



RIDGE

FORMER DUCIE ARMS,
MANCHESTER

DRAINAGE STRATEGY REPORT
JUNE 2021

Document Control Sheet

Client: Dr Norman Ehsan

Project No: 3289

Project Title: Former Ducie Arms, Manchester

Report Title: Drainage Strategy Report

Report Reference: 3289-RDG-00-ZZ-RP-C-0001

Issue: 1

Status: Final

Control Date: 17th June 2021

Document Revision Record:

Issue	Status	Author	Approved	Date
1	Final	Eleanor Dale	Philip Barrett	17.06.21

Document Distribution Record:

Issue	Organisation	Quantity
1	NE/HSP	1

Table of Contents

Executive Summary	1
1.0 Introduction	2
2.0 Development Description and Location	3
2.1 Site Location	3
2.2 Existing Site Description.....	3
2.3 Development Proposals.....	4
3.0 Planning Policy and Consultation	5
3.1 Strategic Flood Risk Assessment (SFRA)	5
4.0 Drainage Strategy	6
4.1 Existing Surface Water Runoff	6
4.2 Geology	7
4.3 Sustainable Drainage Systems	7
4.4 Surface Water Drainage Strategy	12
4.5 Pollution Control.....	13
4.6 Foul Water Strategy	13
5.0 Management Measures, Off Site Impacts and Residual Risk.....	14
5.1 Flood Risk Management Measures.....	14
5.2 Off Site Impacts.....	14
5.3 Residual Risk	14

Appendix A – Architect’s Drawings

Appendix B – Drainage Layout

Appendix C – Outline Surface Water Attenuation Calculations

Executive Summary

This report details the drainage strategy for a mixed-use development on the site of the former Ducie Arms, Stockport Road, Longsight. The proposals include the demolition of the existing former public house (Ducie Arms), and the construction of a new mixed use residential and medical centre.

The proposed development is located on brownfield land and as such brownfield runoff rates will apply. In accordance with the Manchester City Council Strategic Flood Risk Assessment, a reduction of 50% on existing discharge rates is to be applied. This approach has been considered in this report with existing and proposed discharge rates defined. The underlying geology is comprised of Till and the Manchester Marls Formation, comprised of mudstone. Given the cohesive nature of the underlying geology, infiltration is not a viable means of discharging surface water. There are no watercourses in close proximity to the site. There are also no surface water sewers in the immediate area.

A 50% reduction on existing rates results in an allowable discharge of **5.5l/s**. This restricted discharge rate will generate surface water attenuation, which will be contained within the geocellular storage, prior to connecting into United Utilities Combined Sewer that passes through the site.

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. Out of chamber or gully flooding for the extreme 100 year plus climate change event may occur within the development site and is classed as exceedance flows. Flood water from this event will be contained within the development site and directed away from the building to the external parking areas and soft landscaped areas.

Foul water generated by the development will be discharged in the United Utilities Combined Sewer within Stockport Road that passes through the site via a saddle connection. The foul discharge does not present an increased flood risk to the surrounding district.

1.0 Introduction

- 1.1 Ridge & Partners LLP have been appointed by Dr Norman Ehsan to prepare this Drainage Strategy Report to support the planning application for the proposed demolition of the existing former public house (Ducie Arms), and the construction of a new mixed use residential and medical centre. 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 Dr Norman Ehsan and is specific to their interests in the land at the former Ducie Arms, Stockport Road development proposals as described by the Architectural plan in Appendix A.
- 1.3 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 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 foul water drainage strategy.
 - Consider the recommendations of the Manchester City, Salford City and Trafford (MST) Councils Strategic Flood Risk Assessment (SFRA).
 - Assess mitigation measures & 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.

