Osborne Yard, Manchester

Outline Drainage Strategy

Project No: 2006-06
August 2020
Rev: 00

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Revision	Description	Issued by	Date	Checked
00	Issued for RIBA Stage 3	N Powell	27.08.2020	H Gribbon

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1.0 INTRODUCTION

1.1 Purpose of this report

This Outline Surface Water Drainage Strategy has been prepared to support the planning application for the proposed development for Osborne Yard, Manchester.

The assessment includes: a summary of the site, an estimate of the existing and proposed surface water discharge rates, infiltration assessment, SUDs assessment, and outline drainage proposals and performance criteria.

This report should be read in conjunctions with the Flood Risk Assessment, renaissance, July 2020.

The proposal within this report are intended to demonstrate the feasibility of the overarching drainage strategy to support the planning proposal.

2.0 THE SITE

2.1 Site Location

The proposed development site is located off Oldham Rd, Manchester.
The site location is described below:

- Post Code M40 7PS
- OS X (Easting) 385590
- OS Y (Northing) 399569
- Nat. Grid SJ855995

The site location is illustrated in Figure 2.1 below.

Imagery ©2020 Google, Imagery ©2020 Infoterra Ltd & Bluesky

Figure 2.1: Site Location

2.2 Site Description

The site is circa 0.212 hectares and comprises of mainly a carwash facility which is surrounded by unused land.

The site is set within a mixed commercial and residential area. Helga Street borders the site along its north-eastern boundary and Oldham Road along its eastern side. There are retail and commercial units to the southwest and the Network Rail Collyhurst Compound runs at high level behind masonry retaining wall along the western side of the site.

The two buildings that border the site are one and two storeys, respectively. The first is a steel structure used as a garage for repairing vehicles and the second is a masonry building with retail units.

The site is mostly flat as can be seen from the topographical survey in Appendix A. There is extensive vegetation and trees to the north of the site. To the south of the car wash facility, the site has dense vegetation against the rear wall.

The overall site is not enclosed by a wall or fence; however, low level steel fences surround the car wash facility as a demarcation of space and offer no security. There are various entry points onto the site off Oldham Road.

2.3 Existing Site Drainage

The existing site is 60% impermeable with associated existing drainage. Based on the United Utility drawing (Appendix B) the existing foul and surface water from the site discharges to the United Utilities (UU) combined sewer along Oldham Road.

2.4 Geology

Made Ground: British Geological Survey does not indicate made ground, however based on the historical mapping and the development that has taken place, made ground deposits are highly likely to be present.

Although not indicated to be present on site, a large area of made ground is indicated to abut the site to the north-west. This is likely associated with the railway and storage yard.

Superficial Deposits: The site is indicated to be underlain by glacial till. This stratum typically comprises clay to sandy clay, unsorted, with gravels, cobbles and some boulders.

Solid Geology: The deeper solid geology underlying the superficial deposits is indicated to be part of the Pennine Upper Coal Measures which typically comprises mudstone, siltstone, sandstone and coal seams. An extract from the 1:50,000 scale BGS Geological Map Sheet 85 Manchester showing the location of the site.

The bedrock of the Pennine Upper Coal Measures Formation is indicated to dip at an angle of 15° towards the south-west. The closest dip measurement to the site as recorded on BGS mapping is an angle of 5° towards the south-west. However, as this dip is within the Collyhurst Sandstone Formation, which unconformably overlies the Pennine Upper Coal Measures, it is not considered to be representative of the solid geology underlying the site.

A number of coal seams are indicated to be present close to the site within the Pennine Upper Coal Measures Formation. In addition, there are seams present within a potentially influencing distance of the site which are recorded to have been worked by the Bradford Colliery.

2.5 Hydrology

The nearest watercourse to the site is the River Irk, which lies at a distance of 705m north-west of the site and flow direction is indicated to be from north to south.

There are no surface water features located within 250m.

The nearest Water Framework Directive (WFD) Surface Water Body is the River Medlock (Lumb Brook to Irwell), located 1086m SE, with a ‘good’ chemical rating and a ‘moderate’ ecological rating (2016).

There are no surface water abstractions within 2000m of the site.

The closest licenced discharged consent is historical, located 219m SE for sewer storm overflow into the River Irk. The closest active licenced discharge consent is located 418m NE and relates to sewer storm overflow into the River Irk.

Information obtained from the Environment Agency (EA) Risk of Flooding from Rivers and the Sea (RoFRaS) database indicates that the site is not at risk of flooding from rivers and sea.

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded. Data within the environmental searches, obtained from Ambiental Risk Analytics, indicate the maximum groundwater flooding risk at the site is low.

2.6 Proposed Development

The proposed development is for a residential end use comprising a 6-storey apartment block with up to 90 No. 1-3 bedroom apartments, with an area of landscaping at first floor level. Refer to Elevate Architects drawings submitted for planning for details.

The proposals are to work within the existing site levels where possible. The new building will typically have ground floor levels that approximately tie into existing external levels.

3.0 EXISTING & PROPOSED SURFACE WATER DISCHARGE RATES

3.1 Pre-Development Surface Water Run-Off Rates

The existing developed site area is 2,260m^2 (0.226 ha) and is considered 60% impermeable in its current condition. The brownfield areas consists of positively drained hard-standing and buildings with areas of vegetation throughout the other area of the site.

3.1.1 Existing Brownfield Run-Off Rates

To estimate the pre-development surface water discharge into the existing drainage system a mock network has been simulated in industry approved Micro Drainage Software (Appendix E) which is presented in the Table 3.1. The system is based on a single 225 dia connection to the existing surface water system. A critical 60 minute duration has been assumed to obtain the predevelopment rates.

A 50% betterment to brownfield run-off rates is proposed in line with Manchester, Salford & Trafford Strategic Flood Risk Assessment, March 2011 (SFRA). The pre-development run-off rates for the 1, 2, 30 and 100 year events are therefore: -

Return Period	$Q_{Brownfield}$ (l/s)	$Q_{50\% Brownfield}$ (l/s)
1 in 1 year	10.3	5.15
1 in 2 year	13.2	6.60
1 in 30 year	23.1	11.55
1 in 100 year	29.2	14.6

Table 3.1 – Brownfield Run-off Rates

3.1.2 Existing Greenfield Run-Off Rates

A remaining permeable area of 0.092 Ha (922.5m^2) is to be considered as greenfield run-off rates. The greenfield run-off rates for this portion of the development have been calculated using Microdrainage ICP SUDS method. The rates presented below are what would be typical of a site with an equivalent surface area which remains undeveloped / covered in grass or vegetation. A partly urbanised catchment ratio of 0.75, Qbar has a return period of 2.3 years.

The equivalent greenfield run-off rate is tabled below: -

Return Period	$Q_{Greenfield}$ (l/s)
1 in 1 year	1.1
1 in 2 year	1.3
1 in 30 year	1.9
1 in 100 year	2.0

Table 3.2 – Greenfield Run-off Rates

3.2 Proposed Surface Water Discharge Rates & Attenuation Requirements

Peak discharge rates will therefore be restricted to 50% of the pre-development brownfield run-off rate, plus greenfield run-off rates for the remaining area.

Restricting discharge rates to Greenfield run-off rates for the whole site is not considered practicable given the site constraints including; size of site, limitations on infiltration. However, practical measures in addition to the 50% reduction in pre-development discharge are presented below, including allowance for climate change in post-development rates and use of SUDs to reduce runoff.

The total proposed run-off rates for the development site has been presented in the table below.

Return Period	$Q_{50\% \text{ Brownfield}}$ (l/s)	$Q_{Greenfield}$ (l/s)	Q_{total} (l/s)
1 in 1 year	5.15	1.1	**6.3**
1 in 30 year	11.55	1.9	**13.5**
1 in 100 year	14.6	2.0	**16.6**

Table 3.3 – Proposed Surface Water Run-off Rates

The proposed development results in circa 2,260m^2 of building footprint or external hard landscaping.

The ground conditions are not ideal for the use of permeable systems, (refer to the Phase I Desk Top Assessment Report by renaissance dated August 2020). The site is indicated to be underlain with glacial till. This stratum typically comprises clay to sandy clay, unsorted gravels, cobbles and some boulders. This is overlain with made ground and therefore considered at this stage to be unsuitable for infiltration of surface water. This is to be further explored during future Phase II intrusive SI which will confirm the exact characteristics of the ground profile.

The post development discharge rates will include for an increase in the rainfall intensity of 40% to allow for climate change as is consistence with a design life of the development of 100 years, as outlined in NPPF.

