

65-69 Holmes Road

Residential Development in Kentish Town 65-69 Holmes Road, London, NW5 3AN

Drainage Strategy Report

For Hallmark Property Group

06th April 2018

1980_RP_D_FRA_01



Rev	Date	Purpose/Status	Document Ref.	QA
0	15/12/17	For comment		RC/JD
A	06/04/18	For Information	1980 –RP_D_FRA_01	RC/JD

Disclaimer

This report is for the use of the client only and is not for the use of any other parties without the express permission of the client. All calculations and related quantified assumptions are indicative for planning purpose only, and are based solely on the available design proposals and must be reassessed during detailed design with the appropriate compliance methodology.



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Executive Summary

Vortex Ltd has been appointed by Hallmark Property Group to design the surface water drainage aspects of the proposed development at 65-69, Holmes Road, London, NW5 3AN.

The report outlines the strategy for the surface water drainage for the redeveloped site.

It is advised that a combination of Sustainable Drainage Systems (SUDS) is used to increase the time of concentration of the water before it enters the Thames Water combined sewer in Cathcart Street and reduce the impact upon the receiving sewer.

This can be achieved by using Green roofs, Stormwater storage tanks and orifice plates to restrict discharge rates.

This combination of SUDS and retention currently designed will reduce surface runoff for the 1 in 100 year storm return period + 30% climate change allowance to a rate of 34.2 l/s, runoff for the 1 in 30 year storm return period to a rate of 23.8 l/s and runoff for the 1 in 1 year storm return period to a rate of 4.7l/s. This is in line with, and a slight betterment, to the Pringuer-James sustainable drainage systems strategy report, reference L1405, dated July 2016.

Attenuation has been designed to assume the Green roofs to be saturated during the worst case 1 in 100 year storm event with a climate change allowance of 30%. The volume of attenuation has been calculated to be approx. 45.0 m^3 .



1.0 Existing Drainage

The total existing site area is 0.245Ha of which approximately 0.245Ha (100%) is existing impermeable surfacing which includes car parking, buildings and hard landscaping.

A topographical survey has identified that surface water sewers exist within the site boundaries and that they discharge to the Thames Water combined public sewer in Cathcart Street.

A copy of the topographical survey is shown in Appendix A.

The surface water sewer currently discharges from the site at an unrestricted rate, without attenuation.

The Microdrainage calculations of the existing flow rates are shown in Appendix B.

2.0 Proposed Drainage Strategy

Within the site it is proposed to collect surface water at high level and direct it to a Stormwater attenuation tank on the mezzanine floor via rainwater pipes.

The surface water network will include a complex flow control device, consisting of two 50mm and 100 mm diameter orifice plates. One at invert level to cater for the 1 in 1 year storm event and the other 0.9m above invert level to cater for the 1 in 30 and 1in 100 year storm events.

The Drainage Layout drawings are shown in Appendix C.

2.1 Surface Water Drainage

In accordance with Ciria 753, SUDS Manual, flooding is permitted above ground during the 1 in 100 year storm event and all water must be stored below ground during the 1 in 30 year storm event. However, in this instance due to the topography of the site all attenuation will be below external ground level for the 1 in 100 year storm to ensure that no surface water leaves the site without going through the proposed control manhole.

In accordance with the current Local Water Authority technical guidance a climate change allowance of 30% has been allowed within the surface water calculations for the development

Proposed surface water calculations are shown in Appendix D.

SUDS techniques will be included where local ground conditions permit. In conjunction with the surface water management requirements, consideration of green roofs, infiltration devices, and rainwater harvesting techniques will be made. These methods are further detailed in Section 5.

The flows at the outfall will require attenuation to comply with discharge consent limits. This is still to be agreed with Thames Water Utilities Itd under a Section 106 Sewer connection agreement.



2.1.1 Proposed Infrastructure

It is proposed that the surface water drainage system will take the form of a network of pipes transferring surface water within the building.

Surface water discharge will be restricted, and water will be attenuated within the Development Site boundaries.

2.1.2 Standards

The performance of the surface water drainage system will be designed to Sewers for Adoption 6th Edition. This requires the pipes to be sized so they can run full during a simulated 1 in 1 year storm of all durations, but there will be no surcharging within manholes. Additionally, the drainage system has to be tested to ensure there is no flooding as a result of a simulated 1 in 30% year storm of any duration. For storms in excess of this, the standard requires consideration of the route flood water will take to avoid ingress into properties. The latter has been achieved by the use stormwater tanks to attenuate the worst case 1 in 100 year storm event to prevent flooding.

In accordance with the Local Water Authority guidance a climate change allowance of 30% is to be used within the proposed surface water calculations.

The materials specification for the scheme will be in accordance with the Highways Agency Specification for Highway Works. For the purposes of the indicative design, the following material types have been assumed:

- Drainage pipes up to 300mm diameter Vitrified clayware, plastic pipes will be permitted subject to ground conditions.
- Pipes within the building footprint are to be cast iron.
- Drainage pipes over 300mm diameter Concrete
- Manholes and chambers Precast concrete with concrete surround or PPIC
- Gullies precast concrete
- Chamber covers Class D400 infill type in higher quality paved areas.
- Class D400 standard type in all other road / park areas
- Class C250 standard type in all footpath areas
- Pipe bedding Imported granular
- Pipe Trench backfill Selected as dug or imported material
- Manholes should be located at every change of alignment or gradient; at the head of all sewers; at the every junction of a public sewer

The drainage shall be designed utilizing the following criteria:

- Minimum flow velocity 1.0m/s for self-cleansing
- Standard pipe roughness "Ks" of 0.6.



3.0 Surface Water Flows

3.1 Existing and proposed site run-off flows

An extract from the Pringuer-James report is shown in Appendix B and a summary of flow rates are shown in table 1 below.

The existing and proposed flow calculations do not include a reduction in time of concentration or of impermeable areas and are treated as worst case scenario when the Green roofs are in a saturated condition.

A summary of the existing and proposed peak flows are detailed in Table 1 below and include the 40% climate change allowance for the worst case 1 in 100 year storm event.

Return Period	Qbar I/s	50%Qbar I/s	Proposed I/s
1 in 1 year	24.71	12.36	4.7
1 in 30 years	61.7	30.85	23.8
1 in 100 years	48.65	39.33	34.2

Table 1: Summary of Existing and Proposed Surface Water Flows

The existing surface water calculations are shown in Appendix B and the proposed surface water calculations are shown in Appendix D.



4.0 Stormwater Attenuation

It is proposed that Sustainable Urban Drainage Systems (SUDS) will be the primary consideration for surface water management. There are a number of different methods that may be used to provide sufficient attenuation of the surface water described in Section 5 below.

Attenuation should be positioned as close to the outfall as possible and would control the surface water discharge from the site. Implementation of one or all of the SUDS methods outlined in Section 5 of this report is highly recommended to reduce the requirement for below ground storage.

Existing Surface Water volume calculations shown in Appendix E indicate that 126.5m³ of surface water will be generated by the 6 hour 1 in 100 year storm event.

Surface Water calculations shown in Appendix F indicate that 164.4m3 of surface water will be generated by the 6 hour 1 in 100 year storm event including a 30% climate change allowance.

Return Period	Existing Volume Generated m ³
1 in 1 year	44.1
1 in 30 years	97.5
1 in 100 years	126.5
1 in 100 years +30%	164.4

A summary of the existing volumes is detailed in Table 2 below.

Table 2: Summary of Existing and Proposed Surface Water Volumes

The Microdrainage calculations in Appendix D shows that no flooding occurs during the worst case 1 in 100 year storm event with a 30% climate change allowance.

Therefore the proposed attenuation system is suitable for supporting the proposed development.



5.0 Sustainable Urban Drainage Systems (SUDS)

The objective of SUDS is to minimise the impacts of the development on the quantity and quality of site runoff and maximise amenity and biodiversity opportunities. Surface water SUDS will be designed and installed in accordance with NPPF and associated technical guidance March 2012 and associated CIRIA documents.

The mix of SUDS to be used is determined by the conditions on site, in this case a development with areas of external space which can be utilised for SUDS. The methodology of surface water control is to slow the entry of the surface water into the system, by using roof level brown roofs and porous paving that increases the time of concentration (time for water to flow through the system). Then retain the runoff, by using above ground storage and porous paving, which will release it into the Watercourse at an agreed rate to limit the impact of the development on drainage infrastructure and therefore reduce the potential for flooding.

5.1 Infiltration Devices

Infiltration devices drain water directly into the ground. Infiltration trenches and soakaways are more practicable for urban sites with limited space available. Infiltration devices can be integrated into and form part of the landscaped areas.

Infiltration trenches are completely below ground, and water should not occur on the surface.

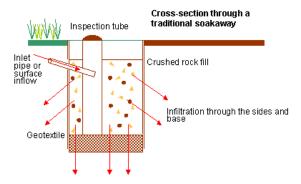


Figure 1 – Typical cross section through infiltration trench

Advantages – Reduces the volume of runoff, effective at pollutant removal, contributes to ground water recharge, simple and cost effective.

Disadvantages – Potentially high failure rates, comprehensive ground investigations required, offset from foundations (min. 5m away), risk of ground water pollution, reduced performance during prolonged wet periods.

Suitable for use – **No**, No Space for such devices and site subsoils are of clay content with poor infiltration properties.



5.2 Brown/Green Roofs

Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover/landscaping over a drainage layer. They are designed to intercept and retain precipitation, increasing the time of concentration and reducing the volume of runoff and attenuation peak flows. Green roofs can be anything from a thin growing layer of sedums and mosses to plants, shrubs and large trees.

These roofs vary in specification and can be designed to attract bird and invertebratespecies. Referring to CIRIA document C644, green and brown roofs also participate in
attenuatingrainwater.Thiswouldreduce the requirement for below ground storage attenuation on the site.

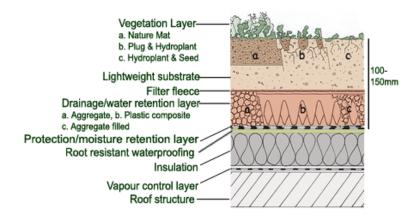


Figure 2 – Typical section through green roof build up

Advantages – Mimic greenfield state of building footprint, good removal of pollutants, ecological and amenity benefits, improve air quality, insulates building.

Disadvantages – Costs, increased structural loading, roof height, design, maintenance and exposure may preclude use.

Suitable for use – Yes, Green roofs are proposed.

1980- 65_69 Holmes Road Drainage Strategy report



5.3 Rainwater Harvesting

These tanks act as mini-storage chambers for surface water, reducing the extent of underground storage required. They provide a source of water for plant irrigation, washing machines and for flushing wc's

Harvested rainwater is stored below ground and pumped to provide a substitute for potable mains water reducing both the site discharge and water consumption.



