

Goulden Street,
Manchester

Drainage Strategy Report

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Executive Summary

This report details the drainage strategy report for a proposed multi-storey residential development on a site at the junction on Goulden Street in the New Cross area of Manchester.

The proposed development is located on brownfield land and as such brownfield runoff rates will apply. Within the Manchester City, Salford City and Trafford Councils Strategic Flood Risk Assessment, it is stated there should be a 50% reduction in the surface water runoff from brownfield developments. This approach has been considered with existing and proposed discharge rates defined in this report. The underlying geology is anticipated to be clay, underlain by moderately to highly weathered sandstone. Based on the cohesive nature of the underlying geology and given that the building footprint covers the majority of development boundary leaving insufficient room for soakaways, soakaways are not considered to be a viable option.

There is an existing combined water sewer within Chadderton Street to the south east. The drainage strategy aims to connect surface water runoff from the development into this sewer at a reduced surface water run-off rate of 10.8 l/s. A pre-development enquiry has been submitted to United Utilities who have confirmed that surface water may discharge to the nearest combined water sewer provided that a 50% reduction in the rate of surface water runoff is achieved. This restricted discharge rate will generate surface water attenuation, which will be contained within geocellular storage crates, prior to connection to the United Utilities sewer network.

There is no residual flood risk from the development site to the surrounding district due to the reduction of existing storm water flow rates. Therefore, the development does not increase the risk of flooding to other adjacent neighbourhoods. Surface water for events up to the 1 in 100-year storm including an allowance for climate change will be retained in the drainage network below ground. Flood water from events beyond this will be contained within the development site and directed away from the building to the external courtyard area.

Foul water generated by the development will be discharged into the existing United Utilities combined sewer in Chadderton Street. The foul discharge does not present an increased flood risk to the surrounding district.

1.0 Introduction

- 1.1 Scott Hughes Design (SHD) has been appointed by Mulbury Homes Ltd to prepare this Drainage Strategy Report to support the full planning application for the erection of an 8-storey residential building comprising 73 residential units, with ground floor commercial use, as well as alterations to the retained perimeter wall and chimney including the introduction of a light box, disabled car parking, highways, landscaping and other associated works at Goulden Street, Manchester. The assessment has been undertaken in line with the 'National Planning Policy Framework' (NPPF) Technical Guidance on Flood Risk.
- 1.2 This report has been commissioned by Mulbury Homes Ltd and is specific to their interests in the development proposals for land on Goulden Street, New Cross, Manchester, as described by the Architectural plan in Appendix A.
- 1.3 Two separate full planning applications for two separate sites within the New Cross area of Manchester city centre are also to be submitted. The two additional sites are Bendix Street and Oldham Road. The planning applications are to be submitted concurrently and the sites are all being progressed by Mulbury Homes and it expected that they will be developed concurrently. This report relates to the Goulden Street site. The Report in relation to the Bendix Street site has been submitted separately in support of the relevant planning application.
- 1.4 The report has been commissioned to identify any drainage related issues associated with the proposed development and which are subsequently addressed within this report;
 - Determine the current surface water drainage regime and assess any potential increase in surface water runoff as a result of the proposed development.
 - Discuss Sustainable Drainage Systems (SuDS) as an option for reducing surface water flood risk.
 - Devise an appropriate outline surface water drainage strategy (including calculation where appropriate) to deal with any potential increase in surface water runoff and include for climate change.
 - Devise an appropriate outline foul water drainage strategy.
 - Consider the recommendations of the Manchester City, Salford City and Trafford Councils Strategic Flood Risk Assessment (SFRA).
 - Assess mitigation measures and off-site impacts and define any residual risks.

2.0 Development Description and Location

2.1 Site Location

The site is referenced in Table 1, and a site location map is provided in Appendix A.

Table 1: Site Referencing Information

Item	Brief Description
Site name	Goulden Street, Manchester
Site address and location	Goulden Street, Manchester, M4 5EJ
Council Area	Manchester City Council
Approximate Grid Reference	OS: 384690, 398853
General Locality	Located in the New Cross area of Manchester to the north east of the city centre.

2.2 Existing Site Description

- 2.2.1 The site is currently occupied by an industrial building which has been demolished except for its chimney and external walls.
- 2.2.2 The development site is located in an area of mixed commercial development and temporary car parking. The site is bounded by Cross Keys Street to the north west, the pedestrianised Bendix Street to the north east, Chadderton Street to the south east and Goulden Street to the south west.
- 2.2.3 Figure 1 (from Google Maps) below identifies the overall site location details.

Figure 1 - Site Location Plan



2.3 Development Proposals

- 2.3.1 As discussed in the earlier sections, the report is prepared to support a planning application for the erection of 8-storey residential building (Use Class C3) comprising 73 residential units, with ground floor commercial use (Classes A1, A2, A3, B1 and D1 (excluding Places of Worship)) (205 sqm); alterations to the retained perimeter wall and chimney including the introduction of a light box; disabled car parking, highways, landscaping and other associated works
- 2.3.2 The proposed development area is approximately 0.12ha.
- 2.3.3 The current outline Architectural Master Plan in Appendix A provides an indication of the proposals for the site.

