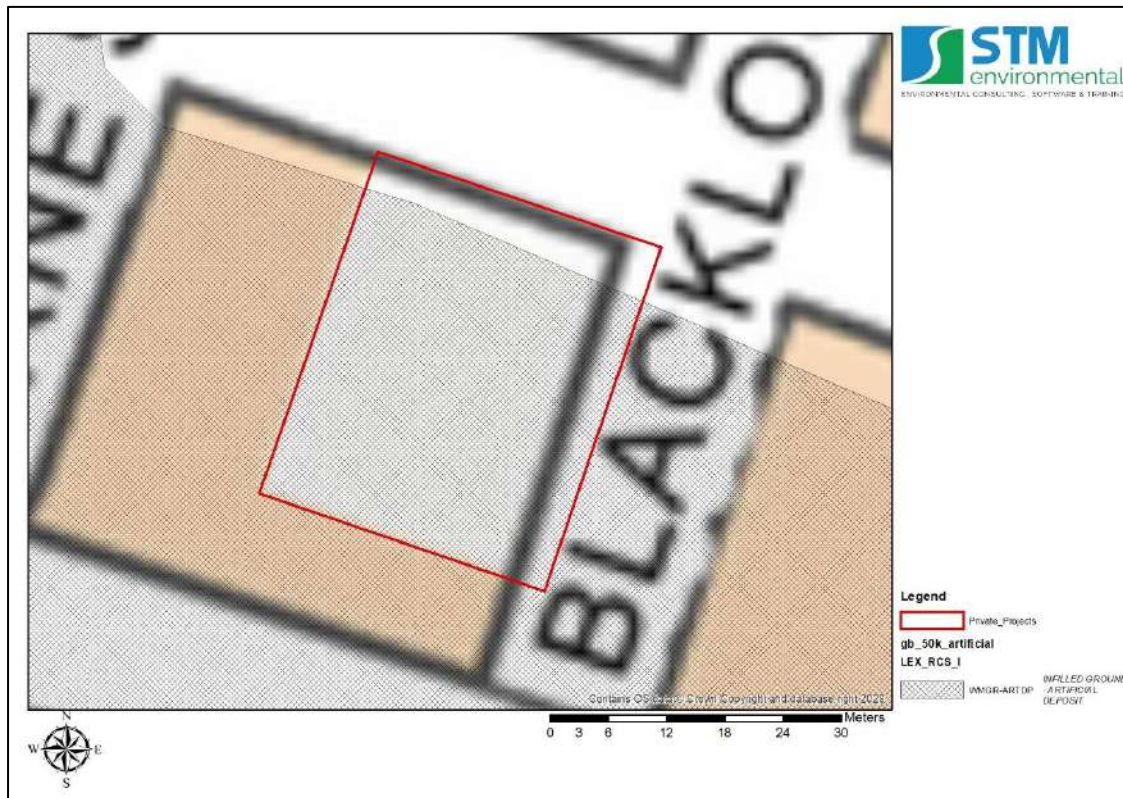
14.2.3 Bedrock Hydrogeology (Source: BGS, 2016)



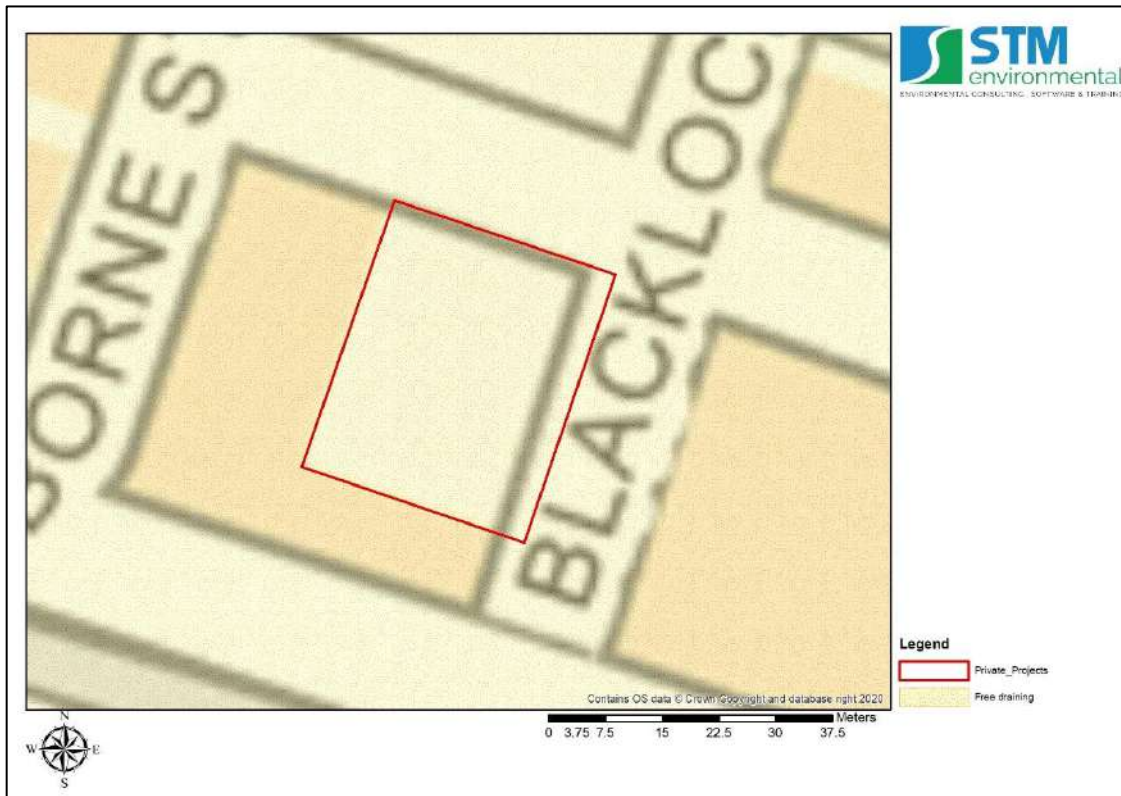
14.2.4 Superficial Hydrogeology (Source: BGS, 2016)



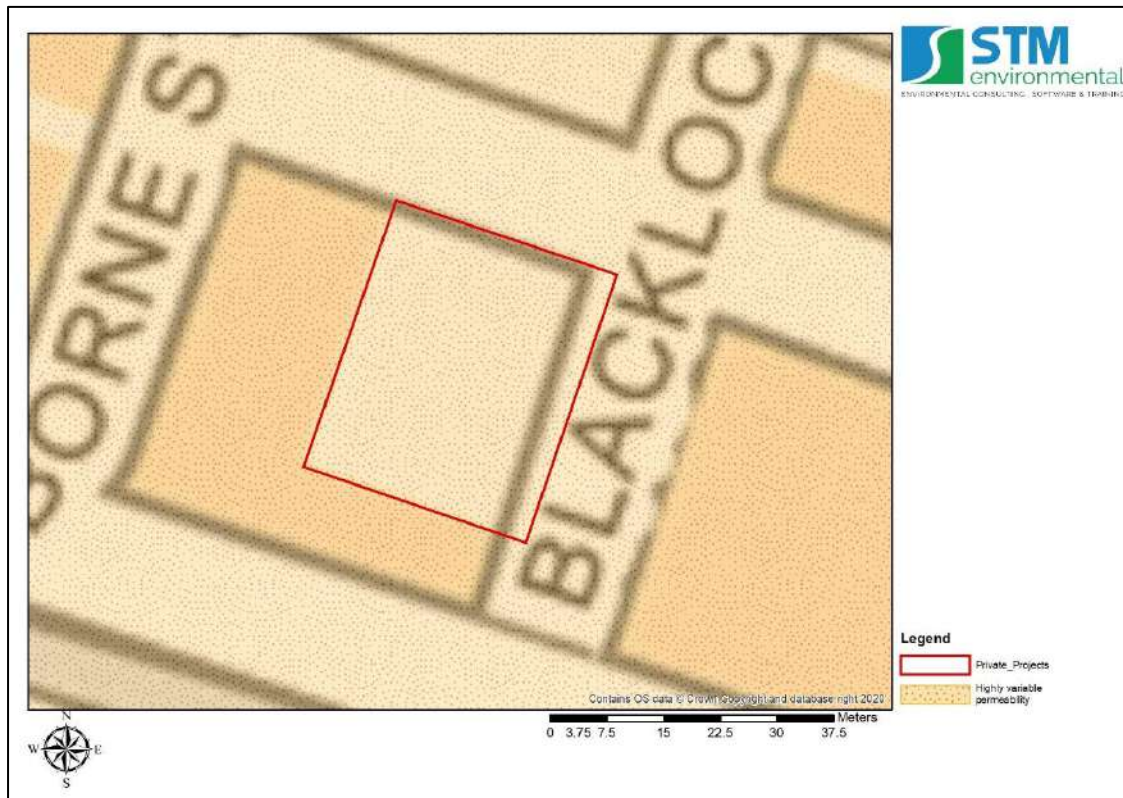
14.2.5 Artificial Ground (Source: BGS, 2016)



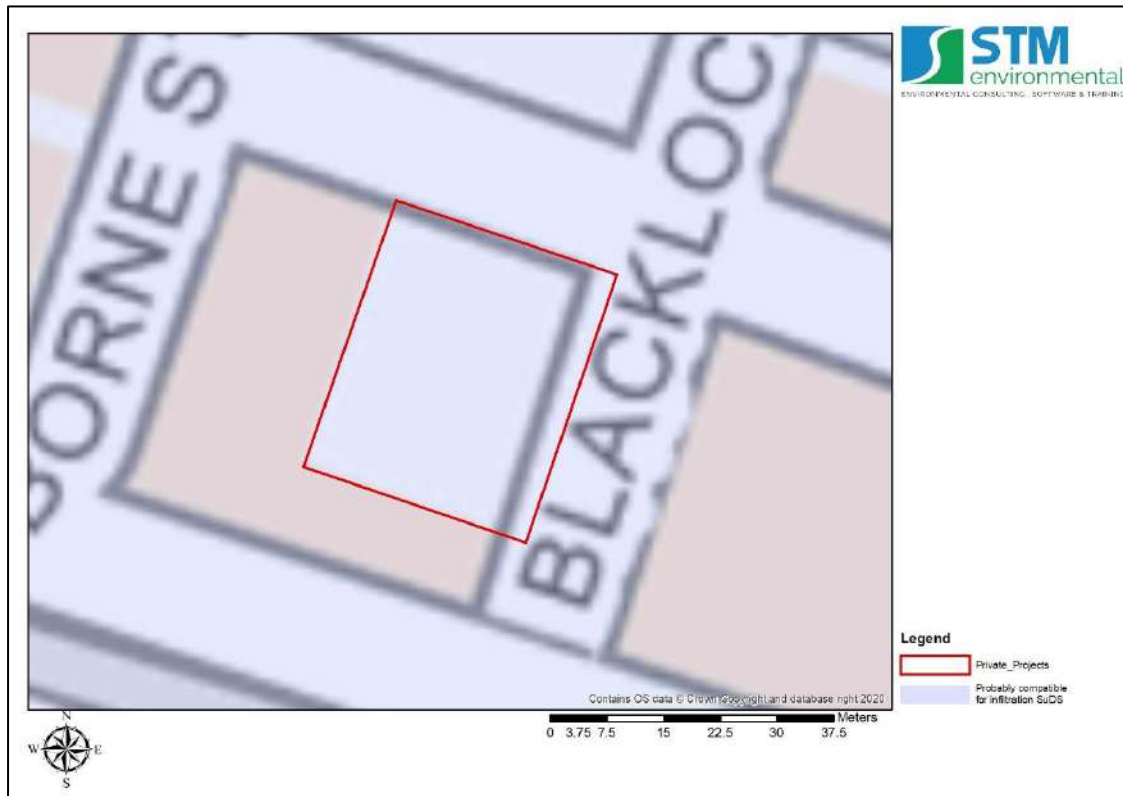
14.2.6 Bedrock Permeability (Source BGS 2016)



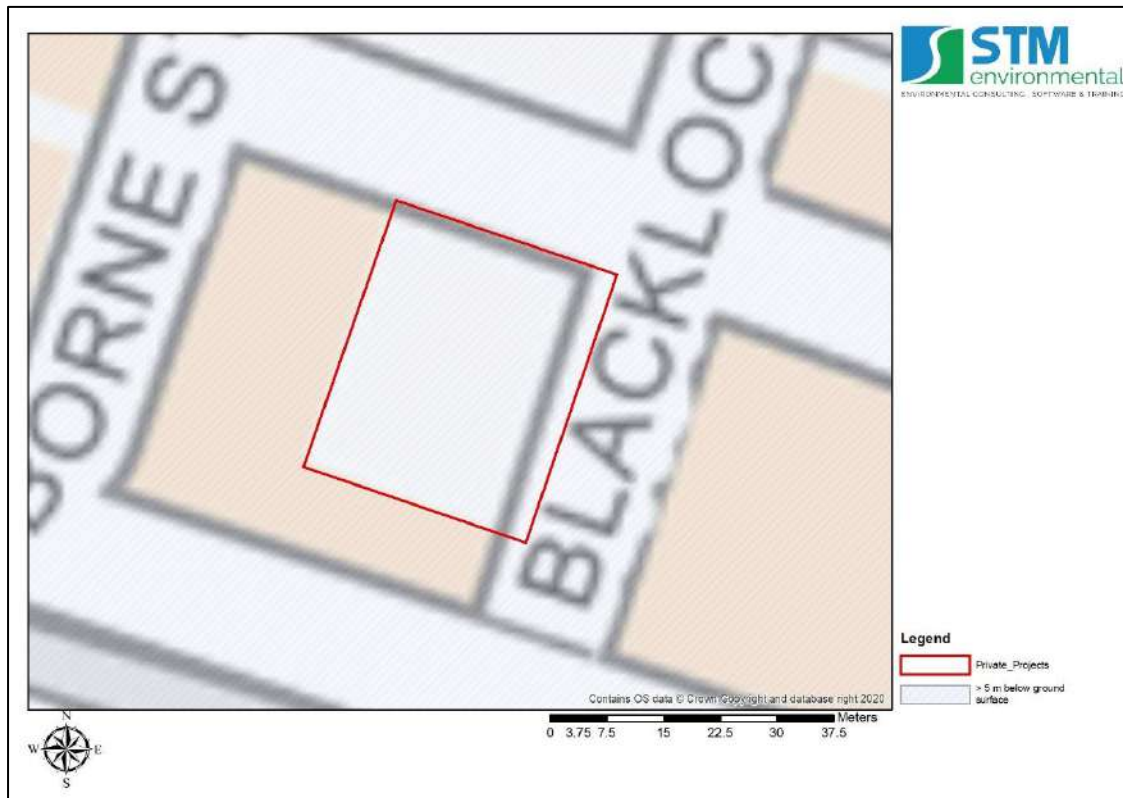
14.2.7 Superficial Permeability (Source BGS:2016)



