



Project Title

Report to Discharge Drainage Related Planning Condition

At

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

PG Consulting
108 Ack Lane West
Cheadle Hulme
Cheshire
SK8 7ES

Tel: 07710 758971

Mail: Paul@pgcl.co.uk

Paul Graveney Consulting Ltd Trading as PG Consulting
Company Registration 11238546

Document Management

Project No.: PGC 856
Project Name: Moseley Road, Fallowfield.
Report Title: Report to Discharge Drainage Related Planning Condition
Issue: 1
Status: Final
Prepared By: Paul Graveney BEng, CEng, MICE

Document Revision

Issue	Status	Author	Approved	Date
1	Final	Paul Graveney	Paul Graveney	25/10/23

Distribution

Issue	Organisation	Quantity
1	APL	1

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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 Moseley 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.*

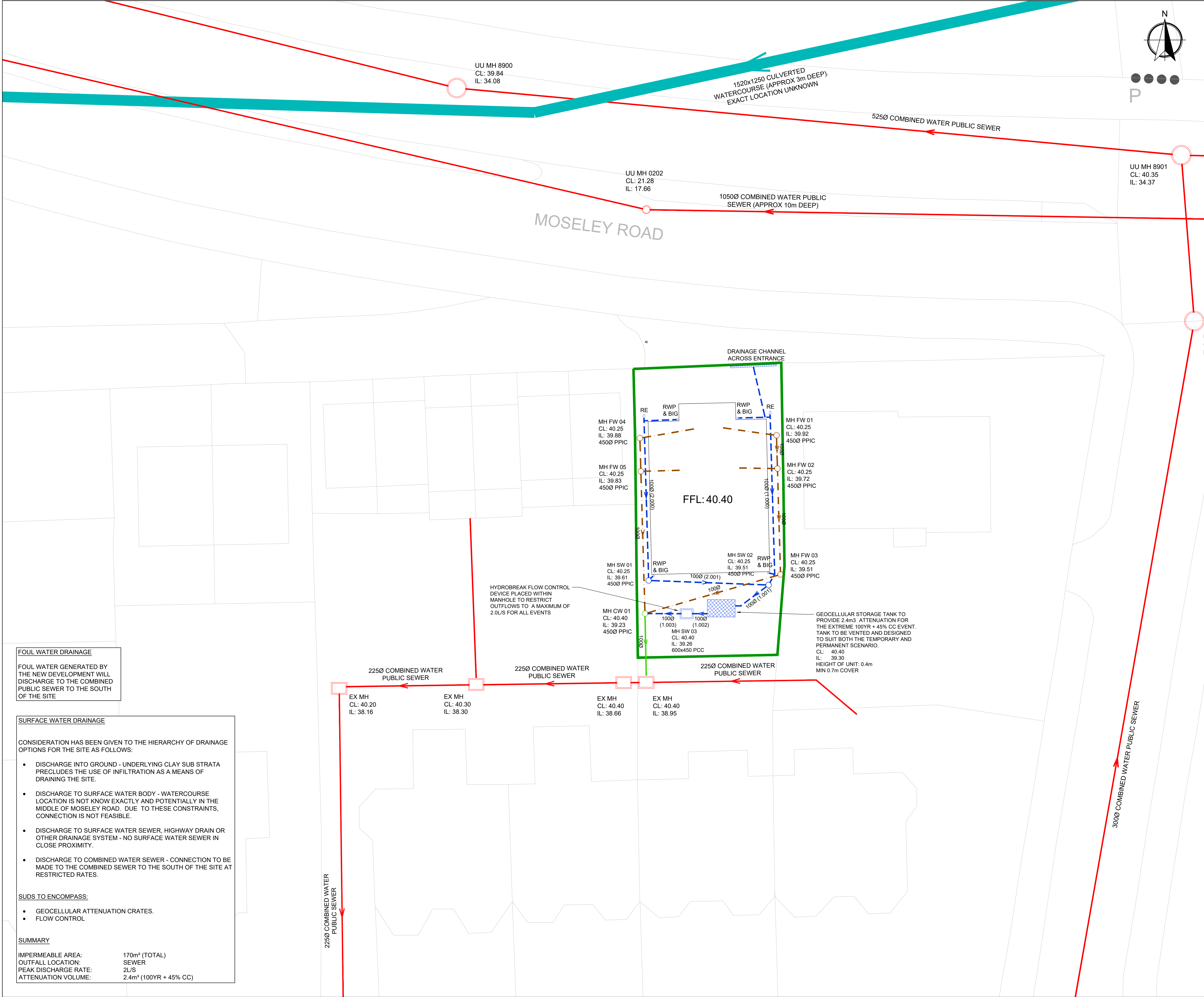
Refer to the hydraulic calculations in Appendix B that indicate no flooding for the 100yr + 45% CC event.