3.0 Planning Policy and Consultation

3.1 Strategic Flood Risk Assessment (SFRA)

- 3.1.1 SFRA's assess the risk associated with all types of flooding and provide the information required to identify the amount of development permitted in an area; how drainage systems in the area should function and also how risks in vulnerable areas can be reduced and/or mitigated. The NPPF states that Regional Planning Bodies (RPB's) or Local Planning Authorities (LPA's) should prepare SFRA's in consultation with the EA.
- 3.2.2 In 2009 JBA Consulting were commissioned by Manchester City, Salford City and Trafford Councils to produce a Level 2 Hybrid SFRA. The final report was published in May 2011. The purpose of the SFRA is to assess and map all known sources of flood risk including fluvial, surface water, sewer, groundwater and all impounded water bodies, considering future climate change predictions.
- 3.2.3 A summary of the main elements from the SFRA associated with the development site is detailed below. The full report can be found on the Manchester City Council website.
- SFRA provides a detailed understanding of flood risks across the borough from all sources.
 - A 50% reduction in surface water runoff rates is recommended for brownfield sites up to a 1 in 100 year storm event, considering climate change.
 - For all sites, development proposals should look at opportunities to incorporate SuDS to attenuate surface water generated from sites.
 - Development should be designed so that there is no flooding to the development in a 1 in 30 year event and so that there is no property flooding in a 1 in 100 year storm event considering climate change event.
 - All proposed developments must ensure that foul and surface water are kept separate.

4.0 Outline Drainage Strategy

4.1 Existing Surface Water Runoff

4.1.1 The proposed residential development is situated on a site that is classified as brownfield.

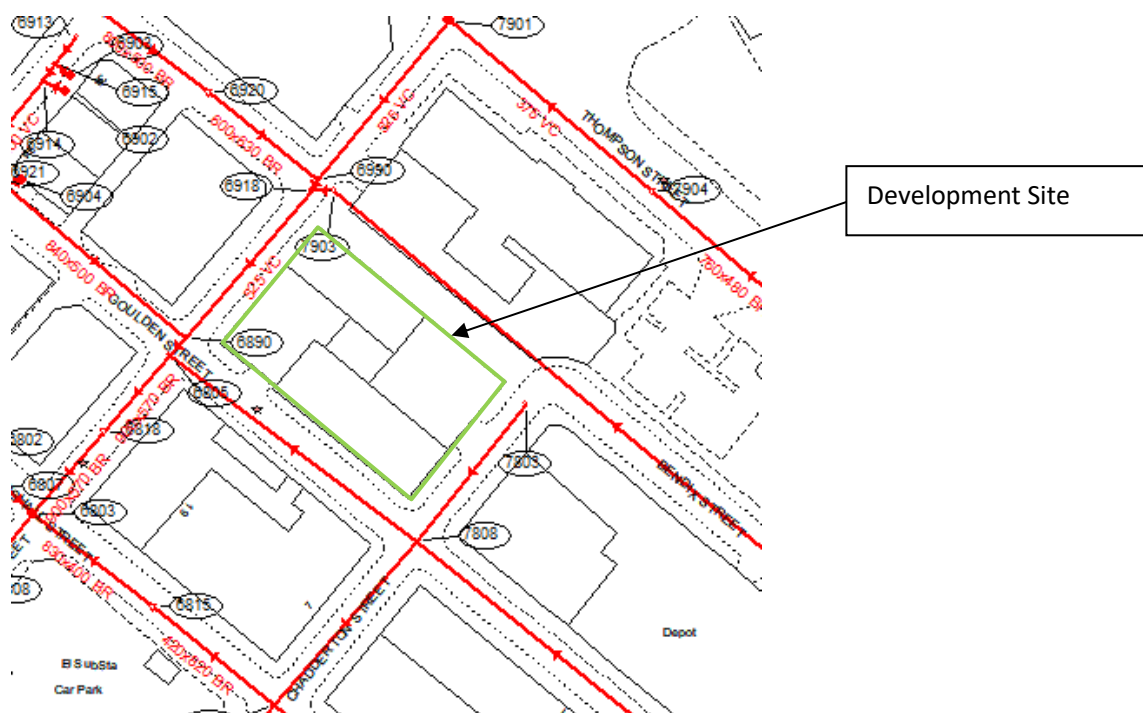
4.1.2 Table 2 below defines the existing brownfield discharge rates from the site.

Table 2 – Existing Runoff Rates

	Impermeable Area (m ²)	Existing Discharge Rate - (Imp Area x 65mm/hr) ÷ 3600	Allowable Discharge Rate (50% Reduction from Existing)
Goulden Street	1200	21.7 l/s	10.8 l/s

4.1.3 Figure 2 below shows an extract of the United Utilities sewer records for the area. There is a 420mm x 820mm brick combined water sewer running along Marshall Street from the south east to the north west, a combined sewer of unknown diameter running along Chadderton Street from the north east to the south west, a combined sewer of unknown diameter running along Goulden Street from the south east to the north west and a 900mm x 570mm brick combined sewer running along Cross Keys Street from the north east to the south west.

Figure 2 – Extract of United Utilities Sewer Record



4.2 Statutory Authority Correspondence

- 4.2.1 A predevelopment enquiry has been submitted to United Utilities, who have confirmed that foul water from the development may discharge to the nearest combined water sewer at an unrestricted rate. Surface water may drain to the nearby combined sewer network provided that existing connectivity can be proven and that a 50% reduction in run off is demonstrated, if infiltration is not a viable option. Refer to Appendix D for details of correspondence.