14.2.8 Infiltration Drainage Potential (Source: BGS, 2016)

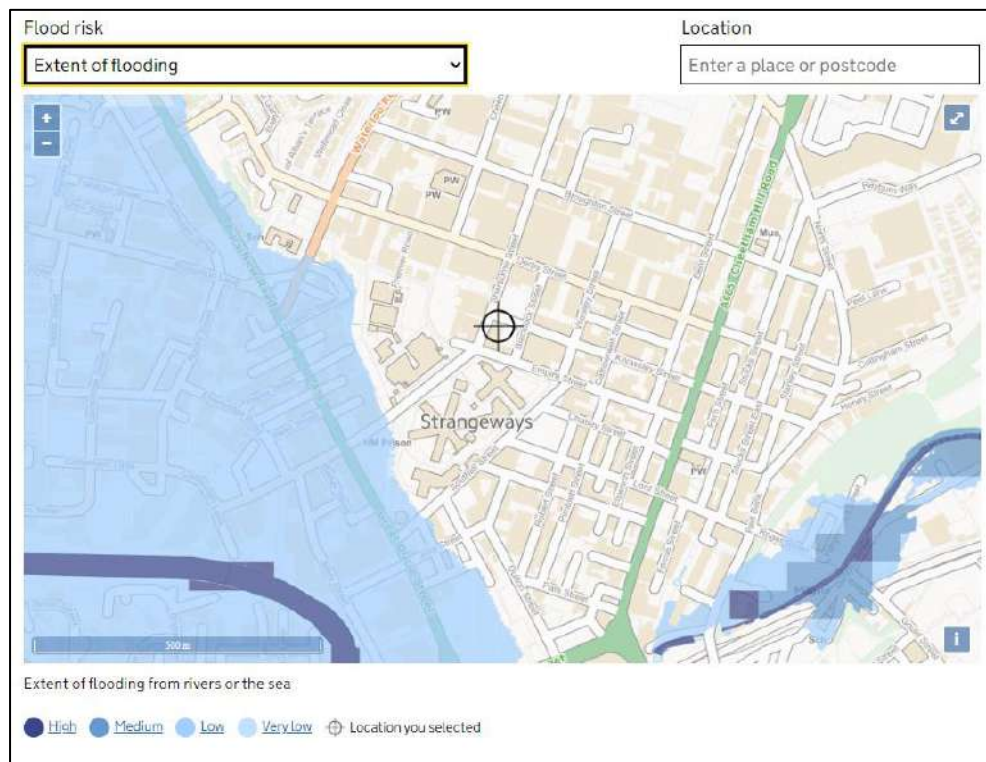


14.2.9 Groundwater Table Depth (Source: BGS 2016)



14.3 Appendix 3 – Flood Risk Mapping

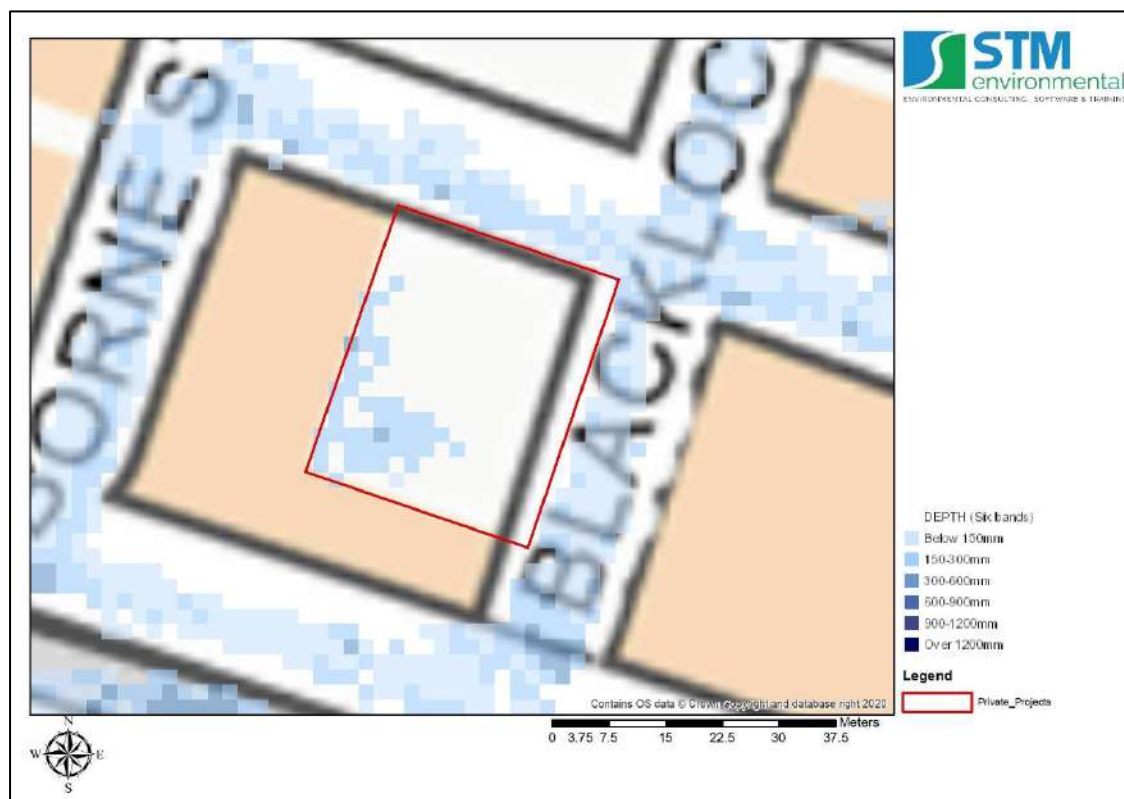
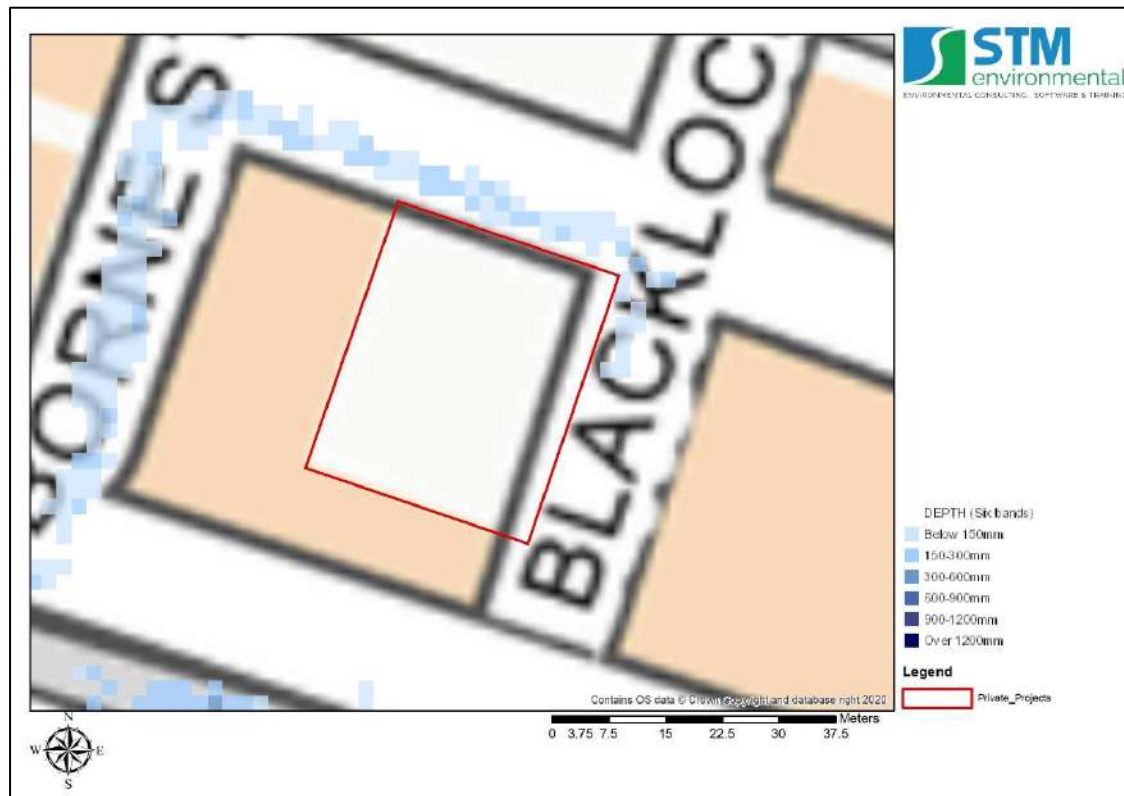
14.3.1 Long Term Fluvial Flood Risk Map (EA)



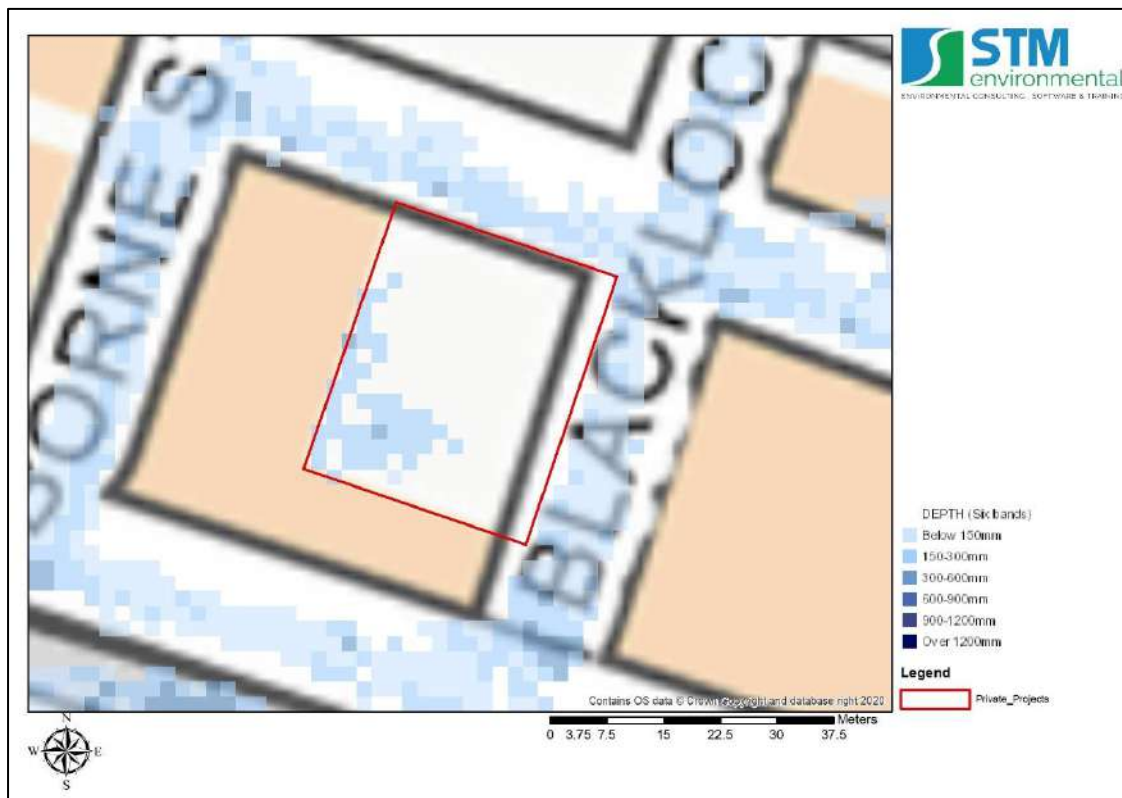
14.3.2 Long Term Pluvial Flood Risk Map (EA)



14.3.3 Surface water flood depth during the 1 in 100 & 1 in 1000 year rainfall return periods (Source: EA, 2016).



14.3.4 Groundwater flooding susceptibility (Source: BGS, 2016).



14.4 Appendix 4 – Run-Off Rate and Storage Calculations

14.4.1 UK SuDS

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Matthew Ashdown
Site name:	63 Knowsley Street
Site location:	M8 8HX

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.49424° N
Longitude:	2.24457° W
Reference:	2389287416
Date:	Feb 08 2021 16:20

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.1160
-----------------------	--------

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	899	899
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	0.75	0.75
1 in 1 year (l/s):	0.65	0.65
1 in 30 years (l/s):	1.28	1.28
1 in 100 year (l/s):	1.56	1.56
1 in 200 years (l/s):	1.78	1.78

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.



Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site characteristics

Total site area (ha):	0.1160
Significant public open space (ha):	0
Area positively drained (ha):	0.116
Impermeable area (ha):	0.1160
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.12
Net impermeable area for storage volume design (ha):	0.12
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Design criteria

Climate change allowance factor:

Urban creep allowance factor:

Volume control approach:

Interception rainfall depth (mm):

Minimum flow rate (l/s):

Methodology

esti

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	55
Rainfall 100 yrs 12 hrs:	--	72.45
FEH / FSR conversion factor:	1.15	1.15
SAAR (mm):	899	899
M5-60 Rainfall Depth (mm):	17	17
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 10 year:	1.38	1.38
Growth curve factor 30 year:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Q_{BAR} for total site area (l/s):	0.75	0.75
Q_{BAR} for net site area (l/s):	0.75	0.75

Site discharge rates

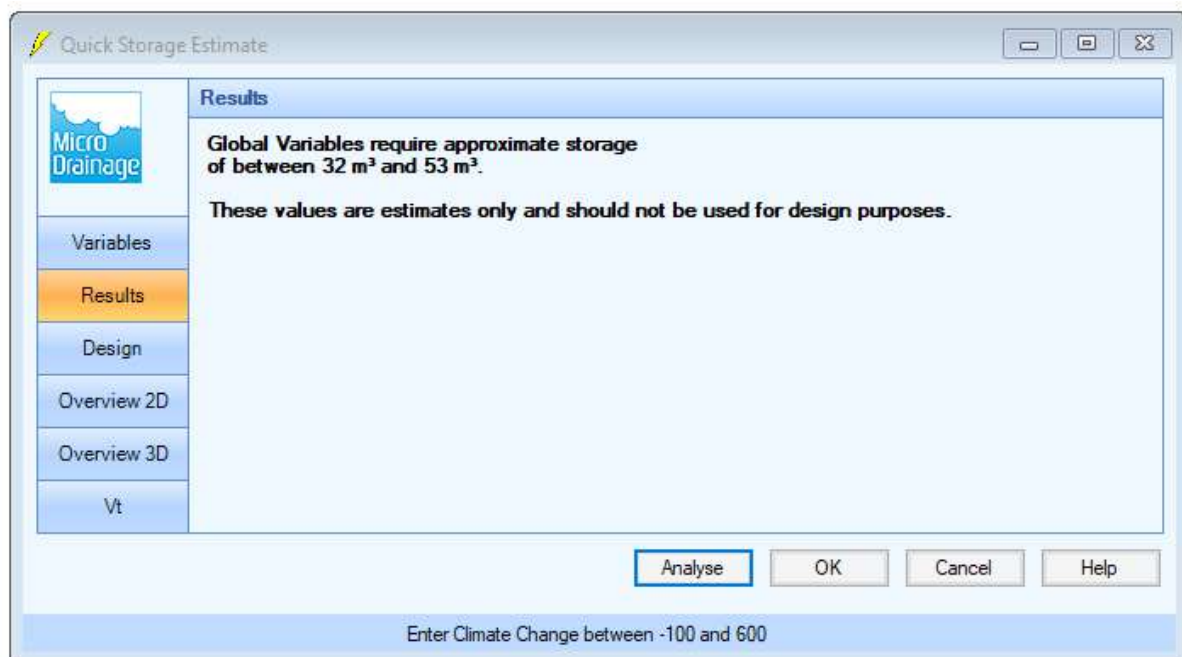
	Default	Edited
1 in 1 year (l/s):	2	2
1 in 30 years (l/s):	2	2
1 in 100 year (l/s):	2	2

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m³):	53	53
Long term storage 1/100 years (m³):	0	0
Total storage 1/100 years (m³):	53	53

This report was produced using the storage estimation tool developed by HRWallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at <http://uksuds.com/terms-and-conditions.htm>. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

14.4.2 Microdrainage Quick Storage Estimates – 5.0 l/s



Quick Storage Estimate

Results

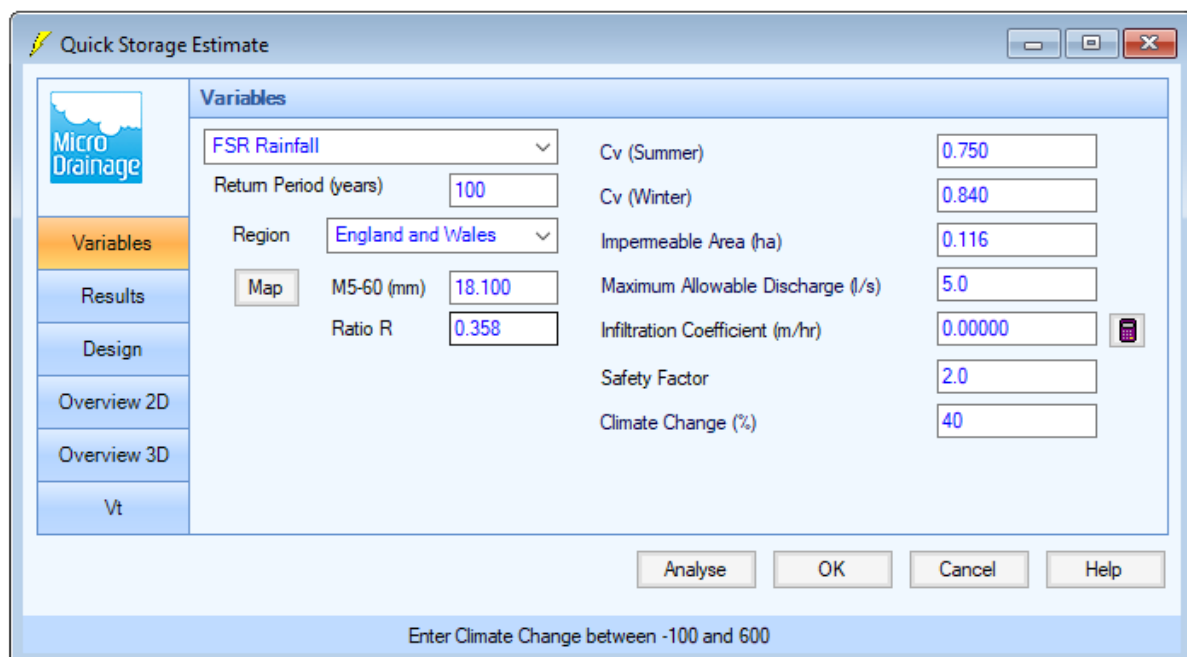
Global Variables require approximate storage of between 32 m³ and 53 m³.