Figure 4 – Rainwater Harvesting

Advantages – Provided source control of storm water runoff, reduces demand on mains water.

Disadvantages – Costs, Risk to public health, use dependant on demand requirements and seasonal rainfall characteristics, maintenance of pumps & control systems.

Suitable for use – No – not part of current proposal.



5.4 Porous Paving

Porous pavement is an alternative to conventional paving in which water permeates through the paved structure rather than draining off it. The surface water will be held in a reservoir structure (high void content sub-base) under the pavement for subsequent delayed discharge or infiltration into the sub-strata below.

The porous paving can be materials such as gravel, grasscrete, porous (no fines) concrete, concrete blocks or porous asphalt. Pollutant removal rates have been shown to be high, as the majority of the removal occurs as a result of the filtration of the water through the aggregate sub-base.

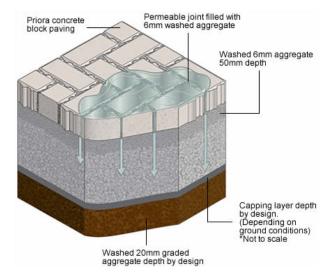


Figure 3 – Typical section through porous paving

Advantages – Effective in removing pollutants, lined systems can be used to avoid infiltration, reduces volume and rate of surface water runoff, suitable for high density developments. Mimics existing Greenfield conditions by filtering into the surrounding soft landscaped areas.

Disadvantages – Costs, used for low traffic volumes, low axel loads and speeds, risk of long term clogging due to poor maintenance.

Suitable for use – **No**. There is no space available for such construction due to the proposed basements.



5.5 Below Ground Attenuation

Attenuation involves the storing of surface water within pipework or underground tanks prior to controlled discharge into the public system. Attenuation tanks can also provide off line storage.

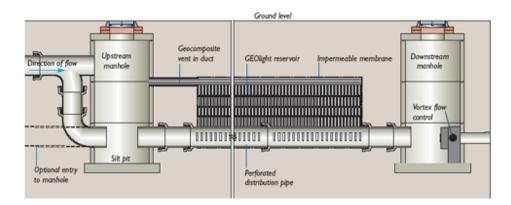


Figure 5 – Typical section through below ground attenuation chamber (cellular storage)

Advantages – Effective storage of surface water, can be used below trafficked areas, can be used below public open areas, minimum maintenance.

Disadvantages - No water quality treatment.

Suitable for use –. No, there is no space available

5.6 Wetlands

Wetlands provide both stormwater attenuation and treatment. They comprise shallowponds and marshy areas, covered in aquatic vegetation. Wetlands provide settlement of sediment and remove contaminants.

Advantages – Effective storage of surface water, good pollutant removal, ecological and amenity benefits.

Disadvantages – Requires large surface area. Health & Safety issues associated with large bodies of water.

Suitable for use – No, there is no space available.



5.7 Swales

Swales are vegetated drainage structures up to 500mm deep and used to provide flow control through attenuation. They can be used for infiltration, where possible.

Advantages – Can be incorporated into landscaping, good removal of contaminants, reduces discharge rates. Low costs.

Disadvantages – Requires large surface area. Limits extent of trees used in landscaping. Health & Safety issues associated with large bodies of water following heavy rainfall.

Suitable for use – No, there is no space available.

5.8 Ponds/Rain gardens

Ponds or rain gardens are irregular shaped vegetated drainage structures used to provide flow control through attenuation. They can be used for infiltration, where possible.

Advantages – Can be incorporated into landscaping, good removal of contaminants, reduces discharge rates. Low costs.

Disadvantages – Requires large surface area. Limits extent of trees used in landscaping. Health & Safety issues associated with large bodies of water following heavy rainfall.

Suitable for use – No, there is no space available.

6.0 Proposed SUDS Strategy

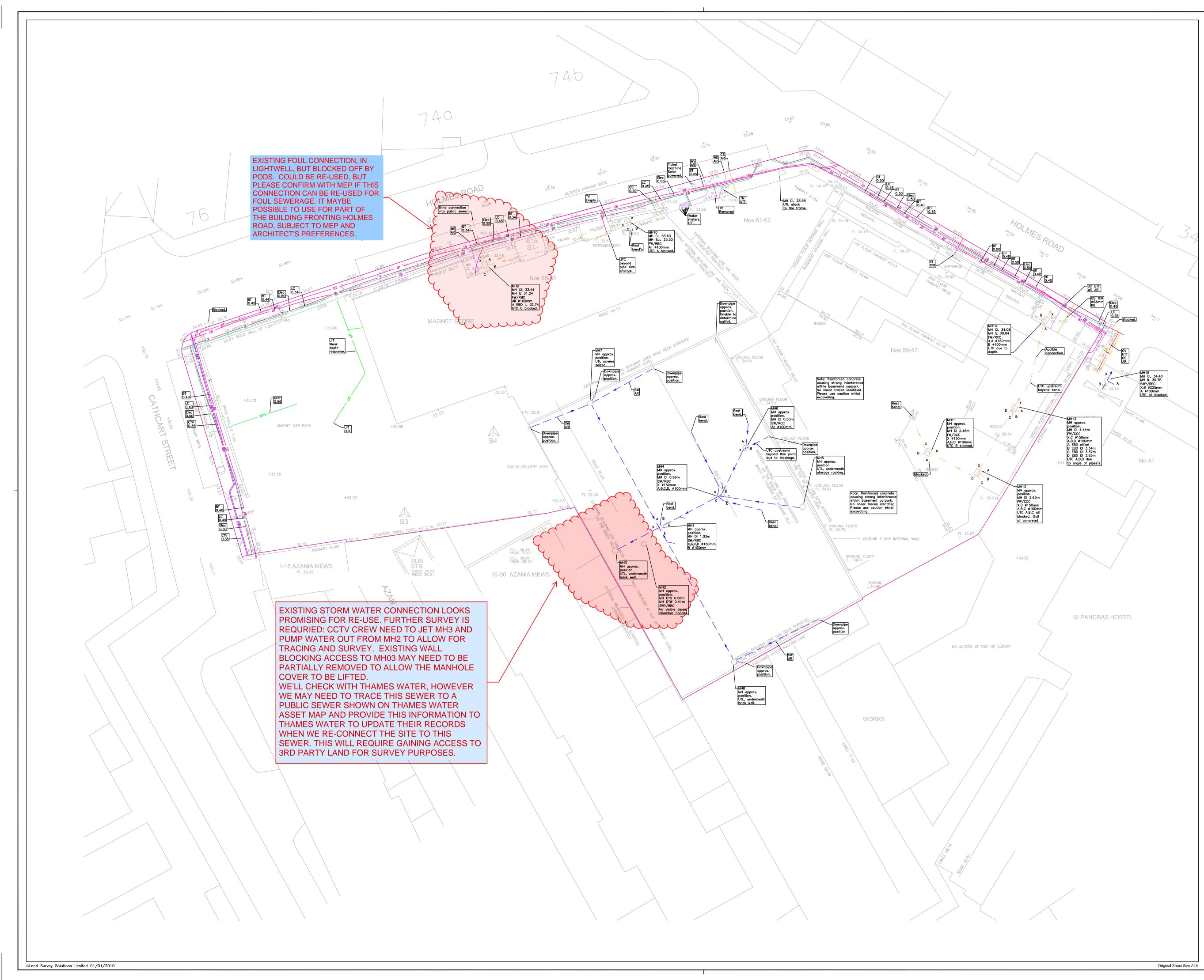
The proposed surface water drainage system for the development will incorporate 45m³ Stormwater storage tanks for attenuation and flows will be restricted to a maximum of 34.2l/s for the worst case 1 in 100 year storm event +30% climate change allowance.

Green roofs are proposed and will be designed by a specialist company. They will be designed to capture the first 5mm of rainfall so that it can be retained for plant use as well as evaporation. Green roofs, by nature, provide primary treatment and improve biodiversity. Benefit to the community will be dependent upon the type of roof and planting proposed.



Appendix A

Topographical Survey



UTILITIES & UNDERGROUND INVESTIGATIONS

ABB	REVIATIONS & SYN	IBOLS			
1D 5C	1 Duct 5 Cables	CPC	Circ Plastic Chamber	EOT	End Of Trace
Ø	Diameter	CrL	Crown Level	BD	Internal Backdrop
AR	Assumed Route	DCr	Depth To Crown	IL	nvert Level
BL	Base Level	D	Depth To Invert	RBC	Rectangular Brick Chamber
СВ	Concrete Benching	DS	Depth To Silt	RCC	Rectangular Conc Chamber
CBC	Circular Brick Chamber	DTB	Depth To Base	SL	Silt Level
CCC	Circular Conc Chamber	DTW	Depth To Water	TFR	Taken From Records
CL	Cover Level	EBD	External Backdrop	UTC	Unable To CCTV
	— вт — ВТ СА	BLE(S)		UTL	Unable To Lift
	- 0/BT OVER	HEAD BT	CABLE(S)	UTT	Unable To Trace
			ONS CABLE(S)	011	Chaple to these
	CABLE				
		RIC CAE			
			ECTRIC CABLE(S)		
	FIBRE		ABLE(S)		
		ERVICE			
			ETRATING RADAR (GPR		
		VATER P		() TRACE	-
		ING CIRC			
		RITY CAE			
		NTIFIED		48.93	UTILITIES COMMENT BOX
	WM WATE	R MAIN		M 0.61	DEPTH TO SERVICE
		R SERVI		VI 0.6 I	DEP III TO SERVICE
		INED SE	WER		
		SEWER			
		3 MAIN			
	SURF	ACE WAT	FER SEWER		

DRAWING NOTES

All below ground details shown have been identified from above ground without excavation. Survey Solution use electro-magnetic and/or ground penetrating radar (GPR) methods to investigate for underground utilities, services and features. Results using these methods are not infallible and we recommend trial excavations are carried out to confirm any identifications, positions and depths.

UTILITIES INVESTIGATION EXTENTS

Any areas on the drawing where services or features have not been shown are not necessarily clear of services or features but are an indication that no items have been identified during our investigations. All reasonable care and normal good practice should still be employed during design and construction processes.

Certain types of services such as plastic or concrete pipes, some conduit and ducting where direct access can not be achieved for tracing may not be shown and alternative locating methods should be used.

Survey Solutions has used all reasonable care to research available service records but the completeness or use of the service records supplied to or by Survey Solutions cannot be guaranteed. Therefore Survey Solutions cannot be held responsible for any features annotated as 'taken from records' (TFR).