- *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

- 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.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- 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.
- 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 1000 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 KNOWN 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:

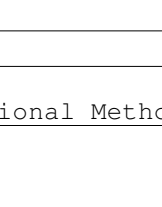
- GEOCELLULAR ATTENUATION CRATES.
- FLOW CONTROL

SUMMARY

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

P1	24.10.23	PG	PG	PRELIMINARY ISSUE
REV	DATE	DRAWN	REV'D	NOTES
CLIENT				
AIRSHACK PROJECTS LIMITED				
PROJECT				
LAND OFF MOSELEY ROAD, FALLOWFIELD				
DRAWING TITLE				
DRAINAGE GA PLAN				
DRAWING STATUS				
INFORMATION				
SCALE	1:150	DRAWN BY	PG	ENGINEER PG SHEET A1
DRAWING No				REVISION
PGC856-C-001				P1
PGConsulting		106 Ack Lane West, Cheadle Hulme, Cheshire, SK8 7ES		
Civil & Infrastructure Engineers		Tel: 07710 758971 Email: paul@pgcd.co.uk		

Appendix B – Hydraulic Calculations

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

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	Area	Time	Area
(mins)	(ha)	(mins)	(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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PIPELINE SCHEDULES for Storm Upstream Manhole <table><thead><tr><th>PN</th><th>Hyd Sect</th><th>Diam (mm)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>1.000</td><td>o</td><td>100</td><td>RE</td><td>40.250</td><td>39.750</td><td>0.400</td><td>Open Manhole</td><td>100</td></tr><tr><td>2.000</td><td>o</td><td>100</td><td>RE</td><td>40.250</td><td>39.750</td><td>0.400</td><td>Open Manhole</td><td>100</td></tr><tr><td>2.001</td><td>o</td><td>100</td><td>SW01</td><td>40.250</td><td>39.610</td><td>0.540</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.001</td><td>o</td><td>100</td><td>SW02</td><td>40.250</td><td>39.510</td><td>0.640</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.002</td><td>o</td><td>100</td><td>TANK</td><td>40.400</td><td>39.300</td><td>1.000</td><td>Open Manhole</td><td>100</td></tr><tr><td>1.003</td><td>o</td><td>100</td><td>SW03</td><td>40.400</td><td>39.260</td><td>1.040</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.004</td><td>o</td><td>100</td><td>CW01</td><td>40.400</td><td>39.230</td><td>1.070</td><td>Open Manhole</td><td>450</td></tr></tbody></table> Downstream Manhole <table><thead><tr><th>PN</th><th>Length (m)</th><th>Slope (1:X)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>1.000</td><td>15.000</td><td>62.5</td><td>SW02</td><td>40.250</td><td>39.510</td><td>0.640</td><td>Open Manhole</td><td>450</td></tr><tr><td>2.000</td><td>14.000</td><td>100.0</td><td>SW01</td><td>40.250</td><td>39.610</td><td>0.540</td><td>Open Manhole</td><td>450</td></tr><tr><td>2.001</td><td>10.000</td><td>100.0</td><td>SW02</td><td>40.250</td><td>39.510</td><td>0.640</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.001</td><td>4.000</td><td>19.0</td><td>TANK</td><td>40.400</td><td>39.300</td><td>1.000</td><td>Open Manhole</td><td>100</td></tr><tr><td>1.002</td><td>2.000</td><td>50.0</td><td>SW03</td><td>40.400</td><td>39.260</td><td>1.040</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.003</td><td>2.000</td><td>66.7</td><td>CW01</td><td>40.400</td><td>39.230</td><td>1.070</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.004</td><td>5.000</td><td>58.1</td><td>existing</td><td>40.400</td><td>39.144</td><td>1.156</td><td>Open Manhole</td><td>0</td></tr></tbody></table> Free Flowing Outfall Details for Storm <table><thead><tr><th>Outfall Pipe Number</th><th>Outfall Name</th><th>C. Level (m)</th><th>I. Level (m)</th><th>Min I. 