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Site Address

**Dundonald Road
Didsbury
Manchester
M20 6RU**

Document Title

Drainage Condition Report



Oak House
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Cheshire
SK8 1PY

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Appendix A – Brennan Consult Drawings

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Revision History

Issue	Date	Status	Prepared By	Signature
O	07.12.22	First Issue	Lee Meadowcroft BSc(Hons) PgDip MScCHE CEng MStructE MICE IHBC	

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1.0 Introduction

- 1.1 In June 2021 a planning application was submitted to Manchester City Council for the Erection of three residential dwellings and associated car parking and turning head on vacant site previously used as a warehouse storage to the south of Dundonald Road, Didsbury, Manchester, M20 6RU.
- 1.2 Planning approval was granted in February 2022 (Ref: 130057/FO/2021) subject to a number of planning conditions, including two conditions relating to the drainage of the development.
- 1.3 This report has been prepared to remove these drainage related planning conditions relevant to the application. The conditions are numbers 6 & 7.

2.0 Drainage Strategy

2.1 Existing Drainage Layout

- 2.1.1 The United Utilities sewer records have been reviewed (Figure 5 below and Appendix E) and confirm there is a 225mm diameter combined water sewer flowing in a northerly direction beneath Dundonald Road.
- 2.1.2 As the land is currently undeveloped no existing drainage has been identified.

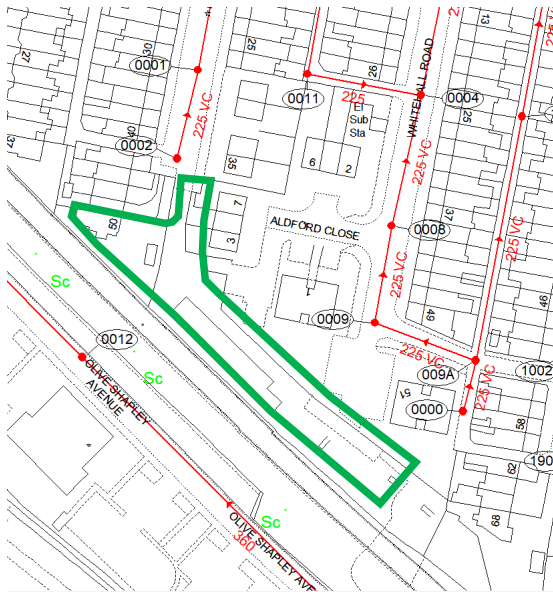


Figure 1 United Utilities Sewer Records

2.2 Existing Runoff

- 2.2.1 The existing site is undeveloped, and therefore can be considered to be fully Greenfield. As the area is very small, this will be reflected in a low greenfield rate that would be too onerous to adhere to post development.

2.3 Geology

2.3.1 A site specific Phase 2 intrusive investigation has been undertaken. This has identified topsoil over gravelly sand to a maximum recorded depth of 3.8m bgl. Soakaway tests were carried out in two trial pits in line with BRE 365 guidance, with three recorded fills each. The lowest recorded rate was 7.19×10^{-5} m/s. In light of these finding infiltration as a means of draining the site will be incorporated.

Full details of the results are identified in the extract below from the site investigation:

7.8 Sustainable Urban Drainage System (SuDS)

Soil infiltration testing was undertaken in two locations on the site in full accordance with BRE Digest 365 'Soakaways' (2016). A summary of the soil percolation test results is given below, and the full results are presented in *Appendix 11*.

