Project Title

Report to Discharge Drainage Related Planning Condition

At

Rear garden of 25 Ladybarn Road
Fronting Mosley Road
Manchester
M14 6NR

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1.0 Introduction

1.1 In December 2020 a planning application was submitted to Manchester City Council for the Erection of two no. three storey four bed semi-detached residential houses with associated parking and landscaping on land to the rear garden of 25 Ladybarn Road, Fronting Moseley Road, Manchester, M14 6NR.

1.2 Planning approval, ref 128939/FO/2020 was granted in February 2021 that included a planning condition relating to the drainage of the development.

1.3 This report has been prepared to remove this condition; number 12.

2.0 Drainage Strategy

2.1 Existing Drainage

2.1.1 A review of the United Utilities adopted sewer records has identified no public sewers passing through the site.

2.1.2 Within Mosely Road to the north there are a 525mm diameter and 1050mm diameter combined water sewer at 6m and 10m depths respectively. Immediately to the south of the site a 225mm diameter combined water sewer has been identified from a CCTV survey flowing west where it then turns south and outfalls to the 375mm diameter combined water sewer in Ladybarn Road.

2.1.3 No surface water sewers have been identified in close proximity.

2.1.4 The site itself is unmade with no positive drainage.

2.2 Existing Runoff

2.2.1 The site area is currently unmade and so is considered to be greenfield for drainage purposes. The greenfield rates have been calculated in the table below.

	Area (m^2)	1 year	Qbar	30 year	100 year
Greenfield Runoff Rates	320	0.1 l/s	0.1 l/s	0.1 l/s	0.1 l/s

Figure 1: Existing Greenfield Runoff Rates

2.2.3 Based on the findings above, the greenfield flow rate is too low and thus a peak flow rate not exceeding 2l/s will be applied.

2.3 Existing Geology

2.3.1 A trial pit was excavated by specialist consultant GeoAssist to a depth of 1.7m at the location of a potential soakaway. The ground conditions identified from this were circa 300mm of topsoil over brown slightly sandy silty clay.

2.3.2 The pit was filled with water to a depth of 0.9m. Over a period of 4 hours the water levels dropped by only 2mm. This generated an infiltration rate of less than 1.78×10^{-8}m/s.

2.3.3 Due to the depth of identified clay and the infiltration results, it was concluded that infiltration is not a viable method for surface water management.

2.3.4 Refer to Appendix C for further details of the testing.

2.4 Hydrological Assessment

2.4.1 A 1500x1220mm culverted watercourse known as Fallowfield Brook is identified on a number of maps to pass beneath Moseley Road. However, as access is not possible, the existing alignment and depth is unknown.

2.4.2 Due to this unknown location and disruptions caused by closing Moseley road, a significant arterial route, this option has been discounted.

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	No	A site-specific trial pit has confirmed that the underlying ground to encompass clays to depth with no movement in water levels from the testing. In light of these findings infiltration is not considered to be suitable.
Connection to Watercourse	No	A culverted watercourse is indicated to be located beneath Moseley Road. Connection discounted due to unknown alignment & depth, plus road closure needed within significant highway.
Connection to Surface Water Sewer	No	No surface water sewer in close proximity
Connection to Combined Water Sewer	Yes	New connection to combined water sewer immediately to the south of the site.

Figure 2: SuDS Hierarchal Approach

2.6 Surface Water Drainage Strategy

2.6.1 The general principal of the surface water drainage strategy is to collect the runoff from the roof of the new residential building, and direct it to a number of RWPs. These will then drop down to a new private surface water network that will outfall to the existing 225mm combined sewer immediately south of the site. The flows will be restricted to 2l/s by the inclusion of a hydrobrake flow control within the last chamber. Due to this restriction, attenuation will take the form of a small online geocellular tank.

2.6.2 A hydraulic model has been simulated within the Microdrainage design software and confirms that no flooding will occur up the extreme 100 year + 45% CC storm event. The drainage GA can be found in Appendix A with the calculations in Appendix B. The post development peak runoff rates from the model can be identified in Figure 3 below.

	1 year	30 year	100 year + 45% CC
Post Development Peak Runoff Rates	1.5 l/s	1.9 l/s	1.9 l/s

Figure 3: Post Development Peak Runoff Rates

2.7 Foul Flows

2.7.1 Foul flows generated by the new development will discharge via a new below ground foul drainage network and outfall to the same combined sewer.

2.8 Maintenance

2.8.1 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.

2.8.2 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.'*

2.8.3 Specific maintenance needs should be monitored, and maintenance schedules adjusted to suit the location and condition of the drainage feature in question.

Operation and Maintenance Activity	SuDS Component		
	Piped Network / Inspection Chambers	Flow Controls	Attenuation Storage Tanks
Regular Maintenance			
Inspection	■	■	■
Litter and debris removal	■	■	
Occasional Maintenance			
Sediment management[1]	■	■	■
Remedial Maintenance			
Structure rehabilitation / repair	□	□	□

■ Will be required □ May be required.
[1] Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

Figure 4: Extract from The SuDS Manual Table 32.1: Typical key SuDS components operation and maintenance activities.