These values are estimates only and should not be used for design purposes.

Buttons: Analyse, OK, Cancel, Help

Enter Climate Change between -100 and 600

The screenshot shows the 'Results' tab of the 'Quick Storage Estimate' window. The left sidebar contains a vertical menu with 'Variables', 'Results' (highlighted), 'Design', 'Overview 2D', 'Overview 3D', and 'Vt'. The main area displays a message about global variables requiring storage between 32 m³ and 53 m³, with a disclaimer that these are estimates. At the bottom, there are four buttons: 'Analyse', 'OK', 'Cancel', and 'Help'. A status bar at the very bottom indicates 'Enter Climate Change between -100 and 600'.



Quick Storage Estimate

Variables

FSR Rainfall	Cv (Summer)	0.750
Return Period (years)	Cv (Winter)	0.840
Region	Impervious Area (ha)	0.116
Map	Maximum Allowable Discharge (l/s)	5.0
M5-60 (mm)	Infiltration Coefficient (m/hr)	0.00000
Ratio R	Safety Factor	2.0
	Climate Change (%)	40

Buttons: Analyse, OK, Cancel, Help

Enter Climate Change between -100 and 600

The screenshot shows the 'Variables' tab of the 'Quick Storage Estimate' window. The left sidebar is identical to the previous window, with 'Variables' highlighted. The main area contains a table of input variables. The variables are: 'FSR Rainfall' (dropdown), 'Return Period (years)' (100), 'Region' (England and Wales), 'Map' (button), 'M5-60 (mm)' (18.100), 'Ratio R' (0.358), 'Cv (Summer)' (0.750), 'Cv (Winter)' (0.840), 'Impervious Area (ha)' (0.116), 'Maximum Allowable Discharge (l/s)' (5.0), 'Infiltration Coefficient (m/hr)' (0.00000), 'Safety Factor' (2.0), and 'Climate Change (%)' (40). There is a calculator icon next to the 'Infiltration Coefficient' field. At the bottom, there are four buttons: 'Analyse', 'OK', 'Cancel', and 'Help'. A status bar at the very bottom indicates 'Enter Climate Change between -100 and 600'.

14.5 Appendix 5 – SuDS Suitability Assessment



SuDS Technique	Typical Uses	Potential Issues	Potential Suitability
Rainwater harvesting	Capture of rainwater into a tank(s) for use (usually non-potable) such as irrigation, toilet flushing, vehicle or plant cleansing.	Care is needed to prevent the development of bacteria, algae and insect infestation.	Suitable on small scale for interception storage
Infiltration: Soakaways Infiltrations trenches and basins	Infiltration components are used to capture surface water runoff and allow it to infiltrate (soak) and filter through to the subsoil layer, into the groundwater.	Free draining bedrock with low groundwater, in a principal aquifer. Artificial ground. Maintenance	Unsuitable - Artificial ground

SuDS Technique	Typical Uses	Potential Issues	Potential Suitability
Green/brown /blue roofs	Used on flat or shallow pitched roofs to provide a durable roof covering which also provides thermal insulation, amenity space, biodiversity habitat as well as attenuation of rainwater.	Maintenance - Ensuring safe access	Unsuitable - Weight
Raingardens	Creation of planted landscaped areas to allow the diversion of a portion of rainwater from either downpipes or surrounding paved surfaces. Raingardens can either allow infiltration into the ground or have tanked systems for water retention.	Require maintenance	Unsuitable.
Permeable pavements / surfaces	Permeable hard surfaces that allow rainwater to pass through either into the ground or to tanked systems. Good as interception storage.	Potential impact of saturation on pavement stability to be considered. May require extensive use of impermeable membranes and under-drainage. Maintenance required.	Suitable - Lined
Swales	Dry ditches used as landscape features to allow the storage and infiltration of rainwater. Often used as linear features alongside roads, footpaths or rail lines but capable of being integrated into the design of many open spaces.	Finding available space in proposed site layout	Unsuitable - space
Detention basin/ponds	Landscape features designed to store and in some cases infiltrate rainwater. Detentions basins are usually dry, whereas a pond should retain water. These features need areas of open space but can often be combined with	Potential health and safety issues. Finding available	Unsuitable - space

SuDS Technique	Typical Uses	Potential Issues	Potential Suitability
	other sustainable drainage techniques.	space in proposed site layout	
Storage tanks/ Geocellular storage	Usually below ground level, they attenuate rainwater for later slow release back into the drainage system.	Pumping may sometimes be required to empty the tank into the drainage system	Suitable
Oversized piping	Using larger than necessary pipework creates additional space to store rainwater.	Lacks the wider benefits of the green infrastructure-based techniques	Suitable



14.6 Appendix 6 – Descriptions Of SuDS Techniques

14.6.1 Permeable Paving

Various options are available for the type of permeable paving that can be installed. Permeable block paving allows for infiltration through gaps in the surface. This can be underlain by a geotextile membrane and fine gravel course followed by with a sub-base or geocellular crates as shown in the figures below.

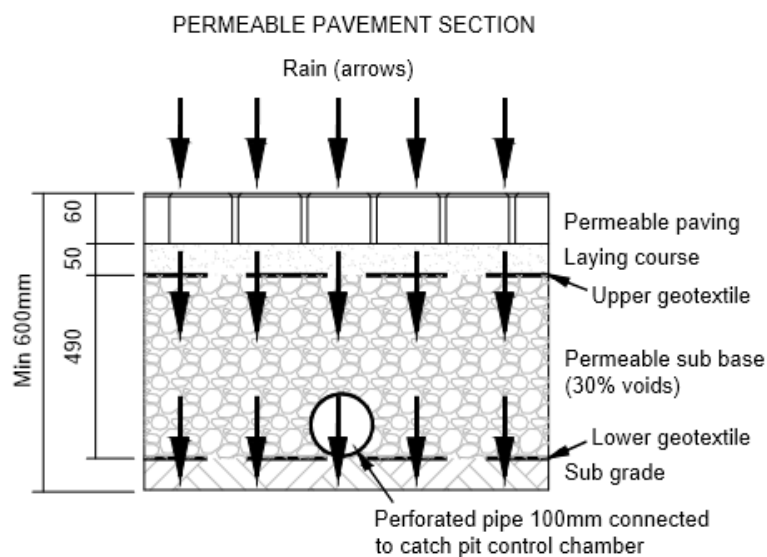


Figure 3 Block Permeable Paving with sub-base

The use of geocellular module storage provides structural strength (up to 400kN/m²) and high-water storage capacity with void space of 95%+.

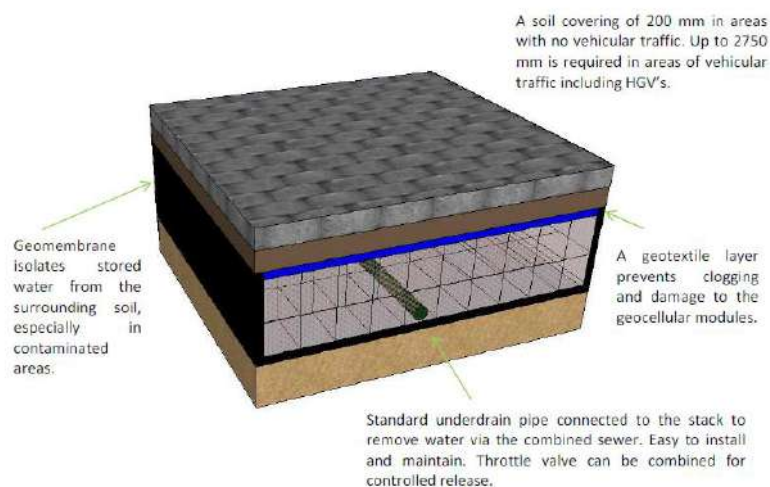


Figure 4 Block Permeable Paving with Geocellular Module

The plastic or concrete grid system is usually installed with a depth of 40 mm, with gaps between filled with an appropriate planting soil and seeded with a turf mix.

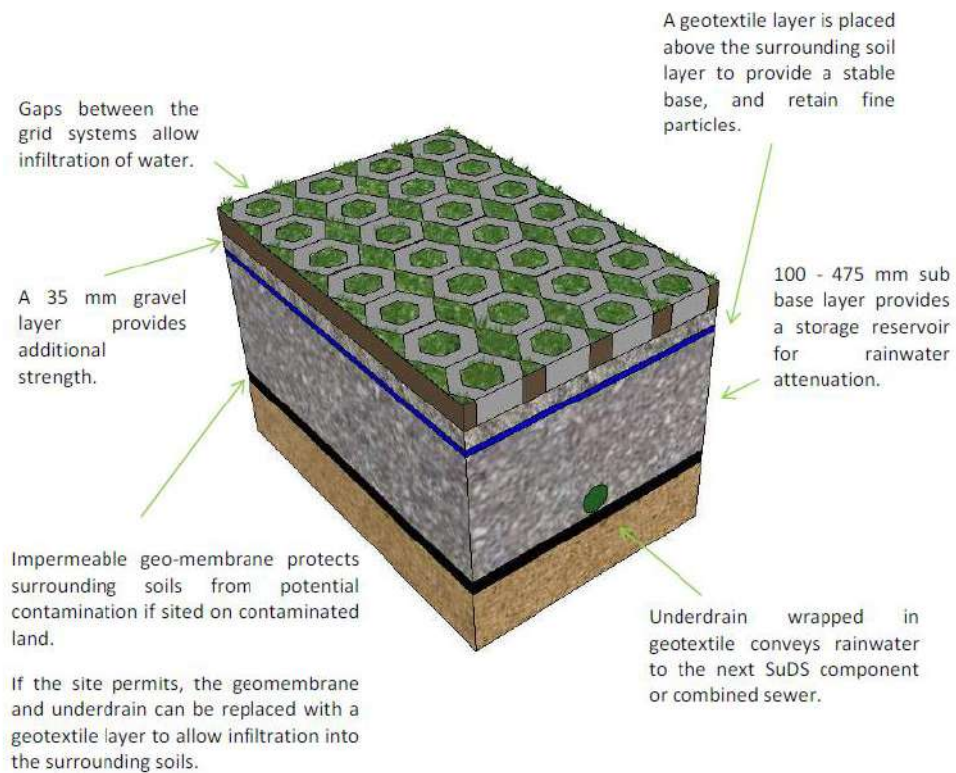


Figure 5 Plastic or Grid Permeable Paving with Sub-base

14.6.2 Permeable Paving Example Construction

Priora Sub-Base Construction

The aggregate installed beneath a Marshalls Priora surface is an essential element of the Marshalls Priora system. The aggregate must provide sufficient porosity to store water in the voids between the granular elements. It must also be of sufficient structural strength to withstand the loads to which the structure will be subjected.

Therefore, for the Marshalls Priora system to work effectively, we provide thorough aggregate specification to help source the correct material.

For detailed aggregate specification please see page 45, and for details of Marshalls Priora Aggregate, please see page 34.

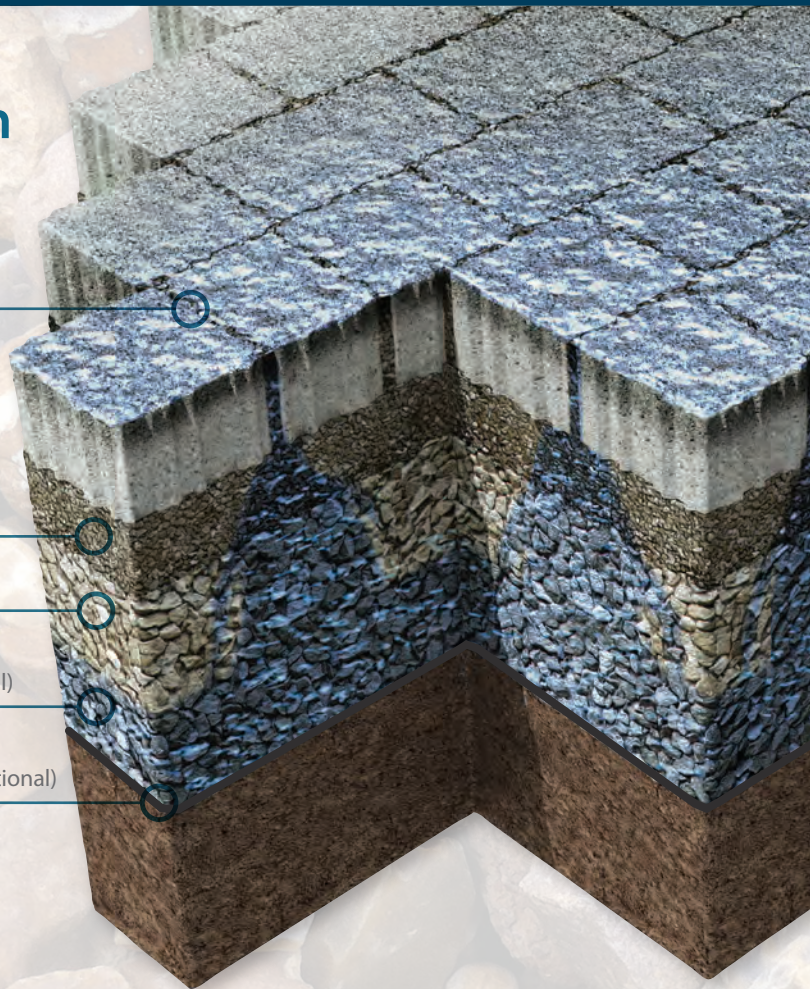
6mm Jointing

6mm Laying Course

20mm Sub-base

Capping Layer (Optional)

Marshalls M15 Grid (Optional)



Jointing

A traditional concrete block pavement would use sand to fill the joints between the blocks. A Marshalls Priora system requires a more open graded coarse material, which will allow water to easily pass through into the sub-base without clogging.

It should also be of an angular nature to maximise interlock within the aggregate and between the blocks to provide additional stability to the surface layer.