4.3 Geology

- 4.3.1 Historical boreholes carried out in the vicinity of the site have identified made ground at depths from 1.3mbgl to 2.9mbgl. The made ground was underlain by stiff to very stiff, high and very high strength clay to 18.6mbgl and below the clay very dense clayey gravelly sand to 21.0mbgl to 23.8mbgl was encountered. The solid geology beneath was found to be weak to moderately weak fine to medium grained moderately to highly weathered sandstone to depths of 28.0mbgl to 31.0mbgl.
- 4.3.2 The site is underlain by a Principal Aquifer. These are layers of permeable rock or drift deposits that have high inter-granular and/or fracture permeability meaning they usually provide a high level of water storage and may support water supply and/or river base flow on a strategic scale. The site does not lie within a Source Protection Zone
- 4.3.3 Based on the extent of the made ground and cohesive nature of the underlying geology, soakaways are not considered to be a potentially viable option.

4.4 Sustainable Drainage Systems

4.4.1 SuDS Objectives:

Sustainable drainage developed in line with the ideals of sustainable development is collectively referred to as Sustainable Drainage Systems (SuDS). At a particular site, these systems are designed both to manage the environmental risks resulting from the urban runoff and to contribute wherever possible to environmental enhancement. SuDS objectives are therefore to minimise the impacts from the development on the quantity and quality of the runoff and maximise amenity and biodiversity opportunities (CIRIA C753, 2015).

4.4.2 SuDS Design Themes

A strong design theme is essential if the maximum aesthetic benefits are to be gained from the SuDS approach. At a more local scale the SuDS should link with the individuals plot structure, planting, public open space requirements and amenity areas, gaining multiple benefits from a limited area of land.

4.4.3 The SuDS Management Train

The 'Management Train Approach' should be central to the surface water drainage strategy of the proposed site. The main objective is treatment and control of runoff as near to the source as possible protecting downstream habitats and further enhancing the amenity value of the site. This concept uses a hierarchy of drainage techniques to incrementally reduce pollution, flow rates and volumes of storm water discharge from the site, and is as follows:

1. **Prevention** – The use of good site design and housekeeping measures to prevent runoff and pollution and includes the use of rainwater reuse / harvesting.
2. **Source Controls** – Control of runoff at source or as close to source as possible (e.g. soakaways, green roofs, pervious pavements).
3. **Site Control** – Management of water in a local area and can include below ground storage / attenuation, detention basins, large infiltration devices.
4. **Regional Control** – Management of water from a site or various sites and can include wetlands and balancing ponds.

4.4.4 SuDS Site Constraints

SuDS techniques are suitable for all sites; therefore, an assessment of the existing site is required so that SuDS limitations can be determined.

- Land Use Characteristics: The size and type of the development plot restricts the range of source control and site control SuDS devices to potentially be considered both above and below ground.
- Site Characteristics: The anticipated made ground and cohesive nature of the underlying geology deem that infiltration techniques will not be suitable.
- Catchment Characteristics: The site is currently brownfield; the proposed runoff rate is a 50% reduction on the existing rate in accordance with the recommendations of the SFRA.
- Environmental and Amenity Performance: The inclusion of SuDS within the overall development is a key driver in providing both amenity and habitat creation. Safety to all future residents is paramount and so best practice guidance will be incorporated so that these devices blend into the surroundings without the need for significant safety precautions. Maintenance plans will be prepared for all SuDS devices that are included.

4.4.5 SuDS Methods

Tables 3 and 4, below, provide an assessment of various above and below ground SuDS methods that can provide water quality treatment and management of flows to reduce runoff rates and volumes and whether they can be suitably incorporated at this development site. The purpose of this assessment is to set out options to be considered at the planning stage with consideration to time constraints, viability and lifetime maintenance of the development.

Table 3: Surface SuDS Methods

Method	Comment	Suitability for Development
Green Roofs	Can be used on suitable low rise buildings to provide retention, attenuation and treatment of rainwater, and promotes evaporation and local biodiversity.	<u><i>Not suitable:</i></u> Architectural proposals for the development and maintenance issues deem this unsuitable.
Water Butts	Plastic tanks placed at the base of rainwater down pipes to collect rainwater runoff from the roof areas.	<u><i>Not Suitable:</i></u> All rainwater downpipes are located within the footprint of the building and so water butts are not feasible.
Rainwater Harvesting	Rainwater harvesting reduces the total runoff volume from the developed site and reduces treated water consumption.	<u><i>Not Suitable:</i></u> - Additional costs of installation would have severe effect on viability of the development. - Running and maintenance costs would not be acceptable to our client and future occupiers. - The ability to restrict peak flow rates and short-term peak volumes is non-existent where a critical storm event occurs.
Infiltration Options	Reduces total run off volume from the development.	<u><i>Not Suitable</i></u> Presence of made ground and cohesive nature of underlying geology deems that this is not a viable option. Proposal is for the building footprint to extend over the majority of the site with a small external courtyard leaving insufficient space for infiltration.

