

	TECHNICAL NOTE	
	Pringuer-James Consulting Engineers (Structural & Civil Engineers) Overseas House, Elm Grove, London SW19 4HE	
Project: Tudor Cottage, Sea Road	Project No. L2340	
By: Vlad Myrsikov	Date: 18.02.2019	
Title: Drainage design for planning condition discharge	No. L2340-TN-003	

Planning Application Reference: APP/C3810/W/17/3183667 and EP/136/18/PL

1. Introduction

Following extensive consultation with Arun Council, PJCE has produced suitable design and calculations for submission and discharge of Drainage Conditions.

This Technical Note provides complete standalone summary, and all relevant information has been transferred from previously produced documentation (L2340-TN-001, and L2340-TN-002) which are now superseded.

2. Surface Water Scheme

The following drawings, included in Appendix, provide details of the surface water scheme for the development.

- L2340-C-52-750_Revision_6 – Drainage for Planning.

3. Existing Site

Existing site surface water drainage consisted of building roofs and impermeable car park pavements to the front of the building. The overall area of 410m² was drainage un-attenuated into Southern Water sewer. The remaining areas were grass or small footpaths which were draining to adjoining grass areas. Appendix contains a sketch showing existing areas.

Pre-development run-off calculations were completed using FEH data for all major rainfall events. Due to small nature of the site, T_c would be between 15 and 30 mins for peak events. 60mins event was included as this is critical for sewerage undertaker. The calculations are provided in Appendix, and the results are summarised in Table 1 below:

	Pre-development site:		
	15 minute	30 minute	60 minute
Q_{ex} (1-in-1 year)	3.60 l/s	2.30 l/s	1.51 l/s
Q_{ex} (1-in-30 year)	8.90 l/s	5.80 l/s	4.52 l/s
Q_{ex} (1-in-100 year)	11.37 l/s	9.11 l/s	5.82 l/s

Table 1 - Existing Site Runoff Rates

PJCE have also calculated peak run-off using Southern Water (Sewers for Adoption) Methodology. For existing site peak runoff rate using this methodology was found to be **4.56l/s**.

The proposed site discharge rate will not exceed existing and is fixed at 2.3l/s peak discharge rate, equivalent to 1-in-1year event. Refer to "Proposed Site" section of this document.

4. Implemented SuDS

The aim of SuDS is to identify “at source” water management measures to reduce surface water runoff. The most appropriate means of surface water control and discharge has been determined based on the hierarchy as set out in the non-statutory technical standards: CIRIA SuDS Manual (C753).

PJCE held extensive consultation with the Arun Council on the best SuDS system to implement for the development and below represents quick summary of the discussion.

Systems considered and not implemented

- *Bioretention systems, Ponds, Detention Basin*
It was impractical to implement bioretention system or to include for permanent pond. Detention basin was discussed with the council and was found to be not viable.
- *Green Roofs*
Green roofs were not implemented as these are not practical on pitched roofs.
- *Soakaways*
Groundwater was found to be relatively high: around 1.7m during summer and rises up to 1.0m below ground during winter. Soil is sandy clay in nature. Thus soakaways are not viable.

Implemented systems

- *Permeable paving with mini-swale as overflow.*
All pavements on site will be permeable, but not connected to drainage network. Pavements have been sized to capture and store the biggest storm without flooding. If pavements do flood, the water will surface flow into a swale and out to the sewer, preventing site flooding or flooding to adjoining properties.

A major advantage of permeable pavements is catchment and treatment of hydrocarbons and other pollutants. As per CIRIA (C752) The SuDS manual, Simple Index Approach Methodology (26.7.1), Car Park for domestic dwellings exhibits pollution index of 0.4 (Table 26.2) while permeable pavements exhibits mitigation potential of 0.4 when discharging to groundwater (Table 26.4), which means no further mitigation is required.
- *Flow Control Devices*
The downstream surface water networks will benefit from reduction in peak run-off from site. As such hydrobrake device has been included within the development and restricted to 2.3l/s
- *Attenuation tanks*
Following consultation with the council it was agreed that attenuation tanks are viable for this development. Tanks have been designed for 1-in-100year +40% CC storm event.

5. Proposed Site

The proposed site impermeable area would only consist of new building roofs. Car Park will be permeable. Any impermeable footways will drain to adjoining grass areas. Overall, the impermeable site draining to sewer has decreased from 410m² pre-development to 365m² post-development, through the replacement of existing impermeable asphalt pavement in favour of permeable gravel car park pavement.

To test realistic system behaviour, a complex micro drainage model has been built, which takes into account actual pipe network to be built on-site and includes the attenuation tanks and hydrobrake. Permeable Pavements have been calculated separately as these are not connected to the drainage system.

Based on practical limitations, the site peak discharge rate was limited to 2.3l/s for 1-in-100year + 40% Climate Change rainfall events, which is the same as 1-in-1 year event for existing site, thus limiting impact on existing sewers from the development.

Full calculations are included in Appendix, and summary of results is provided below.

	Post-Development peak run-off rate		
	Peak run-off Rate	Attenuation Volume required	Total Storage Volume Provided (tanks + pipes + manholes)
Q_{pr} (100 year + 40% CC)	2.3 l/s	14.0 m ³	17.445 m ³

Table 2 -- Post-development modelling results

6. Southern Water Capacity

Capacity Check was completed with Southern Water to check that sufficient sewer capacity exists to accommodate. This is included in Appendix.

7. Other Considerations

Pollution Control

For car park, CIRIA (C752) The SuDS manual, Simple Index Approach Methodology (26.7.1), Car Park for domestic dwellings exhibits pollution index of 0.4 (Table 26.2) while permeable pavements exhibits mitigation potential of 0.4 when discharging to groundwater (Table 26.4), which means no further mitigation, other than permeable pavement itself is required to prevent and mitigate pollution risks to groundwater.

Implementation Timetable

The drainage system and attenuation tanks will be installed before first occupation of the building.

Management and Maintenance Plan

There are three SuDS items that require regular maintenance:

- Permeable Pavement
- Attenuation Tanks
- Hydro-brake

Full maintenance plan for above is included in Appendix. Maintenance will be undertaken by the management company for the building, and no elements will be offered for adoption.

Appendix A – Main Documents Batch:

1. Southern Water Letter
2. Groundwater Monitoring (winter 24-hour monitoring)
3. L2340-C-52-750_Revision 6
4. Attenuation Crate Calculation
5. Permeable Pavement Calculations
6. Pavement Hydraulics
7. Graf Tank

Appendix B - Micro-drainage modelling files:

8. Model - Diagram_Revision6
9. Model – Results_Revision 6
10. Model – Storm_Revision6

Appendix C – Existing Site Run-off Calculations

Appendix D – Maintenance Plan

Appendix E – Geotechnical Investigation Report

Appendix F – Soakaway and Permeability Test

APPENDIX A – MAIN DOCUMENTS BATCH

The following section contains the following documents.

Associated noted to the documents are as follows:

Documents:

1. **Southern Water Letter**
 - This demonstrate SWS has capacity to accept foul and surface water from site.
2. **Groundwater Monitoring (winter 24-hour monitoring)**
 - 24-hour monitoring was completed during very wet weather on 5/6th February.
 - Maximum groundwater level recorded was 4.84m
3. **L2340-C-52-750_Revision 6**
 - Shows proposed site drainage to be taken to construction once Council approval is gained.
4. **Attenuation Crate Calculation**
 - Quick calculation demonstrating peak storm for water attenuation/storage.
 - Used 1-in-100year +40% Climate Change storm.
5. **Permeable Pavement Calculations**
 - Modelled Car Park without outflow or infiltration to demonstrate worst case scenario.
 - The model shows sub-base modelling only – 50mm p-shingle finish is ignored.
 - Permitted “flooding” only during 2880 mins event, however even this flooding is only 1mm above, which would be within p-shingle zone.
 - Modelling shows 330mm Type 4/20 thick pavement as sufficient.
 - Within TPZ we reduced pavement thickness to 200mm, so to compensate volume loss we increased overall pavement thickness to 340mm.
6. **Pavement Hydraulics**
 - This is to check how much fall the pavement will require to surface flow to outfall.
 - Darcy’s Law calculation to check minimum fall required for pavement to fall. This is 16mm, which is well within p-shingle zone, nonetheless we show 50mm fall across site. For peak flow rate and volumes any critical storm event, see item 5. for 2880mm event.
7. **Graf Tank**
 - This provides tank dimensions, capacities for different loadings, etc.
 - Demonstrates that 250mm cover is sufficient.

Sarah Hufford
45-47 High Street
Cobham
Surrey
KT11 3DP

Our ref
DS_CC_PDE-104440

Date
05/02/2019

Contact
[REDACTED]

Dear Sarah,

Further to your recent correspondence regarding the pre-occupation SUDS condition with the council for your site at Tudor Lodge, Sea Road, East Preston BN16 1NX. Southern Water have reviewed the modelling undertaken for the site and can confirm that Southern Water will accept combined connection of no greater than 2.3 l/s.

Foul Water

We are pleased to confirm that there's sufficient capacity within foul sewerage network to accommodate a foul flow for **7 residential** dwellings at the above development at manhole reference TQ7011602.

Storm Water

We are pleased to confirm that there's sufficient capacity within our network to accommodate a restricted surface water flow of **2.3l/s** at the above development at manhole reference TQ7011602.

Please note that this capacity check is only valid for foul water and storm water connection at manhole TW7011602 only. Connection to any other manhole will require a separate capacity check to be undertaken.

Should you require any further information then please do not hesitate to contact us on the above number.

With kind regards,

Dan Champion
[REDACTED]

Key Account Co-ordinator
Developer Services

Mr G Hoare
Rocco Homes
45 - 47 High Street
Cobham
Surrey
KT11 3DP

Our ref: 5005

12th February 2019

Dear Greg,

Sea Road, East Preston - Groundwater monitoring

On your instructions we installed a Level Scout groundwater monitoring device within a standpipe in an open pit on the 5th February. This took readings at 30m intervals for a 24 hour period.

The device was recovered from the site and the depth to groundwater plotted and from the adjacent ground level of 5.65 mOD a groundwater level was calculated.

The results to depth and level are appended to this letter.

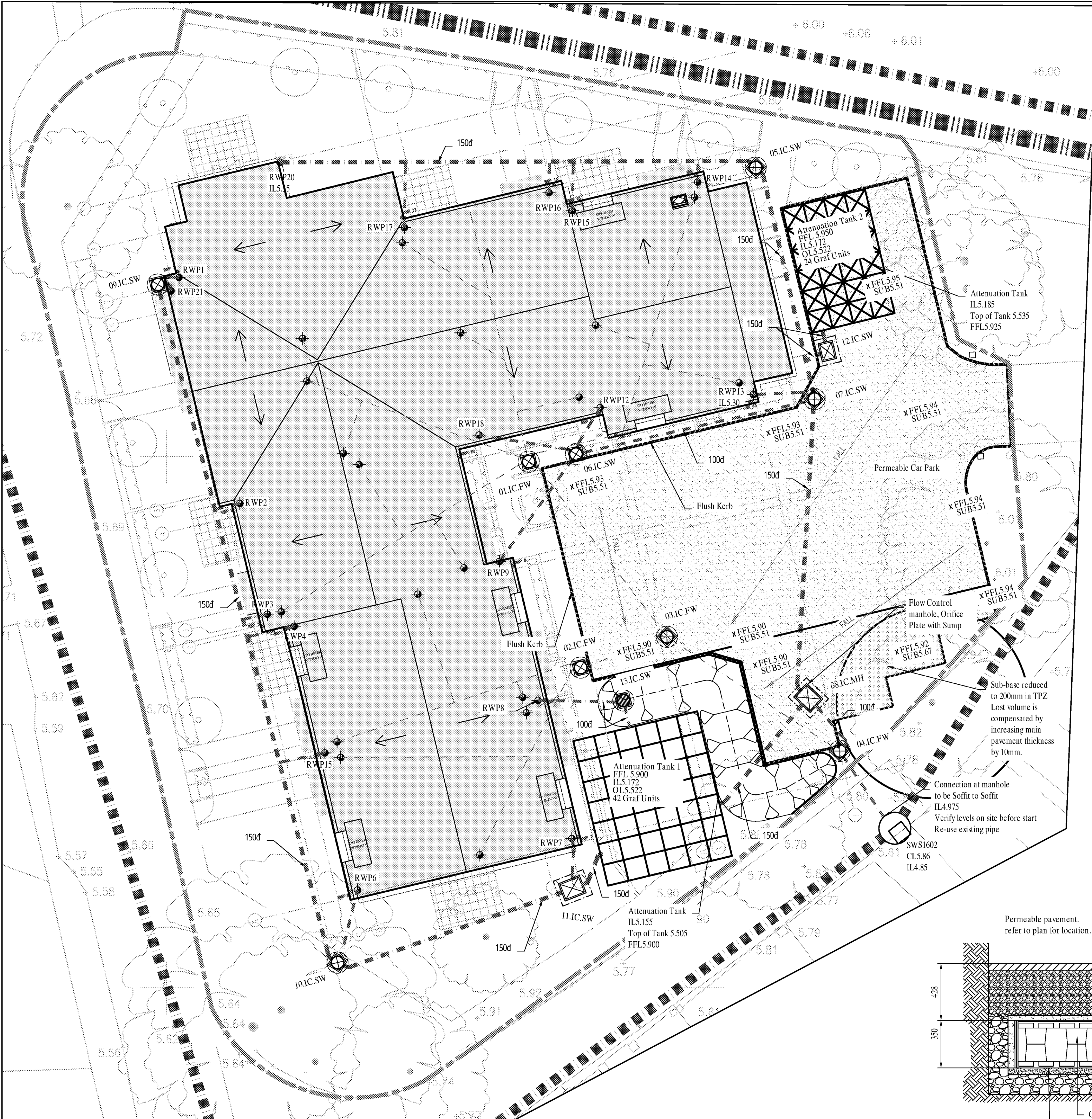
Yours sincerely


A M Smith



Sea Road East Preston Groundwater

Field Cal Date Date/Time	Depth below ground (m)	Water level (mOD)
05/02/2019 13:00	2.05	3.60
05/02/2019 13:30	2.04	3.61
05/02/2019 14:00	2.01	3.64
05/02/2019 14:30	1.99	3.66
05/02/2019 15:00	1.98	3.67
05/02/2019 15:30	1.94	3.71
05/02/2019 16:00	1.91	3.74
05/02/2019 16:30	1.89	3.76
05/02/2019 17:00	1.88	3.77
05/02/2019 17:30	1.87	3.78
05/02/2019 18:00	1.85	3.80
05/02/2019 18:30	1.84	3.81
05/02/2019 19:00	1.83	3.82
05/02/2019 19:30	1.81	3.84
05/02/2019 20:00	1.80	3.85
05/02/2019 20:30	1.78	3.87
05/02/2019 21:00	1.76	3.89
05/02/2019 21:30	1.74	3.91
05/02/2019 22:00	1.73	3.92
05/02/2019 22:30	1.70	3.95
05/02/2019 23:00	1.69	3.96
05/02/2019 23:30	1.67	3.98
06/02/2019 00:00	1.65	4.00
06/02/2019 00:30	1.62	4.03
06/02/2019 01:00	1.57	4.08
06/02/2019 01:30	1.54	4.11
06/02/2019 02:00	1.50	4.15
06/02/2019 02:30	1.46	4.19
06/02/2019 03:00	1.42	4.23
06/02/2019 03:30	1.38	4.27
06/02/2019 04:00	1.34	4.31
06/02/2019 04:30	1.28	4.37
06/02/2019 05:00	1.22	4.43
06/02/2019 05:30	1.16	4.49
06/02/2019 06:00	1.11	4.54
06/02/2019 06:30	1.07	4.58
06/02/2019 07:00	1.03	4.62
06/02/2019 07:30	1.00	4.65
06/02/2019 08:00	0.96	4.69
06/02/2019 08:30	0.93	4.72
06/02/2019 09:00	0.91	4.74
06/02/2019 09:30	0.88	4.77
06/02/2019 10:00	0.86	4.79
06/02/2019 10:30	0.83	4.82
06/02/2019 11:00	0.81	4.84
06/02/2019 11:30	0.84	4.81
06/02/2019 12:00	0.85	4.80



SITE LAYOUT
Scale 1:100

Ref.	FFL	IL	Internal size	Specification	Cover Size	Cover Type	Notes:
04.IC.FW	5.95	5.025	450d	SfA Type 3 - B.16	450 x 450	Solid Top	-
05.IC.SW	5.90	5.230	450d	SfA Type 3 - B.16	450 x 450	Solid Top	-
06.IC.SW	5.95	5.400	450d	SfA Type 3 - B.16	450 x 450	Solid Top	-
07.IC.SW	5.95	5.170	450d	SfA Type 3 - B.16	450 x 450	Solid Top	-
08.MH.SW	5.90	See Notes	1000 x 675	SfA Type 3 - B.19	750 x 675	Solid Top	Sump - IL4.800 Outfall - IL5.100 Flow-Control - See Hydrobrake Specification
09.IC.SW	5.95	5.405	450d	SfA Type 3 - B.16	450 x 450	Solid Top	-
10.IC.SW	5.85	5.230	450d	SfA Type 4 - B.21	450 x 450	Solid Top	-
11.MH.SW	5.90	See Notes	750 x 600	SfA Type 3 - B.19	750 x 600	Solid Top	Sump - IL4.850 Outfall - IL5.172
12.IC.SW	5.95	See Notes	750 x 600	SfA Type 3 - B.19	750 x 600	Solid Top	Sump - IL4.850 Outfall - IL5.172
13.IC.SW	5.60	See Notes	500d	SfA Type 3 - B.19	500 x 500	Grating	Sump - as per manufacturer Outfall - IL5.200

Notes:

- All chamber to be to adoptable standards, SFA - Sewers for Adoption, 7th Edition.
- Check existing sewer invert levels on site prior to start.
- Confirm FFL with Architect before installation

The subgrade should be prepared by trimming to level and compacting, in accordance with "Specification for Highway Works", to a tolerance within + 20mm -30mm. Any soft spoil should be excavated first and back-filled with suitable well-compacted granular material.

Minimum sub-grade "Soaked CBR" to be > 5% where this found to be lower, pavement sub-base must be increased to compensate:
CBR= 4% Sub-base thickness - 400mm
CBR= 3% Sub-base thickness - 425mm
CBR= 2% Sub-base thickness - 475mm
CBR= 1% Sub-base thickness - 600mm
Localised soft-spots can be locally improved in accordance with "Specification for Highway Works."

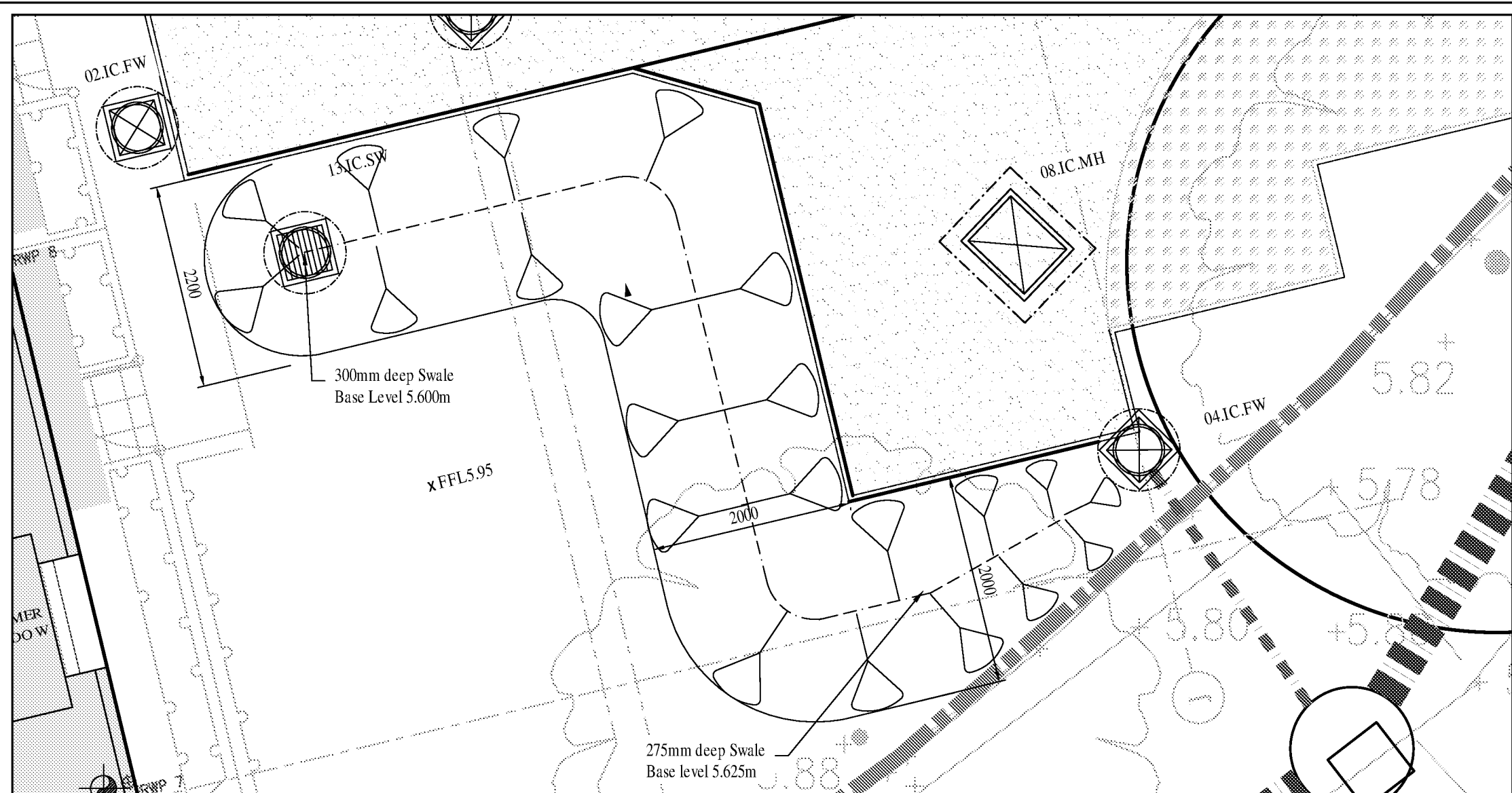
50mm P-shingle

Pavement flush edge kerb.
Marshalls standard 150x100 square channel edge kerb.

Sub-base to be installed completely flat across the site.

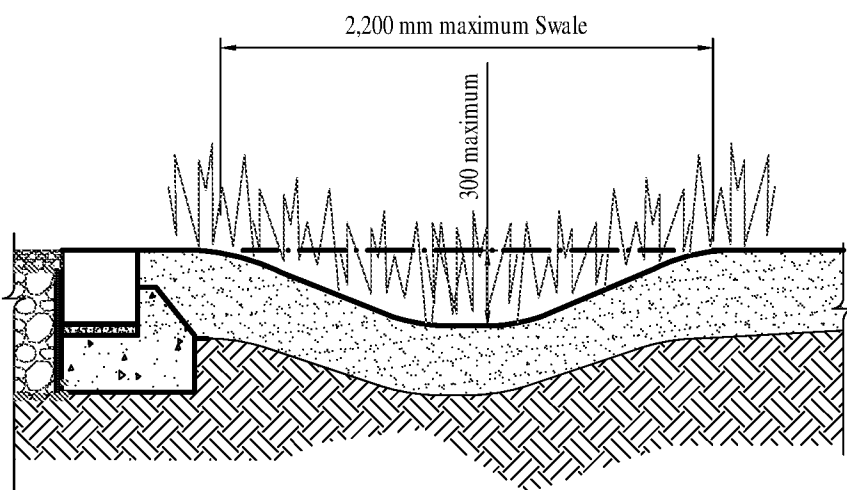
TERRAM ROOTGUARD - Rootguard and Separating permeable membrane to be installed top and bottom of sub-base.

**PERMEABLE PAVEMENT
AREA A**
Scale 1:20

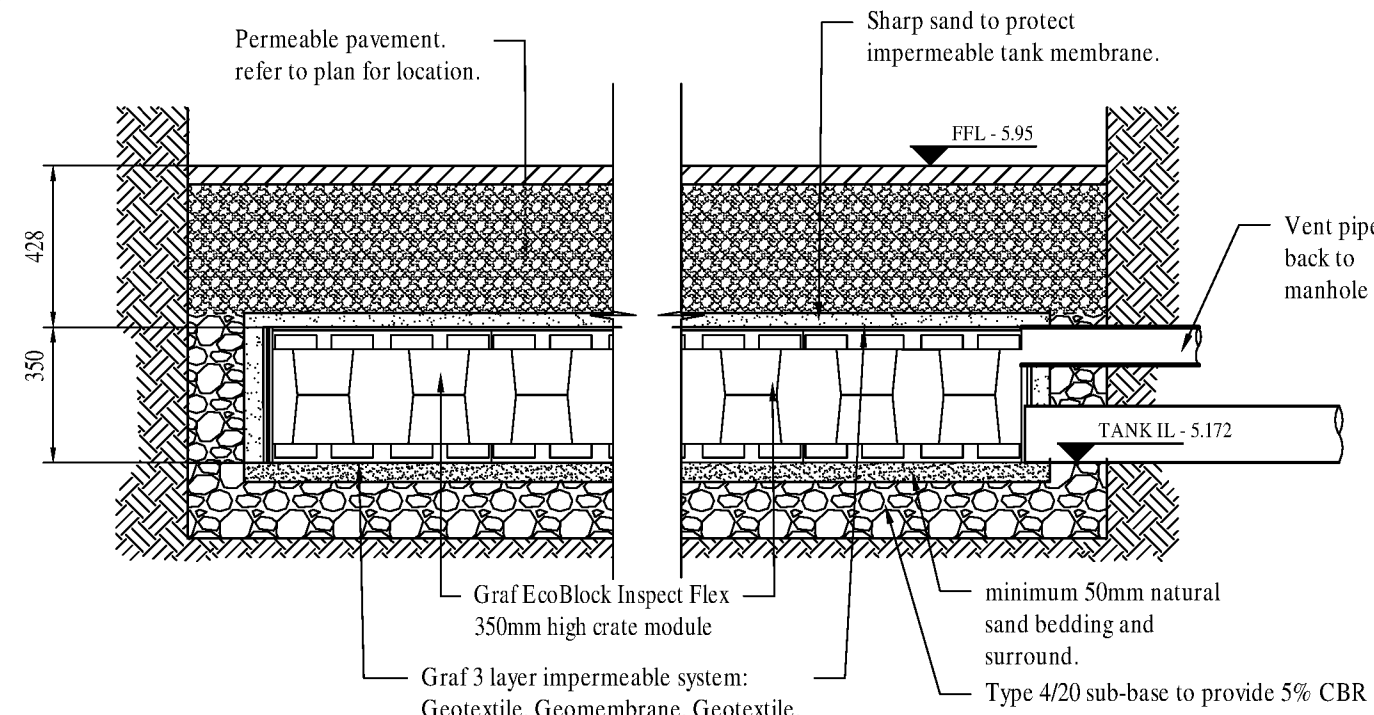


MINI-SWALE PLAN AND DETAIL
Scale 1:50

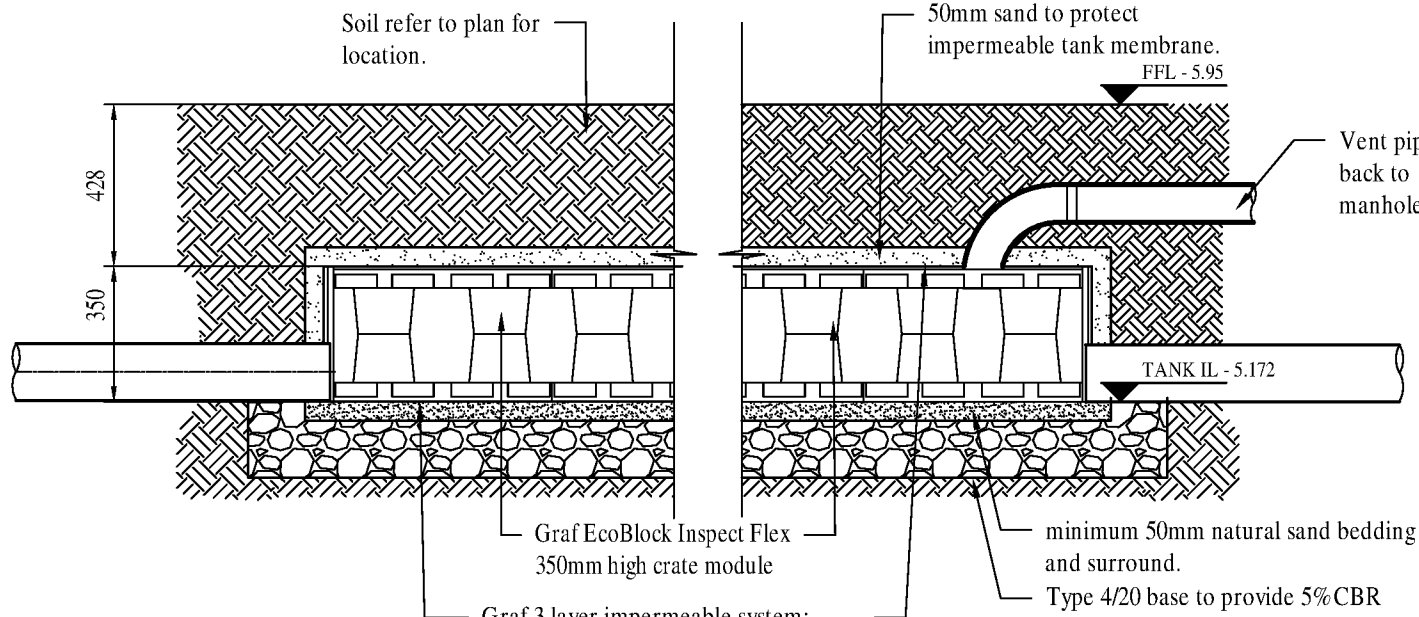
Swale to be installed with continuous fall towards the grated manhole. fall to be from 275mm depth to 300mm depth.



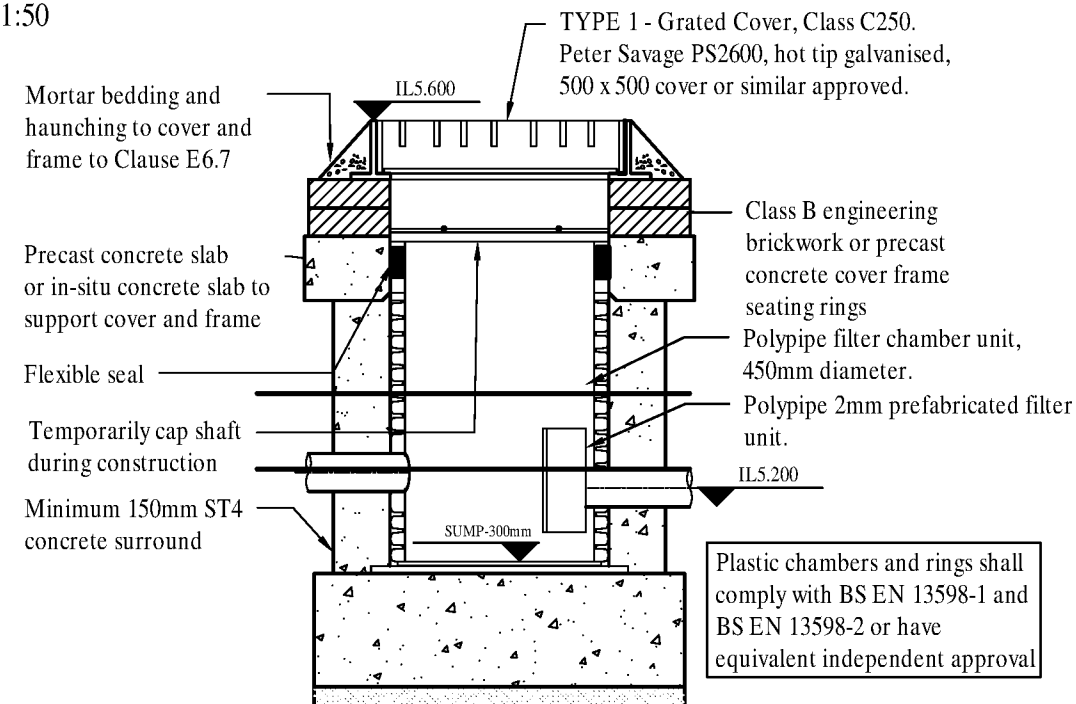
MINI-SWALE DETAIL
Scale N.T.S.



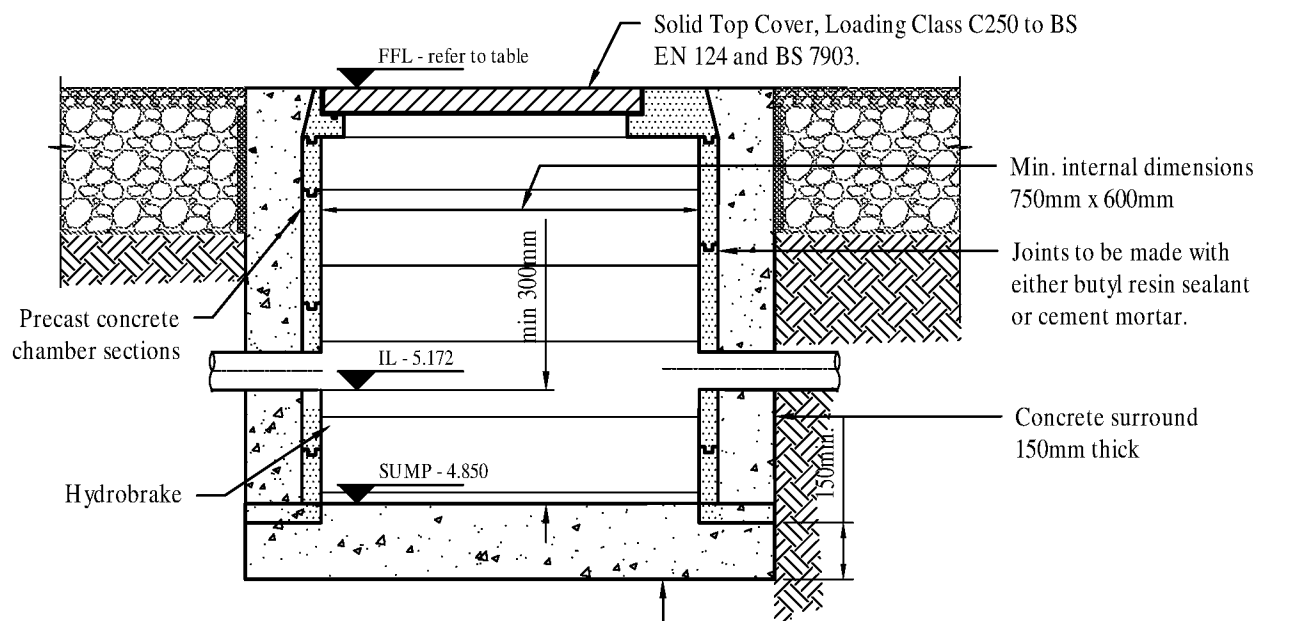
ATTENUATION TANK 2 DETAILS
Scale 1:20



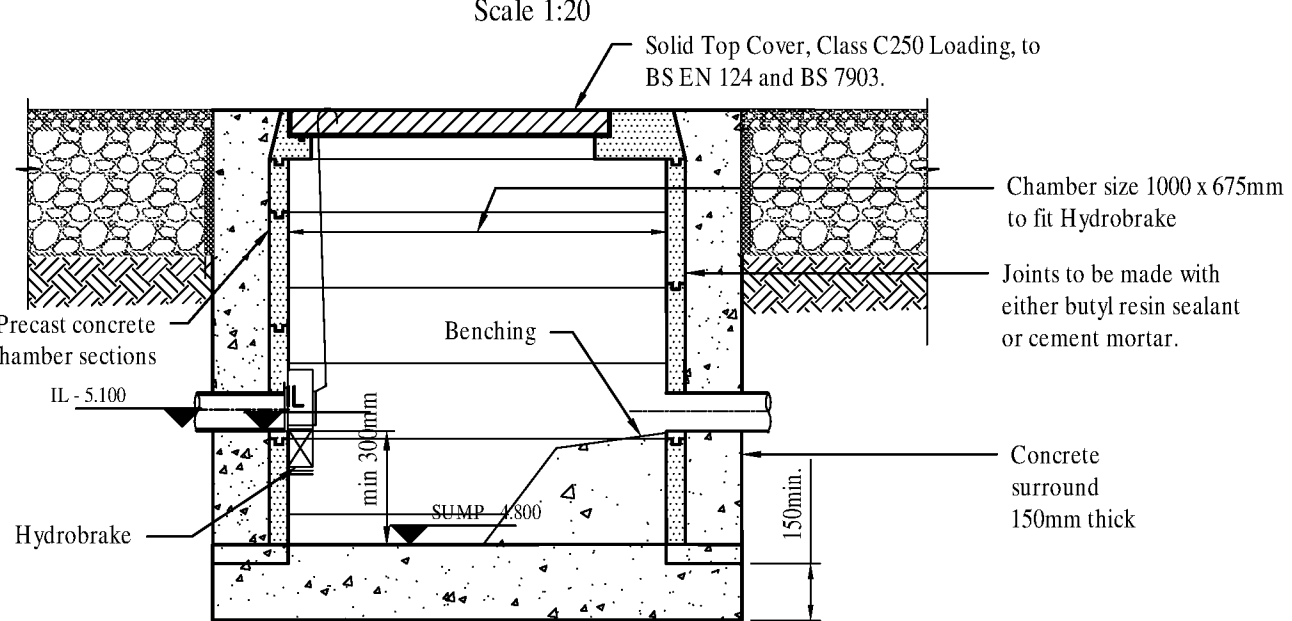
ATTENUATION TANK 1 DETAILS
Scale 1:20



POLYPIPE FILTER CHAMBER
Scale 1:20



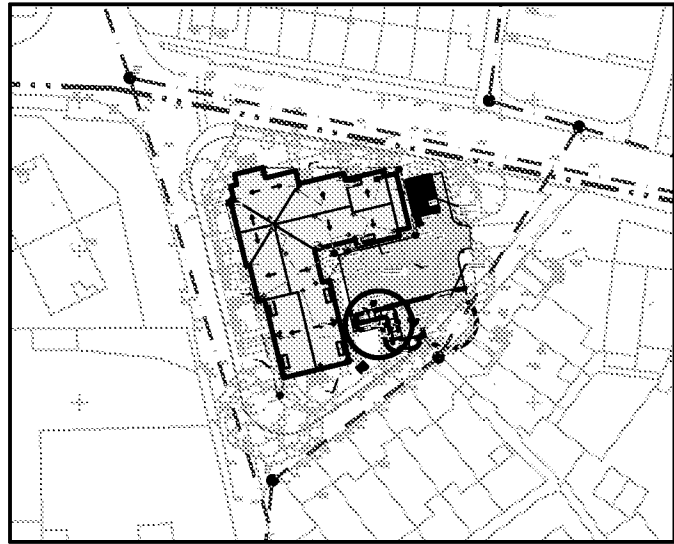
**SUMP CHAMBER DETAIL
TO SFA DETAL B.19**
Scale 1:20



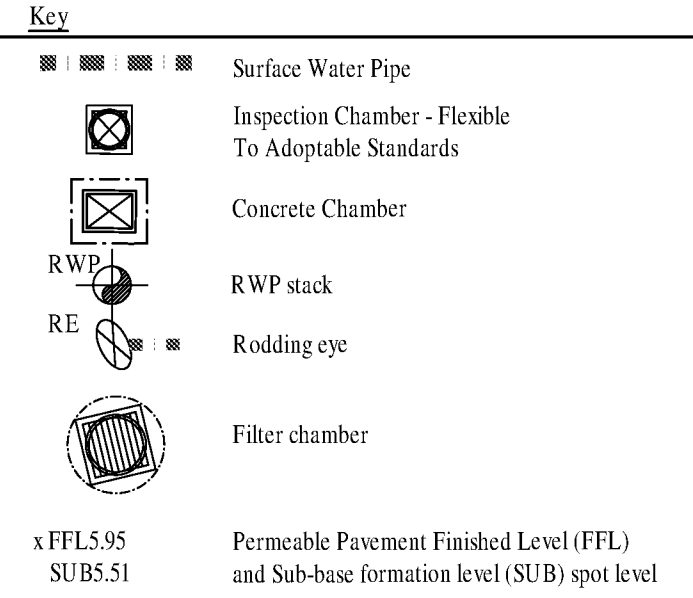
**HYDROBRAKE CHAMBER DETAIL
TO SFA DETAL B.19**
Scale 1:20

Notes:

- This drawing is for planning conditions discharge and is not for construction. Construction drawing will be released once planning approval has been granted.
- All dimensions are in millimetres unless otherwise stated.
- All levels are in metres unless otherwise stated.
- This drawing should be read in conjunction with all relevant architects, structural engineers and m&e engineers drawings and specification.
- Minimum Clay Pipe cover depth for use of Class N/D bedding and surround to be as following. Where minimum cover cannot be met the pipe to be concrete encased.
 - Grass areas: 300mm minimum
 - Footways: 400mm minimum
 - Roads: 600mm minimum
- All stacks/RWP are 100d U.N.O. All pipes are 100d unless noted otherwise.
- All 150d pipes to have minimum gradient 1:150 U.N.O.
- All drains are to be laid in a constant gradient between manhole chambers.
- New connection onto existing sewer to be in accordance with Southern Water requirements.
- All road openings within the public highway to be agreed with the local authority.
- All buried concrete products and mortars are to contain class 2 sulphate resisting cement.



