

DRAINAGE CONDITION REPORT

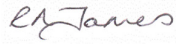
for

SEVA PATIDAR LTD

at

115 SALE ROAD, MANCHESTER

Quality Management

Job No	12321		
Project	115 Sale Road, Manchester		
Location	Manchester		
Title	Drainage Condition Report		
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Date	5 th March 2021		
Prepared by	R Andrew James MEng CEng MStructE	Signature (for file)	
Checked by	David Grundy BEng(hons) CEng MStructE MICE	Signature (for file)	

Revision History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked
01	05.03.21	Final Issue	AJ	DG

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Appendix A – Marston & Grundy Drawings

Appendix B – Hydraulic Calculations

Appendix A – Infiltration Test Results

1 Introduction

- 1.1 In 2020 a planning application was submitted to Manchester Council for the construction of 9 self contained flats over three storeys with associated car parking and landscaping works on land off 115 Sale Road, Manchester. No Drainage information was submitted with the application. Planning approval was granted in October 2020 (Ref: 127586/FO/2020) subject to a number of planning conditions, including one condition relating to the drainage of the development.
- 1.2 This report has been prepared to remove the drainage related planning condition relevant to the application. This is condition No. 10.

2 Drainage Strategy

2.1 Existing Drainage

The United Utilities sewer records have been reviewed and confirms there is a 225mm diameter combined water sewer passing within the site to the south. There is also a 450mm diameter combined water sewer within Sale road to the north.

The current site is unmade and no existing drainage has been identified.

Figure 1 below identifies the existing sewer records.

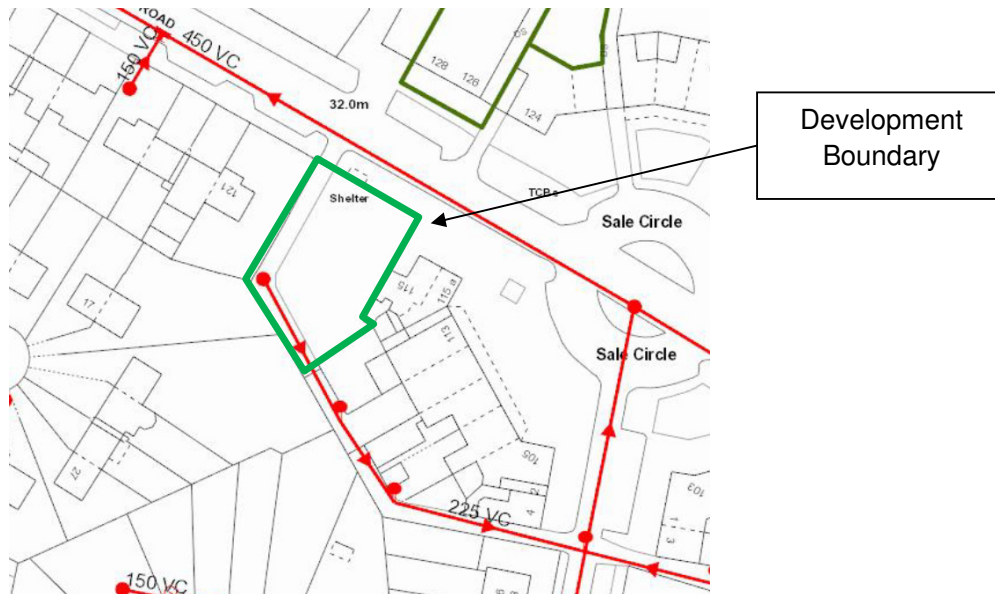


Figure 1: UU sewer Records

2.2 Geotechnical Assessment

A full Phase 2 site investigation has been completed at the site and found the underlying ground to be sand and thus suitable for infiltration. Soakaway tests have been completed with an extract below

Soakaway tests

The soakaway was undertaken within TP1, targeting the granular Glaciofluvial Sheet Deposits (Sand), between 0.9m and 2.0m bgl. The test was repeated three times and the results of the testing in TP1 indicates a soil infiltration rate of approximately 1×10^{-4} m/s.