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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 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>5.8</td><td>5.8</td><td>5.200</td><td>0.0</td><td>9.9</td></tr><tr><td>0.420</td><td>5.8</td><td>9.8</td><td>5.600</td><td>0.0</td><td>9.9</td></tr><tr><td>0.430</td><td>0.0</td><td>9.9</td><td>6.000</td><td>0.0</td><td>9.9</td></tr><tr><td>1.200</td><td>0.0</td><td>9.9</td><td>6.400</td><td>0.0</td><td>9.9</td></tr><tr><td>1.600</td><td>0.0</td><td>9.9</td><td>6.800</td><td>0.0</td><td>9.9</td></tr><tr><td>2.000</td><td>0.0</td><td>9.9</td><td>7.200</td><td>0.0</td><td>9.9</td></tr><tr><td>2.400</td><td>0.0</td><td>9.9</td><td>7.600</td><td>0.0</td><td>9.9</td></tr><tr><td>2.800</td><td>0.0</td><td>9.9</td><td>8.000</td><td>0.0</td><td>9.9</td></tr><tr><td>3.200</td><td>0.0</td><td>9.9</td><td>8.400</td><td>0.0</td><td>9.9</td></tr><tr><td>3.600</td><td>0.0</td><td>9.9</td><td>8.800</td><td>0.0</td><td>9.9</td></tr><tr><td>4.000</td><td>0.0</td><td>9.9</td><td>9.200</td><td>0.0</td><td>9.9</td></tr><tr><td>4.400</td><td>0.0</td><td>9.9</td><td>9.600</td><td>0.0</td><td>9.9</td></tr><tr><td>4.800</td><td>0.0</td><td>9.9</td><td>10.000</td><td>0.0</td><td>9.9</td></tr></tbody></table>			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
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																	
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Date 25/10/2023		Designed by paulg							
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Innovyze		Network 2017.1.2							
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 Coefficient 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									
Water									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	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
Surcharged Flooded						Pipe			
PN	US/MH Name	Depth (m)	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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Innovyze		Network 2017.1.2							
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							
Water Level									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	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
Surcharged Flooded						Pipe			
PN	US/MH Name	Depth (m)	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



Date 25/10/2023

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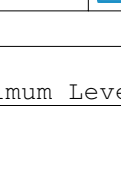
Checked by

Innovyze

Network 2017.1.2

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

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

		Moseley Road, Fallowfield SW Network	Page 11
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Innovyze		Network 2017.1.2	

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 Coefficient	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) Surge	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

Surcharged Flooded					Pipe		
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	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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Appendix C – Soakaway Test Results