KEY PLAN
Scale 1:1000



HYDROBRAKE SPECIFICATION	
Manhole	- 08.IC.SW
Control Mechanism	- Hydrobrake
Specification	- Optimum
Outfall pipe size	- 100mm
Outfall I.L.	- 5.100 m
Hydraulic Head	- 0.515 m
Discharge Rate	- 2.3 l/s
Overflow Pipe	- none
Hydrobrake Model	- MD-SHE-0079-2300-0515-2300

06	14.02.2019	MA	Amended design to council requirements
05	11.02.2019	MA	Amended design to council requirements
04	08.11.2018	MA	Added Basin Setting-out
03	19.10.2018	KK	Updated Site Boundary, added 5m line
02	20.06.2018	DA	Issued for Council Approval
01	30.05.2018	DA	Issued for Council Approval
Rev.	Date	Drawn	Amendment

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ROCCO HOMES

TUDOR COTTAGE, SEA ROAD,
EAST PRESTON

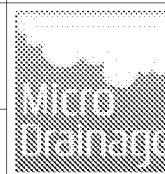
DRAINAGE FOR PLANNING

Status :		APPROVAL	
Scales : as noted @ A1		Date : MAY 2018	
Drawn : MA	Engineer : VM	Checked : DL	
Drawing No. L2340-C-52-750		Revision 06	

Pringuer-James Consulting Engineers Limited							Page 1
Overseas House Elm Grove London SW19 4HE							
Date 06/02/2019 09:22 File ATTENUATION CRATES.SRCX			Designed by vlad Checked by				
Innovyze			Source Control 2018.1.1				
<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 59 minutes.							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	5.354	0.204	0.0	2.3	2.3	8.2	O K
30 min Summer	5.411	0.261	0.0	2.3	2.3	10.4	O K
60 min Summer	5.441	0.291	0.0	2.3	2.3	11.6	O K
120 min Summer	5.405	0.255	0.0	2.3	2.3	10.2	O K
180 min Summer	5.372	0.222	0.0	2.3	2.3	8.9	O K
240 min Summer	5.342	0.192	0.0	2.3	2.3	7.7	O K
360 min Summer	5.289	0.139	0.0	2.3	2.3	5.6	O K
480 min Summer	5.248	0.098	0.0	2.3	2.3	3.9	O K
600 min Summer	5.220	0.070	0.0	2.3	2.3	2.8	O K
720 min Summer	5.201	0.051	0.0	2.2	2.2	2.0	O K
960 min Summer	5.183	0.033	0.0	1.9	1.9	1.3	O K
1440 min Summer	5.165	0.015	0.0	1.5	1.5	0.6	O K
15 min Winter	5.389	0.239	0.0	2.3	2.3	9.5	O K
30 min Winter	5.459	0.309	0.0	2.3	2.3	12.3	O K
60 min Winter	5.500	0.350	0.0	2.3	2.3	14.0	O K
120 min Winter	5.455	0.305	0.0	2.3	2.3	12.2	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	152.152	0.0	10.7	22			
30 min Summer	101.836	0.0	14.4	34			
60 min Summer	65.058	0.0	18.3	58			
120 min Summer	37.632	0.0	21.3	90			
180 min Summer	27.277	0.0	23.1	122			
240 min Summer	21.662	0.0	24.5	154			
360 min Summer	15.568	0.0	26.4	218			
480 min Summer	12.297	0.0	27.8	276			
600 min Summer	10.240	0.0	28.9	332			
720 min Summer	8.818	0.0	29.9	386			
960 min Summer	6.971	0.0	31.5	502			
1440 min Summer	5.021	0.0	34.0	740			
15 min Winter	152.152	0.0	12.2	23			
30 min Winter	101.836	0.0	16.3	35			
60 min Winter	65.058	0.0	20.8	60			
120 min Winter	37.632	0.0	24.1	98			
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Designed by vlad
Checked by



Source Control 2018.1.1

Storm Event			Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control Σ (l/s)	Max Outflow (l/s)	Max Volume (m ³)	Status
180 min	Winter		5.403	0.253	0.0	2.3	2.3	10.1	O K
240 min	Winter		5.356	0.206	0.0	2.3	2.3	8.2	O K
360 min	Winter		5.275	0.125	0.0	2.3	2.3	5.0	O K
480 min	Winter		5.221	0.071	0.0	2.3	2.3	2.8	O K
600 min	Winter		5.194	0.044	0.0	2.2	2.2	1.7	O K
720 min	Winter		5.182	0.032	0.0	1.9	1.9	1.3	O K
960 min	Winter		5.167	0.017	0.0	1.5	1.5	0.7	O K
1440 min	Winter		5.154	0.004	0.0	1.1	1.1	0.2	O K

Storm Event		Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
180 min	Winter	27.277	0.0	26.2	134
240 min	Winter	21.662	0.0	27.8	168
360 min	Winter	15.568	0.0	29.9	228
480 min	Winter	12.297	0.0	31.5	282
600 min	Winter	10.240	0.0	32.8	330
720 min	Winter	8.818	0.0	33.9	388
960 min	Winter	6.971	0.0	35.7	506
1440 min	Winter	5.021	0.0	38.6	750

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Model Details Storage is Online Cover Level (m) 5.500 Cellular Storage Structure Invert Level (m)5.150 Infiltration Coefficient Base (m/hr)0.00000 Infiltration Coefficient Side (m/hr)0.00000 Safety Factor2.0 Porosity0.96 <table><tr><td>Depth (m)</td><td>Area (m²)</td><td>Inf. Area (m²)</td><td>Depth (m)</td><td>Area (m²)</td><td>Inf. Area (m²)</td></tr><tr><td>0.000</td><td>41.6</td><td>0.0</td><td>0.350</td><td>41.6</td><td>0.0</td></tr></table> Hydro-Brake® Optimum Outflow Control Unit ReferenceMD-SHE-0079-2300-0515-2300 Design Head (m)0.515 Design Flow (l/s)2.3 Flush-Flo™Calculated ObjectiveMinimise upstream storage ApplicationSurface Sump AvailableYes Diameter (mm)79 Invert Level (m)5.100 Minimum Outlet Pipe Diameter (mm)100 Suggested Manhole Diameter (mm)1200 <table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>0.515</td><td>2.3</td></tr><tr><td>Flush-Flo™</td><td>0.155</td><td>2.3</td></tr><tr><td>Kick-Flo®</td><td>0.356</td><td>1.9</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>2.0</td></tr></table> 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 <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>2.2</td><td>0.500</td><td>2.3</td><td>1.200</td><td>3.4</td></tr><tr><td>0.200</td><td>2.3</td><td>0.600</td><td>2.5</td><td>1.400</td><td>3.6</td></tr><tr><td>0.300</td><td>2.2</td><td>0.800</td><td>2.8</td><td>1.600</td><td>3.9</td></tr><tr><td>0.400</td><td>2.1</td><td>1.000</td><td>3.1</td><td>1.800</td><td>4.1</td></tr></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	41.6	0.0	0.350	41.6	0.0	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	0.515	2.3	Flush-Flo™	0.155	2.3	Kick-Flo®	0.356	1.9	Mean Flow over Head Range	-	2.0	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	2.2	0.500	2.3	1.200	3.4	0.200	2.3	0.600	2.5	1.400	3.6	0.300	2.2	0.800	2.8	1.600	3.9	0.400	2.1	1.000	3.1	1.800	4.1
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																						
0.000	41.6	0.0	0.350	41.6	0.0																																																						
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0.100	2.2	0.500	2.3	1.200	3.4																																																						
0.200	2.3	0.600	2.5	1.400	3.6																																																						
0.300	2.2	0.800	2.8	1.600	3.9																																																						
0.400	2.1	1.000	3.1	1.800	4.1																																																						
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Overseas House Elm Grove London SW19 4HE																																												
Date 06/02/2019 09:22	Designed by vlad																																											
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Innovyze	Source Control 2018.1.1																																											
<u>Hydro-Brake® Optimum Outflow Control</u> <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>2.000</td><td>4.3</td><td>4.000</td><td>5.9</td><td>7.000</td><td>7.8</td></tr><tr><td>2.200</td><td>4.5</td><td>4.500</td><td>6.3</td><td>7.500</td><td>8.1</td></tr><tr><td>2.400</td><td>4.7</td><td>5.000</td><td>6.6</td><td>8.000</td><td>8.3</td></tr><tr><td>2.600</td><td>4.9</td><td>5.500</td><td>6.9</td><td>8.500</td><td>8.6</td></tr><tr><td>3.000</td><td>5.2</td><td>6.000</td><td>7.2</td><td>9.000</td><td>8.8</td></tr><tr><td>3.500</td><td>5.6</td><td>6.500</td><td>7.5</td><td>9.500</td><td>9.1</td></tr></table>			Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	2.000	4.3	4.000	5.9	7.000	7.8	2.200	4.5	4.500	6.3	7.500	8.1	2.400	4.7	5.000	6.6	8.000	8.3	2.600	4.9	5.500	6.9	8.500	8.6	3.000	5.2	6.000	7.2	9.000	8.8	3.500	5.6	6.500	7.5	9.500	9.1
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																							
2.000	4.3	4.000	5.9	7.000	7.8																																							
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2.400	4.7	5.000	6.6	8.000	8.3																																							
2.600	4.9	5.500	6.9	8.500	8.6																																							
3.000	5.2	6.000	7.2	9.000	8.8																																							
3.500	5.6	6.500	7.5	9.500	9.1																																							
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Pringuer-James Consulting Engineers Limited					Page 37	
Overseas House Elm Grove London SW19 4HE						
Date 11/02/2019 17:06 File PERMEABLE PAVEMENT.SRCX		Designed by vlad Checked by				
Innovyze			Source Control 2018.1.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>						
Half Drain Time exceeds 7 days.						
Storm Event		Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer		5.598	0.078	0.0	4.7	O K
30 min Summer		5.630	0.110	0.0	6.6	O K
60 min Summer		5.665	0.145	0.0	8.7	O K
120 min Summer		5.690	0.170	0.0	10.2	O K
180 min Summer		5.706	0.186	0.0	11.2	O K
240 min Summer		5.718	0.198	0.0	11.9	O K
360 min Summer		5.734	0.214	0.0	12.9	O K
480 min Summer		5.746	0.226	0.0	13.5	O K
600 min Summer		5.755	0.235	0.0	14.1	O K
720 min Summer		5.763	0.243	0.0	14.6	O K
960 min Summer		5.775	0.255	0.0	15.3	O K
1440 min Summer		5.794	0.274	0.0	16.5	O K
2160 min Summer		5.851	0.331	0.0	17.7	FLOOD
2880 min Summer		5.852	0.332	0.0	18.8	FLOOD
4320 min Summer		5.854	0.334	0.0	20.4	FLOOD
5760 min Summer		5.855	0.335	0.0	21.8	FLOOD
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer		152.152	0.0	45		
30 min Summer		101.836	0.0	60		
60 min Summer		65.058	0.0	90		
120 min Summer		37.632	0.0	150		
180 min Summer		27.277	0.0	210		
240 min Summer		21.662	0.0	270		
360 min Summer		15.568	0.0	390		
480 min Summer		12.297	0.0	510		
600 min Summer		10.240	0.0	630		
720 min Summer		8.818	0.0	750		
960 min Summer		6.971	0.0	988		
1440 min Summer		5.021	0.0	1468		
2160 min Summer		3.640	0.9	2188		
2880 min Summer		2.914	2.0	2908		
4320 min Summer		2.153	3.6	4344		
5760 min Summer		1.753	5.0	5784		
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Pringuer-James Consulting Engineers Limited					Page 38		
Overseas House Elm Grove London SW19 4HE							
Date 11/02/2019 17:06 File PERMEABLE PAVEMENT.SRCX		Designed by vlad Checked by					
Innovyze			Source Control 2018.1.1				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Storm Event			Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
7200 min Summer			5.520	0.000	0.0	0.0	O K
8640 min Summer			5.520	0.000	0.0	0.0	O K
10080 min Summer			5.520	0.000	0.0	0.0	O K
15 min Winter			5.598	0.078	0.0	4.7	O K
30 min Winter			5.630	0.110	0.0	6.6	O K
60 min Winter			5.665	0.145	0.0	8.7	O K
120 min Winter			5.690	0.170	0.0	10.2	O K
180 min Winter			5.706	0.186	0.0	11.2	O K
240 min Winter			5.718	0.198	0.0	11.9	O K
360 min Winter			5.734	0.214	0.0	12.9	O K
480 min Winter			5.746	0.226	0.0	13.5	O K
600 min Winter			5.755	0.235	0.0	14.1	O K
720 min Winter			5.763	0.243	0.0	14.6	O K
960 min Winter			5.775	0.255	0.0	15.3	O K
1440 min Winter			5.795	0.275	0.0	16.5	O K
2160 min Winter			5.851	0.331	0.0	17.8	FLOOD
2880 min Winter			5.852	0.332	0.0	18.8	FLOOD
Storm Event			Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
7200 min Summer			-0.012	0.0	0		
8640 min Summer			-0.010	0.0	0		
10080 min Summer			-0.008	0.0	0		
15 min Winter			152.152	0.0	45		
30 min Winter			101.836	0.0	60		
60 min Winter			65.058	0.0	90		
120 min Winter			37.632	0.0	150		
180 min Winter			27.277	0.0	208		
240 min Winter			21.662	0.0	268		
360 min Winter			15.568	0.0	386		
480 min Winter			12.297	0.0	504		
600 min Winter			10.240	0.0	622		
720 min Winter			8.818	0.0	742		
960 min Winter			6.971	0.0	978		
1440 min Winter			5.021	0.0	1452		
2160 min Winter			3.640	1.0	2164		
2880 min Winter			2.914	2.0	2876		
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Pringuer-James Consulting Engineers Limited					Page 39	
Overseas House Elm Grove London SW19 4HE						
Date 11/02/2019 17:06		Designed by vlad				
File PERMEABLE PAVEMENT.SRCX		Checked by				
Innovyze			Source Control 2018.1.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>						
Storm Event		Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
4320 min Winter		5.854	0.334	0.0	20.5	FLOOD
5760 min Winter		5.855	0.335	0.0	21.9	FLOOD
7200 min Winter		5.520	0.000	0.0	0.0	O K
8640 min Winter		5.520	0.000	0.0	0.0	O K
10080 min Winter		5.520	0.000	0.0	0.0	O K
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
4320 min Winter		2.153	3.7	4296		
5760 min Winter		1.753	5.1	5720		
7200 min Winter		-0.012	0.0	0		
8640 min Winter		-0.010	0.0	0		
10080 min Winter		-0.008	0.0	0		
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Pringuer-James Consulting Engineers Limited		Page 40
Overseas House Elm Grove London SW19 4HE		
Date 11/02/2019 17:06	Designed by vlad	
File PERMEABLE PAVEMENT.SRCX	Checked by	
Innovyze		Source Control 2018.1.1

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 507144 101633 TQ 07144 01633
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.750
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.020

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 10 0.006		10 20 0.007		20 30 0.007	

Time Area Diagram

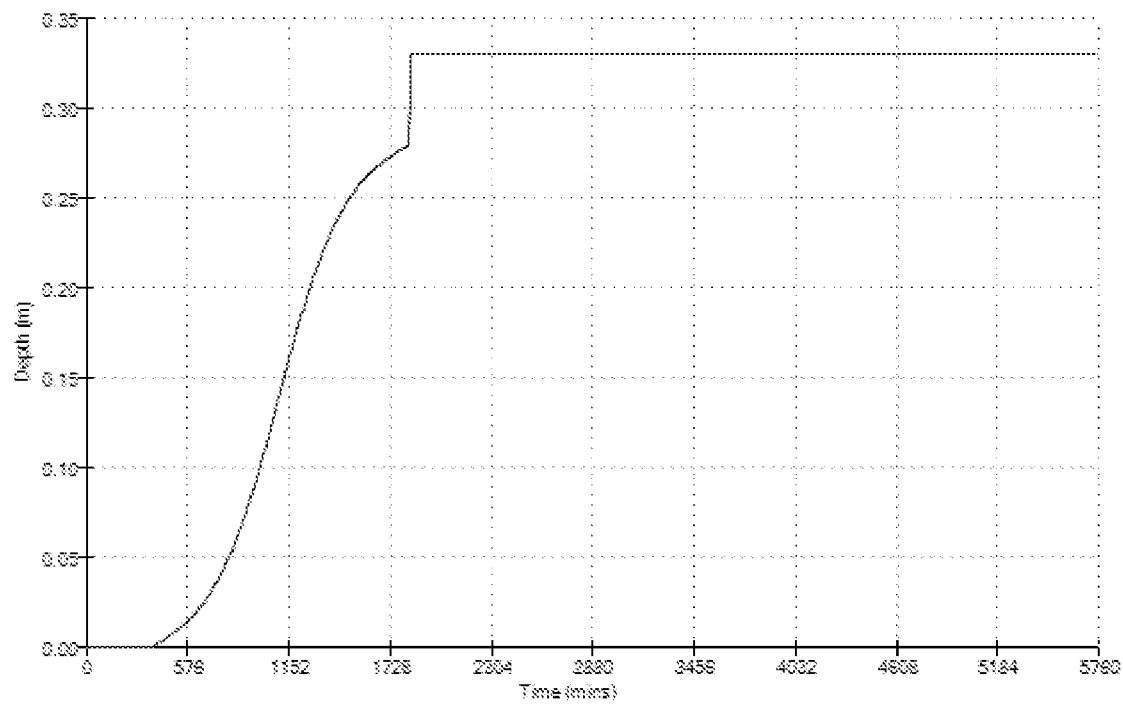
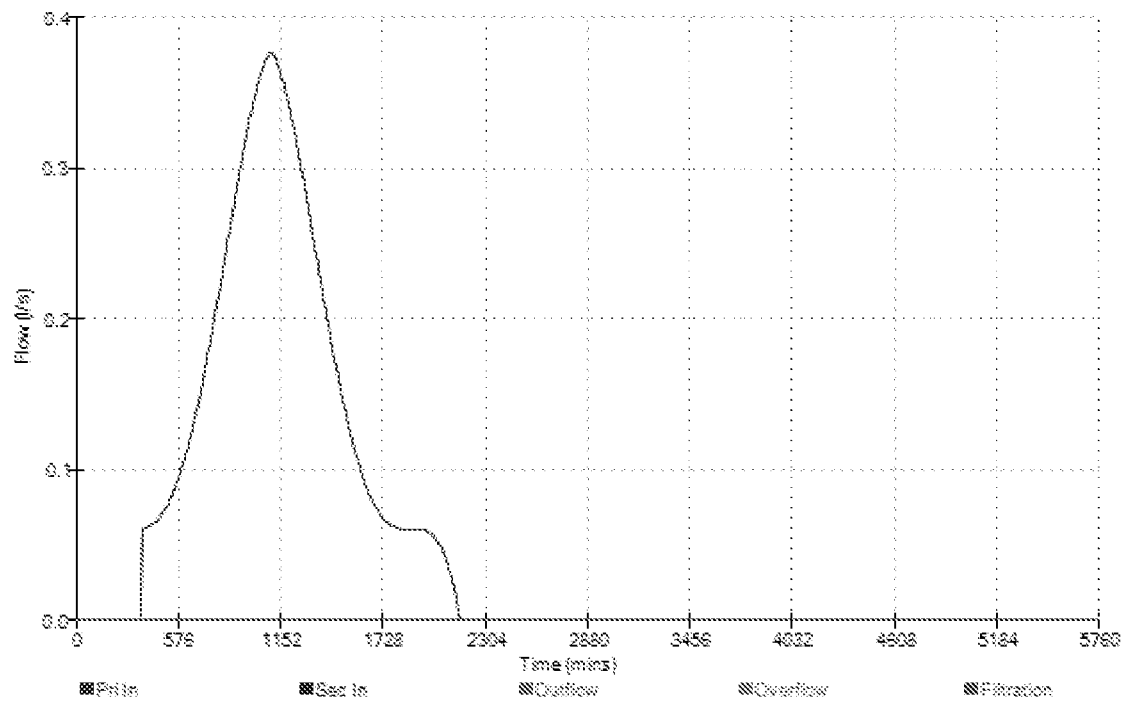
Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	
0 4 0.000	

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Pringuer-James Consulting Engineers Limited		Page 41
Overseas House Elm Grove London SW19 4HE		
Date 11/02/2019 17:06 File PERMEABLE PAVEMENT.SRCX	Designed by vlad Checked by	
Innovyze Source Control 2018.1.1		
Model Details Storage is Online Cover Level (m) 5.850 Porous Car Park Structure Infiltration Coefficient Base (m/hr) 0.00000 Membrane Percolation (mm/hr) 1000 Max Percolation (l/s) 55.6 Safety Factor 1.0 Porosity 0.30 Invert Level (m) 5.520 Width (m) 10.0 Length (m) 20.0 Slope (1:X) 0.0 Depression Storage (mm) 5 Evaporation (mm/day) 3 Membrane Depth (m) 50		
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Event: 2160 min Winter