Jointing Aggregate Specification:
6mm Open Graded Crushed Rock



6mm Aggregate

Laying Course

The large size of sub-base material aggregate creates an uneven surface when compacted and has an open textured surface. Therefore a laying course material is required, to provide a flatter platform onto which the blocks are laid. This should prevent any rocking or instability of the blocks in-situ.

Crucially, the laying course in a Marshalls Priora system should also provide maximum infiltration properties, allowing water to flow freely through the joints.

Laying Course Aggregate Specification:
6mm Open Graded Crushed Rock

Sub-Base

In addition to providing structural stability (as it would in a traditional pavement), the sub-base of a Marshalls Priora system must also provide sufficient hydraulic capacity to store water. This is achieved by using an aggregate with a high permeability.

Permeability is measured in terms of the aggregate/ void ratio. We recommend the use of an aggregate with a void ratio of between 30% - 32%. In effect this means that every 3m³ of aggregate can store approximately 1m³ of water

Sub-Base Aggregate Specification:
20mm Open Graded Crushed Rock



20mm Aggregate

Capping Layer

A capping layer is required on weak ground to improve the bearing capacity of the pavement. Ground is considered "weak" when the CBR (California Bearing Ratio) is below 5%. Marshalls M15 Grid can be used at the interface of the capping layer and the subgrade to confine the capping material and stabilise the structure, reducing the amount of capping material required. See page 45 for Capping Material specification. See page 33 for information on M15 Grid.

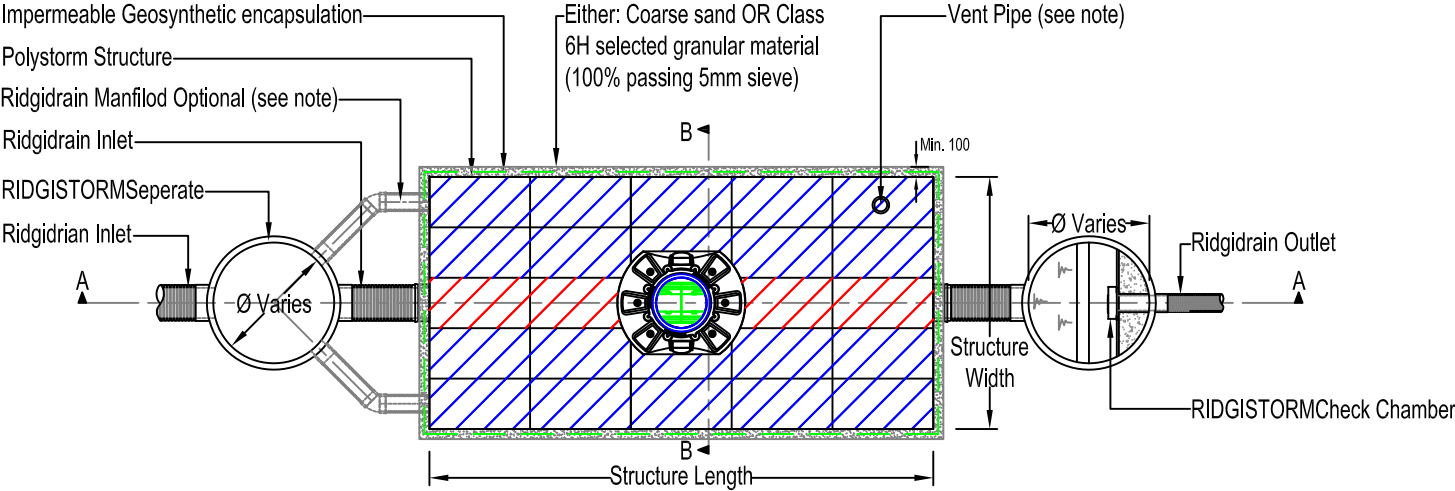
Full specification of suitable aggregate is set out in EN 13242: 2002

14.6.3 Geocellular structures, oversized pipes and tanks

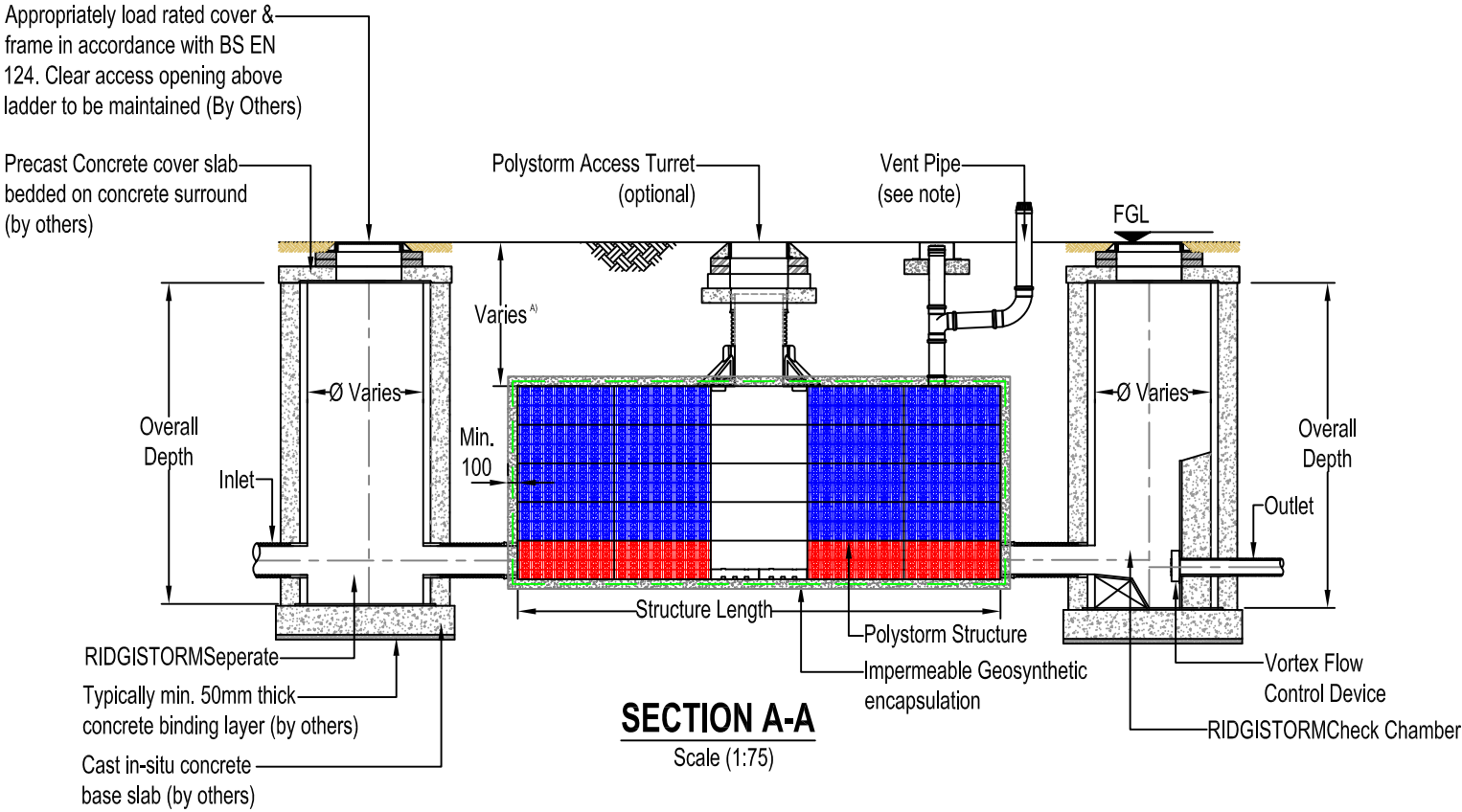
Modular plastic geocellular structures, with a high void ratio, are a new below ground storage arrangement that can replace underground pipes or tanks that have been used to store water. They can also be used to convey or infiltrate surface water runoff into the ground.

Underground storage features attenuate an agreed volume with a control structure to limit the discharge rate. Structural design must be provided to ensure integrity of the box, pipe or tank under loading. Silt interception and management arrangement is critical to long-term effectiveness of these structures and this must be demonstrated at design stage and confirmed for the design life of the development. It can be implemented either in the form of a modular box system with inlet and outlet pipework connected to the sides of the structure or in the form of a honeycomb structure with perforated pipes running under or through the box. Water is forced into the box when flows increase. There are now shallow, load bearing boxes which can be used under pavements and in particular below permeable pavement which protects the box from silt contamination and provides treatment with enhanced storage. Moreover, geocellular systems can be installed above a high-water table.

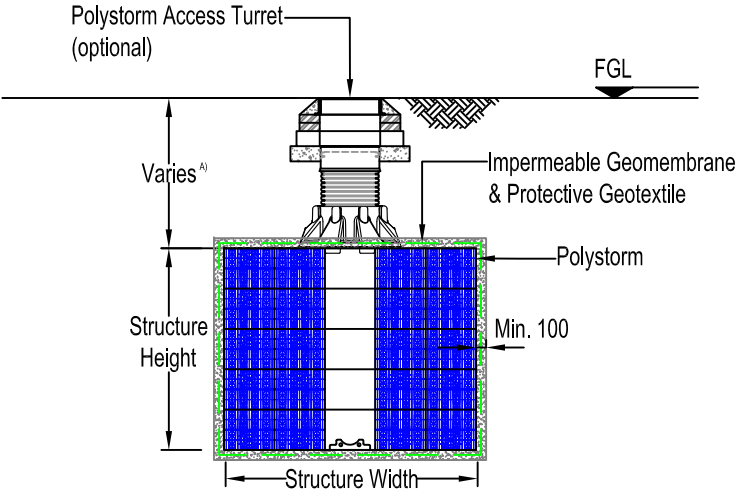
14.6.4 Geocellular Storage



TYPICAL ATTENUATION TANK PLAN
(Scale 1:75)

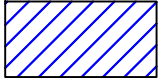


SECTION A-A
Scale (1:75)



SECTION B-B
Scale (1:75)

KEY:



POLYSTORM (PSM1, 1A & 2 CELL)



POLYSTORM (PSM4 CELL)

POLYSTORM ACCESS NOTES

1. Refer to Polypipe drawing No. PSM_SD_PSM_004 for typical integration into Polystorm structure.

VENTILATION NOTE

For information on Ventilation Options please refer to drawing ref: PSM_SD_PSM_002

MANIFOLD NOTE

Where single pipe hydraulic capacity is exceeded manifold detail may be required. For information on Manifold connections please refer to drawing ref: PSM_SD_008

NOTE A

For information on tank cover depths please refer to drawing ref: PSM_SD_PSM_005 or alternatively contact the Technical Team:- 01509 61500

NOTES

1. All dimensions in millimetres, unless otherwise stated.
2. All dimensions are nominal and may vary within manufacturing or construction tolerances.
3. All site temporary and enabling works by others.
4. Polypipe products to be installed in accordance with Polypipe civils recommendations (refer to Polypipe technical guidance for further information), giving due consideration to the requirements of the organisation who will be taking ultimate owner ship of the installation.
5. This drawing is intended for guidance only. Confirmation of the information contained within this document should be sought from the consulting engineers before final design or construction activities commence.

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Polypipe Civils

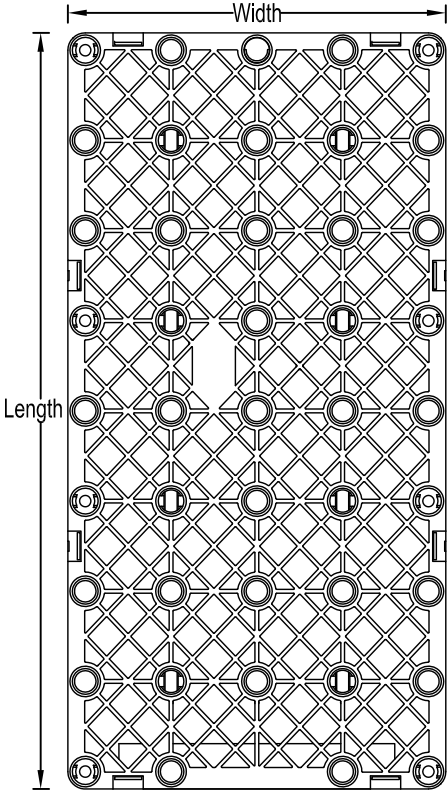
Charnwood Business Park,
North Road, Loughborough,
Leicestershire, LE11 1LE

Tel: 01509 615100
Fax: 01509 615215
www.polypipe.com/civils
www.polypipe.com/wms

PROJECT		STATUS	
POLYSTORM STANDARD DETAILS		FOR INFORMATION	
TITLE		DATE	DRAWN BY
		17/03/16	JL
		ORIGINAL SIZE	SCALE
POLYSTORM ATTENUATION DETAIL		A3	AS SHOWN
		DRAWING No.	REV.
		PSM_SD_PSM_001	

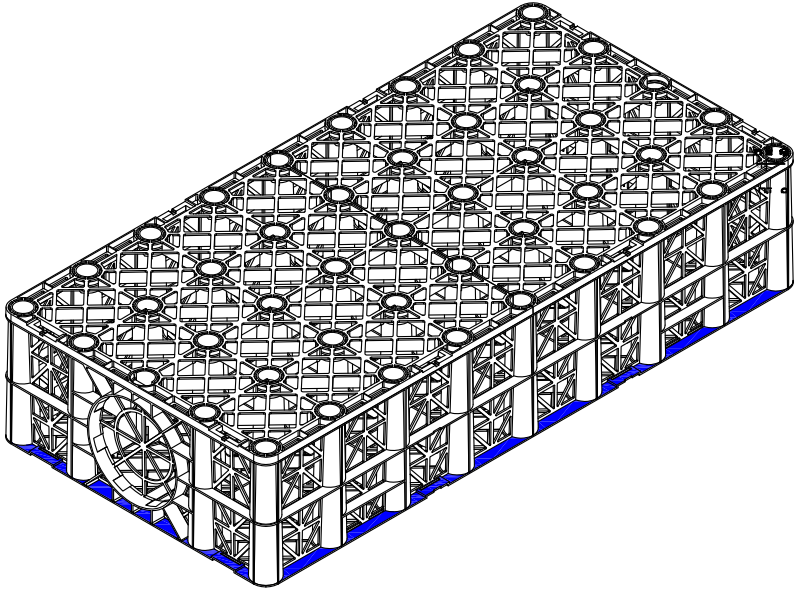
POLYSTORM CELL

Product Code: PSM3



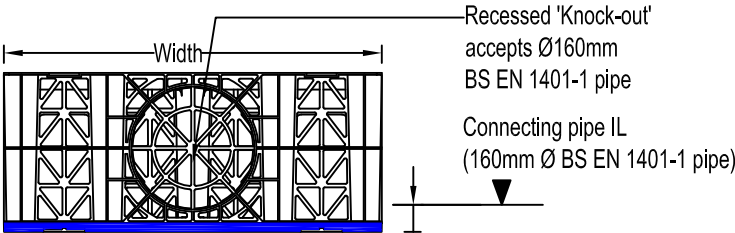
PLAN VIEW

Scale 1:10



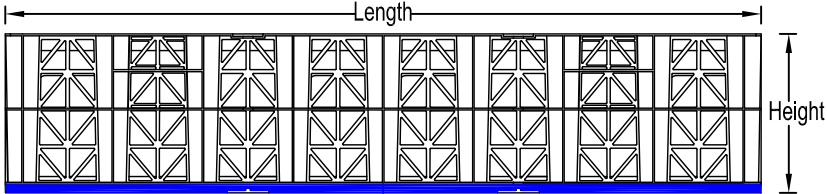
ISOMETRIC VIEW

Scale 1:10



END ELEVATION

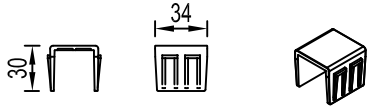
Scale 1:10



SIDE ELEVATION

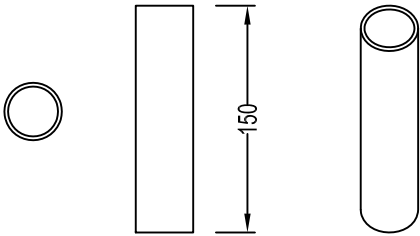
Scale 1:10

POLYSTORM TABLE									
NAME	CODE	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	A (mm)	VERTICAL STRENGTH (kN/m ²)	LATERAL STRENGTH (kN/m ²)	COLOUR	MATERIAL
Polystorm Xtra	PSM3	1000	500	210	36	834	93	Grey	Prime Polypropylene