Full details of the test results can be found in Appendix C.

2.3 SuDS Hierarchal Approach

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	Investigation of local ground conditions has confirmed that the underlying ground is suitable for infiltration.
Connection to Watercourse	No	There is no watercourse in close proximity to the site.
Connection to Surface Water Sewer	No	There is no surface water sewer in close proximity to the site.
Connection to Combined Water Sewer	No	Higher options possible.

Figure 2: SuDS Hierarchal Approach

2.4 Surface Water Drainage Strategy

The general principal of the surface water drainage strategy is to collect the runoff from the roofs of the new apartment block building and direct it to a number of new RWP's that will drop down to a new surface water network on either side. The access road and car park is also hard paved and will be collected in this same network. The new drainage will then outfall to a geocellular soakaway chamber in the centre of the car park.

Full calculations have been carried out and show no flooding up to and including the 100yr + 40% climate change storm event.

2.5 Maintenance

The long-term maintenance of the new drainage infrastructure will be with the owners / occupiers of the new apartments or potentially a management company in line with best practice guidance. Annual inspections will need to be carried out and clearing of gullies, channel drains and catch pits constructed.

3 Drainage Related Planning Condition and Responses

3.1 Planning Conditions

The specific condition is written below with the M&G response in Blue beneath

Condition 10.

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 local planning authority. The development shall be constructed and completed in accordance with the approved details.

The scheme shall also include:

- 1 Evidence that the drainage hierarchy has been followed for surface water runoff management;*
- 2 Surface water drainage layout including discharge points, proposed attenuation and proposed overland flow routes for extreme events (up to a 1 in 100 year including climate change allowance);*
- 3 Details of surface water attenuation that offers a reduction in surface water runoff rate to greenfield runoff rates;*
- 4 Assessment of overland flow routes for extreme events (exceedance of design capacity, blockages of drainage elements including inlets or surcharge of discharge outfalls) that is diverted away from buildings. The flood water should be routed towards the less vulnerable areas i.e. open spaces, car parks and roads. FFLs to be at least 150mm higher than cover levels of adjacent manholes and inlet structures wherever practicable - in cases when that is not feasible, mitigation measures need to be proposed in a form of interception inlet drains or similar. A layout with overland flow routes needs to be presented with appreciation of these overland flow routes with regards to the properties on site and adjacent properties off site.*
- 5 Hydraulic calculations to support the drainage proposal.*
- 6 Details of how the scheme shall be maintained and managed after completion.*

As described in Section 2, an assessment of the existing ground conditions and a full assessment of the SuDS Hierarchal approach has been considered. This has determined that the surface water discharge option is to outfall to a soakaway chamber.

The drainage GA drawing in Appendix A and calculations in Appendix B define further.

Below is the M&G response to the 6 points raised in the condition

1. Infiltration testing has proven that the ground is suitable for soakaways which is on top of the SuDS hierarchal approach.
2. Appendix A provides the drainage GA. Calculations in Appendix B has proven there is no exceedance flooding.

3. Attenuation will take the form of a geocellular infiltration tank. Thus no flows discharging off site.
4. The building is elevated above the adjoining pathways, access road and car park. Any exceedance from blockage will be retained on the access road and car park and not pose a risk to the new building or adjacent properties.
5. Refer to Appendix B for the hydraulic calculations.
6. All the drainage is standard drainage pipes, manholes and gullies. Details for maintaining the geocellular soakaway will be in line with Ciria guidance as indicated below

TABLE 13.1 Operation and maintenance requirements for soakaways

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Appendix A – Marston & Grundy Drawings

Appendix B – Hydraulic Calculations

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	115 Sale Road Surface Water Network	
Date 07/03/2021 20:20 File Sale Road - SW Calcs.MDX	Designed by paulg 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)	2	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.370	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	0.059	4-8	0.010