To comply with the Non-Statutory Technical Standards for Sustainable Drainage: Practice Guidance the runoff volume for the post development 1 in 100 year 6 hour rainfall event will not exceed the pre-development runoff volume as the Brownfield runoff rates have been reduced by 50%. Elements of SUDs not considered within the new drainage strategy will aid in the reduction and time of concentration of the post development runoff volume.

The total allowable discharge from the site is 16.6 l/s.

A quick storage estimate for the 1 in 100 year storm event, plus 40% for climate change, using Micro Drainage, indicates that the total of circa 46-84m^3 of attenuation across the site is required to limit the peak surface water discharge to 50% of the pre-development brownfield plus greenfield, with the discharge limits as presented in Table 3.3.

Refer to Appendix B, Existing Site Permeable and Impermeable areas and Storage Volume Estimate summary, with micro-drainage outputs provided in Appendix E.

As the full footprint of the site will be occupied by the new development, at this stage, the provision of an attenuation tank has been considered. As the design progresses, it is possible that the podium deck and also the main flat roof can be considered as Blue roofs. The

provision of 50mm depth of surface water storage in both of these areas will provide the necessary volume required.

For the post-development discharge rates and volumes, the benefit of these SUDs techniques will be conservatively ignored at this stage and will be investigated further as the development is brought forward to detailed design and construction.

4.0 SURFACE WATER DISCHARGE & SUDS ASSESSMENT

4.1 Surface Water Discharge Assessment

In accordance with NPPF, the following hierarchy of surface water drainage options has been considered:

- Discharge into the ground (infiltration);
- Discharge to a surface water body;
- Discharge to a surface water sewer, highway drain, or another drainage system;
- Discharge to a combined sewer.

Infiltration direct to the ground has been considered, however, due to anticipated areas of made ground and clay content it may not be feasible to dispose of surface water from the development through infiltration.

Opportunities for discharge to watercourse have been considered. The nearest watercourse to the site is the River Irk, which lies at a distance of 705m north-west of the site and flow direction is indicated to be from north to south. There are no surface water features located within 250m, therefore, it is not viable to discharge to this watercourse due to its distance.

Surface water flows will be collected by a dedicated gravity system designed in accordance with BS EN 752 before discharging to a sewer network and into the public combined sewer within Oldham Road, subject to agreement under S106 of the water industry Act.

The surface water system will accommodate flows on-site up to and including the 1 in 100-year critical duration event, with an allowance for climate change. Surface water discharge rate from the site is to be restricted to 50% betterment of existing Brownfield run-off plus Greenfield run-off. Detailed calculations of onsite storage and discharge rates can be found in Appendix C - Existing Site Permeable Areas & Outline Attenuation Summary, and Appendix E, Micro Drainage Pre-Development Surface Water Run-off.

The surface water system will be collected on site, via various SUDs features and collected by a dedicated gravity system designed in accordance with BS EN 752 before discharging to the sewer network, subject to agreement under S106 of the water industry act.

Foul water flows will be collected by a dedicated gravity network designed in accordance with BS EN 752 before discharging to the existing combined sewer in Oldham Road, subject to agreement under Section 106 of the water industry Act.

4.2 Sustainable Urban Drainage

Table 4.1 below provides a summary of typical SUDs techniques outlined within CIRIA guide 753 SUDs manual. Based on a review of the suitability of the SUDs techniques it is proposed that the Osborne Yard development incorporated the following:

- Blue Roof roofs generally and at first floor level on the accessible deck over the parking area to reduce runoff rates, improve water quality and possibly provide amenity value.
- Provide a flow control and underground storage to limit runoff from the site to acceptable limits with the final arrangement to be developed as each phase of the development comes forward for detailed planning.

SUDs Technique	Description	Suitability for Development Site	
Soft Landscaping	Grassed areas that allow direct infiltration of rainwater	Not suitable due to no provision of grassed area.	×
Filter Drains	Granular filled Linear drains / soakaway with either granular fill and perforated pipe, or dense vegetation that treat runoff from adjacent impermeable areas	Not suitable due to ground conditions, contamination risk and proximity of buildings.	×
Swales	Shallow landscape channel that can infiltrate or convey runoff.	Not suitable due to ground conditions, contamination risk and proximity of buildings.	×
Infiltration Basins	Depressions in the ground designed to store and infiltration runoff to the ground. Can be landscaped to provide amenity value.	Not suitable due to ground conditions, contamination risk and proximity of buildings.	×
Wet Ponds	Basins with permanent pool of water providing water quality treatment, wildlife and amenity benefit. Designed to provide temporary storage for additional runoff.	Not suitable due to ground conditions, contamination risk and proximity of buildings.	×
Extended Detention Basins	Dry basins that are designed to temporarily store runoff providing water quality treatment.	Not suitable due to ground conditions, contamination risk and proximity of buildings.	×
Constructed Wetland	Ponds and shallow wetland areas with vegetation to improve pollution removal and enhance wildlife habitat.	Not suitable due to ground conditions, contamination risk and proximity of buildings.	×
Porous Paving	Granular build-up beneath permeable paving systems that can be used to either store runoff (lined system) and increase time of concentration or allow percolation into the ground.	Not suitable due to extent and nature of development	×
Trees Pits	Managed permeable paving systems around tree pits that can be used to either store runoff (lined system) and increase time of concentration or allow percolation into the ground.	Not suitable due to no provision of trees with pits	×
Soakaways	Infiltration device to temporarily store runoff and allow it to percolate into the ground.	Not suitable due to ground conditions and contamination risk.	×
Green Roof	**Vegetated roof area that reduce runoff and increase time of concentration.**	**Suitable to the roof area, subject to design development.**	✓
Blue Roof	**Roof area designed to store and reduce peak runoff rates during intense storms.**	**Suitable to the roof area.**	✓
Underground Storage	**Attenuation structures installed below ground to provide runoff storage.**	**Suitable beneath car park area at ground floor**	✓

× Not suitable ? Potentially suitable subject to further investigation ✓ Suitable

Table 4.1 – SUDs Techniques & Suitability for Development Site

4.3 Water Quality Assessment

The drainage from the site is from the roof to the buildings and a very small area of public / private space, which is restricted to pedestrian use only. Water quality is generally affected by frequent rainfall events, 1 in 1 year events or less, which is circa 5mm/hr for the proposed development site. To assess the water quality consideration will be given to the guidance with the National Standard for Sustainable Urban Drainage (NSSUD) and CIRIA Guide C753. The pollution hazard levels for difference land uses are presented in table 4.2 and are based on the definitions in the NSSUD and C753.

Pollution Hazard Level	Land Use
Very Low	Residential roofs
Low	Individual property driveways, non-residential roofs, residential car parks, low traffic roads, non-residential car parking with infrequent change (e.g. Schools, offices)
Medium	Commercial yards and delivery areas, non-residential car parking with frequent change (e.g. hospital, retail), minor roads
High	Site with heavy pollution (e.g. Haulage yards, lorry parks, waste sites, sites with chemical and fuels are delivered, handled, stored etc.)

Table 4.2 – Pollution Hazard Levels

As the car park area is to be used for residential parking access the Pollution Hazard Level is considered as very low to low with the primary consideration given to removal of gross solids and sediment.

The following tables indicate the minimum number of treatment stages required before surface runoff should reach the infiltration or receiving water body and are extracted from the NSSUD.

Pollution Hazard Level	Land Use	Low	Med	High
G1	Source Protection Zone 1, within 50m of a well, spring or borehole that supplies potable water.	1	3	Consult the EA
G2	Into or immediately adjacent to a sensitive receptor that could be influenced by infiltrated water. Includes designated nature conservation, heritage and landscape sites – including Biodiversity Action Plan (BAP) habitats and Protected Species.	1	3	
G3	Source Protection Zone II and III or Principal Aquifer	1	3	
G4	Secondary Aquifer	1	2	
G5	Unproductive strata	1	2	

Table 4.3 – Groundwater Minimum Treatment Stages

Pollution Hazard Level	Normal surface water	Sensitive surface water
Low	0	1
Med	2	3
High	Consult the EA	

Table 4.4 – Surface Water Body Minimum Treatment Stages

Surface water discharging by infiltration is considered not to be viable generally at this stage given the ground conditions as previously noted and this will be confirmed during the Phase II site investigations.

Discharge of surface water to the receiving public sewer requires no treatment stages due to the low pollution hazard level. However, the adoption of SUDS and good practice will provide inherent treatment. Areas of blue roofs dependant on detailing, will act to absorb most frequent rainfall events and filter out solids and sediment. Any roof areas not utilised as blue-roofs will past through silt traps prior to entering the attenuation tank and flow control device. Sumps will also be provided to gullies and channels within the ground floor areas prior to connecting to the silt traps. The silt traps and sumps will allow most of the sediment and solids to settle out under low flows, prior to discharging to the public sewer.