POLYSTORM CLIP

Scale 1:5



POLYSTORM SHEAR CONNECTOR

Scale 1:5

POLYSTORM SYSTEM NOTES

- Polystorm units are available with either a Ø225mm or Ø300mm Ridgidrain socket upon request. Please refer to:- PSM_SD_005

NOTES

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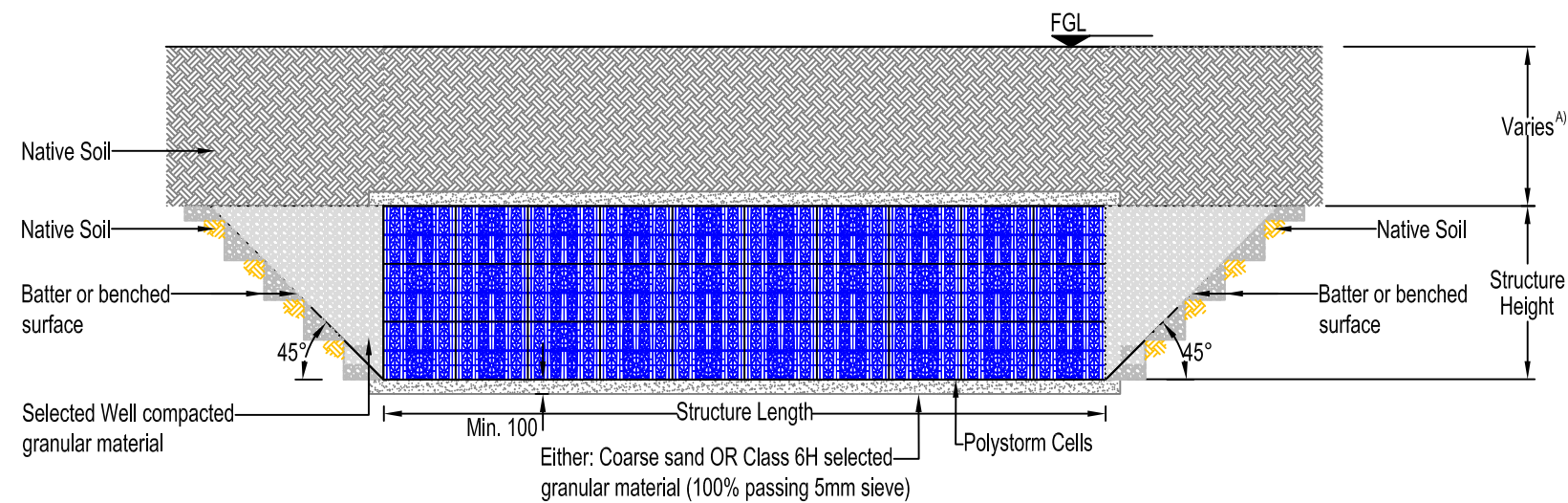


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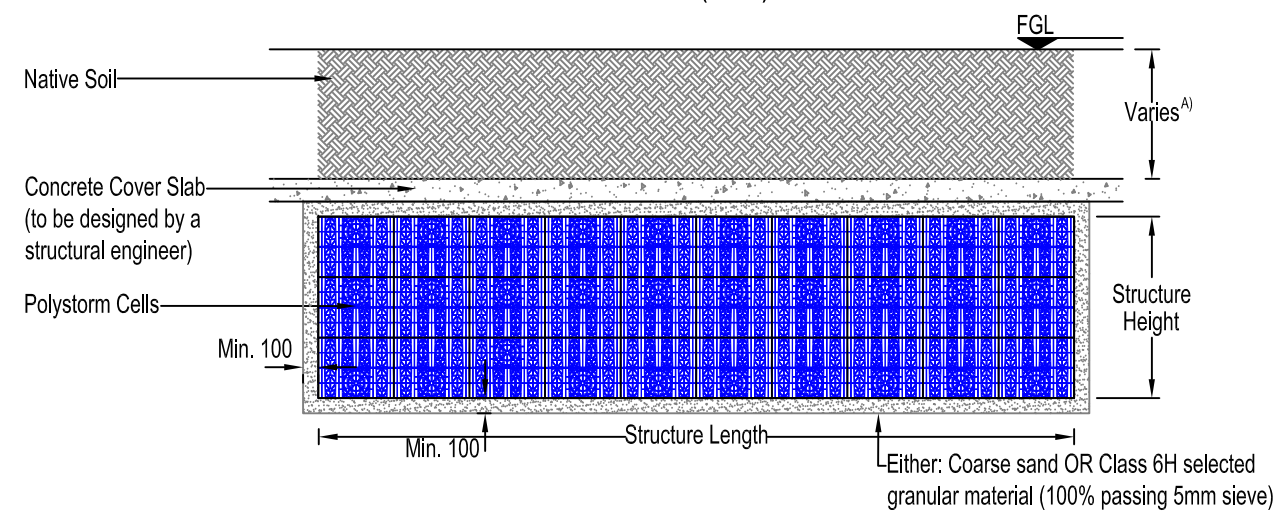
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		DATE	DRAWN BY
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		ORIGINAL SIZE	SCALE
		A3	AS SHOWN
		DRAWING No.	REV.
		PSM_SD_002	



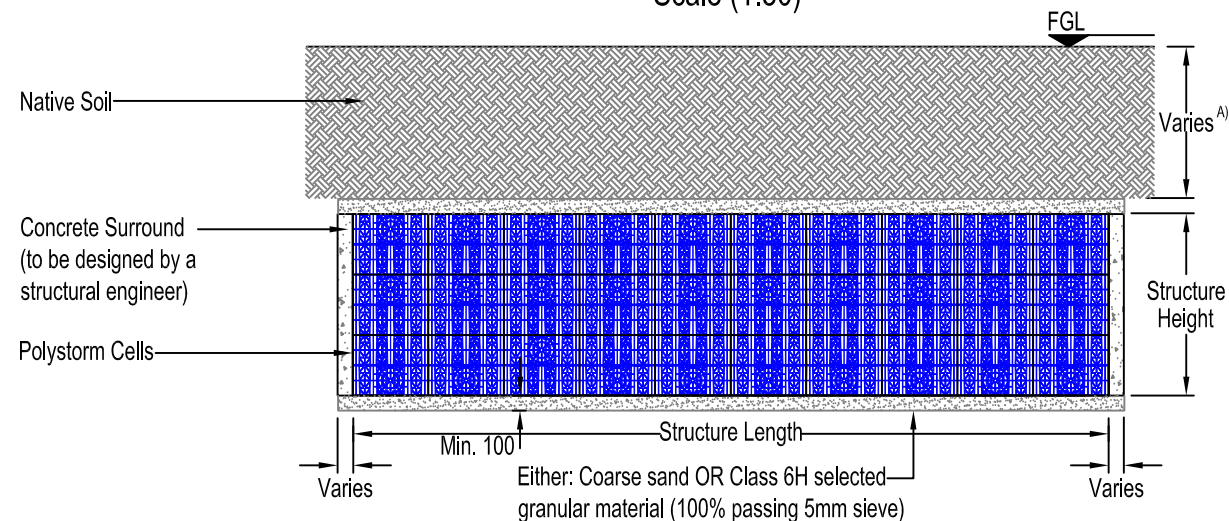
SOIL IMPROVEMENTS DETAIL

Scale (1:50)



CONCRETE COVER SLAB DETAIL

Scale (1:50)



THRUST RELIEF DETAIL

Scale (1:50)

NOTE A

For information on tank cover depths and advice on which improvement method would be appropriate, please contact the Technical Team:- 01509 61500

NOTES

1. All dimensions in millimetres, unless otherwise stated.
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3. All site temporary and enabling works by others.
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PROJECT	POLYSTORM STANDARD DETAILS	STATUS		FOR INFORMATION	
		DATE	DRAWN BY	17/03/16	JL
TITLE	POLYSTORM ENHANCED INSTALLATION DETAIL	ORIGINAL SIZE	SCALE		
		A3	AS SHOWN		
		DRAWING No.		REV.	
		PSM_SD_IM_001			

14.6.5 Hydrobrake Flow Control

Hydro-Brake® Vortex Flow Control

Reduce Storage Needs by Controlling Flow.

Product Profile

The Hydro-Brake® Vortex Flow Control is a versatile, self-activating device with a unique geometry designed to harness the energy of vortex flow.

The Hydro-Brake® is used to maximize savings on new construction projects by minimizing stormwater detention volumes. Also an economical retrofit solution, the Hydro-Brake® can be installed in over-discharging ponds and catch basins to restrict the outflow without requiring the construction of additional detention volumes.

With large openings that guard against blockages and an installation base upwards of 25,000 units, the Hydro-Brake® is a trusted and proven solution used to reduce the rate of stormwater runoff.

How it Works

The Hydro-Brake® operates on simple fluid hydraulics. Flow enters the volute tangentially through the inlet. Under low flow conditions, the Hydro-Brake® acts as a large orifice and water passes directly from the inlet to the outlet (Fig.1a).

As flow increases and reaches the Flush-Flo™ point, high peripheral velocities initiate the throttling action. As head increases, the valve approaches the Switch-Flo™ and Kick-Flo™ points and an air-filled core starts to form in the volute. As head continues to increase, the air core fully stabilizes and the valve discharge is throttled to that of a smaller orifice (Fig.1b).

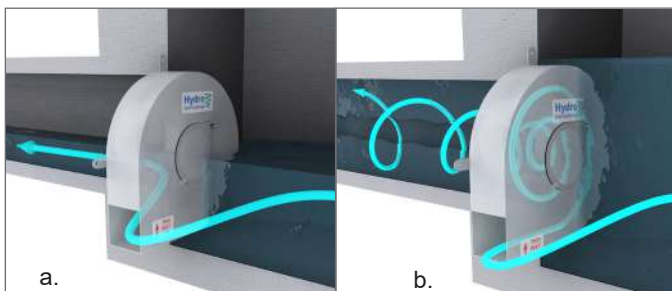


Fig.1 The Hydro-Brake® operates like (a) a large orifice under low flow conditions, and (b) a small orifice under higher flow / higher head conditions when a vortex air core forms within the device and throttles the flow.

Applications

- Outlet flow control for stormwater detention
- Outlet flow control for dams and flood reservoirs
- Reduction of runoff volume from sites
- “Blue roof” stormwater detention schemes
- Erosion control and energy dissipation

Advantages

- Reduced stormwater storage volumes by up to 40%
- Up to 50% savings in project storage costs
- Self-activating with no moving parts or power requirements
- Available in wall-mounted or floor-mounted geometries
- Area of opening is 3-6 times larger than the equivalent orifice
- Virtually maintenance free
- Proven performance with over 25,000 installations worldwide

The Hydro-Brake® Vortex Flow Control optimizes flow control to allow for higher discharge rates at lower heads than conventional flow control options. The head/discharge curves shown below illustrate the behavior of a Hydro-Brake® Vortex Flow Control compared to an orifice (Fig.2).

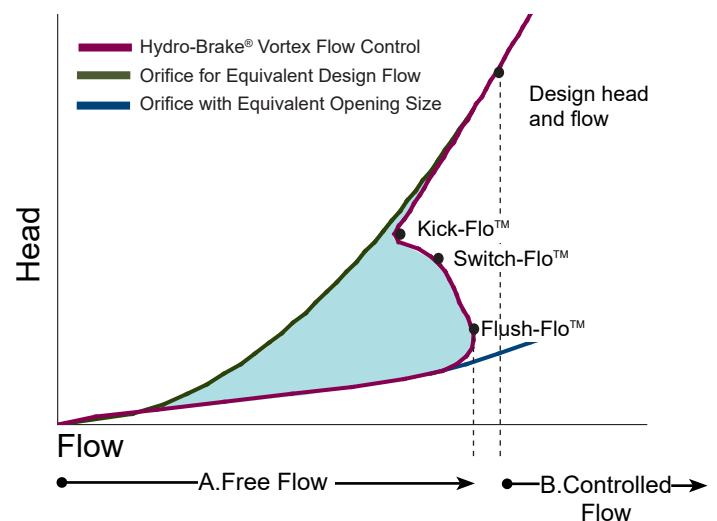


Fig.2 The characteristic of the Hydro-Brake® vs. an equivalent orifice.

Hydro-Brake® Vortex Flow Control

Sizing & Design

Three series of Hydro-Brake® Vortex Flow Controls are available to suit various applications and design constraints. Refer to the Hydro-Brake® Design Chart for typical sizing guidelines (Table 1).

Table 1. Hydro-Brake® Vortex Flow Control design chart.

Series	S Series	V Series	C Series
Typical Geometry			
Models	SH STH SXH SMH SMXH	SV SXV SMV	C CX CH
Typical Applications	- Flow control at the inlet of the storm drain system - Outlet flow control for stormwater detention systems	- Erosion control & energy dissipation - Roof runoff control for "Blue Roof" detention schemes	- Outlet flow control for flood dams and levees - Outlet flow control for stormwater detention systems
Typical Mount Style	Wall Mount	Downspout/Roof Mount Floor Mount Pipe Mount	Floor Mount
Typical Diameter Range*	2 - 16 in (5 - 41 cm)	2 - 16 in (5 - 41 cm)	3 - 20 in (7.5 - 51 cm)
Typical Flow Range**	0.05 - 5.6 cfs (1 - 157 L/s)	0.05 - 6.0 cfs (1 - 174 L/s)	0.18 - 14.3 cfs (5.3 - 405 L/s)

*Listed diameter ranges are typical guidelines only. Hydro-Brake® Vortex Flow Controls can be manufactured to any specified diameter up to 6'.

**Flow ranges listed are for 4' - 6.5' of head.

Contact Hydro International for site-specific sizing and design requirements.

Optional Design Accessories

Pivoting Bypass Door



For maintenance access to the outlet pipe.

Curved Backplate



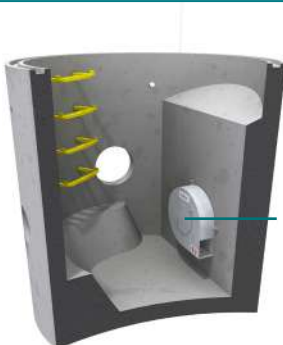
To allow for flush-mounting to the wall of a round manhole.

Vortex Suppressor Pipe

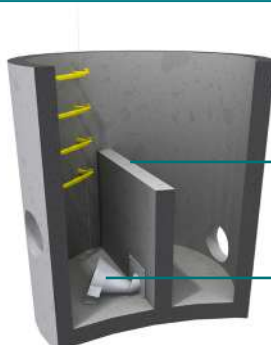


To eliminate air core for emergency bypass.

Typical Chamber Configurations



Wall Mounted
SXH Model for
Catch Basin
Inlet Control



Large Storm
Bypass Weir

Floor Mounted
CH Model for
Small Storm
Flow Control



Pipe Mounted
SXV Model for
Energy & Velocity
Dissipation

14.7 Appendix 7 – SuDS Maintenance Manual

All maintenance activities will be the responsibility of the developer Andersen Textiles Ltd. They will appoint a management company to undertake the general maintenance duties within the site and will join service agreements with the suppliers and manufactures of the SuDS/Pumps when required.