Location	Test No.	Dimensions of Pit Before Test	Behaviour During Test	Dimensions of Pit After Test	Soil Infiltration Rate (m/sec)
SuDS1	1	1500 (L) x 450 (W) x 2200 (D)	Pit sides stable	1500 (L) x 450 (W) x 2100 (D)	7.19×10^{-5}
SuDS1	2	1500 (L) x 450 (W) x 2200 (D)	Pit sides stable	1500 (L) x 450 (W) x 2200 (D)	7.28×10^{-5}
SuDS1	3	1500 (L) x 450 (W) x 2200 (D)	Pit sides stable	1500 (L) x 450 (W) x 2200 (D)	8.14×10^{-5}
SuDS2	1	1900 (L) x 500 (W) x 2400 (D)	Pit sides stable	1900 (L) x 500 (W) x 2400 (D)	1.17×10^{-4}
SuDS2	2	1900 (L) x 500 (W) x 2400 (D)	Pit sides stable	1900 (L) x 500 (W) x 2400 (D)	1.18×10^{-4}
SuDS2	3	1900 (L) x 500 (W) x 2400 (D)	Pit sides stable	1900 (L) x 500 (W) x 2400 (D)	2.20×10^{-4}

Three fills were carried out at both positions SuDS1 and SuDS2 at a depth of 2.2m and 2.4m bgl respectively within the underlying granular material. The calculated soil infiltration rates ranged between 1.17×10^{-4} m/s and 8.14×10^{-5} m/s which indicate good drainage conditions are present within the underlying soils.

The use of SuDS drainage within the natural ground is considered to be a feasible option at the site based on the results of testing at these locations and depths.

SuDS drainage should be located away from the crest of the slope which could potentially initiate instability, this should be considered in the drainage strategy.

Figure 2 Extract of Soil Infiltration Testing

2.4 Hydrological Assessment

2.2 As discussed in previous sections, a review of the topographical survey, OS Maps and Environment Agency maps would indicate the closest surface water feature to be the River Mersey, located some 1.2km beyond the south western boundary.

2.5 SuDS Hierarchal Approach

- 2.5.1 Based on the existing drainage configuration, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in detail below:

Method	Suitability	Suitability for Development
Infiltration to Ground	Yes	Desk based information would indicate that the underlying soils would be suitable for infiltration options. TBC following site specific infiltration tests.
Connection to Watercourse	No	Watercourse too far from the development boundary.
Connection to Surface Water Sewer	No	No surface water sewer in close proximity to the development site.
Connection to a Combined Sewer	No	Higher options possible.

Figure 3 SuDS Hierarchal Approach

2.6 Surface Water Drainage Strategy

- 2.6.1 The SuDS assessment and hierarchal approach discussed in Figure 3 above has defined the overall SuDS strategy. The general principal of the surface water drainage strategy is to collect the runoff from the roof of the new residential properties and direct it to a new below ground surface water drainage network that will outfall to a geocellular crate infiltration tank within the rear garden of each property. The access road and parking will be constructed in permeable paving.
- 2.6.2 The proposed private drainage layout for the new development building will be designed in accordance with BS EN 752: 2017 and Building Regulations Part H guidance. This is to indicate no surcharge for the 2-year storm event and no flooding for up to the 30-year storm event.
- 2.6.3 A detailed drainage GA drawing and calculations can be found in the Appendices. This has shown no flooding for both the 30-year and extreme 100 year + 40% climate change event.

2.7 Maintenance

- 2.7.1 The drainage network encompasses standard pipework & manholes, permeable surfacing and a geocellular soakaway tank. As long as the gullies at the base of the rainwater pipes are kept clear of leaves and detritus by regular inspection by the property owners then this should negate it passing into the network.
- 2.7.2 All management and maintenance of the drainage will be with the owner of each property. This will involve general maintenance of the drainage network in accordance with best practice. All drainage will remain private and not be adopted by the local sewerage authority.

- 2.7.3 This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details. Where proprietary products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints. The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.
- 2.7.4 There are three types of maintenance activities associated with surface water drainage systems. The SuDS Manual, CIRIA C753, defines these as:
- Regular Maintenance – 'basic tasks undertaken on a frequent and predictable schedule' including vegetation management, litter and debris removal, and inspections.'
 - Occasional Maintenance – 'tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example.'
 - Remedial Maintenance – 'intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.'
- 2.7.5 Specific maintenance needs should be monitored and maintenance schedules adjusted to suit the location and condition of the drainage feature in question.