4.4 SUDS Management Plan

The adopted Sustainable Urban Drainage systems are to be maintained by the Building Management Company selected by the client. The building management company will be required to maintain the SUDs features in line with the following recommendations and suppliers' requirements of the various features. The management plan and selection of SUDs for each phase of development will be dealt within in more details as the detailed planning applications are progressed.

The following operation and maintenance requirements for the SUDs features incorporated into the development are to be adopted by the Building Management Company. These requirements are general and have been extracted from the CIRA Guide C753.

Table 12.5 - Operation and maintenance requirement for green roofs

(also applies to blue roofs)

Table 21.3 - Operation and maintenance requirement for attenuation storage tanks

The Main Contractor delivering each phase of development will update the general requirements to reflect the product specific requirements of the as installed proprietary SUDs and incorporate these into the Operation & Maintenance manual for the building.

TABLE 12.5 Operation and maintenance requirements for green roofs

Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (ie year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

5.0 OUTLINE DRAINAGE STRATEGY

5.1 Surface Water System

The surface water drainage is to collect the rainwater from the proposed building within a dedicated surface water network. The system is to then discharge under gravity to the combined sewer in Oldham Road subject to agreement under S106 of the water industry act. An outline drainage strategy is presented in Appendix D.

The surface water discharge from the site is to be limited 50% of the existing brownfield plus greenfield run-off rates using a flow control devise within the final manhole on site prior to discharge into the public sewer.

Attenuation will be provided using cellular storage beneath the car park area with the potential for a blue roof to be adopted over the car park and at the main roof level.

The surface water discharging from the site will be from the building roofs and a nominal amount of private pedestrian only accessible areas at grade only. To ensure water quality to the public sewer is acceptable all rainwater to the public realm area is to be collected in gullies and channels with sumps. In additional all rainwater from the building and at-grade private areas is to pass through silt trap manholes prior to discharging into the attenuation tank to allow silt to be intercepted and settle out under normal rainfall conditions.

The extent of the existing UU combined sewer drain in Oldham Road is to be surveyed to confirm connection levels for the new drainage from the development site. The new surface water drainage connection will be subject to a section 106 application.

The surface water drainage network is to be designed in accordance with Building Regulation Part H, BS EN 752 and 'Sewers for Adoption' 7th edition. In addition, the following requirements will also be adopted in accordance with the Non-Statutory Technical Standards for Sustainable Drainage: Practice Guidance and Salford City Councils SuDS requirements for new developments:

- No surcharging of drainage network for design storm of 1 in 2 years.
- As the site is relatively flat with limited opportunity for management to store flood at grade the below ground drainage system will be designed to ensure flooding does not occur on site for both the 1 in 30 year and 1 in 100 year rainfall events
- 1:100 year + 40% model reviewed, and flood routing plans prepared as part of details site design
- No flooding inside buildings in a 1 in 100 year plus climate change event.

Refer to Appendix E for Micro Drainage calculations showing pre-development discharge on which the proposed system has been based. surface water system will work for the 1, 2, 30 and 100 year return events with 40% climate change and free flow outfall, together with the 1 in 100 + CC Storm duration up to 6hr and 40% climate change for the surcharge outfall with the 1 in 100 year flood level.

5.2 Foul Water System

The foul water drainage from the apartments, plant areas, and washdown gullies will be collected by a dedicated gravity foul network. The system is to be connected to the existing UU combined sewer in Oldham Road, via a new connection.

The proposal is to connect to existing sewer via a saddle connection. At present, based on the details for the upstream UU MH6500, the invert at the connection point is assumed to be 53.70m AOD, allowing the new system to discharge via gravity.

The new foul water drainage connection will be subject to a section 106 application.

The drainage system is to be designed in accordance with Building Regulations Part H, BS EN 752 and 'sewers for adoption' 7th edition.

5.3 Exceedance Events

The levels to the site are relatively flat and in an exceedance event, safe egress can be provided directly from the building onto Oldham Road via the main entrance to the south west or directly from the townhouses which face onto Oldham Road.

5.4 Phasing & Surface Water Management During Construction

It is assumed that given the scale of the development that it will be delivered in a single phase.

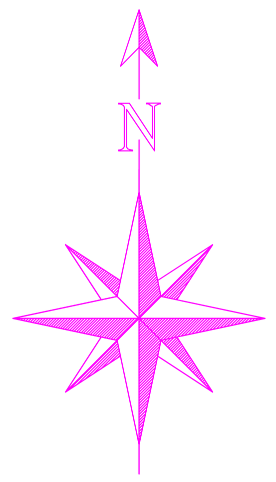
The management of surface water management during construction will be addressed by the Main Contractor as part of their 'Construction Management Plan'.

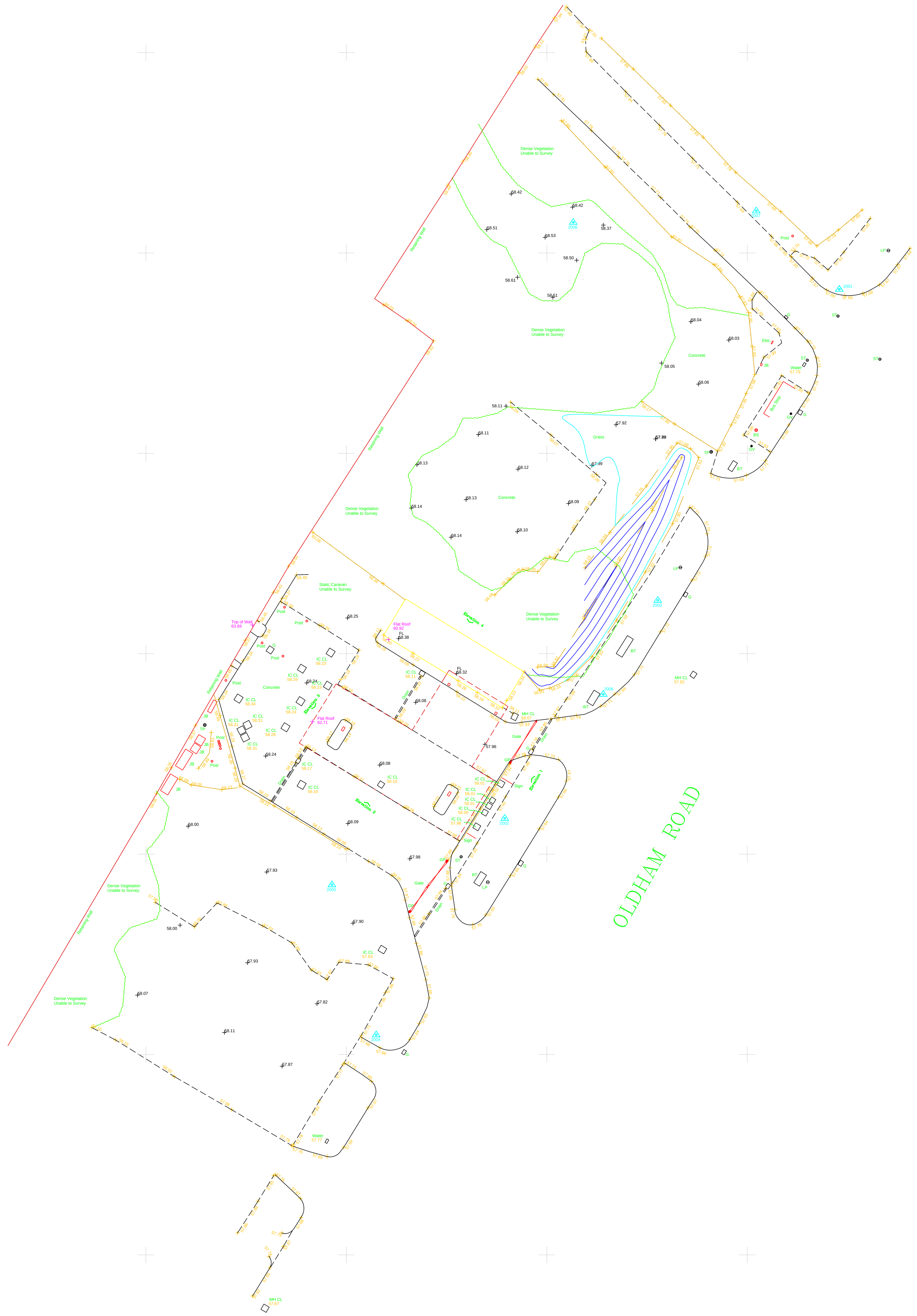
A brief overview of the key consideration relating to surface water management and flood risk that will need to be incorporated into the Main Contractors construction methodology include:

- The existing buildings on site are to be demolished. Stockpiling of material on site is to be minimised to ensure that the flood storage capacity for the 1 in 1000 year (0.1% AEP) event is not compromised.
- Due to the industrial history of the site it is anticipated that ground remediation may be required. A working platform will also be required during construction to allow for formation of piled foundations etc. The top of the working platform is to be located at or lower than existing site levels to ensure that the flood storage capacity for the 1 in 1000 year (0.1% AEP) event is not compromised.
- Subject to the level of contamination beneath the site, level of site remediation, and quality of working platform compaction to reduce infiltration, consideration should be given to the risk of residual contamination on site affecting groundwaters and the adjacent watercourse.
- The risk of spillage of diesel and other contamination risk during construction activities are to be assessed and measures implemented to ensure they do not cause a risk to groundwaters and the adjacent watercourse.