The information presented below is taken from the CIRIA SuDS Manual (Report c753) and [SuDS](#). Further details on installation and maintenance can be found detailed below and online.



14.7.1 Pervious Pavements

Maintenance Schedule	Required Action	Typical Frequency	Responsibility
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.	Andersen Textiles Ltd will be responsible for setting up the management company.
Occasional maintenance	Stabilise and mow contributing areas.	As required.	
	Removal of weeds or manage using weed killer applied directly into the weeds 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 lost material.	As required.	



Maintenance Schedule	Required Action	Typical Frequency	Responsibility
	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).	Andersen Textiles Ltd will be responsible for setting up the management company.
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, 48h after large storms in first six months.	
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.	
	Monitor Inspection chambers.	Annually.	

Many of the specific maintenance activities for pervious pavements can be undertaken as part of a general site cleaning contract (many car parks or roads are swept to remove litter and for visual reasons to keep them tidy). Therefore, if litter management is already required at the site, this should have marginal cost implications.

14.7.2 Geo-Cellular Maintenance

Maintenance Schedule	Required Action	Typical Frequency	Responsibility
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings.	Annually.	Andersen Textiles Ltd will be responsible for setting up the management company.
	Cleaning of gutters and any filters on downpipes.	Annually (or as required based on inspections).	
	Trimming any roots that may be causing blockages.	Annually (or as required).	
Occasional maintenance	Remove sediment and debris from manhole, storage structure and components and floor of inspection tube or chamber and inside of concrete manhole rings.	As required, based on inspections.	
Remedial actions	Reconstruct geocellular and/or replace or clean void fill, if performance failure occurs	As required	Andersen Textiles Ltd will be responsible for setting up the management company.
	Replacement of clogged geotextile (will require reconstruction of soakaway).	As required.	
Monitoring	Inspect silt raps and note rate of sediment accumulation.	Monthly in the first year and then annually.	
	Check soakaway to ensure emptying is occurring.	Annually.	

Maintenance will usually be carried out manually, although a suction tanker can be used for sediment / debris removal for large systems. If maintenance is not undertaken



for long periods, deposits can become hard-packed and require considerable effort to remove.

Replacement of the geocellular units will be necessary if the system becomes blocked with silt. Effective monitoring will give information on changes in infiltration rate and provide a warning of potential failure in the long term.

Areas draining to infiltration components should be regularly swept to prevent silt being washed off the surface. This will minimize the need for maintenance.

Maintenance responsibility should be placed with an appropriate organisation, and maintenance schedules should be developed during the design phase.



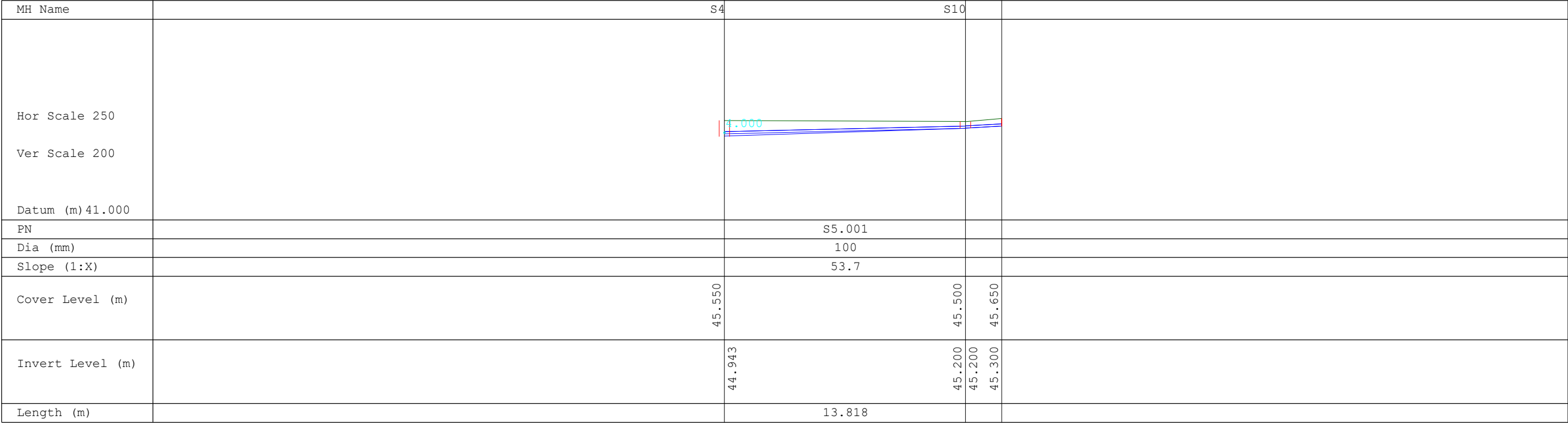
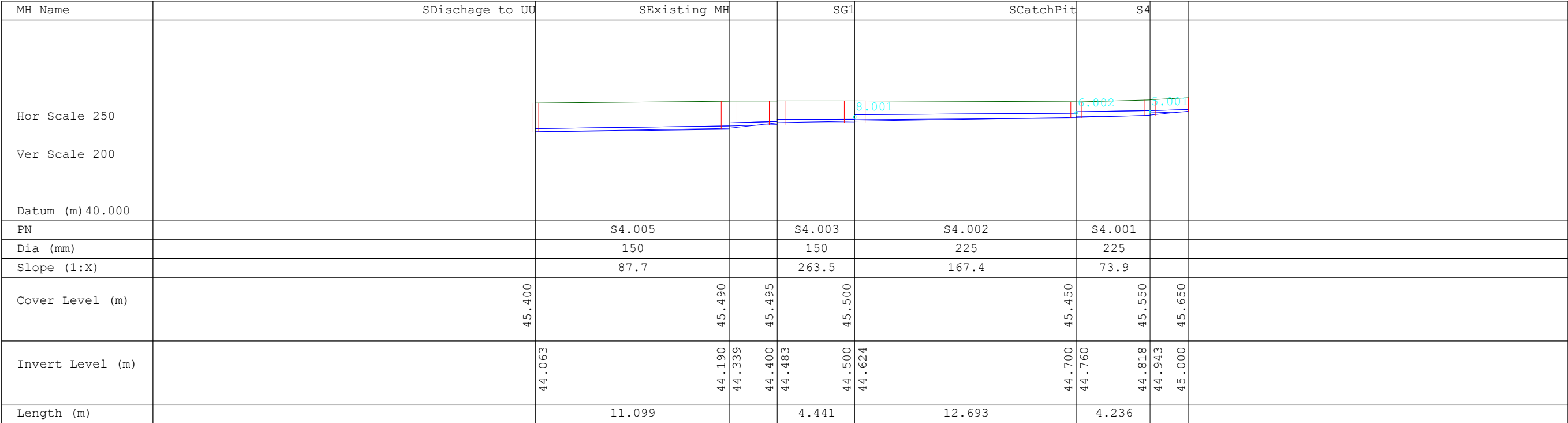
14.7.3 Interceptor & Flow Control Maintenance

Maintenance Schedule	Required Action	Typical Frequency	Responsibility
Regular maintenance	Inspect for sediment and debris;	Quarterly; As required. Increase freq. to Monthly during Autumn;	Andersen Textiles Ltd will be responsible for setting up the management company.
	Inspection & Cleaning of SuDS components upstream of flow control element.	Quarterly; Increase freq. to Monthly during Autumn;	
Remedial actions	Removal of debris and sediment;	Annually; Or as required.	
Remedial actions	Replacement of parts; Manhole cover, filters or components of flow control device;	As required;	
Monitoring	Ensure flow control device is function correctly during and after storm events; Check water levels up stream and downstream of flow control device	Monthly; During 1 st year of installation or during and after storm event; When possible Reduce to Quarterly following the 1 st year;	
	Check for damage to flow control components	Annually;	
	Check for securely fitting manhole lid; Ensures debris cannot enter the system unfiltered;	Annually;	

14.8 Appendix 8 - Microdrainage

14.8.1 Layout of Network

PDF copy to follow this page.



MH Name	SCatchPit	S8	S5	
Hor Scale 250				
Ver Scale 200				
Datum (m) 41.000				
PN		S6.002	S6.001	
Dia (mm)		150	150	
Slope (1:X)		197.4	291.5	
Cover Level (m)	45.450	45.500	45.450	45.650
Invert Level (m)	44.862	44.900 44.900	44.950 44.950	45.000
Length (m)		7.487	14.637	

MH Name	S8	
Hor Scale 250		
Ver Scale 200		
Datum (m) 41.000		
PN		
Dia (mm)		
Slope (1:X)		
Cover Level (m)	45.500	45.650
Invert Level (m)	44.925 45.000	
Length (m)		

MH Name	SG1	SCatchpit	SP1	
Hor Scale 250				
Ver Scale 200				
Datum (m) 40.000				
PN		S8.001	S8.000	
Dia (mm)		150	150	
Slope (1:X)		82.5	143.7	
Cover Level (m)	45.500	45.450	45.350	
Invert Level (m)	44.678	44.766 44.766	44.920	
Length (m)		7.238	22.175	

14.8.2 Layout of Network - Features, Exceedance flows and Sewer Connection

PDF to follow this page.

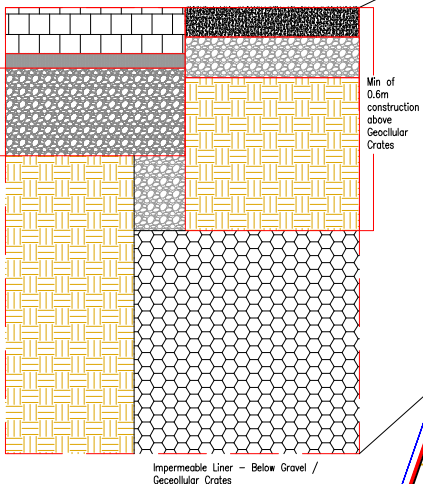
section through
existing chamber

Surface Water drainage
to join Foul drainage
connection on site just
before MANHOLE.

foul drainage discharges
into existing chamber at invert Level

existing
outlet into Knowsley Street
combined sewer

Cross Section of Permeable Paving (lined) and
Geocellular Storage



Min of 0.3m construction
of MOT Type 3 Gravel Below
permeable block Paving

Impermeable
liner - Below
Gravel /
Geocellular
Crates

Min of 0.6m
construction
above
Geocellular
Crates

3 Permeable Block Paving (Or Similar);
See manufacture of chosen product for exact
specifications

Example Construction:
80mm concrete blocks
50mm bedding sand
300mm MOT 3 Permeable Aggregate (no fines)
Impermeable lining;

Overland flow route - Maximum on site
surface water depth during an
exceedance event is 150mm - at a
flood level of 45.50mAOD excess would
flow north out of site.

7 Exceedance Flow Storage Area -

South West of yard is 300mm lower than
finished floor level at 45.650mAOD, at
45.350mAOD at the lowest point.

6 Pavement and access route into the rear of the units
is flat at 45.650mAOD.

Pavement slab is 150mm above the yard, which has
a maximum of 45.0mAOD.

Existing Manhole and connection into UU

5 Foul and Surface water connection Combine on site before
discharging into the exiting on site combined manhole connection.

Foul sewer discharge will be unrestricted;

Surface water connection will discharge at a maximum rate of
5.0l/s.

Discharge will be controlled via a hydro-break vortex flow orifice
control.

Interceptor prevents foul sewage entering surface water system.

1 Geocellular Storage;
100m2 / 7ares;
22.5m long
6.7m wide
1.15m deep excavations

Tarmac / Permeable Paving
Construction material / infill
Minimum of 0.6m thickness
Geocellular storage Crates 0.4m thick

2 The Hydro-Break® Chamber comprises a precast
reinforced concrete chamber base containing a
bespoke Hydro-Break® flow control.

Surface water discharge to 2.0 l/s during all
storm events.

Vortex flow control device helps prevents
blockages whilst significantly reducing the runoff
rate.

U bend or P bend pipe to stop fumes.

4 The Polystorm Catchpit (or similar) is a prefabricated 600mm
catchpit, used as part of a Polystorm system.

It is an easily maintainable and cost effective way of protecting
the downstream sustainable drainage system (SuDS).

They are designed to separate silt and debris, helping to protect the
Polystorm geocellular system and reducing tank maintenance
activities.

See manufacture for specifications and more details.

General Notes

1.1. THIS DRAWING IS COPYRIGHT
AND SHOULD NOT BE REPRODUCED
IN WHOLE OR PART WITHOUT THE
WRITTEN CONSENT OF STM
NVRONMENTAL CONSULTANTS
LTD.

1.2. DO NOT SCALE FROM THIS
DRAWING.

1.3. ALL DIMENSIONS TO BE
CHECKED ON SITE AND
CO-ORDINATE WITH RELEVANT
ARCHITECT'S
DRAWINGS. ANY DISCREPANCIES TO
BE REPORTED TO THE ENGINEER
PRIOR TO CONSTRUCTION.

1.4. ALL DIMENSIONS IN METERS AND
MILLIMETERS UNLESS NOTED
OTHERWISE.

1.5. ALL LEVELS IN METERS.

1.6. SIZES HEREON SHALL NOT BE
MODIFIED WITHOUT THE WRITTEN
APPROVAL OF THE ENGINEER.

1.7. THIS DRAWING IS TO BE READ IN
CONJUNCTION WITH ALL RELEVANT
ENGINEERS DRAWINGS &
SPECIFICATIONS.

- Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
- Design is subject to Building Regulation, Sewage Undertaker and Highways Department approval.
- Before work commences contractor should consult the engineer and the SI report regarding any contamination issues. All necessary Health and Safety measures to be taken.
- Any soft spots discovered after proof rolling shall be removed and replaced with suitable engineering fill.
- The surface tolerances to the sub base layer thickness should be no more than +5mm or -30mm.
- New road levels to be in smoothly with existing road. Levels to be confirmed prior to construction and reported to the Engineer.
- Tarmac road construction to comply with BS EN 130108.
- Foul sewer discharge will be unrestricted.
- Surface Water discharge to United Utilities Water Combined sewer is set at 25%;
- Consent to discharge to be obtained from Thames Water.
- PERMEABLE PAVING AND GEOCELLULAR STORAGE ATTENUATION TANK TO BE SEALED TO PREVENT INFILTRATION INTO UNDERLYING CHALK.

KEY

- Pipes (SW)
- Pipes (Foul)
- Manhole
- Flow Control
- Geocellular
- Permeable Paving
- Overland Flow Route

No.	Revision/Issue	Date

Firm Name and Address

Project Name and Address

63 Knowsley Street,
Cheetham Hill,
Manchester, M8 8HX

Project
SWDS - 2023 - 00001

Date
16/01/2023

Scale

Sheet

Sheet 1 of 1.