Pringuer-James Consulting Engineers Limited				Page 1	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06 File PERMEABLE PAVEMENT.SRCX		Designed by vlad Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time (mins)	Level (m)	Depth (m)	Σ Inflow (l/s)	Filtration (l/s)	Volume (m³)
4	5.520	0.000	0.0	0.0	0.0
8	5.520	0.000	0.0	0.0	0.0
12	5.520	0.000	0.0	0.0	0.0
16	5.520	0.000	0.0	0.0	0.0
20	5.520	0.000	0.0	0.0	0.0
24	5.520	0.000	0.0	0.0	0.0
28	5.520	0.000	0.0	0.0	0.0
32	5.520	0.000	0.0	0.0	0.0
36	5.520	0.000	0.0	0.0	0.0
40	5.520	0.000	0.0	0.0	0.0
44	5.520	0.000	0.0	0.0	0.0
48	5.520	0.000	0.0	0.0	0.0
52	5.520	0.000	0.0	0.0	0.0
56	5.520	0.000	0.0	0.0	0.0
60	5.520	0.000	0.0	0.0	0.0
64	5.520	0.000	0.0	0.0	0.0
68	5.520	0.000	0.0	0.0	0.0
72	5.520	0.000	0.0	0.0	0.0
76	5.520	0.000	0.0	0.0	0.0
80	5.520	0.000	0.0	0.0	0.0
84	5.520	0.000	0.0	0.0	0.0
88	5.520	0.000	0.0	0.0	0.0
92	5.520	0.000	0.0	0.0	0.0
96	5.520	0.000	0.0	0.0	0.0
100	5.520	0.000	0.0	0.0	0.0
104	5.520	0.000	0.0	0.0	0.0
108	5.520	0.000	0.0	0.0	0.0
112	5.520	0.000	0.0	0.0	0.0
116	5.520	0.000	0.0	0.0	0.0
120	5.520	0.000	0.0	0.0	0.0
124	5.520	0.000	0.0	0.0	0.0
128	5.520	0.000	0.0	0.0	0.0
132	5.520	0.000	0.0	0.0	0.0
136	5.520	0.000	0.0	0.0	0.0
140	5.520	0.000	0.0	0.0	0.0
144	5.520	0.000	0.0	0.0	0.0
148	5.520	0.000	0.0	0.0	0.0
152	5.520	0.000	0.0	0.0	0.0
156	5.520	0.000	0.0	0.0	0.0
160	5.520	0.000	0.0	0.0	0.0
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Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06 File PERMEABLE PAVEMENT.SRCX		Designed by vlad Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
164	5.520	0.000	0.0	0.0	0.0
168	5.520	0.000	0.0	0.0	0.0
172	5.520	0.000	0.0	0.0	0.0
176	5.520	0.000	0.0	0.0	0.0
180	5.520	0.000	0.0	0.0	0.0
184	5.520	0.000	0.0	0.0	0.0
188	5.520	0.000	0.0	0.0	0.0
192	5.520	0.000	0.0	0.0	0.0
196	5.520	0.000	0.0	0.0	0.0
200	5.520	0.000	0.0	0.0	0.0
204	5.520	0.000	0.0	0.0	0.0
208	5.520	0.000	0.0	0.0	0.0
212	5.520	0.000	0.0	0.0	0.0
216	5.520	0.000	0.0	0.0	0.0
220	5.520	0.000	0.0	0.0	0.0
224	5.520	0.000	0.0	0.0	0.0
228	5.520	0.000	0.0	0.0	0.0
232	5.520	0.000	0.0	0.0	0.0
236	5.520	0.000	0.0	0.0	0.0
240	5.520	0.000	0.0	0.0	0.0
244	5.520	0.000	0.0	0.0	0.0
248	5.520	0.000	0.0	0.0	0.0
252	5.520	0.000	0.0	0.0	0.0
256	5.520	0.000	0.0	0.0	0.0
260	5.520	0.000	0.0	0.0	0.0
264	5.520	0.000	0.0	0.0	0.0
268	5.520	0.000	0.0	0.0	0.0
272	5.520	0.000	0.0	0.0	0.0
276	5.520	0.000	0.0	0.0	0.0
280	5.520	0.000	0.0	0.0	0.0
284	5.520	0.000	0.0	0.0	0.0
288	5.520	0.000	0.0	0.0	0.0
292	5.520	0.000	0.0	0.0	0.0
296	5.520	0.000	0.0	0.0	0.0
300	5.520	0.000	0.0	0.0	0.0
304	5.520	0.000	0.0	0.0	0.0
308	5.520	0.000	0.0	0.0	0.0
312	5.520	0.000	0.0	0.0	0.0
316	5.520	0.000	0.0	0.0	0.0
320	5.520	0.000	0.0	0.0	0.0
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Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
324	5.520	0.000	0.0	0.0	0.0
328	5.520	0.000	0.0	0.0	0.0
332	5.520	0.000	0.0	0.0	0.0
336	5.520	0.000	0.0	0.0	0.0
340	5.520	0.000	0.0	0.0	0.0
344	5.520	0.000	0.0	0.0	0.0
348	5.520	0.000	0.0	0.0	0.0
352	5.520	0.000	0.0	0.0	0.0
356	5.520	0.000	0.0	0.0	0.0
360	5.520	0.000	0.0	0.0	0.0
364	5.520	0.000	0.0	0.0	0.0
368	5.520	0.000	0.0	0.0	0.0
372	5.520	0.000	0.1	0.0	0.0
376	5.520	0.000	0.1	0.0	0.0
380	5.521	0.001	0.1	0.0	0.0
384	5.521	0.001	0.1	0.0	0.1
388	5.521	0.001	0.1	0.0	0.1
392	5.521	0.001	0.1	0.0	0.1
396	5.522	0.002	0.1	0.0	0.1
400	5.522	0.002	0.1	0.0	0.1
404	5.522	0.002	0.1	0.0	0.1
408	5.522	0.002	0.1	0.0	0.1
412	5.523	0.003	0.1	0.0	0.2
416	5.523	0.003	0.1	0.0	0.2
420	5.523	0.003	0.1	0.0	0.2
424	5.523	0.003	0.1	0.0	0.2
428	5.524	0.004	0.1	0.0	0.2
432	5.524	0.004	0.1	0.0	0.2
436	5.524	0.004	0.1	0.0	0.3
440	5.524	0.004	0.1	0.0	0.3
444	5.525	0.005	0.1	0.0	0.3
448	5.525	0.005	0.1	0.0	0.3
452	5.525	0.005	0.1	0.0	0.3
456	5.526	0.006	0.1	0.0	0.3
460	5.526	0.006	0.1	0.0	0.3
464	5.526	0.006	0.1	0.0	0.4
468	5.526	0.006	0.1	0.0	0.4
472	5.527	0.007	0.1	0.0	0.4
476	5.527	0.007	0.1	0.0	0.4
480	5.527	0.007	0.1	0.0	0.4
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Pringuer-James Consulting Engineers Limited				Page 4	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
484	5.527	0.007	0.1	0.0	0.4
488	5.528	0.008	0.1	0.0	0.5
492	5.528	0.008	0.1	0.0	0.5
496	5.528	0.008	0.1	0.0	0.5
500	5.529	0.009	0.1	0.0	0.5
504	5.529	0.009	0.1	0.0	0.5
508	5.529	0.009	0.1	0.0	0.6
512	5.530	0.010	0.1	0.0	0.6
516	5.530	0.010	0.1	0.0	0.6
520	5.530	0.010	0.1	0.0	0.6
524	5.530	0.010	0.1	0.0	0.6
528	5.531	0.011	0.1	0.0	0.6
532	5.531	0.011	0.1	0.0	0.7
536	5.531	0.011	0.1	0.0	0.7
540	5.532	0.012	0.1	0.0	0.7
544	5.532	0.012	0.1	0.0	0.7
548	5.532	0.012	0.1	0.0	0.7
552	5.533	0.013	0.1	0.0	0.8
556	5.533	0.013	0.1	0.0	0.8
560	5.533	0.013	0.1	0.0	0.8
564	5.534	0.014	0.1	0.0	0.8
568	5.534	0.014	0.1	0.0	0.9
572	5.535	0.015	0.1	0.0	0.9
576	5.535	0.015	0.1	0.0	0.9
580	5.535	0.015	0.1	0.0	0.9
584	5.536	0.016	0.1	0.0	0.9
588	5.536	0.016	0.1	0.0	1.0
592	5.537	0.017	0.1	0.0	1.0
596	5.537	0.017	0.1	0.0	1.0
600	5.537	0.017	0.1	0.0	1.0
604	5.538	0.018	0.1	0.0	1.1
608	5.538	0.018	0.1	0.0	1.1
612	5.539	0.019	0.1	0.0	1.1
616	5.539	0.019	0.1	0.0	1.1
620	5.539	0.019	0.1	0.0	1.2
624	5.540	0.020	0.1	0.0	1.2
628	5.540	0.020	0.1	0.0	1.2
632	5.541	0.021	0.1	0.0	1.3
636	5.541	0.021	0.1	0.0	1.3
640	5.542	0.022	0.1	0.0	1.3
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Pringuer-James Consulting Engineers Limited				Page 5	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
644	5.542	0.022	0.1	0.0	1.3
648	5.543	0.023	0.1	0.0	1.4
652	5.543	0.023	0.1	0.0	1.4
656	5.544	0.024	0.1	0.0	1.4
660	5.544	0.024	0.1	0.0	1.5
664	5.545	0.025	0.1	0.0	1.5
668	5.545	0.025	0.1	0.0	1.5
672	5.546	0.026	0.1	0.0	1.6
676	5.546	0.026	0.1	0.0	1.6
680	5.547	0.027	0.1	0.0	1.6
684	5.548	0.028	0.1	0.0	1.7
688	5.548	0.028	0.1	0.0	1.7
692	5.549	0.029	0.1	0.0	1.7
696	5.549	0.029	0.1	0.0	1.8
700	5.550	0.030	0.2	0.0	1.8
704	5.551	0.031	0.2	0.0	1.8
708	5.551	0.031	0.2	0.0	1.9
712	5.552	0.032	0.2	0.0	1.9
716	5.552	0.032	0.2	0.0	1.9
720	5.553	0.033	0.2	0.0	2.0
724	5.554	0.034	0.2	0.0	2.0
728	5.554	0.034	0.2	0.0	2.1
732	5.555	0.035	0.2	0.0	2.1
736	5.556	0.036	0.2	0.0	2.1
740	5.556	0.036	0.2	0.0	2.2
744	5.557	0.037	0.2	0.0	2.2
748	5.558	0.038	0.2	0.0	2.3
752	5.559	0.039	0.2	0.0	2.3
756	5.559	0.039	0.2	0.0	2.4
760	5.560	0.040	0.2	0.0	2.4
764	5.561	0.041	0.2	0.0	2.5
768	5.562	0.042	0.2	0.0	2.5
772	5.562	0.042	0.2	0.0	2.5
776	5.563	0.043	0.2	0.0	2.6
780	5.564	0.044	0.2	0.0	2.6
784	5.565	0.045	0.2	0.0	2.7
788	5.566	0.046	0.2	0.0	2.7
792	5.567	0.047	0.2	0.0	2.8
796	5.567	0.047	0.2	0.0	2.8
800	5.568	0.048	0.2	0.0	2.9
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Pringuer-James Consulting Engineers Limited				Page 6	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
804	5.569	0.049	0.2	0.0	2.9
808	5.570	0.050	0.2	0.0	3.0
812	5.571	0.051	0.2	0.0	3.0
816	5.572	0.052	0.2	0.0	3.1
820	5.573	0.053	0.2	0.0	3.2
824	5.574	0.054	0.2	0.0	3.2
828	5.574	0.054	0.2	0.0	3.3
832	5.575	0.055	0.2	0.0	3.3
836	5.576	0.056	0.2	0.0	3.4
840	5.577	0.057	0.2	0.0	3.4
844	5.578	0.058	0.2	0.0	3.5
848	5.579	0.059	0.2	0.0	3.6
852	5.580	0.060	0.3	0.0	3.6
856	5.581	0.061	0.3	0.0	3.7
860	5.582	0.062	0.3	0.0	3.7
864	5.583	0.063	0.3	0.0	3.8
868	5.584	0.064	0.3	0.0	3.9
872	5.585	0.065	0.3	0.0	3.9
876	5.587	0.067	0.3	0.0	4.0
880	5.588	0.068	0.3	0.0	4.1
884	5.589	0.069	0.3	0.0	4.1
888	5.590	0.070	0.3	0.0	4.2
892	5.591	0.071	0.3	0.0	4.3
896	5.592	0.072	0.3	0.0	4.3
900	5.593	0.073	0.3	0.0	4.4
904	5.594	0.074	0.3	0.0	4.5
908	5.595	0.075	0.3	0.0	4.5
912	5.597	0.077	0.3	0.0	4.6
916	5.598	0.078	0.3	0.0	4.7
920	5.599	0.079	0.3	0.0	4.7
924	5.600	0.080	0.3	0.0	4.8
928	5.601	0.081	0.3	0.0	4.9
932	5.603	0.083	0.3	0.0	5.0
936	5.604	0.084	0.3	0.0	5.0
940	5.605	0.085	0.3	0.0	5.1
944	5.606	0.086	0.3	0.0	5.2
948	5.608	0.088	0.3	0.0	5.3
952	5.609	0.089	0.3	0.0	5.3
956	5.610	0.090	0.3	0.0	5.4
960	5.611	0.091	0.3	0.0	5.5
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Pringuer-James Consulting Engineers Limited				Page 7	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
964	5.613	0.093	0.3	0.0	5.6
968	5.614	0.094	0.3	0.0	5.6
972	5.615	0.095	0.3	0.0	5.7
976	5.617	0.097	0.3	0.0	5.8
980	5.618	0.098	0.3	0.0	5.9
984	5.619	0.099	0.3	0.0	6.0
988	5.621	0.101	0.3	0.0	6.0
992	5.622	0.102	0.3	0.0	6.1
996	5.623	0.103	0.3	0.0	6.2
1000	5.625	0.105	0.3	0.0	6.3
1004	5.626	0.106	0.3	0.0	6.4
1008	5.628	0.108	0.3	0.0	6.5
1012	5.629	0.109	0.4	0.0	6.5
1016	5.630	0.110	0.4	0.0	6.6
1020	5.632	0.112	0.4	0.0	6.7
1024	5.633	0.113	0.4	0.0	6.8
1028	5.635	0.115	0.4	0.0	6.9
1032	5.636	0.116	0.4	0.0	7.0
1036	5.638	0.118	0.4	0.0	7.1
1040	5.639	0.119	0.4	0.0	7.1
1044	5.640	0.120	0.4	0.0	7.2
1048	5.642	0.122	0.4	0.0	7.3
1052	5.643	0.123	0.4	0.0	7.4
1056	5.645	0.125	0.4	0.0	7.5
1060	5.646	0.126	0.4	0.0	7.6
1064	5.648	0.128	0.4	0.0	7.7
1068	5.649	0.129	0.4	0.0	7.8
1072	5.651	0.131	0.4	0.0	7.8
1076	5.652	0.132	0.4	0.0	7.9
1080	5.654	0.134	0.4	0.0	8.0
1084	5.655	0.135	0.4	0.0	8.1
1088	5.657	0.137	0.4	0.0	8.2
1092	5.658	0.138	0.4	0.0	8.3
1096	5.660	0.140	0.4	0.0	8.4
1100	5.661	0.141	0.4	0.0	8.5
1104	5.663	0.143	0.4	0.0	8.6
1108	5.664	0.144	0.4	0.0	8.7
1112	5.666	0.146	0.4	0.0	8.8
1116	5.667	0.147	0.4	0.0	8.8
1120	5.669	0.149	0.4	0.0	8.9
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Pringuer-James Consulting Engineers Limited					Page 8	
Overseas House Elm Grove London SW19 4HE						
Date 11/02/2019 17:06		Designed by vlad				
File PERMEABLE PAVEMENT.SRCX		Checked by				
Innovyze			Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>						
Time	Level	Depth	Σ Inflow	Filtration	Volume	
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)	
1124	5.670	0.150	0.4	0.0	9.0	
1128	5.672	0.152	0.4	0.0	9.1	
1132	5.673	0.153	0.4	0.0	9.2	
1136	5.675	0.155	0.4	0.0	9.3	
1140	5.676	0.156	0.4	0.0	9.4	
1144	5.678	0.158	0.4	0.0	9.5	
1148	5.679	0.159	0.4	0.0	9.6	
1152	5.681	0.161	0.4	0.0	9.6	
1156	5.682	0.162	0.4	0.0	9.7	
1160	5.684	0.164	0.4	0.0	9.8	
1164	5.685	0.165	0.4	0.0	9.9	
1168	5.686	0.166	0.4	0.0	10.0	
1172	5.688	0.168	0.4	0.0	10.1	
1176	5.689	0.169	0.4	0.0	10.2	
1180	5.691	0.171	0.4	0.0	10.2	
1184	5.692	0.172	0.3	0.0	10.3	
1188	5.693	0.173	0.3	0.0	10.4	
1192	5.695	0.175	0.3	0.0	10.5	
1196	5.696	0.176	0.3	0.0	10.6	
1200	5.698	0.178	0.3	0.0	10.7	
1204	5.699	0.179	0.3	0.0	10.7	
1208	5.700	0.180	0.3	0.0	10.8	
1212	5.702	0.182	0.3	0.0	10.9	
1216	5.703	0.183	0.3	0.0	11.0	
1220	5.704	0.184	0.3	0.0	11.1	
1224	5.706	0.186	0.3	0.0	11.1	
1228	5.707	0.187	0.3	0.0	11.2	
1232	5.708	0.188	0.3	0.0	11.3	
1236	5.709	0.189	0.3	0.0	11.4	
1240	5.711	0.191	0.3	0.0	11.4	
1244	5.712	0.192	0.3	0.0	11.5	
1248	5.713	0.193	0.3	0.0	11.6	
1252	5.714	0.194	0.3	0.0	11.7	
1256	5.716	0.196	0.3	0.0	11.7	
1260	5.717	0.197	0.3	0.0	11.8	
1264	5.718	0.198	0.3	0.0	11.9	
1268	5.719	0.199	0.3	0.0	12.0	
1272	5.721	0.201	0.3	0.0	12.0	
1276	5.722	0.202	0.3	0.0	12.1	
1280	5.723	0.203	0.3	0.0	12.2	
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Pringuer-James Consulting Engineers Limited				Page 9	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
1284	5.724	0.204	0.3	0.0	12.2
1288	5.725	0.205	0.3	0.0	12.3
1292	5.726	0.206	0.3	0.0	12.4
1296	5.728	0.208	0.3	0.0	12.5
1300	5.729	0.209	0.3	0.0	12.5
1304	5.730	0.210	0.3	0.0	12.6
1308	5.731	0.211	0.3	0.0	12.7
1312	5.732	0.212	0.3	0.0	12.7
1316	5.733	0.213	0.3	0.0	12.8
1320	5.734	0.214	0.3	0.0	12.8
1324	5.735	0.215	0.3	0.0	12.9
1328	5.736	0.216	0.3	0.0	13.0
1332	5.737	0.217	0.3	0.0	13.0
1336	5.738	0.218	0.3	0.0	13.1
1340	5.739	0.219	0.3	0.0	13.2
1344	5.740	0.220	0.2	0.0	13.2
1348	5.741	0.221	0.2	0.0	13.3
1352	5.742	0.222	0.2	0.0	13.3
1356	5.743	0.223	0.2	0.0	13.4
1360	5.744	0.224	0.2	0.0	13.4
1364	5.745	0.225	0.2	0.0	13.5
1368	5.746	0.226	0.2	0.0	13.6
1372	5.747	0.227	0.2	0.0	13.6
1376	5.748	0.228	0.2	0.0	13.7
1380	5.749	0.229	0.2	0.0	13.7
1384	5.750	0.230	0.2	0.0	13.8
1388	5.750	0.230	0.2	0.0	13.8
1392	5.751	0.231	0.2	0.0	13.9
1396	5.752	0.232	0.2	0.0	13.9
1400	5.753	0.233	0.2	0.0	14.0
1404	5.754	0.234	0.2	0.0	14.0
1408	5.755	0.235	0.2	0.0	14.1
1412	5.755	0.235	0.2	0.0	14.1
1416	5.756	0.236	0.2	0.0	14.2
1420	5.757	0.237	0.2	0.0	14.2
1424	5.758	0.238	0.2	0.0	14.3
1428	5.759	0.239	0.2	0.0	14.3
1432	5.759	0.239	0.2	0.0	14.4
1436	5.760	0.240	0.2	0.0	14.4
1440	5.761	0.241	0.2	0.0	14.4
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Pringuer-James Consulting Engineers Limited				Page 10	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
1444	5.762	0.242	0.2	0.0	14.5
1448	5.762	0.242	0.2	0.0	14.5
1452	5.763	0.243	0.2	0.0	14.6
1456	5.764	0.244	0.2	0.0	14.6
1460	5.764	0.244	0.2	0.0	14.7
1464	5.765	0.245	0.2	0.0	14.7
1468	5.766	0.246	0.2	0.0	14.7
1472	5.766	0.246	0.2	0.0	14.8
1476	5.767	0.247	0.2	0.0	14.8
1480	5.768	0.248	0.2	0.0	14.9
1484	5.768	0.248	0.2	0.0	14.9
1488	5.769	0.249	0.2	0.0	14.9
1492	5.770	0.250	0.2	0.0	15.0
1496	5.770	0.250	0.1	0.0	15.0
1500	5.771	0.251	0.1	0.0	15.0
1504	5.771	0.251	0.1	0.0	15.1
1508	5.772	0.252	0.1	0.0	15.1
1512	5.772	0.252	0.1	0.0	15.1
1516	5.773	0.253	0.1	0.0	15.2
1520	5.774	0.254	0.1	0.0	15.2
1524	5.774	0.254	0.1	0.0	15.2
1528	5.775	0.255	0.1	0.0	15.3
1532	5.775	0.255	0.1	0.0	15.3
1536	5.776	0.256	0.1	0.0	15.3
1540	5.776	0.256	0.1	0.0	15.4
1544	5.777	0.257	0.1	0.0	15.4
1548	5.777	0.257	0.1	0.0	15.4
1552	5.778	0.258	0.1	0.0	15.5
1556	5.778	0.258	0.1	0.0	15.5
1560	5.779	0.259	0.1	0.0	15.5
1564	5.779	0.259	0.1	0.0	15.5
1568	5.779	0.259	0.1	0.0	15.6
1572	5.780	0.260	0.1	0.0	15.6
1576	5.780	0.260	0.1	0.0	15.6
1580	5.781	0.261	0.1	0.0	15.6
1584	5.781	0.261	0.1	0.0	15.7
1588	5.782	0.262	0.1	0.0	15.7
1592	5.782	0.262	0.1	0.0	15.7
1596	5.782	0.262	0.1	0.0	15.7
1600	5.783	0.263	0.1	0.0	15.8
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Pringuer-James Consulting Engineers Limited				Page 11	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
1604	5.783	0.263	0.1	0.0	15.8
1608	5.784	0.264	0.1	0.0	15.8
1612	5.784	0.264	0.1	0.0	15.8
1616	5.784	0.264	0.1	0.0	15.9
1620	5.785	0.265	0.1	0.0	15.9
1624	5.785	0.265	0.1	0.0	15.9
1628	5.786	0.266	0.1	0.0	15.9
1632	5.786	0.266	0.1	0.0	16.0
1636	5.786	0.266	0.1	0.0	16.0
1640	5.787	0.267	0.1	0.0	16.0
1644	5.787	0.267	0.1	0.0	16.0
1648	5.787	0.267	0.1	0.0	16.0
1652	5.788	0.268	0.1	0.0	16.1
1656	5.788	0.268	0.1	0.0	16.1
1660	5.788	0.268	0.1	0.0	16.1
1664	5.789	0.269	0.1	0.0	16.1
1668	5.789	0.269	0.1	0.0	16.1
1672	5.789	0.269	0.1	0.0	16.2
1676	5.790	0.270	0.1	0.0	16.2
1680	5.790	0.270	0.1	0.0	16.2
1684	5.790	0.270	0.1	0.0	16.2
1688	5.790	0.270	0.1	0.0	16.2
1692	5.791	0.271	0.1	0.0	16.2
1696	5.791	0.271	0.1	0.0	16.3
1700	5.791	0.271	0.1	0.0	16.3
1704	5.792	0.272	0.1	0.0	16.3
1708	5.792	0.272	0.1	0.0	16.3
1712	5.792	0.272	0.1	0.0	16.3
1716	5.793	0.273	0.1	0.0	16.4
1720	5.793	0.273	0.1	0.0	16.4
1724	5.793	0.273	0.1	0.0	16.4
1728	5.793	0.273	0.1	0.0	16.4
1732	5.794	0.274	0.1	0.0	16.4
1736	5.794	0.274	0.1	0.0	16.4
1740	5.794	0.274	0.1	0.0	16.4
1744	5.794	0.274	0.1	0.0	16.5
1748	5.795	0.275	0.1	0.0	16.5
1752	5.795	0.275	0.1	0.0	16.5
1756	5.795	0.275	0.1	0.0	16.5
1760	5.795	0.275	0.1	0.0	16.5
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Pringuer-James Consulting Engineers Limited				Page 12	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
1764	5.796	0.276	0.1	0.0	16.5
1768	5.796	0.276	0.1	0.0	16.6
1772	5.796	0.276	0.1	0.0	16.6
1776	5.796	0.276	0.1	0.0	16.6
1780	5.797	0.277	0.1	0.0	16.6
1784	5.797	0.277	0.1	0.0	16.6
1788	5.797	0.277	0.1	0.0	16.6
1792	5.797	0.277	0.1	0.0	16.6
1796	5.798	0.278	0.1	0.0	16.7
1800	5.798	0.278	0.1	0.0	16.7
1804	5.798	0.278	0.1	0.0	16.7
1808	5.798	0.278	0.1	0.0	16.7
1812	5.799	0.279	0.1	0.0	16.7
1816	5.799	0.279	0.1	0.0	16.7
1820	5.799	0.279	0.1	0.0	16.7
1824	5.799	0.279	0.1	0.0	16.8
1828	5.800	0.280	0.1	0.0	16.8
1832	5.800	0.280	0.1	0.0	16.8
1836	5.808	0.288	0.1	0.0	16.8
1840	5.823	0.303	0.1	0.0	16.8
1844	5.837	0.317	0.1	0.0	16.8
1848	5.850	0.330	0.1	0.0	16.9
1852	5.850	0.330	0.1	0.0	16.9
1856	5.850	0.330	0.1	0.0	16.9
1860	5.850	0.330	0.1	0.0	16.9
1864	5.850	0.330	0.1	0.0	16.9
1868	5.850	0.330	0.1	0.0	16.9
1872	5.850	0.330	0.1	0.0	16.9
1876	5.850	0.330	0.1	0.0	17.0
1880	5.850	0.330	0.1	0.0	17.0
1884	5.850	0.330	0.1	0.0	17.0
1888	5.850	0.330	0.1	0.0	17.0
1892	5.850	0.330	0.1	0.0	17.0
1896	5.850	0.330	0.1	0.0	17.0
1900	5.850	0.330	0.1	0.0	17.0
1904	5.850	0.330	0.1	0.0	17.1
1908	5.850	0.330	0.1	0.0	17.1
1912	5.850	0.330	0.1	0.0	17.1
1916	5.850	0.330	0.1	0.0	17.1
1920	5.850	0.330	0.1	0.0	17.1
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Pringuer-James Consulting Engineers Limited				Page 13	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
1924	5.850	0.330	0.1	0.0	17.1
1928	5.850	0.330	0.1	0.0	17.1
1932	5.850	0.330	0.1	0.0	17.2
1936	5.850	0.330	0.1	0.0	17.2
1940	5.850	0.330	0.1	0.0	17.2
1944	5.850	0.330	0.1	0.0	17.2
1948	5.850	0.330	0.1	0.0	17.2
1952	5.850	0.330	0.1	0.0	17.2
1956	5.850	0.330	0.1	0.0	17.2
1960	5.850	0.330	0.1	0.0	17.3
1964	5.850	0.330	0.1	0.0	17.3
1968	5.850	0.330	0.1	0.0	17.3
1972	5.850	0.330	0.1	0.0	17.3
1976	5.850	0.330	0.1	0.0	17.3
1980	5.850	0.330	0.1	0.0	17.3
1984	5.850	0.330	0.1	0.0	17.3
1988	5.851	0.331	0.1	0.0	17.4
1992	5.851	0.331	0.1	0.0	17.4
1996	5.851	0.331	0.1	0.0	17.4
2000	5.851	0.331	0.1	0.0	17.4
2004	5.851	0.331	0.1	0.0	17.4
2008	5.851	0.331	0.1	0.0	17.4
2012	5.851	0.331	0.1	0.0	17.4
2016	5.851	0.331	0.1	0.0	17.5
2020	5.851	0.331	0.1	0.0	17.5
2024	5.851	0.331	0.1	0.0	17.5
2028	5.851	0.331	0.1	0.0	17.5
2032	5.851	0.331	0.1	0.0	17.5
2036	5.851	0.331	0.1	0.0	17.5
2040	5.851	0.331	0.1	0.0	17.5
2044	5.851	0.331	0.1	0.0	17.5
2048	5.851	0.331	0.1	0.0	17.6
2052	5.851	0.331	0.0	0.0	17.6
2056	5.851	0.331	0.0	0.0	17.6
2060	5.851	0.331	0.0	0.0	17.6
2064	5.851	0.331	0.0	0.0	17.6
2068	5.851	0.331	0.0	0.0	17.6
2072	5.851	0.331	0.0	0.0	17.6
2076	5.851	0.331	0.0	0.0	17.6
2080	5.851	0.331	0.0	0.0	17.6
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Pringuer-James Consulting Engineers Limited				Page 14	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
2084	5.851	0.331	0.0	0.0	17.7
2088	5.851	0.331	0.0	0.0	17.7
2092	5.851	0.331	0.0	0.0	17.7
2096	5.851	0.331	0.0	0.0	17.7
2100	5.851	0.331	0.0	0.0	17.7
2104	5.851	0.331	0.0	0.0	17.7
2108	5.851	0.331	0.0	0.0	17.7
2112	5.851	0.331	0.0	0.0	17.7
2116	5.851	0.331	0.0	0.0	17.7
2120	5.851	0.331	0.0	0.0	17.7
2124	5.851	0.331	0.0	0.0	17.7
2128	5.851	0.331	0.0	0.0	17.7
2132	5.851	0.331	0.0	0.0	17.7
2136	5.851	0.331	0.0	0.0	17.7
2140	5.851	0.331	0.0	0.0	17.7
2144	5.851	0.331	0.0	0.0	17.8
2148	5.851	0.331	0.0	0.0	17.8
2152	5.851	0.331	0.0	0.0	17.8
2156	5.851	0.331	0.0	0.0	17.8
2160	5.851	0.331	0.0	0.0	17.8
2164	5.851	0.331	0.0	0.0	17.8
2168	5.851	0.331	0.0	0.0	17.8
2172	5.851	0.331	0.0	0.0	17.8
2176	5.851	0.331	0.0	0.0	17.8
2180	5.851	0.331	0.0	0.0	17.8
2184	5.851	0.331	0.0	0.0	17.8
2188	5.851	0.331	0.0	0.0	17.8
2192	5.851	0.331	0.0	0.0	17.8
2196	5.851	0.331	0.0	0.0	17.8
2200	5.851	0.331	0.0	0.0	17.8
2204	5.851	0.331	0.0	0.0	17.8
2208	5.851	0.331	0.0	0.0	17.8
2212	5.851	0.331	0.0	0.0	17.8
2216	5.851	0.331	0.0	0.0	17.8
2220	5.851	0.331	0.0	0.0	17.8
2224	5.851	0.331	0.0	0.0	17.8
2228	5.851	0.331	0.0	0.0	17.8
2232	5.851	0.331	0.0	0.0	17.8
2236	5.851	0.331	0.0	0.0	17.8
2240	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 15	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
2244	5.851	0.331	0.0	0.0	17.8
2248	5.851	0.331	0.0	0.0	17.8
2252	5.851	0.331	0.0	0.0	17.8
2256	5.851	0.331	0.0	0.0	17.8
2260	5.851	0.331	0.0	0.0	17.8
2264	5.851	0.331	0.0	0.0	17.8
2268	5.851	0.331	0.0	0.0	17.8
2272	5.851	0.331	0.0	0.0	17.8
2276	5.851	0.331	0.0	0.0	17.8
2280	5.851	0.331	0.0	0.0	17.8
2284	5.851	0.331	0.0	0.0	17.8
2288	5.851	0.331	0.0	0.0	17.8
2292	5.851	0.331	0.0	0.0	17.8
2296	5.851	0.331	0.0	0.0	17.8
2300	5.851	0.331	0.0	0.0	17.8
2304	5.851	0.331	0.0	0.0	17.8
2308	5.851	0.331	0.0	0.0	17.8
2312	5.851	0.331	0.0	0.0	17.8
2316	5.851	0.331	0.0	0.0	17.8
2320	5.851	0.331	0.0	0.0	17.8
2324	5.851	0.331	0.0	0.0	17.8
2328	5.851	0.331	0.0	0.0	17.8
2332	5.851	0.331	0.0	0.0	17.8
2336	5.851	0.331	0.0	0.0	17.8
2340	5.851	0.331	0.0	0.0	17.8
2344	5.851	0.331	0.0	0.0	17.8
2348	5.851	0.331	0.0	0.0	17.8
2352	5.851	0.331	0.0	0.0	17.8
2356	5.851	0.331	0.0	0.0	17.8
2360	5.851	0.331	0.0	0.0	17.8
2364	5.851	0.331	0.0	0.0	17.8
2368	5.851	0.331	0.0	0.0	17.8
2372	5.851	0.331	0.0	0.0	17.8
2376	5.851	0.331	0.0	0.0	17.8
2380	5.851	0.331	0.0	0.0	17.8
2384	5.851	0.331	0.0	0.0	17.8
2388	5.851	0.331	0.0	0.0	17.8
2392	5.851	0.331	0.0	0.0	17.8
2396	5.851	0.331	0.0	0.0	17.8
2400	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 16	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06 File PERMEABLE PAVEMENT.SRCX		Designed by vlad Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
2404	5.851	0.331	0.0	0.0	17.8
2408	5.851	0.331	0.0	0.0	17.8
2412	5.851	0.331	0.0	0.0	17.8
2416	5.851	0.331	0.0	0.0	17.8
2420	5.851	0.331	0.0	0.0	17.8
2424	5.851	0.331	0.0	0.0	17.8
2428	5.851	0.331	0.0	0.0	17.8
2432	5.851	0.331	0.0	0.0	17.8
2436	5.851	0.331	0.0	0.0	17.8
2440	5.851	0.331	0.0	0.0	17.8
2444	5.851	0.331	0.0	0.0	17.8
2448	5.851	0.331	0.0	0.0	17.8
2452	5.851	0.331	0.0	0.0	17.8
2456	5.851	0.331	0.0	0.0	17.8
2460	5.851	0.331	0.0	0.0	17.8
2464	5.851	0.331	0.0	0.0	17.8
2468	5.851	0.331	0.0	0.0	17.8
2472	5.851	0.331	0.0	0.0	17.8
2476	5.851	0.331	0.0	0.0	17.8
2480	5.851	0.331	0.0	0.0	17.8
2484	5.851	0.331	0.0	0.0	17.8
2488	5.851	0.331	0.0	0.0	17.8
2492	5.851	0.331	0.0	0.0	17.8
2496	5.851	0.331	0.0	0.0	17.8
2500	5.851	0.331	0.0	0.0	17.8
2504	5.851	0.331	0.0	0.0	17.8
2508	5.851	0.331	0.0	0.0	17.8
2512	5.851	0.331	0.0	0.0	17.8
2516	5.851	0.331	0.0	0.0	17.8
2520	5.851	0.331	0.0	0.0	17.8
2524	5.851	0.331	0.0	0.0	17.8
2528	5.851	0.331	0.0	0.0	17.8
2532	5.851	0.331	0.0	0.0	17.8
2536	5.851	0.331	0.0	0.0	17.8
2540	5.851	0.331	0.0	0.0	17.8
2544	5.851	0.331	0.0	0.0	17.8
2548	5.851	0.331	0.0	0.0	17.8
2552	5.851	0.331	0.0	0.0	17.8
2556	5.851	0.331	0.0	0.0	17.8
2560	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 17	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
2564	5.851	0.331	0.0	0.0	17.8
2568	5.851	0.331	0.0	0.0	17.8
2572	5.851	0.331	0.0	0.0	17.8
2576	5.851	0.331	0.0	0.0	17.8
2580	5.851	0.331	0.0	0.0	17.8
2584	5.851	0.331	0.0	0.0	17.8
2588	5.851	0.331	0.0	0.0	17.8
2592	5.851	0.331	0.0	0.0	17.8
2596	5.851	0.331	0.0	0.0	17.8
2600	5.851	0.331	0.0	0.0	17.8
2604	5.851	0.331	0.0	0.0	17.8
2608	5.851	0.331	0.0	0.0	17.8
2612	5.851	0.331	0.0	0.0	17.8
2616	5.851	0.331	0.0	0.0	17.8
2620	5.851	0.331	0.0	0.0	17.8
2624	5.851	0.331	0.0	0.0	17.8
2628	5.851	0.331	0.0	0.0	17.8
2632	5.851	0.331	0.0	0.0	17.8
2636	5.851	0.331	0.0	0.0	17.8
2640	5.851	0.331	0.0	0.0	17.8
2644	5.851	0.331	0.0	0.0	17.8
2648	5.851	0.331	0.0	0.0	17.8
2652	5.851	0.331	0.0	0.0	17.8
2656	5.851	0.331	0.0	0.0	17.8
2660	5.851	0.331	0.0	0.0	17.8
2664	5.851	0.331	0.0	0.0	17.8
2668	5.851	0.331	0.0	0.0	17.8
2672	5.851	0.331	0.0	0.0	17.8
2676	5.851	0.331	0.0	0.0	17.8
2680	5.851	0.331	0.0	0.0	17.8
2684	5.851	0.331	0.0	0.0	17.8
2688	5.851	0.331	0.0	0.0	17.8
2692	5.851	0.331	0.0	0.0	17.8
2696	5.851	0.331	0.0	0.0	17.8
2700	5.851	0.331	0.0	0.0	17.8
2704	5.851	0.331	0.0	0.0	17.8
2708	5.851	0.331	0.0	0.0	17.8
2712	5.851	0.331	0.0	0.0	17.8
2716	5.851	0.331	0.0	0.0	17.8
2720	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 18	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
2724	5.851	0.331	0.0	0.0	17.8
2728	5.851	0.331	0.0	0.0	17.8
2732	5.851	0.331	0.0	0.0	17.8
2736	5.851	0.331	0.0	0.0	17.8
2740	5.851	0.331	0.0	0.0	17.8
2744	5.851	0.331	0.0	0.0	17.8
2748	5.851	0.331	0.0	0.0	17.8
2752	5.851	0.331	0.0	0.0	17.8
2756	5.851	0.331	0.0	0.0	17.8
2760	5.851	0.331	0.0	0.0	17.8
2764	5.851	0.331	0.0	0.0	17.8
2768	5.851	0.331	0.0	0.0	17.8
2772	5.851	0.331	0.0	0.0	17.8
2776	5.851	0.331	0.0	0.0	17.8
2780	5.851	0.331	0.0	0.0	17.8
2784	5.851	0.331	0.0	0.0	17.8
2788	5.851	0.331	0.0	0.0	17.8
2792	5.851	0.331	0.0	0.0	17.8
2796	5.851	0.331	0.0	0.0	17.8
2800	5.851	0.331	0.0	0.0	17.8
2804	5.851	0.331	0.0	0.0	17.8
2808	5.851	0.331	0.0	0.0	17.8
2812	5.851	0.331	0.0	0.0	17.8
2816	5.851	0.331	0.0	0.0	17.8
2820	5.851	0.331	0.0	0.0	17.8
2824	5.851	0.331	0.0	0.0	17.8
2828	5.851	0.331	0.0	0.0	17.8
2832	5.851	0.331	0.0	0.0	17.8
2836	5.851	0.331	0.0	0.0	17.8
2840	5.851	0.331	0.0	0.0	17.8
2844	5.851	0.331	0.0	0.0	17.8
2848	5.851	0.331	0.0	0.0	17.8
2852	5.851	0.331	0.0	0.0	17.8
2856	5.851	0.331	0.0	0.0	17.8
2860	5.851	0.331	0.0	0.0	17.8
2864	5.851	0.331	0.0	0.0	17.8
2868	5.851	0.331	0.0	0.0	17.8
2872	5.851	0.331	0.0	0.0	17.8
2876	5.851	0.331	0.0	0.0	17.8
2880	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 19	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
2884	5.851	0.331	0.0	0.0	17.8
2888	5.851	0.331	0.0	0.0	17.8
2892	5.851	0.331	0.0	0.0	17.8
2896	5.851	0.331	0.0	0.0	17.8
2900	5.851	0.331	0.0	0.0	17.8
2904	5.851	0.331	0.0	0.0	17.8
2908	5.851	0.331	0.0	0.0	17.8
2912	5.851	0.331	0.0	0.0	17.8
2916	5.851	0.331	0.0	0.0	17.8
2920	5.851	0.331	0.0	0.0	17.8
2924	5.851	0.331	0.0	0.0	17.8
2928	5.851	0.331	0.0	0.0	17.8
2932	5.851	0.331	0.0	0.0	17.8
2936	5.851	0.331	0.0	0.0	17.8
2940	5.851	0.331	0.0	0.0	17.8
2944	5.851	0.331	0.0	0.0	17.8
2948	5.851	0.331	0.0	0.0	17.8
2952	5.851	0.331	0.0	0.0	17.8
2956	5.851	0.331	0.0	0.0	17.8
2960	5.851	0.331	0.0	0.0	17.8
2964	5.851	0.331	0.0	0.0	17.8
2968	5.851	0.331	0.0	0.0	17.8
2972	5.851	0.331	0.0	0.0	17.8
2976	5.851	0.331	0.0	0.0	17.8
2980	5.851	0.331	0.0	0.0	17.8
2984	5.851	0.331	0.0	0.0	17.8
2988	5.851	0.331	0.0	0.0	17.8
2992	5.851	0.331	0.0	0.0	17.8
2996	5.851	0.331	0.0	0.0	17.8
3000	5.851	0.331	0.0	0.0	17.8
3004	5.851	0.331	0.0	0.0	17.8
3008	5.851	0.331	0.0	0.0	17.8
3012	5.851	0.331	0.0	0.0	17.8
3016	5.851	0.331	0.0	0.0	17.8
3020	5.851	0.331	0.0	0.0	17.8
3024	5.851	0.331	0.0	0.0	17.8
3028	5.851	0.331	0.0	0.0	17.8
3032	5.851	0.331	0.0	0.0	17.8
3036	5.851	0.331	0.0	0.0	17.8
3040	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 20	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
3044	5.851	0.331	0.0	0.0	17.8
3048	5.851	0.331	0.0	0.0	17.8
3052	5.851	0.331	0.0	0.0	17.8
3056	5.851	0.331	0.0	0.0	17.8
3060	5.851	0.331	0.0	0.0	17.8
3064	5.851	0.331	0.0	0.0	17.8
3068	5.851	0.331	0.0	0.0	17.8
3072	5.851	0.331	0.0	0.0	17.8
3076	5.851	0.331	0.0	0.0	17.8
3080	5.851	0.331	0.0	0.0	17.8
3084	5.851	0.331	0.0	0.0	17.8
3088	5.851	0.331	0.0	0.0	17.8
3092	5.851	0.331	0.0	0.0	17.8
3096	5.851	0.331	0.0	0.0	17.8
3100	5.851	0.331	0.0	0.0	17.8
3104	5.851	0.331	0.0	0.0	17.8
3108	5.851	0.331	0.0	0.0	17.8
3112	5.851	0.331	0.0	0.0	17.8
3116	5.851	0.331	0.0	0.0	17.8
3120	5.851	0.331	0.0	0.0	17.8
3124	5.851	0.331	0.0	0.0	17.8
3128	5.851	0.331	0.0	0.0	17.8
3132	5.851	0.331	0.0	0.0	17.8
3136	5.851	0.331	0.0	0.0	17.8
3140	5.851	0.331	0.0	0.0	17.8
3144	5.851	0.331	0.0	0.0	17.8
3148	5.851	0.331	0.0	0.0	17.8
3152	5.851	0.331	0.0	0.0	17.8
3156	5.851	0.331	0.0	0.0	17.8
3160	5.851	0.331	0.0	0.0	17.8
3164	5.851	0.331	0.0	0.0	17.8
3168	5.851	0.331	0.0	0.0	17.8
3172	5.851	0.331	0.0	0.0	17.8
3176	5.851	0.331	0.0	0.0	17.8
3180	5.851	0.331	0.0	0.0	17.8
3184	5.851	0.331	0.0	0.0	17.8
3188	5.851	0.331	0.0	0.0	17.8
3192	5.851	0.331	0.0	0.0	17.8
3196	5.851	0.331	0.0	0.0	17.8
3200	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 21	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
3204	5.851	0.331	0.0	0.0	17.8
3208	5.851	0.331	0.0	0.0	17.8
3212	5.851	0.331	0.0	0.0	17.8
3216	5.851	0.331	0.0	0.0	17.8
3220	5.851	0.331	0.0	0.0	17.8
3224	5.851	0.331	0.0	0.0	17.8
3228	5.851	0.331	0.0	0.0	17.8
3232	5.851	0.331	0.0	0.0	17.8
3236	5.851	0.331	0.0	0.0	17.8
3240	5.851	0.331	0.0	0.0	17.8
3244	5.851	0.331	0.0	0.0	17.8
3248	5.851	0.331	0.0	0.0	17.8
3252	5.851	0.331	0.0	0.0	17.8
3256	5.851	0.331	0.0	0.0	17.8
3260	5.851	0.331	0.0	0.0	17.8
3264	5.851	0.331	0.0	0.0	17.8
3268	5.851	0.331	0.0	0.0	17.8
3272	5.851	0.331	0.0	0.0	17.8
3276	5.851	0.331	0.0	0.0	17.8
3280	5.851	0.331	0.0	0.0	17.8
3284	5.851	0.331	0.0	0.0	17.8
3288	5.851	0.331	0.0	0.0	17.8
3292	5.851	0.331	0.0	0.0	17.8
3296	5.851	0.331	0.0	0.0	17.8
3300	5.851	0.331	0.0	0.0	17.8
3304	5.851	0.331	0.0	0.0	17.8
3308	5.851	0.331	0.0	0.0	17.8
3312	5.851	0.331	0.0	0.0	17.8
3316	5.851	0.331	0.0	0.0	17.8
3320	5.851	0.331	0.0	0.0	17.8
3324	5.851	0.331	0.0	0.0	17.8
3328	5.851	0.331	0.0	0.0	17.8
3332	5.851	0.331	0.0	0.0	17.8
3336	5.851	0.331	0.0	0.0	17.8
3340	5.851	0.331	0.0	0.0	17.8
3344	5.851	0.331	0.0	0.0	17.8
3348	5.851	0.331	0.0	0.0	17.8
3352	5.851	0.331	0.0	0.0	17.8
3356	5.851	0.331	0.0	0.0	17.8
3360	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 22	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
3364	5.851	0.331	0.0	0.0	17.8
3368	5.851	0.331	0.0	0.0	17.8
3372	5.851	0.331	0.0	0.0	17.8
3376	5.851	0.331	0.0	0.0	17.8
3380	5.851	0.331	0.0	0.0	17.8
3384	5.851	0.331	0.0	0.0	17.8
3388	5.851	0.331	0.0	0.0	17.8
3392	5.851	0.331	0.0	0.0	17.8
3396	5.851	0.331	0.0	0.0	17.8
3400	5.851	0.331	0.0	0.0	17.8
3404	5.851	0.331	0.0	0.0	17.8
3408	5.851	0.331	0.0	0.0	17.8
3412	5.851	0.331	0.0	0.0	17.8
3416	5.851	0.331	0.0	0.0	17.8
3420	5.851	0.331	0.0	0.0	17.8
3424	5.851	0.331	0.0	0.0	17.8
3428	5.851	0.331	0.0	0.0	17.8
3432	5.851	0.331	0.0	0.0	17.8
3436	5.851	0.331	0.0	0.0	17.8
3440	5.851	0.331	0.0	0.0	17.8
3444	5.851	0.331	0.0	0.0	17.8
3448	5.851	0.331	0.0	0.0	17.8
3452	5.851	0.331	0.0	0.0	17.8
3456	5.851	0.331	0.0	0.0	17.8
3460	5.851	0.331	0.0	0.0	17.8
3464	5.851	0.331	0.0	0.0	17.8
3468	5.851	0.331	0.0	0.0	17.8
3472	5.851	0.331	0.0	0.0	17.8
3476	5.851	0.331	0.0	0.0	17.8
3480	5.851	0.331	0.0	0.0	17.8
3484	5.851	0.331	0.0	0.0	17.8
3488	5.851	0.331	0.0	0.0	17.8
3492	5.851	0.331	0.0	0.0	17.8
3496	5.851	0.331	0.0	0.0	17.8
3500	5.851	0.331	0.0	0.0	17.8
3504	5.851	0.331	0.0	0.0	17.8
3508	5.851	0.331	0.0	0.0	17.8
3512	5.851	0.331	0.0	0.0	17.8
3516	5.851	0.331	0.0	0.0	17.8
3520	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 23	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
3524	5.851	0.331	0.0	0.0	17.8
3528	5.851	0.331	0.0	0.0	17.8
3532	5.851	0.331	0.0	0.0	17.8
3536	5.851	0.331	0.0	0.0	17.8
3540	5.851	0.331	0.0	0.0	17.8
3544	5.851	0.331	0.0	0.0	17.8
3548	5.851	0.331	0.0	0.0	17.8
3552	5.851	0.331	0.0	0.0	17.8
3556	5.851	0.331	0.0	0.0	17.8
3560	5.851	0.331	0.0	0.0	17.8
3564	5.851	0.331	0.0	0.0	17.8
3568	5.851	0.331	0.0	0.0	17.8
3572	5.851	0.331	0.0	0.0	17.8
3576	5.851	0.331	0.0	0.0	17.8
3580	5.851	0.331	0.0	0.0	17.8
3584	5.851	0.331	0.0	0.0	17.8
3588	5.851	0.331	0.0	0.0	17.8
3592	5.851	0.331	0.0	0.0	17.8
3596	5.851	0.331	0.0	0.0	17.8
3600	5.851	0.331	0.0	0.0	17.8
3604	5.851	0.331	0.0	0.0	17.8
3608	5.851	0.331	0.0	0.0	17.8
3612	5.851	0.331	0.0	0.0	17.8
3616	5.851	0.331	0.0	0.0	17.8
3620	5.851	0.331	0.0	0.0	17.8
3624	5.851	0.331	0.0	0.0	17.8
3628	5.851	0.331	0.0	0.0	17.8
3632	5.851	0.331	0.0	0.0	17.8
3636	5.851	0.331	0.0	0.0	17.8
3640	5.851	0.331	0.0	0.0	17.8
3644	5.851	0.331	0.0	0.0	17.8
3648	5.851	0.331	0.0	0.0	17.8
3652	5.851	0.331	0.0	0.0	17.8
3656	5.851	0.331	0.0	0.0	17.8
3660	5.851	0.331	0.0	0.0	17.8
3664	5.851	0.331	0.0	0.0	17.8
3668	5.851	0.331	0.0	0.0	17.8
3672	5.851	0.331	0.0	0.0	17.8
3676	5.851	0.331	0.0	0.0	17.8
3680	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 24	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
3684	5.851	0.331	0.0	0.0	17.8
3688	5.851	0.331	0.0	0.0	17.8
3692	5.851	0.331	0.0	0.0	17.8
3696	5.851	0.331	0.0	0.0	17.8
3700	5.851	0.331	0.0	0.0	17.8
3704	5.851	0.331	0.0	0.0	17.8
3708	5.851	0.331	0.0	0.0	17.8
3712	5.851	0.331	0.0	0.0	17.8
3716	5.851	0.331	0.0	0.0	17.8
3720	5.851	0.331	0.0	0.0	17.8
3724	5.851	0.331	0.0	0.0	17.8
3728	5.851	0.331	0.0	0.0	17.8
3732	5.851	0.331	0.0	0.0	17.8
3736	5.851	0.331	0.0	0.0	17.8
3740	5.851	0.331	0.0	0.0	17.8
3744	5.851	0.331	0.0	0.0	17.8
3748	5.851	0.331	0.0	0.0	17.8
3752	5.851	0.331	0.0	0.0	17.8
3756	5.851	0.331	0.0	0.0	17.8
3760	5.851	0.331	0.0	0.0	17.8
3764	5.851	0.331	0.0	0.0	17.8
3768	5.851	0.331	0.0	0.0	17.8
3772	5.851	0.331	0.0	0.0	17.8
3776	5.851	0.331	0.0	0.0	17.8
3780	5.851	0.331	0.0	0.0	17.8
3784	5.851	0.331	0.0	0.0	17.8
3788	5.851	0.331	0.0	0.0	17.8
3792	5.851	0.331	0.0	0.0	17.8
3796	5.851	0.331	0.0	0.0	17.8
3800	5.851	0.331	0.0	0.0	17.8
3804	5.851	0.331	0.0	0.0	17.8
3808	5.851	0.331	0.0	0.0	17.8
3812	5.851	0.331	0.0	0.0	17.8
3816	5.851	0.331	0.0	0.0	17.8
3820	5.851	0.331	0.0	0.0	17.8
3824	5.851	0.331	0.0	0.0	17.8
3828	5.851	0.331	0.0	0.0	17.8
3832	5.851	0.331	0.0	0.0	17.8
3836	5.851	0.331	0.0	0.0	17.8
3840	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 25	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
3844	5.851	0.331	0.0	0.0	17.8
3848	5.851	0.331	0.0	0.0	17.8
3852	5.851	0.331	0.0	0.0	17.8
3856	5.851	0.331	0.0	0.0	17.8
3860	5.851	0.331	0.0	0.0	17.8
3864	5.851	0.331	0.0	0.0	17.8
3868	5.851	0.331	0.0	0.0	17.8
3872	5.851	0.331	0.0	0.0	17.8
3876	5.851	0.331	0.0	0.0	17.8
3880	5.851	0.331	0.0	0.0	17.8
3884	5.851	0.331	0.0	0.0	17.8
3888	5.851	0.331	0.0	0.0	17.8
3892	5.851	0.331	0.0	0.0	17.8
3896	5.851	0.331	0.0	0.0	17.8
3900	5.851	0.331	0.0	0.0	17.8
3904	5.851	0.331	0.0	0.0	17.8
3908	5.851	0.331	0.0	0.0	17.8
3912	5.851	0.331	0.0	0.0	17.8
3916	5.851	0.331	0.0	0.0	17.8
3920	5.851	0.331	0.0	0.0	17.8
3924	5.851	0.331	0.0	0.0	17.8
3928	5.851	0.331	0.0	0.0	17.8
3932	5.851	0.331	0.0	0.0	17.8
3936	5.851	0.331	0.0	0.0	17.8
3940	5.851	0.331	0.0	0.0	17.8
3944	5.851	0.331	0.0	0.0	17.8
3948	5.851	0.331	0.0	0.0	17.8
3952	5.851	0.331	0.0	0.0	17.8
3956	5.851	0.331	0.0	0.0	17.8
3960	5.851	0.331	0.0	0.0	17.8
3964	5.851	0.331	0.0	0.0	17.8
3968	5.851	0.331	0.0	0.0	17.8
3972	5.851	0.331	0.0	0.0	17.8
3976	5.851	0.331	0.0	0.0	17.8
3980	5.851	0.331	0.0	0.0	17.8
3984	5.851	0.331	0.0	0.0	17.8
3988	5.851	0.331	0.0	0.0	17.8
3992	5.851	0.331	0.0	0.0	17.8
3996	5.851	0.331	0.0	0.0	17.8
4000	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 26	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06 File PERMEABLE PAVEMENT.SRCX		Designed by vlad Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
4004	5.851	0.331	0.0	0.0	17.8
4008	5.851	0.331	0.0	0.0	17.8
4012	5.851	0.331	0.0	0.0	17.8
4016	5.851	0.331	0.0	0.0	17.8
4020	5.851	0.331	0.0	0.0	17.8
4024	5.851	0.331	0.0	0.0	17.8
4028	5.851	0.331	0.0	0.0	17.8
4032	5.851	0.331	0.0	0.0	17.8
4036	5.851	0.331	0.0	0.0	17.8
4040	5.851	0.331	0.0	0.0	17.8
4044	5.851	0.331	0.0	0.0	17.8
4048	5.851	0.331	0.0	0.0	17.8
4052	5.851	0.331	0.0	0.0	17.8
4056	5.851	0.331	0.0	0.0	17.8
4060	5.851	0.331	0.0	0.0	17.8
4064	5.851	0.331	0.0	0.0	17.8
4068	5.851	0.331	0.0	0.0	17.8
4072	5.851	0.331	0.0	0.0	17.8
4076	5.851	0.331	0.0	0.0	17.8
4080	5.851	0.331	0.0	0.0	17.8
4084	5.851	0.331	0.0	0.0	17.8
4088	5.851	0.331	0.0	0.0	17.8
4092	5.851	0.331	0.0	0.0	17.8
4096	5.851	0.331	0.0	0.0	17.8
4100	5.851	0.331	0.0	0.0	17.8
4104	5.851	0.331	0.0	0.0	17.8
4108	5.851	0.331	0.0	0.0	17.8
4112	5.851	0.331	0.0	0.0	17.8
4116	5.851	0.331	0.0	0.0	17.8
4120	5.851	0.331	0.0	0.0	17.8
4124	5.851	0.331	0.0	0.0	17.8
4128	5.851	0.331	0.0	0.0	17.8
4132	5.851	0.331	0.0	0.0	17.8
4136	5.851	0.331	0.0	0.0	17.8
4140	5.851	0.331	0.0	0.0	17.8
4144	5.851	0.331	0.0	0.0	17.8
4148	5.851	0.331	0.0	0.0	17.8
4152	5.851	0.331	0.0	0.0	17.8
4156	5.851	0.331	0.0	0.0	17.8
4160	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 27	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06 File PERMEABLE PAVEMENT.SRCX		Designed by vlad Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
4164	5.851	0.331	0.0	0.0	17.8
4168	5.851	0.331	0.0	0.0	17.8
4172	5.851	0.331	0.0	0.0	17.8
4176	5.851	0.331	0.0	0.0	17.8
4180	5.851	0.331	0.0	0.0	17.8
4184	5.851	0.331	0.0	0.0	17.8
4188	5.851	0.331	0.0	0.0	17.8
4192	5.851	0.331	0.0	0.0	17.8
4196	5.851	0.331	0.0	0.0	17.8
4200	5.851	0.331	0.0	0.0	17.8
4204	5.851	0.331	0.0	0.0	17.8
4208	5.851	0.331	0.0	0.0	17.8
4212	5.851	0.331	0.0	0.0	17.8
4216	5.851	0.331	0.0	0.0	17.8
4220	5.851	0.331	0.0	0.0	17.8
4224	5.851	0.331	0.0	0.0	17.8
4228	5.851	0.331	0.0	0.0	17.8
4232	5.851	0.331	0.0	0.0	17.8
4236	5.851	0.331	0.0	0.0	17.8
4240	5.851	0.331	0.0	0.0	17.8
4244	5.851	0.331	0.0	0.0	17.8
4248	5.851	0.331	0.0	0.0	17.8
4252	5.851	0.331	0.0	0.0	17.8
4256	5.851	0.331	0.0	0.0	17.8
4260	5.851	0.331	0.0	0.0	17.8
4264	5.851	0.331	0.0	0.0	17.8
4268	5.851	0.331	0.0	0.0	17.8
4272	5.851	0.331	0.0	0.0	17.8
4276	5.851	0.331	0.0	0.0	17.8
4280	5.851	0.331	0.0	0.0	17.8
4284	5.851	0.331	0.0	0.0	17.8
4288	5.851	0.331	0.0	0.0	17.8
4292	5.851	0.331	0.0	0.0	17.8
4296	5.851	0.331	0.0	0.0	17.8
4300	5.851	0.331	0.0	0.0	17.8
4304	5.851	0.331	0.0	0.0	17.8
4308	5.851	0.331	0.0	0.0	17.8
4312	5.851	0.331	0.0	0.0	17.8
4316	5.851	0.331	0.0	0.0	17.8
4320	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 28	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
4324	5.851	0.331	0.0	0.0	17.8
4328	5.851	0.331	0.0	0.0	17.8
4332	5.851	0.331	0.0	0.0	17.8
4336	5.851	0.331	0.0	0.0	17.8
4340	5.851	0.331	0.0	0.0	17.8
4344	5.851	0.331	0.0	0.0	17.8
4348	5.851	0.331	0.0	0.0	17.8
4352	5.851	0.331	0.0	0.0	17.8
4356	5.851	0.331	0.0	0.0	17.8
4360	5.851	0.331	0.0	0.0	17.8
4364	5.851	0.331	0.0	0.0	17.8
4368	5.851	0.331	0.0	0.0	17.8
4372	5.851	0.331	0.0	0.0	17.8
4376	5.851	0.331	0.0	0.0	17.8
4380	5.851	0.331	0.0	0.0	17.8
4384	5.851	0.331	0.0	0.0	17.8
4388	5.851	0.331	0.0	0.0	17.8
4392	5.851	0.331	0.0	0.0	17.8
4396	5.851	0.331	0.0	0.0	17.8
4400	5.851	0.331	0.0	0.0	17.8
4404	5.851	0.331	0.0	0.0	17.8
4408	5.851	0.331	0.0	0.0	17.8
4412	5.851	0.331	0.0	0.0	17.8
4416	5.851	0.331	0.0	0.0	17.8
4420	5.851	0.331	0.0	0.0	17.8
4424	5.851	0.331	0.0	0.0	17.8
4428	5.851	0.331	0.0	0.0	17.8
4432	5.851	0.331	0.0	0.0	17.8
4436	5.851	0.331	0.0	0.0	17.8
4440	5.851	0.331	0.0	0.0	17.8
4444	5.851	0.331	0.0	0.0	17.8
4448	5.851	0.331	0.0	0.0	17.8
4452	5.851	0.331	0.0	0.0	17.8
4456	5.851	0.331	0.0	0.0	17.8
4460	5.851	0.331	0.0	0.0	17.8
4464	5.851	0.331	0.0	0.0	17.8
4468	5.851	0.331	0.0	0.0	17.8
4472	5.851	0.331	0.0	0.0	17.8
4476	5.851	0.331	0.0	0.0	17.8
4480	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 29	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
4484	5.851	0.331	0.0	0.0	17.8
4488	5.851	0.331	0.0	0.0	17.8
4492	5.851	0.331	0.0	0.0	17.8
4496	5.851	0.331	0.0	0.0	17.8
4500	5.851	0.331	0.0	0.0	17.8
4504	5.851	0.331	0.0	0.0	17.8
4508	5.851	0.331	0.0	0.0	17.8
4512	5.851	0.331	0.0	0.0	17.8
4516	5.851	0.331	0.0	0.0	17.8
4520	5.851	0.331	0.0	0.0	17.8
4524	5.851	0.331	0.0	0.0	17.8
4528	5.851	0.331	0.0	0.0	17.8
4532	5.851	0.331	0.0	0.0	17.8
4536	5.851	0.331	0.0	0.0	17.8
4540	5.851	0.331	0.0	0.0	17.8
4544	5.851	0.331	0.0	0.0	17.8
4548	5.851	0.331	0.0	0.0	17.8
4552	5.851	0.331	0.0	0.0	17.8
4556	5.851	0.331	0.0	0.0	17.8
4560	5.851	0.331	0.0	0.0	17.8
4564	5.851	0.331	0.0	0.0	17.8
4568	5.851	0.331	0.0	0.0	17.8
4572	5.851	0.331	0.0	0.0	17.8
4576	5.851	0.331	0.0	0.0	17.8
4580	5.851	0.331	0.0	0.0	17.8
4584	5.851	0.331	0.0	0.0	17.8
4588	5.851	0.331	0.0	0.0	17.8
4592	5.851	0.331	0.0	0.0	17.8
4596	5.851	0.331	0.0	0.0	17.8
4600	5.851	0.331	0.0	0.0	17.8
4604	5.851	0.331	0.0	0.0	17.8
4608	5.851	0.331	0.0	0.0	17.8
4612	5.851	0.331	0.0	0.0	17.8
4616	5.851	0.331	0.0	0.0	17.8
4620	5.851	0.331	0.0	0.0	17.8
4624	5.851	0.331	0.0	0.0	17.8
4628	5.851	0.331	0.0	0.0	17.8
4632	5.851	0.331	0.0	0.0	17.8
4636	5.851	0.331	0.0	0.0	17.8
4640	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 30	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
4644	5.851	0.331	0.0	0.0	17.8
4648	5.851	0.331	0.0	0.0	17.8
4652	5.851	0.331	0.0	0.0	17.8
4656	5.851	0.331	0.0	0.0	17.8
4660	5.851	0.331	0.0	0.0	17.8
4664	5.851	0.331	0.0	0.0	17.8
4668	5.851	0.331	0.0	0.0	17.8
4672	5.851	0.331	0.0	0.0	17.8
4676	5.851	0.331	0.0	0.0	17.8
4680	5.851	0.331	0.0	0.0	17.8
4684	5.851	0.331	0.0	0.0	17.8
4688	5.851	0.331	0.0	0.0	17.8
4692	5.851	0.331	0.0	0.0	17.8
4696	5.851	0.331	0.0	0.0	17.8
4700	5.851	0.331	0.0	0.0	17.8
4704	5.851	0.331	0.0	0.0	17.8
4708	5.851	0.331	0.0	0.0	17.8
4712	5.851	0.331	0.0	0.0	17.8
4716	5.851	0.331	0.0	0.0	17.8
4720	5.851	0.331	0.0	0.0	17.8
4724	5.851	0.331	0.0	0.0	17.8
4728	5.851	0.331	0.0	0.0	17.8
4732	5.851	0.331	0.0	0.0	17.8
4736	5.851	0.331	0.0	0.0	17.8
4740	5.851	0.331	0.0	0.0	17.8
4744	5.851	0.331	0.0	0.0	17.8
4748	5.851	0.331	0.0	0.0	17.8
4752	5.851	0.331	0.0	0.0	17.8
4756	5.851	0.331	0.0	0.0	17.8
4760	5.851	0.331	0.0	0.0	17.8
4764	5.851	0.331	0.0	0.0	17.8
4768	5.851	0.331	0.0	0.0	17.8
4772	5.851	0.331	0.0	0.0	17.8
4776	5.851	0.331	0.0	0.0	17.8
4780	5.851	0.331	0.0	0.0	17.8
4784	5.851	0.331	0.0	0.0	17.8
4788	5.851	0.331	0.0	0.0	17.8
4792	5.851	0.331	0.0	0.0	17.8
4796	5.851	0.331	0.0	0.0	17.8
4800	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 31	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
4804	5.851	0.331	0.0	0.0	17.8
4808	5.851	0.331	0.0	0.0	17.8
4812	5.851	0.331	0.0	0.0	17.8
4816	5.851	0.331	0.0	0.0	17.8
4820	5.851	0.331	0.0	0.0	17.8
4824	5.851	0.331	0.0	0.0	17.8
4828	5.851	0.331	0.0	0.0	17.8
4832	5.851	0.331	0.0	0.0	17.8
4836	5.851	0.331	0.0	0.0	17.8
4840	5.851	0.331	0.0	0.0	17.8
4844	5.851	0.331	0.0	0.0	17.8
4848	5.851	0.331	0.0	0.0	17.8
4852	5.851	0.331	0.0	0.0	17.8
4856	5.851	0.331	0.0	0.0	17.8
4860	5.851	0.331	0.0	0.0	17.8
4864	5.851	0.331	0.0	0.0	17.8
4868	5.851	0.331	0.0	0.0	17.8
4872	5.851	0.331	0.0	0.0	17.8
4876	5.851	0.331	0.0	0.0	17.8
4880	5.851	0.331	0.0	0.0	17.8
4884	5.851	0.331	0.0	0.0	17.8
4888	5.851	0.331	0.0	0.0	17.8
4892	5.851	0.331	0.0	0.0	17.8
4896	5.851	0.331	0.0	0.0	17.8
4900	5.851	0.331	0.0	0.0	17.8
4904	5.851	0.331	0.0	0.0	17.8
4908	5.851	0.331	0.0	0.0	17.8
4912	5.851	0.331	0.0	0.0	17.8
4916	5.851	0.331	0.0	0.0	17.8
4920	5.851	0.331	0.0	0.0	17.8
4924	5.851	0.331	0.0	0.0	17.8
4928	5.851	0.331	0.0	0.0	17.8
4932	5.851	0.331	0.0	0.0	17.8
4936	5.851	0.331	0.0	0.0	17.8
4940	5.851	0.331	0.0	0.0	17.8
4944	5.851	0.331	0.0	0.0	17.8
4948	5.851	0.331	0.0	0.0	17.8
4952	5.851	0.331	0.0	0.0	17.8
4956	5.851	0.331	0.0	0.0	17.8
4960	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 32	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
4964	5.851	0.331	0.0	0.0	17.8
4968	5.851	0.331	0.0	0.0	17.8
4972	5.851	0.331	0.0	0.0	17.8
4976	5.851	0.331	0.0	0.0	17.8
4980	5.851	0.331	0.0	0.0	17.8
4984	5.851	0.331	0.0	0.0	17.8
4988	5.851	0.331	0.0	0.0	17.8
4992	5.851	0.331	0.0	0.0	17.8
4996	5.851	0.331	0.0	0.0	17.8
5000	5.851	0.331	0.0	0.0	17.8
5004	5.851	0.331	0.0	0.0	17.8
5008	5.851	0.331	0.0	0.0	17.8
5012	5.851	0.331	0.0	0.0	17.8
5016	5.851	0.331	0.0	0.0	17.8
5020	5.851	0.331	0.0	0.0	17.8
5024	5.851	0.331	0.0	0.0	17.8
5028	5.851	0.331	0.0	0.0	17.8
5032	5.851	0.331	0.0	0.0	17.8
5036	5.851	0.331	0.0	0.0	17.8
5040	5.851	0.331	0.0	0.0	17.8
5044	5.851	0.331	0.0	0.0	17.8
5048	5.851	0.331	0.0	0.0	17.8
5052	5.851	0.331	0.0	0.0	17.8
5056	5.851	0.331	0.0	0.0	17.8
5060	5.851	0.331	0.0	0.0	17.8
5064	5.851	0.331	0.0	0.0	17.8
5068	5.851	0.331	0.0	0.0	17.8
5072	5.851	0.331	0.0	0.0	17.8
5076	5.851	0.331	0.0	0.0	17.8
5080	5.851	0.331	0.0	0.0	17.8
5084	5.851	0.331	0.0	0.0	17.8
5088	5.851	0.331	0.0	0.0	17.8
5092	5.851	0.331	0.0	0.0	17.8
5096	5.851	0.331	0.0	0.0	17.8
5100	5.851	0.331	0.0	0.0	17.8
5104	5.851	0.331	0.0	0.0	17.8
5108	5.851	0.331	0.0	0.0	17.8
5112	5.851	0.331	0.0	0.0	17.8
5116	5.851	0.331	0.0	0.0	17.8
5120	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 33	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
5124	5.851	0.331	0.0	0.0	17.8
5128	5.851	0.331	0.0	0.0	17.8
5132	5.851	0.331	0.0	0.0	17.8
5136	5.851	0.331	0.0	0.0	17.8
5140	5.851	0.331	0.0	0.0	17.8
5144	5.851	0.331	0.0	0.0	17.8
5148	5.851	0.331	0.0	0.0	17.8
5152	5.851	0.331	0.0	0.0	17.8
5156	5.851	0.331	0.0	0.0	17.8
5160	5.851	0.331	0.0	0.0	17.8
5164	5.851	0.331	0.0	0.0	17.8
5168	5.851	0.331	0.0	0.0	17.8
5172	5.851	0.331	0.0	0.0	17.8
5176	5.851	0.331	0.0	0.0	17.8
5180	5.851	0.331	0.0	0.0	17.8
5184	5.851	0.331	0.0	0.0	17.8
5188	5.851	0.331	0.0	0.0	17.8
5192	5.851	0.331	0.0	0.0	17.8
5196	5.851	0.331	0.0	0.0	17.8
5200	5.851	0.331	0.0	0.0	17.8
5204	5.851	0.331	0.0	0.0	17.8
5208	5.851	0.331	0.0	0.0	17.8
5212	5.851	0.331	0.0	0.0	17.8
5216	5.851	0.331	0.0	0.0	17.8
5220	5.851	0.331	0.0	0.0	17.8
5224	5.851	0.331	0.0	0.0	17.8
5228	5.851	0.331	0.0	0.0	17.8
5232	5.851	0.331	0.0	0.0	17.8
5236	5.851	0.331	0.0	0.0	17.8
5240	5.851	0.331	0.0	0.0	17.8
5244	5.851	0.331	0.0	0.0	17.8
5248	5.851	0.331	0.0	0.0	17.8
5252	5.851	0.331	0.0	0.0	17.8
5256	5.851	0.331	0.0	0.0	17.8
5260	5.851	0.331	0.0	0.0	17.8
5264	5.851	0.331	0.0	0.0	17.8
5268	5.851	0.331	0.0	0.0	17.8
5272	5.851	0.331	0.0	0.0	17.8
5276	5.851	0.331	0.0	0.0	17.8
5280	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 34	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
5284	5.851	0.331	0.0	0.0	17.8
5288	5.851	0.331	0.0	0.0	17.8
5292	5.851	0.331	0.0	0.0	17.8
5296	5.851	0.331	0.0	0.0	17.8
5300	5.851	0.331	0.0	0.0	17.8
5304	5.851	0.331	0.0	0.0	17.8
5308	5.851	0.331	0.0	0.0	17.8
5312	5.851	0.331	0.0	0.0	17.8
5316	5.851	0.331	0.0	0.0	17.8
5320	5.851	0.331	0.0	0.0	17.8
5324	5.851	0.331	0.0	0.0	17.8
5328	5.851	0.331	0.0	0.0	17.8
5332	5.851	0.331	0.0	0.0	17.8
5336	5.851	0.331	0.0	0.0	17.8
5340	5.851	0.331	0.0	0.0	17.8
5344	5.851	0.331	0.0	0.0	17.8
5348	5.851	0.331	0.0	0.0	17.8
5352	5.851	0.331	0.0	0.0	17.8
5356	5.851	0.331	0.0	0.0	17.8
5360	5.851	0.331	0.0	0.0	17.8
5364	5.851	0.331	0.0	0.0	17.8
5368	5.851	0.331	0.0	0.0	17.8
5372	5.851	0.331	0.0	0.0	17.8
5376	5.851	0.331	0.0	0.0	17.8
5380	5.851	0.331	0.0	0.0	17.8
5384	5.851	0.331	0.0	0.0	17.8
5388	5.851	0.331	0.0	0.0	17.8
5392	5.851	0.331	0.0	0.0	17.8
5396	5.851	0.331	0.0	0.0	17.8
5400	5.851	0.331	0.0	0.0	17.8
5404	5.851	0.331	0.0	0.0	17.8
5408	5.851	0.331	0.0	0.0	17.8
5412	5.851	0.331	0.0	0.0	17.8
5416	5.851	0.331	0.0	0.0	17.8
5420	5.851	0.331	0.0	0.0	17.8
5424	5.851	0.331	0.0	0.0	17.8
5428	5.851	0.331	0.0	0.0	17.8
5432	5.851	0.331	0.0	0.0	17.8
5436	5.851	0.331	0.0	0.0	17.8
5440	5.851	0.331	0.0	0.0	17.8
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Pringuer-James Consulting Engineers Limited				Page 35	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
5444	5.851	0.331	0.0	0.0	17.8
5448	5.851	0.331	0.0	0.0	17.8
5452	5.851	0.331	0.0	0.0	17.8
5456	5.851	0.331	0.0	0.0	17.8
5460	5.851	0.331	0.0	0.0	17.8
5464	5.851	0.331	0.0	0.0	17.8
5468	5.851	0.331	0.0	0.0	17.8
5472	5.851	0.331	0.0	0.0	17.8
5476	5.851	0.331	0.0	0.0	17.8
5480	5.851	0.331	0.0	0.0	17.8
5484	5.851	0.331	0.0	0.0	17.8
5488	5.851	0.331	0.0	0.0	17.8
5492	5.851	0.331	0.0	0.0	17.8
5496	5.851	0.331	0.0	0.0	17.8
5500	5.851	0.331	0.0	0.0	17.8
5504	5.851	0.331	0.0	0.0	17.8
5508	5.851	0.331	0.0	0.0	17.8
5512	5.851	0.331	0.0	0.0	17.8
5516	5.851	0.331	0.0	0.0	17.8
5520	5.851	0.331	0.0	0.0	17.8
5524	5.851	0.331	0.0	0.0	17.8
5528	5.851	0.331	0.0	0.0	17.8
5532	5.851	0.331	0.0	0.0	17.8
5536	5.851	0.331	0.0	0.0	17.8
5540	5.851	0.331	0.0	0.0	17.8
5544	5.851	0.331	0.0	0.0	17.8
5548	5.851	0.331	0.0	0.0	17.8
5552	5.851	0.331	0.0	0.0	17.8
5556	5.851	0.331	0.0	0.0	17.8
5560	5.851	0.331	0.0	0.0	17.8
5564	5.851	0.331	0.0	0.0	17.8
5568	5.851	0.331	0.0	0.0	17.8
5572	5.851	0.331	0.0	0.0	17.8
5576	5.851	0.331	0.0	0.0	17.8
5580	5.851	0.331	0.0	0.0	17.8
5584	5.851	0.331	0.0	0.0	17.8
5588	5.851	0.331	0.0	0.0	17.8
5592	5.851	0.331	0.0	0.0	17.8
5596	5.851	0.331	0.0	0.0	17.8
5600	5.851	0.331	0.0	0.0	17.8
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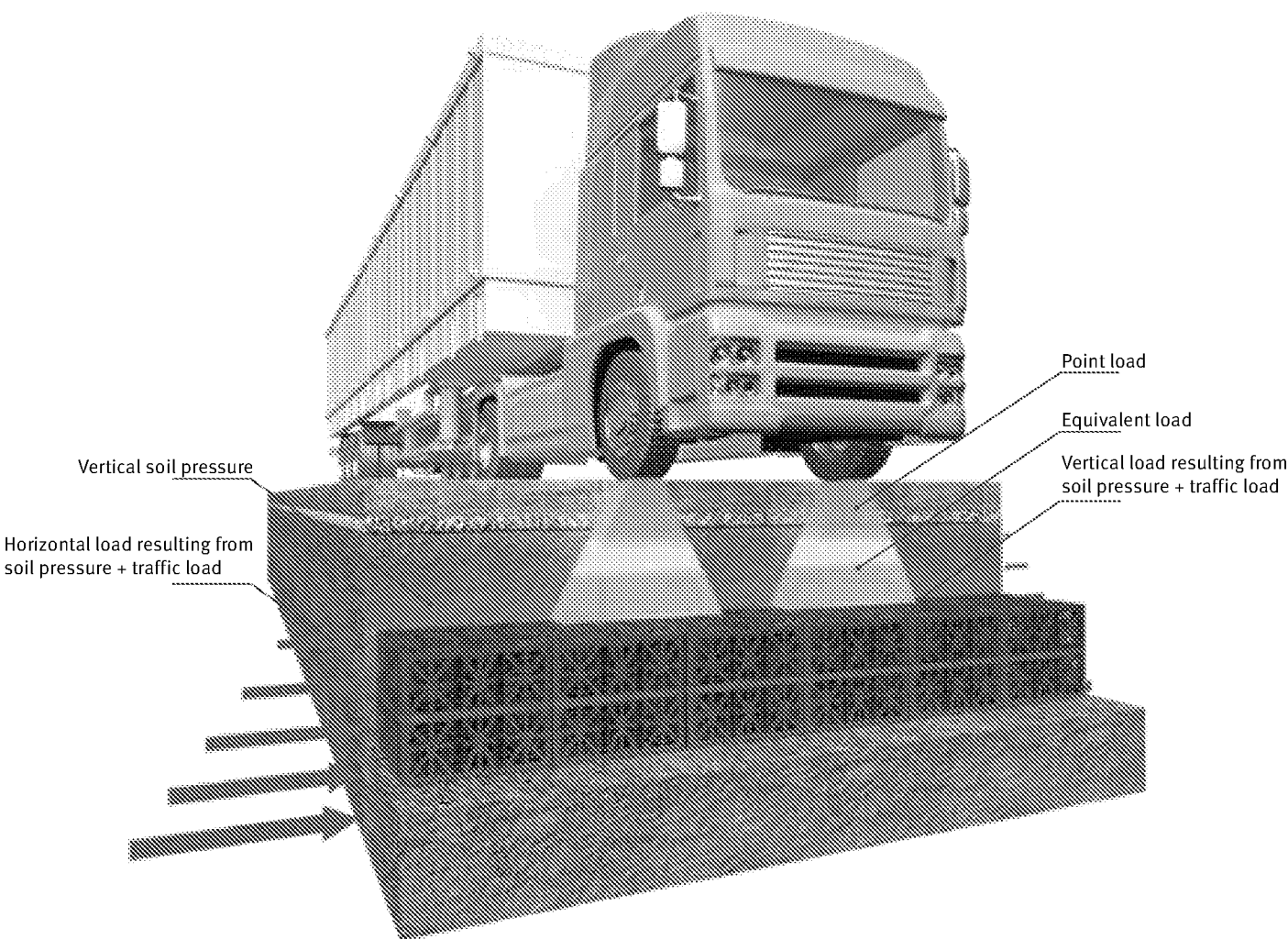
Pringuer-James Consulting Engineers Limited				Page 36	
Overseas House Elm Grove London SW19 4HE					
Date 11/02/2019 17:06		Designed by vlad			
File PERMEABLE PAVEMENT.SRCX		Checked by			
Innovyze		Source Control 2018.1.1			
<u>Flood Routing through Storage Facility</u> <u>Event: 2160 min Winter</u>					
Time	Level	Depth	Σ Inflow	Filtration	Volume
(mins)	(m)	(m)	(l/s)	(l/s)	(m³)
5604	5.851	0.331	0.0	0.0	17.8
5608	5.851	0.331	0.0	0.0	17.8
5612	5.851	0.331	0.0	0.0	17.8
5616	5.851	0.331	0.0	0.0	17.8
5620	5.851	0.331	0.0	0.0	17.8
5624	5.851	0.331	0.0	0.0	17.8
5628	5.851	0.331	0.0	0.0	17.8
5632	5.851	0.331	0.0	0.0	17.8
5636	5.851	0.331	0.0	0.0	17.8
5640	5.851	0.331	0.0	0.0	17.8
5644	5.851	0.331	0.0	0.0	17.8
5648	5.851	0.331	0.0	0.0	17.8
5652	5.851	0.331	0.0	0.0	17.8
5656	5.851	0.331	0.0	0.0	17.8
5660	5.851	0.331	0.0	0.0	17.8
5664	5.851	0.331	0.0	0.0	17.8
5668	5.851	0.331	0.0	0.0	17.8
5672	5.851	0.331	0.0	0.0	17.8
5676	5.851	0.331	0.0	0.0	17.8
5680	5.851	0.331	0.0	0.0	17.8
5684	5.851	0.331	0.0	0.0	17.8
5688	5.851	0.331	0.0	0.0	17.8
5692	5.851	0.331	0.0	0.0	17.8
5696	5.851	0.331	0.0	0.0	17.8
5700	5.851	0.331	0.0	0.0	17.8
5704	5.851	0.331	0.0	0.0	17.8
5708	5.851	0.331	0.0	0.0	17.8
5712	5.851	0.331	0.0	0.0	17.8
5716	5.851	0.331	0.0	0.0	17.8
5720	5.851	0.331	0.0	0.0	17.8
5724	5.851	0.331	0.0	0.0	17.8
5728	5.851	0.331	0.0	0.0	17.8
5732	5.851	0.331	0.0	0.0	17.8
5736	5.851	0.331	0.0	0.0	17.8
5740	5.851	0.331	0.0	0.0	17.8
5744	5.851	0.331	0.0	0.0	17.8
5748	5.851	0.331	0.0	0.0	17.8
5752	5.851	0.331	0.0	0.0	17.8
5756	5.851	0.331	0.0	0.0	17.8
5760	5.851	0.331	0.0	0.0	17.8
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LOCATION	CALCULATIONS	OPTIONS
	<u>Maxim Slope Across Car Park Calculation</u> Using Darcy's law: Eq 20.2 C/PRIA753 The SuDS Manual $Q = A \cdot k \cdot i$ $Q = \text{m}^3/\text{s} = \text{max flow capacity of sub-base}$ this must exceed peak rainfall onto pavement during critical storm. Peak rainfall: 1 in 100 year + 40% CC flood event. Peak flow when "flood" level approaches sub-base top top = $2880 \text{ mins} = 0.1 \text{ L/s} = 0.0001 \text{ m}^3/\text{s}$ $A = \text{cross-sectional area (narrowest)} = 0.33 \text{ m (D)} \times 6 \text{ m (W)}$ $A = 1.98 \text{ m}^2$ $K = 6 \times 10^{-2}$ minimum for Type 3 or Type 4/20 Sub-bases C/PRIA753, 20, 11.4 $i = \text{hydraulic gradient (m/m)}$ $i = \frac{Q}{A \cdot k} = \frac{0.0001}{1.98 \times (6 \times 10^{-2})} = 8.41 \times 10^{-4} \text{ m/m}$ $L = \text{max length from outfall to furthest car park point}$ $L = 20 \text{ m}$ $h = 20 \times i = 0.0168 \text{ m} = 16.8 \text{ mm} \rightarrow \text{max water buildup}$ $16 \text{ mm} < 50 \text{ (P-shingle)} \quad \text{OK } \checkmark$	