Total Area Contributing (ha) = 0.069

Total Pipe Volume (m³) = 0.795

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	17.000	0.170	100.0	0.014	4.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	9.000	0.090	100.0	0.007	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.002	11.000	0.110	100.0	0.003	0.00	0.0	0.600	o	100	Pipe/Conduit	
2.000	11.000	0.110	100.0	0.010	4.00	0.0	0.600	o	100	Pipe/Conduit	
2.001	24.000	0.410	58.5	0.007	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	4.37	31.100	0.014	0.0	0.0	0.0	0.77	6.0	1.9
1.001	50.00	4.56	30.930	0.021	0.0	0.0	0.0	0.77	6.0	2.8
1.002	50.00	4.80	30.840	0.024	0.0	0.0	0.0	0.77	6.0	3.2
2.000	50.00	4.24	31.250	0.010	0.0	0.0	0.0	0.77	6.0	1.4
2.001	50.00	4.64	31.140	0.017	0.0	0.0	0.0	1.01	7.9	2.3

		115 Sale Road Surface Water Network		Page 3																																																																																																																																																																																																			
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<u>PIPELINE SCHEDULES for Storm</u> <u>Upstream Manhole</u> <table><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><tr><td>1.000</td><td>o</td><td>100</td><td>S1</td><td>32.100</td><td>31.100</td><td>0.900</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.001</td><td>o</td><td>100</td><td>S2</td><td>32.100</td><td>30.930</td><td>1.070</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.002</td><td>o</td><td>100</td><td>S3</td><td>32.100</td><td>30.840</td><td>1.160</td><td>Open Manhole</td><td>450</td></tr><tr><td>2.000</td><td>o</td><td>100</td><td>RE</td><td>32.150</td><td>31.250</td><td>0.800</td><td>Open Manhole</td><td>450</td></tr><tr><td>2.001</td><td>o</td><td>100</td><td>S4</td><td>32.150</td><td>31.140</td><td>0.910</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.003</td><td>o</td><td>150</td><td>S5</td><td>32.100</td><td>30.680</td><td>1.270</td><td>Open Manhole</td><td>1200</td></tr><tr><td>1.004</td><td>o</td><td>150</td><td>DUMMY</td><td>32.100</td><td>30.200</td><td>1.750</td><td>Open Manhole</td><td>1200</td></tr></table> <u>Downstream Manhole</u> <table><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><tr><td>1.000</td><td>17.000</td><td>100.0</td><td>S2</td><td>32.100</td><td>30.930</td><td>1.070</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.001</td><td>9.000</td><td>100.0</td><td>S3</td><td>32.100</td><td>30.840</td><td>1.160</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.002</td><td>11.000</td><td>100.0</td><td>S5</td><td>32.100</td><td>30.730</td><td>1.270</td><td>Open