Depths obtained using electro-magnetic or GPR are effected by ground conditions and should be treated as indicative only. Electro-magnetic depths to utilities and services are generally taken to the centre of a feature, GPR depths to the top of a feature and drainage depth shown to inverts, unless otherwise indicated.

Drainage pipe sizes will be obtained without entering the camber and therefore should be treated as approximate. Pipe dimensions which have not been obtained visually will be taken from records when available.

All services, drainage and utilities routes are assumed straight between access points, unless otherwise stated. The numbers of cables in runs will not be shown unless specifically requested. All services are below ground unless indicated.

Services, utilities and features may not have been surveyed if obstructed or not reasonably visible or accessible at the time of survey.

Survey Solutions accept no responsibility for the completeness or accuracy of either the topographical survey or base mapping on this project.

All critical dimensions and measurements should be checked and verified with any errors or discrepancies notified to Survey Solutions immediately. The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work.

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AVAILABILITY OF UTILITY RECORD DRAWINGS					
UTILITY	AVAILABILITY	UTILITY	AVAILABILITY	UTILITY	AVAILABILITY
SEWER WATER MAIN GAS MAIN	NO NO PUBLIC	BT CABLE TV ELECTRICITY	PUBLIC NO NO	OIL PIPES OTHERS	NO NO

REV DESCRIPTION		DRAWN	APPR	DATE
		Diotini		Ditte
	SUR SOLU eovil Norwich Perth Nor	ttinghar	n Brentv	vood
Tel No: 0845 0405 969		Fax No	: 0845 04	05 970

www.survey-solutions.co.uk enquiries@survey-solutions.co.uk
LAND SURVEYING BUILDING SURVEYING UNDERGROUND SURVEYING

PROJECT TITLE 65-69 HOLMES ROAD LONDON, NW5 3AN				
DRAWING DETAIL UTILITIES AND CCTV DRAINAGE INVESTIGATION SHEET 1 OF 1				
CLIENT CONTEMPORARY DESIGN SOLUTIO			ONS LLP	SCALE 1:200
SURVEYORSURVEY DATECHECKED BYSRF/PI13/07/2016LMP			APPROVED BY RAG	DWG STATUS FINAL
DRAWING NUMBER 18004UG-01			REVISION	ISSUE DATE



Appendix B

Pre-development surface water calculations



Calculated by:	Ray Clark
Site name:	65-69 Holmes Road
Site location:	65-69 Holmes Road

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Site coordinates

Latitude:	51.54942° N
Longitude:	0.14485° W
Reference:	6200902
Date:	2017-12-15T11:10:48

Methodology	IH12	4			
Site characteristics					
Total site area (ha)			0.245		
Methodology					
Qbar estimation metho	bc	Calculate fr	om SPR a	nd SAAR	
SPR estimation metho	bd	Calculate from	Calculate from SOIL type		
			Default	Edited	
SOIL type			4	4	
HOST class					
SPR/SPRHOST			0.47	0.47	
Hydrological charact	eristic	s	Default	Edited	
SAAR (mm)			641	641	
Hydrological region			6	6	
Growth curve factor: 1 year			0.85	0.85	
Growth curve factor: 30 year			2.3	2.3	
Growth curve factor: 1	00 ye	ar	3.19	3.19	

Notes:

(1) Is Q_{BAR} < 2.0 l/s/ha?

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consents are usually set at 5.0l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements (3) Is SPR/SPRHOST \leq 0.3?

Greenfield runoff rates L Default Edited Qbar (l/s) 1.07 1.07 1 in 1 year (l/s) 0.91 0.91 1 in 30 years (l/s) 2.45 2.45 1 1 in 100 years (l/s) 3.4 3.4 1

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at http://uksuds.com/terms-and-conditions.htm. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for use of this data in the design or operational characteristics of any drainage scheme.

RCD	Page 1
9 Birchtree Way	EXISTING FLOWS
Maidstone	65-69 HOLMES ROAD
Kent ME15 7RP	LONDON
Date 15/12/2017 10:26	Designed by RAC
File 1158-1003 EXISTING FLOW	Checked by Drainage
Micro Drainage	Network 2016.1.1
STORM SEWER DESIGN	by the Modified Rational Method
Design	Criteria for Storm
Pipe Sizes STA	NDARD Manhole Sizes STANDARD
FSR Rainfall	Model - England and Wales
Return Period (years) M5-60 (mm)	100 PIMP (%) 100 20.600 Add Flow / Climate Change (%) 0
	20.600Add Flow / Climate Change (%)00.436Minimum Backdrop Height (m)0.200
Maximum Rainfall (mm/hr)	50 Maximum Backdrop Height (m) 1.500
Maximum Time of Concentration (mins) Foul Sewage (l/s/ha)	30 Min Design Depth for Optimisation (m) 1.200 0.000 Min Vel for Auto Design only (m/s) 1.00
Volumetric Runoff Coeff.	
Designe	ed with Level Soffits
<u>Time Are</u>	ea Diagram for Storm
	Area Time Area (ha) (mins) (ha)
0-4	0.189 4-8 0.056
Total Area	Contributing (ha) = 0.245
Total Pi	pe Volume (m³) = 5.655
<u>Network D</u>	esign Table for Storm
PN Length Fall Slope I.Area T.H	
(m) (m) (1:X) (ha) (mir	ns) Flow (l/s) (mm) SECT (mm) Design
	.00 0.0 0.600 o 300 Pipe/Conduit 🔒
	.00 0.0 0.600 o 300 Pipe/Conduit 💣
	.00 0.0 0.600 o 300 Pipe/Conduit 💣 .00 0.0 0.600 o 300 Pipe/Conduit 💣
	•
Netwo	ork Results Table
PN Rain T.C. US/IL Σ I.A	_
(mm/hr) (mins) (m) (ha	
	065 0.0 0.0 0.0 1.11 78.3 8.8
	125 0.0 0.0 0.0 1.11 78.3 16.9 185 0.0 0.0 0.0 1.11 78.3 25.1
	245 0.0 0.0 0.0 1.11 78.3 33.2
	2016 XP Solutions

RCD		Page 2
9 Birchtree Way	EXISTING FLOWS	
Maidstone	65-69 HOLMES ROAD	<u> </u>
Kent ME15 7RP	LONDON	Micco
Date 15/12/2017 10:26	Designed by RAC	
File 1158-1003 EXISTING FLOW	Checked by	Digitigh
Micro Drainage	Network 2016.1.1	1

Free Flowing Outfall Details for Storm

Outfall	Outfall	c.	Level	I.	Level		Min	D,L	W
Pipe Number	Name		(m)		(m)	Ι.	Level (m)	(mm)	(mm)
							• •		

1.003 EX 23.000 21.600 21.600 1200 0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Storm Duration (mins)	30
Ratio R	0.436		

RCD			Page 3
9 Birchtree Way		EXISTING FLOWS	
Maidstone		65-69 HOLMES ROAD	4
Kent ME15 7RP		LONDON	Micco
Date 15/12/2017	10:26	Designed by RAC	
File 1158-1003	EXISTING FLOW	. Checked by	Drainage
Micro Drainage		Network 2016.1.1	
<u>Summary c</u>	of Critical Resu	lts by Maximum Level (H	Rank 1) for Storm
Ho Manhole Head Foul Sewage	al Reduction Factor Hot Start (mins) ot Start Level (mm) loss Coeff (Global) e per hectare (l/s)	0.500 Flow per Person per	10m³/ha Storage 2.000 let Coeffiecient 0.800 Day (l/per/day) 0.000
		ntrols 0 Number of Time/Are ntrols 0 Number of Real Tim	2
	Rainfall Model	<u>hetic Rainfall Details</u> FSR Ratio ngland and Wales Cv (Summer 20.700 Cv (Winter) 0.750
Margir		rning (mm) s Timestep 2.5 Second Incre DTS Status DVD Status tia Status	450.0 ement (Extended) ON OFF OFF
Return H	Profile(s) mration(s) (mins) Period(s) (years) limate Change (%)	15, 30, 60, 120, 180, 24 720, 960, 1440, 2160,	
			Water
US/MH PN Name		mate First (X) First (Y) Fi ange Surcharge Flood O	
1.001 2 15 1.002 3 15	Winter 1 Winter 1 Winter 1 Winter 1	+0% +0% +0% +0%	22.075 22.002 21.924 21.843
	· -	olume Flow / Overflow Flow	
1.000 1.001 1.002 1.003	2 -0.198 3 -0.176	0.000 0.14 9.5 0.000 0.25 17.0 0.000 0.35 24.1 0.000 0.46 31.2) OK L OK
	©198	2-2016 XP Solutions	

RCD										Pa	ge 1		
9 Birchtr	cee Way			EX	ISTING E	LOWS							
Maidstone	9			65	-69 HOLM	ES ROA	D			4			
Kent ME1	.5 7RP			LO	NDON						lice		
Date 15/1	Date 15/12/2017 10:59 Designed by RAC												
File 1158	File 1158-1003 EXISTING FLOW Checked by												
Micro Dra					twork 20								
STORM SEWER DESIGN by the Modified Rational Method													
	Design Criteria for Storm												
Pipe Sizes STANDARD Manhole Sizes STANDARD													
					del - Eng	Land and	Wales	3					
	Reti	ırn Pe	eriod (ye	ars) (mm) 20.	100	المأم 7	Flore /	C1.	mata a	PIMP			
				(mm) 20. io R 0.		Add : Mii				2	(%) 0 (m) 0.200		
			fall (mm	/hr)	50	Ma	ximum	Backo	drop H	eight	(m) 1.500		
Maximum I	ime of Cor												
			age (l/s Runoff Co			n Vel fo Min Slop							
						-	-	. <u>1</u> . 0.		· - ·			
			De	signed v	with Level	Soffit	S						
			<u>Time</u>	e Area	Diagram	for St	orm						
				Time A mins) (i	rea Time ha) (mins	Area) (ha)							
			· ·										
				0-4 0.	.189 4-	8 0.056							
			Total 2	Area Con	tributing	(ha) =	0.245						
			Tota	al Pipe	Volume (m	³) = 5.6	55						
						,							
			<u>Netwo</u>	rk Desi	.gn Table	e for S	<u>storm</u>						
	ngth Fall				Base	k	HYD			lon Typ			
	(m) (m)	(1:X	i) (ha)	(mins)	Flow (1/s) (mm)	SECT	(mm)			Design		
1.000 20	.000 0.100	200.	0 0.065	5.00	0.	0 0.600	0	300	Pipe/	'Condui	t 🔒		
	.000 0.100					0 0.600			-	(Condui	t 💣		
	.000 0.100					0 0.600				'Condui 'Condui			
1.005 20	.000 0.100	200.	0 0.000	0.00	0.	0 0.000	0	500	ттрел	CONGUL	t 💣		
			N	letwork	Results	Table							
PN		T.C. mins)	US/IL X (m)	E I.Area (ha)	Σ Base Flow (1/		Add (1/		Vel (m/s)	Cap (1/s)	Flow (l/s)		
1.000	50.00	5.30	22.000	0.065	0	.0 0.0)	0.0	1.11	78.3	8.8		
1.001	50.00	5.60	21.900	0.125	0	.0 0.0		0.0					
1.002	50.00		21.800	0.185		.0 0.0		0.0			25.1		
1.003	50.00	6.20	21.700	0.245	0	.0 0.0	J	0.0	1.11	78.3	33.2		
			©1	982-20	16 XP So	lution	S						
L													