Loads and angles of friction

The installation depths and maximum fill cover heights are very much dependent on the loading of the finished surface and the type of system material used. When a vehicle makes contact with the surface, its weight is first converted into a point load. The asphalt structure and the soil layers beneath it distribute this load according to their mechanical properties. For the soil layers, the angle of friction ϕ' (see page 13)

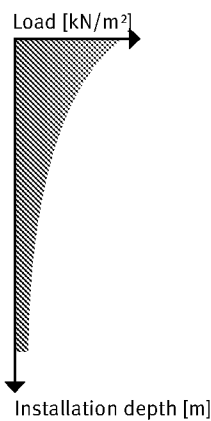
is decisive. To achieve even loading of the infiltration system elements, a suitable minimum soil cover is required. The infiltration system elements are also subject to horizontal loading, resulting from the vertical loading being diverted by the internal rigidity of the filler material in the soil. The horizontal loading limits the maximum depth at which the infiltration system elements can be installed.



Traffic loads

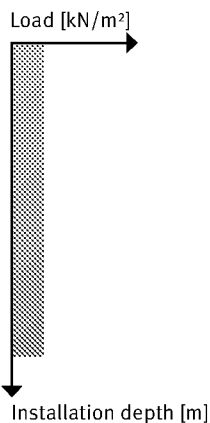
Point load

The infiltration system elements can be installed in areas of pedestrian loading (without vehicle traffic) and areas with calmed vehicle traffic up to a maximum total weight of 60 tons. This includes car parks and access roads with low speeds. In areas of pedestrian loading, traffic load is normally assumed to be 0 kN/m^2 . In areas with traffic loading, a distinction must be made between point loads and distributed loads. Point loads decrease exponentially as depth increases, partly related to the angle of friction. The fill material reduces the point load and causes the traffic load to be evenly distributed.



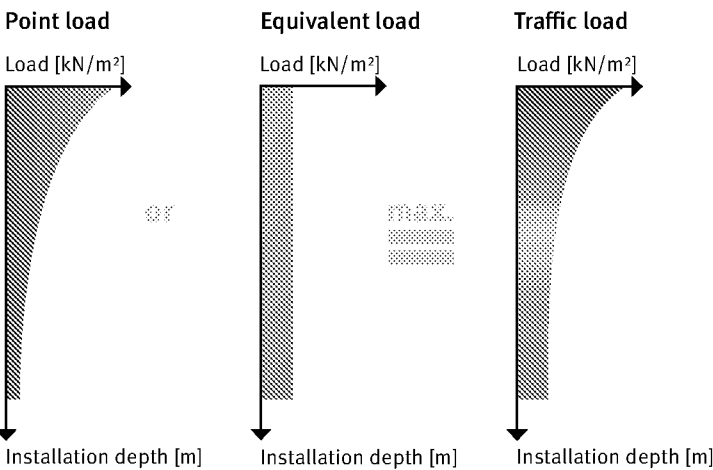
Equivalent load

National standards also require the equivalent load for road surfaces to be taken into account. In theory, the equivalent load is an evenly distributed load (e.g. national standards in Germany use Lorry $60 \text{ t} \approx 33.3 \text{ kN/m}^2$ equivalent load, British standards use 10 kN/m^2 w/o safety factors for high loading distributed loads) based on the total weight of the vehicle in relation to the projected contact area. For a theoretical load calculation the equivalent load is not dependent on the installation depth and therefore remains constant.



Result: traffic load

To assess traffic load, the maximum point load or equivalent load must always be used for design purposes.

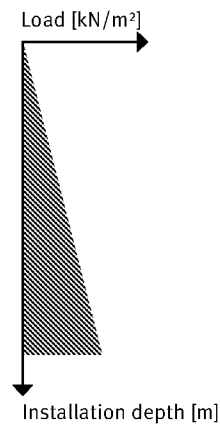


Loads and angles of friction

continued

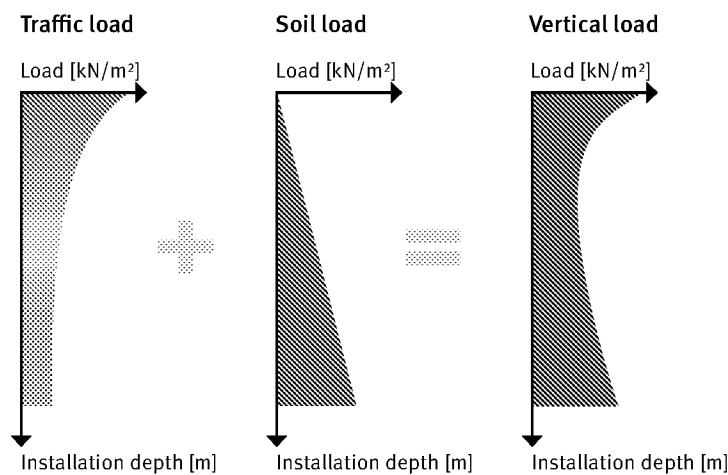
Vertical soil pressure

The covering soil layers/ soil fill cover produce vertical soil pressure. This is linear and depends on the installation depth / height of the fill cover and the density of the chosen material. The vertical soil pressure is normally estimated to be around 20 kN/m² per metre of fill cover.



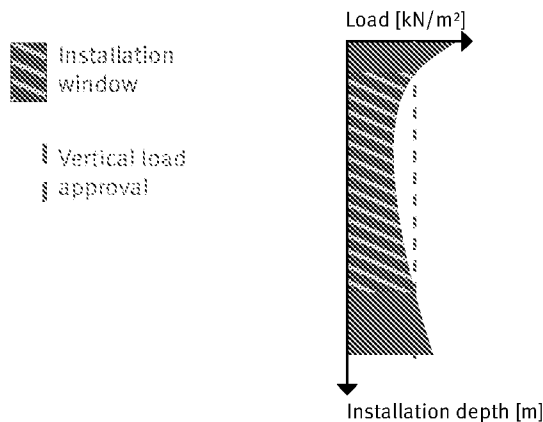
Vertical loads

The vertical load comprises the traffic load and soil pressure as described above. The sum of the two loads is therefore dependent on the installation depth. This limits the maximum permitted fill cover on top of the infiltration elements.



Vertical loads – overall evaluation

The approved long-term vertical load for the EcoBloc Inspect with a lifetime of 50 years is 59 kN/m² including safety factor of 2.0. Some national standards and certificates like BBA in UK use different calculation methods, see BBA certificates for GRAF products. Both the approved vertical loads and the vertical loads actually present limit the installation window of the ditch elements with the minimum and maximum installation depth. The installation window for the infiltration tunnel / twin infiltration tunnel can be calculated in the same way.



Horizontal load

The angle of friction has an important influence on the horizontal loading. Part of this vertical load is converted into a horizontal load by the internal rigidity of the filler material.

The horizontal load is also dependent on the height of the fill cover, i.e. the installation depth, and limits the installation window for the infiltration ditch elements.

Class	Suitable for pedestrian loading	Car	Lorry 12	Lorry 30	Lorry 40	Lorry 60
Installation depth (max.) [m] $\phi' = 20^\circ$	3.00	3.00	3.00	2.75	2.50	2.25
Installation depth (max.) [m] $\phi' = 30^\circ$	4.25	4.25	4.25	3.75	3.75	3.25
Installation depth (max.) [m] $\phi' = 40^\circ$	5.00	5.00	5.00	5.00	5.00	5.00

If infiltration system elements are to be installed for the storage of rainwater (retention or rainwater harvesting), additional loads caused by the presence / rising of groundwater must be evaluated.

Angle of friction

The fill material used has a significant influence on the horizontal load and therefore the load which the system element must withstand at the sides. The angle of friction ϕ' describes the effective angle of internal friction of a material. The effect of the angle of friction can be seen, for example, in a heap of a granular medium (e.g. sand or gravel). The greater the angle

of friction ϕ' , the higher such a medium can be piled up. In addition, the greater the angle of friction and thus the internal rigidity of the material, the lower the horizontal load. A high angle of friction also favours the distribution of the point load into an evenly distributed load. Preference should therefore always be given to a filler material with a high angle of friction.

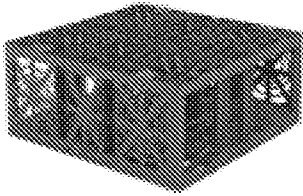
Material	Loam	Loam/sand mix	Sand	Gravel
Angle of friction ϕ'	15° – 25°	25° – 30°	30° – 35°	35° – 40°

EcoBloc system

Modules

EcoBloc Inspect flex

- ✱ Lorry-bearing 60 tons/HS-25
- ✱ 150 m³ (39,600 US gal.)/Truck
- ✱ Inspectable
- ✱ High pressure jetting possible



Load ★★★★★
Logistics ★★★



EcoBloc Inspect flex

DN 100 (4") / 150 (6") / 200 (8") connecting surfaces

Volume	Length	Width	Height	Weight	Colour	Order no.
205 l (54.2 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	320 mm (12.6")	8 kg (17.6 lbs)	grey	402005

🔍 Webcode G4107



EcoBloc Inspect flex base plate

Forms the foundation of the EcoBloc Inspect flex system

Volume	Length	Width	Height	Weight	Colour	Order no.
25 l (6.6 US gal.)	800 mm (2' 7.5")	800 mm (2' 7.5")	40 mm (1.6")	4 kg (8.8 lbs)	grey	402006

EcoBloc Inspect flex end plates

The front ends of an EcoBloc Inspect flex system are sealed by end plates with DN 100 (4") / 150 (6") / 200 (8") contact surfaces



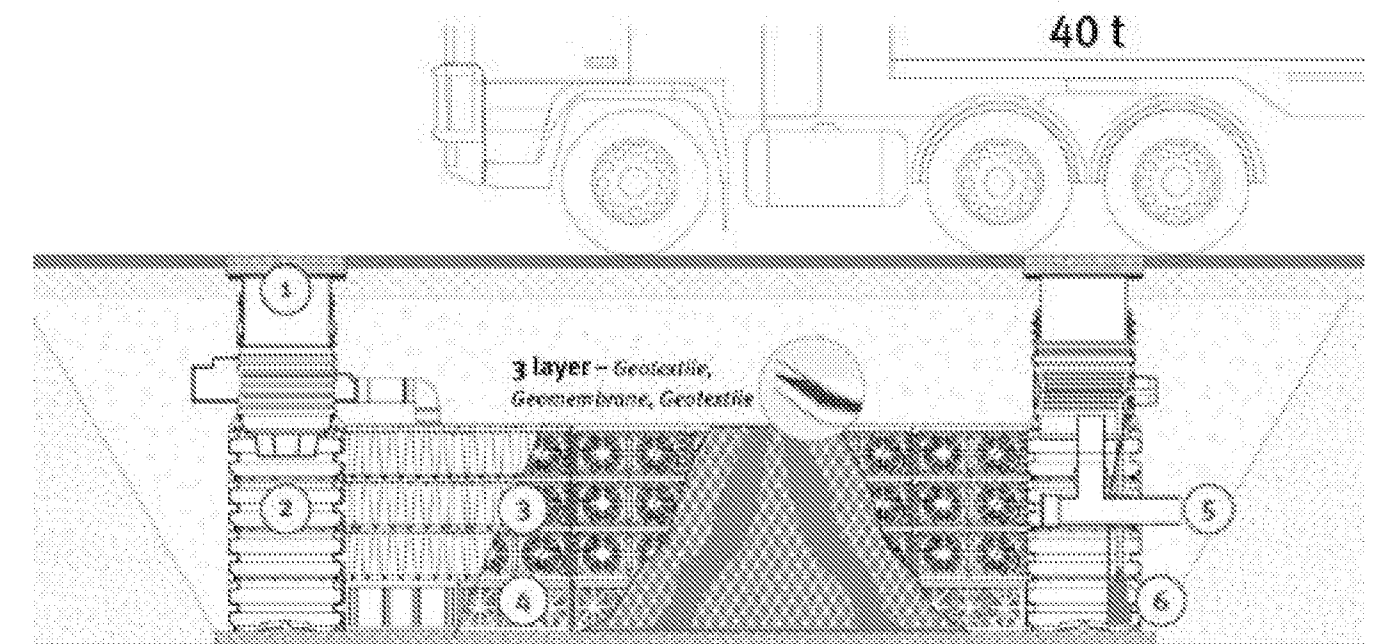
Item	Colour	Order no.
EcoBloc Inspect flex end plates (Set 2 units)	grey	402002

Technical data sheet

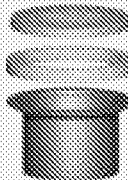
Infiltration module			
Gross volume		A 205 l (54.2 US gal.)	
Net volume		D 195 l (51.5 US gal.)	
Storage coefficient		96 %	
Inspectable 		•	
High pressure jetting possible		•	
Load			
Load	Short-term	max. 100 kN/m²	
	Long-term	max. 59 kN/m²	
Without traffic load	min. earth covering	250 mm (9.8")	
	max. earth covering	2750 mm (9')	
	max. installation depth	5000 mm (16' 4.8")	
	max. number of layers	14	
Vehicle	min. earth covering	250 mm (9.8")	
	max. earth covering	2750 mm (9')	
	max. installation depth	5000 mm (16' 4.8")	
	max. number of layers	14	
Lorry 12/H-10/H-15	min. earth covering	500 mm (1' 7.7")	
	max. earth covering	2750 mm (9')	
	max. installation depth	5000 mm (16' 4.8")	
	max. number of layers	13	
Lorry 30	min. earth covering	500 mm (1' 7.7")	
	max. earth covering	2500 mm (8' 2.4")	
	max. installation depth	5000 mm (16' 4.8")	
	max. number of layers	13	
Lorry 40/HS-20	min. earth covering	500 mm (1' 7.7")	
	max. earth covering	2250 mm (7' 4.5")	
	max. installation depth	5000 mm (16' 4.8")	
	max. number of layers	13	
Lorry 60/HS-25	min. earth covering	800 mm (2' 7.5")	
	max. earth covering	2000 mm (6' 6.7")	
	max. installation depth	5000 mm (16' 4.8")	
	max. number of layers	13	
Connections			
DN 100 (4")		•	
DN 150 (6")		•	
DN 200 (8")		•	
DN 250 (10")		• 1), 2)	
DN 300 (12")		• 1), 2)	
DN 400 (16")		• 1), 2)	
DN 500 (20")		• 2)	
Measurements			
Length		800 mm (2' 7.5")	
Width		800 mm (2' 7.5")	
Height		320 mm (1' 0.6")	
Weight		8 kg (17.6 lbs)	

1) Optionally available with Vario Shaft 2) Optionally available with adaptor plates

Retention with EcoBloc Inspect flex and maxx



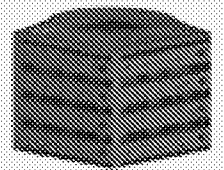
1 Telescopic dome shaft lorry



- Lorry-bearing up to 60 tons
- Cover and compensating ring to be provided on site

Page 27

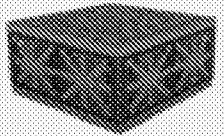
2 Vario 800 flex, type 2



- Optimally aligned to EcoBloc Inspect flex
- Wide range of possible shaft solutions
- Connections up to DN 400 (16")

Page 26

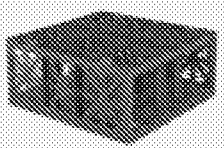
3 EcoBloc maxx



- Lorry-bearing 40 tons/HS-20
- 410 m³ (108,310 US gal.)/Truck

Page 22

4 EcoBloc Inspect flex



- Lorry-bearing 60 tons/HS-25
- 150 m³ (39,600 US gal.)/Truck
- Inspectable
- High pressure jetting possible

Page 22

APPENDIX B – MICRODRAINAGE MODELLING FILES

8. **Model - Diagram_Revision6**
 - This provides graphic representation for the model.
9. **Model – Results_Revision 6**
 - This gives you full results from Micro-drainage. Relevant pages are:
10. **Model – Storm_Revision6**
 - This is model set-up data only. There's not results here, but gives key information about the model itself if you wish to scrutinise all the details. Most relevant pages:

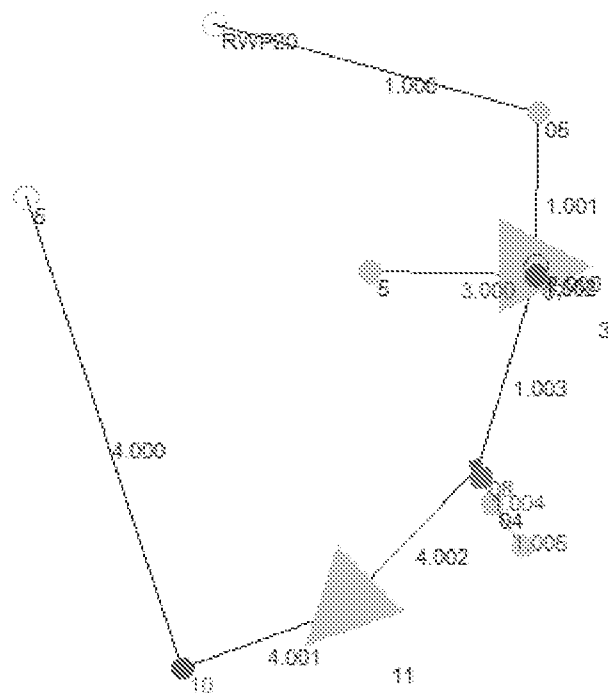


Micro
Drainage

Designed by vlad

Checked by

Network 2018.1.1



Pringuer-James Consulting Engineers Limited		Page 1
Overseas House Elm Grove London SW19 4HE		
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File Storm Model_Revision 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Summary of Results for 60 minute 100 year Summer (Storm)