14.8.3 Microdrainage results

STM Environmental Consultants		Page 1																																				
Unit 6, Crane Mews 32 Gould Road, Twickenham London, TW2 6RS																																						
Date 23/06/2023 11:05 File 63 KNOWSLEY STREET_V2.MDX	Designed by matthewa Checked by																																					
Innovyze	Network 2020.1																																					
STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Storm Pipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - England and Wales <table><tr><td>Return Period (years)</td><td>100</td><td>PIMP (%)</td><td>100</td></tr><tr><td>M5-60 (mm)</td><td>18.200</td><td>Add Flow / Climate Change (%)</td><td>0</td></tr><tr><td>Ratio R</td><td>0.358</td><td>Minimum Backdrop Height (m)</td><td>0.200</td></tr><tr><td>Maximum Rainfall (mm/hr)</td><td>50</td><td>Maximum Backdrop Height (m)</td><td>1.500</td></tr><tr><td>Maximum Time of Concentration (mins)</td><td>30</td><td>Min Design Depth for Optimisation (m)</td><td>0.250</td></tr><tr><td>Foul Sewage (l/s/ha)</td><td>0.000</td><td>Min Vel for Auto Design only (m/s)</td><td>1.00</td></tr><tr><td>Volumetric Runoff Coeff.</td><td>0.750</td><td>Min Slope for Optimisation (1:X)</td><td>500</td></tr></table> Designed with Level Soffits Time Area Diagram for Storm <table><thead><tr><th>Time (mins)</th><th>Area (ha)</th><th>Time (mins)</th><th>Area (ha)</th></tr></thead><tbody><tr><td>0-4</td><td>0.077</td><td>4-8</td><td>0.039</td></tr></tbody></table> Total Area Contributing (ha) = 0.116 Total Pipe Volume (m³) = 2.186			Return Period (years)	100	PIMP (%)	100	M5-60 (mm)	18.200	Add Flow / Climate Change (%)	0	Ratio R	0.358	Minimum Backdrop Height (m)	0.200	Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500	Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.250	Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00	Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500	Time (mins)	Area (ha)	Time (mins)	Area (ha)	0-4	0.077	4-8	0.039
Return Period (years)	100	PIMP (%)	100																																			
M5-60 (mm)	18.200	Add Flow / Climate Change (%)	0																																			
Ratio R	0.358	Minimum Backdrop Height (m)	0.200																																			
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Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500																																			
Time (mins)	Area (ha)	Time (mins)	Area (ha)																																			
0-4	0.077	4-8	0.039																																			
Network Design Table for Storm « - Indicates pipe capacity < flow																																						
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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
S4.000	2.214	0.057	38.6	0.023	5.00	0.0	0.600	o	100	Pipe/Conduit		🔴
S5.000	2.084	0.100	20.8	0.000	5.00	0.0	0.600	o	100	Pipe/Conduit		🟢
S5.001	13.818	0.257	53.7	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit		🟢
S4.001	4.236	0.057	73.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		🟢
S6.000	2.361	0.050	47.0	0.023	5.00	0.0	0.600	o	225	Pipe/Conduit		🟡
S6.001	14.637	0.050	291.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		🟢

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S4.000	50.00	5.03	45.000	0.023	0.0	0.0	0.0	1.24	9.8	3.1
S5.000	50.00	5.02	45.300	0.000	0.0	0.0	0.0	1.70	13.3	0.0
S5.001	50.00	5.24	45.200	0.000	0.0	0.0	0.0	1.05	8.3	0.0
S4.001	50.00	5.29	44.818	0.023	0.0	0.0	0.0	1.52	60.6	3.1
S6.000	50.00	5.02	45.000	0.023	0.0	0.0	0.0	1.91	76.0	3.1
S6.001	50.00	5.44	44.950	0.023	0.0	0.0	0.0	0.58	10.3	3.1



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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S7.000	2.423	0.075	32.3	0.013	5.00	0.0	0.600	o	150	Pipe/Conduit	
S6.002	7.487	0.038	197.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.002	12.693	0.076	167.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.000	22.175	0.154	143.7	0.042	5.00	0.0	0.600	o	150	Pipe/Conduit	
S8.001	7.238	0.088	82.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.003	4.441	0.017	263.5	0.015	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.004	2.762	0.061	44.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S7.000	50.00	5.02	45.000	0.013	0.0	0.0	0.0	1.78	31.4	1.8
S6.002	50.00	5.61	44.900	0.036	0.0	0.0	0.0	0.71	12.6	4.9
S4.002	50.00	5.82	44.700	0.059	0.0	0.0	0.0	1.01	40.1	8.0
S8.000	50.00	5.44	44.920	0.042	0.0	0.0	0.0	0.84	14.8	5.6
S8.001	50.00	5.55	44.766	0.042	0.0	0.0	0.0	1.11	19.6	5.6
S4.003	50.00	5.94	44.500	0.116	0.0	0.0	0.0	0.61	10.9	15.7
S4.004	50.00	5.97	44.400	0.116	0.0	0.0	0.0	1.51	26.6	15.7



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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S4.005	11.099	0.127	87.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S4.005	50.00	6.15	44.190	0.116	0.0	0.0	0.0	1.07	19.0	15.7



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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S5	45.650	0.650	Junction		S4.000	45.000	100				
S8	45.650	0.350	Junction		S5.000	45.300	100				
S10	45.500	0.300	Open Manhole	600	S5.001	45.200	100	S5.000	45.200	100	
S4	45.550	0.732	Open Manhole	600	S4.001	44.818	225	S4.000	44.943	100	
								S5.001	44.943	100	
S7	45.650	0.650	Junction		S6.000	45.000	225				
S5	45.450	0.500	Junction		S6.001	44.950	150	S6.000	44.950	225	
S4	45.650	0.650	Junction		S7.000	45.000	150				
S8	45.500	0.600	Open Manhole	600	S6.002	44.900	150	S6.001	44.900	150	
								S7.000	44.925	150	25
SCatchPit	45.450	0.750	Open Manhole	600	S4.002	44.700	225	S4.001	44.760	225	60
								S6.002	44.862	150	87
SP1	45.350	0.430	Open Manhole	600	S8.000	44.920	150				
SCatchpit	45.450	0.684	Open Manhole	600	S8.001	44.766	150	S8.000	44.766	150	
SG1	45.500	1.000	Open Manhole	1200	S4.003	44.500	150	S4.002	44.624	225	199
								S8.001	44.678	150	178
S11	45.495	1.095	Open Manhole	900	S4.004	44.400	150	S4.003	44.483	150	83
SExisting MH	45.490	1.300	Open Manhole	900 x 650	S4.005	44.190	150	S4.004	44.339	150	149
SDischarge to UU	45.400	1.337	Open Manhole	375		OUTFALL		S4.005	44.063	150	



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MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
------------	---------------------------	----------------------------	--------------------------------	---------------------------------	-------------------	-------------------

Symbol	Value 1	Value 2	Value 3	Value 4	Requirement	Diagram
S5	383864.743	399749.960			No Entry	
S8	383869.055	399762.488			No Entry	
S10	383867.021	399762.941	383867.021	399762.941	Required	
S4	383862.531	399749.873	383862.531	399749.873	Required	
S7	383857.182	399727.499			No Entry	
S5	383855.174	399728.742			No Entry	
S4	383862.098	399741.324			No Entry	
S8	383860.013	399742.557	383860.013	399742.557	Required	



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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SCatchPit	383858.295	399749.844	383858.295	399749.844	Required	
SP1	383848.353	399737.683	383848.353	399737.683	Required	
SCatchpit	383855.512	399758.671	383855.512	399758.671	Required	
SG1	383861.937	399762.004	383861.937	399762.004	Required	
S11	383857.738	399763.450	383857.738	399763.450	Required	
SExisting MH	383856.121	399765.688	383856.121	399765.688	Required	
SDischarge to UU	383858.679	399776.488			No Entry	



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Upstream Manhole

Downstream Manhole

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PN	USMH	Dia/Len	Width	US Easting	US Northing	Intersection	Intersection	Layout
	Name	(mm)	(mm)	(m)	(m)	Easting (m)	Northing (m)	(North)

S4.000	S5		383864.743	399749.960			
S5.000	S8		383869.055	399762.488			
S5.001	S10	600	383867.021	399762.941	383867.021	399762.941	
S4.001	S4	600	383862.531	399749.873	383862.531	399749.873	
S6.000	S7		383857.182	399727.499			
S6.001	S5		383855.174	399728.742			
S7.000	S4		383862.098	399741.324			
S6.002	S8	600	383860.013	399742.557	383860.013	399742.557	
S4.002	SCatchPit	600	383858.295	399749.844	383858.295	399749.844	



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Drainage

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PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S8.000	SP1	600		383848.353	399737.683	383848.353	399737.683	
S8.001	SCatchpit	600		383855.512	399758.671	383855.512	399758.671	
S4.003	SG1	1200		383861.937	399762.004	383861.937	399762.004	
S4.004	S11	900		383857.738	399763.450	383857.738	399763.450	
S4.005	SExisting MH	900	650	383856.121	399765.688	383856.121	399765.688	





Micro
Drainage

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PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S4.000	S5			383864.743	399749.960			
S5.000	S8			383869.055	399762.488			
S5.001	S10	600		383867.021	399762.941	383867.021	399762.941	
S4.001	S4	600		383862.531	399749.873	383862.531	399749.873	
S6.000	S7			383857.182	399727.499			
S6.001	S5			383855.174	399728.742			
S7.000	S4			383862.098	399741.324			
S6.002	S8	600		383860.013	399742.557	383860.013	399742.557	
S4.002	SCatchPit	600		383858.295	399749.844	383858.295	399749.844	



Micro
Drainage

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PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S8.000	SP1	600		383848.353	399737.683	383848.353	399737.683	
S8.001	SCatchpit	600		383855.512	399758.671	383855.512	399758.671	
S4.003	SG1	1200		383861.937	399762.004	383861.937	399762.004	
S4.004	S11	900		383857.738	399763.450	383857.738	399763.450	
S4.005	SExisting MH	900	650	383856.121	399765.688	383856.121	399765.688	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
S4.005	SDischarge to UU	375		383858.679	399776.488	



Micro
Drainage

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
4.000	User	-	100	0.023	0.023	0.023
5.000	-	-	100	0.000	0.000	0.000
5.001	-	-	100	0.000	0.000	0.000
4.001	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.023	0.023	0.023
6.001	-	-	100	0.000	0.000	0.000
7.000	User	-	100	0.013	0.013	0.013
6.002	-	-	100	0.000	0.000	0.000
4.002	-	-	100	0.000	0.000	0.000
8.000	User	-	100	0.030	0.030	0.030
	User	-	100	0.011	0.011	0.042
8.001	-	-	100	0.000	0.000	0.000
4.003	User	-	100	0.015	0.015	0.015
4.004	-	-	100	0.000	0.000	0.000
4.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.116	0.116	0.116



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Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
S4.000	S5	100	0.507	0.550	Unclassified				Junction
S5.000	S8	100	0.200	0.250	Unclassified				Junction
S5.001	S10	100	0.200	0.507	Unclassified	600	0	0.200	Unclassified
S4.001	S4	225	0.465	0.507	Unclassified	600	0	0.507	Unclassified
S6.000	S7	225	0.275	0.425	Unclassified				Junction
S6.001	S5	150	0.350	0.450	Unclassified				Junction
S7.000	S4	150	0.425	0.500	Unclassified				Junction
S6.002	S8	150	0.438	0.450	Unclassified	600	0	0.450	Unclassified
S4.002	SCatchPit	225	0.525	0.651	Unclassified	600	0	0.525	Unclassified
S8.000	SP1	150	0.280	0.534	Unclassified	600	0	0.280	Unclassified
S8.001	SCatchpit	150	0.534	0.672	Unclassified	600	0	0.534	Unclassified
S4.003	SG1	150	0.850	0.862	Unclassified	1200	0	0.850	Unclassified
S4.004	S11	150	0.945	1.001	Unclassified	900	0	0.945	Unclassified
S4.005	SExisting MH	150	1.150	1.187	Unclassified	900	650	1.150	Unclassified

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
S4.005	SDischarge to UU	45.400	44.063	0.000	375	0

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Unit 6, Crane Mews 32 Gould Road, Twickenham London, TW2 6RS		
Date 23/06/2023 11:05 File 63 KNOWSLEY STREET_V2.MDX	Designed by matthewa Checked by	
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Simulation Criteria for Storm Volumetric Runoff Coeff 0.750 Manhole Headloss Coeff (Global) 0.500 Inlet Coeffiecient 0.800 Areal Reduction Factor 1.000 Foul Sewage per hectare (l/s) 0.000 Flow per Person per Day (l/per/day) 0.000 Hot Start (mins) 0 Additional Flow - % of Total Flow 0.000 Run Time (mins) 60 Hot Start Level (mm) 0 MADD Factor * 10m³/ha Storage 2.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0 Synthetic Rainfall Details Rainfall Model FSR M5-60 (mm) 18.200 Cv (Summer) 0.750 Return Period (years) 100 Ratio R 0.358 Cv (Winter) 0.840 Region England and Wales Profile Type Summer Storm Duration (mins) 30		
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Unit 6, Crane Mews 32 Gould Road, Twickenham London, TW2 6RS																				
Date 23/06/2023 11:05 File 63 KNOWSLEY STREET_V2.MDX	Designed by matthewa Checked by																			
Innovyze	Network 2020.1																			
Storage Structures for Storm Porous Car Park Manhole: SP1, DS/PN: S8.000 Infiltration Coefficient Base (m/hr) 0.00000Width (m) 5.0 Membrane Percolation (mm/hr) 1000Length (m) 27.0 Max Percolation (l/s) 37.5Slope (1:X) 0.0 Safety Factor 2.0Depression Storage (mm) 5 Porosity 0.30Evaporation (mm/day) 3 Invert Level (m) 44.920Cap Volume Depth (m) 0.300 Cellular Storage Manhole: SG1, DS/PN: S4.003 Invert Level (m) 44.500Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>100.0</td><td>100.0</td><td>0.400</td><td>100.0</td><td>116.0</td><td>0.401</td><td>0.0</td><td>116.0</td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	100.0	100.0	0.400	100.0	116.0	0.401	0.0	116.0
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Manhole Headloss for Storm <table><thead><tr><th>PN</th><th>US/MH Name</th><th>US/MH Headloss</th></tr></thead><tbody><tr><td>S4.000</td><td>S5</td><td>0.000</td></tr><tr><td>S5.000</td><td>S8</td><td>0.000</td></tr><tr><td>S5.001</td><td>S10</td><td>0.500</td></tr><tr><td>S4.001</td><td>S4</td><td>0.500</td></tr><tr><td>S6.000</td><td>S7</td><td>0.000</td></tr><tr><td>S6.001</td><td>S5</td><td>0.000</td></tr><tr><td>S7.000</td><td>S4</td><td>0.000</td></tr><tr><td>S6.002</td><td>S8</td><td>0.500</td></tr><tr><td>S4.002</td><td>SCatchPit</td><td>0.500</td></tr><tr><td>S8.000</td><td>SP1</td><td>0.500</td></tr><tr><td>S8.001</td><td>SCatchpit</td><td>0.500</td></tr><tr><td>S4.003</td><td>SG1</td><td>0.500</td></tr><tr><td>S4.004</td><td>S11</td><td>0.500</td></tr><tr><td>S4.005</td><td>SExisting MH</td><td>0.500</td></tr></tbody></table>			PN	US/MH Name	US/MH Headloss	S4.000	S5	0.000	S5.000	S8	0.000	S5.001	S10	0.500	S4.001	S4	0.500	S6.000	S7	0.000	S6.001	S5	0.000	S7.000	S4	0.000	S6.002	S8	0.500	S4.002	SCatchPit	0.500	S8.000	SP1	0.500	S8.001	SCatchpit	0.500	S4.003	SG1	0.500	S4.004	S11	0.500	S4.005	SExisting MH	0.500
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PN	US/MH Name	Level Not Exceeded	Modify Control	Modify Pipe Size	Max Pipe Diameter	No. Pipe Failures	Add Storage	No. Storage Failures	Use CASDef
S4.000	S5	45.650	No	No	450	0	No	0	No
S5.000	S8	45.650	Yes	No	150	0	Yes	0	Yes
S5.001	S10	45.500	Yes	No	150	0	Yes	0	Yes
S4.001	S4	45.550	Yes	No	525	0	Yes	0	Yes
S6.000	S7	45.650	No	No	350	0	No	0	No
S6.001	S5	45.450	Yes	No	350	0	Yes	0	Yes
S7.000	S4	45.650	No	No	425	0	No	0	No
S6.002	S8	45.500	Yes	No	425	0	Yes	0	Yes
S4.002	SCatchPit	45.450	Yes	No	600	0	Yes	0	Yes
S8.000	SP1	45.350	Yes	No	280	0	Yes	0	Yes
S8.001	SCatchpit	45.450	Yes	No	534	0	Yes	0	Yes
S4.003	SG1	45.500	Yes	No	850	0	Yes	0	Yes
S4.004	S11	45.495	Yes	No	945	0	Yes	0	Yes
S4.005	SExisting MH	45.490	Yes	No	1150	0	Yes	0	Yes