2.8.4 Piped Networks, Inspection, Manhole and Catchpit Chambers

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 where required.

Pipes are proprietary products, and the materials can vary across the site and as such where used the manufacture's recommendations should be followed.

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.

Access for maintenance is provided through access chambers and manholes.

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 5: Operation and Maintenance Requirements of Piped Networks and Inspection Chambers

2.8.5 Flow Control Units

The flow control units are intended for flood control and flow restriction.

The flow control is specified as an orifice plate and is a proprietary product; therefore, manufacturer's recommendations should also be taken into consideration.

Access for maintenance has been provided by locating within manhole chambers.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance	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 and flow control chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets.	As required.

Figure 6: Operation and Maintenance Requirements for Flow Controls

2.8.6 Attenuation storage tanks

Attenuation storage tanks are used to create a below ground void space for the temporary storage of surface water before controlled release. The flexibility in size and shape of the tanks mean that they can be tailored to suit the specific characteristics of any site. The main benefits are their high storage volume and the potential for installation beneath roads and car parks.

Attenuation Storage Tanks should be designed to prevent or minimise the risk of sediment ingress into the tank systems. An off-line storage system will be used on this scheme as they are less prone to sedimentation, a sediment sump will also be included immediately upstream of the tank.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly	Monthly for 3 months, then annually
	Remove debris from the catchment surface	Monthly
	Inspect inlets, outlets and overflow for blockages, and clear if required	Monthly
Occasional Maintenance	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
	Survey inside of tank for sediment build-up and remove if necessary	As required

Figure 7: Operation and Maintenance Requirements for Attenuation Storage Tanks

3.0 Drainage Related Planning Condition and Responses

3.1 Planning Conditions

3.1.1 The detailed planning conditions are listed below in *italics* with the PG Consulting response in Blue below.

Condition 12

Before the development hereby approved commences, a drainage strategy including the details of separate drainage systems for foul and surface water, shall be submitted to and approved in writing by the City Council. The approved scheme shall be implemented in full as part of the development.

3.2.2 In October 2023, Manchester LLFA were consulted on the discharge of the condition. They subsequently required further information to discharge the condition. The points are listed below in *italics* with the PG Consulting response in Blue beneath each.

- *Surface water drainage layout including all components, levels, connectivity and proposed overland flow routes for extreme events.*

  Refer to the drainage GA in Appendix A. No overland flooding has been indicated from the hydraulic modelling. The building will however be elevated above the surrounding pathways and driveway such that there is no risk of flooding.

- *Details of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment. Provide at least a 50% reduction in runoff rate compared to the existing rates, as the site is located within Conurbation Core Critical Drainage Area.*

  A peak discharge rate of 2l/s will be applied. This is considered the minimum rate to prevent blockage. The Drainage Ga indicates the attenuation location, with the volume defined in the calculations.

- *A blockage risk assessment is undertaken as part of the drainage strategy to support proposed flows less than 5 l/s. If the risk cannot be adequately managed, a higher minimum discharge rate should be considered / agreed with relevant.*

  The drainage network is collecting the roof water only and so there is limited risk of debris entering. Furthermore the catchpit at the base of the flow control will collect surplus silts and be regularly emptied.

- *Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice.*

  A Part 1 connection application has been submitted to UU. They will accept connection to the sewer once the LLFA discharge the planning condition.

- *Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100-year rainfall event with allowance for 45% climate change in any part of a building;*

  Refer to the hydraulic calculations in Appendix B that indicate no flooding for the 100yr + 45% CC event.