Manhole</td><td>1200</td></tr><tr><td>2.000</td><td>11.000</td><td>100.0</td><td>S4</td><td>32.150</td><td>31.140</td><td>0.910</td><td>Open Manhole</td><td>450</td></tr><tr><td>2.001</td><td>24.000</td><td>58.5</td><td>S5</td><td>32.100</td><td>30.730</td><td>1.270</td><td>Open Manhole</td><td>1200</td></tr><tr><td>1.003</td><td>3.000</td><td>100.0</td><td>DUMMY</td><td>32.100</td><td>30.650</td><td>1.300</td><td>Open Manhole</td><td>1200</td></tr><tr><td>1.004</td><td>10.000</td><td>99.0</td><td>ground</td><td>32.100</td><td>30.099</td><td>1.851</td><td>Open Manhole</td><td>0</td></tr></table> <u>Free Flowing Outfall Details for Storm</u> <table><tr><th>Outfall Pipe Number</th><th>Outfall Name</th><th>C. Level (m)</th><th>I. Level (m)</th><th>Min I. Level (m)</th><th>D, L (mm)</th><th>W (mm)</th></tr><tr><td>1.004</td><td>ground</td><td>32.100</td><td>30.099</td><td>30.000</td><td>0</td><td>0</td></tr></table> <u>Simulation Criteria for Storm</u> <table><tr><td>Volumetric Runoff Coeff</td><td>0.750</td><td>Additional Flow - % of Total Flow</td><td>0.000</td></tr><tr><td>Areal Reduction Factor</td><td>1.000</td><td>MADD Factor * 10m³/ha Storage</td><td>2.000</td></tr><tr><td>Hot Start (mins)</td><td>0</td><td>Inlet Coefficient</td><td>0.800</td></tr><tr><td>Hot Start Level (mm)</td><td>0</td><td>Flow per Person per Day (l/per/day)</td><td>0.000</td></tr><tr><td>Manhole Headloss Coeff (Global)</td><td>0.500</td><td>Run Time (mins)</td><td>60</td></tr><tr><td>Foul Sewage per hectare (l/s)</td><td>0.000</td><td>Output Interval (mins)</td><td>1</td></tr><tr><td>Number of Input Hydrographs</td><td>0</td><td>Number of Storage Structures</td><td>1</td></tr><tr><td>Number of Online Controls</td><td>1</td><td>Number of Time/Area Diagrams</td><td>0</td></tr><tr><td>Number of Offline Controls</td><td>0</td><td>Number of Real Time Controls</td><td>0</td></tr></table> <u>Synthetic Rainfall Details</u>						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	S1	32.100	31.100	0.900	Open Manhole	450	1.001	o	100	S2	32.100	30.930	1.070	Open Manhole	450	1.002	o	100	S3	32.100	30.840	1.160	Open Manhole	450	2.000	o	100	RE	32.150	31.250	0.800	Open Manhole	450	2.001	o	100	S4	32.150	31.140	0.910	Open Manhole	450	1.003	o	150	S5	32.100	30.680	1.270	Open Manhole	1200	1.004	o	150	DUMMY	32.100	30.200	1.750	Open Manhole	1200	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	17.000	100.0	S2	32.100	30.930	1.070	Open Manhole	450	1.001	9.000	100.0	S3	32.100	30.840	1.160	Open Manhole	450	1.002	11.000	100.0	S5	32.100	30.730	1.270	Open Manhole	1200	2.000	11.000	100.0	S4	32.150	31.140	0.910	Open Manhole	450	2.001	24.000	58.5	S5	32.100	30.730	1.270	Open Manhole	1200	1.003	3.000	100.0	DUMMY	32.100	30.650	1.300	Open Manhole	1200	1.004	10.000	99.0	ground	32.100	30.099	1.851	Open Manhole	0	Outfall Pipe Number	Outfall Name	C. 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<u>Pump Manhole: DUMMY, DS/PN: 1.004, Volume (m³): 2.2</u>																																																																							