RCD		Page 2
9 Birchtree Way	EXISTING FLOWS	
Maidstone	65-69 HOLMES ROAD	<u> </u>
Kent ME15 7RP	LONDON	Micco
Date 15/12/2017 10:59	Designed by RAC	
File 1158-1003 EXISTING FLOW	Checked by	Diamaye
Micro Drainage	Network 2016.1.1	1

Free Flowing Outfall Details for Storm

Outfall	Outfall	c.	Level	I.	Level		Min	D,L	W
Pipe Number	Name		(m)		(m)	Ι.	Level (m)	(mm)	(mm)
							• •		

1.003 EX 23.000 21.600 21.600 1200 0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Storm Duration (mins)	30
Ratio R	0.436		

RCD		Page 3											
9 Birchtree Way	EXISTING FLOWS												
Maidstone	65-69 HOLMES ROAD	4											
Kent ME15 7RP	LONDON	Micco											
Date 15/12/2017 10:59	Designed by RAC	– Micro Drainage											
File 1158-1003 EXISTING FLOW.	File 1158-1003 EXISTING FLOW Checked by												
Micro Drainage Network 2016.1.1													
- Areal Reduction Fact	Sults by Maximum Level (Rank 1) for Simulation Criteria or 1.000 Additional Flow - % of Total Fl s) 0 MADD Factor * 10m³/ha Stora m) 0 Inlet Coeffiecie	.ow 0.000 age 2.000											
Manhole Headloss Coeff (Globa Foul Sewage per hectare (l/ Number of Input Hydr Number of Online (l) 0.500 Flow per Person per Day (l/per/da												
<u>Sy</u> Rainfall Model	nthetic Rainfall Details FSR Ratio R 0.436												
Region M5-60 (mm)	England and Wales Cv (Summer) 0.750 20.700 Cv (Winter) 0.840												
-	DTS Status DVD Status												
Profile(s) Duration(s) (mins) Return Period(s) (years) Climate Change (%)	Summer and Win 15, 30, 60, 120, 180, 240, 360, 480, 9 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10	600, 760,											
US/MH Return Cli PN Name Storm Period Cha		Water rflow Level ct. (m)											
1.000115Winter301.001215Winter301.002315Winter301.003415Winter30	+0% +0% +0% 30/15 Winter +0% 30/15 Summer	22.171 22.148 22.105 22.025											
Surcharged Flo	ooded Pipe												
_		evel											
PN Name (m) (m ³) Cap. (l/s) (l/s) Status Exc	ceeded											
1.000 1 -0.129 ().000 0.33 22.4 ОК												
	0.000 0.61 41.4 OK												
	0.000 0.88 60.4 SURCHARGED												
1.003 4 0.025 (0.000 1.16 79.3 SURCHARGED												

RCD												Pa	ge 1
9 Birch	tree 1	Way			EX	ISTIN	IG FL	OWS					
Maidsto	ne	-			65	5-69 H	IOLME	s roai	D			4	
Kent M	E15 71	RP			LC	NDON							- m
Date 15	Date 15/12/2017 10:16 Designed by RAC												
	File 1158-1003 EXISTING FLOW Checked by												rainage
	Micro Drainage Network 2016.1.1												
STORM SEWER DESIGN by the Modified Rational Method													
				Des	ign Cr	iteri	a foi	<u>s Stor</u>	<u>rm</u>				
Pipe Sizes STANDARD Manhole Sizes STANDARD													
FSR Rainfall Model - England and Wales													
		Retu	rn Pe	riod (ye	ars) (mm) 20	100		- ה- _א		014-	ate C	PIMP (nange (
					(mm) 20 io R 0							2	*) 0.200
				fall (mm	/hr)	50		Max	ximum	Backo	drop He	eight (m) 1.500
Maximum	n Time			ation (m age (l/s								ation (nly (m/	m) 1.200 s) 1.00
	V			unoff Co								ion (1:	
								-		-			
				De	signed	with Le	evel S	offits	5				
				<u>Time</u>	e Area	Diagr	<u>am fo</u>	or Sto	orm				
					Time A mins) (-	Area (ha)					
					0-4 0	.189	4-8	0.056					
						1							
				Total i	Area Con	itribut	ing (ha) = (0.245				
				Tota	al Pipe	Volume	e (m³)	= 5.6	55				
				<u>Netwo</u> :	rk Desi	ign Ta	able	for S	torm				
PN :				e I.Area		Ba		k	HYD		Secti	on Typ	
	(m)	(m)	(1:X) (ha)	(mins)	Flow	(1/s)	(mm)	SECT	(mm)			Design
1.000	20.000	0.100	200.	0 0.065	5.00		0.0	0.600	0		-	Condui	
1.001								0.600	0			Condui	t 💣
1.002								0.600	0		-	'Condui 'Condui	
1.000	20.000	0.100	2001	0.000	0.00		0.0		Ũ	000	1100	0011002	- U
				N	letwork	Resu	lts :	<u>[able</u>					
PN			.c.	US/IL X			ase		Add			Cap	Flow
	(mm/	hr) (n	ins)	(m)	(ha)	Flow	(l/s)	(l/s)	(1,	s)	(m/s)	(l/s)	(1/s)
1.00		.00		22.000	0.065		0.0	0.0		0.0		78.3	8.8
1.00		.00		21.900	0.125		0.0	0.0		0.0		78.3	
1.00		.00		21.800 21.700	0.185 0.245		0.0	0.0		0.0	1.11	78.3 78.3	25.1 33.2
1.00	2 50		5.20	21.700	0.240		5.0	0.0		0.0	±•±±	,	JJ • 2
				©1	982-20	16 XP	Solı	utions	3				
L													

RCD		Page 2
9 Birchtree Way	EXISTING FLOWS	
Maidstone	65-69 HOLMES ROAD	L.
Kent ME15 7RP	LONDON	Micco
Date 15/12/2017 10:16	Designed by RAC	
File 1158-1003 EXISTING FLOW	Checked by	Digiliada
Micro Drainage	Network 2016.1.1	1

Free Flowing Outfall Details for Storm

Outfall	Outfall	c.	Level	I.	Level		Min	D,L	W
Pipe Number	Name		(m)		(m)	Ι.	Level (m)	(mm)	(mm)
							• •		

1.003 EX 23.000 21.600 21.600 1200 0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Storm Duration (mins)	30
Ratio R	0.436		

RCD								Page	e 3
9 Birchtree	Way]	EXISTI	NG FLOWS	5			
Maidstone				65-69 H	HOLMES H	ROAD		4	A .
Kent ME15 7	RP		:	LONDON				Mic	- Cm
Date 15/12/2	2017 10:3	16	1	Designe	ed by RA	AC		— MI0	
File 1158-10	03 EXIS	FING FLO	ow	Checked	d by			Ulc	inage
Micro Draina	ide]	Networl	< 2016.1	1.1		•	
<u>Summa:</u>	Areal Rec Hot	luction F : Start (<u>Simu</u> 'actor 1. mins)	1 <u>lation</u> 000 A 0	<u>Criteria</u> dditiona	l Flow	<u>(Rank 1) f</u> - % of Tota * 10m³/ha S	l Flow 0.	000
	Headloss (ewage per Number o Number	hectare f Input H of Onlin	obal) 0. (1/s) 0. Hydrograp ne Contro	500 Flc 000 phs 0 Nu pls 0 Nu	umber of umber of	rson pe Storage Time/Ar	nlet Coeffi r Day (l/pe s Structures rea Diagrams	r/day) 0. s 0 s 0	
	Number	of Offlin					me Controls	s 0	
	Rai	nfall Moo Reg: M5-60 (r	del ion Engl	and and	Wales Cv	Ratic (Summe	e R 0.436 er) 0.750 er) 0.840		
Ма	urgin for		alysis T DTS	imestep Status Status	2.5 Secc	ond Incr	ement (Exte	450.0 ended) ON OFF OFF	
Reti	ırn Period		ns) rs)				Summer and 40, 360, 48 2880, 4320 7200, 8640	30, 600,), 5760,	
US/MH PN Name	Storm		Climate Change	First Surcha		Irst (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.001 2 1.002 3	15 Winter 15 Winter 15 Winter 15 Winter	100 100	+0% +0%	100/15 : 100/15 : 100/15 : 100/15 :	Summer Summer				22.348 22.318 22.256 22.120
	c	rcharged	Flooded			Pipe			
	US/MH	Depth			Overflow	-		Level	
PN	Name	- (m)	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded	
1.000	1	0.048	0.000	0.42		<u> 28</u> ⊑	SURCHARGED		
1.000		0.048					SURCHARGED		
1.002	3	0.156		1.14			SURCHARGED		
1.003	4	0.120	0.000	1.50		102.7	SURCHARGED		
			©1982-2	2016 XF	Soluti	ons			
			<u> </u>		DUIUUI				