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Half Drain	Pipe	Status	Level Exceeded
			Time (mins)	Flow (l/s)		
S4.002	SCatchPit			11.0		OK
S8.000	SP1		13	13.4		OK
S8.001	SCatchpit			7.4		OK
S4.003	SG1		91	5.5	SURCHARGED	
S4.004	S11			5.0	SURCHARGED	
S4.005	SExisting MH			5.0		OK

14.9 Appendix 9 - United Utilities

14.9.1 Asset Map

STM Environmental Ltd**Unit 6
Crane Mews, 32 Gould Road,
Twickham,
TW2 6RS****FAO:****How to contact us:****United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP****Telephone: 0370 7510101****E-mail: propertysearches@uuplc.co.uk****Your Ref: 63 Knowsley
Our Ref: UUPS-ORD-250254
Date: 22/02/2021****Dear Sirs****Location: 63 Knowsley Street**

I acknowledge with thanks your request dated 12/02/2021 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. <http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,



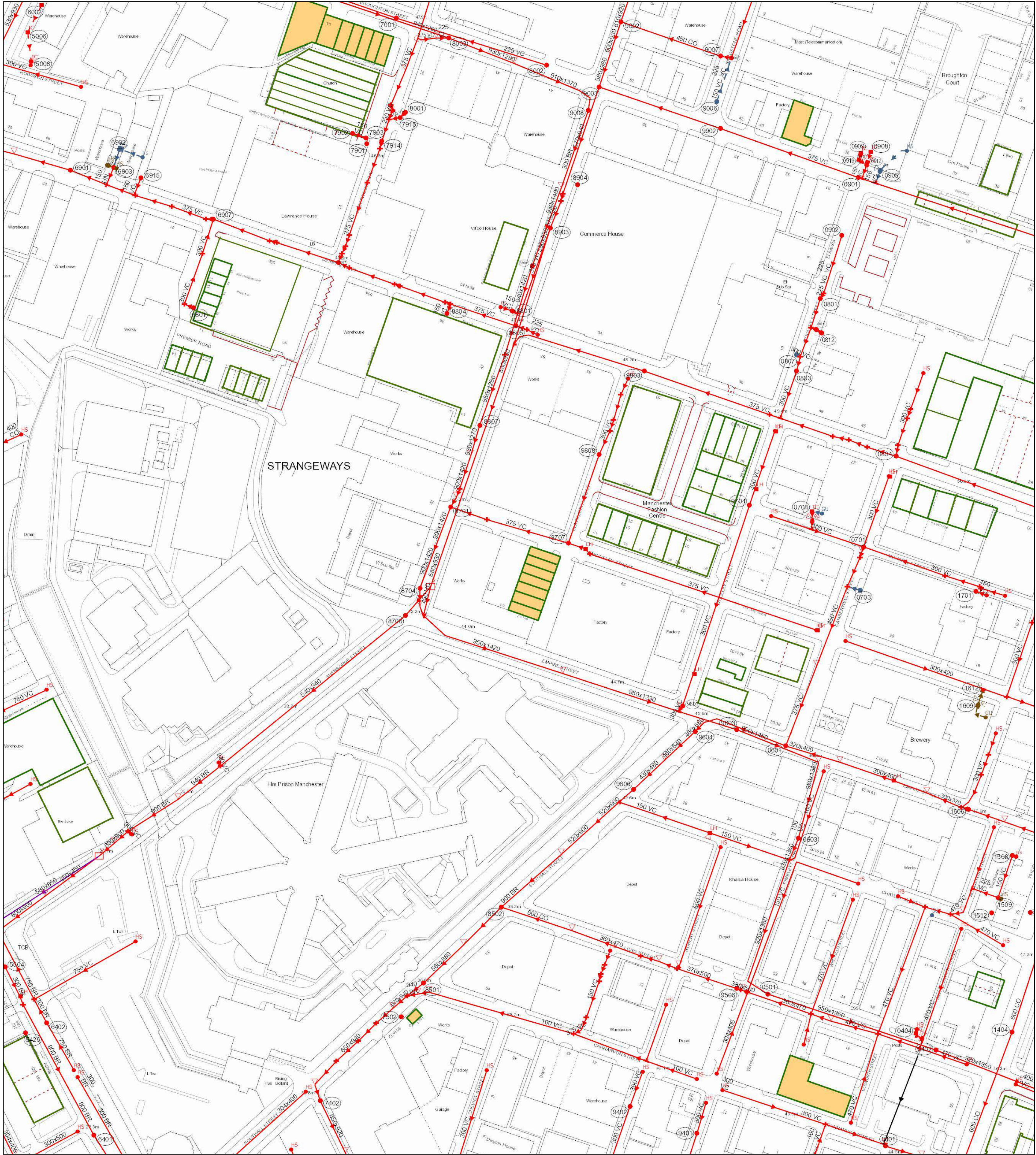
Karen McCormack
Property Searches Manager

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



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

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Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0811	49.67	CO	0	300			VC	3.162278	
0804	50.9	CO	0	47.4	375		VC	16.76305	
1404	46.61	CO	40.72	600			CO	85.44004	1 in 38
6907	42.41	CO	37.44	375			VC	4	
7001	47.71	CO	44.93	225			VC	67.6767	1 in 98
6401	28.13	CO	23.73	900			BR	52.15362	1 in 745
6903		CO		150			UN	10.27699	
6915		VC		10.28776			VC	10.28776	
6801	42.48	CO	0	300			VC	6.385165	
9902	50.49	CO	47.32	375			VC	70.83784	
8501	36.48	CO	31.57	300			BR	11.30175	1 in 112
0912		CO		150			VC	8.040379	
9008	50.2	CO	38.21	300			BR	45.54119	
5504	27.36	CO	24.01	300			BR	23.27371	
8907	46.1	CO	30.01	930			VC	17.72005	
8707	45.8	CO	42.4	375			VC	46.84015	
8001	47.18	CO	45.28	150			VC	4.24264	1 in 14
9402	41.75	CO	38.81	300			VC	118.596	1 in 47
0701	48.96	CO	44.49	375			VC	3.162278	
8704	43.45	CO	35.53	920			BR	10	
0807	49.39	SW	0	300			VC	2.236068	
8704	48.1	CO	44.33	300			VC	117.0043	1 in 43
7402	32.78	CO	29.37	650			BR	32.20248	1 in 66
8706	42.4	CO	38.15	540			BR	131.9029	
1608	47.98	CO	44.28	300			VC	4.123108	
0902	50.88	CO	46.05	225			VC	33.52611	
7907	46.61	41.2	375				VC	35.78514	
9803	48.25	CO	45.08	375			VC	77.15124	
8002	46.83	47.03	225				VC	88.97701	1 in 80
0803	49.42	CO	46.14	300			VC	27.51363	
9003	50.27	CO	46.83	570			BR	62.20707	
7914	46.79	CO	41.99	375			VC	4.123106	
0703	48.57	SW	0	450			VC	7.28011	
1509		CO		225			VC	15.28911	
8801			31.57	150			VC	3.42654	
8502	38.99	CO	31.57	900			BR	29.69848	1 in 93
9401	42.71	CO	39.38	300			VC	137.8768	
0901	43.98	CO	34.98	950			BR	58.03061	1 in 654
9002	50.61	CO	47.19	600			BR	18.97367	1 in 105
6901	38.11	CO	35.12	375			VC	32.28003	1 in 17
9808	47.06	CO	42.99	300			VC	51.88521	1 in 115
8805	47.43	CO	42.43	375			VC	37.94733	
6902		SW		150			PF	10.56117	
9007	50.87	CO	48.09	450			VC	58.18935	1 in 216
1508		CO		150			VC	24.88755	
9506	43.61	CO	39.34	370			VC	34.78505	
9603	45.74	CO	35.21	950			BR	48.49548	
0812		CO		150			VC	3.695551	
9803	48.67	CO	45.64	375			VC	57.24509	1 in 18
8005	50.82	CO	46.15	450			CO	6.082763	1 in 152
0901	51.58	CO	48.23	375			VC	80.65358	1 in 117
9402	45.05	CO	34.82	920			BR	96.59604	1 in 508
6402	27.69	CO	24.5	300			BR	14.74482	
9601	45.29	CO	36.54	225			VC	1.414214	
7915	47.23	CO	43.81	150			VC	6.082763	
8902	46.09	CO	36.08	940			BR	27.20294	
9604	45.01	CO	39.9	460			BR	23.34524	1 in 12
8701	45.1	CO	35.76	900			BR	48.10405	1 in 481
0801	46.61	CO	46.44	300			VC	16.76305	
0601	46.3	CO	41.83	320			VC	50.96193	
8003	45.27	CO	36.36	930			BR	38.52642	
0401	44.58	CO	39.72	320			VC	20.89061	
9006	50.66	SW	40.08	150			VC	12.54911	1 in 141
9606	42.96	CO	33.23	150			BR	53.81579	
7902		CO		520			VC	7.676768	
6903		CO	35.13	930			BR	13	
8903	45.67	CO	45.64	580			BR	208.8163	1 in 39

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6903		CO		150			UN	10.27699	
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6801	42.48	CO	0	300			VC	6.385165	
9902	50.49	CO	47.32	375			VC	70.83784	
8501	36.48	CO	31.57	300			BR	11.30175	1 in 112
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8502	38.99	CO	31.57	900			BR	29.69848	1 in 93
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0901	43.98	CO	34.98	950			BR	58.03061	1 in 654
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6901	38.11	CO	35.12	375			VC	32.28003	1 in 17
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6902		SW		150			PF	10.56117	
9007	50.87	CO	48.09	450			VC	58.18935	1 in 216
1508		CO		150			VC	24.88755	
9506	43.61	CO	39.34	370			VC	34.78505	
9603	45.74	CO	35.21	950			BR	48.49548	
0812		CO		150			VC	3.695551	
9803	48.67	CO	45.64	375			VC	57.24509	1 in 18
8005	50.82	CO	46.15	450			CO	6.082763	1 in 152
0901	51.58	CO	48.23	375			VC	80.65358	1 in 117
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7915	47.23	CO	43.81	150			VC	6.082763	
8902	46.09	CO	36.08	940			BR	27.20294	
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9606	42.96	CO	33.23	150			BR	53.81579	
7902		CO		520			VC	7.676768	
6903		CO	35.13	930			BR	13	
8903	45.67	CO	45.64	580			BR	208.8163	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
brown - foul
blue - surface water
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

OY Overflow

SEWER SHAPE

CI Circular

EG Egg

OV Oval

FT Flat Top

RE Rectangular

SG Square

TR Trapezoidal

AR Arch

BA Barrel

HO HorseShoe

UN Unspecified

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:
63 Knowsley Street,

Scale: 1:1250 Date: 22/02/2021

Sheet: 1 of 1

Printed by: Property Searches

14.9.2 Connection Agreement in Principle

From: [Perry, Graham](#)
To: [Matthew Ashdown](#)
Cc: [Wastewater Developer Services](#)
Subject: RE: PDE CA28 63 Knowsley Street M8 8HX UU Reference Number :4200045192
Date: 14 December 2021 21:57:07
Attachments: [image004.png](#)
[image006.png](#)
[image007.png](#)

Hello Matthew

I have reviewed your correspondence with Gary and can confirm that a connection to the combined sewer would be acceptable at a point convenient to your design. To minimise the attenuation required we would accept a discharge of 5 l/s but you must seek approval from the LLFA for this.

If you are proposing to install basements then you must ensure that any foul is pumped at lower levels to prevent surcharging in the existing sewer from entering your system.

Thanks

Graham Perry



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Visit: unitedutilities.com/wow

From: Matthew Ashdown [mailto:matthew@stmenviroinmental.co.uk]
Sent: 02 December 2021 13:40
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: PDE CA28 63 Knowsley Street M8 8HX UU Reference Number :4200045192

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Good afternoon,

I've been in discussion with the highways authorities regarding the use of their drainage assets.

They have stated that they would prefer the discharge is connected into the combined sewer

run, to ensure no overrun of the carriage during times when the highways system is unable to cope.

Is this an acceptable assessment to allow the a connection to be agreed in principle?

Kind regards

Kind regards,

Matthew Ashdown

Senior Environmental Consultant (BSc)



T: 0845 303 9434;

M: 07810 512 806;

E: matthew@stmenvironmental.co.uk

W: <http://www.stmenvironmental.co.uk/>

A: Unit 6, Crane Mews, 32, Gould Rd, Twickenham TW2 6RS

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or for the consequences of any actions taken on the basis of

the information provided, unless that information is subsequently confirmed in writing. If you are not the intended

recipient you are notified that disclosing, copying, distributing

or taking any action in reliance on the contents of this information is strictly prohibited.

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Sent: 24 November 2021 11:28

To: Matthew Ashdown <matthew@stmenvironmental.co.uk>

Cc: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Subject: Pre Development Enquiry for: PDE CA28 63 Knowsley Street M8 8HX UU Reference Number : 4200045192

Good Morning, Matthew

Pre Development Enquiry for: PDE CA28 63 Knowsley Street M8 8HX UU Reference Number : 4200045192

-

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 3723223 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 375mm diameter public combined sewer within Knowsley Street located to the North 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;**
- 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

Thank you for providing historic bore hole records indicating that the site would not be suitable to discharge surface water via soakaway. United Utilities accept that this would be unfeasible.

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 375mm diameter public combined sewer within Knowsley Street located North 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.

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 public 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.

-

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/larger-developments/wastewater/sewer-connections/>

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.

Kind regards,

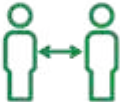
 Water for the North West	Gary Jaundrell Assistant Developer Engineer Developer Services & Metering Customer Services T: 07388 715 589 unitedutilities.com
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Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just 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

Coronavirus | Prevent the spread

 Wash your hands	 Disinfect common surfaces	 Practise social distancing	 FEVER + COUGH Stay home if you have symptoms
--	--	---	---

[Click for our message to customers](#)

From: Matthew Ashdown [<mailto:matthew@stmenvironmental.co.uk>]

Sent: 17 November 2021 11:57

To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Subject: Surface Water Pre-Application Capacity Check - 63 Knowsley Street (Part 2)

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Part 2.

From: Matthew Ashdown
Sent: 17 November 2021 11:35
To: WastewaterDeveloperServices@uuplc.co.uk
Subject: FW: Surface Water Pre-Application Capacity Check

Good afternoon,

I would like to raise a surface water capacity check into the United Utilities Combined sewer at the following site address:

63 Knowsley Street
Cheetham Hill
Manchester
M8 8HX

The proposal is to discharge all surface water into the combined sewer run into manhole asset ID – 8707 at a maximum rate of 1.2l/s.

Please see the following information attached:

STM Environmental - Surface Water Drainage Strategy - 63 Knowsley Street - FINAL V1.1_R.pdf - was(Split into 4 parts due to size)

SI Report.pdf

Signed -wastewater-pre-development-enquiry-2021-update-web-acc.pdf

Please let me know if further information is required.

For info regarding the required info; please see the table below.

Page numbers in the table below refer to the “STM Environmental - Surface Water Drainage Strategy - 63 Knowsley Street - FINAL V1.1_R.pdf”

• Site location plan including site boundary and road/street names	Yes – Page 15 / 33 - 35
• Preferred drainage outfall route(s) and point(s) of access etc.	Yes - 65 - 68
• Topographical survey	Yes - *LiDAR – Page 40
• Ground investigation report	Yes –SI Report
• Evidence of existing drainage connections and estimated rates of discharge (for Brownfield sites)	Yes – 21
• Full calculations to show pre-development surface water rates for Greenfield sites	Yes – 21

Kind regards,

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14.9.3 Existing Manhole



1300mm depth – Invert = 44.19mAOD