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep Fine

DTS Status ON

DVD Status ON

Inertia Status ON

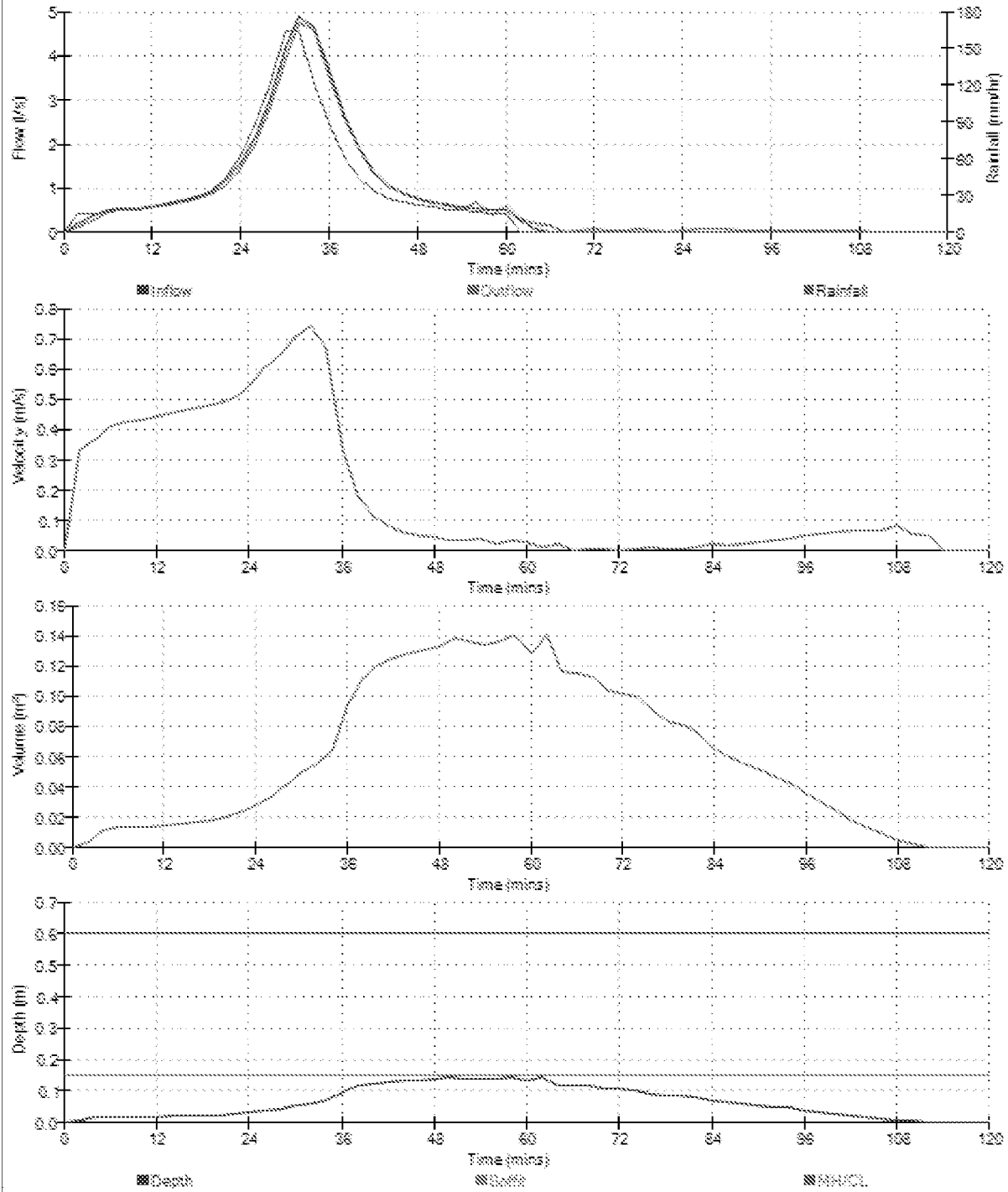
		Water	Surcharged	Flooded				Pipe
	US/MH	Level	Depth	Volume	Flow /	Overflow	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status
1.000	RWP20	5.496	-0.004	0.000	0.33		4.7	OK*
1.001	05	5.514	0.134	0.000	0.37		4.4	SURCHARGED
2.000	3	5.485	0.158	0.000	-0.71		-7.7	SURCHARGED
1.002	4	5.327	0.003	0.000	-0.38		-4.1	SURCHARGED*
3.000	5	5.497	-0.003	0.000	0.97		5.9	OK
1.003	07	5.512	0.191	0.000	0.30		3.7	SURCHARGED
4.000	5	5.492	-0.063	0.000	0.44		6.3	OK*
4.001	10	5.489	0.109	0.000	0.55		6.6	SURCHARGED
4.002	11	5.486	0.164	0.000	0.11		1.4	SURCHARGED
1.004	08	5.515	0.315	0.000	0.58		2.3	SURCHARGED
1.005	04	5.125	-0.055	0.000	0.43		2.3	OK

Pringuer-James Consulting Engineers Limited		Page 2
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:35	Designed by vlad	
File Storm Model_Revision 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Rainfall Hyetograph for 60 minute 100 year Summer (Storm)

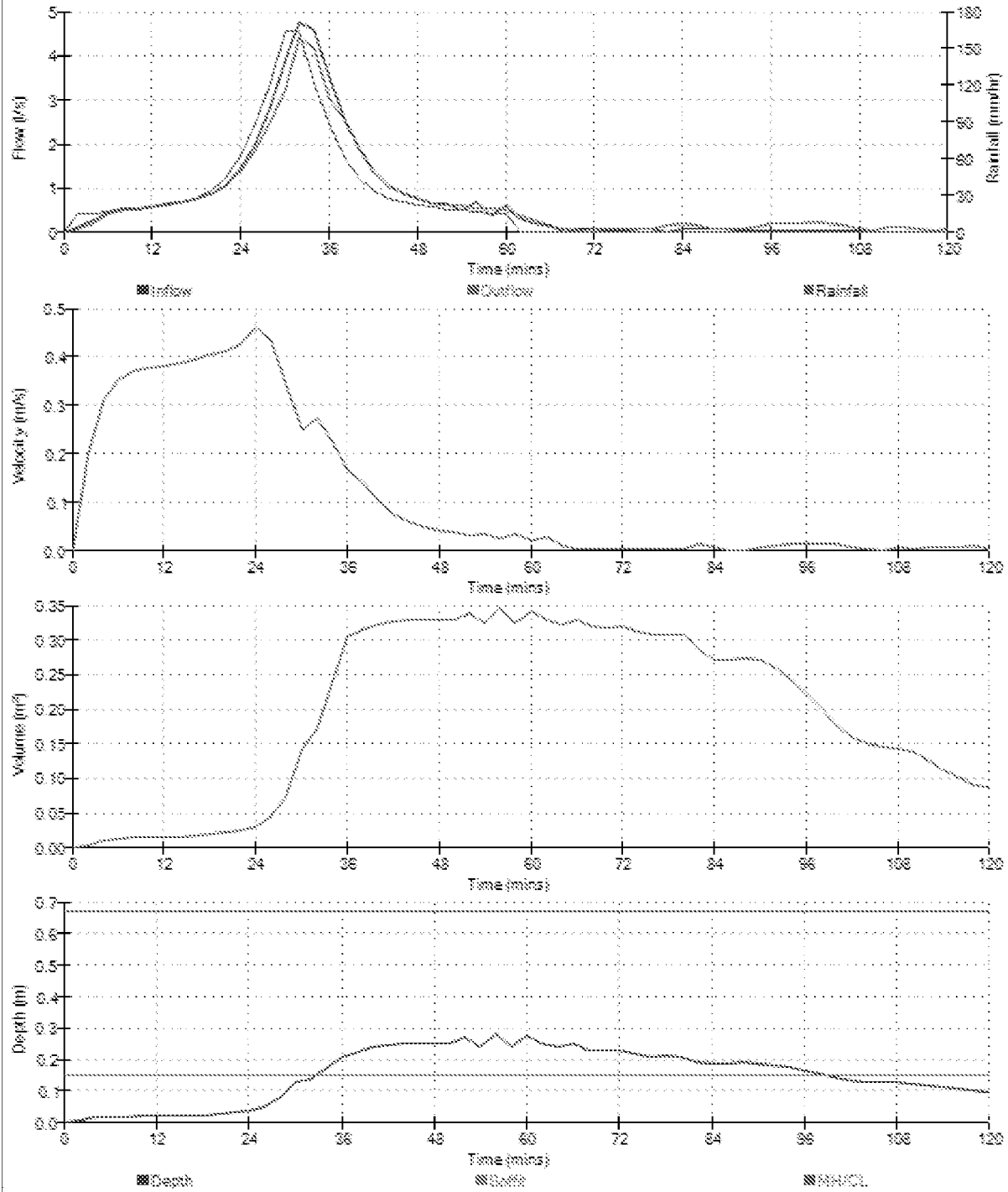
Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)	Time (mins)	Rain (mm/hr)
2	15.242	14	22.306	26	89.501	38	62.409	50	20.354
4	16.032	16	24.722	28	122.123	40	44.518	52	18.820
6	16.822	18	28.114	30	164.225	42	34.295	54	17.566
8	17.566	20	34.295	32	164.225	44	28.114	56	16.822
10	18.820	22	44.518	34	122.123	46	24.722	58	16.032
12	20.354	24	62.409	36	89.501	48	22.306	60	15.242

Graphs for Pipe 1.000 US/MH RWP20 (Storm)
60 minute 100 year Summer
Status: OK*

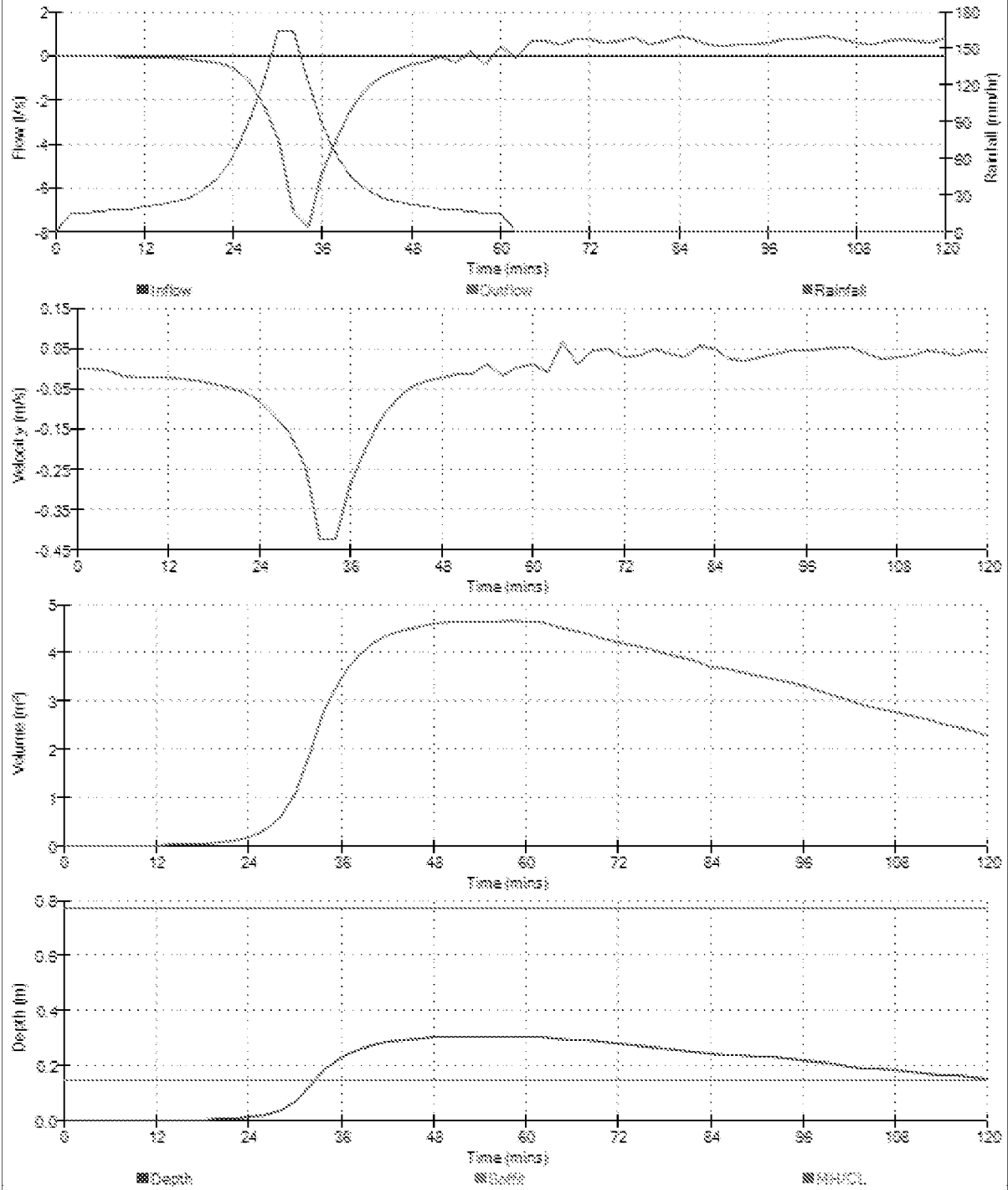


Pringuer-James Consulting Engineers Limited		Page 4
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:35	Designed by vlad	
File Storm Model_Revision 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

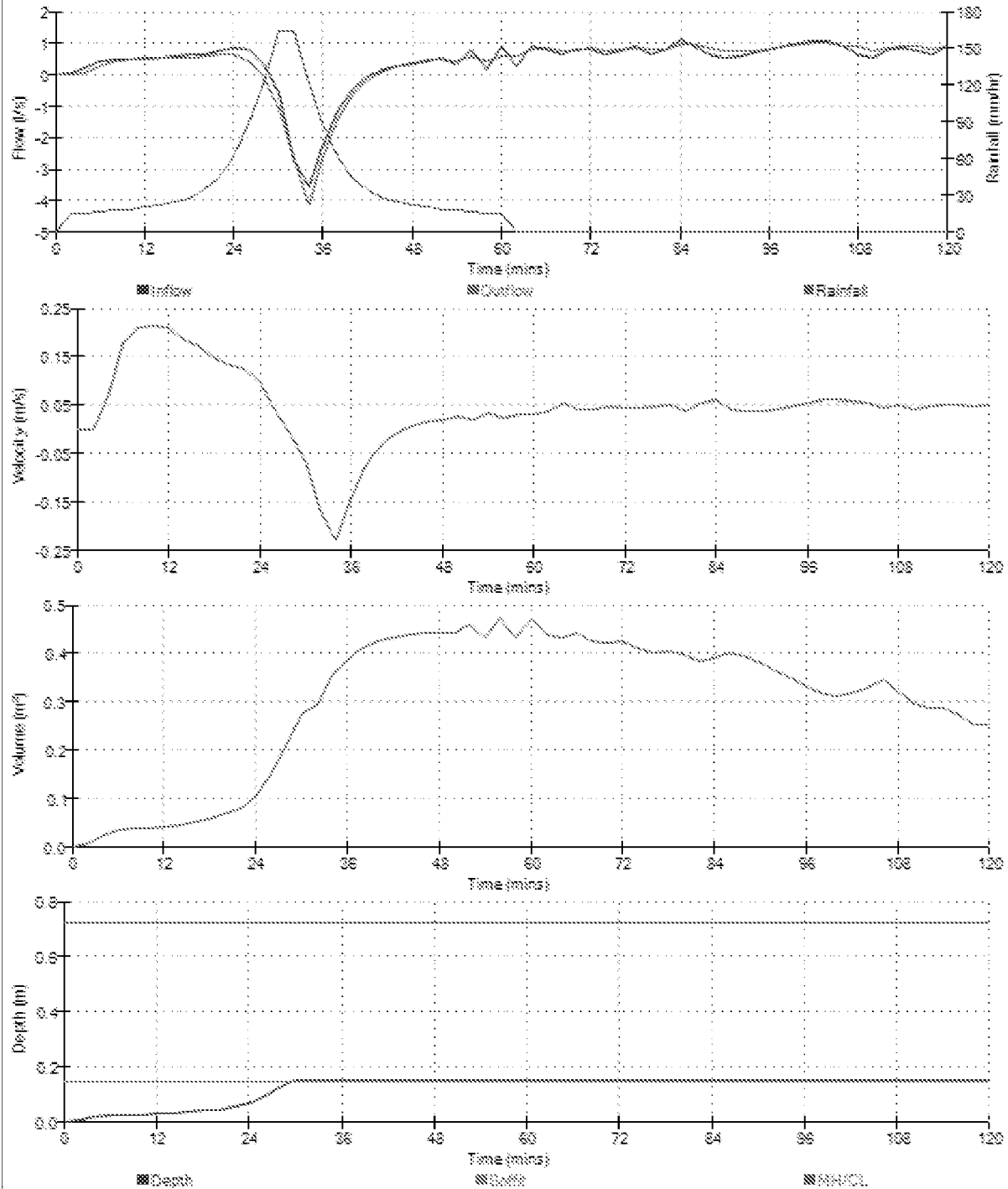
Graphs for Pipe 1.001 US/MH 05 (Storm)
60 minute 100 year Summer
Status: SURCHARGED



Graphs for Pipe 2.000 US/MH 3 (Storm)
60 minute 100 year Summer
Status: SURCHARGED

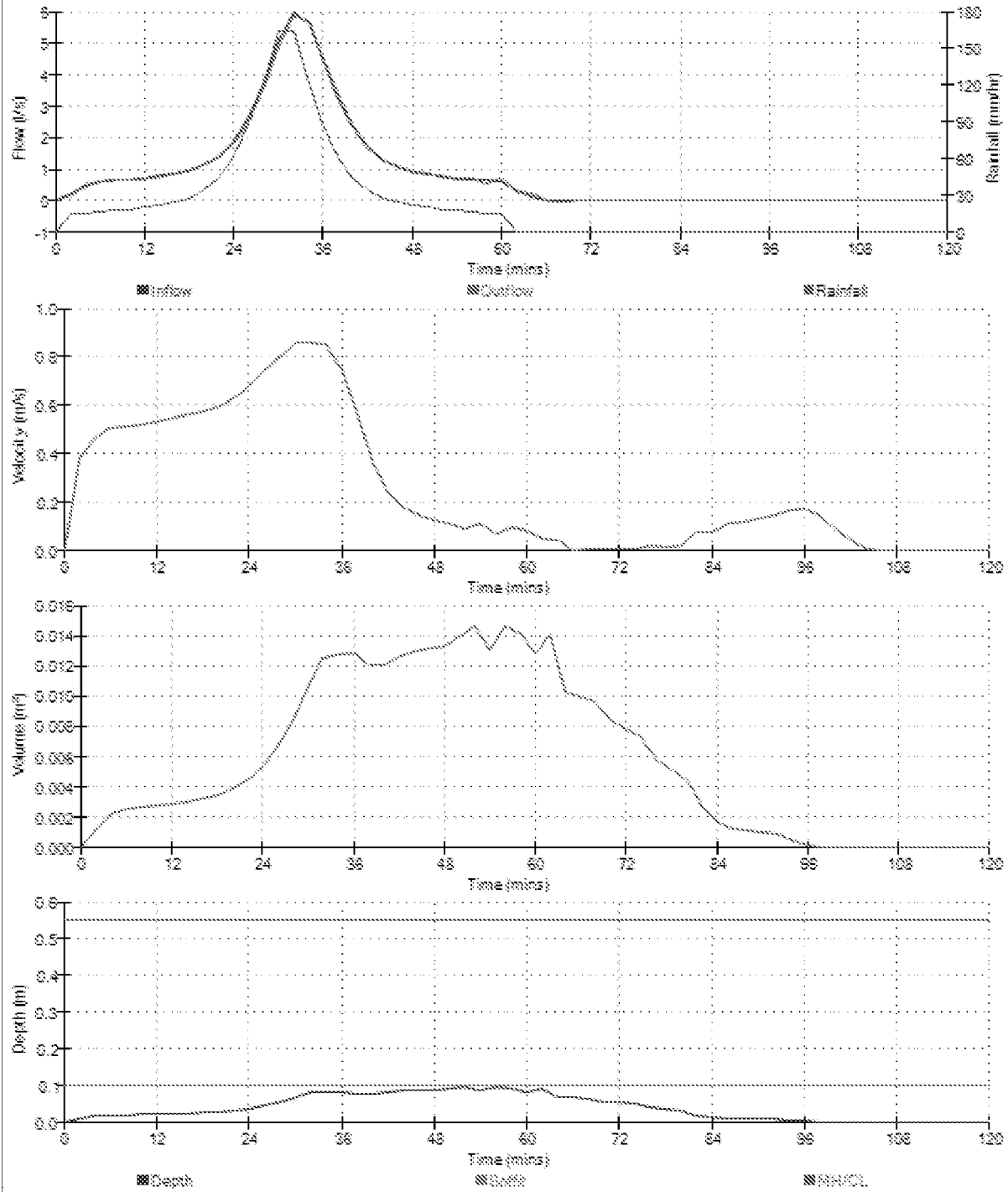


Graphs for Pipe 1.002 US/MH 4 (Storm)
60 minute 100 year Summer
Status: OK*



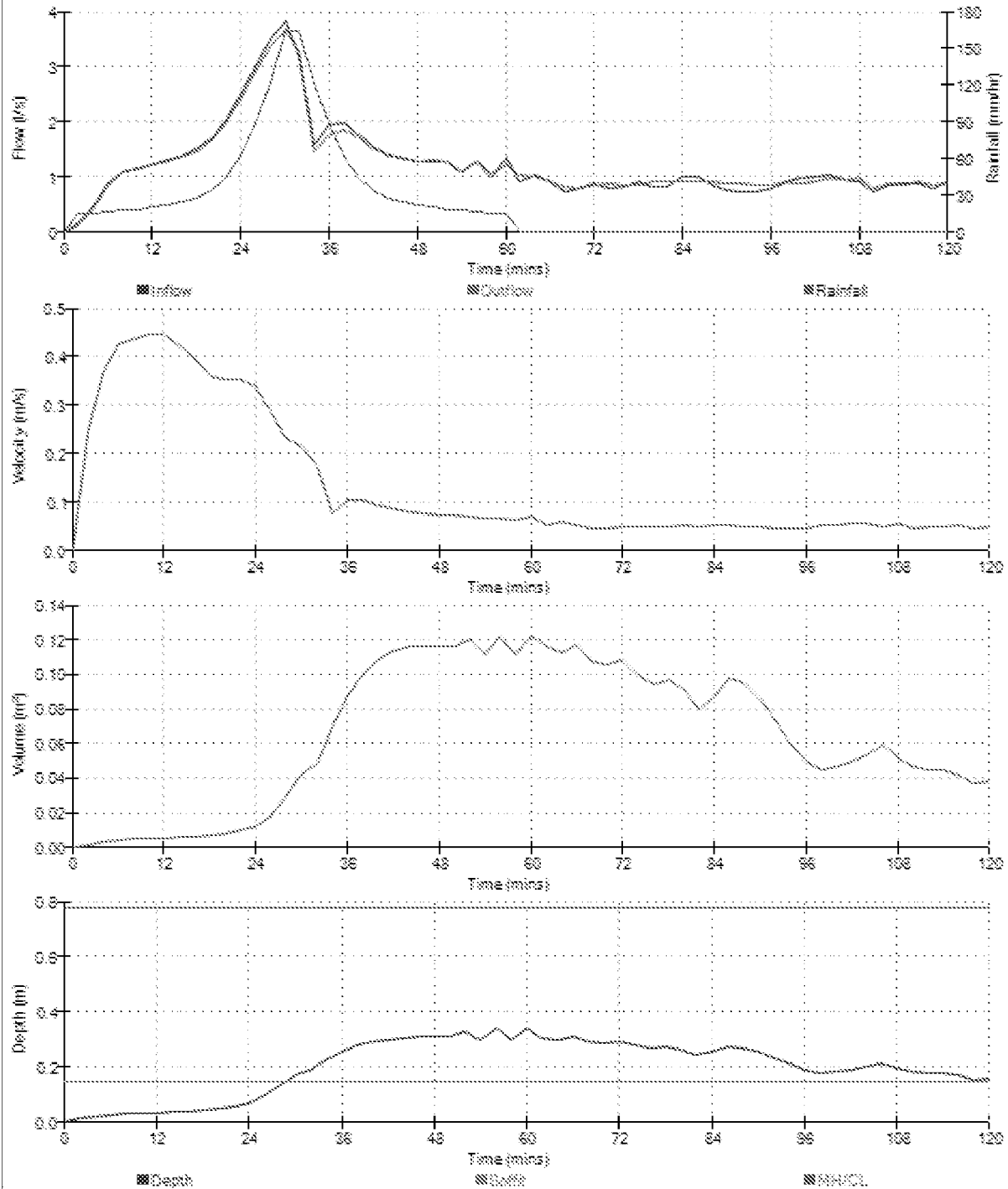
Pringuer-James Consulting Engineers Limited		Page 7
Overseas House Elm Grove London SW19 4HE		
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Graphs for Pipe 3.000 US/MH 5 (Storm)
60 minute 100 year Summer
Status: OK



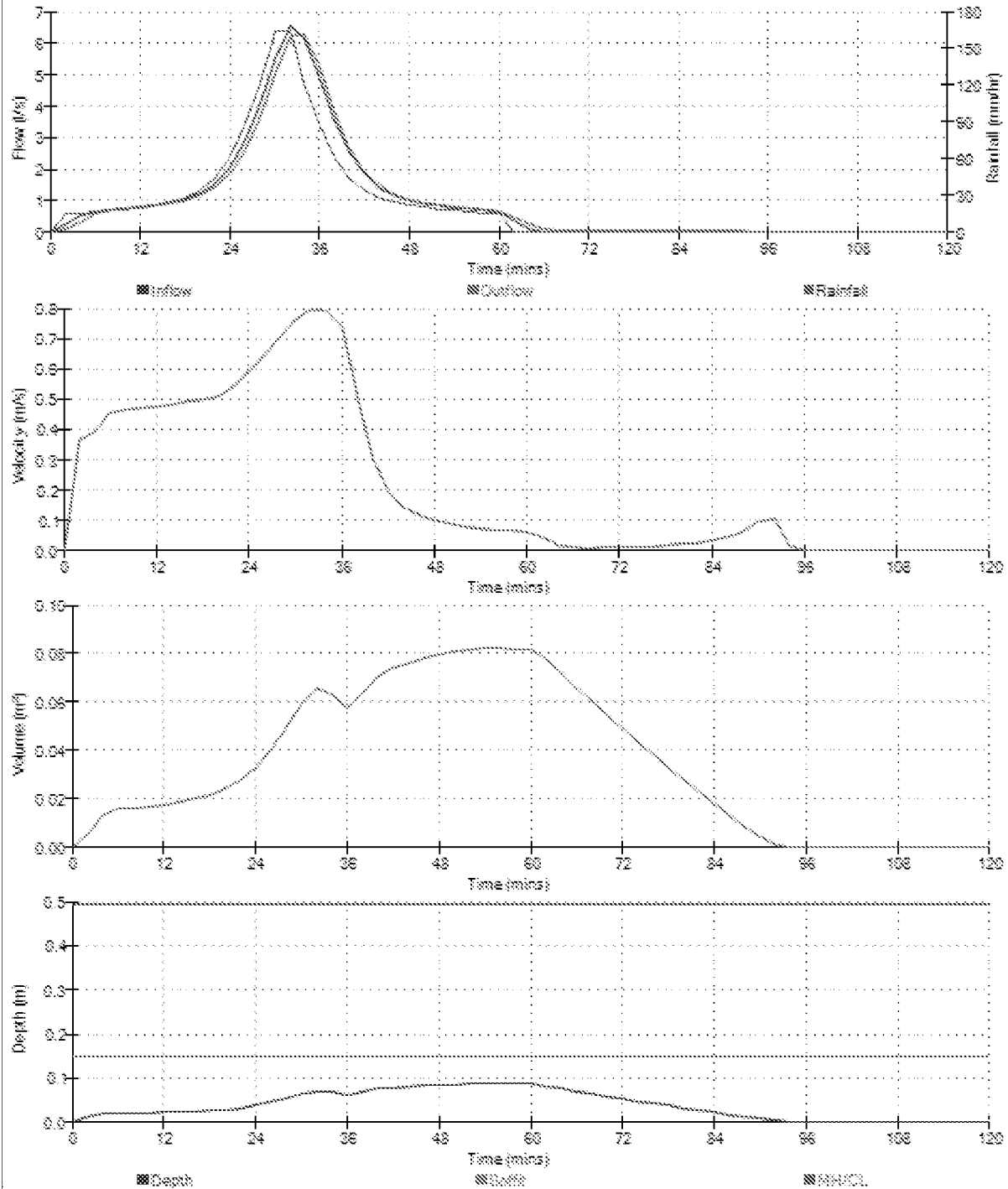
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Graphs for Pipe 1.003 US/MH 07 (Storm)
60 minute 100 year Summer
Status: SURCHARGED

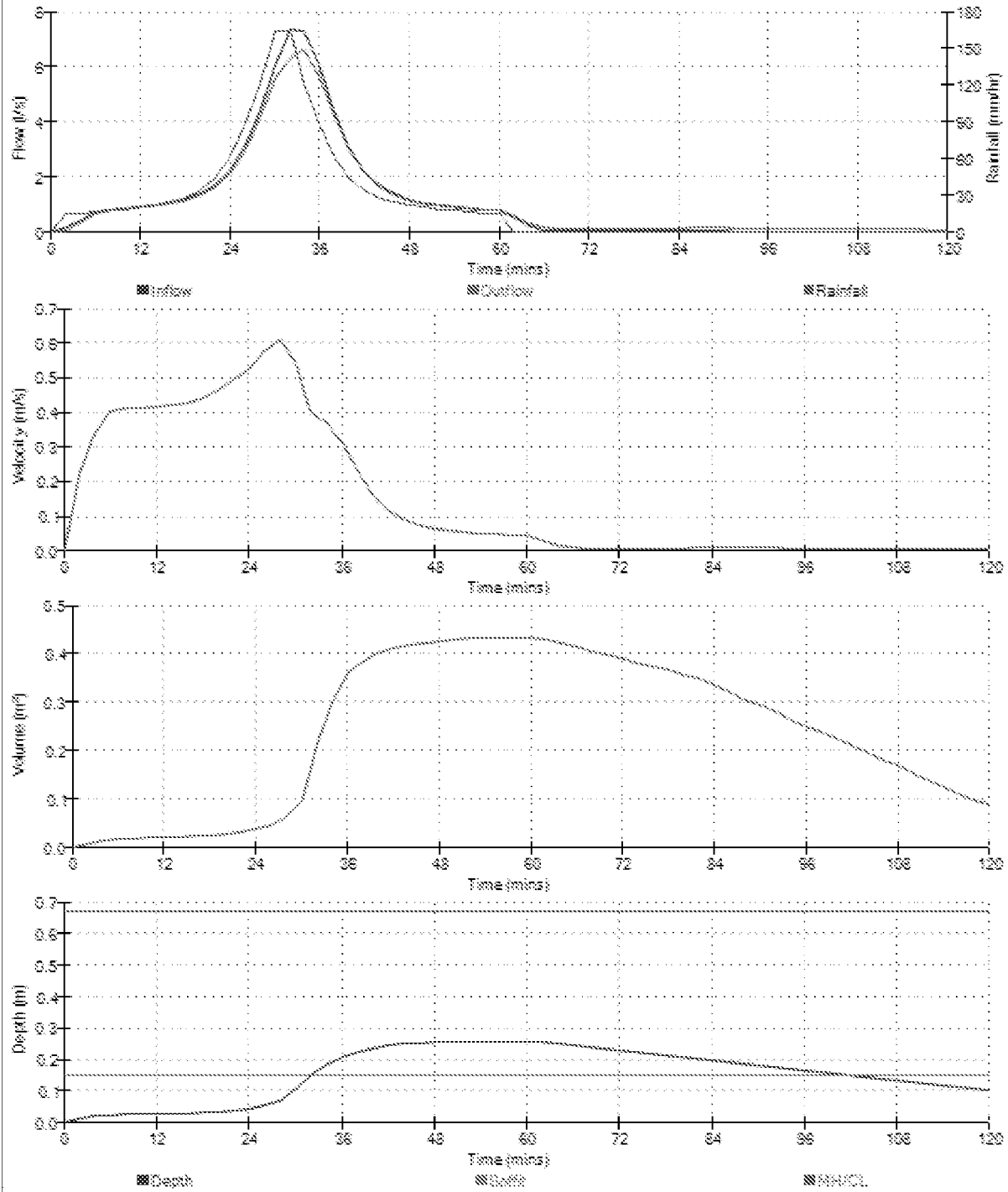


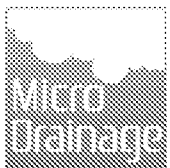
Pringuer-James Consulting Engineers Limited		Page 9
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Innovyze	Network 2018.1.1	

Graphs for Pipe 4.000 US/MH 5 (Storm)
60 minute 100 year Summer
Status: OK*

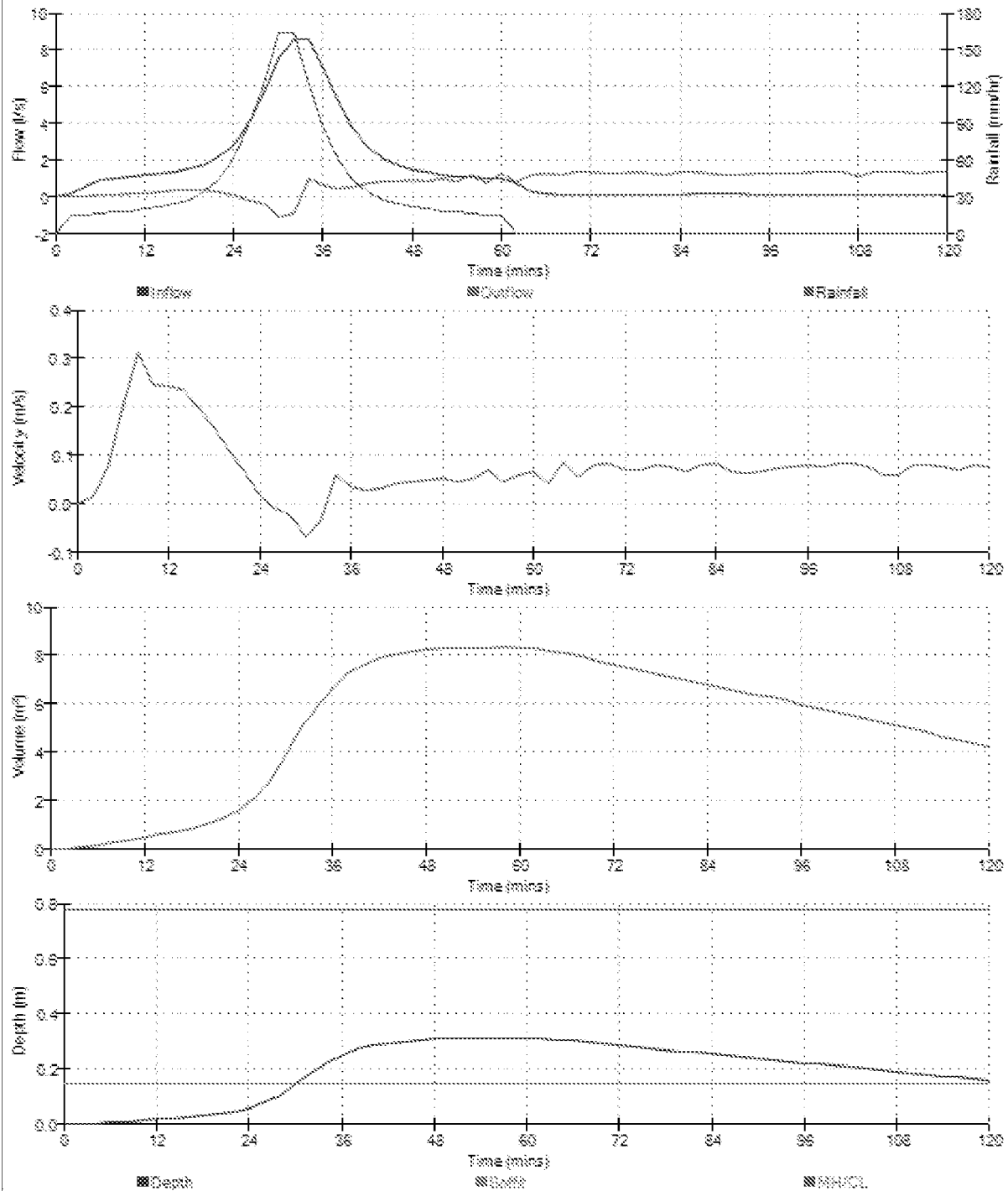


Graphs for Pipe 4.001 US/MH 10 (Storm)
60 minute 100 year Summer
Status: SURCHARGED

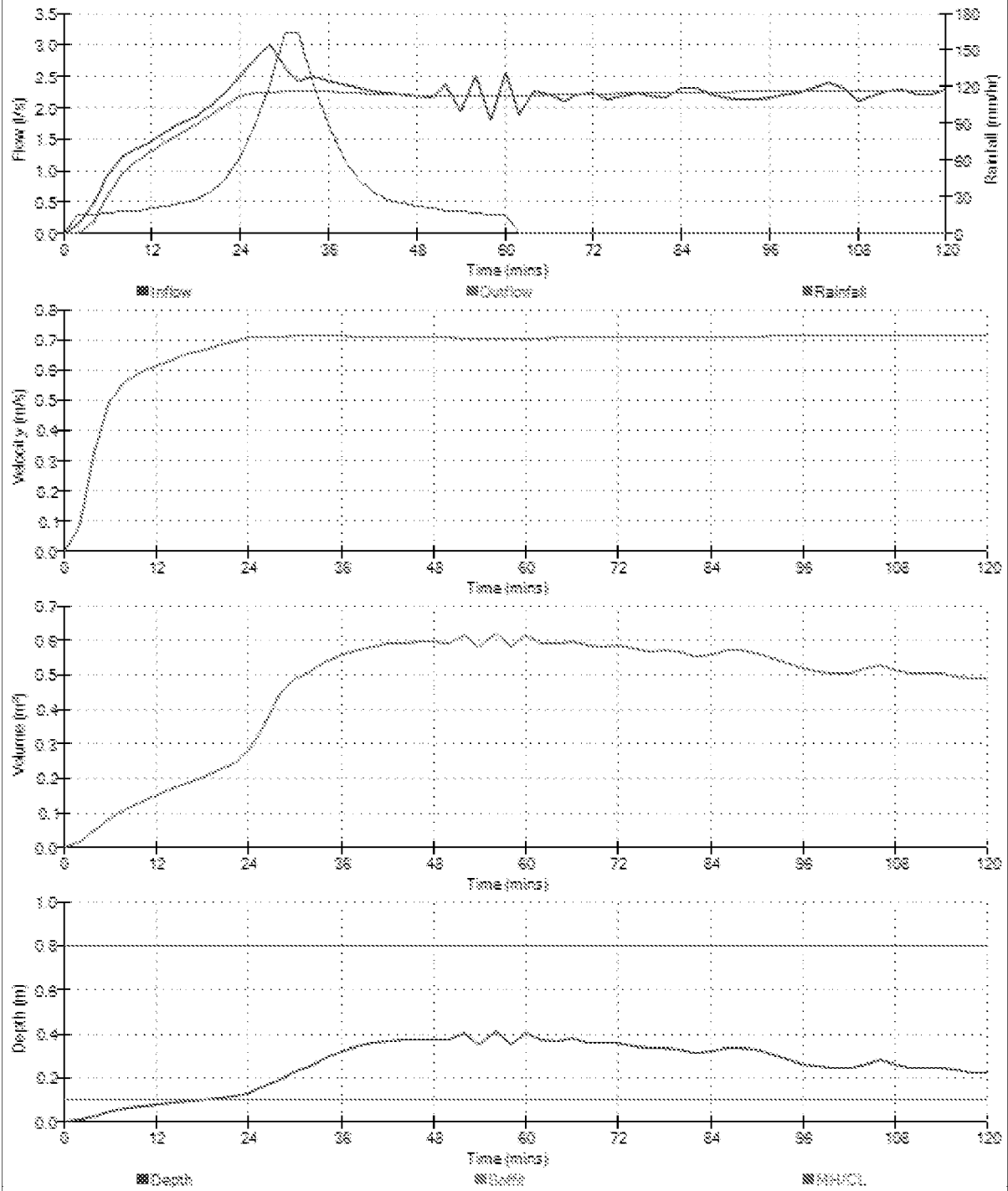


Pringuer-James Consulting Engineers Limited		Page 11
Overseas House Elm Grove London SW19 4HE		
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File Storm Model_Revision 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