Appendix C

Drainage Strategy Layout



Appendix D

Post Development surface water calculations

9 Birc											Pa	ge 1
	htree	Way				-69 HOLME	S ROAI	D				
Maidst					LO	NDON					4	<u> </u>
	ME15 7										M	licro
Date 0	5/04/2	018 1	4:52			signed by						rainaq
File 1	158-10	03 18	0504.	MDX		ecked by						
1icro	Draina	ge			Ne	twork 201	6.1.1					
		STOR	M SEW	IER DES	IGN by	the Modif	ied R	atior	nal M	Metho	<u>d</u>	
				Des	<u>ign Cr</u>	iteria foi	r Stor	<u>rm</u>				
			Pi	pe Sizes	STANDA	RD Manhole	Sizes	STAND	ARD			
		Deter	D.			del - Engla	nd and	Wales	3		DIMD (
		Retui	rn Per	iod (yea M5-60 (1 600	Add F	low /	Clim		PIMP (^s ange (^s	
						438					ight (r	
	Ma	aximum	Rainf	all (mm/	'hr)	1				-	-	m) 10.00
Maximur	m Time o	ot Cond Foul	centra Sewa	tion (mi	.ns) 'ha) ∩ '	30 Min Des 000 Min						
	Vo										on (1:2	
				De	signed w	ith Level 1	Inverts	5				
				Time	Area l	Diagram fo	or Sto	orm				
					Time An mins) (1	rea Time ha) (mins)						
				(1								
					0-4 0.	162 4-8	0.083					
				Total A	Area Con	tributing (ha) = (0.245				
						-						
						tributing (Volume (m³)						
				Tota	al Pipe '	-	= 6.7	15				
PN	Length (m)	Fall (m)	Slope (1:X)	Tota <u>Netwo</u> I.Area	al Pipe ' rk Desi T.E.	Volume (m³)	= 6.7	15	DIA (mm)	Secti	.on Typ	e Auto Design
	-	(m)	(1:X)	Tota <u>Netwo:</u> e I.Area (ha)	nl Pipe ' rk Desi T.E. (mins)	Volume (m ³) gn Table Base Flow (l/s)	= 6.73	15 torm HYD	(mm)		.on Typ	Design
1.000	(m)	(m) 0.200	(1:X)	Tota <u>Netwo:</u> i.Area (ha) 0.080	nl Pipe ' rk Desi T.E. (mins)	Volume (m ³) gn Table Base Flow (l/s) 0.0	= 6.73	15 torm HYD SECT	(mm) 300	Pipe/		Design
1.000 2.000 1.001	(m) 30.000	(m) 0.200 0.200 0.200	(1:X) 150.0 150.0	Tota <u>Netwo:</u> i.Area (ha) 0 0.080 0 0.080 0 0.085	nl Pipe <u>rk Desi</u> T.E. (mins) 5.00 5.00	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0	= 6.7 <u>for S</u> k (mm) 0.600	15 torm HYD SECT o	(mm) 300 300 300	Pipe/ Pipe/ Pipe/	'Condui	Design t 👌 t 👌 t 🔐
1.000 2.000 1.001	(m) 30.000 30.000 30.000	(m) 0.200 0.200 0.200	(1:X) 150.0 150.0	Tota <u>Netwo:</u> i.Area (ha) 0 0.080 0 0.080 0 0.085 0 0.000	nl Pipe rk Desi T.E. (mins) 5.00 5.00 0.00 0.00	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0	= 6.7 for S k (mm) 0.600 0.600 0.600 0.600	15 torm HYD SECT 0 0	(mm) 300 300 300	Pipe/ Pipe/ Pipe/	'Condui 'Condui	Design t 👌 t 👌 t 🔐
1.000 2.000 1.001	(m) 30.000 30.000 30.000 20.000	(m) 0.200 0.200 0.200 0.200	(1:X) 150.0 150.0	Tota <u>Netwo:</u> i I.Area (ha) 0 0.080 0 0.085 0 0.000 <u>N</u>	nl Pipe rk Desi T.E. (mins) 5.00 5.00 0.00 0.00	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0	= 6.7 for S k (mm) 0.600 0.600 0.600 0.600 <u>Fable</u> Foul	15 torm HYD SECT 0 0	(mm) 300 300 300 150	Pipe/ Pipe/ Pipe/ Pipe/	'Condui 'Condui 'Condui 'Condui Cap	Design t 👌 t 👌 t 🔐
1.000 2.000 1.001 1.002	(m) 30.000 30.000 20.000 N Ra: (mm/	(m) 0.200 0.200 0.200 0.200	(1:X) 150.0 150.0 150.0 100.0 2.C. hins)	Tota <u>Netwo:</u> a I.Area (ha) 0 0.080 0 0.085 0 0.000 <u>N</u> US/IL Σ	nl Pipe rk Desi T.E. (mins) 5.00 5.00 0.0	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results <u>Γ</u> Σ Base	= 6.7 for S k (mm) 0.600 0.600 0.600 0.600 <u>Fable</u> Foul (1/s)	15 HYD SECT 0 0 0 0	(mm) 300 300 300 150	Pipe/ Pipe/ Pipe/ Pipe/ Vel	'Condui 'Condui 'Condui 'Condui Cap	Design t 1 t 1 t 1 t t 1 t t t
1.000 2.000 1.001 1.002	(m) 30.000 30.000 20.000 N Ra: (mm/	(m) 0.200 0.200 0.200 0.200 in T 'hr) (m	(1:X) 150.0 150.0 150.0 150.0 100.0 2.C. bins) 5.39	Tota <u>Netwo:</u> i I.Area (ha) 0 0.080 0 0.085 0 0.085 0 0.000 <u>N</u> US/IL 2 (m)	rk Desi T.E. (mins) 5.00 5.00 0.00 0.00 0.00 retwork : I.Area (ha)	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results 7 E Base Flow (l/s)	= 6.7 for S k (mm) 0.600 0.600 0.600 0.600 <u>Foul</u> (1/s) 0.0	15 torm HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm) 300 300 150 Flow (s)	Pipe/ Pipe/ Pipe/ Pipe/ Vel (m/s)	Condui Condui Condui Condui Condui	Design t 1 t 1 t 1 t t 1 t t t t t t t t t t t
1.000 2.000 1.001 1.002 PI 1.0	(m) 30.000 30.000 20.000 N Ra: (mm/ 00 1 00 1	(m) 0.200 0.200 0.200 0.200 in T 'hr) (m .00	(1:x) 150.0 150.0 150.0 150.0 100.0 2.C. bins) 5.39 5.39	Tota <u>Netwo:</u> a I.Area (ha) 0 0.080 0 0.085 0 0.085 0 0.000 <u>N</u> US/IL 2 (m) 31.700	al Pipe ' rk Desi T.E. (mins) 5.00 5.00 0.00 0.00 0.00 Cetwork : I.Area (ha) 0.080	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results 7 E Base Flow (l/s) 0.0	= 6.7: for S k (mm) 0.600 0.600 0.600 0.600 <u>Foul</u> (1/s) 0.0 0.0	15 torm HYD SECT 0 0 0 0 0 Add 1 (1/	(mm) 300 300 150 Flow (s) 0.0	Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28	Condui Condui Condui Condui Condui Cap (l/s) 90.6	Design t 1 t 1 t 1 t t t t t t t t t t t t t t
1.000 2.000 1.001 1.002 PI 1.0 2.0	(m) 30.000 30.000 20.000 N Ra: (mm/ 00 1 00 1 01 1	(m) 0.200 0.200 0.200 0.200 in T 'hr) (n 00	(1:x) 150.0 150.0 150.0 150.0 100.0 2.C. bins) 5.39 5.39 5.39	Tota <u>Netwo:</u> i I.Area (ha) 0 0.080 0 0.085 0 0.000 <u>N</u> US/IL <u>2</u> (m) 31.700 31.700	al Pipe ' rk Desi T.E. (mins) 5.00 5.00 0.00 0.00 0.00 Cetwork 1.Area (ha) 0.080 0.080	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results 7 E Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	= 6.7: for S k (mm) 0.600 0.600 0.600 0.600 0.600 Foul (1/s) 0.0 0.0	15 torm HYD SECT 0 0 0 0 Add : (1/	(mm) 300 300 150 Flow (s) 0.0	<pre>Pipe/ Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28 1.28</pre>	Condui Condui Condui Condui Condui Cap (l/s) 90.6 90.6	Design t 1 t 1 t 1 t 1 t t 1 t 1
1.000 2.000 1.001 1.002 PI 1.0 2.0 1.0	(m) 30.000 30.000 20.000 N Ra: (mm/ 00 1 00 1 01 1	(m) 0.200 0.200 0.200 0.200 in T 'hr) (n 00 00	(1:x) 150.0 150.0 150.0 150.0 100.0 2.C. bins) 5.39 5.39 5.39	Tota <u>Netwo:</u> i I.Area (ha) 0 0.080 0 0.085 0 0.000 <u>N</u> US/IL 2 (m) 31.700 31.700 31.500	al Pipe rk Desi T.E. (mins) 5.00 5.00 0.00 0.00 0.00 retwork C I.Area (ha) 0.080 0.080 0.245	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results 7 E Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	= 6.7: for S k (mm) 0.600 0.600 0.600 0.600 <u>Fable</u> Foul (1/s) 0.0 0.0	15 torm HYD SECT 0 0 0 0 Add : (1/	(mm) 300 300 150 Flow 's) 0.0 0.0	<pre>Pipe/ Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28 1.28 1.28</pre>	Condui Condui Condui Condui Condui Cap (l/s) 90.6 90.6	Design t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1
1.000 2.000 1.001 1.002 PI 1.0 2.0 1.0	(m) 30.000 30.000 20.000 N Ra: (mm/ 00 1 00 1 01 1	(m) 0.200 0.200 0.200 0.200 in T 'hr) (n 00 00	(1:x) 150.0 150.0 150.0 150.0 100.0 2.C. bins) 5.39 5.39 5.39	Netwo: Netwo: a I.Area (ha) 0 0.080 0 0.080 0 0.085 0 0.085 0 0.085 0 0.085 0 0.085 0 0.080 0 0.080 0 0.085 0 0.080 0 0.085 0 0.080 0 0.080 0 0.080 0 0.080 0 0.080 0 0.080 0 0.080 0 0.080 0 0.080 0 0.080 0 0.080 31.700 31.500 29.400 1.500	al Pipe rk Desi T.E. (mins) 5.00 5.00 0.00 0.00 0.00 Cetwork CI.Area (ha) 0.080 0.080 0.245 0.245	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results 7 E Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	= 6.7: <u>for S</u> k (mm) 0.600 0.600 0.600 0.600 <u>Cable</u> Foul (1/s) 0.0 0.0 0.0	15 torm HYD SECT 0 0 0 0 0 Add : (1/	(mm) 300 300 150 Flow 's) 0.0 0.0	<pre>Pipe/ Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28 1.28 1.28</pre>	Condui Condui Condui Condui Condui Cap (l/s) 90.6 90.6	Design t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1

RCD		Page 2
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	L'
Kent ME15 7RP		Micco
Date 05/04/2018 14:52	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Drainage
Micro Drainage	Network 2016.1.1	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	Conr	MH nection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	32.300	0.600	Open	Manhole	300	1.000	31.700	300				
2	32.300	0.600	Open	Manhole	300	2.000	31.700	300				
3	32.300	0.800	Open	Manhole	300	1.001	31.500	300	1.000	31.500	300	
									2.000	31.500	300	
4	32.300	2.900	Open	Manhole	1500	1.002	29.400	150	1.001	31.300	300	2050
EXISTING	32.300	3.100	Open	Manhole	300		OUTFALL	1	1.002	29,200	150	
	-2.000	0.100	or cri	1.4			001111111		1002	29.200	100	