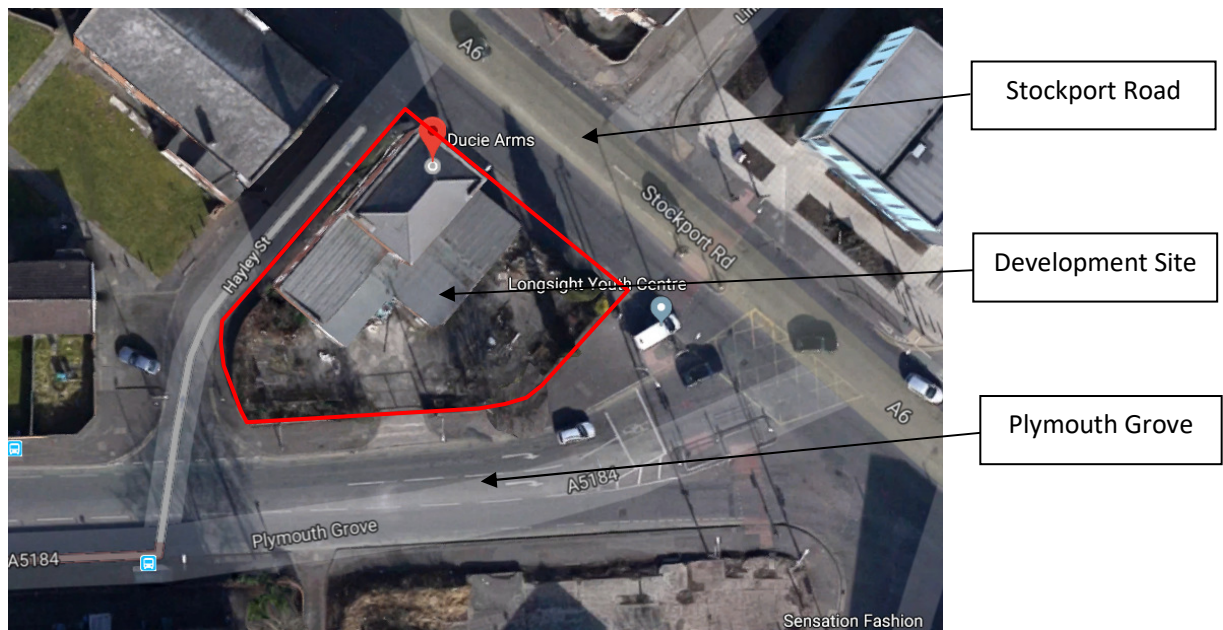
Table 1: Site Referencing Information

Item	Brief Description
Site name	Former Ducie Arms, Stockport Road
Site address and location	424 Stockport Road, Longsight, Manchester, M12 4EX
Council Area	Manchester City Council
Approximate Grid Reference	OS: 386478, 395938
General Locality	The site is located some 3.9km to the southeast of Manchester City Centre.

2.2 Existing Site Description

- 2.2.1 The site is currently comprised of the former Ducie Arms Public House and car parking. The majority of the site is impermeable with minimal planting on the southern boundary.
- 2.2.2 The site is bordered to the north and east by Stockport Road. Hayley Street borders the site to the west and Plymouth Grove borders the site to the south. The surrounding area is a mixture of residential and commercial development.
- 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 demolition of the existing former public house (Ducie Arms), and the construction of a new mixed use residential and medical centre.
- 2.3.2 The proposed development area is approximately 0.8ha.
- 2.3.3 The current Architectural Master Plan in Appendix A provides an indication of the proposals of 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 May 2009 JBA Consulting were commissioned by Manchester City, Salford City and Trafford (MST) Councils to update a Level 2 Hybrid Strategic Flood Risk Assessment (SFRA) for the area, following on from the Greater Manchester Sub-Regional SFRA completed in August 2008. 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, taking into account 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.
 - Development should aim for a minimum reduction in surface water runoff rates for 50% for brownfield sites, with the aim of reducing runoff to greenfield rates up to a 1 in 100 year storm event, considering climate change.
 - 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 plus climate change event.
 - For all sites, development proposals should look at opportunities to incorporate SuDS to reduce the risk of surface water flooding.