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<table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Flow (l/s)</th> </tr> </thead> <tbody> <tr><td>0.200</td><td>0.0000</td></tr> <tr><td>0.400</td><td>0.0000</td></tr> <tr><td>0.600</td><td>0.0000</td></tr> <tr><td>0.800</td><td>0.0000</td></tr> <tr><td>1.000</td><td>0.0000</td></tr> <tr><td>1.200</td><td>0.0000</td></tr> <tr><td>1.400</td><td>0.0000</td></tr> <tr><td>1.600</td><td>0.0000</td></tr> </tbody> </table>	Depth (m)	Flow (l/s)	0.200	0.0000	0.400	0.0000	0.600	0.0000	0.800	0.0000	1.000	0.0000	1.200	0.0000	1.400	0.0000	1.600	0.0000	<table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Flow (l/s)</th> </tr> </thead> <tbody> <tr><td>1.800</td><td>0.0000</td></tr> <tr><td>2.000</td><td>0.0000</td></tr> <tr><td>2.200</td><td>0.0000</td></tr> <tr><td>2.400</td><td>0.0000</td></tr> <tr><td>2.600</td><td>0.0000</td></tr> <tr><td>2.800</td><td>0.0000</td></tr> <tr><td>3.000</td><td>0.0000</td></tr> <tr><td>3.200</td><td>0.0000</td></tr> </tbody> </table>	Depth (m)	Flow (l/s)	1.800	0.0000	2.000	0.0000	2.200	0.0000	2.400	0.0000	2.600	0.0000	2.800	0.0000	3.000	0.0000	3.200	0.0000	<table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Flow (l/s)</th> </tr> </thead> <tbody> <tr><td>3.400</td><td>0.0000</td></tr> <tr><td>3.600</td><td>0.0000</td></tr> <tr><td>3.800</td><td>0.0000</td></tr> <tr><td>4.000</td><td>0.0000</td></tr> <tr><td>4.200</td><td>0.0000</td></tr> <tr><td>4.400</td><td>0.0000</td></tr> <tr><td>4.600</td><td>0.0000</td></tr> <tr><td>4.800</td><td>0.0000</td></tr> </tbody> </table>	Depth (m)	Flow (l/s)	3.400	0.0000	3.600	0.0000	3.800	0.0000	4.000	0.0000	4.200	0.0000	4.400	0.0000	4.600	0.0000	4.800	0.0000	<table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Flow (l/s)</th> </tr> </thead> <tbody> <tr><td>5.000</td><td>0.0000</td></tr> <tr><td>5.200</td><td>0.0000</td></tr> <tr><td>5.400</td><td>0.0000</td></tr> <tr><td>5.600</td><td>0.0000</td></tr> <tr><td>5.800</td><td>0.0000</td></tr> <tr><td>6.000</td><td>0.0000</td></tr> </tbody> </table>	Depth (m)	Flow (l/s)	5.000	0.0000	5.200	0.0000	5.400	0.0000	5.600	0.0000	5.800	0.0000	6.000	0.0000
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Storage Structures for Storm