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RCD		- T	-				5-60 17					P	age 3
9 Birc		e way	r					OLMES	ruad				
Maidst Kent		ם חד				170	ONDON						~~~~
			11-	50			o i an c	d hr	٦C				Micro
Date 05/04/2018 14:52 File 1158-1003 180504.MDX							Designed by RAC Checked by JD						Drainago
Micro			1000	04.MDZ	7			2016.					
MICIO	DIAI	Ilaye				INE	ELWOIK	2010.	1.1				
				<u> </u>	IPEL	INE SC	CHEDUL	ES for	Sto	rm			
						<u>Upsti</u>	ream M	anhole	<u>•</u>				
	P	-		am MH m) Name			Level I (m)).Depth (m)		MH nection	мн і	DIAM., I (mm)	•*W
	1.	000	o 3	00 1	32.	300 3	1.700	0.300	Open	Manhole		3	00
	2.	000	o <mark>3</mark>	00 2	32.	300 3	1.700	0.300	Open	Manhole		3	00
		001	o 3						-	Manhole			00
	1.	002	o 1	50 4	32.	300 2	9.400	2.750	Open	Manhole		15	U U
					-	Downst	tream	Manhol	e				
	PN	Length (m)	Slog (1:)			C.Level (m)	L I.Leve (m)	el D.De (m	-	MH Connecti		MH DIAM (mm	•
1	.000	30.000	150.	.0	3	32.300	31.5	00 0.	500 C	pen Mani	nole		300
2	.000	30.000	150.	. 0	3	32.300	31.5	00 0.	500 C	pen Mani	nole		300
		30.000 20.000		.0 .0 EXIS						pen Mani pen Mani			1500 300
				Free F	'lowi:	ng Out	tfall	Detail	s fo	r Stor	n		
			Outfa			-		. Level		in D,		W	
		Pi		umber	Name		(m)	(m)	I. I	evel (m		am)	
									(:	m)			
				1.002 E	XISTI	NG 32	2.300	29.200	29	9.300 3	00	0	
				S	imul <i>a</i>	tion	Criter	ria fo	r Sto	orm			
		Volum	motri	c Puncf	f Coc	ff 0 7	50 74	ditions	ו הוי	ow − % o:	F Tot	al Flore	0 000
				duction						or * 10m			
		-		t Start	•		0	_				iecient	
Ma	anhol			art Lev Coeff (per Pe	erson	per Day Run		er/day) (mins)	0.000 60
110				hectar					Out	put Inte		, ,	1
		NT1	her f	of Innui	- 4	ograph	0 NI	mbor of	St ~~	age Stru	otur	ag 1	
				-	-	5 1				age Stru /Area Di			
		Nu	umber	of Off	Line C	Control	s 0 Nur	mber of	Real	Time Co	ntro	Ls O	
					Synt?	<u>hetic</u>	Rainf	all De	tail	S			
				Rainfal	l Mod	el		FSR	L	Ratio 1	я O.	438	
		Ret		Period					Prof	ile Type	e Sum	mer	
					-						· · ·	7 5 0	
				M5-	-		land an	d Wales 20.600		(Summer) (Winter)			
				M5-	Regi 60 (m	m)			Cv				

RCD		Page 4
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 05/04/2018 14:52	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Drainage
Micro Drainage	Network 2016.1.1	

Synthetic Rainfall Details

Storm Duration (mins) 30

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RCD		Page 5
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 05/04/2018 14:52	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Drainage
Micro Drainage	Network 2016.1.1	

Online Controls for Storm

Complex Manhole: 4, DS/PN: 1.002, Volume (m³): 7.2

<u>Orifice</u>

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 29.400

<u>Orifice</u>

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 30.400

RCD		Page 6
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 05/04/2018 14:52	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Digiligh
Micro Drainage	Network 2016.1.1	

Storage Structures for Storm

Cellular Storage Manhole: 4, DS/PN: 1.002

Invert Level (m) 29.400 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m) Area (m²) Inf. Area (m²) Depth (m) Area (m²) Inf. Area (m²)

0.000	20.0	20.0	2.501	0.0	64.7
2.500	20.0	64.7			

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	ht ma -	Moss			65-60 "				Page	e 7
9 Birchtree Way Maidstone				65-69 HOLMES ROAD			L			
		7			LONDON					~,
Kent 1	-								— Mic	
Date 05/04/2018 14:52 File 1158-1003 180504.MDX					Designed by RAC					
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licro	Draina	age		1	Jetwork	2016.1	.1			
Ма	anhole H	Areal Rec Hot Sta Headloss C ewage per Number o Number Number	duction F Start (art Level Coeff (Gl hectare f Input H of Onlin of Offlin	Simu actor 1. mins) (mm) obal) 0. (1/s) 0. Hydrograp ne Contro ne Contro Synthet del ion Engli	alation (000 A 0 .500 Flor .000 phs 0 Nu ols 1 Nu ols 0 Nu ic Rainf and and	<u>Criteria</u> dditional MADD F w per Per umber of S umber of S	Flow iactor I: son pe Storage Time/Ar Real Ti ils Ratic (Summe		l Flow 0 torage 2 ecient 0 r/day) 0 a 1 a 0	000 000 800
		urn Period	Ana Profile n(s) (mi	alysis T DTS DVD Inertia (s) ns) rs)	imestep Status Status Status 15, 30,	60, 120,	180, 2	Summer and 40, 360, 48 2880, 4320 7200, 8640	ON ON ON d Winter 80, 600, 0, 5760,	
			Return (First Surcha		rst (Y)	First (Z)		Water Leve (m)
PN	US/MH Name	Storm	Period	2 -		- 9-	Flood	Overflow	Act.	
PN 1.000 2.000 1.001 1.002	Name 1 2 3	Storm 15 Winter 15 Winter 15 Winter 30 Winter	100 100 100	+30% +30% +30%	100/15 s 100/15 s	Summer Summer	Flood	Overflow	Act.	32.25 <mark>32.14</mark>
1.000 2.000 1.001	Name 1 2 3	15 Winter 15 Winter 15 Winter 30 Winter	100 100 100 100	+30% +30% +30% +30%	100/15 s 100/15 s 100/15 s 100/15 s	Summer Summer		Overflow	Act.	32.25 <mark>32.14</mark>
1.000 2.000 1.001	Name 1 2 3	15 Winter 15 Winter 15 Winter 30 Winter Su	100 100 100	+30% +30% +30% +30%	100/15 s 100/15 s 100/15 s 100/15 s	Summer Summer	Pipe	Overflow	Act. Level	32.25 <mark>32.14</mark>
1.000 2.000 1.001	Name 1 2 3	15 Winter 15 Winter 15 Winter 30 Winter Su:	100 100 100 100 rcharged	+30% +30% +30% +30%	100/15 s 100/15 s 100/15 s 100/15 s	Summer Summer Summer	Pipe	Overflow Status		32.25 32.14 32.00
1.000 2.000 1.001	Name 1 2 3 4 PN	15 Winter 15 Winter 30 Winter Su: US/MH Name	100 100 100 100 rcharged Depth (m)	+30% +30% +30% +30% Flooded Volume (m ³)	100/15 s 100/15 s 100/15 s 100/15 s Flow / Cap.	Summer Summer Summer Summer	Pipe Flow (1/s)	Status	Level Exceeded	32.25 32.25 32.14 32.00
1.000 2.000 1.001	Name 1 2 3 4 PN 1.000	15 Winter 15 Winter 30 Winter US/MH Name 1	100 100 100 100 rcharged Depth (m) 0.251	+30% +30% +30% +30% Flooded Volume (m ³) 0.000	100/15 s 100/15 s 100/15 s 100/15 s Flow / Cap. 0.54	Summer Summer Summer Summer	Pipe Flow (l/s) 44.4	Status FLOOD RISK	Level Exceeded	32.25 32.14 32.00
1.000 2.000 1.001	Name 1 2 3 4 PN	15 Winter 15 Winter 30 Winter US/MH Name 1 2	100 100 100 100 rcharged Depth (m)	+30% +30% +30% +30% Flooded Volume (m ³) 0.000 0.000	100/15 s 100/15 s 100/15 s 100/15 s Flow / Cap. 0.54 0.54 1.62	Summer Summer Summer Summer	Pipe Flow (1/s) 44.4 44.4	Status	Level Exceeded	32.25 32.14 32.00
1.000 2.000 1.001	Name 1 2 3 4 PN 1.000 2.000	15 Winter 15 Winter 30 Winter US/MH Name 1 2 3	100 100 100 100 rcharged Depth (m) 0.251 0.251	+30% +30% +30% +30% Flooded Volume (m ³) 0.000 0.000 0.000	100/15 s 100/15 s 100/15 s 100/15 s Flow / Cap. 0.54 0.54 1.62	Summer Summer Summer Summer	Pipe Flow (1/s) 44.4 44.4 133.6	Status FLOOD RISK FLOOD RISK	Level Exceeded	32.25 32.14 32.00
1.000 2.000 1.001	Name 1 2 3 4 PN 1.000 2.000 1.001	15 Winter 15 Winter 30 Winter US/MH Name 1 2 3	100 100 100 100 rcharged Depth (m) 0.251 0.251 0.341 2.452	+30% +30% +30% +30% Flooded Volume (m ³) 0.000 0.000 0.000 0.000	100/15 s 100/15 s 100/15 s 100/15 s Flow / Cap. 0.54 0.54 1.62 2.05	Summer Summer Summer Summer	Pipe Flow (1/s) 44.4 44.4 133.6 34.2	Status FLOOD RISK FLOOD RISK FLOOD RISK	Level Exceeded	32.25 32.14 32.00