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

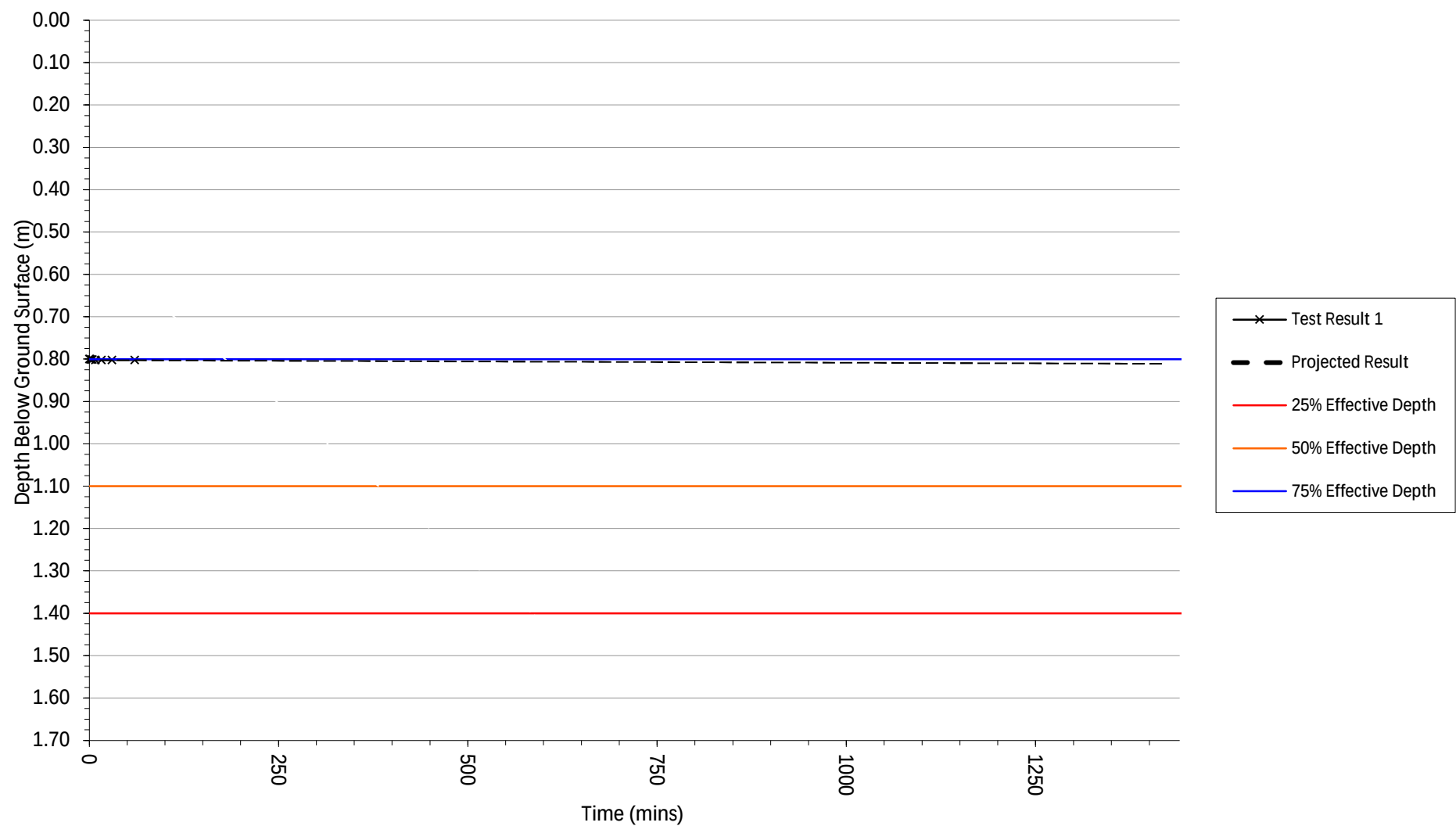
Effective Depth (m)	
75%	0.80
25%	1.40
50%	1.10

$a s_{50}$ 3.36 m²
 $0.675 V_{p75-25}$ 0.792 m³
 $1.225 a_{p50}$ 4.68 m²
 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