- *Hydraulic calculations to support the drainage proposal.*

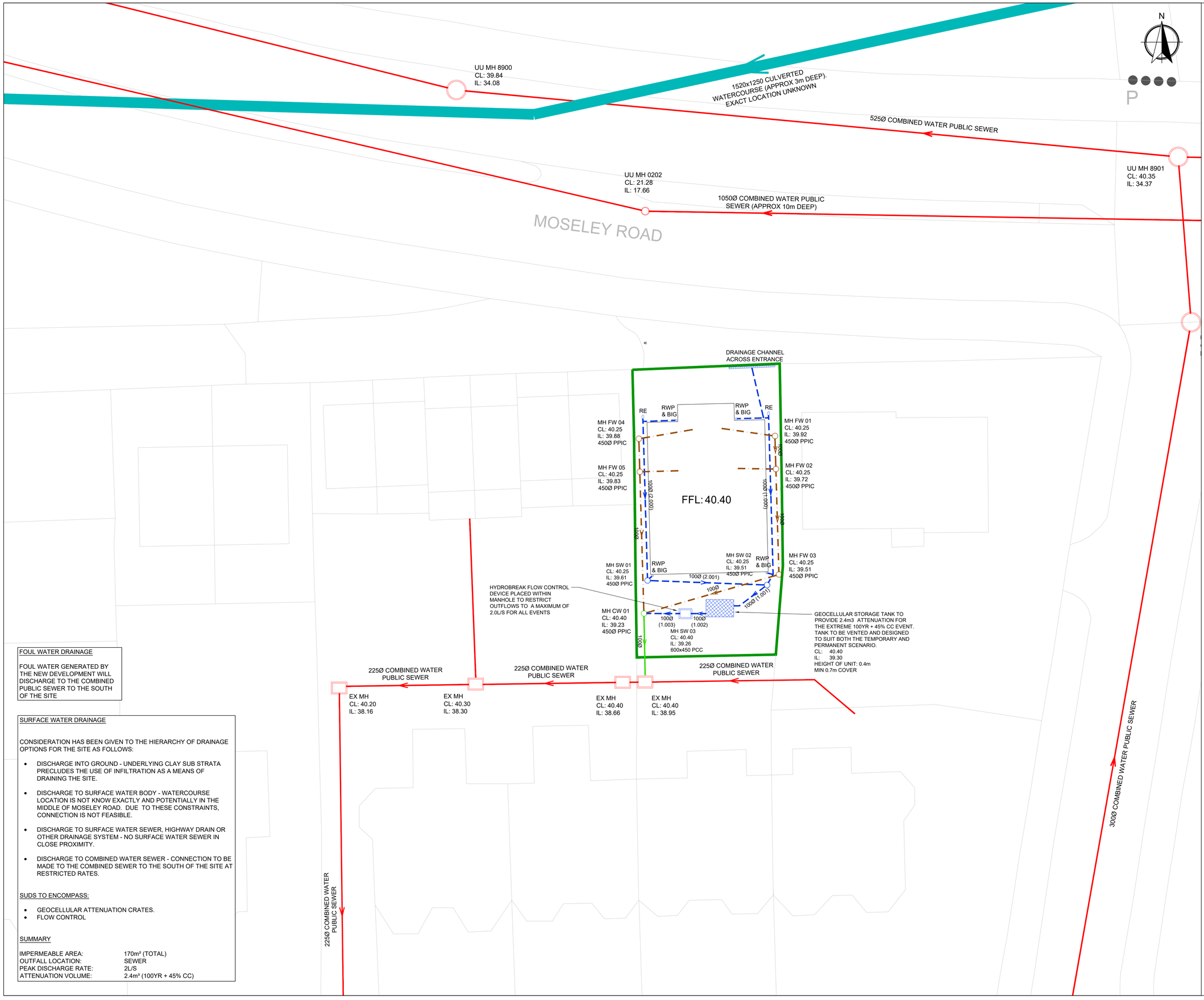
  Refer to the hydraulic calculations in Appendix B that indicate no flooding for the 100yr + 45% CC event.

- *Details of how the scheme shall be maintained and managed after completion.*

  Refer to Section 2.8 for full details of the management and maintenance of the drainage features.

Appendix A – PG Consulting Drawing

PGC 856-C-001: Drainage GA



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.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. DETAILS OF EXISTING SEWERS SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO THE COMMENCEMENT OF WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY. THE CONTRACTOR SHOULD CHECK THE LEVELS OF ALL NEW OUT FALLS IN RELATION TO EXISTING SEWERS PRIOR TO ANY CONSTRUCTION TO ENSURE THE PROPOSED DESIGN CAN BE ACHIEVED.
4. DO NOT SCALE FROM THIS DRAWN, WORK TO DIMENSIONS OR COORDINATES PROVIDED. ALL LEVELS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY.

KEY

- EXISTING COMBINED WATER PUBLIC SEWER
- EXISTING CULVERTED WATERCOURSE
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- SITE BOUNDARY

NOTE ALL RWP AND SVP LOCATIONS TO BE CONFIRMED BY OTHERS

ALL PIPEWORK TO BE 100Ø UNLESS NOTED OTHERWISE

FOUL WATER DRAINAGE

FOUL WATER GENERATED BY THE NEW DEVELOPMENT WILL DISCHARGE TO THE COMBINED PUBLIC SEWER TO THE SOUTH OF THE SITE

SURFACE WATER DRAINAGE

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

- DISCHARGE INTO GROUND - UNDERLYING CLAY SUB STRATA PRECLUDES THE USE OF INFILTRATION AS A MEANS OF DRAINING THE SITE.
- DISCHARGE TO SURFACE WATER BODY - WATERCOURSE LOCATION IS NOT KNOW EXACTLY AND POTENTIALLY IN THE MIDDLE OF MOSELEY ROAD. DUE TO THESE CONSTRAINTS, CONNECTION IS NOT FEASIBLE.
- DISCHARGE TO SURFACE WATER SEWER, HIGHWAY DRAIN OR OTHER DRAINAGE SYSTEM - NO SURFACE WATER SEWER IN CLOSE PROXIMITY.
- DISCHARGE TO COMBINED WATER SEWER - CONNECTION TO BE MADE TO THE COMBINED SEWER TO THE SOUTH OF THE SITE AT RESTRICTED RATES.