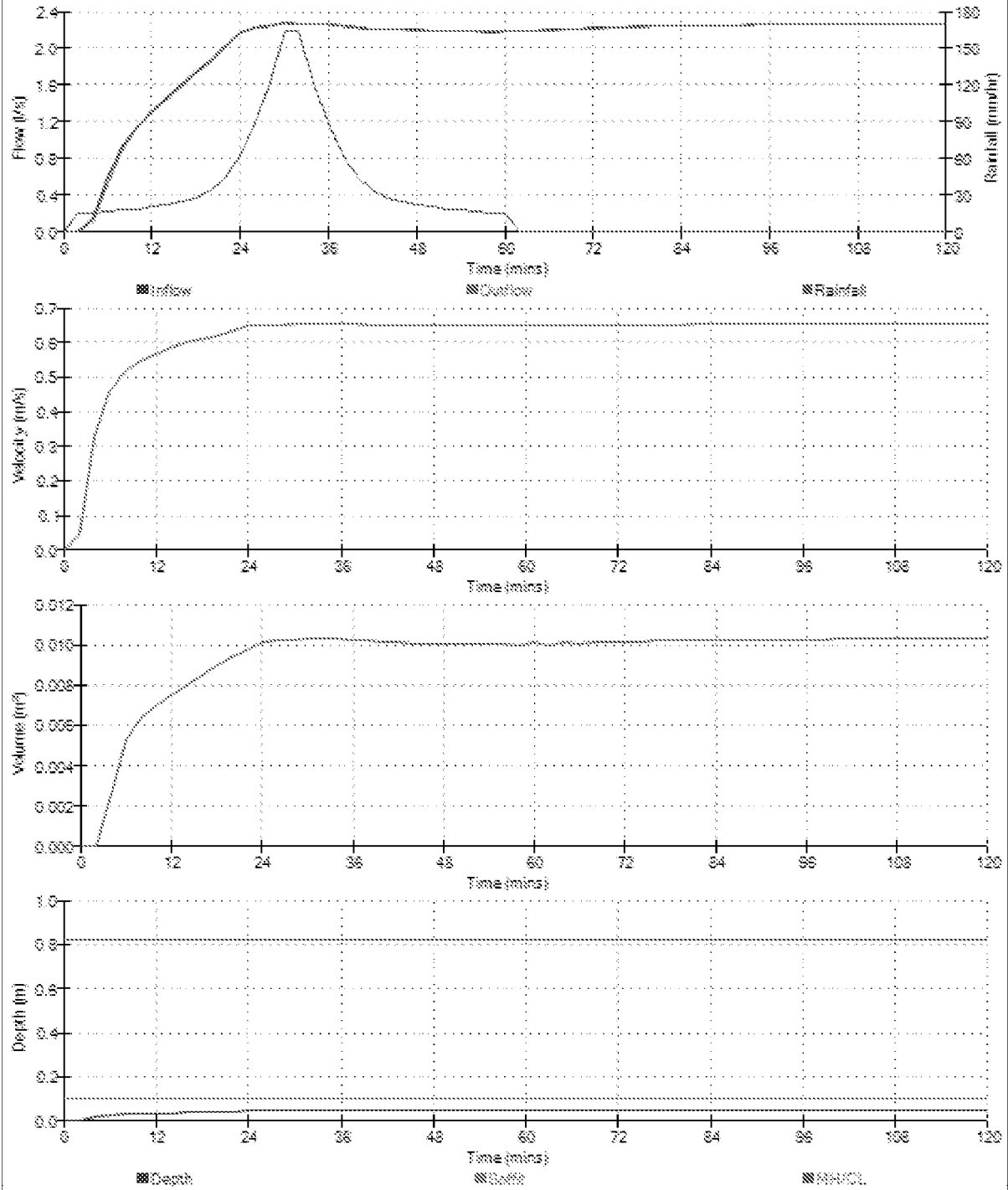
Graphs for Pipe 4.002 US/MH 11 (Storm)
60 minute 100 year Summer
Status: SURCHARGED



Graphs for Pipe 1.004 US/MH 08 (Storm)
60 minute 100 year Summer
Status: SURCHARGED



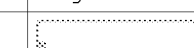
Graphs for Pipe 1.005 US/MH 04 (Storm)
60 minute 100 year Summer
Status: OK



Pringuer-James Consulting Engineers Limited				Page 14	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
Flows and Levels for Pipe 1.000 US/MH RWP20 (Storm) 60 minute 100 year Summer Average Rainfall Intensity 46.470 mm/hr					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
2	5.359	5.240	-0.141	0.0	0.1
4	5.366	5.247	-0.134	0.0	0.3
6	5.368	5.250	-0.132	0.0	0.5
8	5.369	5.250	-0.131	0.0	0.5
10	5.369	5.251	-0.131	0.0	0.6
12	5.370	5.252	-0.130	0.0	0.6
14	5.370	5.253	-0.130	0.0	0.6
16	5.371	5.254	-0.129	0.0	0.7
18	5.373	5.255	-0.127	0.0	0.8
20	5.375	5.258	-0.125	0.0	0.9
22	5.378	5.261	-0.122	0.0	1.1
24	5.383	5.267	-0.117	0.0	1.4
26	5.389	5.282	-0.111	0.0	2.0
28	5.397	5.313	-0.103	0.0	2.8
30	5.405	5.359	-0.095	0.0	3.9
32	5.410	5.372	-0.090	0.0	4.7
34	5.420	5.404	-0.080	0.0	4.6
36	5.449	5.436	-0.051	0.0	3.5
38	5.466	5.456	-0.034	0.0	2.6
40	5.475	5.469	-0.025	0.0	1.9
42	5.480	5.476	-0.020	0.0	1.4
44	5.484	5.480	-0.016	0.0	1.1
46	5.485	5.482	-0.015	0.0	0.9
48	5.488	5.482	-0.012	0.0	0.8
50	5.493	5.482	-0.007	0.0	0.7
52	5.491	5.502	-0.009	0.0	0.7
54	5.489	5.472	-0.011	0.0	0.5
56	5.491	5.514	-0.009	0.0	0.7
58	5.495	5.473	-0.005	0.0	0.4
60	5.483	5.505	-0.017	0.0	0.6
62	5.496	5.482	-0.004	0.0	0.3
64	5.471	5.470	-0.029	0.0	0.2
66	5.471	5.484	-0.029	0.0	0.2
68	5.468	5.463	-0.032	0.0	0.0
70	5.459	5.461	-0.041	0.0	0.1
72	5.457	5.462	-0.043	0.0	0.1
74	5.454	5.452	-0.046	0.0	0.0
76	5.445	5.441	-0.055	0.0	0.0
78	5.438	5.442	-0.062	0.0	0.1
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Pringuer-James Consulting Engineers Limited				Page 15	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
Flows and Levels for Pipe 1.000 US/MH RWP20 (Storm) 60 minute 100 year Summer Average Rainfall Intensity 46.470 mm/hr					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
80	5.436	5.439	-0.064	0.0	0.1
82	5.431	5.426	-0.069	0.0	0.0
84	5.421	5.419	-0.079	0.0	0.1
86	5.415	5.419	-0.085	0.0	0.1
88	5.410	5.421	-0.090	0.0	0.1
90	5.406	5.419	-0.094	0.0	0.1
92	5.402	5.414	-0.098	0.0	0.1
94	5.397	5.406	-0.103	0.0	0.1
96	5.391	5.396	-0.109	0.0	0.1
98	5.386	5.386	-0.114	0.0	0.0
100	5.379	5.375	-0.121	0.0	0.0
102	5.373	5.366	-0.127	0.0	0.0
104	5.368	5.362	-0.132	0.0	0.1
106	5.364	5.360	-0.136	0.0	0.1
108	5.359	5.358	-0.141	0.0	0.1
110	5.357	5.356	-0.143	0.0	0.0
112	5.350	5.350	-0.150	0.0	0.0
114	5.350	5.344	-0.150	0.0	0.0
116	5.350	5.339	-0.150	0.0	0.0
118	5.350	5.333	-0.150	0.0	0.0
120	5.350	5.328	-0.150	0.0	0.0
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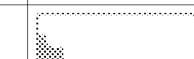
Pringuer-James Consulting Engineers Limited				Page 16	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
Flows and Levels for Pipe 1.001 US/MH 05 (Storm) 60 minute 100 year Summer Average Rainfall Intensity 46.470 mm/hr					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
2	5.240	5.184	-0.140	0.0	0.1
4	5.247	5.193	-0.133	0.0	0.2
6	5.250	5.200	-0.130	0.0	0.4
8	5.250	5.201	-0.130	0.0	0.5
10	5.251	5.202	-0.129	0.0	0.5
12	5.252	5.204	-0.128	0.0	0.6
14	5.253	5.207	-0.127	0.0	0.6
16	5.254	5.211	-0.126	0.0	0.7
18	5.255	5.216	-0.125	0.0	0.8
20	5.258	5.221	-0.122	0.0	0.9
22	5.261	5.228	-0.119	0.0	1.0
24	5.267	5.242	-0.113	0.0	1.4
26	5.282	5.269	-0.098	0.0	1.9
28	5.313	5.304	-0.067	0.0	2.5
30	5.359	5.327	-0.021	0.0	3.2
32	5.372	5.327	-0.008	0.0	4.4
34	5.404	5.327	0.024	0.0	4.2
36	5.436	5.327	0.056	0.0	3.1
38	5.456	5.327	0.076	0.0	2.5
40	5.469	5.327	0.089	0.0	1.9
42	5.476	5.327	0.096	0.0	1.4
44	5.480	5.327	0.100	0.0	1.1
46	5.482	5.327	0.102	0.0	0.9
48	5.482	5.327	0.102	0.0	0.8
50	5.482	5.327	0.102	0.0	0.7
52	5.502	5.327	0.122	0.0	0.6
54	5.472	5.327	0.092	0.0	0.6
56	5.514	5.327	0.134	0.0	0.5
58	5.473	5.327	0.093	0.0	0.6
60	5.505	5.327	0.125	0.0	0.5
62	5.482	5.327	0.102	0.0	0.4
64	5.470	5.327	0.090	0.0	0.3
66	5.484	5.327	0.104	0.0	0.1
68	5.463	5.327	0.083	0.0	0.1
70	5.461	5.327	0.081	0.0	0.1
72	5.462	5.327	0.082	0.0	0.1
74	5.452	5.327	0.072	0.0	0.1
76	5.441	5.327	0.061	0.0	0.1
78	5.442	5.327	0.062	0.0	0.1
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Pringuer-James Consulting Engineers Limited		Page 17
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:35	Designed by vlad	
File Storm Model_Revision 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Flows and Levels for Pipe 1.001 US/MH 05 (Storm)
60 minute 100 year Summer
Average Rainfall Intensity 46.470 mm/hr

Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
80	5.439	5.327	0.059	0.0	0.1
82	5.426	5.327	0.046	0.0	0.2
84	5.419	5.327	0.039	0.0	0.2
86	5.419	5.327	0.039	0.0	0.2
88	5.421	5.327	0.041	0.0	0.1
90	5.419	5.327	0.039	0.0	0.1
92	5.414	5.327	0.034	0.0	0.1
94	5.406	5.327	0.026	0.0	0.1
96	5.396	5.327	0.016	0.0	0.2
98	5.386	5.327	0.006	0.0	0.2
100	5.375	5.327	-0.005	0.0	0.2
102	5.366	5.327	-0.014	0.0	0.2
104	5.362	5.327	-0.018	0.0	0.2
106	5.360	5.327	-0.020	0.0	0.2
108	5.358	5.327	-0.022	0.0	0.1
110	5.356	5.327	-0.024	0.0	0.1
112	5.350	5.327	-0.030	0.0	0.1
114	5.344	5.327	-0.036	0.0	0.1
116	5.339	5.327	-0.041	0.0	0.1
118	5.333	5.327	-0.047	0.0	0.0
120	5.328	5.327	-0.052	0.0	0.1

Pringuer-James Consulting Engineers Limited				Page 18	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
Flows and Levels for Pipe 2.000 US/MH 3 (Storm) 60 minute 100 year Summer Average Rainfall Intensity 46.470 mm/hr					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
2	5.177	5.184	-0.150	0.0	0.0
4	5.177	5.193	-0.150	0.0	0.0
6	5.177	5.200	-0.150	0.0	0.0
8	5.178	5.201	-0.149	0.0	0.0
10	5.178	5.202	-0.149	0.0	0.0
12	5.178	5.204	-0.149	0.0	-0.1
14	5.179	5.207	-0.148	0.0	-0.1
16	5.180	5.211	-0.147	0.0	-0.1
18	5.181	5.216	-0.146	0.0	-0.1
20	5.183	5.221	-0.144	0.0	-0.2
22	5.185	5.228	-0.142	0.0	-0.3
24	5.189	5.242	-0.138	0.0	-0.5
26	5.199	5.269	-0.128	0.0	-1.1
28	5.217	5.304	-0.110	0.0	-2.2
30	5.248	5.327	-0.079	0.0	-3.8
32	5.306	5.327	-0.021	0.0	-7.1
34	5.366	5.327	0.039	0.0	-7.7
36	5.408	5.327	0.081	0.0	-5.3
38	5.436	5.327	0.109	0.0	-3.7
40	5.455	5.327	0.128	0.0	-2.4
42	5.466	5.327	0.139	0.0	-1.5
44	5.473	5.327	0.146	0.0	-0.9
46	5.478	5.327	0.151	0.0	-0.6
48	5.481	5.327	0.154	0.0	-0.4
50	5.482	5.327	0.155	0.0	-0.2
52	5.483	5.327	0.156	0.0	0.0
54	5.484	5.327	0.157	0.0	-0.3
56	5.484	5.327	0.157	0.0	0.2
58	5.485	5.327	0.158	0.0	-0.4
60	5.483	5.327	0.156	0.0	0.4
62	5.484	5.327	0.157	0.0	-0.1
64	5.477	5.327	0.150	0.0	0.7
66	5.473	5.327	0.146	0.0	0.7
68	5.468	5.327	0.141	0.0	0.5
70	5.462	5.327	0.135	0.0	0.7
72	5.457	5.327	0.130	0.0	0.7
74	5.452	5.327	0.125	0.0	0.6
76	5.446	5.327	0.119	0.0	0.7
78	5.440	5.327	0.113	0.0	0.8
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Pringuer-James Consulting Engineers Limited		Page 19
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:35	Designed by vlad	
File Storm Model_Revision 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Flows and Levels for Pipe 2.000 US/MH 3 (Storm)
60 minute 100 year Summer
Average Rainfall Intensity 46.470 mm/hr

Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
80	5.436	5.327	0.109	0.0	0.6
82	5.430	5.327	0.103	0.0	0.7
84	5.423	5.327	0.096	0.0	0.9
86	5.419	5.327	0.092	0.0	0.7
88	5.415	5.327	0.088	0.0	0.5
90	5.411	5.327	0.084	0.0	0.5
92	5.407	5.327	0.080	0.0	0.5
94	5.401	5.327	0.074	0.0	0.5
96	5.396	5.327	0.069	0.0	0.6
98	5.389	5.327	0.062	0.0	0.7
100	5.383	5.327	0.056	0.0	0.8
102	5.376	5.327	0.049	0.0	0.9
104	5.370	5.327	0.043	0.0	0.9
106	5.365	5.327	0.038	0.0	0.7
108	5.361	5.327	0.034	0.0	0.6
110	5.357	5.327	0.030	0.0	0.5
112	5.351	5.327	0.024	0.0	0.7
114	5.345	5.327	0.018	0.0	0.7
116	5.340	5.327	0.013	0.0	0.7
118	5.334	5.327	0.007	0.0	0.6
120	5.328	5.327	0.001	0.0	0.8

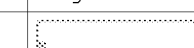
Pringuer-James Consulting Engineers Limited				Page 20	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
Flows and Levels for Pipe 1.002 US/MH 4 (Storm) 60 minute 100 year Summer Average Rainfall Intensity 46.470 mm/hr					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
2	5.184	5.184	-0.140	0.0	0.0
4	5.193	5.193	-0.131	0.0	0.1
6	5.200	5.199	-0.124	0.0	0.3
8	5.201	5.201	-0.122	0.0	0.5
10	5.202	5.201	-0.122	0.0	0.5
12	5.204	5.203	-0.120	0.0	0.5
14	5.207	5.207	-0.117	0.0	0.5
16	5.211	5.209	-0.113	0.0	0.5
18	5.216	5.215	-0.108	0.0	0.6
20	5.221	5.221	-0.103	0.0	0.6
22	5.228	5.227	-0.096	0.0	0.6
24	5.242	5.241	-0.082	0.0	0.7
26	5.269	5.269	-0.054	0.0	0.4
28	5.304	5.305	-0.020	0.0	-0.1
30	5.327	5.343	0.003	0.0	-1.1
32	5.327	5.358	0.003	0.0	-2.6
34	5.327	5.400	0.003	0.0	-4.1
36	5.327	5.429	0.003	0.0	-2.7
38	5.327	5.450	0.003	0.0	-1.4
40	5.327	5.464	0.003	0.0	-0.6
42	5.327	5.472	0.003	0.0	-0.2
44	5.327	5.477	0.003	0.0	0.1
46	5.327	5.480	0.003	0.0	0.3
48	5.327	5.480	0.003	0.0	0.3
50	5.327	5.479	0.003	0.0	0.5
52	5.327	5.499	0.003	0.0	0.5
54	5.327	5.467	0.003	0.0	0.4
56	5.327	5.510	0.003	0.0	0.6
58	5.327	5.468	0.003	0.0	0.4
60	5.327	5.512	0.003	0.0	0.6
62	5.327	5.476	0.003	0.0	0.6
64	5.327	5.470	0.003	0.0	0.8
66	5.327	5.481	0.003	0.0	0.9
68	5.327	5.461	0.003	0.0	0.8
70	5.327	5.459	0.003	0.0	0.8
72	5.327	5.463	0.003	0.0	0.8
74	5.327	5.450	0.003	0.0	0.8
76	5.327	5.439	0.003	0.0	0.8
78	5.327	5.444	0.003	0.0	0.9
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Pringuer-James Consulting Engineers Limited				Page 21	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
Flows and Levels for Pipe 1.002 US/MH 4 (Storm) 60 minute 100 year Summer Average Rainfall Intensity 46.470 mm/hr					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
80	5.327	5.434	0.003	0.0	0.8
82	5.327	5.416	0.003	0.0	0.8
84	5.327	5.428	0.003	0.0	1.0
86	5.327	5.446	0.003	0.0	1.0
88	5.327	5.441	0.003	0.0	0.8
90	5.327	5.425	0.003	0.0	0.8
92	5.327	5.405	0.003	0.0	0.7
94	5.327	5.383	0.003	0.0	0.7
96	5.327	5.360	0.003	0.0	0.8
98	5.327	5.348	0.003	0.0	0.9
100	5.327	5.352	0.003	0.0	1.0
102	5.327	5.362	0.003	0.0	1.0
104	5.327	5.372	0.003	0.0	1.0
106	5.327	5.383	0.003	0.0	0.9
108	5.327	5.367	0.003	0.0	0.9
110	5.327	5.352	0.003	0.0	0.7
112	5.327	5.348	0.003	0.0	0.9
114	5.327	5.348	0.003	0.0	0.9
116	5.327	5.339	0.003	0.0	0.9
118	5.327	5.326	0.003	0.0	0.8
120	5.327	5.328	0.003	0.0	0.9
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Pringuer-James Consulting Engineers Limited				Page 22	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
Flows and Levels for Pipe 3.000 US/MH 5 (Storm) 60 minute 100 year Summer Average Rainfall Intensity 46.470 mm/hr					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
2	5.413	5.184	-0.087	0.0	0.2
4	5.419	5.193	-0.081	0.0	0.4
6	5.421	5.199	-0.079	0.0	0.6
8	5.422	5.201	-0.078	0.0	0.6
10	5.422	5.201	-0.078	0.0	0.7
12	5.423	5.203	-0.077	0.0	0.7
14	5.424	5.207	-0.076	0.0	0.8
16	5.425	5.209	-0.075	0.0	0.9
18	5.427	5.215	-0.073	0.0	1.0
20	5.430	5.221	-0.070	0.0	1.1
22	5.433	5.227	-0.067	0.0	1.4
24	5.439	5.241	-0.061	0.0	1.8
26	5.447	5.269	-0.053	0.0	2.6
28	5.457	5.305	-0.043	0.0	3.6
30	5.471	5.343	-0.029	0.0	4.9
32	5.484	5.358	-0.016	0.0	5.9
34	5.485	5.400	-0.015	0.0	5.7
36	5.485	5.429	-0.015	0.0	4.6
38	5.481	5.450	-0.019	0.0	3.4
40	5.481	5.464	-0.019	0.0	2.4
42	5.484	5.472	-0.016	0.0	1.7
44	5.486	5.477	-0.014	0.0	1.3
46	5.488	5.480	-0.012	0.0	1.1
48	5.489	5.480	-0.011	0.0	0.9
50	5.492	5.479	-0.008	0.0	0.8
52	5.497	5.499	-0.003	0.0	0.8
54	5.487	5.467	-0.013	0.0	0.7
56	5.497	5.510	-0.003	0.0	0.7
58	5.494	5.468	-0.006	0.0	0.6
60	5.486	5.512	-0.014	0.0	0.7
62	5.493	5.476	-0.007	0.0	0.3
64	5.470	5.470	-0.030	0.0	0.3
66	5.468	5.481	-0.032	0.0	0.0
68	5.465	5.461	-0.035	0.0	0.0
70	5.458	5.459	-0.042	0.0	0.0
72	5.454	5.463	-0.046	0.0	0.0
74	5.451	5.450	-0.049	0.0	0.0
76	5.442	5.439	-0.058	0.0	0.0
78	5.437	5.444	-0.063	0.0	0.0
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Pringuer-James Consulting Engineers Limited				Page 23	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
Flows and Levels for Pipe 3.000 US/MH 5 (Storm) 60 minute 100 year Summer Average Rainfall Intensity 46.470 mm/hr					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
80	5.433	5.434	-0.067	0.0	0.0
82	5.422	5.416	-0.078	0.0	0.0
84	5.415	5.428	-0.085	0.0	0.0
86	5.413	5.446	-0.087	0.0	0.0
88	5.412	5.441	-0.088	0.0	0.0
90	5.412	5.425	-0.088	0.0	0.0
92	5.410	5.405	-0.090	0.0	0.0
94	5.408	5.383	-0.092	0.0	0.0
96	5.406	5.360	-0.094	0.0	0.0
98	5.404	5.348	-0.096	0.0	0.0
100	5.402	5.352	-0.098	0.0	0.0
102	5.401	5.362	-0.099	0.0	0.0
104	5.400	5.372	-0.100	0.0	0.0
106	5.400	5.383	-0.100	0.0	0.0
108	5.400	5.367	-0.100	0.0	0.0
110	5.400	5.352	-0.100	0.0	0.0
112	5.400	5.348	-0.100	0.0	0.0
114	5.400	5.348	-0.100	0.0	0.0
116	5.400	5.339	-0.100	0.0	0.0
118	5.400	5.326	-0.100	0.0	0.0
120	5.400	5.328	-0.100	0.0	0.0
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Pringuer-James Consulting Engineers Limited				Page 24	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
<u>Flows and Levels for Pipe 1.003 US/MH 07 (Storm)</u> <u>60 minute 100 year Summer</u> <u>Average Rainfall Intensity 46.470 mm/hr</u>					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
2	5.184	5.112	-0.137	0.0	0.1
4	5.193	5.128	-0.128	0.0	0.4
6	5.199	5.144	-0.121	0.0	0.9
8	5.201	5.159	-0.120	0.0	1.1
10	5.201	5.169	-0.119	0.0	1.2
12	5.203	5.177	-0.117	0.0	1.2
14	5.207	5.186	-0.114	0.0	1.3
16	5.209	5.194	-0.112	0.0	1.4
18	5.215	5.202	-0.106	0.0	1.5
20	5.221	5.210	-0.100	0.0	1.7
22	5.227	5.218	-0.093	0.0	2.0
24	5.241	5.232	-0.079	0.0	2.4
26	5.269	5.258	-0.051	0.0	2.9
28	5.305	5.293	-0.016	0.0	3.4
30	5.343	5.326	0.022	0.0	3.7
32	5.358	5.351	0.038	0.0	3.3
34	5.400	5.391	0.079	0.0	1.5
36	5.429	5.420	0.109	0.0	1.8
38	5.450	5.442	0.129	0.0	1.9
40	5.464	5.457	0.143	0.0	1.7
42	5.472	5.466	0.152	0.0	1.5
44	5.477	5.472	0.157	0.0	1.4
46	5.480	5.475	0.160	0.0	1.3
48	5.480	5.474	0.160	0.0	1.3
50	5.479	5.471	0.159	0.0	1.3
52	5.499	5.502	0.179	0.0	1.3
54	5.467	5.453	0.147	0.0	1.1
56	5.510	5.515	0.190	0.0	1.3
58	5.468	5.452	0.148	0.0	1.1
60	5.512	5.507	0.191	0.0	1.2
62	5.476	5.471	0.155	0.0	1.1
64	5.470	5.468	0.149	0.0	1.0
66	5.481	5.479	0.160	0.0	0.9
68	5.461	5.459	0.141	0.0	0.8
70	5.459	5.456	0.139	0.0	0.8
72	5.463	5.459	0.143	0.0	0.8
74	5.450	5.447	0.129	0.0	0.9
76	5.439	5.437	0.119	0.0	0.9
78	5.444	5.439	0.124	0.0	0.9
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Pringuer-James Consulting Engineers Limited		Page 25
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:35	Designed by vlad	
File Storm Model_Revision 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

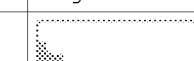
Flows and Levels for Pipe 1.003 US/MH 07 (Storm)
60 minute 100 year Summer
Average Rainfall Intensity 46.470 mm/hr

Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
80	5.434	5.432	0.114	0.0	0.9
82	5.416	5.413	0.096	0.0	0.9
84	5.428	5.421	0.107	0.0	0.9
86	5.446	5.438	0.125	0.0	0.9
88	5.441	5.438	0.121	0.0	0.9
90	5.425	5.425	0.105	0.0	0.9
92	5.405	5.405	0.085	0.0	0.9
94	5.383	5.383	0.063	0.0	0.9
96	5.360	5.363	0.040	0.0	0.9
98	5.348	5.351	0.028	0.0	0.9
100	5.352	5.342	0.031	0.0	0.9
102	5.362	5.346	0.041	0.0	0.9
104	5.372	5.362	0.052	0.0	1.0
106	5.383	5.381	0.063	0.0	0.9
108	5.367	5.360	0.046	0.0	1.0
110	5.352	5.346	0.032	0.0	0.8
112	5.348	5.343	0.028	0.0	0.9
114	5.348	5.343	0.027	0.0	0.9
116	5.339	5.334	0.019	0.0	0.9
118	5.326	5.322	0.006	0.0	0.9
120	5.328	5.323	0.008	0.0	0.9

Pringuer-James Consulting Engineers Limited				Page 26	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
Flows and Levels for Pipe 4.000 US/MH 5 (Storm) 60 minute 100 year Summer Average Rainfall Intensity 46.470 mm/hr					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
2	5.416	5.243	-0.139	0.0	0.1
4	5.423	5.251	-0.132	0.0	0.4
6	5.426	5.255	-0.129	0.0	0.6
8	5.426	5.256	-0.129	0.0	0.7
10	5.427	5.257	-0.128	0.0	0.7
12	5.428	5.258	-0.127	0.0	0.8
14	5.429	5.259	-0.126	0.0	0.8
16	5.430	5.261	-0.125	0.0	0.9
18	5.432	5.262	-0.123	0.0	1.0
20	5.435	5.265	-0.120	0.0	1.2
22	5.438	5.269	-0.117	0.0	1.4
24	5.443	5.276	-0.112	0.0	1.9
26	5.451	5.285	-0.104	0.0	2.6
28	5.459	5.300	-0.096	0.0	3.7
30	5.469	5.336	-0.086	0.0	5.1
32	5.476	5.381	-0.079	0.0	6.2
34	5.473	5.414	-0.082	0.0	6.3
36	5.467	5.440	-0.088	0.0	5.3
38	5.474	5.457	-0.081	0.0	3.8
40	5.480	5.468	-0.075	0.0	2.7
42	5.484	5.475	-0.071	0.0	1.9
44	5.486	5.479	-0.069	0.0	1.5
46	5.488	5.482	-0.067	0.0	1.2
48	5.490	5.485	-0.065	0.0	1.0
50	5.491	5.486	-0.064	0.0	0.9
52	5.492	5.487	-0.063	0.0	0.9
54	5.492	5.488	-0.063	0.0	0.8
56	5.492	5.488	-0.063	0.0	0.7
58	5.492	5.489	-0.063	0.0	0.7
60	5.492	5.488	-0.063	0.0	0.7
62	5.487	5.486	-0.068	0.0	0.5
64	5.482	5.481	-0.073	0.0	0.3
66	5.476	5.475	-0.079	0.0	0.1
68	5.470	5.470	-0.085	0.0	0.1
70	5.465	5.465	-0.090	0.0	0.1
72	5.459	5.459	-0.096	0.0	0.1
74	5.454	5.454	-0.101	0.0	0.1
76	5.448	5.448	-0.107	0.0	0.1
78	5.443	5.443	-0.112	0.0	0.1
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Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
Flows and Levels for Pipe 4.000 US/MH 5 (Storm) 60 minute 100 year Summer Average Rainfall Intensity 46.470 mm/hr					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
80	5.438	5.438	-0.117	0.0	0.1
82	5.433	5.433	-0.122	0.0	0.1
84	5.428	5.427	-0.127	0.0	0.1
86	5.423	5.422	-0.132	0.0	0.1
88	5.418	5.416	-0.137	0.0	0.1
90	5.414	5.411	-0.141	0.0	0.1
92	5.411	5.406	-0.144	0.0	0.1
94	5.405	5.401	-0.150	0.0	0.0
96	5.405	5.395	-0.150	0.0	0.0
98	5.405	5.390	-0.150	0.0	0.0
100	5.405	5.385	-0.150	0.0	0.0
102	5.405	5.379	-0.150	0.0	0.0
104	5.405	5.374	-0.150	0.0	0.0
106	5.405	5.368	-0.150	0.0	0.0
108	5.405	5.363	-0.150	0.0	0.0
110	5.405	5.358	-0.150	0.0	0.0
112	5.405	5.352	-0.150	0.0	0.0
114	5.405	5.347	-0.150	0.0	0.0
116	5.405	5.341	-0.150	0.0	0.0
118	5.405	5.336	-0.150	0.0	0.0
120	5.405	5.330	-0.150	0.0	0.0
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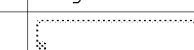
Pringuer-James Consulting Engineers Limited				Page 28	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
<u>Flows and Levels for Pipe 4.001 US/MH 10 (Storm)</u> <u>60 minute 100 year Summer</u> <u>Average Rainfall Intensity 46.470 mm/hr</u>					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
2	5.243	5.173	-0.137	0.0	0.1
4	5.251	5.175	-0.129	0.0	0.4
6	5.255	5.179	-0.125	0.0	0.7
8	5.256	5.183	-0.124	0.0	0.8
10	5.257	5.187	-0.123	0.0	0.9
12	5.258	5.191	-0.122	0.0	0.9
14	5.259	5.195	-0.121	0.0	1.0
16	5.261	5.199	-0.119	0.0	1.1
18	5.262	5.205	-0.118	0.0	1.2
20	5.265	5.211	-0.115	0.0	1.4
22	5.269	5.219	-0.111	0.0	1.6
24	5.276	5.232	-0.104	0.0	2.1
26	5.285	5.251	-0.095	0.0	3.0
28	5.300	5.278	-0.080	0.0	4.2
30	5.336	5.317	-0.044	0.0	5.6
32	5.381	5.358	0.001	0.0	6.3
34	5.414	5.392	0.034	0.0	6.6
36	5.440	5.422	0.060	0.0	5.7
38	5.457	5.444	0.077	0.0	4.3
40	5.468	5.459	0.088	0.0	3.0
42	5.475	5.468	0.095	0.0	2.2
44	5.479	5.474	0.099	0.0	1.7
46	5.482	5.478	0.102	0.0	1.4
48	5.485	5.481	0.105	0.0	1.2
50	5.486	5.483	0.106	0.0	1.1
52	5.487	5.484	0.107	0.0	1.0
54	5.488	5.485	0.108	0.0	0.9
56	5.488	5.485	0.108	0.0	0.9
58	5.489	5.486	0.109	0.0	0.8
60	5.488	5.485	0.108	0.0	0.8
62	5.486	5.484	0.106	0.0	0.6
64	5.481	5.480	0.101	0.0	0.3
66	5.475	5.475	0.095	0.0	0.2
68	5.470	5.470	0.090	0.0	0.1
70	5.465	5.464	0.085	0.0	0.1
72	5.459	5.459	0.079	0.0	0.1
74	5.454	5.453	0.074	0.0	0.1
76	5.448	5.448	0.068	0.0	0.1
78	5.443	5.442	0.063	0.0	0.1
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Pringuer-James Consulting Engineers Limited		Page 29
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:35	Designed by vlad	
File Storm Model_Revision 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Flows and Levels for Pipe 4.001 US/MH 10 (Storm)
60 minute 100 year Summer
Average Rainfall Intensity 46.470 mm/hr

Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
80	5.438	5.437	0.058	0.0	0.1
82	5.433	5.432	0.053	0.0	0.2
84	5.427	5.426	0.047	0.0	0.2
86	5.422	5.421	0.042	0.0	0.2
88	5.416	5.416	0.036	0.0	0.2
90	5.411	5.411	0.031	0.0	0.2
92	5.406	5.406	0.026	0.0	0.2
94	5.401	5.401	0.021	0.0	0.1
96	5.395	5.396	0.015	0.0	0.1
98	5.390	5.390	0.010	0.0	0.1
100	5.385	5.384	0.005	0.0	0.1
102	5.379	5.378	-0.001	0.0	0.1
104	5.374	5.372	-0.006	0.0	0.1
106	5.368	5.368	-0.012	0.0	0.1
108	5.363	5.363	-0.017	0.0	0.1
110	5.358	5.358	-0.022	0.0	0.1
112	5.352	5.352	-0.028	0.0	0.1
114	5.347	5.346	-0.033	0.0	0.1
116	5.341	5.341	-0.039	0.0	0.1
118	5.336	5.335	-0.044	0.0	0.1
120	5.330	5.330	-0.050	0.0	0.1

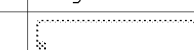
Pringuer-James Consulting Engineers Limited				Page 30	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
Flows and Levels for Pipe 4.002 US/MH 11 (Storm) 60 minute 100 year Summer Average Rainfall Intensity 46.470 mm/hr					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
2	5.173	5.112	-0.149	0.0	0.0
4	5.175	5.128	-0.147	0.0	0.0
6	5.179	5.144	-0.143	0.0	0.1
8	5.183	5.159	-0.139	0.0	0.1
10	5.187	5.169	-0.135	0.0	0.2
12	5.191	5.177	-0.131	0.0	0.3
14	5.195	5.186	-0.127	0.0	0.3
16	5.199	5.194	-0.123	0.0	0.4
18	5.205	5.202	-0.117	0.0	0.4
20	5.211	5.210	-0.111	0.0	0.4
22	5.219	5.218	-0.103	0.0	0.3
24	5.232	5.232	-0.090	0.0	0.1
26	5.251	5.258	-0.071	0.0	-0.2
28	5.278	5.293	-0.044	0.0	-0.4
30	5.317	5.326	-0.005	0.0	-1.0
32	5.358	5.351	0.036	0.0	-0.9
34	5.392	5.391	0.070	0.0	1.0
36	5.422	5.420	0.100	0.0	0.7
38	5.444	5.442	0.122	0.0	0.5
40	5.459	5.457	0.137	0.0	0.6
42	5.468	5.466	0.146	0.0	0.7
44	5.474	5.472	0.152	0.0	0.8
46	5.478	5.475	0.156	0.0	0.9
48	5.481	5.474	0.159	0.0	0.9
50	5.483	5.471	0.161	0.0	0.9
52	5.484	5.502	0.162	0.0	1.1
54	5.485	5.453	0.163	0.0	0.9
56	5.485	5.515	0.163	0.0	1.2
58	5.486	5.452	0.164	0.0	0.8
60	5.485	5.507	0.163	0.0	1.3
62	5.484	5.471	0.162	0.0	0.8
64	5.480	5.468	0.158	0.0	1.2
66	5.475	5.479	0.153	0.0	1.3
68	5.470	5.459	0.148	0.0	1.3
70	5.464	5.456	0.142	0.0	1.4
72	5.459	5.459	0.137	0.0	1.4
74	5.453	5.447	0.131	0.0	1.3
76	5.448	5.437	0.126	0.0	1.3
78	5.442	5.439	0.120	0.0	1.4
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Pringuer-James Consulting Engineers Limited		Page 31
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:35	Designed by vlad	
File Storm Model_Revision 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Flows and Levels for Pipe 4.002 US/MH 11 (Storm)
60 minute 100 year Summer
Average Rainfall Intensity 46.470 mm/hr

Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
80	5.437	5.432	0.115	0.0	1.3
82	5.432	5.413	0.110	0.0	1.2
84	5.426	5.421	0.104	0.0	1.4
86	5.421	5.438	0.099	0.0	1.4
88	5.416	5.438	0.094	0.0	1.3
90	5.411	5.425	0.089	0.0	1.3
92	5.406	5.405	0.084	0.0	1.2
94	5.401	5.383	0.079	0.0	1.3
96	5.396	5.363	0.074	0.0	1.3
98	5.390	5.351	0.068	0.0	1.3
100	5.384	5.342	0.062	0.0	1.3
102	5.378	5.346	0.056	0.0	1.4
104	5.372	5.362	0.050	0.0	1.4
106	5.368	5.381	0.046	0.0	1.4
108	5.363	5.360	0.041	0.0	1.1
110	5.358	5.346	0.036	0.0	1.4
112	5.352	5.343	0.030	0.0	1.4
114	5.346	5.343	0.024	0.0	1.4
116	5.341	5.334	0.019	0.0	1.3
118	5.335	5.322	0.013	0.0	1.4
120	5.330	5.323	0.008	0.0	1.4

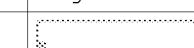
Pringuer-James Consulting Engineers Limited				Page 32	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
<u>Flows and Levels for Pipe 1.004 US/MH 08 (Storm)</u> <u>60 minute 100 year Summer</u> <u>Average Rainfall Intensity 46.470 mm/hr</u>					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
2	5.112	5.084	-0.088	0.0	0.0
4	5.128	5.095	-0.072	0.0	0.2
6	5.144	5.106	-0.055	0.0	0.6
8	5.159	5.110	-0.040	0.0	1.0
10	5.169	5.112	-0.031	0.0	1.2
12	5.177	5.114	-0.023	0.0	1.3
14	5.186	5.116	-0.014	0.0	1.5
16	5.194	5.118	-0.005	0.0	1.6
18	5.202	5.120	0.002	0.0	1.7
20	5.210	5.122	0.010	0.0	1.9
22	5.218	5.123	0.019	0.0	2.0
24	5.232	5.125	0.032	0.0	2.2
26	5.258	5.125	0.058	0.0	2.2
28	5.293	5.125	0.093	0.0	2.2
30	5.326	5.125	0.126	0.0	2.3
32	5.351	5.125	0.151	0.0	2.3
34	5.391	5.125	0.192	0.0	2.3
36	5.420	5.125	0.221	0.0	2.3
38	5.442	5.125	0.242	0.0	2.2
40	5.457	5.125	0.257	0.0	2.2
42	5.466	5.124	0.266	0.0	2.2
44	5.472	5.124	0.273	0.0	2.2
46	5.475	5.124	0.275	0.0	2.2
48	5.474	5.124	0.274	0.0	2.2
50	5.471	5.124	0.271	0.0	2.2
52	5.502	5.124	0.302	0.0	2.2
54	5.453	5.124	0.254	0.0	2.2
56	5.515	5.124	0.315	0.0	2.2
58	5.452	5.124	0.253	0.0	2.2
60	5.507	5.124	0.308	0.0	2.2
62	5.471	5.124	0.271	0.0	2.2
64	5.468	5.124	0.268	0.0	2.2
66	5.479	5.124	0.279	0.0	2.2
68	5.459	5.124	0.259	0.0	2.2
70	5.456	5.125	0.256	0.0	2.2
72	5.459	5.125	0.259	0.0	2.2
74	5.447	5.125	0.247	0.0	2.2
76	5.437	5.125	0.237	0.0	2.2
78	5.439	5.125	0.240	0.0	2.2
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Pringuer-James Consulting Engineers Limited		Page 33
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:35	Designed by vlad	
File Storm Model_Revision 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Flows and Levels for Pipe 1.004 US/MH 08 (Storm)
60 minute 100 year Summer
Average Rainfall Intensity 46.470 mm/hr

Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
80	5.432	5.125	0.232	0.0	2.2
82	5.413	5.125	0.214	0.0	2.2
84	5.421	5.125	0.221	0.0	2.2
86	5.438	5.125	0.238	0.0	2.2
88	5.438	5.125	0.239	0.0	2.3
90	5.425	5.125	0.225	0.0	2.3
92	5.405	5.125	0.205	0.0	2.3
94	5.383	5.125	0.183	0.0	2.3
96	5.363	5.125	0.163	0.0	2.3
98	5.351	5.125	0.151	0.0	2.3
100	5.342	5.125	0.142	0.0	2.3
102	5.346	5.125	0.146	0.0	2.3
104	5.362	5.125	0.162	0.0	2.3
106	5.381	5.125	0.181	0.0	2.3
108	5.360	5.125	0.160	0.0	2.3
110	5.346	5.125	0.147	0.0	2.3
112	5.343	5.125	0.143	0.0	2.3
114	5.343	5.125	0.143	0.0	2.3
116	5.334	5.125	0.134	0.0	2.3
118	5.322	5.125	0.122	0.0	2.3
120	5.323	5.125	0.123	0.0	2.3