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

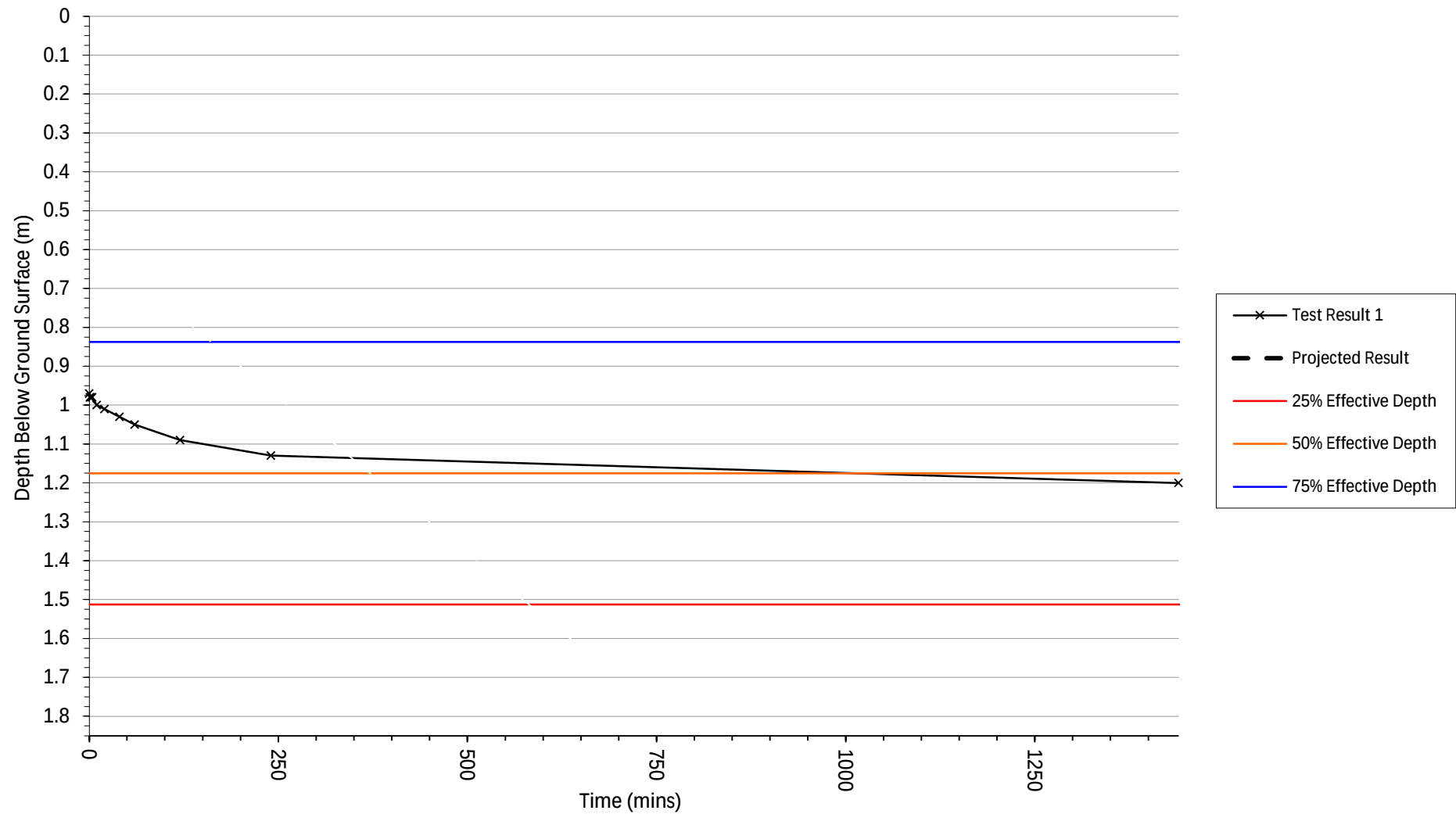
Effective Depth (m)	
75%	0.84
25%	1.51
50%	1.18