SUDS TO ENCOMPASS:

- GEOCELLULAR ATTENUATION CRATES.
- FLOW CONTROL

SUMMARY

IMPERMEABLE AREA:	170m² (TOTAL)
OUTFALL LOCATION:	SEWER
PEAK DISCHARGE RATE:	2L/S
ATTENUATION VOLUME:	2.4m³ (100YR + 45% CC)

REV	DATE	DRAWN	REV'D ENG.	NOTES
P1	24.10.23	PG	PG	PRELIMINARY ISSUE

CLIENT
AIRSHACK PROJECTS LIMITED

PROJECT
LAND OFF MOSELEY ROAD, FALLOWFIELD

DRAWING TITLE
DRAINAGE GA PLAN

DRAWING STATUS
INFORMATION

SCALE	DRAWN BY	ENGINEER	SHEET
1:150	PG	PG	A1

DRAWING No	REVISION
PGC856-C-001	P1

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Appendix B – Hydraulic Calculations

	Moseley Road, Fallowfield SW Network
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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	4	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.371	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.015	4-8	0.002

Total Area Contributing (ha) = 0.017

Total Pipe Volume (m³) = 0.408

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	15.000	0.240	62.5	0.010	4.00	0.0	0.600	o	100	Pipe/Conduit	
2.000	14.000	0.140	100.0	0.004	4.00	0.0	0.600	o	100	Pipe/Conduit	
2.001	10.000	0.100	100.0	0.003	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	4.000	0.210	19.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.002	2.000	0.040	50.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.26	39.750	0.010	0.0	0.0	0.0	0.98	7.7	1.4
2.000	50.00	4.30	39.750	0.004	0.0	0.0	0.0	0.77	6.0	0.5
2.001	50.00	4.52	39.610	0.007	0.0	0.0	0.0	0.77	6.0	0.9
1.001	50.00	4.56	39.510	0.017	0.0	0.0	0.0	1.78	14.0	2.3
1.002	50.00	4.59	39.300	0.017	0.0	0.0	0.0	1.09	8.6	2.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.003	2.000	0.030	66.7	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.004	5.000	0.086	58.1	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.003	50.00	4.62	39.260	0.017	0.0	0.0	0.0	0.94	7.4	2.3
1.004	50.00	4.71	39.230	0.017	0.0	0.0	0.0	1.01	7.9	2.3

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	100	RE	40.250	39.750	0.400	Open Manhole	100
2.000	o	100	RE	40.250	39.750	0.400	Open Manhole	100
2.001	o	100	SW01	40.250	39.610	0.540	Open Manhole	450
1.001	o	100	SW02	40.250	39.510	0.640	Open Manhole	450
1.002	o	100	TANK	40.400	39.300	1.000	Open Manhole	100
1.003	o	100	SW03	40.400	39.260	1.040	Open Manhole	450
1.004	o	100	CW01	40.400	39.230	1.070	Open Manhole	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	15.000	62.5	SW02	40.250	39.510	0.640	Open Manhole	450
2.000	14.000	100.0	SW01	40.250	39.610	0.540	Open Manhole	450
2.001	10.000	100.0	SW02	40.250	39.510	0.640	Open Manhole	450
1.001	4.000	19.0	TANK	40.400	39.300	1.000	Open Manhole	100
1.002	2.000	50.0	SW03	40.400	39.260	1.040	Open Manhole	450
1.003	2.000	66.7	CW01	40.400	39.230	1.070	Open Manhole	450
1.004	5.000	58.1	existing	40.400	39.144	1.156	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.004	existing	40.400	39.144	38.950	0	0

Simulation Criteria for Storm

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

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

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Simulation Criteria for Storm

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	4	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.371		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW03, DS/PN: 1.003, Volume (m³): 0.2

Unit Reference	MD-SHE-0067-2000-1000-2000
Design Head (m)	1.000
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	67
Invert Level (m)	39.260
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	2.0
Flush-Flo™	0.296	1.9
Kick-Flo®	0.599	1.6
Mean Flow over Head Range	-	1.7

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	1.6	1.200	2.2	3.000	3.3	7.000	4.9
0.200	1.9	1.400	2.3	3.500	3.5	7.500	5.1
0.300	1.9	1.600	2.5	4.000	3.8	8.000	5.2
0.400	1.9	1.800	2.6	4.500	4.0	8.500	5.4
0.500	1.8	2.000	2.7	5.000	4.2	9.000	5.5
0.600	1.6	2.200	2.9	5.500	4.4	9.500	5.7
0.800	1.8	2.400	3.0	6.000	4.6		
1.000	2.0	2.600	3.1	6.500	4.7		

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	Moseley Road, Fallowfield SW Network
Date 25/10/2023 File Moseley Road Sw Network...	Designed by paulg Checked by
Innovyze	Network 2017.1.2

Storage Structures for Storm

Cellular Storage Manhole: TANK, DS/PN: 1.002

Invert Level (m) 39.300 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	5.8	5.8	5.200	0.0	9.9
0.420	5.8	9.8	5.600	0.0	9.9
0.430	0.0	9.9	6.000	0.0	9.9
1.200	0.0	9.9	6.400	0.0	9.9
1.600	0.0	9.9	6.800	0.0	9.9
2.000	0.0	9.9	7.200	0.0	9.9
2.400	0.0	9.9	7.600	0.0	9.9
2.800	0.0	9.9	8.000	0.0	9.9
3.200	0.0	9.9	8.400	0.0	9.9
3.600	0.0	9.9	8.800	0.0	9.9
4.000	0.0	9.9	9.200	0.0	9.9
4.400	0.0	9.9	9.600	0.0	9.9
4.800	0.0	9.9	10.000	0.0	9.9