APPENDIX A

Topographical Survey





LEGEND

CONTROL STATIONS

MANHOLE — MH CL 31.20

BUSH

TREE

DROP KERB

EMBANKMENT — TOP BANK / BOTTOM BANK

OVERHEAD ELECTRICITY LINE

OVERHEAD TELEPHONE LINE

FOOTPATH

FENCE

HEDGE

FOLIAGE

DITCH

VERGE

EXISTING BUILDING

MAIN CONTOUR — 50.00

CONTOUR — 49.50

SW SEWER

FW SEWER

AV	Air Valve
BH	Borehole
BD	Bollard
BM	Bench Mark
BS	Bus Stop
BT	BT Inspection Chamber
BL	Bed Level
CATV	Cable TV Cover
CL	Cover Level
C/L	Chain Link Fence
CP	Catch Pit
CPS	Concrete Paving Slab
ECB	Electricity Control Box
EH	Building Eaves Level
ER	Earthing Rod
FB	Flower Bed
FH	Fire Hydrant
FL	Floor Level
GH	Greenhouse
GP	Gate Post
GR	Grate
GV	Gas Valve
G	Gully
IC	Inspection Chamber
IL	Invert Level
KO	Kerb Outlet
JB	Junction Box
LP	Lamp Post
MH	Man Hole
MK	Marker Post
MS	Mile Stone Marker
NP	Street Name Plate
O/H	Overhead
P	Post
PB	Post Box
PI	Pipe
PM	Parking Meter
P/R	Post & Rail Fence
P/W	Post & Wire Fence
PYL	Electricity Pylon
RE	Rodding Eye
RH	Building Ridge Level
RSJ	Reinforced Steel Joist
R/W	Retaining Wall
RWP	Rainwater Pipe
SPS	Stone Paving Slabs
SL	Soffit Level
SP	Sign Post
ST	Stop Tap
SV	Stop Valve
SY	Stay Wire
TC	Tactile Crossing
TOW	Top Of Wall Level
TH	Trial Hole
TL	Traffic Light
TP	Telegraph Pole
UTL	Unable To Lift
WM	Water Meter
WL	Water Level
VH	Building Valley Level

Disclaimer

Man Entry to sewers has not been undertaken. Depths, Pipesizes etc are measured from the ground. All sewers and inverts to be checked prior to any works commencing on site. Geomatic Surveys Limited are not resposible for manholes, services, information not surveyed which may have an impact on site development.

Boundaries shown are physical and may not represent legally conveyed ownership

Tree species have only been identified using basic identification techniques. For precise tree species identification, it is recommended that a qualified aboroculturist is used prior to tree removal.

REV	DATE	DESCRIPTION	BY	APP.

Sheet Layout

Sheet 1

Survey Information

The Survey has been orientated to Ordnance Survey National Grid and datum using one central control station. No Scale Factor has been applied to the coordinates meaning that the survey is arbitrary and not true Ordnance Survey Coordinates.

Geomatic Surveys Ltd

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Client

MPH ANCOATS LIMITED

Project Title

FORMER GARAGE SITE
OLDHAM ROAD
MANCHESTER

Drawing Title

TOPOGRAPHICAL SURVEY

Drawn	Checked	Surveyed Date
ML	IRH	11/03/2020
Date	**Scale**	**Sheet No.**
13/03/2020	1:200 @ A0	SHEET 1 OF 1
Drg. No.		**Rev**
02409/Topo		

SURVEY CONTROL STATIONS

STN	EASTING	NORTHING	HEIGHT
2001	385629.181	399616.377	57.741
2002	385595.807	399563.574	57.880
2003	385611.070	399585.332	57.841
2004	385582.979	399541.968	57.764
2005	385578.557	399556.948	57.904
2007	385620.900	399624.199	57.731
2008	385602.635	399623.057	58.471

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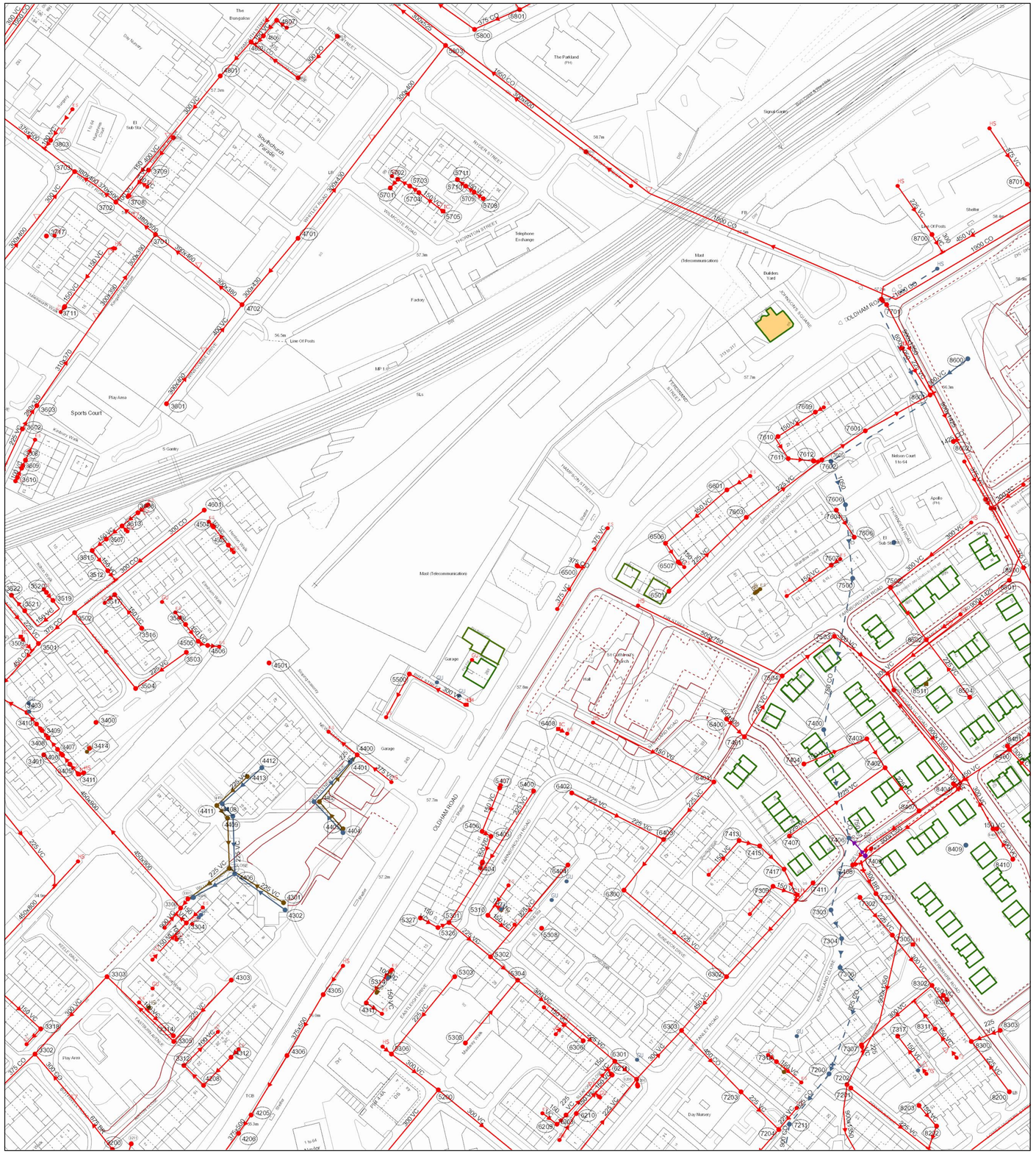
APPENDIX B