Method	Comment	Suitability for Development
Permeable Surfacing (Infiltration)	- Reduces total run off volume from the development. - Can be used to enhance water quality.	<u>Not Suitable</u> Presence of made ground and cohesive nature of underlying geology deems that this is not a viable option.
Permeable Surfacing (Standard)	- Can be used to enhance quality of runoff water. - Sub-base provides 'source' storage and reduces the volume of storage downstream. - The storage can be created with selection of the stone fill or use of plastic box stems. - Impermeable membrane at base of construction to prevent impact on pavement stability.	<u>Not Suitable</u> Presence of made ground and cohesive nature of underlying geology deems that this is not a viable option.
Swales, basins and ponds	- Provide areas for above ground surface runoff storage. - Swales also allow filtering of particulate matter, improving water quality	<u>Not suitable:</u> Proposal is for the building footprint to extend over the majority of the site with a small external courtyard leaving insufficient space.
Bio-Retention	Collect and retain run-off to help improve water quality, prior to discharge in piped system on infiltration.	<u>Not suitable:</u> Proposal is for the building footprint to extend over the majority of the site with a small external courtyard leaving insufficient space.

Table 4: Sub-Surface SuDS Methods

Method	Comment	Suitability for Development
Geocellular Storage	• Suitable for sites with insufficient space for basins etc. • Suitable for sites where topography prevents the use of open basins etc. • Can be very effective infiltration devices subject to ground conditions.	<u>Suitable:</u> • The use of geocellular attenuation may be possible to retain excess storm water.
Large Diameter Pipes, Culverts or Tanks	• Suitable for sites with insufficient space for basins etc. • Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. • Generally be suitable for adoption by the statutory water company (e.g. United Utilities).	<u>Suitable:</u> • The use of oversized pipes may be possible to retain excess storm water.

4.4.6 SuDS Hierarchal Approach

Based on the SuDS assessment in Tables 3 and 4, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in greater detail below:

Table 5: SuDS Hierarchal Approach

Method	Suitability	Suitability for Development
Infiltration to Ground	No	Underlying ground is anticipated to be made ground over clay. Furthermore, the building footprint extends up to site boundary leaving no available space to include soakaway pits at a minimum of 5m from the building
Connection to Watercourse	No	There are no watercourses or culverts in close proximity to the site.
Connection to Surface Water Sewer	No	There are no surface water sewers in close proximity to the development site
Connection to a Combined Sewer	Yes	The development site is surrounded by combined sewers

4.4.7 SuDS Design Philosophy

The SuDS assessment and hierarchal approach discussed in Tables 3, 4 and 5 above has defined the overall SuDS strategy. Thus, the SuDS philosophy for the development site is the promotion of Prevention, Source Control and Site Control techniques with discharge rates to reduce from the pre-development brownfield rates, to reduce the risk of both site and downstream flooding.

The following design philosophy is proposed:

- Surface water treatment using the 'Management Train' approach to remove and isolate contamination at all SuDS facilities prior to conveyance to the ground.
- Discharge into existing combined sewer in Chadderton Street.
- Site control in the form of geocellular storage crates with restricted outflow.

4.5 **Outline Surface Water Drainage Strategy**

4.5.1 The existing development site is made up of 100% impermeable roof and hard paved areas and as such is classed as brownfield.

4.5.2 The outline strategy is to direct all runoff into the existing combined water sewer in Chadderton Street via new surface water drainage runs. The surface water runoff will be restricted to the runoff rate of 10.8 l/s. In turn, this will generate surface water attenuation which will be contained in

geocellular storage crates, which will be connected into the existing combined water sewer within Chadderton Street.

- 4.5.3 Flooding can occur on a local scale beyond the 30-year criterion due to runoff exceeding the capacity of the minor system during extreme events and it can only be addressed on a site-specific basis. Sewers for Adoption (SfA) 7th Edition (WRc, 2006) states that developments should be protected against flooding from extreme events (1 in 30 year) and that flood pathways are identified when the drainage system is exceeded.
- 4.5.4 The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations Part H guidance, i.e. up to the 30-year storm return period criterion and tested for the 1 in 100 year return period including a 40% increase to account for climate change to confirm that there is no flood risk to the building.
- 4.5.5 In the case of this development, all surface water flows up to the 1 in 100 year event including an allowance for climate change will be retained below ground.
- 4.5.6 Table 6 below defines the post-development attenuation volumes associated with the site (further details can be found on Drawing GOU-3356-SHD-00-ZZ-DR-C-0100 – Drainage Strategy GA in Appendix B). The volumes identified below are preliminary for this outline assessment and are likely to alter at detailed design stage when more site-specific information is made available.

Table 6: Outline Attenuation Volumes

	Impermeable Area (m ²)	Allowable Discharge Rate (l/s)	1 in 30 year attenuation (m ³)	1 in 100 year attenuation + 40% Climate Change Allowance (m ³)
Goulden Street	1200	10.8	8	25

4.6 Pollution Control

- 4.6.1 Silt is to be prevented from entering the drainage system by the use of trapped gullies, channels with silt traps, French drains with silt traps or by the use of Sustainable Drainage techniques. If appropriate, oil separators in line with Pollution Prevention Guidance 3 (PPG 3) criteria will be provided (it is acknowledged that PPG 3 has been withdrawn, however as no replacement has been released it is still best practice guidance).

4.7 Foul Water Strategy

- 4.7.1 The outline foul water drainage strategy is to connect foul water into the existing Untied Utilities combined sewer in Chadderton Street.