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	Moseley Road, Fallowfield SW Network
Date 25/10/2023 File Moseley Road Sw Network...	Designed by paulg Checked by
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.371
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	RE	15 Winter	1	+0%	100/15 Winter				39.778
2.000	RE	15 Winter	1	+0%	100/15 Winter				39.770
2.001	SW01	15 Winter	1	+0%	100/15 Summer				39.636
1.001	SW02	15 Winter	1	+0%	100/15 Summer				39.538
1.002	TANK	15 Winter	1	+0%	30/15 Summer				39.355
1.003	SW03	15 Winter	1	+0%	30/15 Summer				39.351
1.004	CW01	15 Winter	1	+0%					39.261

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	RE	-0.072	0.000	0.18		1.3	OK	
2.000	RE	-0.080	0.000	0.09		0.5	OK	
2.001	SW01	-0.074	0.000	0.15		0.8	OK	
1.001	SW02	-0.072	0.000	0.18		2.1	OK	
1.002	TANK	-0.045	0.000	0.26		1.5	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.003	SW03	-0.009	0.000	0.30		1.5	OK	
1.004	CW01	-0.069	0.000	0.21		1.5	OK	

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	Moseley Road, Fallowfield SW Network
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.371
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	RE	15 Winter	30	+0%	100/15 Winter				39.796
2.000	RE	15 Winter	30	+0%	100/15 Winter				39.782
2.001	SW01	15 Summer	30	+0%	100/15 Summer				39.654
1.001	SW02	15 Summer	30	+0%	100/15 Summer				39.558
1.002	TANK	15 Winter	30	+0%	30/15 Summer				39.511
1.003	SW03	15 Winter	30	+0%	30/15 Summer				39.527
1.004	CW01	30 Winter	30	+0%					39.266

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	RE	-0.054	0.000	0.44		3.2	OK	
2.000	RE	-0.068	0.000	0.22		1.3	OK	
2.001	SW01	-0.056	0.000	0.40		2.2	OK	
1.001	SW02	-0.052	0.000	0.46		5.4	OK	
1.002	TANK	0.111	0.000	0.36		2.0	SURCHARGED	

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	Moseley Road, Fallowfield SW Network
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.003	SW03	0.167	0.000	0.40		1.9	SURCHARGED	
1.004	CW01	-0.064	0.000	0.27		1.9	OK	

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	Moseley Road, Fallowfield SW Network
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.371
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	RE	30 Winter	100	+45%	100/15 Winter				40.201
2.000	RE	30 Winter	100	+45%	100/15 Winter				40.210
2.001	SW01	30 Winter	100	+45%	100/15 Summer				40.202
1.001	SW02	30 Winter	100	+45%	100/15 Summer				40.213
1.002	TANK	30 Winter	100	+45%	30/15 Summer				40.236
1.003	SW03	30 Winter	100	+45%	30/15 Summer				40.254
1.004	CW01	30 Winter	100	+45%					39.266

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	RE	0.351	0.000	0.62		4.6	FLOOD RISK	
2.000	RE	0.360	0.000	0.32		1.8	FLOOD RISK	
2.001	SW01	0.492	0.000	0.54		3.0	FLOOD RISK	
1.001	SW02	0.603	0.000	0.58		6.8	FLOOD RISK	
1.002	TANK	0.836	0.000	0.41		2.3	FLOOD RISK	

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	Moseley Road, Fallowfield SW Network
Date 25/10/2023 File Moseley Road Sw Network...	Designed by paulg Checked by
Innovyze	Network 2017.1.2

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.003	SW03	0.894	0.000	0.40		1.9	FLOOD RISK	
1.004	CW01	-0.064	0.000	0.28		1.9	OK	

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Appendix C – Soakaway Test Results

GeoAssist Limited	Site:	Land to Rear of 25 Ladybarn Lane	
	Job Ref:	6070 VMF	TP1
Soil Infiltration Rate Test	Originator:	MB	
	Checked:	MR	
	Date:	06/11/2021	

Easting 385829.123 Northing 393906.469 Level (mAOD) 41.04

Test Pit Dimensions (m)
Inlet Pipe Invert Level (m) 0.5 Assumed

Width (m)	Length (m)	Depth (m)	Volume (m^3)	Effective Depth (m)
0.6	2.2	1.7	2.244	1.2

Test Results
Test Date: 15/09/2021

Groundwater: None
Soil Type: Made Ground to 0.30m
Brown slightly sandy silty CLAY to 1.70m