United Utilities Water Sewer Records



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

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
7302	52.62	CO	49.95	225			VC	27.65963	1 in 106
3304		CO		150			VC	7.571001	
7505	53.8	CO	46.08	900			BR	69.46236	1 in 1.66925966
4302	56.7	SW	54.9	225			VC	34.4093	1 in 51
7406	52.49	SW	48.49	825			CO	41.23106	
3803		CO		100			VC	5.894462	
4208		CO		100			VC	15.48903	
5200	55.48	CO	51.35	300			VC	63.25346	1 in 60
8406	54.83	CO	53.97	150			VC	2	1 in 1
3301	56.13	CO	53.53	225			VC	6.403124	
6500	57.75	CO	53.77	375			CO	3.162278	
8311		CO		150			VC	19.53619	
5310		CO		150			VC	19.68693	
7701	56.75	CO	48.7	900			BR	55.47442	
7403	53.1	CO	50.7	225			VC	18.86796	1 in 118
8504	54.03	CO	52.53	225			VC	40	1 in 43
5303	56.2	CO	54.44	225			VC	55.44366	1 in 94
6506		CO		150			VC	12.41613	
3802		CO		150			VC	22.55512	
8602	56.07	CO	47.46	1425			CO	2.236068	
4504		CO		150			VC	3.735685	
4300	56.11	SW	53.53	300			VC	3.162278	
3602	56.26	CO	54.3	225			VC	8.062258	1 in 28
4303	55.77	CO	53.62	225			VC	46.69047	1 in 90
4506		CO		150			VC	6.323258	
7315		CO		150			VC	17.98458	
4802	57.04	CO	53.85	300			VC	25.4951	1 in 127
4205		CO	0	375			VC	12.20656	
7200	51.08	SW	48.31	825			CO	35.60899	
8407	53.13	CO	49.65	450			VC	35.22783	
7612		CO		150			VC	3.07154	
5704		CO		150			VC	6.274852	
8502	53.63	CO	51.43	300			VC	106.6811	
7400	54.12	SW	49.41	750			CO	61.61169	1 in 162
5302	55.33	CO	52.38	225			VC	19.84943	1 in 74
7306	51.92	SW	48.24	825			CO	61.91497	
3508		CO		150			VC	11.54142	
6200	53.29	CO	50.39	300			VC	36.79674	
4411	56.85	FO	54.39	225			VC	9.219544	1 in 154
5305	55.33	CO	53.75	225			VC	45.45327	1 in 65
6401	56.5	CO	0	225			VC	42.52058	
5702		CO		150			VC	6.448569	
3702	56.42	CO	50.77	370			VC	14.21267	1 in 102
3601	56.23	CO	53.22	300			CO	35	1 in 55
3503	56.43	CO	54.28	225			VC	34.4093	1 in 191
3610		CO		100			VC	5.654219	
3502	56.15	CO	53.55	375			CO	26.24881	1 in 80
7409	52.85	OV	49.42	450			VC	6.403124	1 in 21
3300	56.11	CO	52.05	450			BR	114.0219	1 in 35
4406	56.38	SW	54.22	300			VC	26.41969	1 in 38
4404	57.68	FO	55.28	225			VC	19.84943	1 in 68
8303	53.67	CO	0	225			VC	8.544003	
7701	56.75	CO		900			BR	29.08549	
4804	57.67	CO	54.89	300			CO	31.82766	
5304	55.48	CO	52.11	300			VC	34.82815	1 in 45
5306	55.89	CO	51.75	300			VC	32.80244	1 in 82
7303	52.56	SW	48.89	825			CO	17.08801	1 in 34
7503	53.99	CO	47.91	300			VC	36.61967	
4801	57.01	CO	53.58	300			VC	45.45327	1 in 33
8501	55.91	CO	46.64	900			BR	42.0119	1 in 1.03274098
6203		CO	0	225			VC	20.51828	
3507		CO		150			VC	10.15424	
6303		CO	0	450			CO	47.38143	
6507		CO		150			VC	4.630096	
3606		CO		150			VC	11.43174	
5703		CO		150			VC	7.620569	
3519		CO		150			VC	32.25584	
6501	57.19	CO	55.25	225			VC	59.4138	1 in 61
6402	57.85	CO	55.43	225			VC	57.24509	1 in 63
5500	57.38	CO	54.32	300			VC	27.29469	
7603	56.28	CO	53.16	225			VC	52.80151	1 in 64
3501	56.02	CO	53.16	450			CO	18.43916	1 in 13
8500	55.96	CO	52.47	375			VC	77.8203	
4803	57.7	CO	54.83	375			CO	32.80244	1 in 34
7602	55.17	CO	51.7	225			VC	28.84441	1 in 23
3703	56.4	CO	50.49	375			CO	65.00268	
4702	56.42	CO	51.94	300			VC	31.241	1 in 89
4402	57.37	FO	54.99	225			VC	33.42155	
4410	56.78	SW	54.86	225			VC	9.219544	1 in 307
3504	56.58	CO	54.01	300			CO	54.03703	1 in 139
7411	52.67	CO	50.36	225			VC	70.76723	
3200	54.11	CO	51.29	675			BR	34.20526	1 in 76
7202	51.06	CO	44.72	900			BR	51.36731	1 in 1.24075636
3520		CO		150			VC	5.737083	
4407	56.54	FO	54.03	225			VC	28.6007	1 in 57
8400	54.45	CO	50.5	450			VC	60.46781	1 in 73
8603	56.04	CO	53.31	375			CO	5.830952	1 in 20
4206		CO	0	375			VC	42.2019	
5803	58.45	CO	48.34	300			VC	61.22555	
3517		CO		150			VC	7.084855	
4701	56.8	CO	52.51	300			VC	48.27007	1 in 97
7201	51.14	CO	49.53	225			VC	71.02714	1 in 116
4806		CO		150			VC	6.99312	
6404	55	CO	52.17	225			VC	66.70632	
8700	57.52	CO	54.37	300			VC	11.6619	
3512		CO		150			VC	6.834999	
7405	52.69	CO	46.23	225			VC	12.80625	
4312		CO		100			VC	21.76589	
7405	52.69	CO	50.44	525			BR	5.09902	1 in 5
7211		SW		900			CO	48.6621	
5801	58.74	CO	53.9	375			CO	27.313	1 in 114
7606		SW		750			CO	41.19466	
7700	56.78	CO	52.42	450			VC	4.24264	1 in 1
7415		CO		150			VC	18.69432	
6301	53.43	CO	50.45	300			VC	15.6205	1 in 391
4601	56.53	CO	54.24	300			CO	91.83137	1 in 151
4400	57.72	CO	53.35	375			VC	20.61553	
4403	57.39	SW	55.45	225			VC	29.73214	1 in 69
3515		CO		150			VC	14.1575	
4701	56.8	CO	52.51	300			VC	67.80118	
4807		CO		150			VC	11.42461	
6400	55.9	CO	51.55	450			BR	7.071068	1 in 35
5314		CO		150			VC	19.33943	
3613		CO		150			VC	11.46134	
7413		CO		150			VC	11.87819	
8601	56.23	CO	48.86	225			VC	2.242978	
4401	57.67	SW	55.02	400			VC	5.656854	
7307	51.74	CO	49.01	225			VC	4.123106	
7502	54.22	CO	51.79	300			VC	35.22783	1 in 168
5406		CO		150			VC	5.564116	
8401	54.4	CO	52.31	150			VC	2.236068	1 in 75
6302		CO	0	450			VC	39.05125	
7304	52.3	SW	48.36	825			CO	16.03122	1 in 160
7204	52.24	CO	49	225			VC	31.89044	1 in 23
4503		CO		150			VC	13.14877	
7203	52.23	CO	49.69	225			VC	29.69848	
4505		CO		150			VC	6.183486	
3709		CO		150			VC	18.06807	
4305		CO	0	375			VC	39.44617	
7604	55.22	CO	50.11	225			VC	18.02776	
7401	55.89	CO	51.02	225			VC	39.96248	1 in 74
4405	55.23	SW	53.31	225			VC	23.34524	
3608		CO		100			VC	12.60632	
6306		CO		150			VC	28.62222	
6211		CO		150			VC	3.858939	
5405		CO		150			VC	15.11279	
8604	55.97	CO	53.02	375			VC	37.58989	1 in 70
3312		CO		100			VC	26.45841	
7609		CO		150			VC	24.868	
8701	58.61	CO	55.32	375			VC	9.433981	
6800	57.84	CO	51.06	300			VC	97.80082	1 in 57
4413	57.1	FO	54.64	225			VC	23.34524	1 in 93
7417		CO		150			VC	19.14707	
8600	57.19	SW	54.27	300			VC	26.40076	
7504	54.99	CO	50.23	300			CO	36.40055	1 in 42
3521		CO		150			VC	11.39656	
7402	53.06	CO	50.52	225			VC	30.61046	1 in 67
8405	54.38	CO	50.5	300			VC	31.76476	
4306		CO	0	375			CO	38.58756	
3609		CO		100			VC	4.902224	
4408	56.82	SW	54.83	225			VC	32.01562	1 in 52
6206		CO		100			VC	3.876579	
6403	56.31	CO	50.74	225			VC	35.60899	1 in 187
7309		CO		150			VC	13.8343	
4412	57.42	SW	55.25	225			VC	29.73214	1 in 76
4301	56.88	FO	54.5	225			VC	35.51056	1 in 76
7407	55.16	CO	51.39	225			VC	65.21503	1 in 78
3701	56.41	CO	51.16	380			VC	14.21267	1 in 95
7601	55.34	CO	50.43	225			VC	41.18252	1 in 26
5404		CO		150			VC	3.544027	
5800	58.69	CO	53.66	375			CO	46.61545	1 in 97
6209		CO		150			VC	7.21112	
7408	52.51	CO	46.27	225			VC	5.09902	
4311		CO		150			VC	10.40183	
8410	54.62	CO	50.74	300			VC	20.24846	1 in 88
4409	56.83	FO	54.33	225			VC	28.01785	1 in 93
6601		CO		150			VC	44.98351	
7301	52.35	CO	45.3	900			BR	116.505	1 in 2.98884088
8202		CO		150			VC	13.26296	
5407		CO		150			VC	26.12233	
7605		SW		1050				25.29822	
8404	53.75	CO	45.64	300			BR	4.24264	
3603	56.14	CO	53.69	310			VC	58.24946	1 in 48
3305	55.15	CO	53.1	225			VC	51.62364	
3516		CO		150			VC	23.91558	
7610		CO		150			VC	14.97616	
7404	54.14	CO	51.53	150			VC	37.69616	1 in 51
6300	55.27	CO	50.54	225			VC	74.51846	
7507		CO		150			VC	30.09967	
7500	54.86	SW	50.01	750			CO	85.51023	1 in 329
7611		CO		150			VC	14.03533	
3303		CO	0	300			VC	58.72819	
5327		CO		150			VC	11.23531	
6210		CO		150			VC	29.47141	
5708		CO		150			VC	6.138985	
5709		CO		150			VC	5.827429	
5326		CO		150			VC	6.818915	
3318		CO		150			VC	11.54413	
5301	57.09	CO	54	225			VC	29.83287	1 in 34
7305	52.68	CO	49.65	300			VC	35.60899	1 in 91
8302	53	CO	49.25	300			VC	51.08816	1 in 222
3302	53.87	CO	50.38	375			CO	67.17886	1 in 177
8301		CO		150			VC	2.112283	
5400	57.9	CO	55.25	225			VC	86.82166	1 in 130
8300	53.78	CO	50.44	300			VC	38.01316	1 in 86
5710		CO		150			VC	5.985626	
8200	53.73	CO	51.39	225			VC	35	1 in 113