5.0 Management Measures, Off Site Impacts and Residual Risk

5.1 Flood Risk Management Measures

- 5.1.1 The surface water drainage strategy will restrict surface water runoff to 10.8 l/s, prior to discharge into the existing combined sewer within Chadderton Street. The new surface water networks will be designed in line with current British Standard and Sewers for Adoption Guidance up to the 100-year storm return period including an allowance for climate change.
- 5.1.2 The use of SuDS in the form of Prevention and Site Control measures, with controlled (restricted) outflow, in line with the required reduction in runoff rates, will help to minimise the flood risk impact to the surrounding sewer networks.
- 5.1.3 There will be a site management health and safety document prepared in respect of the final development. This will include the required maintenance regime for the on-site drains and drainage facilities such as the channels, gullies, pipes, manholes and all SUDS facilities.
- 5.1.4 The respective site users will be responsible for site cleanliness, gully emptying and drain cleansing to ensure that the surface water drainage system will always operate at its maximum efficiency.
- 5.1.5 Should any flooding occur from the new drains it will be directed away from the residential units to the car parking area.

5.2 Off Site Impacts

- 5.2.1 Up to and including the 100-year plus increase in rainfall allowance due to climate change (CC) event, the report has justified that there is no risk of flooding.
- 5.2.2 Surface water runoff reduces from the pre-development regime and utilises SuDS solutions to satisfy the site constraints. As all surface water will be discharged on site there will be no impact on the surrounding drainage network.
- 5.2.3 As there is no flood displacement or increased rate of runoff as part of this proposal into the adjacent sewers, the proposed development will therefore not increase flood risk onto its locality.

5.3 Residual Risk

- 5.3.1 With careful design of the drainage elements as described above there will be no residual flood-related risks that will remain after the development has been completed.
- 5.3.2 Flood risk to people and property can be managed but it can never be completely removed; a residual risk remains after flood management or mitigation measures have been put in place. The only known flood related risk that will remain will be the risk of out of manhole flooding within both the existing private and public sewer network beyond the 30-year design criterion. Should exceedance occur, out of chamber flood water will be directed to the external courtyard area and will not be a flood risk generator to the building.

Appendix A – Architectural Site Layout

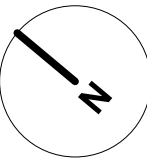


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Rev	Description	Date
P2	Planning Submission	30.09.19