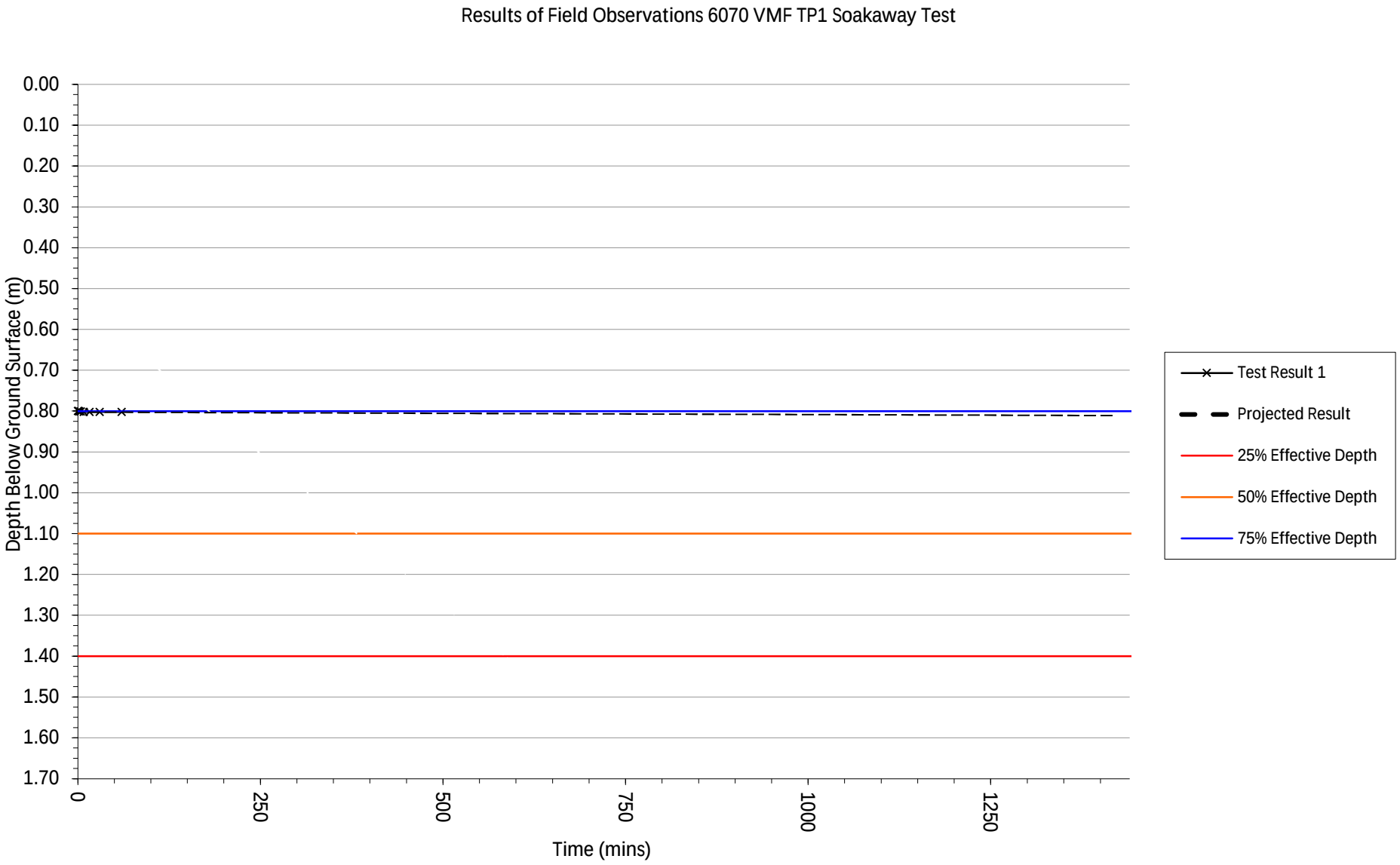
Date	Time (mins)	TEST 1 Depth Below Surface (m)	TEST 2 Depth Below Surface (m)	
15/09/2021	0	0.8		
15/09/2021	1	0.8		
15/09/2021	2	0.801		
15/09/2021	4	0.801		
15/09/2021	8	0.802		
15/09/2021	16	0.802		
15/09/2021	30	0.802		
15/09/2021	60	0.802		
15/09/2021	120	0.802		
15/09/2021	240	0.802		

Calculations

Effective Depth (m)					
75%	0.80		as_{50}	3.36	m^2
25%	1.40	0.675	V_{p75-25}	0.792	m^3
50%	1.10	1.225	a_{p50}	4.68	m^2
			t_{p75-25}	10000000	seconds projected (greater than)

Soil Infiltration Rate *f* Less than 1.7E-08 m/sec

Notes: Trial Pit did not half empty within 24 Hrs therefore test failed. Second refill not required. Soil infiltration rate Is not suitable for soakaway drainage


Results of Field Observations 6070 VMF TP1 Soakaway Test
Depth Below Ground Surface (m)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
1.70
0
250
500
750
1000
1250
Time (mins)
Test Result 1
Projected Result
25% Effective Depth
50% Effective Depth
75% Effective Depth

GeoAssist Limited	Site:	Land to Rear of 25 Ladybarn Lane	
	Job Ref:	6070 VMF	TP2
Soil Infiltration Rate Test	Originator:	MB	
	Checked:	MR	
	Date:	06/11/2021	