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned | Foul | Surface Water | Combined

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

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

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

MANHOLE FUNCTION

- FO Foul
- SW Surface Water
- CO Combined
- OV Overflow

SEWER SHAPE

- CI Circular
- EG Egg
- OV Oval
- FT Flat Top
- RE Rectangular
- SQ 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:

TARIK HAND CARD WASH 271 OLDHAM ROAD,
MANCHESTER,
M40 7PS

Scale: 1:1250 **Date:** 03/08/2020

Sheet: 1 of 1

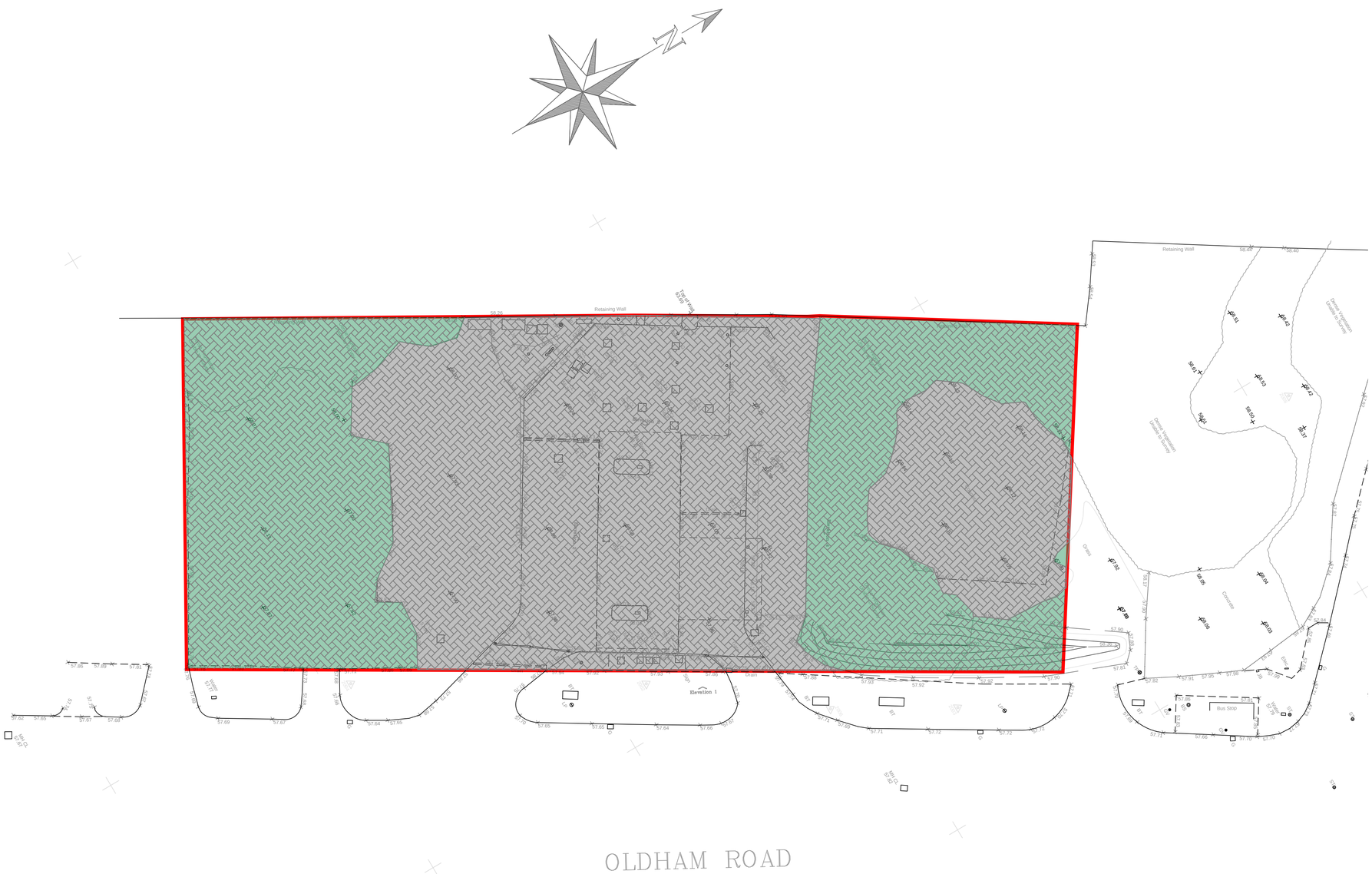
Printed by: Property Searches

SEWER RECORDS

United Utilities
helping life flow smoothly

APPENDIX C

Existing Site Permeable Areas & Outline Attenuation Summary



KEY

SITE BOUNDARY
TOTAL AREA: 2,260m² (0.226ha)

SOFT LANDSCAPED AREAS

AREA: 922.5m² (0.092ha)

HARD SURFACE AREAS

AREA: 1,337.5m² (0.134ha)

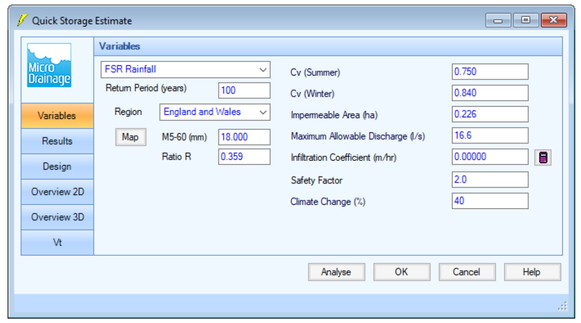
NOTES:

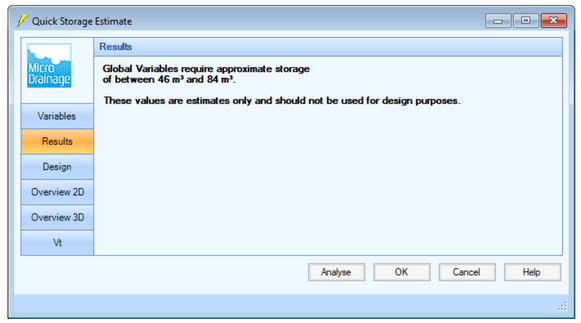
1. THIS DRAWING IS INTENDED TO INDICATE THE EXISTING DRAINED AREAS FROM THE DERWENT STREET SITE. IT IS BASED UPON A REVIEW OF THE TOPOGRPHICAL SURVEY AND AERIAL IMAGES OF THE SITE.
2. FOR TOPOGRPAHICAL SURVEY REFER TO GEOMATIC SUREVYS LTD DRAWING 02409/Topo DATED 13 MARCH 2020.
3. EXISTING DISCHARGE RATES GIVEN HAVE BEEN CALCULATED USING MICRODRAINAGE. GREENFIELD RUN-OFF RATES ARE BASED ON THE AREA OF SOFT LANDSCAPING AND BROWNFIELD RUN-OFF RATES ARE BASED ON THE HARD PAVED AREAS.

EXISTING & PROPOSED MAXIMUM DISCHARGE RATES

RAINFALL EVENT	GREENFIELD [1] $Q_{GREENFIELD}$	BROWNFIELD [2] $Q_{BROWNFIELD}$	TOTAL DISCHARGE [3] Q_{TOTAL}	PROPOSED DISCHARGE [4] $Q_{GREENFIELD}$ + 50% $Q_{BROWNFIELD}$
1 IN 1 YEAR	1.1 l/s	10.3 l/s	11.4 l/s	***6.3 l/s***
1 IN 2 YEAR	1.3 l/s	13.2 l/s	14.5 l/s	***7.9 l/s***
1 IN 30 YEAR	1.9 l/s	23.1 l/s	25.0 l/s	***13.5 l/s***
1 IN 100 YEAR	2.0 l/s	29.2 l/s	31.2 l/s	***16.6 l/s***

[1] GREENFIELD CALCULATIONS IN ACCORDANCE WITH ICP SUDS MEAN ANNUAL METHOD WITHIN MICRODRAINAGE
[2] BROWNFIELD RUN-OFF CALCULATED USING A 2 PIPE MODEL IN MICRODRAINAGE
[3] TOTAL DISCHARGE IS THE SUMMATION OF EXISTING GREENFIELD AND BROWNFIELD RUN-OFF RATES
[4] PROPOSED RUN-OFF IS BASED ON GREENFIELD +50% BROWNFIELD RUN-OFF ASS SITE IS LOCATED IN A CRITICAL DRAINAGE AREA





Rev:	Description:	Date:	By:	Chkd:
P01	FOR INFORMATION	24.08.20	NP	HG

renaissance
Renaissance Associates Ltd
Carvers Warehouse
77 Dale Street
Manchester
M1 2HG

Project:

OSBORNE YARD, MANCHESTER

Drawing Title:

EXISTING AREA AND DISCHARGE RATES

Status:

FOR INFORMATION

Size:	Date:	Drawn by:	Designed by:	Checked by:
A1	AUG 20	NP	NP	HG

Scale: 1:200 @ A1 | Project No: 2006-06

Project: Originator: Volume: Level: Type: Role: Category/Number: Rev:

OYM-REN-XX-XX-SK-C-00051-P01

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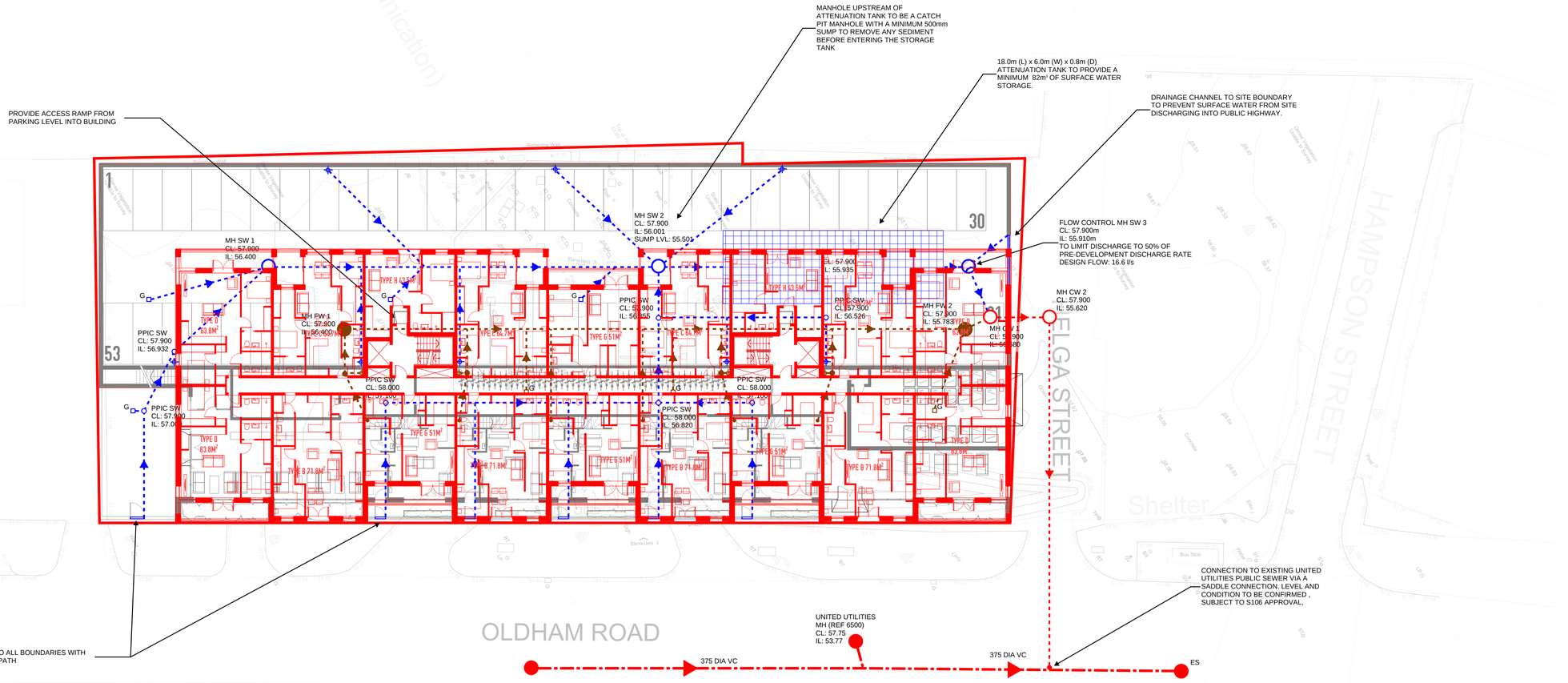
APPENDIX D