Cellular Storage Manhole: DUMMY, DS/PN: 1.004

Invert Level (m) 30.200 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.41400 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.41400

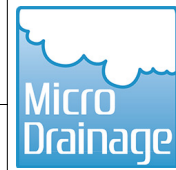
Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	25.0	25.0	5.200	0.0	41.0
0.400	25.0	33.0	5.600	0.0	41.0
0.800	25.0	41.0	6.000	0.0	41.0
0.801	0.0	41.0	6.400	0.0	41.0
1.600	0.0	41.0	6.800	0.0	41.0
2.000	0.0	41.0	7.200	0.0	41.0
2.400	0.0	41.0	7.600	0.0	41.0
2.800	0.0	41.0	8.000	0.0	41.0
3.200	0.0	41.0	8.400	0.0	41.0
3.600	0.0	41.0	8.800	0.0	41.0
4.000	0.0	41.0	9.200	0.0	41.0
4.400	0.0	41.0	9.600	0.0	41.0
4.800	0.0	41.0	10.000	0.0	41.0

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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 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 0.370					
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, 40							
Water							
US/MH	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
PN Name Storm Period Change Surcharge Flood Overflow Act.							(m)
1.000 S1 15 Winter 1 +0% 30/15 Summer							31.138
1.001 S2 15 Winter 1 +0% 30/15 Summer							30.977
1.002 S3 15 Winter 1 +0% 30/15 Summer							30.890
2.000 RE 15 Winter 1 +0% 100/15 Summer							31.282
2.001 S4 15 Winter 1 +0% 100/15 Summer							31.175
1.003 S5 15 Winter 1 +0% 30/15 Summer							30.775
1.004 DUMMY 60 Winter 1 +0% 30/15 Summer							30.331
Surcharged Flooded						Pipe	
US/MH	Depth	Volume	Flow /	Overflow	Flow	Level	
PN Name (m) (m³) Cap. (l/s) (l/s) Status Exceeded							
1.000 S1 -0.062 0.000 0.31 1.8 OK							
1.001 S2 -0.053 0.000 0.45 2.5 OK							
1.002 S3 -0.050 0.000 0.50 2.8 OK							
2.000 RE -0.068 0.000 0.23 1.3 OK							
2.001 S4 -0.065 0.000 0.26 2.0 OK							
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Date 07/03/2021 20:20 File Sale Road - SW Calcs.MDX		Designed by paulg Checked by																																											
Innovyze		Network 2017.1.2																																											
<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>																																													
<table><thead><tr><th colspan="2"></th><th colspan="2">Surcharged</th><th colspan="2">Flooded</th><th colspan="2">Pipe</th><th colspan="2">Level</th></tr><tr><th>PN</th><th>US/MH Name</th><th>Depth (m)</th><th>Volume (m³)</th><th>Flow / Cap.</th><th>Overflow (l/s)</th><th>Flow (l/s)</th><th>Status</th><th>Exceeded</th><th></th></tr></thead><tbody><tr><td>1.003</td><td>S5</td><td>-0.055</td><td>0.000</td><td>0.71</td><td></td><td>7.7</td><td>OK</td><td></td><td></td></tr><tr><td>1.004</td><td>DUMMY</td><td>-0.019</td><td>0.000</td><td>0.00</td><td></td><td>0.0</td><td>OK</td><td></td><td></td></tr></tbody></table>								Surcharged		Flooded		Pipe		Level		PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Exceeded		1.003	S5	-0.055	0.000	0.71		7.7	OK			1.004	DUMMY	-0.019	0.000	0.00		0.0	OK		
		Surcharged		Flooded		Pipe		Level																																					
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Exceeded																																					
1.003	S5	-0.055	0.000	0.71		7.7	OK																																						
1.004	DUMMY	-0.019	0.000	0.00		0.0	OK																																						
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115 Sale Road
Surface Water 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

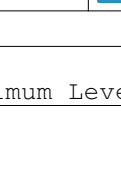
Rainfall Model	FSR	Ratio R	0.370
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

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, 40

									Water
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)
1.000	S1	15 Winter	30	+0%	30/15 Summer				31.239
1.001	S2	15 Winter	30	+0%	30/15 Summer				31.159
1.002	S3	15 Winter	30	+0%	30/15 Summer				31.056
2.000	RE	15 Winter	30	+0%	100/15 Summer				31.304
2.001	S4	15 Summer	30	+0%	100/15 Summer				31.202
1.003	S5	15 Winter	30	+0%	30/15 Summer				30.902
1.004	DUMMY	60 Winter	30	+0%	30/15 Summer				30.636

PN	Surcharged Flooded			Pipe	Status	Level Exceeded
	US/MH Name	Depth (m)	Volume (m³)	Flow / Overflow (l/s)		
1.000	S1	0.039	0.000	0.71	4.1	SURCHARGED
1.001	S2	0.129	0.000	1.06	5.9	SURCHARGED
1.002	S3	0.116	0.000	1.20	6.8	SURCHARGED
2.000	RE	-0.046	0.000	0.56	3.2	OK
2.001	S4	-0.038	0.000	0.70	5.4	OK

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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 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	0.370
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, 40

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	S1	15 Winter	100	+40%	30/15 Summer				32.035
1.001	S2	15 Winter	100	+40%	30/15 Summer				31.810
1.002	S3	120 Winter	100	+40%	30/15 Summer				31.657
2.000	RE	15 Winter	100	+40%	100/15 Summer				31.674
2.001	S4	120 Winter	100	+40%	100/15 Summer				31.658
1.003	S5	120 Winter	100	+40%	30/15 Summer				31.651
1.004	DUMMY	120 Winter	100	+40%	30/15 Summer				31.647