Piped Networks, Inspection, Manhole and Catchpit Chambers

- 2.7.6 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access.
- 2.7.7 Pipes are proprietary products and the materials can vary across the site and as such where used the manufacture's recommendations should be followed.
- 2.7.8 Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.
- 2.7.9 Access for maintenance is provided through access chambers and manholes.
- 2.7.10 Regular inspection and maintenance are important to identify areas which may have been obstructed / clogged and may not be drainage correctly thus exposing the development to a greater level of flood risk.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required, take remedial action	Monthly for three months, then six monthly
	Debris removal from catchment surface / gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Maintenance	Repair / rehabilitation of gratings, inlets and outlets	As required
Monitoring	Inspect / check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed	Annually and after large storm events
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of features or pipework is required.	As required

Figure 4 Operation and Maintenance Requirements of Piped Networks and Inspection Chambers

Porous Paved Area

- 2.7.11 Permeable surfacing enables any water landing on the surface to infiltrate directly to ground at source, thus acting close to a permeable surface.
- 2.7.12 Regular inspection and maintenance are important for the effective operation of the permeable surfacing to allow it to work efficiently through its design life.

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

Figure 5 Operation and Maintenance Requirements of Permeable Surfacing

Infiltration Tank

- 2.7.13 The infiltration tank is wrapped on the outside in a geotextile blanket and infilled with geocellular crates. This allows the water to pass into the tank and infiltrate to the underlying sand.
- 2.7.14 Access for maintenance should be provided by an access chamber constructed as a catchpit, located at the main entry. Regular inspection and maintenance are important for the effective operation of attenuation tanks as designed. As the feature is buried, a regular inspection regime is very important to ensure the correction functionality of the surface water drainage network.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets, outlets and overflows for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular Maintenance \ Inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets, outlets and overflows.	As required.

Figure 6 Operation and Maintenance Requirements of Geocellular Infiltration Tanks

3.0 Drainage Related Planning Condition and Responses

3.1 Planning Conditions

Each point of conditions 6 & 7 are listed below in *italics* with the Brennan Consult response beneath in Blue.

Condition 6

Development shall not begin until a surface water drainage scheme for the site, based on sustainable drainage principles has been submitted to and approved in writing by the City Council as local planning authority. The development shall be constructed and completed in accordance with the approved details.

As defined in Section 2.3, the intrusive investigation has confirmed that the underlying ground comprises sands and thus suitable for infiltration based options.

In light of these findings, the SuDS hierarchal approach has been proposed with geocellular soakaways located in the rear garden of each property and permeable surfacing to the access road and parking areas.

Refer to the drainage GA drawing in Appendix A and hydraulic calculations in Appendix B.

Condition 7

The site shall be drained via separate systems for the disposal of foul and surface water.

As shown on the drainage GA drawing in Appendix A foul and surface water shall be drained on separate systems.

Project Title Drainage Condition Report, Dundonald Road, Didsbury, M20 6RU
Project No 2786
Date 7th December 2022



Appendix A – Brennan Consult Drawings

- 2786 100 – Drainage GA



INDICATES 'WAVIN' DOMESTIC SILT TRAP (6LB300) TO ALL MANHOLES IMMEDIATELY PRIOR TO SOAKAWAY, INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS WRITTEN INSTRUCTIONS.

'WAVIN' AQUACELL CORE-R SOAKAWAY CRATES, 3.5 x 2.0 x 0.4m DEEP (2.8m³). CRATES TO BE WRAPPED IN COMPATIBLE PERMEABLE GEOTEXTILE MEMBRANE & VENTED. BASED ON PERMEABILITY RATE OF 7.19 x10⁻⁶ m/s. BASE LEVEL: 34.800m

SOAKAWAYS TO BE POSITIONED MINIMUM 5m AWAY FROM ANY BUILDING FOUNDATIONS.