4.0 Drainage Strategy

4.1 Existing Surface Water Runoff

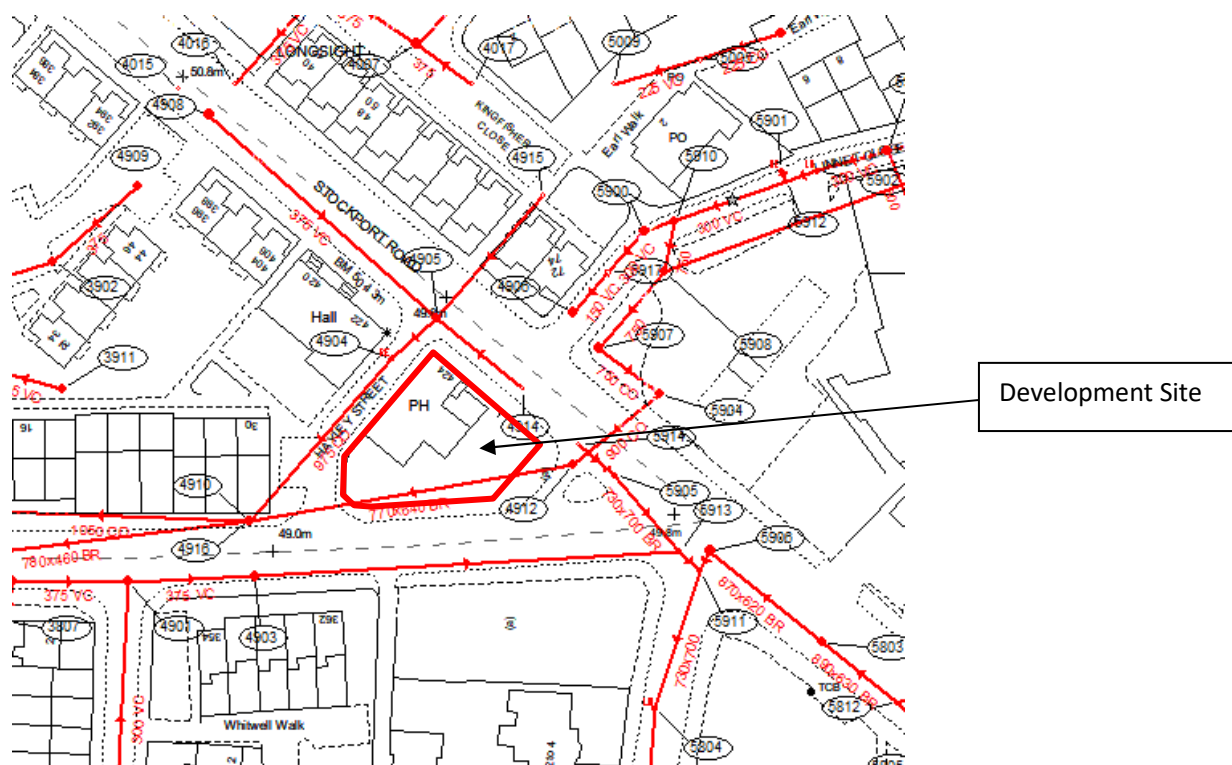
- 4.1.1 The proposed residential development is situated on the site of the former Ducie Arms Public House and is on brownfield land.
- 4.1.2 Table 2 below defines the existing brownfield discharge rates from the site.

Table 2 – Existing Runoff Rates

	Impermeable Area (m ²)	Existing Discharge Rate - (Imp Area x 50mm/hr) ÷ 3600	Allowable Discharge Rate (50% Reduction from Existing)
Ducie Arms Public House and Car Park	800	11 l/s	5.5 l/s

- 4.1.3 Figure 2 below shows an extract of the United Utilities sewer records for the area. The site is surrounded by Public Combined Sewers. There is also an existing United Utilities Combined sewer that passes through the site. Given the size and depth of the sewer a 6.5m easement either side of the sewer is required. The required easement can be achieved.

Figure 2 – Extract of United Utilities Sewer Records



4.2 Geology

- 4.2.1 The site is underlain by Till, which is made up of outwash sand and gravel deposits. The site is also underlain by the Manchester Marls Formation, comprised of mudstone.
- 4.2.2 The Manchester Marls Formation is classed as a Secondary A Aquifer. These are permeable layers capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers. The site is not within a groundwater source protection zone.
- 4.2.3 Based on the cohesive nature of the underlying geology, soakaways are not a potentially viable SuDS technique.

4.3 Sustainable Drainage Systems

4.3.1 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).

4.3.2 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.

4.3.3 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.

4.3.4 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: Infiltration is not a viable SuDS technique.
- Catchment Characteristics: The site is currently brownfield. The proposed runoff rate needs to be a 50% reduction from existing rates.
- 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 surrounding without the need for significant safety precautions. Maintenance plans will be prepared for all SuDS devices that are included.

4.3.5 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>Not suitable:</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>Suitable:</u> Water Butts have the potential to be installed at the downpipes.
Rainwater Harvesting	Rainwater harvesting reduces the total runoff volume from the developed site, and reduces treated water consumption.	<u>Not Suitable:</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>Not Suitable:</u> Cohesive underlying geology indicates infiltration is not a viable technique.
Permeable Surfacing (Infiltration)	- Reduces total run off volume from the development. - Can be used to enhance water quality.	<u>Not Suitable:</u> Cohesive underlying geology indicates infiltration is not a viable technique.