Surcharged Flooded

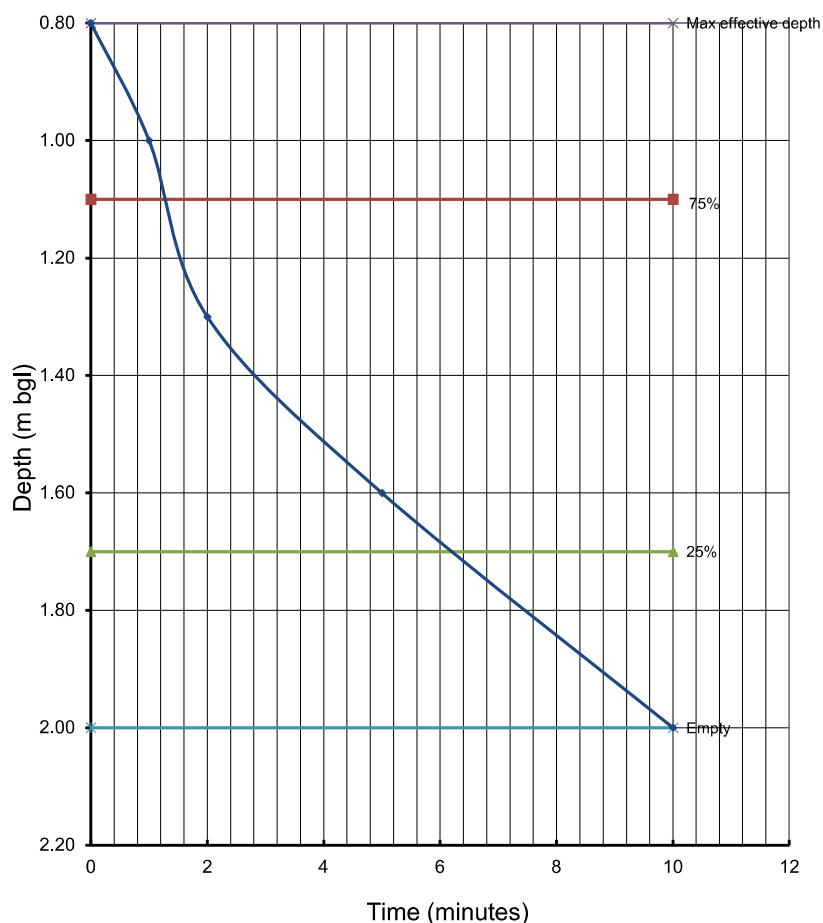
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.835	0.000	1.13		6.5	FLOOD RISK	
1.001	S2	0.780	0.000	1.75		9.8	FLOOD RISK	
1.002	S3	0.717	0.000	0.78		4.4	SURCHARGED	
2.000	RE	0.324	0.000	0.88		5.0	SURCHARGED	
2.001	S4	0.418	0.000	0.41		3.1	SURCHARGED	

Appendix C – Infiltration Test Results

IN SITU SOAKAWAY TEST RESULT

Trial Pit No.	TP01
Date	14/01/2021
Operator	HH
Test Strata	Glaciofluvial Sheet Deposits – Sand
Stability of pit	Spalling in MG
Backfill used	10mm Gravel

Filling	1 of 3
Trial Pit Length (m)	1.80
Trial Pit Width (m)	0.70
Trial Pit Depth (m)	2.00
Amount of Backfill placed (m)	2
Assumed Backfill Void Ratio	0.3

[illegible]

Initial Water Level (m)	0.80	Total internal surface area of pit (m ²)	11.26
Final Water Level (m)	2.00	Internal surface area of trial pit within effective depth range (m ²)	4.26
Change in Water Level (m)	1.20	Volume outflowing between 75% and 25% effective depth (m ³)	0.23
Effective Depth at 25% (tp25) (m)	1.70	Time at 25% (tp25) (minutes)	6.25
Effective Depth at 75% (tp75) (m)	1.10	Time at 75% (tp75) (minutes)	1.25

Soil Infiltration Rate (m/s)	1.77E-04
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Notes: 1. Undertaken in general accordance with BRE DG 365 method
2. Based on extrapolated data NO