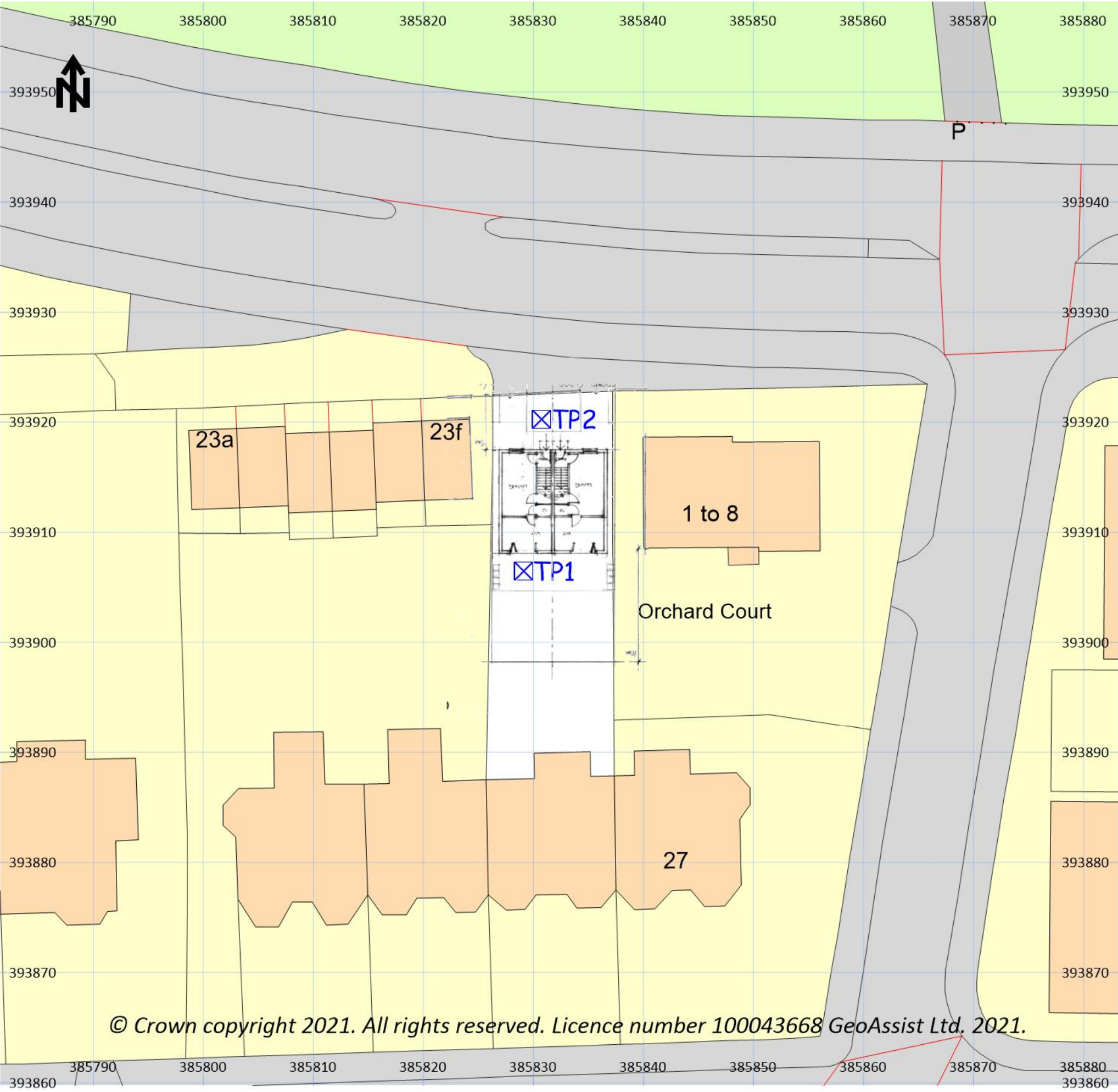
$$\begin{aligned}
 &as_{50} && 4.32 \text{ m}^2 \\
 &0.675 V_{p75-25} && 1.053 \text{ m}^3 \\
 &1.225 a_{p50} && 5.88 \text{ m}^2 \\
 &t_{p75-25} && 600000 \text{ seconds projected}
 \end{aligned}$$

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





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