Client
Mulbury City

Project
Goulden Street

Title
Site Plan

Status
Planning

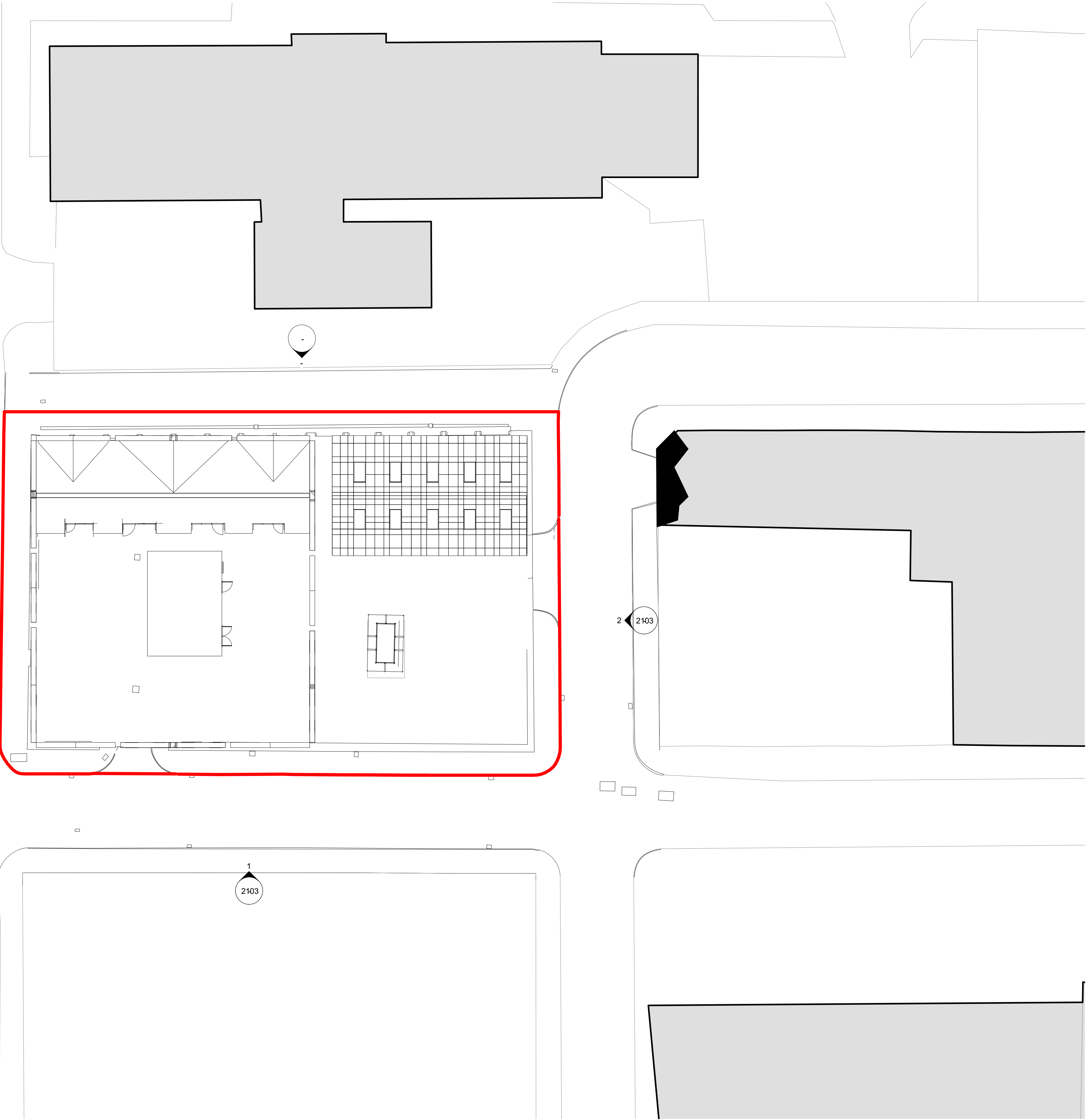
Project number	Date
0321	08/24/18

Drawn by	Checked by
Author	Checker

Scale	Revision
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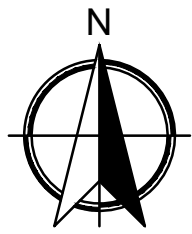
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0321-TGA-XX-00-DR-A-0201

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Appendix B – Outline Drainage Layout



SURFACE WATER DRAINAGE

CONSIDERATION HAS BEEN GIVEN TO THE HIERARCHY OF DRAINAGE OPTIONS FOR THE SITE AS FOLLOWS:

1. DISCHARGE INTO GROUND - LIMITED EXTERNAL AREA LEAVING INSUFFICIENT SPACE AND GROUND CONDITIONS UNSUITABLE
2. DISCHARGE TO SURFACE WATER BODY - THERE ARE NO NEARBY WATERCOURSES
3. DISCHARGE TO SURFACE WATER SEWER - THERE ARE NO NEARBY SURFACE WATER SEWERS
4. CONNECTION TO COMBINED SEWER - THE PROPOSAL AT THIS TIME IS TO DISCHARGE SURFACE WATER FROM THE DEVELOPMENT INTO THE EXISTING COMBINED SEWER IN CHADDERTON STREET AT A RESTRICTED RATE OF 10.8l/s AS AGREED WITH UNITED UTILITIES

FOUL WATER DRAINAGE

FOUL WATER GENERATED BY THE SITE WILL DISCHARGE INTO THE EXISTING COMBINED WATER SEWER IN CHADDERTON STREET

GENERAL NOTES

1. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.
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DRAINAGE KEY

- EXISTING CW DRAIN
- EXISTING CW MANHOLE
- PROPOSED CW DRAIN
- PROPOSED CW MANHOLE
- PROPOSED FW DRAIN
- PROPOSED FW MANHOLE
- PROPOSED SW DRAIN
- PROPOSED SW MANHOLE
- SITE BOUNDARY

P2	19.11.19	EJD	PG	GF LAYOUT UPDATED
P1	07.09.18	JS	PG	PRELIMINARY ISSUE
No	DATE	DRAWN	REV'D ENG.	AMENDMENT

STATUS	PURPOSE OF ISSUE
S2	FOR INFORMATION

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CLIENT	MULBURY HOMES Ltd		
PROJECT	GOULDEN STREET, NEW CROSS, MANCHESTER		
DRAFTER	JS	ENGINEER	PG
TITLE	DRAINAGE STRATEGY GA		
SCALE	1:200	SHEET	A1
DRAWING No	GOU-SHD-00-ZZ-DR-C-0100		REV
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Appendix C – Outline Surface Water Attenuation Calculations