Pringuer-James Consulting Engineers Limited				Page 34	
Overseas House Elm Grove London SW19 4HE					
Date 15/02/2019 11:35		Designed by vlad			
File Storm Model_Revision 6.MDX		Checked by			
Innovyze		Network 2018.1.1			
<u>Flows and Levels for Pipe 1.005 US/MH 04 (Storm)</u> <u>60 minute 100 year Summer</u> <u>Average Rainfall Intensity 46.470 mm/hr</u>					
Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
2	5.084	5.044	-0.096	0.0	0.0
4	5.095	5.044	-0.085	0.0	0.1
6	5.106	5.044	-0.074	0.0	0.5
8	5.110	5.044	-0.070	0.0	0.9
10	5.112	5.044	-0.067	0.0	1.1
12	5.114	5.044	-0.066	0.0	1.3
14	5.116	5.044	-0.064	0.0	1.4
16	5.118	5.044	-0.062	0.0	1.6
18	5.120	5.044	-0.060	0.0	1.7
20	5.122	5.044	-0.058	0.0	1.9
22	5.123	5.044	-0.057	0.0	2.0
24	5.125	5.044	-0.055	0.0	2.2
26	5.125	5.044	-0.055	0.0	2.2
28	5.125	5.044	-0.055	0.0	2.2
30	5.125	5.044	-0.055	0.0	2.3
32	5.125	5.044	-0.055	0.0	2.3
34	5.125	5.044	-0.055	0.0	2.3
36	5.125	5.044	-0.055	0.0	2.3
38	5.125	5.044	-0.055	0.0	2.2
40	5.125	5.044	-0.055	0.0	2.2
42	5.124	5.044	-0.055	0.0	2.2
44	5.124	5.044	-0.055	0.0	2.2
46	5.124	5.044	-0.055	0.0	2.2
48	5.124	5.044	-0.055	0.0	2.2
50	5.124	5.044	-0.056	0.0	2.2
52	5.124	5.044	-0.055	0.0	2.2
54	5.124	5.044	-0.055	0.0	2.2
56	5.124	5.044	-0.055	0.0	2.2
58	5.124	5.044	-0.056	0.0	2.2
60	5.124	5.044	-0.055	0.0	2.2
62	5.124	5.044	-0.056	0.0	2.2
64	5.124	5.044	-0.055	0.0	2.2
66	5.124	5.044	-0.055	0.0	2.2
68	5.124	5.044	-0.055	0.0	2.2
70	5.125	5.044	-0.055	0.0	2.2
72	5.125	5.044	-0.055	0.0	2.2
74	5.125	5.044	-0.055	0.0	2.2
76	5.125	5.044	-0.055	0.0	2.2
78	5.125	5.044	-0.055	0.0	2.2
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Pringuer-James Consulting Engineers Limited		Page 35
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:35	Designed by vlad	
File Storm Model_Revision 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Flows and Levels for Pipe 1.005 US/MH 04 (Storm)
60 minute 100 year Summer
Average Rainfall Intensity 46.470 mm/hr

Time (mins)	Upstream Level (m)	Downstream Level (m)	Surcharged Depth (m)	Total O/F (l/s)	Pipe Flow (l/s)
80	5.125	5.044	-0.055	0.0	2.2
82	5.125	5.044	-0.055	0.0	2.2
84	5.125	5.044	-0.055	0.0	2.2
86	5.125	5.044	-0.055	0.0	2.2
88	5.125	5.044	-0.055	0.0	2.3
90	5.125	5.044	-0.055	0.0	2.3
92	5.125	5.044	-0.055	0.0	2.3
94	5.125	5.044	-0.055	0.0	2.3
96	5.125	5.044	-0.055	0.0	2.3
98	5.125	5.044	-0.055	0.0	2.3
100	5.125	5.044	-0.055	0.0	2.3
102	5.125	5.044	-0.055	0.0	2.3
104	5.125	5.044	-0.055	0.0	2.3
106	5.125	5.044	-0.055	0.0	2.3
108	5.125	5.044	-0.055	0.0	2.3
110	5.125	5.044	-0.055	0.0	2.3
112	5.125	5.044	-0.055	0.0	2.3
114	5.125	5.044	-0.055	0.0	2.3
116	5.125	5.044	-0.055	0.0	2.3
118	5.125	5.044	-0.055	0.0	2.3
120	5.125	5.044	-0.055	0.0	2.3

Pringuer-James Consulting Engineers Limited		Page 1
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:53	Designed by vlad	
File STORM MODEL_REVISION 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.026	4-8	0.012

Total Area Contributing (ha) = 0.038

Total Pipe Volume (m³) = 1.567

Pringuer-James Consulting Engineers Limited		Page 2
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:53	Designed by vlad	
File STORM MODEL_REVISION 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

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	150	RWP20	5.950	5.350	0.450	Junction	
1.001	o	150	05	5.900	5.230	0.520	Open Manhole	450
2.000	o	150	3	5.950	5.177	0.623	Open Manhole	750 x 600
1.002	o	150	4	5.900	5.174	0.576	Junction	
3.000	o	100	5	5.950	5.400	0.450	Open Manhole	450
1.003	o	150	07	5.950	5.170	0.630	Open Manhole	450
4.000	o	150	5	5.900	5.405	0.345	Junction	
4.001	o	150	10	5.900	5.230	0.520	Open Manhole	450
4.002	o	150	11	5.950	5.172	0.628	Open Manhole	750 x 600
1.004	o	100	08	5.900	5.100	0.700	Open Manhole	1000 x 675
1.005	o	100	04	5.900	5.080	0.720	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	17.700	150.0	05	5.900	5.232	0.518	Open Manhole	450
1.001	8.071	150.0	4	5.900	5.176	0.574	Junction	
2.000	0.500	150.0	4	5.900	5.174	0.576	Junction	
1.002	0.500	150.0	07	5.950	5.170	0.630	Open Manhole	450
3.000	8.746	80.2	07	5.950	5.291	0.559	Open Manhole	450
1.003	10.594	150.0	08	5.900	5.100	0.650	Open Manhole	1000 x 675
4.000	26.056	149.7	10	5.900	5.231	0.519	Open Manhole	450
4.001	8.700	150.0	11	5.950	5.172	0.628	Open Manhole	750 x 600
4.002	10.530	150.4	08	5.900	5.102	0.648	Open Manhole	1000 x 675
1.004	2.010	100.5	04	5.900	5.080	0.720	Open Manhole	450
1.005	2.733	59.4		5.860	5.034	0.726	Open Manhole	225

Pringuer-James Consulting Engineers Limited		Page 3
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:53	Designed by vlad	
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall C. Level Name (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005	5.860	5.034	5.975	225	0

Simulation Criteria for Storm

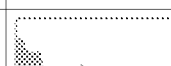
Volumetric Runoff Coeff	0.900
Areal Reduction Factor	1.000
Hot Start (mins)	0
Hot Start Level (mm)	0
Manhole Headloss Coeff (Global)	0.750
Foul Sewage per hectare (l/s)	0.000
Additional Flow - % of Total Flow	40.000
MADD Factor * 10m ³ /ha Storage	2.000
Run Time (mins)	120
Output Interval (mins)	2

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 507144 101633 TQ 07144 01633
Data Type	Point
Summer Storms	Yes
Winter Storms	No
Cv (Summer)	0.900
Cv (Winter)	0.840
Storm Duration (mins)	60

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Date 15/02/2019 11:53	Designed by vlad	
File STORM MODEL_REVISION 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Online Controls for Storm

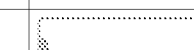
Hydro-Brake® Optimum Manhole: 08, DS/PN: 1.004, Volume (m³): 0.9

Unit Reference	MD-SHE-0079-2300-0515-2300
Design Head (m)	0.515
Design Flow (l/s)	2.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	79
Invert Level (m)	5.100
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.515	2.3
Flush-Flo™	0.155	2.3
Kick-Flo®	0.356	1.9
Mean Flow over Head Range	-	2.0

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)
0.100	2.2	1.600	3.9	5.000	6.6
0.200	2.3	1.800	4.1	5.500	6.9
0.300	2.2	2.000	4.3	6.000	7.2
0.400	2.1	2.200	4.5	6.500	7.5
0.500	2.3	2.400	4.7	7.000	7.8
0.600	2.5	2.600	4.9	7.500	8.1
0.800	2.8	3.000	5.2	8.000	8.3
1.000	3.1	3.500	5.6	8.500	8.6
1.200	3.4	4.000	5.9	9.000	8.8
1.400	3.6	4.500	6.3	9.500	9.1

Pringuer-James Consulting Engineers Limited		Page 5
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:53	Designed by vlad	
File STORM MODEL_REVISION 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Storage Structures for Storm

Cellular Storage Manhole: 3, DS/PN: 2.000

Invert Level (m) 5.177
 Infiltration Coefficient Base (m/hr) 0.00000
 Infiltration Coefficient Side (m/hr) 0.00000
 Safety Factor 2.0
 Porosity 0.96

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	15.3	0.0	0.351	0.0	0.0
0.350	15.3	0.0	0.422	0.0	0.0

Cellular Storage Manhole: 11, DS/PN: 4.002

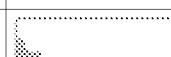
Invert Level (m) 5.172
 Infiltration Coefficient Base (m/hr) 0.00000
 Infiltration Coefficient Side (m/hr) 0.00000
 Safety Factor 2.0
 Porosity 0.96

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	26.8	0.0	0.351	0.0	0.0
0.350	26.8	0.0	0.427	0.0	0.0

Manhole Headloss for Storm

PN	US/MH	US/MH
Name	Headloss	

1.000	RWP20	0.000
1.001	05	0.750
2.000	3	0.750
1.002	4	0.000
3.000	5	0.750
1.003	07	0.750
4.000	5	0.000
4.001	10	0.750
4.002	11	0.750
1.004	08	0.750
1.005	04	0.750

Pringuer-James Consulting Engineers Limited		Page 6
Overseas House Elm Grove London SW19 4HE		
Date 15/02/2019 11:53	Designed by vlad	
File STORM MODEL_REVISION 6.MDX	Checked by	
Innovyze	Network 2018.1.1	

Volume Summary (Static)

Length Calculations based on Centre-Centre

Pipe Number	USMH Name	Manhole Volume (m ³)	Pipe Volume (m ³)	Storage Structure Volume (m ³)	Total Volume (m ³)
1.000	RWP20	0.000	0.313	0.000	0.313
1.001	05	0.107	0.143	0.000	0.249
2.000	3	0.348	0.009	5.146	5.502
1.002	4	0.000	0.009	0.000	0.009
3.000	5	0.087	0.069	0.000	0.156
1.003	07	0.124	0.187	0.000	0.311
4.000	5	0.000	0.460	0.000	0.460
4.001	10	0.107	0.154	0.000	0.260
4.002	11	0.350	0.186	9.013	9.550
1.004	08	0.540	0.016	0.000	0.556
1.005	04	0.130	0.021	0.000	0.152
Total		1.793	1.567	14.159	17.519

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m ³)	Pipe Volume (m ³)	Storage Structure Volume (m ³)	Total Volume (m ³)
1.000	RWP20	0.000	0.309	0.000	0.309
1.001	05	0.107	0.139	0.000	0.245
2.000	3	0.348	0.002	5.146	5.496
1.002	4	0.000	0.005	0.000	0.005
3.000	5	0.087	0.065	0.000	0.153
1.003	07	0.124	0.174	0.000	0.298
4.000	5	0.000	0.456	0.000	0.456
4.001	10	0.107	0.143	0.000	0.250
4.002	11	0.350	0.171	9.013	9.534
1.004	08	0.540	0.010	0.000	0.550
1.005	04	0.130	0.019	0.000	0.149
Total		1.793	1.493	14.159	17.445

APPENDIX C: EXISTING SITE RUN-OFF CALCULATIONS

Equations Used

GREENFIELD AREAS

IH124: Catchment descriptor equation

Peak Run-off

$$Q_{\text{BAR (rural)}} = 0.00108 \text{ AREA}^{0.89} \text{ SAAR}^{1.17} \text{ SOIL}^{2.17}$$

$Q_{\text{BAR (rural)}}$ = mean annual flood (a return period in the region of 2.3 years)

AREA = area of catchment in km²

SAAR = Standard Average Annual Rainfall for the period 1941-1970 in mm
soil index, taken from FST soil maps or the WRAP map of the Wellington

SOIL = procedure

Calculation is completed for 50ha and linearly interpolated for required site area

DEVELOPED AREAS

Calculated using Modified Rational Method and FEH data

Peak Run-off

Rate

$$Q_o = 2.78 C_v C_r i A$$

C_v = Volumetric Runoff coefficient

C_r = 1.3 (routing Coefficient)

i = Rainfall Intensity

A = Area

2.78 = Coefficient which accounts for the differences in units used for the inputs and the outputs of the equation

$$V = \frac{PR}{100} I A$$

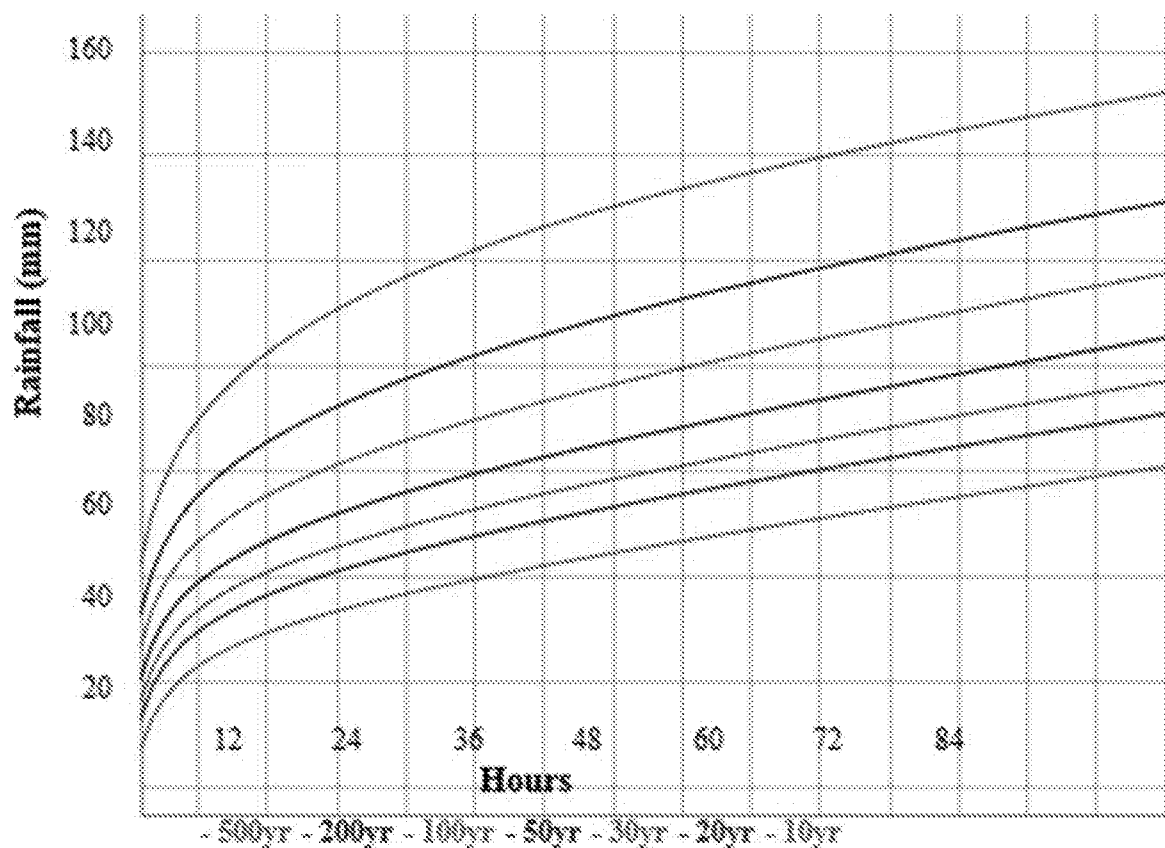
V = Volume of runoff

PR = Percentage of Run-off

I = rainfall depth (mm)

A = Area

Rainfall Data							
Location		507144	101633	125A Tudor Lodge, Sea Road, East Preston			
FEH data							
Return Period		1	2	10	30	100	100+CC (+40%)
Duration (mins)	Duration (hrs)	FSR rainfall depths (mm)	FEH Rainfall depths (mm)				
15	0.25	7.19	8.37	16.47	21.45	27.17	38.04
30	0.5	9.26	10.80	21.47	28.46	36.37	47.28
60	1	12.08	13.67	27.07	36.10	46.47	60.41
120	2	15.18	18.50	33.03	42.64	53.76	69.89
240	4	19.41	23.63	39.36	49.64	61.89	80.46
360	6	22.26	26.63	43.06	53.76	66.72	86.74
600	10	24.70	30.53	47.78	59.09	73.14	95.08
1440	24	33.40	37.86	56.92	69.67	86.07	111.89



Peak runoff rate calculations - Existing Site

IMPERMEABLE AREAS (Pre-development)			
Roofs	=	0.9	normal roofs
Pavements	=	0.75	hard standing
Surface	Area (ha)	Cv	Weighted Cv
Roofs	0.026	0.9	
Pavement	0.015	0.75	
TOTAL	0.041	0	0.85
Return Period			
1 in 1			
Duration (mins)	Rainfall Depth (mm)	Intensity (mm/hr)	Peak Flow Rate (l/s)
15	7.19	28.75	3.60
30	9.26	18.53	2.32
60	12.08	12.08	1.51

Return Period			
1 in 30			
Duration (mins)	Rainfall Depth (mm)	Intensity (mm/hr)	Peak Flow Rate (l/s)
15	17.93	71.72	8.98
30	23.16	46.33	5.80
60	36.10	36.10	4.52

Return Period			
1 in 100			
Duration (mins)	Rainfall Depth (mm)	Intensity (mm/hr)	Peak Flow Rate (l/s)
15	22.70	90.80	11.37
30	36.37	72.74	9.11
60	46.47	46.47	5.82

APPENDIX D – MAINTENANCE PLAN

The following components will require maintenance over the lifetime of the development:

- Attenuation Tanks (crates)
- Permeable Pavements
- Mini-Swale
- Hydro-brake

All above elements will be maintained in accordance with CIRIA (C753) The SuDS Manual recommendation as detailed below. Reputable maintenance company will be commissioned to undertake maintenance once relevant products are installed.

Attenuation tank, including upstream silt traps and filter chambers.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify areas that are not operating correctly	Monthly for 3 month, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required.

Permeable Pavements

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Check pavement for loose stone and re-instate where required.	Once a year or as required.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds and management of any weeds in the pavement or adjacent.	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Rehabilitation of surface and upper structure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance reduced due to significant clogging)
Monitoring	Initial Inspection	Monthly for three month after installation
	Inspect for evidence of poor operation and/or weed growth – take remedial action if required.	Three-monthly, 48h after large storms in first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually
	Monitor inspection chambers	Annually

Hydrobrake

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Check and Empty sump pit. Check Hydro-brake for any blockages. If fault is identified during routine inspection/monitoring, undertake remedial action.	Every 6 month.
Remedial Action	Repair and/or replace hydro-brake	As required
Monitoring	Inspection to check orifice performance, condition of the system and to identify any faults.	Every 3 to 6 month

Mini-Swale (overflow from permeable pavement)

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season) or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect vegetation coverage.	Monthly for 6 months, quarterly for 2 years, then half yearly.
Occasional Maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if base soil is exposed over 10% or more of the swale treatment area.
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove and dispose of oils and petrol residue using safe standard practices	As required



**TUDOR COTTAGE,
125 SEA ROAD,
EAST PRESTON,
LITTLEHAMPTON**

Geoenvironmental Investigation

Client
Rocco Homes

Report No. 4706

21st February 2018



CONTENTS

	Section	Page
	SYNOPSIS	I
I	Site description	2
2	Development proposals	2
3	Geology	2
4	Field work	3
5	Laboratory testing	3
6	Ground conditions	
	6.1 Stratigraphy	4
	6.1.1 Made Ground	4
	6.1.2 Aeolian Deposits "Brickearth"	5
	6.1.3 Lewes Nodular Chalk Formation	5
	6.2 Groundwater	6
7	Discussion	
	7.1 General	6
	7.2 Ground floor slabs	7
	7.3 Excavations	7
	7.4 Contaminant analysis	
	7.4.1 Solid phase	8
	7.4.2 Waste Acceptance Criteria (WAC) analysis	10
	7.5 Buried concrete	11

Procedural Notes

APPENDICES

A	Figures
B	Borehole Records
C	Standpipe Records
D	Laboratory Test Results
E	Cover System

**TUDOR COTTAGE,
125 SEA ROAD,
EAST PRESTON,
LITTLEHAMPTON**

Geoenvironmental Investigation

Synopsis

An investigation has been carried out at a site on Sea Road in Littlehampton on the instructions of Rocco Homes.

The purpose of the investigation was to determine the ground conditions and to provide recommendations in respect of foundation design and other geotechnical matters for the construction of a two-storey residential block.

This report describes the work carried out in the field and the laboratory, presents the results and discusses their implications for the development.

The ground conditions revealed by the investigation comprise Made Ground underlain by Aeolian Deposits with Chalk at depth, which is suitable for piled foundations to be utilised. Their design will require further investigation.

Chemical analysis revealed some lead contamination and remediation options are discussed.

1

Site description

The site is located in a residential area of East Preston in Littlehampton, some 200m from the coast. It comprises a 1½-storey residential property with a driveway and garden on its western and eastern sides respectively. The site is bound on three sides by roads and a small car park is located just beyond its shorter, eastern boundary. At the time of investigation several mature and semi-mature trees were present within and surrounding the site. The existing site layout is shown in Figure 1 at Appendix A.

2

Development proposals

It is intended to demolish the existing property and construct a two-storey residential block and car park. The proposed layout is shown in Figure 2 at Appendix A.

Loading is not yet known but is expected to be typically light.

3

Geology

Published records of the British Geological Survey (BGS) indicate the site to be underlain by River Terrace Deposits overlying the Lewes Nodular Chalk Formation.

4

Field work

The extent of the field work was agreed with the Client and comprised four boreholes drilled by continuous dynamic (windowless) sampler techniques to between 4.5m and 5.5m depth.

The ground investigation layout is shown in Figure 1 at Appendix A.

Representative soil samples were recovered for subsequent laboratory examination and testing, while Standard Penetration Tests (SPT) were carried out as appropriate.

Details of the strata encountered are provided on the Borehole Records at Appendix B, together with particulars of the samples recovered, groundwater observations and SPT results. An SPT profile is provided in Figure 3 at Appendix A.

A standpipe was installed in borehole WS4 to permit monitoring of water levels. Readings were taken on four occasions and are provided at Appendix C.

5

Laboratory testing

The following laboratory tests were conducted on samples recovered during the field work:-

- Natural moisture content: to assess the in situ condition of the soil;
- Liquid and Plastic Limits: to classify cohesive soil into behavioral groups;
- Sulphate and pH value: for the specification of buried concrete; and

- Contamination: chemical analyses to detect the presence of common contaminants, viz:-

Metals & metalloids: Total arsenic, cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, zinc and water soluble boron,

Organic: Total phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH) and speciated Total Petroleum Hydrocarbons (TPH).

Others: Asbestos screen and Waste Acceptance Criteria (WAC)

Results of these tests are presented at Appendix D.

6

Ground conditions

6.1

Stratigraphy

The stratigraphy of the site as revealed in the exploratory holes is shown in detail on the Borehole Records at Appendix B and is described in general terms hereafter.

6.1.1

Made Ground

Made Ground was recorded at all exploratory positions under grass or tarmac and measured between 0.5m and 0.8m thick. Its composition was variable, with a brown sandy hardcore and brick gravel recorded in WS1 and WS3, a dark brown very sandy slightly gravelly silt described in WS3 and WS4, and a dark brown very silty slightly gravelly sand encountered in borehole WS2.

6.1.2

Aeolian Deposits "Brickearth"

Beneath the Made Ground, Aeolian Deposits were encountered at all locations, continuing to 4.8m and 4.3m in boreholes WS3 and WS4 and to the limit of investigation in boreholes WS1 and WS2 at 5.5m and 4.5m depth, respectively. The deposits were capped by a cohesive layer typically described as soft brownish grey, silty, sandy, slightly gravelly clay, recorded to between 1.3m and 2.95m depth in all boreholes. Underlying the clay were interbedded silt and sand and less frequent clay layers, deposited in variable sequences between boreholes. Generally however, the materials were orangeish brown and calcareous, and each layer measured between 0.2m and 1.0m thick. Stiffness and density also varied, with soft and firm clay, as well as loose and medium dense silt and sand recorded throughout the depth of investigation. For the purposes of this report, all these materials have been assumed to be Aeolian Deposits.

6.1.3

Lewes Nodular Chalk Formation

Material interpreted as part of the Lewes Nodular Chalk Formation was encountered beneath the Aeolian Deposits, at 4.8m and 4.3m depth in boreholes WS3 and WS4 respectively and continuing to the full depth of investigation at 5.5m depth. The material was described as light greyish white chalk. The samples produced by continuous dynamic (windowless) sampler techniques only permit basic descriptions since the fabric of the rock is destroyed.

6.2

Groundwater

Groundwater was encountered at all exploratory locations at between 3m and 4.5m depth. However, the speed of drilling and the use of casing to support the bore may have masked any small inflows and impinged on the accuracy of the observations.

Subsequent monitoring of a standpipe installed to 5m depth in borehole WS4 recorded groundwater at between 1.7m and 2.1m depth.

7

Discussion

7.1

General

Made Ground was encountered on site and it is therefore possible that other pockets of Made Ground are also present; perhaps deeper, of different character or associated with the remains of underground construction; despite not having been detected by this investigation. All remains of underground obstructions should be removed prior to redevelopment to enable the new foundations to be constructed without hindrance and to perform satisfactorily.

The ground conditions revealed by the investigation comprised Made Ground overlying Aeolian Deposits with Chalk at depth. Spread foundations are not recommended due to the variable ground conditions at shallow depth and presence of relatively shallow groundwater. Therefore piled foundations are recommended, the design of which will require further investigation.

7.2

Ground floor slabs

Made Ground is prone to large and unpredictable amounts of settlement and therefore does not provide a suitable bearing stratum. Laboratory testing has confirmed high plasticity of the cohesive aeolian deposits below. Therefore they also do not have satisfactory load carrying properties, due to the close proximity of trees. As such, suspended construction should be employed to accommodate the expected movement of the cohesive aeolian deposits upon changes in moisture content or swelling of the soil associated with death or removal of trees. A void of 300mm thickness should be incorporated beneath the suspended slab in accordance with NHBC recommendations, assuming pre-cast concrete flooring.

7.3

Excavations

Made Ground is inherently variable in both composition and compaction and should thus be regarded as unstable and be fully supported at all times. The shallow, cohesive aeolian deposits, present to at least 1.2m depth, are expected to remain stable in vertical cut of moderate depth for short periods of time. Any excavation exceeding 1.2m depth or required to stay open over longer periods, should be supported at all times or battered to a safe angle of repose. This is especially important for the safety of personnel when required to work in or close to excavations. Particular care should be exercised where excavations are close to existing structures including highways to ensure they do not experience any loss of support. Temporary and permanent works should be designed to resist the additional lateral earth pressures arising from any superimposed loads in addition to those generated by the soil itself, without significant deformation.

Standpipe monitoring indicated groundwater levels between 1.7m and 2.1m depth and therefore shallow excavations are expected to remain suitably dry.

No attempt should be made to lower the general groundwater level, as the cone of depression will extend beyond the site boundary and may well induce excessive settlement in surrounding properties and other structures.

7.4

Contaminant analysis

7.4.1

Solid phase

Contaminant testing was undertaken on three soil samples and the results compared with the limited number of CLEA¹ Soil Guideline Values (SGVs) for residential land use that have been published to date. Where not available from that source, reference has also been made to the LQM/CIEH Suitable 4 Use Levels (S4ULs)², and the C4SL Levels³ for lead. Appropriate trigger levels are given with the results at Appendix D.

Analysis for metals/metalloids revealed sample WS2 at 0.4m depth to exceed residential C4SL trigger values for lead, with a recorded concentration of 349mg/kg. All other determinands were below residential land use triggers. Since WS2 is located within an area of proposed soft landscaping, some remediation will be necessary.

¹ *The Contaminated Land Exposure Assessment Model, Department for Environment, Food and Rural Affairs, The Environment Agency, R & D Publications SGV 1 et al., March 2002*

² *The LQM/CIEH S4ULs for Human Health Risk Assessment, Nathanail, P. et al., Land Quality Press, 2015*

³ *Category 4 Screening Levels for assessment of land affected by contamination, Department for Environmentt Food and rural affairs., 2012*

To address the issue of lead contamination on site, reference has been made to the guidance on cover systems for contaminated land issued by BRE Press⁴. Based on the laboratory results, it specifies that a minimum soil cover thickness of some 310mm is required to mitigate the risk from lead contamination, assuming a lead concentration of no more than 50mg/kg in imported soils. Alternatively it may be preferable to excavate and remove the contaminated soils, carry out validation testing on the sides and base of the excavation and replace with imported clean soil. Details of the assessment are provided at Appendix E. In areas of hardstanding or below building footprints, contaminants can remain in situ, as the pathway in a source-pathway-receptor model will be blocked. Some additional soil testing is therefore recommended in the soft landscaping area between WSI and WS2 to delineate the area requiring remediation.

Analysis for total monohydric phenols recorded very low total phenol concentrations of less than 5mg/kg.

Petroleum hydrocarbons (TPH) analysis recorded a maximum total TPH of 4.5mg/kg occurring in sample WSI at 0.3m depth. Of this 3.3mg/kg was recorded in species group C21-35, which is well below the exceedance value of 890 mg/kg for either aromatic or aliphatic compounds. Such low concentrations are not considered to be significant.

Speciated polycyclic aromatic hydrocarbons (PAH) testing showed no samples to exceed S4ULs for any PAH species.

Analysis for asbestos recorded no asbestos fibres in any of the samples.

⁴ *Cover Systems for Land Regeneration, Thickness of Cover Systems for Contaminated Land, BRE Press BR465 2008*

In view of the foregoing, it is recommended that appropriate health and safety precautions, such as detailed in HS(G)66⁵ and elsewhere, should be followed by the construction workforce and others who may come into contact with potentially contaminated soil. They should be agreed with the Health and Safety Executive and are likely to include, but not be restricted to, the following:-

- maintenance of good standards of personal hygiene;
- wearing personal protective clothing that is changed and cleaned frequently to eliminate skin contact;
- prevention of ingestion by using washing and changing facilities at all break times;
- prohibition of eating, drinking or smoking between break times; and
- controlling the spread of dust and airborne mists to prevent inhalation.

7.4.2

Waste Acceptance Criteria (WAC) analysis

One sample was subject to the WAC full solid waste suite and single-stage leachate. The results have been compared with the Landfill Waste Acceptance Criteria and are presented at Appendix D.

Within the solid waste suite, all results were within the Inert classification. Parameters determined on the compliance leaching test were also within the Inert classification.

The results should be forwarded to the receiving facility to ensure correct disposal method. All transfer notes should be retained.

⁵ *Protection of workers and the general public during the development of contaminated land HS(G)66 Health and Safety Executive, 1991*

7.5

Buried concrete

Laboratory tests on soil samples yielded a characteristic soluble sulphate concentration of 0.53g/l which results in a Design Sulphate Class⁶ of DS-2.

Standpipe readings confirm the groundwater to be mobile and all pH determinations were greater than 6.5. Therefore the Aggressive Chemical Environment for Concrete, ACEC, is classed as AC-2.

S E Hoggard
AP GEOTECHNICS LTD.
21st February 2018

This report has been prepared for the sole and specific use of Rocco Homes for the purpose of the proposed development at Tudor Cottage and should not be relied upon by any third party. Any other persons who use any information contained herein without the written permission of AP GEOTECHNICS LTD. do so at their own risk. The copyright to this report remains the property of AP GEOTECHNICS LTD.

⁶ Concrete in aggressive ground. BRE Special Digest 1. Building Research Establishment, 2005

PROCEDURAL NOTES for GROUND INVESTIGATIONS

General

This report is based upon data obtained from field descriptions of the strata and examination of the samples by an engineer, together with the results of in situ and laboratory tests as appropriate. Responsibility cannot be accepted for variations in ground conditions between and around any of the exploratory points that is not revealed by the data. Whilst the report may offer an opinion on the ground conditions between exploratory points and below the depth of investigation, this is for guidance only and no liability is accepted for its accuracy. Unless specifically included in the report, it should be assumed that no testing has been carried out in respect of asbestos or Japanese Knotweed and no liability is inferred or will be accepted.

Drilling procedure

Boring by light cable percussion drilling allows the ground conditions to be reasonably well established. However, a certain amount of disturbance is inevitable and some mixing of soils can occur.

Sampling procedure

"Undisturbed" samples of predominantly cohesive soils are taken with a 100mm diameter open tube sampler, generally in accordance with BS 5930: 1999.

Where appropriate, or where an undisturbed sample is unsuccessful, disturbed samples are recovered and sealed into polythene bags.

Groundwater samples are taken when water is encountered in sufficient quantity.

Standard penetration tests

The test is conducted generally in accordance with BS 1377: Part 9: 1990. The sampler tube is subject to a seating drive of 150mm into the soil at the base of the borehole. Results are given on the Borehole Records as the number of blows required to drive the sampler tube a further 300mm and this is known as the "N" value. Where the driving resistance is such that full penetration is not achieved, the test is generally terminated after 50 blows and the actual distance penetrated is recorded.

Groundwater

Groundwater observations necessarily reflect the conditions encountered at the time of the exploratory work. Long term monitoring of standpipes is usually required to establish an equilibrium water level since the normal rate of boring is too fast to permit steady state conditions to be achieved.

Groundwater levels are subject to variations caused by changes in drainage conditions and seasonal climatic changes.

Water may necessarily be added to advance the bore whilst casing may be required to maintain an open hole. These can both mask subsequent groundwater observations and are therefore noted on the individual Borehole Record.

APPENDICES

A Figures

Figure 1: Ground Investigation

Figure 2: Proposed Layout

Figure 3: SPT Profile

B Borehole Records

Symbols and Abbreviations

Borehole Records

C Standpipe Records

Water Levels

D Laboratory Test Results

Summary of Geotechnical Tests

Contaminants in Soil

Waste Acceptance Criteria (WAC)

E Cover System

APPENDIX A

FIGURES

Tudor Cottage,
125 Sea Road,
East Preston,
BN16 1NX

**Ground
Investigation**

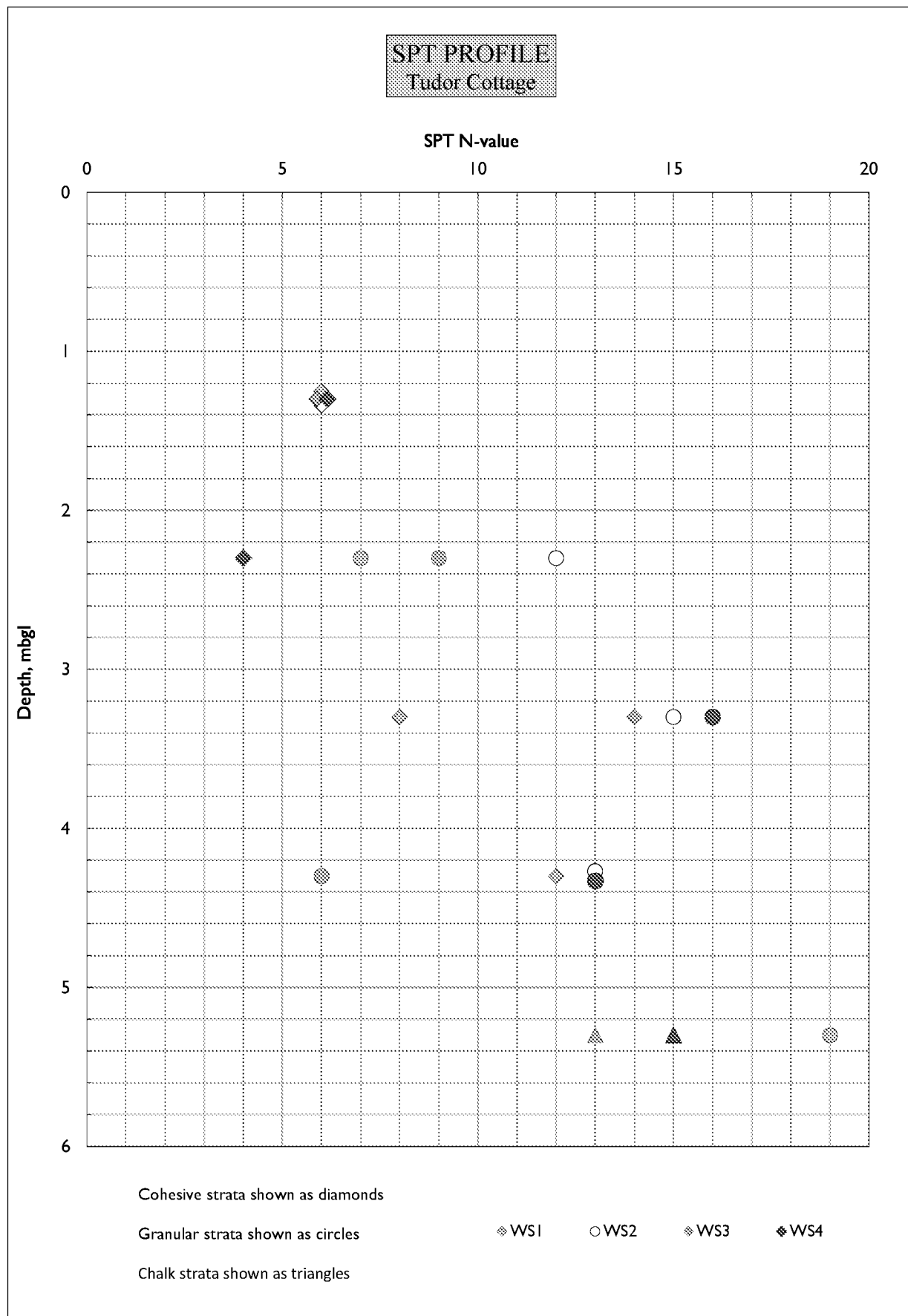


Figure 1

Proposed Layout



Figure 2



APPENDIX B

BOREHOLE RECORDS

SYMBOLS and ABBREVIATIONS

Samples

Undisturbed

U	Standard open drive "undisturbed" 102mm dia. in boreholes 38mm dia. in trial pits, window sampler and hand auger
T	Thin wall open drive
P	Piston
CBR	CBR mould
L	Windowless sampler liner

Disturbed

D	Small
B	Bulk
W	Water
C	Contaminants: plastic tub
J	Contaminants: brown glass jar

In situ tests

SPT	Standard Penetration Test, open shoe
CPT	solid cone
	N value is number of blows for 300mm penetration.
	Blow count also given as seating drive followed by four increments of 75mm.