Method	Comment	Suitability for Development
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>Suitable:</u> Permeable surfacing which connects into attenuation prior to discharge is suitable for use on private parking areas.
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> - Space constraints on site do not permit large above ground areas for surface water storage. - No scope to reduce development area due to site viability.
Bio-Retention	Collect and retain run-off to help improve water quality, prior to discharge in piped system on infiltration.	<u>Not suitable:</u> - Space constraints on site do not permit large above ground areas for surface water storage. - No scope to reduce development area due to site viability.

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.

4.3.6 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	Cohesive underlying geology indicates infiltration is not a viable technique.
Connection to Watercourse	No	There are no watercourses in the vicinity of the site.
Connection to Surface Water Sewer	No	There are no surface water sewers in the vicinity of the site.
Connection to a Combined Sewer	Yes	There are existing combined sewers in the surrounding roads. The site benefits from an existing connection.

4.3.7 SuDS Design Philosophy

The SuDS assessment and hierarchical 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 the Public Combined Sewer within the site.
- Site control in the form of geocellular storage with restricted outflow to 5.5l/s.
- Aim to limit where possible the impermeable fraction of development.

4.4 **Surface Water Drainage Strategy**

- 4.4.1 The existing development site can be classed as brownfield. According to the SFRA published by Manchester City, Salford City and Trafford (MST) Councils, developments should aim for a minimum reduction in surface water runoff rates of 50% for brownfield sites.
- 4.4.2 The strategy is to direct all runoff into new surface water drainage runs. The surface water runoff will be restricted to 5.5l/s. In turn, this will generate surface water attenuation which will be contained in geocellular storage, prior to connecting into the existing United Utilities Combined Sewer within the site. The new development also proposes to reduce the impermeable footprint by the inclusion of soft landscaped verges within the car park.
- 4.4.3 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. Design & Construction Guidance 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.
- 4.4.4 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.
- 4.4.5 In the case of this development, exceedance flows will be all those over and above the 30-year design criterion set by Design & Construction Guidance. Using storage within the external areas would be achievable and would direct flood water away from the proposed building with flows directed back into the drains as the water levels recede.
- 4.4.6 Table 6 below defines the post-development attenuation volumes associated with the site (further details can be found on Drawing 3289-RDG-00-ZZ-DR-C-0100 – Drainage Strategy 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) (extra over from 30yr retained on the surface)
Medical Centre	700	5.5	8.0	18.0

4.5 Pollution Control

- 4.5.1 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).

4.6 Foul Water Strategy

- 4.6.1 The foul water drainage strategy is to connect into the existing United Utilities Combined Sewer, via an existing manhole where possible.

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 5.5l/s. Attenuation has been proposed in the form of geocellular storage in the car parking area. The new surface water networks will be designed in line with current British Standard and Design & Construction 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 sewers and drains it will be directed away from the building to the external car parking areas.

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 hard standing areas but will not be a flood risk generator.

Appendix A – Architectural Site Layout

PROGRESS DRAWING

This drawing is not intended to be used for contract pricing or fabrication purposes. All content is subject to change



Roof - site Plan as proposed Scale 1:200

H	FIRST ISSUE	EJG/II	07/06/21
G	FIRST ISSUE	EJG/II	24/03/21
E	FIRST ISSUE	EJG/VK	10/02/21
D	FIRST ISSUE	EJG/VK	3 Nov 20
C	FIRST ISSUE	EJG	3 Sept 20
B	FIRST ISSUE	EJG	30 Jul 20
A	FIRST ISSUE	EJG	2 Jul 20
Rev	DESCRIPTION	By	Date



HOWARD & SEDDON A.R.I.B.A.
CHARTERED ARCHITECTS
 64 WASHWAY ROAD
 SALE, CHESHIRE, M33 7RE
 TEL NO. 0161 - 973 8296
 FAX NO. 0161 - 962 3485
 E-MAIL : ADMIN@HOWARDANDEDSON.CO.UK

Project
 Proposed development
 DUCIE ARMS 424 STOCKPORT ROAD
 MANCHESTER M12 4EX
 Client
 Dr Noman Ehsan