Outline Drainage Strategy



NOTES

1. DO NOT SCALE FROM THIS DRAWING. ANY AMBIGUITIES. OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS TO BE CHECKED/VERIFIED ON SITE.
2. FOR SETTING OUT OF RWPs AND SVPs LOCATIONS REFER TO CURRENT ARCHITECT DRAWINGS. FOR SETTING OUT OF EXTERNAL LEVELS AND DRAINAGE REFER TO LANDSCAPE ARCHITECT CURRENT DRAWINGS. FOR ABOVE GROUND DRAINAGE REFER TO M&E CURRENT DRAWINGS.
3. ALL ADOPTED DRAINAGE WORKS TO BE IN ACCORDANCE WITH THE LATEST EDITION OF 'SEWERS FOR ADOPTION', AND ' SEWERS FOR ADOPTION - A DESIGN AND CONSTRUCTION GUIDE - SMALL DEVELOPMENTS VERSION - SEPEMBER 2013' AND UNITED UTILITIES APPROVED DETAILS. IF DISCREPANCIES ARE NOTED BETWEEN THE UU, SIA AND RENAISSANCE DRAWINGS THESE SHOULD BE BROUGHT TO THE ATTENTION OF RENAISSANCE FOR REVIEW.
4. ALL NON-ADOPTED (PRIVATE) DRAINAGE WORKS TO BE IN ACCORDANCE WITH THE LATEST EDITION OF THE BUILDING REGULATIONS AND RENAISSANCE DETAILS.
5. DRAINAGE SIZES AND FALLS TO BE AS INDICATED, AND NOT LESS THAN THE FOLLOWING MINIMAL FALLS:
   FOUL
   1/80 FOR SVP WITH WC
   1/40 FOR SVP WITH NO WC
   SURFACE
   1/150 FOR 150 DIA PIPES
   1/100 FOR 100 DIA PIPES
6. ALL RWP GULLYS , CHANNEL DRAINS, TO BE TRAPPED AND WITH RODDABLE ACCESS.
7. ALL RWPs AND SVPs TO BE RODDABLE
8. ALLOW FOR 450 DIA PPICs TO PRIVATE AREAS U.N.O.
9. ALL PPIC COVERS TO BE GRADE B125 IN FOOTHPATHS/SOFT LANDSCAPING OR D400 IN TRAFFICKED AREAS
10. SEWERS TO BE LAID IN MAXIMUM 3m LENGTHS UNLESS THERE IS A SPECIFIC OPERATIONAL NEED TO LAY LONGER AND THIS IS AGREED BETWEEN THE CONTRACTOR AND THE PIPE SUPPLIER.
11. BEDDING AND BACKFILL MATERIAL TO CONFORM TO THE REQUIREMENTS OF THE WATER INDUSTRY SPECIFICATION 4-08092 (TABLE A2)
12. ALL CONCRETE PIPES TO BE TO BS EN 1916 CLASS 120 (54kN/m).
13. PLASTIC PIPIES SHOULD HAVE THE BSI KITEMARK AND CERTIFIED TO BS EN 13476-1 AND CONFORM WITH WIS 4-35-01 OR BS 13476-2. PIPES LESS THAN OR EQUAL TO 500 DIA SHALL HAVE A SHORT TERM RING STIFFNESS NOT LESS THAN 8kN/m2.
14. SULPHATE RESISTANT CEMENT (C20-DC2) AND PRECAST CONCRETE PRODUCTS MUST BE USED OR A LABORATORY REPORT PROVIDED DEMONSTRATING THAT SUCH PRECAUTIONS ARE NOT NECESSARY
15. SEWERS TO BE LAID IN CLASS 'S' BEDDING WHERE MINIMUM COVER REQUIREMENTS ARE MET. WHERE MINIMUM COVER DEPTHS CANNOT BE ACHIEVED THEN A 150mm CONCRETE PROTECTION SLAB SHOULD BE PROVIDED.
16. UNLESS NOTIFIED OTHERWISE CHANNEL DRAINS TO BE ACO M150D 0.0 OR SIMILAR APPROVED
17. THE CONTRACTOR IS TO UNDERTAKE A FULL CCTV SURVEY AT COMPLETION OF THE PROJECT TO DEMONSTRATE THAT THE DRAINAGE IS CLEAN. ANY DEFECTS ARE TO BE CORRECTED BY THE CONTRACTOR PRIOR TO HANDOVER OF THE SYSTEM TO THE CLIENT
18. THE DRAINAGE DESIGN ,LAYOUT AND DETAILS ARE ALL SUBJECT TO APPROVAL FROM:
    - MANCHESTER CITY COUNCIL
    - UNITED UTILITIES S106 APPLICATION

KEY

- SITE BOUNDARY
- EXISTING UNITED UTILITIES COMBINED SEWER
- PROPOSED COMBINED WATER DRAINAGE NETWORK
- PROPOSED SURFACE WATER DRAINAGE NETWORK
- PROPOSED SURFACE WATER DRAINAGE NETWORK
- LINEAR DRAIN
- SURFACE WATER GULLY
- FOUL WATER GULLY
- INDICATES RWP
- INDICATES SVP

LANDSCAPING AND PLANTING OF TREES/BUSHES/SHRUBS

THE LANDSCAPE ARCHITECT IS TO ENSURE THAT THE PLANTING PROPOSALS DO NOT IMPACT ON THE DRAINS AND SEWERS. REFER TO EXTRACT FROM SEWERS FOR ADOPTION WITH REQUIREMENTS.

A sewer or lateral drain should not be located closer to trees/bushes/shrubs than the canopy width at mature height, except where special protection measures are provided, in accordance with Clause B5.5. A tree should not be planted directly over sewers or where excavation onto the sewer would require removal of the tree. The following shallow rooting shrubs are generally suitable for planting close to sewers and lateral drains:

- *Berberis candidula*; (Paleleaf barberry)
- *Berberis julianae;* (Wintergreen barberry)
- *Ceanothus burkwoodii;* (Californian lilac 'Burkwoodii')
- *Cotoneaster dammeri;* (Bearberry cotoneaster)
- *Cotoneaster skogholm; (Cotoneaster* x s*uecicus, 'Skogholm')*
- *Cytisus varieties or Sarothamnus;* ((Common or Scotch) Broom)
- *Euonymus japonica;* (Japanese spindle)
- *Euonymus radicans;* Variety of *Euonymus* (Fortune's spindle or wintercreeper*)*
- *Mahonia varieties;* can be included in the genus *Berberis,* most common name is *M. aquifolium* (Oregon grape)
- *Potentilla varieties;* most varieties are types of cinquefoil. Also includes Common tormentil, silverweed and barren strawberry
- *Skimmia japonica;* (Skimmia)
- *Spiraea japonica;* (Japanese spirea or Japanese meadowsweet)
- *Veronica varieties;* (Speedwell)
- *Viburnum davidii;* (David viburnum)
- *Viburnum tinus;* (Lauristinus)

Rev:	Description:	Date:	By:	Chkd:
P01	FOR INFORMATION	26.08.20	JB	HG

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Renaissance Associates Ltd
Carvers Warehouse
77 Dale Street
Manchester
M1 2HG

Project:

OSBORNE YARD, MANCHESTER

Drawing Title:

BELOW GROUND DRAINAGE GENERAL ARRANGEMENT

Status:

FOR INFORMATION

Size:	Date:	Drawn by:	Designed by:	Checked by:
A1	AUG 20	JB	HG	HG

Scale: 1:100@A1 Project No: 2005-02

Project:	Originator:	Volume:	Level:	Type:	Role:	Category/Number:	Rev:
OYM	REN	XX	XX	DR	C	00100	P01

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APPENDIX E

Micro Drainage Pre-Development Surface Water Run-Off

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	SAAR (mm)	860	Urban	0.750
Area (ha)	0.092	Soil	0.450	Region Number	Region 10

Results	**l/s**
QBAR Rural	0.5
QBAR Urban	1.3
Q2 years	1.3
Q1 year	1.1
Q30 years	1.9
Q100 years	2.0

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.359	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)	1.200
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

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.099	4-8	0.035

Total Area Contributing (ha) = 0.134

Total Pipe Volume (m³) = 0.353

Network Design Table for Storm

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
1.000	10.000	0.125	80.0	0.134	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	10.000	0.125	80.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

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)
1.000	50.00	5.15	57.100	0.134	0.0	0.0	0.0	1.12	19.9	18.1
1.001	50.00	5.30	56.975	0.134	0.0	0.0	0.0	1.12	19.9	18.1

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.134	0.134	0.134
1.001	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.134	0.134	0.134

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)
1.001		58.000	56.850	0.000	0	0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.359		

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1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.359
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 60
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Summer	1	+0%	30/60 Summer				57.184
1.001	2	60 Summer	1	+0%	30/60 Summer				57.059

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.066	0.000	0.58			10.3	OK	
1.001	2	-0.066	0.000	0.58			10.3	OK	

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2 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.359
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 60
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Summer	2	+0%	30/60 Summer				57.199
1.001	2	60 Summer	2	+0%	30/60 Summer				57.073

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.051	0.000	0.74			13.2	OK	
1.001	2	-0.052	0.000	0.74			13.2	OK	

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30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.359
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 60
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Summer	30	+0%	30/60 Summer				57.432
1.001	2	60 Summer	30	+0%	30/60 Summer				57.210

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.182	0.000	1.31			23.1	SURCHARGED	
1.001	2	0.085	0.000	1.29			22.9	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.359
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 60
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	60 Summer	100	+0%	30/60 Summer				57.695
1.001	2	60 Summer	100	+0%	30/60 Summer				57.339

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.445	0.000	1.64			29.0	SURCHARGED	
1.001	2	0.214	0.000	1.65			29.2	SURCHARGED	

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