THE MAINTENANCE OF THE SOAKAWAY'S ARE THE RESPONSIBILITY OF THE INDIVIDUAL HOME OWNERS. THE SOAKAWAY'S SHALL BE INSPECTED ANNUALLY TO ENSURE THERE ARE NO BLOCKAGES.

DRAINAGE LEGEND

INDICATES NEW FW DRAINAGE	INDICATES EXISTING FW DRAINAGE
INDICATES NEW SW DRAINAGE	INDICATES EXISTING SW DRAINAGE
INDICATES NEW CW DRAINAGE	INDICATES EXISTING CW DRAINAGE

ALL MANHOLES TO BE CONCRETE ENCASED PPIC's, REFER TO DETAIL ON DRAWING 2786 - 101.

ALL MANHOLE COVERS TO BE 8125 LOAD RATING.



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RESIDENTIAL DEVELOPMENT
PROPOSED DRAINAGE PLAN

Project No.	Originator	Zone	Level	Type	Role	Drawing No.	Revision
2786	BCL	00	XX	DR	D	0100	P01

Scale 1:150	Size A1	Drawn WSS	Date NOV 22	Checked CB	Passed CB
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Appendix B – Hydraulic Calculations

- 100yr + 40% CC soakaway design for each property.

Brennan Consult				Page 1	
Oak House, 2 Gatley Road Cheadle Stockport, SK8 1PY		Dundonald Road Single House 100yr + 40% CC Soakaway			
Date 23/11/2022 File Dundonald Road - Single...		Designed by paulg Checked by			
Innovyze		Source Control 2017.1.2			
Summary of Results for 100 year Return Period (+40%)					
Half Drain Time : 148 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	34.983	0.183	0.1	1.2	O K
30 min Summer	35.038	0.238	0.1	1.6	O K
60 min Summer	35.085	0.285	0.1	1.9	O K
120 min Summer	35.108	0.308	0.1	2.1	O K
180 min Summer	35.110	0.310	0.1	2.1	O K
240 min Summer	35.106	0.306	0.1	2.0	O K
360 min Summer	35.089	0.289	0.1	1.9	O K
480 min Summer	35.072	0.272	0.1	1.8	O K
600 min Summer	35.055	0.255	0.1	1.7	O K
720 min Summer	35.038	0.238	0.1	1.6	O K
960 min Summer	35.007	0.207	0.1	1.4	O K
1440 min Summer	34.955	0.155	0.1	1.0	O K
2160 min Summer	34.899	0.099	0.1	0.7	O K
2880 min Summer	34.865	0.065	0.1	0.4	O K
4320 min Summer	34.843	0.043	0.1	0.3	O K
5760 min Summer	34.835	0.035	0.1	0.2	O K
7200 min Summer	34.829	0.029	0.1	0.2	O K
8640 min Summer	34.825	0.025	0.1	0.2	O K
10080 min Summer	34.822	0.022	0.0	0.1	O K
15 min Winter	35.007	0.207	0.1	1.4	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	119.757	0.0	24		
30 min Summer	79.807	0.0	37		
60 min Summer	50.812	0.0	64		
120 min Summer	31.320	0.0	112		
180 min Summer	23.299	0.0	144		
240 min Summer	18.779	0.0	176		
360 min Summer	13.732	0.0	246		
480 min Summer	11.005	0.0	314		
600 min Summer	9.261	0.0	382		
720 min Summer	8.039	0.0	448		
960 min Summer	6.425	0.0	580		
1440 min Summer	4.677	0.0	830		
2160 min Summer	3.399	0.0	1188		
2880 min Summer	2.706	0.0	1512		
4320 min Summer	1.960	0.0	2208		
5760 min Summer	1.557	0.0	2936		
7200 min Summer	1.302	0.0	3672		
8640 min Summer	1.124	0.0	4400		
10080 min Summer	0.993	0.0	5136		
15 min Winter	119.757	0.0	24		
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Oak House, 2 Gatley Road Cheadle Stockport, SK8 1PY		Dundonald Road Single House 100yr + 40% CC Soakaway			