Easting 385830.747 Northing 393920.259 Level (mAOD) 40.71

Test Pit Dimensions (m)
Inlet Pipe Invert Level (m) 0.5 Assumed

Width (m)	Length (m)	Depth (m)	Volume (m^3)	Effective Depth (m)
0.6	2.6	1.85	2.886	1.35

Test Results
Test Date: 15/09/2021

Groundwater: None
Soil Type: Made Ground to 0.70m
Brown slightly sandy silty CLAY to 1.80m

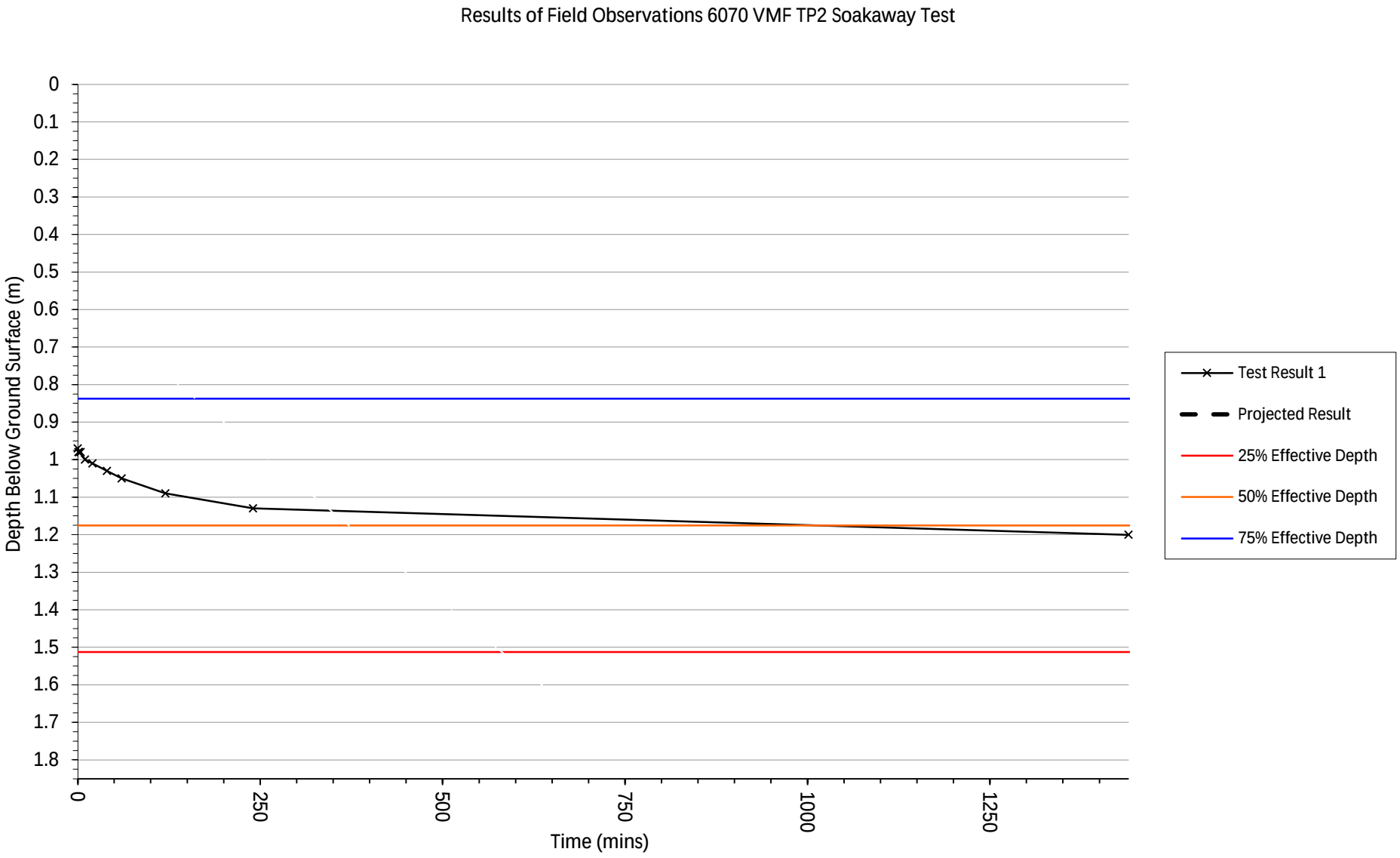
Date	Time (mins)	TEST 1 Depth Below Surface (m)	TEST 2 Depth Below Surface (m)	
15/09/2021	0	0.97		
15/09/2021	1	0.98		
15/09/2021	2	0.98		
15/09/2021	4	0.98		
15/09/2021	10	1		
15/09/2021	20	1.01		
15/09/2021	40	1.03		
15/09/2021	60	1.05		
15/09/2021	120	1.09		
15/09/2021	240	1.13		
15/09/2021	1440	1.2		