Scott Hughes Design Ltd							Page 1																																																																																																																																																																																																																																																																																		
The Flint Glass Works 64 Jersey Street Manchester M4 6JW				Goulden Street New Cross																																																																																																																																																																																																																																																																																					
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Summary of Results for 30 year Return Period Half Drain Time : 9 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>7.658</td><td>0.158</td><td>0.0</td><td>10.1</td><td>10.1</td><td>6.0</td><td>O K</td></tr><tr><td>30 min Summer</td><td>7.692</td><td>0.192</td><td>0.0</td><td>11.3</td><td>11.3</td><td>7.3</td><td>O K</td></tr><tr><td>60 min Summer</td><td>7.695</td><td>0.195</td><td>0.0</td><td>11.3</td><td>11.3</td><td>7.4</td><td>O K</td></tr><tr><td>120 min Summer</td><td>7.669</td><td>0.169</td><td>0.0</td><td>10.7</td><td>10.7</td><td>6.4</td><td>O K</td></tr><tr><td>180 min Summer</td><td>7.648</td><td>0.148</td><td>0.0</td><td>9.4</td><td>9.4</td><td>5.6</td><td>O K</td></tr><tr><td>240 min Summer</td><td>7.632</td><td>0.132</td><td>0.0</td><td>8.3</td><td>8.3</td><td>5.0</td><td>O K</td></tr><tr><td>360 min Summer</td><td>7.612</td><td>0.112</td><td>0.0</td><td>6.6</td><td>6.6</td><td>4.3</td><td>O K</td></tr><tr><td>480 min Summer</td><td>7.600</td><td>0.100</td><td>0.0</td><td>5.6</td><td>5.6</td><td>3.8</td><td>O K</td></tr><tr><td>600 min Summer</td><td>7.592</td><td>0.092</td><td>0.0</td><td>4.8</td><td>4.8</td><td>3.5</td><td>O K</td></tr><tr><td>720 min Summer</td><td>7.585</td><td>0.085</td><td>0.0</td><td>4.3</td><td>4.3</td><td>3.2</td><td>O K</td></tr><tr><td>960 min Summer</td><td>7.576</td><td>0.076</td><td>0.0</td><td>3.5</td><td>3.5</td><td>2.9</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>7.564</td><td>0.064</td><td>0.0</td><td>2.6</td><td>2.6</td><td>2.5</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>7.555</td><td>0.055</td><td>0.0</td><td>1.9</td><td>1.9</td><td>2.1</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>7.549</td><td>0.049</td><td>0.0</td><td>1.6</td><td>1.6</td><td>1.8</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>7.541</td><td>0.041</td><td>0.0</td><td>1.1</td><td>1.1</td><td>1.6</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>7.537</td><td>0.037</td><td>0.0</td><td>0.9</td><td>0.9</td><td>1.4</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>7.534</td><td>0.034</td><td>0.0</td><td>0.8</td><td>0.8</td><td>1.3</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>7.531</td><td>0.031</td><td>0.0</td><td>0.7</td><td>0.7</td><td>1.2</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>7.530</td><td>0.030</td><td>0.0</td><td>0.6</td><td>0.6</td><td>1.1</td><td>O K</td></tr><tr><td>15 min Winter</td><td>7.676</td><td>0.176</td><td>0.0</td><td>11.0</td><td>11.0</td><td>6.7</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak 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Summer</td><td>2.694</td><td>0.0</td><td>58.2</td><td>738</td></tr><tr><td>2160 min Summer</td><td>1.978</td><td>0.0</td><td>64.1</td><td>1100</td></tr><tr><td>2880 min Summer</td><td>1.588</td><td>0.0</td><td>68.6</td><td>1464</td></tr><tr><td>4320 min Summer</td><td>1.164</td><td>0.0</td><td>75.4</td><td>2200</td></tr><tr><td>5760 min Summer</td><td>0.933</td><td>0.0</td><td>80.6</td><td>2872</td></tr><tr><td>7200 min Summer</td><td>0.785</td><td>0.0</td><td>84.8</td><td>3672</td></tr><tr><td>8640 min Summer</td><td>0.682</td><td>0.0</td><td>88.4</td><td>4384</td></tr><tr><td>10080 min Summer</td><td>0.605</td><td>0.0</td><td>91.5</td><td>5056</td></tr><tr><td>15 min Winter</td><td>65.439</td><td>0.0</td><td>16.5</td><td>24</td></tr></tbody></table>									Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status	15 min Summer	7.658	0.158	0.0	10.1	10.1	6.0	O K	30 min Summer	7.692	0.192	0.0	11.3	11.3	7.3	O K	60 min Summer	7.695	0.195	0.0	11.3	11.3	7.4	O K	120 min Summer	7.669	0.169	0.0	10.7	10.7	6.4	O K	180 min Summer	7.648	0.148	0.0	9.4	9.4	5.6	O K	240 min Summer	7.632	0.132	0.0	8.3	8.3	5.0	O K	360 min Summer	7.612	0.112	0.0	6.6	6.6	4.3	O K	480 min Summer	7.600	0.100	0.0	5.6	5.6	3.8	O K	600 min Summer	7.592	0.092	0.0	4.8	4.8	3.5	O K	720 min Summer	7.585	0.085	0.0	4.3	4.3	3.2	O K	960 min Summer	7.576	0.076	0.0	3.5	3.5	2.9	O K	1440 min Summer	7.564	0.064	0.0	2.6	2.6	2.5	O K	2160 min Summer	7.555	0.055	0.0	1.9	1.9	2.1	O K	2880 min Summer	7.549	0.049	0.0	1.6	1.6	1.8	O K	4320 min Summer	7.541	0.041	0.0	1.1	1.1	1.6	O K	5760 min Summer	7.537	0.037	0.0	0.9	0.9	1.4	O K	7200 min Summer	7.534	0.034	0.0	0.8	0.8	1.3	O K	8640 min Summer	7.531	0.031	0.0	0.7	0.7	1.2	O K	10080 min Summer	7.530	0.030	0.0	0.6	0.6	1.1	O K	15 min Winter	7.676	0.176	0.0	11.0	11.0	6.7	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	65.439	0.0	14.7	24	30 min 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Micro Drainage		Source Control 2017.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.357	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.120

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.025	8 12	0.025	16 20	0.020
4 8	0.025	12 16	0.025		

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Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 7.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	40.0	40.0	2.600	0.0	57.7
0.200	40.0	45.1	2.800	0.0	57.7
0.400	40.0	50.1	3.000	0.0	57.7
0.600	40.0	55.2	3.200	0.0	57.7
0.800	0.0	57.7	3.400	0.0	57.7
1.000	0.0	57.7	3.600	0.0	57.7
1.200	0.0	57.7	3.800	0.0	57.7
1.400	0.0	57.7	4.000	0.0	57.7
1.600	0.0	57.7	4.200	0.0	57.7
1.800	0.0	57.7	4.400	0.0	57.7
2.000	0.0	57.7	4.600	0.0	57.7
2.200	0.0	57.7	4.800	0.0	57.7
2.400	0.0	57.7	5.000	0.0	57.7

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0154-1260-1500-1260
Design Head (m)	1.500
Design Flow (l/s)	12.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	154
Invert Level (m)	7.500
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	12.6
Flush-Flo™	0.440	12.6
Kick-Flo®	0.945	10.1
Mean Flow over Head Range	-	10.9

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

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Micro Drainage		Source Control 2017.1