Title
 Roof - Site
 Plan as proposed

Drawn EJG/II	DRG no. 14,273
Date 07/06/21	H04
Scale 1:200(A3)	Amendment H

Appendix B – Drainage Layout

Appendix C – Outline Surface Water Attenuation Calculations

Scott Hughes Design Ltd							Page 2
The Flint Glass Works 64 Jersey Street Manchester M4 6JW			Former Ducie Arms Stockport Road				
Date 17/06/2021 File 30yr.SRCX			Designed by EJD Checked by EJD				
Micro Drainage			Source Control 2018.1				
<u>Summary of Results for 30 year Return Period</u>							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	48.683	0.183	0.0	5.3	5.3	7.8	O K
60 min Winter	48.680	0.180	0.0	5.3	5.3	7.7	O K
120 min Winter	48.642	0.142	0.0	5.0	5.0	6.1	O K
180 min Winter	48.616	0.116	0.0	4.5	4.5	5.0	O K
240 min Winter	48.601	0.101	0.0	3.8	3.8	4.3	O K
360 min Winter	48.583	0.083	0.0	3.0	3.0	3.5	O K
480 min Winter	48.573	0.073	0.0	2.5	2.5	3.1	O K
600 min Winter	48.566	0.066	0.0	2.1	2.1	2.8	O K
720 min Winter	48.561	0.061	0.0	1.8	1.8	2.6	O K
960 min Winter	48.554	0.054	0.0	1.5	1.5	2.3	O K
1440 min Winter	48.546	0.046	0.0	1.1	1.1	1.9	O K
2160 min Winter	48.539	0.039	0.0	0.8	0.8	1.6	O K
2880 min Winter	48.534	0.034	0.0	0.6	0.6	1.5	O K
4320 min Winter	48.529	0.029	0.0	0.5	0.5	1.2	O K
5760 min Winter	48.526	0.026	0.0	0.4	0.4	1.1	O K
7200 min Winter	48.524	0.024	0.0	0.3	0.3	1.0	O K
8640 min Winter	48.522	0.022	0.0	0.3	0.3	0.9	O K
10080 min Winter	48.521	0.021	0.0	0.2	0.2	0.9	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	43.549	0.0	12.8	27			
60 min Winter	27.653	0.0	16.2	44			
120 min Winter	17.072	0.0	20.1	76			
180 min Winter	12.745	0.0	22.5	106			
240 min Winter	10.313	0.0	24.2	136			
360 min Winter	7.606	0.0	26.8	196			
480 min Winter	6.129	0.0	28.8	256			
600 min Winter	5.181	0.0	30.4	316			
720 min Winter	4.514	0.0	31.8	378			
960 min Winter	3.630	0.0	34.1	500			
1440 min Winter	2.667	0.0	37.6	738			
2160 min Winter	1.956	0.0	41.4	1112			
2880 min Winter	1.569	0.0	44.3	1464			
4320 min Winter	1.149	0.0	48.6	2200			
5760 min Winter	0.920	0.0	51.9	2936			
7200 min Winter	0.774	0.0	54.6	3544			
8640 min Winter	0.672	0.0	56.9	4464			
10080 min Winter	0.596	0.0	58.9	4992			
©1982-2018 Innovyze							

Scott Hughes Design Ltd		Page 3
The Flint Glass Works 64 Jersey Street Manchester M4 6JW	Former Ducie Arms Stockport Road	
Date 17/06/2021 File 30yr.SRCX	Designed by EJD Checked by EJD	
Micro Drainage Source Control 2018.1		

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	0.362	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.070

Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)
0 4	0.035	4 8	0.035

©1982-2018 Innovyze

Scott Hughes Design Ltd		Page 4
The Flint Glass Works 64 Jersey Street Manchester M4 6JW	Former Ducie Arms Stockport Road	
Date 17/06/2021 File 30yr.SRCX	Designed by EJD Checked by EJD	
Micro Drainage Source Control 2018.1		

Model Details

Storage is Online Cover Level (m) 49.700

Cellular Storage Structure

Invert Level (m) 48.500 Safety Factor 1.9
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	45.0	45.0	0.401	0.0	55.7
0.400	45.0	55.7			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0110-5500-1000-5500
Design Head (m) 1.000
Design Flow (l/s) 5.5
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 110
Invert Level (m) 48.500
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	5.5
Flush-Flo™	0.298	5.5
Kick-Flo®	0.645	4.5
Mean Flow over Head Range	-	4.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.8	1.200	6.0	3.000	9.2	7.000	13.8
0.200	5.4	1.400	6.4	3.500	9.9	7.500	14.2
0.300	5.5	1.600	6.8	4.000	10.5	8.000	14.7
0.400	5.4	1.800	7.2	4.500	11.2	8.500	15.1
0.500	5.2	2.000	7.6	5.000	11.7	9.000	15.5
0.600	4.8	2.200	7.9	5.500	12.3	9.500	15.9
0.800	5.0	2.400	8.3	6.000	12.8		
1.000	5.5	2.600	8.6	6.500	13.3		