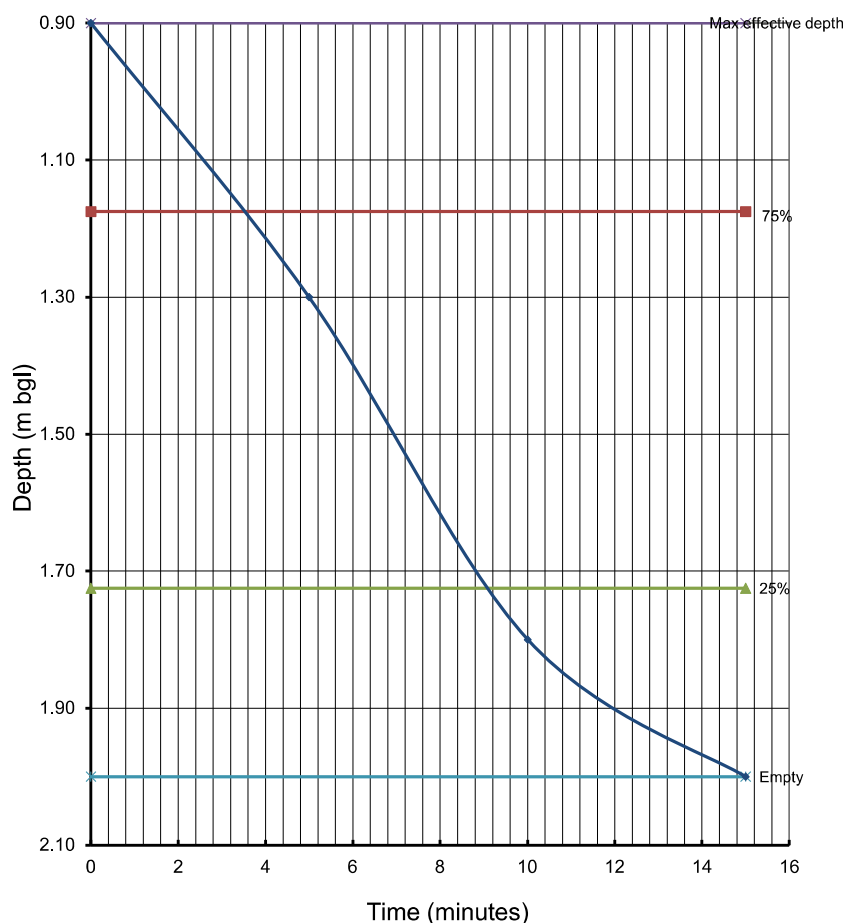
* Water level did not drop sufficiently for the calculation to be made

Client:	Seva Patidar Ltd	
Project:	Land adjacent to 115 Sale Road, Northern Moor	
Project No.	AG3225-21	

IN SITU SOAKAWAY TEST RESULT

Trial Pit No.	TP01
Date	14/01/2021
Operator	HH
Test Strata	Glaciofluvial Sheet Deposits – Sand
Stability of pit	Spalling in MG
Backfill used	10mm Gravel

Filling	3 of 3
Trial Pit Length (m)	1.80
Trial Pit Width (m)	0.70
Trial Pit Depth (m)	2.00
Amount of Backfill placed (m)	2
Assumed Backfill Void Ratio	0.3

[illegible]

Initial Water Level (m)	0.90	Total internal surface area of pit (m ²)	11.26
Final Water Level (m)	2.00	Internal surface area of trial pit within effective depth range (m ²)	4.01
Change in Water Level (m)	1.10	Volume outflowing between 75% and 25% effective depth (m ³)	0.21
Effective Depth at 25% (tp25) (m)	1.73	Time at 25% (tp25) (minutes)	8.5
Effective Depth at 75% (tp75) (m)	1.18	Time at 75% (tp75) (minutes)	1

Soil Infiltration Rate (m/s)	1.15E-04
------------------------------	----------

Notes: 1. Undertaken in general accordance with BRE DG 365 method
2. Based on extrapolated data NO

* Water level did not drop sufficiently for the calculation to be made

Client:	Seva Patidar Ltd
Project:	Land adjacent to 115 Sale Road, Northern Moor
Project No.	AG3225-21

APPLIED GEOLOGY