Calculations

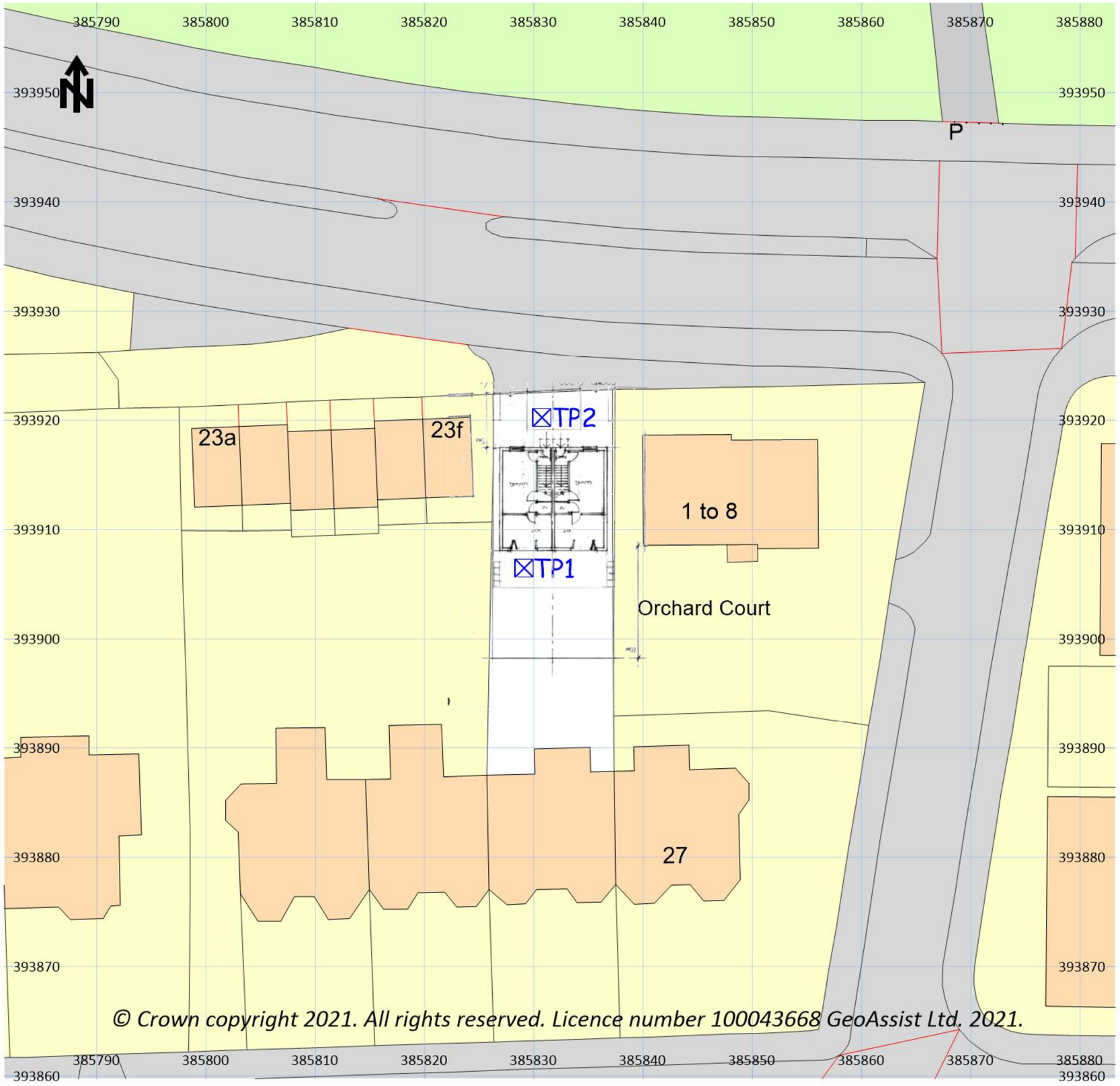
Effective Depth (m)					
75%	0.84		as_{50}	4.32	m^2
25%	1.51	0.675	V_{p75-25}	1.053	m^3
50%	1.18	1.225	a_{p50}	5.88	m^2
			t_{p75-25}	600000	seconds projected

Soil Infiltration Rate *f* 3.0E-07 m/sec

Notes: Trial Pit did not half empty within 24 Hrs therefore test failed. Second refill not required. Soil infiltration rate Is not suitable for soakaway drainage


Results of Field Observations 6070 VMF TP2 Soakaway Test
Depth Below Ground Surface (m)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
0
250
500
750
1000
1250
Time (mins)
Test Result 1
Projected Result
25% Effective Depth
50% Effective Depth
75% Effective Depth

6070GALv1.00



GeoAssist Limited
Civil, Environmental & Geotechnical
Telephone: +44 (0) 161 480 8885 e-mail : info@geoassist.co.uk

A1 Site Plan

Site Name	Land to rear of 25 Ladybarn Road
Location	Fallowfield, Manchester
GeoAssist Ref	6070VMF
Client	Airshack Projects Ltd
	396 Wilmsow Road Manchester M20 3BN
Planning Consultant	
NGR (centre of site)	385832,393909
Production Date	Sept 2021
Survey Method	
Surveyor	Others
Status	Final v1.00
Base Survey	OSGB36

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