©1982-2018 Innovyze

Scott Hughes Design Ltd

The Flint Glass Works
64 Jersey Street
Manchester M4 6JW

Date 17/06/2021
File 100yr + cc.SRCX

Micro Drainage

Former Ducie Arms
Stockport Road

Designed by EJD
Checked by EJD

Source Control 2018.1

Page 2



Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	48.888	0.388	0.0	5.5	5.5	16.6	O K
60 min Winter	49.403	0.903	0.0	5.5	5.5	17.6	Flood Risk
120 min Winter	48.861	0.361	0.0	5.5	5.5	15.4	O K
180 min Winter	48.791	0.291	0.0	5.5	5.5	12.4	O K
240 min Winter	48.728	0.228	0.0	5.4	5.4	9.8	O K
360 min Winter	48.645	0.145	0.0	5.1	5.1	6.2	O K
480 min Winter	48.614	0.114	0.0	4.4	4.4	4.9	O K
600 min Winter	48.599	0.099	0.0	3.8	3.8	4.2	O K
720 min Winter	48.589	0.089	0.0	3.3	3.3	3.8	O K
960 min Winter	48.577	0.077	0.0	2.7	2.7	3.3	O K
1440 min Winter	48.563	0.063	0.0	2.0	2.0	2.7	O K
2160 min Winter	48.553	0.053	0.0	1.4	1.4	2.2	O K
2880 min Winter	48.547	0.047	0.0	1.2	1.2	2.0	O K
4320 min Winter	48.539	0.039	0.0	0.8	0.8	1.7	O K
5760 min Winter	48.535	0.035	0.0	0.7	0.7	1.5	O K
7200 min Winter	48.532	0.032	0.0	0.6	0.6	1.3	O K
8640 min Winter	48.529	0.029	0.0	0.5	0.5	1.2	O K
10080 min Winter	48.527	0.027	0.0	0.4	0.4	1.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	79.493	0.0	23.3	30
60 min Winter	50.812	0.0	29.9	50
120 min Winter	31.438	0.0	36.9	86
180 min Winter	23.432	0.0	41.3	120
240 min Winter	18.907	0.0	44.4	150
360 min Winter	13.852	0.0	48.8	204
480 min Winter	11.115	0.0	52.3	258
600 min Winter	9.363	0.0	55.0	318
720 min Winter	8.134	0.0	57.4	376
960 min Winter	6.509	0.0	61.2	494
1440 min Winter	4.746	0.0	67.0	738
2160 min Winter	3.454	0.0	73.1	1116
2880 min Winter	2.754	0.0	77.7	1464
4320 min Winter	1.997	0.0	84.5	2176
5760 min Winter	1.588	0.0	89.6	2904
7200 min Winter	1.329	0.0	93.7	3656
8640 min Winter	1.148	0.0	97.2	4448
10080 min Winter	1.014	0.0	100.2	5056

©1982-2018 Innovyze



Designed by EJD

Checked by EJD

Source Control 2018.1

Scott Hughes Design Ltd		Page 4
The Flint Glass Works 64 Jersey Street Manchester M4 6JW	Former Ducie Arms Stockport Road	
Date 17/06/2021 File 100yr + cc.SRCX	Designed by EJD Checked by EJD	
Micro Drainage Source Control 2018.1		

Model Details

Storage is Online Cover Level (m) 49.700

Cellular Storage Structure

Invert Level (m) 48.500 Safety Factor 1.9
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	45.0	45.0	0.401	0.0	55.7
0.400	45.0	55.7			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0110-5500-1000-5500
Design Head (m) 1.000
Design Flow (l/s) 5.5
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 110
Invert Level (m) 48.500
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	5.5
Flush-Flo™	0.298	5.5
Kick-Flo®	0.645	4.5
Mean Flow over Head Range	-	4.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.8	1.200	6.0	3.000	9.2	7.000	13.8
0.200	5.4	1.400	6.4	3.500	9.9	7.500	14.2
0.300	5.5	1.600	6.8	4.000	10.5	8.000	14.7
0.400	5.4	1.800	7.2	4.500	11.2	8.500	15.1
0.500	5.2	2.000	7.6	5.000	11.7	9.000	15.5
0.600	4.8	2.200	7.9	5.500	12.3	9.500	15.9
0.800	5.0	2.400	8.3	6.000	12.8		
1.000	5.5	2.600	8.6	6.500	13.3		

©1982-2018 Innovyze