V () Vane test (c_u kPa)

P () Hand penetrometer (c_u kg/cm²)

M () Mexe probe (CBR %)

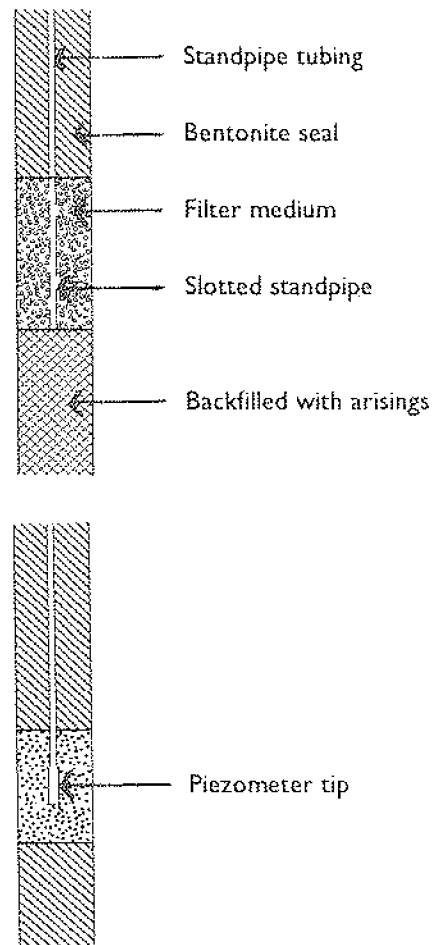
Water records

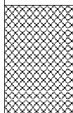
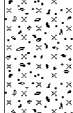
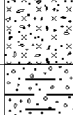
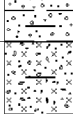
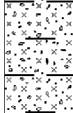
▼₂ Standing level

▼₂ Depth encountered

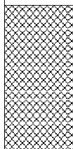
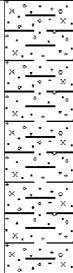
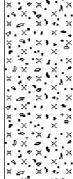
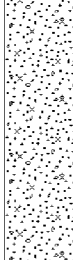
suffix identifies separate strikes

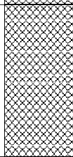
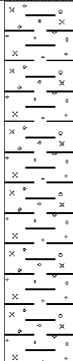
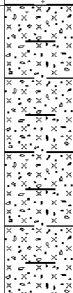
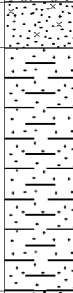
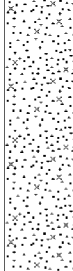
Standpipes

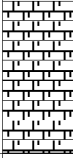


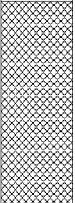
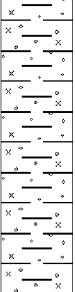
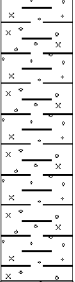
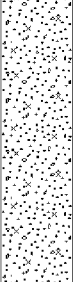
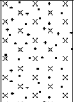
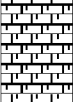
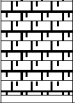
 AP GEOTECHNICS				T 01932 848460 F 01932 851255 E mail@apgeotechnics.co.uk		Site TUDOR COTTAGE, 125 SEA ROAD, EAST PRESTON, BN16 1NX		Number WS1	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Rocco Homes		Job Number 4706	
		Location See site plan		Dates 22/06/2017		Engineer		Sheet 1/2	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.00-1.00	L1		90% recovery			MADE GROUND: Tarmac over brown mottled red and grey silty sandy gravel of hardcore and brick			
0.30	D1				(0.40)				
					0.40 (0.10) 0.50	MADE GROUND: Dark brown silty sandy topsoil			
						Soft dark greyish brown silty slightly sandy CLAY			
					(0.80)				
1.00 1.00-1.45 1.00-2.00	D2 SPT(C) N=6 L2	NIL	60% recovery 1/1,2,1,2		1.30 (0.30) 1.60	Light greyish orange very sandy slightly gravelly calcareous SILT			
					(0.40)	No core recovery			
2.00-3.00 2.00-2.45	L3 SPT(C) N=7	NIL	100% recovery 3/1,2,2,2		2.00 (0.20) 2.20	Orangeish brown silty very sandy calcareous CLAY			
						Loose orangeish brown very sandy slightly gravelly calcareous SILT			
					(0.80)	...becoming gravelly			
						...becoming very gravelly			
3.00-4.00 3.00-3.45	L4 SPT(C) N=8	NIL	100% recovery 3/1,2,2,3		3.00 (0.30) 3.30	Soft orangeish brown very sandy slightly gravelly calcareous CLAY			
						Light orangeish brown clayey sandy slightly gravelly calcareous SILT			
					(0.70)	...becoming light grey			
4.00-5.00 4.00-4.45	L5 SPT(C) N=12	NIL	70% recovery 5/2,3,3,4		4.00 (0.30) 4.30	Firm orangeish brown silty slightly sandy slightly gravelly calcareous CLAY			
					(0.25)	Light grey slightly sandy slightly gravelly calcareous SILT			
			Water strike(1) at 4.50m.		4.55 (0.30) 4.85	Light brownish grey silty sandy flint calcareous GRAVEL			
			22/06/2017:2.20m			Medium dense brown mottled white very sandy gravelly calcareous SILT			
Remarks Strata depths approximate where recovery <100%								Scale (approx) 1:25	Logged By ljs
								Figure No. 4706.WS1	

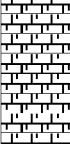
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Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Rocco Homes		Job Number 4706	
		Location See site plan		Dates 22/06/2017		Engineer		Sheet 2/2	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
5.00-5.45	SPT(C) N=19	4.45	6/4,4,5,6		(0.65) 5.50				
						Complete at 5.50m			
Remarks								Scale (approx)	Logged By
								1:25	ljs
								Figure No. 4706.WS1	

 AP GEOTECHNICS				T 01932 848460 F 01932 851255 E mail@apgeotechnics.co.uk		Site TUDOR COTTAGE, 125 SEA ROAD, EAST PRESTON, BN16 1NX		Number WS2	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Rocco Homes		Job Number 4706	
		Location See site plan		Dates 22/06/2017		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.00-1.00	L1	NIL	90% recovery			MADE GROUND: Grass over dark brown very silty slightly gravelly sand. Gravel is of brick, concrete and tarmac			
0.40	D1				0.50	Soft brownish grey mottled orange silty slightly sandy slightly gravelly CLAY			
0.80	D2				(0.90)				
1.00-2.00 1.00-1.45	L2 SPT(C) N=6		50% recovery 1/1,1,2,2		1.40	No core recovery			
1.50	D3	NIL			(0.50)				
2.00-3.00 2.00-2.45	L3 SPT(C) N=12		100% recovery 2/2,2,4,4		1.90 (0.10) 2.00	Orangeish brown very silty calcareous SAND			
					(0.70)	Medium dense orangeish brown very sandy slightly gravelly calcareous SILT			
					2.70 (0.25)	Grey sandy flint calcareous GRAVEL			
3.00-4.00 3.00-3.45	L4 SPT(C) N=15	3.00	100% recovery 6/3,4,4,4 Water strike(1) at 3.10m.		2.95	Medium dense orangeish brown silty slightly gravelly fine to medium calcareous SAND			▽1
					(0.90)				
					3.85	Medium dense grey calcareous SILT with some shell fragments			
4.00-4.45	SPT(C) N=13	3.37	22/06/2017:2.77m 5/2,3,4,4		(0.65)				
					4.50	Complete at 4.50m			
Remarks Strata depths approximate where recovery <100% Borehole collapsed back @ 3.30m								Scale (approx) 1:25	Logged By ljs
								Figure No. 4706.WS2	

 AP GEOTECHNICS				T 01932 848460 F 01932 851255 E mail@apgeotechnics.co.uk		Site TUDOR COTTAGE, 125 SEA ROAD, EAST PRESTON, BN16 1NX		Number WS3		
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Rocco Homes		Job Number 4706		
		Location See site plan		Dates 22/06/2017		Engineer		Sheet 1/2		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water	
0.00-1.00	L1	NIL	90% recovery		(0.30)	MADE GROUND: Grass over dark brown very sandy slightly gravelly silt				
					0.30	MADE GROUND: Brown mottled red and grey silty sandy gravel of brick, concrete and manmade waste				
0.60	D1				(0.50)	Soft greyish brown silty slightly gravelly CLAY with occasional calcareous nodules				
					0.80					
1.00-2.00 1.00-1.45	L2 SPT(C) N=6	NIL	80% recovery 2/1,1,2,2		(1.20)					
1.50	D2				2.00	Loose greyish orangeish brown mottled light grey clayey sandy slightly gravelly calcareous SILT				
					(0.95)					
					2.95					
3.00-4.00	L4	3.00	Water strike(1) at 3.00m. 100% recovery 7/3,3,4,4		(0.15)	Orangeish brown silty fine to medium calcareous SAND			▽1	
3.00-3.45	SPT(C) N=14				3.10	Firm brownish grey very sandy calcareous CLAY				
					(0.80)	...becoming sandy gravelly clay				
3.50	D3				3.90	...becoming dark brownish grey very sandy slightly gravelly clay				
4.00-5.00 4.00-4.45	L5 SPT(C) N=6	3.10	70% recovery 3/1,1,2,2		(0.90)	Loose light orangeish brown slightly silty fine to medium calcareous SAND				
					4.80	...becoming gravelly				
						...becoming very gravelly				
						Light greyish white CHALK				
Remarks Strata depths approximate where recovery <100% Borehole collapsed back @ 3.10m									Scale (approx) 1:25	Logged By ljs
									Figure No. 4706.WS3	

 AP GEOTECHNICS				T 01932 848460 F 01932 851255 E mail@apgeotechnics.co.uk		Site TUDOR COTTAGE, 125 SEA ROAD, EAST PRESTON, BN16 1NX		Number WS3	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Rocco Homes		Job Number 4706	
		Location See site plan		Dates 22/06/2017		Engineer		Sheet 2/2	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
5.00-5.45	SPT(C) N=13	3.10	5/3,3,4,3		(0.70) 5.50	Complete at 5.50m			
Remarks						Scale (approx) 1:25		Logged By ljs	
						Figure No. 4706.WS3			

 AP GEOTECHNICS T 01932 848460 F 01932 851255 E mail@apgeotechnics.co.uk				Site TUDOR COTTAGE, 125 SEA ROAD, EAST PRESTON, BN16 1NX				Number WS4	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Rocco Homes		Job Number 4706	
		Location See site plan		Dates 22/06/2017		Engineer		Sheet 1/2	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.00	L1		90% recovery			MADE GROUND: Grass over dark brown very sandy slightly gravelly silt			
0.50	D1				(0.70)				
1.00-1.45	D2 SPT(C) N=6				0.70	Soft brown mottled orange and grey silty slightly gravelly CLAY			
1.00-2.00	L2	NIL	100% recovery 2/1,1,2,2						
2.00-3.00	L3 SPT(C) N=4				(2.25)	...becoming very soft, greyish brown mottled black, slightly sandy slightly silty clay			
2.00-2.45		NIL	90% recovery 1/1,1,1,1			...becoming very sandy slightly gravelly and calcareous			
3.00-4.00	L4 SPT(C) N=16				2.95	Medium dense light orangeish brown silty very gravelly calcareous SAND			
3.00-3.45		NIL	90% recovery 4/3,4,4,5		(1.00)	...with some chalk gravel			
4.00-5.00	L5 SPT(C) N=13				3.95	Medium dense orangeish brown very sandy calcareous SILT			
4.00-4.45		NIL	90% recovery 7/3,3,4,3		(0.35)	White CHALK			
			Water strike(1) at 4.20m.		4.30				
					(1.20)				
Remarks Strata depths approximate where recovery <100%							Scale (approx) 1:25	Logged By ljs	Figure No. 4706.WS4

 AP GEOTECHNICS				T 01932 848460 F 01932 851255 E mail@apgeotechnics.co.uk		Site TUDOR COTTAGE, 125 SEA ROAD, EAST PRESTON, BN16 1NX		Number WS4	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Rocco Homes		Job Number 4706	
		Location See site plan		Dates 22/06/2017		Engineer		Sheet 2/2	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
5.00-5.45	SPT(C) N=15	4.30	6/3,4,4,4		(1.20) 5.50				
						Complete at 5.50m			
Remarks							Scale (approx) 1:25	Logged By ljs	
							Figure No. 4706.WS4		

APPENDIX C

STANDPIPE RECORDS

STANDPIPE RECORDS

WATER LEVELS

Project: Tudor Cottage, 125 Sea Road, East Preston, BN16 1NX
 Client: Rocco Homes

Project No: 4706
 Sheet No: 1/1

Location	WS4																	
Red. level																		
Date	Water level		Water level		Water level		Water level		Water level		Water level		Water level					
	m bgl	m OD	m bgl	m OD	m bgl	m OD	m bgl	m OD	m bgl	m OD	m bgl	m OD	m bgl	m OD				
3.7.17	2.10																	
13.7.17	1.73																	
5.9.17	2.02																	
26.9.17	1.83																	

Remarks

APPENDIX D

LABORATORY TEST RESULTS

SUMMARY OF GEOTECHNICAL TESTS

Project: Tudor Cottage, 125 Sea Road, East Preston, BN16 1NX
 Client: Rocco Homes

Project No: 4706
 Sheet No: 1/1

Location	Sample No	Depth m	Description	CLASSIFICATION							TRIAXIAL COMPRESSION - TOTAL STRESS							CHEMICAL		
				Natural Moisture Content	Liquid Limit	Plastic Limit	Plast. Index	Passing 425µm	Mod. Plast. Index	Class	Type	Moisture Content	Bulk Density	Radial Stress	Deviator Stress	Cohesion		Sulphate (SO4)		pH
				%	%	%	%	%	%			%	Mg/m³	kPa	kPa	cu, kPa assuming Øu = 0	cu, kPa Øu, deg	Water g/l	Soil (Sol) g/l	
WS1	D2	1.0	Dark greyish brown silty slightly sandy CLAY	29	67	25	42	100		CH										
WS2	D2	0.8	Brownish grey mottled orange silty slightly sandy slightly gravelly CLAY	20	36	19	17	100		CI								0.53	7.81	
WS3	D2	1.5	Greyish brown silty slightly gravelly CLAY w/ occasional calcareous nodules	20	42	23	19	100		CI										
WS3	D3	3.5	Brownish grey sandy gravelly calcareous CLAY	17	23	9	14	95	13	CL								0.49	7.61	
WS4	D2	1.0	Brown mottled orange and grey silty slightly gravelly CLAY	27	67	34	33	100		CH										

Note: Soil Classification based upon unmodified Plasticity Index

CONTAMINANTS IN SOIL

Project: Tudor Cottage, 125 Sea Road, East Preston, BN16 1NX
 Client: Rocco Homes

Project No: 4706
 Sheet No: 1/1

Location	Sample	Depth m	Arsenic	Cadmium	Chromium trivalent	Copper	Lead	Mercury inorganic	Nickel	Selenium	Zinc	Chromium hexavalent	Boron water sol.	Phenols tot. monohydric	Sulphate water sol.	TPH by GCMS							pH
																C8 - C10	C10 - C12	C12 - C16	C16 - C21	C21 - C35	C35 - C40	Total C8 - C40	
WS1	DI	0.3	11.5	< 0.5	22.4	31.6	104	< 0.5	17.0	< 1.0	89.7	< 0.8	< 0.5	< 5		< 1.0	< 1.0	< 1.0	< 1.0	3.3	1.2	4.5	
WS2	DI	0.4	16.2	0.6	27.8	44.6	349	< 0.5	24.4	< 1.0	289	< 0.8	0.7	< 5	0.02	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	8.0
WS3	DI	0.6	11.7	< 0.5	21.5	32.7	187	< 0.5	18.5	< 1.0	138	< 0.8	0.9	< 5		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
WS4	DI	0.5													0.03								8.1
S4UL ¹	residential ³		37	11	910	2400		40	180	250	3700	6	290	380									
	residential ^{3a}		40	85	910	7100		56	180	430	40000	6	11000	1200									
	commercial		640	190	8600	68000		1100	980	12000	730000	33	240000	1300									
CLEA ²	residential		32					170	130	350													
	commercial		640					3600	1800	13000													
C4SL	residential ¹						200																
	residential ^{3a}						300																
	commercial						2700																

Notes

- S4UL given at 6% soil organic matter
 - CLEA SGVs given at 6% soil organic matter
 - Residential with plant uptake
 - Residential without plant uptake
- © AP GEOTECHNICS LTD.

All units are mg/kg dry weight of soil unless otherwise stated, except for pH which is dimensionless

Exceptions denoted thus: Residential 
 Commercial 

CONTAMINANTS IN SOIL

Project: Tudor Cottage, 125 Sea Road, East Preston, BN16 1NX
 Client: Rocco Homes

Project No: 4706
 Sheet No: 1/1

Speciated Polyaromatic Hydrocarbons by GCMS																
Location Sample Depth, m	WS1	WS2	WS3										LQM/CI/EL S4UL ³			
	DI	DI	DI									residential ⁴	residential ⁵	allotments	commercial	
	0.3	0.4	0.6													
Determinand	Concentration, mg/kg															
PAH																
Naphthalene	<0.1	<0.1	<0.1									13	13	24	1100	
Acenaphthylene	<0.1	<0.1	<0.1									920	6000	160	100000	
Acenaphthene	<0.1	<0.1	<0.1									1100	6000	200	100000	
Fluorene	<0.1	<0.1	<0.1									860	4500	160	71000	
Phenanthrene	<0.1	<0.1	0.8									440	1500	90	23000	
Anthracene	<0.1	<0.1	0.2									11000	37000	2200	540000	
Fluoranthene	<0.1	<0.1	1.0									890	1600	290	23000	
Pyrene	0.1	<0.1	0.8									2000	3800	620	54000	
Benzo(a)anthracene	<0.1	<0.1	0.5									13	15	13	180	
Chrysene	0.2	0.1	0.6									27	32	19	350	
Benzo(b)fluoranthene	<0.1	<0.1	0.4									3.7	4.0	3.9	45	
Benzo(k)fluoranthene	0.2	0.1	0.5									100	110	130	1200	
Benzo(a)pyrene	<0.1	<0.1	0.4									3	3.2	3.5	36	
Indeno(123-cd)pyrene	0.1	0.1	0.4									41	46	39	510	
Dibenzo(ah)anthracene	<0.1	<0.1	0.2									0.3	0.32	0.43	3.6	
Benzo(ghi)perylene	<0.1	<0.1	0.4									350	360	640	4000	
Total PAH (16)	0.9	0.7	6.3													

Notes

- Total PAH = Sum of EPA16 identified components
 - The results are expressed as mg/kg dry weight soil after correction for moisture content
 - S4UL given at 6% soil organic matter
 - Residential with plant uptake
 - Residential without plant uptake
- © AP GEOTECHNICS LTD.

Exceptions denoted thus: Residential 
 Commercial 

CONTAMINANTS IN SOIL

Project: Tudor Cottage, 125 Sea Road, East Preston, BN16 1NX
Client: Rocco Homes

Project No: 4706
Sheet No: 1/1

Location	Sample	Depth m	Asbestos identification		
			Description of matrix	Overall percentage of asbestos identified (approx.)	Type of asbestos identified
WS1	DI	0.3	Brown soil, stones, concrete, clinker, brick		none detected
WS2	DI	0.4	Brown soil, stones, clinker		none detected
WS3	DI	0.6	Brown sandy soil, stones, clinker, brick, organics		none detected



2683

Results Summary

Report No.: 17-13199

WAC Analysis

Elab Ref:	106847				Landfill Waste Acceptance Criteria Limits		
Sample Date:	14/07/2017				Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:	WS4						
Depth (m)	0.5						
Site:	Tudor Cottage						
Determinand		Code	Units				
Total Organic Carbon		N	%	1.60	3	5	6
Loss on Ignition		M	%	2.3	--	--	10
Total BTEX		M	mg/kg	< 0.01	6	--	--
Total PCBs (7 congeners)		M	mg/kg	< 0.03	1	--	--
TPH Total WAC		M	mg/kg	9	500	--	--
Total (of 17) PAHs		N	mg/kg	4.0	100	--	--
pH		M		8.1	--	>6	--
Acid Neutralisation Capacity		N	mol/kg	< 0.1	--	To evaluate	To evaluate

Eluate Analysis

		10:1	10:1	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg		
		mg/l	mg/kg			
Arsenic	N	0.006	0.06	0.5	2	25
Barium	N	0.039	0.39	20	100	300
Cadmium	N	< 0.001	< 0.01	0.04	1	5
Chromium	N	< 0.005	< 0.05	0.5	10	70
Copper	N	0.009	0.09	2	50	100
Mercury	N	< 0.005	< 0.01	0.01	0.2	2
Molybdenum	N	< 0.005	< 0.05	0.5	10	30
Nickel	N	0.002	< 0.05	0.4	10	40
Lead	N	0.013	0.13	0.5	10	50
Antimony	N	0.006	0.06	0.06	0.7	5
Selenium	N	< 0.005	< 0.05	0.1	0.5	7
Zinc	N	0.011	0.11	4	50	200
Chloride	N	< 5	< 50	800	15000	25000
Fluoride	N	< 5	< 10	10	150	500
Sulphate	N	4	39.40	1000	20000	50000
Total Dissolved Solids	N	220	2200.00	4000	60000	100000
Phenol Index	N	< 0.01	< 0.10	1	-	-
Dissolved Organic Carbon	N	36.300	363.00	500	800	1000

Leach Test Information

pH	N	8.0				
Conductivity (uS/cm)	N	247				
Dry mass of test portion (g)		100.000				
Dry Matter (%)		88				
Moisture (%)		14				
Eluent Volume (ml)		962				

Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ELAB cannot be held responsible for any discrepancies with current legislation

APPENDIX E

COVER SYSTEM

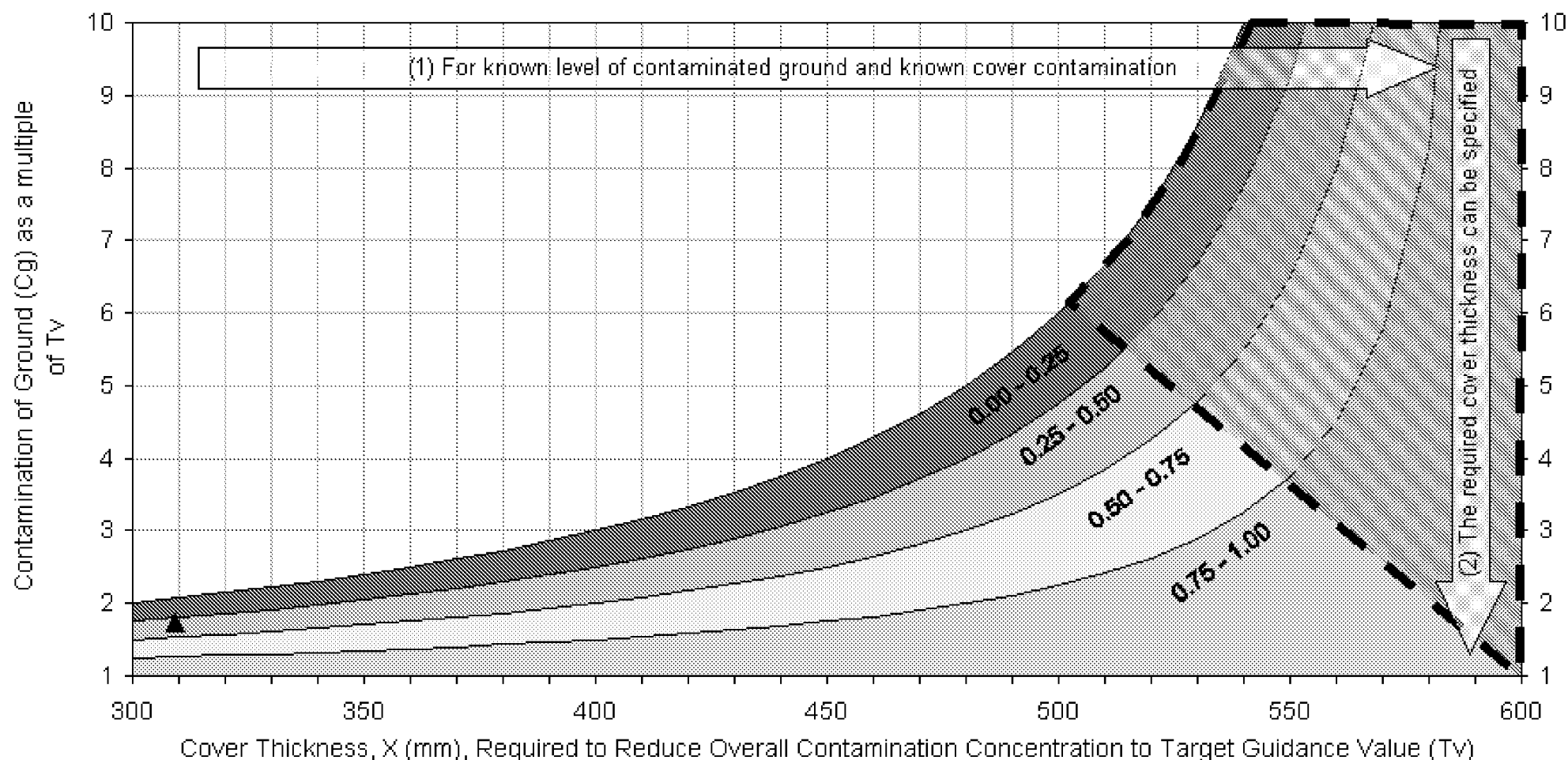
Calculations based on mixed zone (M)	600	mm
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[illegible]

Summary		
	Target Guideline Value 1	Target Guideline Value 2
Number of contaminants	17	17
Number of contaminants with no thickness calculation	16	17
Breakdown - Number for which no TV specified	16	17
Breakdown - Number for which no soil specified	16	16
Breakdown - Number for which no cover specified	16	16
Breakdown - Number for which cover > TV	0	0
Number of contaminants with thickness calculation	1	0
Breakdown - Number for which no cover required	0	0
Breakdown - Number for which cover required	1	0
Overall thickness of cover required	309	0

Design Chart

- $C_c = 0.00 - 0.25 \times \text{Trigger levels}$
 - ▨ $C_c = 0.25 - 0.50 \times \text{Trigger levels}$
 - ▩ $C_c = 0.50 - 0.75 \times \text{Trigger levels}$
 - ▧ $C_c = 0.75 - 1.00 \times \text{Trigger levels}$
 - ▲ Target Guideline Value 2
 - ▲ Target Guideline Value 1
- If site specific data falls in shaded area consideration should be given to the applicability of using a cover system



SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: TUDOR COTTAGE, 125A SEA ROAD, EAST PRESTON, BN16 1NX
 Client: Rocco Homes

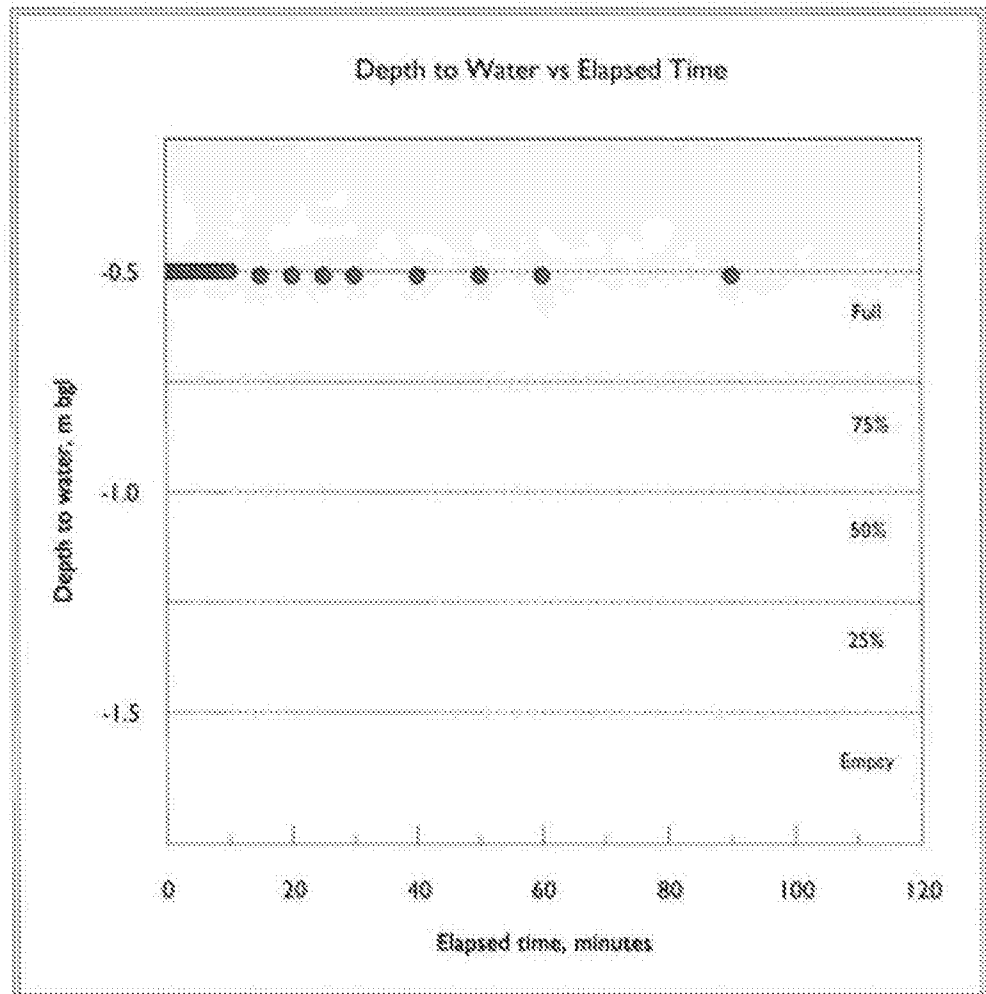
Project No: 4951
 Sheet No: 1/1

SA	1
Test No.	1
Depth, m	1.50
Length, m	2.00
Width, m	0.80

Description of stratum under test
Brown sandy CLAY

Depth in water prior to test, m below g.l.
pit dry

Elapsed Time min	Depth to Water m
0.0	0.500
1.0	0.500
2.0	0.500
3.0	0.500
4.0	0.500
5.0	0.500
6.0	0.500
7.0	0.500
8.0	0.500
9.0	0.500
10.0	0.500
15.0	0.510
20.0	0.510
25.0	0.510
30.0	0.510
40.0	0.510
50.0	0.510
60.0	0.510
90.0	0.510



$$f = (V75 - V25) / A50(T75 - T25)$$

$$V75 - V25 = 0.80 \text{ m}^3$$

$$A50 = 4.40 \text{ m}^2$$

$$T75 - T25 = \text{indeterminate min}$$

$$f = \text{indeterminate m/s}$$

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: TUDOR COTTAGE, 125A SEA ROAD, EAST PRESTON, BN16 1NX

Client: Rocco Homes

Project No: 4951

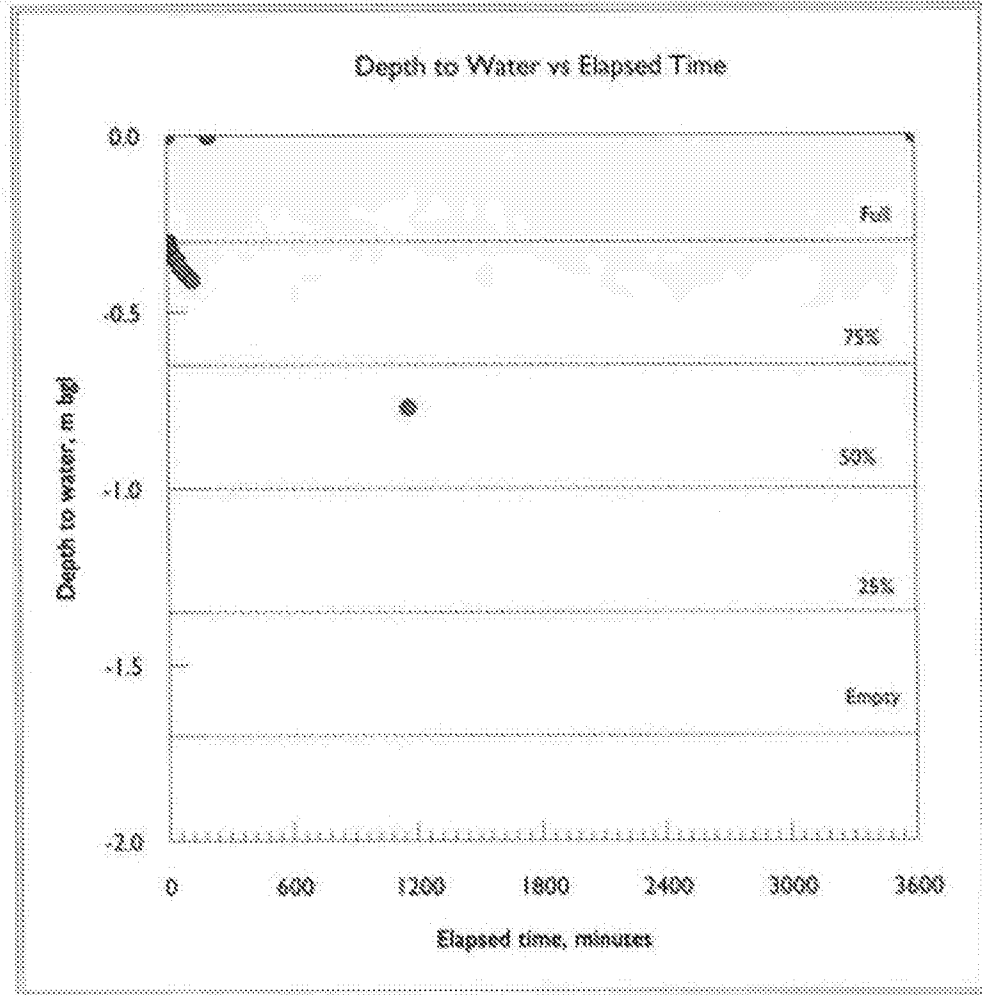
Sheet No: 1/3

SA	2
Test No.	1
Depth, m	1.70
Length, m	1.50
Width, m	0.80

Description of medium under test
Brown sandy clay with some flints

Depth to water prior to test, m below g.l.
pit dry

Elapsed Time min	Depth to Water m
0.0	0.300
1.0	0.300
2.0	0.300
3.0	0.300
4.0	0.300
5.0	0.300
6.0	0.300
7.0	0.300
8.0	0.300
9.0	0.310
10.0	0.310
15.0	0.320
20.0	0.330
25.0	0.330
30.0	0.340
40.0	0.350
50.0	0.350
60.0	0.370
90.0	0.390
120.0	0.410
1162.0	0.770



$$f = (V75 - V25) / A50(T75 - T25)$$

$$V75 - V25 = 0.84 \text{ m}^3$$

$$A50 = 4.42 \text{ m}^2$$

$$T75 - T25 = 3000 \text{ min extrapolated}$$

$$f = 1.06E-006 \text{ m/s extrapolated}$$

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: TUDOR COTTAGE, 125A SEA ROAD, EAST PRESTON, BN16 1NX

Client: Rocco Homes

Project No: 4951

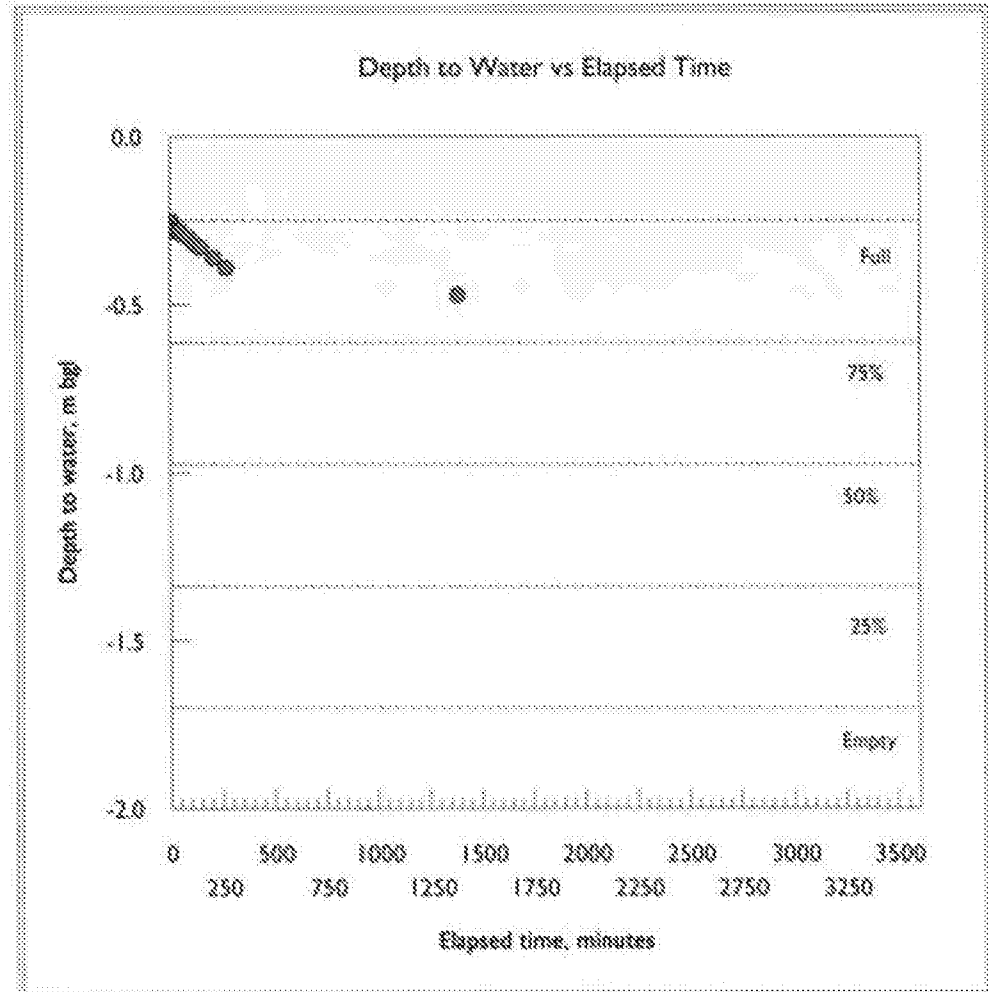
Sheet No: 2/3

SA	2
Test No.	2
Depth, m	1.70
Length, m	1.50
Width, m	0.80

Description of material under test
Brown sandy clay with some flints

Depth to water prior to test, as below g.l.
pit dry

Elapsed Time min	Depth to Water m
0.0	0.250
1.0	0.250
2.0	0.250
3.0	0.250
4.0	0.250
5.0	0.250
6.0	0.260
7.0	0.260
8.0	0.260
9.0	0.260
10.0	0.260
15.0	0.260
20.0	0.270
25.0	0.270
30.0	0.280
40.0	0.280
50.0	0.280
60.0	0.290
90.0	0.300
120.0	0.320
150.0	0.330
210.0	0.360
270.0	0.390
1385.0	0.470



$$f = (V75 - V25) / A50(T75 - T25)$$

$$V75 - V25 = 0.87 \text{ m}^3$$

$$A50 = 4.54 \text{ m}^2$$

$$T75 - T25 = \text{indeterminate min}$$

$$f = \text{indeterminate m/s}$$

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: TUDOR COTTAGE, 125A SEA ROAD, EAST PRESTON, BN16 1NX

Client: Rocco Homes

Project No: 4951

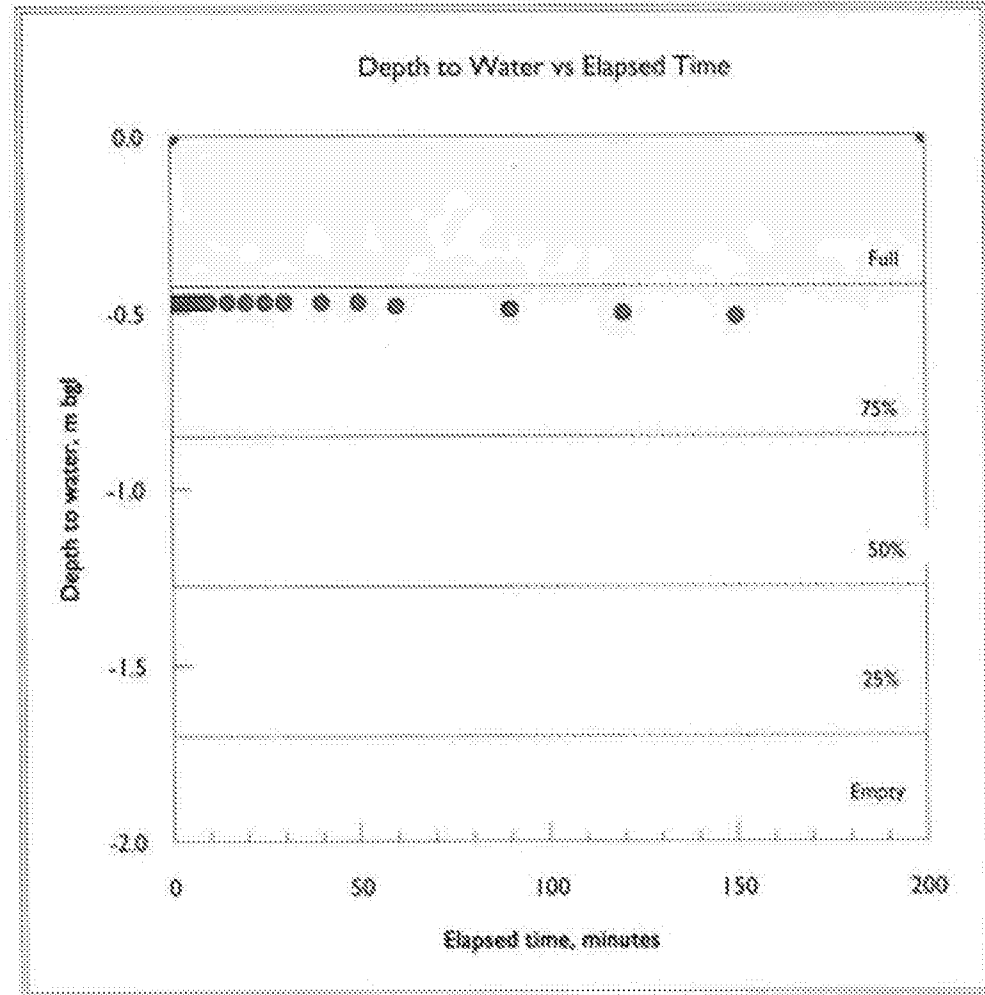
Sheet No: 3/3

SA	2
Test No.	3
Depth, m	1.70
Length, m	1.50
Width, m	0.80

Description of stratum under test
Brown sandy clay with some flints

Depth to water prior to test, m below g.l.
git dry

Elapsed Time min	Depth to Water m
0.0	
1.0	0.470
2.0	0.470
3.0	0.470
4.0	0.470
5.0	0.470
6.0	0.470
7.0	0.470
8.0	0.470
9.0	0.470
10.0	0.470
15.0	0.470
20.0	0.470
25.0	0.470
30.0	0.470
40.0	0.470
50.0	0.470
60.0	0.480
90.0	0.490
120.0	0.500
150.0	0.510



$$f = (V75 - V25) / A50(T75 - T25)$$

$$V75 - V25 = 1.02 \text{ m}^3$$

$$A50 = 5.11 \text{ m}^2$$

$$T75 - T25 = \text{indeterminate min}$$

$$f = \text{indeterminate m/s}$$