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				·	0-4 0.		0.083	0.245				
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				Total .	0-4 0. Area Con	162 4-8	0.083					
				Total . Tot	0-4 0. Area Con al Pipe	162 4-8	0.083 ha) = (= 6.72	15				
PN	Length (m)	Fall (m)	Slope (1:X)	Total . Tot <u>Netwo</u>	0-4 0. Area Con al Pipe <u>rk Desi</u> T.E.	162 4-8 tributing (Volume (m ³)	0.083 ha) = (= 6.72	15	DIA (mm)	Secti	.on Typ	e Auto Design
	-	(m)	(1:X)	Total . Tot <u>Netwo</u> e I.Area (ha)	0-4 0. Area Con al Pipe <u>rk Desi</u> t.E. (mins)	162 4-8 tributing (Volume (m ³) .gn Table Base Flow (l/s)	0.083 ha) = (= 6.72 for S k	15 torm HYD	(mm)		.on Typ	Design
1.000	(m)	(m) 0.200	(1:X)	Total . Tot <u>Netwo</u> I.Area (ha) 0.080	0-4 0. Area Con al Pipe <u>rk Desi</u> t.E. (mins) 0 5.00	162 4-8 tributing (Volume (m ³) .gn Table Base Flow (l/s) 0.0	0.083 ha) = (= 6.7: <u>for S</u> k (mm)	15 torm HYD SECT	(mm) 300	Pipe/		Design
1.000 2.000 1.001	(m) 30.000	(m) 0.200 0.200 0.200	(1:X) 150.0 150.0	Total Tot <u>Netwo</u> 1.Area (ha) 0 0.080 0 0.085	0-4 0. Area Con al Pipe <u>rk Desi</u> T.E. (mins) 5.00 5.00 0 0.00	162 4-8 tributing (Volume (m ³) .gn Table Base Flow (l/s) 0.0 0.0 0.0	0.083 ha) = (= 6.7: <u>for S</u> k (mm) 0.600	15 torm HYD SECT o	(mm) 300 300 300	Pipe/ Pipe/ Pipe/	Condui	Design t 👌 t 👌 t 🔐
1.000 2.000 1.001	(m) 30.000 30.000 30.000	(m) 0.200 0.200 0.200	(1:X) 150.0 150.0	Total . Tot Netwo I.Area (ha) 0 0.080 0 0.085 0 0.000	0-4 0. Area Con al Pipe <u>rk Desi</u> T.E. (mins) 5.00 5.00 0.00 0.00	162 4-8 tributing (Volume (m ³) .gn Table Base Flow (l/s) 0.0 0.0 0.0	0.083 ha) = (= 6.7: <u>for S</u> k (mm) 0.600 0.600 0.600	15 torm HYD SECT 0 0	(mm) 300 300 300	Pipe/ Pipe/ Pipe/	'Condui 'Condui 'Condui	Design t 👌 t 👌 t 🔐
1.000 2.000 1.001	(m) 30.000 30.000 30.000 20.000	(m) 0.200 0.200 0.200 0.200	(1:X) 150.0 150.0	Total . Tot <u>Netwo</u> 1.Area (ha) 0.080 0.085 0.000 <u>1</u>	0-4 0. Area Con al Pipe <u>rk Desi</u> T.E. (mins) 5.00 5.00 0.00 0.00	162 4-8 tributing (Volume (m ³) .gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 Results 5	0.083 ha) = (= 6.72 for <u>S</u> k (mm) 0.600 0.600 0.600 0.600 <u>0.600</u> <u>Cable</u> Foul	15 torm HYD SECT 0 0	(mm) 300 300 300 150	Pipe/ Pipe/ Pipe/ Pipe/	'Condui 'Condui 'Condui 'Condui Cap	Design t 👌 t 👌 t 🔐
1.000 2.000 1.001 1.002	(m) 30.000 30.000 20.000 (Rai (mm/)	(m) 0.200 0.200 0.200 0.200 T hr) (m	(1:X) 150.0 150.0 150.0 100.0 2.C. hins)	Total . Tot <u>Netwo</u> i .Area (ha) 0 0.080 0 0.085 0 0.000 <u>h</u> US/IL 2	0-4 0. Area Con al Pipe <u>rk Desi</u> T.E. (mins) 5.00 5.00 0.00 0.00 0.00 <u>0.00</u> <u>Network</u> E I.Area	162 4-8 tributing (Volume (m ³) .gn Table Base Flow (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.083 ha) = (= 6.72 for <u>S</u> k (mm) 0.600 0.600 0.600 0.600 <u>0.600</u> <u>Cable</u> Foul	HYD SECT 0 0 0	(mm) 300 300 300 150	Pipe/ Pipe/ Pipe/ Vipe/	'Condui 'Condui 'Condui 'Condui Cap	Design t 1 t 1 t 1 t 1 t t 1 t t
1.000 2.000 1.001 1.002 PN	(m) 30.000 30.000 20.000 (Rai (mm/) 20 1	(m) 0.200 0.200 0.200 0.200 0.200 n T hr) (m 00	(1:X) 150.0 150.0 150.0 100.0 9.C. hins) 5.39	Total . Tot Netwo P I.Area (ha) 0 0.080 0 0.085 0 0.085 0 0.000 <u>N</u> US/IL 2 (m)	0-4 0. Area Con al Pipe 7 rk Desi rk Desi rk Desi 5.00 5.00 5.00 0.00 0.00 0.00 Network E I.Area (ha)	162 4-8 tributing (Volume (m ³) .gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 Results 5 Σ Base Flow (l/s)	0.083 ha) = (= 6.72 <u>for S</u> k (mm) 0.600 0.600 0.600 0.600 <u>Cable</u> Foul (1/s)	HYD SECT 0 0 0	(mm) 300 300 150 Flow (s)	Pipe/ Pipe/ Pipe/ Vel (m/s)	Condui Condui Condui Condui Condui	Design t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1
1.000 2.000 1.001 1.002 PN 1.00 2.00	(m) 30.000 30.000 20.000 (Rai (mm/2) 00 1 00 1	(m) 0.200 0.200 0.200 0.200 0.200 .00 .00	(1:X) 150.0 150.0 150.0 100.0 2.C. iins) 5.39 5.39	Total . Total . Tot <u>Netwo</u> i .Area (ha) 0 0.080 0 0.085 0 0.085 0 0.085 0 0.085 0 0.085 0 0.085 0 0.080 0 0.085 0 0.080 0 0.085 0 0.080 0 0.085 0 0.080 0 0.000 0 0.080 0 0.000 0 0.0000 0 0.00000 0 0.00000 0 0.00000 0 0.00000 0 0.000000 0 0.00000 0 0.00000 0 0.00000 0 0.00000000 0 0.0000000000	0-4 0. Area Con al Pipe 7 rk Desi rk Desi rk Desi rk Desi 5.00 5.00 5.00 0.00 0.00 0.00 0.00 Vetwork E I.Area (ha) 0.080 0.080	162 4-8 tributing (Volume (m ³) .gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 Results 5 Σ Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.083 ha) = (= 6.7: <u>for S</u> k (mm) 0.600 0.600 0.600 0.600 0.600 <u>Cable</u> Foul (1/s) 0.0	HYD SECT 0 0 0	(mm) 300 300 300 150 Flow (s) 0.0 0.0	Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28 1.28	Condui Condui Condui Condui Condui Cap (1/s) 90.6 90.6	Design t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1
1.000 2.000 1.001 1.002 PN 1.00 2.00 1.00	(m) 30.000 30.000 20.000 (Rai (mm/) 00 1 00 1 01 1	(m) 0.200 0.200 0.200 0.200 0.200 .00 .00	(1:x) 150.0 150.0 150.0 150.0 100.0 5.39 5.39 5.39 5.39	Total . Total . Tot <u>Netwo</u> i .Area (ha) 0 0.080 0 0.085 0 0.085 0 0.085 0 0.085 0 0.085 0 0.080 0 0.085 0 0.080 0 0.085 0 0.080 0 0.085 0 0.080 0 0.085 0 0.080 0 0.000 0 0.080 0 0.000 0 0.0000 0 0.00000 0 0.00000 0 0.00000 0 0.00000 0 0.000000 0 0.000000 0 0.0000000000	0-4 0. Area Con al Pipe 7 rk Desi rk Desi rk Desi rk Desi 5.00 5.00 5.00 0.00 0.00 0.00 Network E I.Area (ha) 0.080 0.080 0.080 0.080	162 4-8 tributing (Volume (m ³) .gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.083 ha) = (= 6.7: <u>for S</u> k (mm) 0.600 0.600 0.600 0.600 0.600 <u>Cable</u> Foul (1/s) 0.0	HYD SECT 0 0 0	(mm) 300 300 300 150 Flow (s) 0.0 0.0 0.0	Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28 1.28	Condui Condui Condui Condui Condui Dondui 90.6 90.6	Design t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1
1.000 2.000 1.001 1.002 PN 1.00 2.00	(m) 30.000 30.000 20.000 (Rai (mm/) 00 1 00 1 01 1	(m) 0.200 0.200 0.200 0.200 0.200 .00 .00	(1:x) 150.0 150.0 150.0 150.0 100.0 5.39 5.39 5.39 5.39	Total . Total . Tot <u>Netwo</u> i .Area (ha) 0 0.080 0 0.085 0 0.085 0 0.085 0 0.085 0 0.085 0 0.085 0 0.080 0 0.085 0 0.080 0 0.085 0 0.080 0 0.085 0 0.080 0 0.000 0 0.080 0 0.000 0 0.0000 0 0.00000 0 0.00000 0 0.00000 0 0.00000 0 0.000000 0 0.00000 0 0.00000 0 0.00000 0 0.00000000 0 0.0000000000	0-4 0. Area Con al Pipe 7 rk Desi rk Desi rk Desi rk Desi 5.00 5.00 5.00 0.00 0.00 0.00 0.00 Vetwork E I.Area (ha) 0.080 0.080	162 4-8 tributing (Volume (m ³) .gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.083 ha) = (= 6.7: <u>for S</u> k (mm) 0.600 0.600 0.600 0.600 0.600 <u>Cable</u> Foul (1/s) 0.0	HYD SECT 0 0 0	(mm) 300 300 300 150 Flow (s) 0.0 0.0	Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28 1.28	Condui Condui Condui Condui Condui Cap (1/s) 90.6 90.6	Design t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1
1.000 2.000 1.001 1.002 PN 1.00 2.00 1.00	(m) 30.000 30.000 20.000 (Rai (mm/) 00 1 00 1 01 1	(m) 0.200 0.200 0.200 0.200 0.200 .00 .00	(1:x) 150.0 150.0 150.0 150.0 100.0 5.39 5.39 5.39 5.39	Total . Total . Tot <u>Netwo</u> i .Area (ha) 0 0.080 0 0.085 0 0.085 0 0.085 0 0.085 0 0.085 0 0.080 0 0.085 0 0.080 0 0.085 0 0.080 0 0.085 0 0.080 0 0.085 0 0.080 0 0.000 0 0.080 0 0.000 0 0.0000 0 0.00000 0 0.00000 0 0.00000 0 0.00000 0 0.000000 0 0.000000 0 0.0000000000	0-4 0. Area Con al Pipe 7 rk Desi rk Desi rk Desi rk Desi 5.00 5.00 5.00 0.00 0.00 0.00 Network E I.Area (ha) 0.080 0.080 0.080 0.080	162 4-8 tributing (Volume (m ³) .gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.083 ha) = (= 6.7: <u>for S</u> k (mm) 0.600 0.600 0.600 0.600 0.600 <u>Cable</u> Foul (1/s) 0.0	HYD SECT 0 0 0	(mm) 300 300 150 Flow 's) 0.0 0.0	Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28 1.28	Condui Condui Condui Condui Condui Dondui 90.6 90.6	Design t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1