Date 23/11/2022 File Dundonald Road - Single...		Designed by paulg Checked by			
Innovyze		Source Control 2017.1.2			
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	35.069	0.269	0.1	1.8	O K
60 min Winter	35.124	0.324	0.2	2.2	O K
120 min Winter	35.155	0.355	0.2	2.4	O K
180 min Winter	35.155	0.355	0.2	2.4	O K
240 min Winter	35.149	0.349	0.2	2.3	O K
360 min Winter	35.125	0.325	0.2	2.2	O K
480 min Winter	35.099	0.299	0.1	2.0	O K
600 min Winter	35.073	0.273	0.1	1.8	O K
720 min Winter	35.049	0.249	0.1	1.7	O K
960 min Winter	35.003	0.203	0.1	1.4	O K
1440 min Winter	34.930	0.130	0.1	0.9	O K
2160 min Winter	34.860	0.060	0.1	0.4	O K
2880 min Winter	34.844	0.044	0.1	0.3	O K
4320 min Winter	34.832	0.032	0.1	0.2	O K
5760 min Winter	34.825	0.025	0.1	0.2	O K
7200 min Winter	34.821	0.021	0.0	0.1	O K
8640 min Winter	34.818	0.018	0.0	0.1	O K
10080 min Winter	34.816	0.016	0.0	0.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	79.807	0.0	38		
60 min Winter	50.812	0.0	64		
120 min Winter	31.320	0.0	118		
180 min Winter	23.299	0.0	152		
240 min Winter	18.779	0.0	188		
360 min Winter	13.732	0.0	266		
480 min Winter	11.005	0.0	340		
600 min Winter	9.261	0.0	412		
720 min Winter	8.039	0.0	482		
960 min Winter	6.425	0.0	616		
1440 min Winter	4.677	0.0	868		
2160 min Winter	3.399	0.0	1188		
2880 min Winter	2.706	0.0	1492		
4320 min Winter	1.960	0.0	2208		
5760 min Winter	1.557	0.0	2944		
7200 min Winter	1.302	0.0	3648		
8640 min Winter	1.124	0.0	4408		
10080 min Winter	0.993	0.0	5112		
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Oak House, 2 Gatley Road Cheadle Stockport, SK8 1PY	Dundonald Road Single House 100yr + 40% CC Soakaway	
Date 23/11/2022 File Dundonald Road - Single...	Designed by paulg Checked by	
Innovyze	Source Control 2017.1.2	

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	0.370	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.006

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.002		4 8 0.002		8 12 0.002	

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Oak House, 2 Gatley Road Cheadle Stockport, SK8 1PY	Dundonald Road Single House 100yr + 40% CC Soakaway	
Date 23/11/2022 File Dundonald Road - Single...	Designed by paulg Checked by	
Innovyze	Source Control 2017.1.2	

Model Details

Storage is Online Cover Level (m) 35.800

Cellular Storage Structure

Invert Level (m) 34.800 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 0.26000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.26000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	7.0	7.0	2.600	0.0	11.2
0.200	7.0	9.1	2.800	0.0	11.2
0.400	7.0	11.2	3.000	0.0	11.2
0.401	0.0	11.2	3.200	0.0	11.2
0.800	0.0	11.2	3.400	0.0	11.2
0.801	0.0	11.2	3.600	0.0	11.2
1.200	0.0	11.2	3.800	0.0	11.2
1.400	0.0	11.2	4.000	0.0	11.2
1.600	0.0	11.2	4.200	0.0	11.2
1.800	0.0	11.2	4.400	0.0	11.2
2.000	0.0	11.2	4.600	0.0	11.2
2.200	0.0	11.2	4.800	0.0	11.2
2.400	0.0	11.2	5.000	0.0	11.2