Hydro-Brake® Optimum Outflow Control

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.5	1.200	11.3	3.000	17.5	7.000	26.3
0.200	11.4	1.400	12.2	3.500	18.8	7.500	27.2
0.300	12.3	1.600	13.0	4.000	20.1	8.000	28.0
0.400	12.6	1.800	13.7	4.500	21.2	8.500	28.8
0.500	12.5	2.000	14.4	5.000	22.3	9.000	29.7
0.600	12.4	2.200	15.1	5.500	23.4	9.500	30.4
0.800	11.6	2.400	15.7	6.000	24.4		
1.000	10.4	2.600	16.3	6.500	25.4		

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.357	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.120

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.025	8 12	0.025	16 20	0.020
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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	Goulden Street New Cross	
Date 23/08/2018	Designed by AB	
File Goulden Street Source C...	Checked by PG	
Micro Drainage		Source Control 2017.1

Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 7.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	40.0	40.0	2.600	0.0	57.7
0.200	40.0	45.1	2.800	0.0	57.7
0.400	40.0	50.1	3.000	0.0	57.7
0.600	40.0	55.2	3.200	0.0	57.7
0.800	0.0	57.7	3.400	0.0	57.7
1.000	0.0	57.7	3.600	0.0	57.7
1.200	0.0	57.7	3.800	0.0	57.7
1.400	0.0	57.7	4.000	0.0	57.7
1.600	0.0	57.7	4.200	0.0	57.7
1.800	0.0	57.7	4.400	0.0	57.7
2.000	0.0	57.7	4.600	0.0	57.7
2.200	0.0	57.7	4.800	0.0	57.7
2.400	0.0	57.7	5.000	0.0	57.7

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0143-1080-1500-1080
Design Head (m) 1.500
Design Flow (l/s) 10.8
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 143
Invert Level (m) 7.500
Minimum Outlet Pipe Diameter (mm) 225
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	10.8
Flush-Flo™	0.437	10.8
Kick-Flo®	0.933	8.6
Mean Flow over Head Range	-	9.4

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

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Scott Hughes Design Ltd			Page 5				
The Flint Glass Works 64 Jersey Street Manchester M4 6JW		Goulden Street New Cross					
Date 23/08/2018		Designed by AB					
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Micro Drainage		Source Control 2017.1					
<u>Hydro-Brake® Optimum Outflow Control</u>							
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.2	1.200	9.7	3.000	15.0	7.000	22.5
0.200	9.8	1.400	10.5	3.500	16.1	7.500	23.2
0.300	10.5	1.600	11.1	4.000	17.2	8.000	24.0
0.400	10.8	1.800	11.8	4.500	18.2	8.500	24.7
0.500	10.8	2.000	12.4	5.000	19.1	9.000	25.4
0.600	10.6	2.200	12.9	5.500	20.0	9.500	26.1
0.800	9.9	2.400	13.5	6.000	20.9		
1.000	8.9	2.600	14.0	6.500	21.7		
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Appendix D – United Utilities Correspondence

Ann Bacon

From: Dodd, Matthew <Matthew.Dodd@uuplc.co.uk>
Sent: 03 July 2018 14:51
To: Paul Graveney
Cc: Wastewater Developer Services
Subject: RE: PDE CA28 Goulden Street Manchester M4 5E - 4200021405

Good Afternoon Paul

We have carried out an assessment of your application which is based on the information provided; this pre development advice will be valid for 12 months

Foul

All Foul flows from the three sites will be allowed to drain to the public combined sewer network at an unrestricted rate.

Surface Water

Surface water must drain to soakaways or some other form of infiltration system but if ground conditions confirm that this is not a viable solution all surface water can drain to the nearby combined sewer network. For undeveloped sites, greenfield run-off rates apply. For previously developed sites, existing connectivity will need to be proven and the developer will need to demonstrate a 50% reduction in run-off rates (minimum 5l/s) to the combined sewer. If existing connectivity cannot be proven, you will need to revert to greenfield run-off rates as per planning policy.

Connection Application

Although we may discuss and agree discharge points & rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below

<http://www.unitedutilities.com/connecting-public-sewer.aspx>

Sewer Adoption Agreement

You may wish to offer the proposed new sewers for adoption. United Utilities assess adoption application based on Sewers adoption 6th Edition and for any pumping stations our company addenda document. Please refer to link below to obtain further guidance and application pack:

Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

Please note, if you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements of Sewers for adoption and United Utilities Asset Standards. The proposed design should give consideration to long term operability and give United Utilities a cost effective proposal for the life of the assets. Therefore, further to this enquiry should you wish to progress a Section 104 agreement, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 agreement, has been assessed and accepted in writing by United Utilities. Any works carried out prior to the technical assessment being approved is done entirely at the developers own risk and could be subject to change.

Regards

Matthew Dodd

Assistant Developer Engineer
Developer Services and Planning
Network Delivery
United Utilities
T: 01925 679369 (internal 79369)
unitedutilities.com

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From: Armstrong, Megan

Sent: 20 June 2018 11:17

To: Dodd, Matthew <Matthew.Dodd@uuplc.co.uk>

Subject: PDE CA28 Goulden Street Manchester M4 5E - 4200021405 - due date 4.7.18

Customer email Paul Graveney pgraveney@scotthughesdesign.co.uk

Megan Armstrong

Customer Service Assistant
Developer Services
United Utilities
T: 0345 072 6067
unitedutilities.com

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