RCD		Page 2
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	L.
Kent ME15 7RP		Micco
Date 05/04/2018 14:53	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Drainage
Micro Drainage	Network 2016.1.1	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	Conr	MH nection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	32.300	0.600	Open	Manhole	300	1.000	31.700	300				
2	32.300	0.600	Open	Manhole	300	2.000	31.700	300				
3	32.300	0.800	Open	Manhole	300	1.001	31.500	300	1.000	31.500	300	
									2.000	31.500	300	
4	32.300	2.900	Open	Manhole	1500	1.002	29.400	150	1.001	31.300	300	2050
EXISTING	32.300	3.100	Open	Manhole	300		OUTFALL	1	1.002	29,200	150	
	-2.000	0.100	or chi	1.4			001111111		1002	29.200	100	

RCD 9 Birchtree	Way			65-69 н	IOLMES RO	ΠΑΓ	Pa	.ge 3
Maidstone				LONDON				
Kent ME15 7	RP			20112011				un an
Date 05/04/2	53		Designe	d by RAG	2		licio	
File 1158-10				Checked	-			rainage
Micro Draina	ge				2016.1.	.1		
		PI	PELINE	SCHEDUI	LES for a	<u>Storm</u>		
			Up	stream M	<u>Manhole</u>			
PN	Hyd Dia Sect (mm		C.Level (m)	I.Level (m)	-	MH M Connection	H DIAM., L* (mm)	W
1.000	o 30	00 1	32.300	31.700	0.300 0	pen Manhole	30	0
2.000	o 30	0 2	32.300	31.700	0.300 O	pen Manhole	30	0
1.001	o 30	0 3	32,300	31.500	0.500 0	pen Manhole	30	10
1.002				29.400		pen Manhole		
				notro	Marhel			
			DOW	nstream	Mannole			
	ngth Slop m) (1:X			evel I.Lev n) (m)	-	ch MH Connectio	MH DIAM. n (mm)	•
1.000 30.	.000 150.	0	3 <mark>32</mark> .	300 31.5	500 0.50	0 Open Manho	le	300
2.000 30.	.000 150.	0	3 32.	300 31.5	00 0.50	0 Open Manho	le	300
1.001 30. 1.002 20.	.000 150. .000 100.					00 Open Manho 50 Open Manho		1500 300
	т	roo El	owing	011+f-11	Dotaila	for Storm		
	Outfa Pipe Nu		itfall (Name	C. Level : (m)		Min D,L I. Level (mm)	W (mm)	
						(m)		
	1	.002 EX	ISTING	32.300	29.200	29.300 300	0	
		Si	nulatio	on Crite	ria for	Storm		
	'olumetric Areal Rec					Flow - % of actor * 10m³/		
		Start		0	11122 10		effiecient	
					w per Pers	son per Day (
Manhole H Foul Se	wage per					Output Inter	ime (mins) val (mins)	60 1
						-		
						torage Struct 'ime/Area Diac		
						eal Time Cont	·	
		c	wn+ho+	ic Rainf	Fall Dot	ails		
		<u>a</u>	ynchel	IC NAIII	arr Det	<u></u>		
		Rainfall			FSR	Ratio R		
	Poturn I	Period (years)			Profile Type		
	Ketuin i		Porion 1	Fnaland a				
	Recuill r		Region 1 0 (mm)	England ar		Cv (Winter)		
	Recuiii i		0 (mm)	England ar	20.600	Cv (Winter)		

RCD		Page 4
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 05/04/2018 14:53	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Drainage
Micro Drainage	Network 2016.1.1	

Synthetic Rainfall Details

Storm Duration (mins) 30

RCD		Page 5
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 05/04/2018 14:53	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Drainage
Micro Drainage	Network 2016.1.1	

Online Controls for Storm

Complex Manhole: 4, DS/PN: 1.002, Volume (m³): 7.2

<u>Orifice</u>

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 29.400

<u>Orifice</u>

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 30.400

RCD		Page 6
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 05/04/2018 14:53	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Digiliada
Micro Drainage	Network 2016.1.1	

Storage Structures for Storm

Cellular Storage Manhole: 4, DS/PN: 1.002

Invert Level (m) 29.400 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m) Area (m²) Inf. Area (m²) Depth (m) Area (m²) Inf. Area (m²)

0.000	20.0	20.0	2.501	0.0	64.7
2.500	20.0	64.7			



Appendix E

Pre-development surface water volume calculations

RCD		Page 1
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 15/12/2017 10:55	Designed by RAC	
File 1158-1003 TOTAL VOLUME	Checked by	Digiligh
Micro Drainage	Source Control 2016.1.1	

Summary of Results for 1 year Return Period

Storm Event		Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
	Summer Winter			39.3 44.1	O K

	Sto	rm	Rain	Flooded	Time-Peak
	Eve	nt	(mm/hr)	Volume	(mins)
				(m³)	
360	min	Summer	3.569	0.0	368
360	min	Winter	3.569	0.0	368

RCD		Page 2
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	L.
Kent ME15 7RP		Micco
Date 15/12/2017 10:55	Designed by RAC	
File 1158-1003 TOTAL VOLUME	Checked by	Drainage
Micro Drainage	Source Control 2016.1.1	
Ra	infall Details	
Rainfall Model		es
Return Period (years)	and and Wales Cv (Summer) 0.75 Cv (Winter) 0.84	
	20.400 Shortest Storm (mins) 36	
Ratio R		
Summer Storms	Yes Climate Change %	+ 0
Tin	ne Area Diagram	
Tota	al Area (ha) 0.245	
Time (mins)	Area Time (mins) Area	
From: To:	(ha) From: To: (ha)	
0 4	4 8 0.120	

RCD		Page 3				
9 Birchtree Way	65-69 HOLMES ROAD					
Maidstone	LONDON	4				
Kent ME15 7RP		Micco				
Date 15/12/2017 10:55	Designed by RAC					
File 1158-1003 TOTAL VOLUME	Checked by	Drainage				
Micro Drainage	Source Control 2016.1.1					
<u>Model Details</u>						

Storage is Online Cover Level (m) 25.400

<u>Tank or Pond Structure</u>

Invert Level (m) 22.900

Depth (m) Area (m²) Depth (m) Area (m²)

0.000 130.0 2.500 130.0

RCD		Page 1
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	L.
Kent ME15 7RP		Micco
Date 15/12/2017 10:57	Designed by RAC	
File 1158-1003 TOTAL VOLUME	Checked by	Digiliga
Micro Drainage	Source Control 2016.1.1	

Summary of Results for 30 year Return Period

Sto Eve		Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
	Summer Winter			87.0 97.5	O K O K

	Sto	rm	Rain	Flooded	Time-Peak
	Eve	nt	(mm/hr)	Volume	(mins)
				(m³)	
360	min	Summer	7.892	0.0	368
360	min	Winter	7.892	0.0	368

RCD							Page 2
9 Birchtree Way			65-69	HOLM	ES ROAI	D	
Maidstone		LONDO	N			1 L	
Kent ME15 7RP							Micco
Date 15/12/2017	10:57		Desig	ned b	y RAC		
File 1158-1003 7	OTAL VOLUME		Check	ed by			Drainago
Aicro Drainage			Sourc	e Cont	trol 20	016.1.1	
		<u>Rai</u>	<u>nfall</u>	Deta	<u>ils</u>		
	Rainfall Model			FSR		Winter Storms	
Return	Period (years)	n Engla	nd and	30 Walos		Cv (Summer) Cv (Winter)	
	M5-60 (mm)					st Storm (mins)	
	Ratio F					st Storm (mins)	
	Summer Storms	5		Yes	Cl	limate Change %	+0
		<u>Tim</u>	e Area	<u>a Diac</u>	<u>gram</u>		
		Tota	l Area	(ha) (.245		
	Time	(mins)	Area	Time	(mins)	Area	
	From:	To:	(ha)	From:	To:	(ha)	
	0	4	0.125	4	8	0.120	
				I			

RCD		Page 3				
9 Birchtree Way	65-69 HOLMES ROAD					
Maidstone	LONDON	4				
Kent ME15 7RP		Micco				
Date 15/12/2017 10:57	Designed by RAC					
File 1158-1003 TOTAL VOLUME	Checked by	Drainage				
Micro Drainage	Source Control 2016.1.1					
<u>Model Details</u>						

Storage is Online Cover Level (m) 25.400

<u>Tank or Pond Structure</u>

Invert Level (m) 22.900

Depth (m) Area (m²) Depth (m) Area (m²)

0.000 130.0 2.500 130.0

RCD		Page 1
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 15/12/2017 10:56	Designed by RAC	Drainarre
File 1158-1003 TOTAL VOLUME	Checked by	Dialiaye
Micro Drainage	Source Control 2016.1.1	

Summary of Results for 100 year Return Period

Storm Event		Max Level (m)	Max Depth (m)	Max Volume (m³)	Status	
		Summer Winter				O K O K

	Sto	rm	Rain	Flooded	Time-Peak
	Eve	nt	(mm/hr)	Volume	(mins)
				(m³)	
360	min	Summer	10.244	0.0	368
360	min	Winter	10.244	0.0	368

RCD	Page 2
9 Birchtree Way	65-69 HOLMES ROAD
Maidstone	LONDON
Kent ME15 7RP	Micro
Date 15/12/2017 10:56	Decigned by RAC
File 1158-1003 TOTAL VOLUME	. Checked by Drainage
Micro Drainage	Source Control 2016.1.1
E	Rainfall Details
M5-60 (mm)	FSR Winter Storms Yes 100 Cv (Summer) 0.750 gland and Wales Cv (Winter) 0.840 20.400 Shortest Storm (mins) 360 0.436 Longest Storm (mins) 360 Yes Climate Change % +0
<u>T</u>	'ime Area Diagram
Tc	otal Area (ha) 0.245
	ns) Area Time (mins) Area : (ha) From: To: (ha)
0	4 0.125 4 8 0.120

RCD		Page 3						
9 Birchtree Way	65-69 HOLMES ROAD							
Maidstone	LONDON	L'						
Kent ME15 7RP		Micco						
Date 15/12/2017 10:56	Designed by RAC							
File 1158-1003 TOTAL VOLUME	Checked by	Drainage						
Micro Drainage	Source Control 2016.1.1							
1	Model Details	Model Details						

Storage is Online Cover Level (m) 25.400

<u>Tank or Pond Structure</u>

Invert Level (m) 22.900

Depth (m) Area (m²) Depth (m) Area (m²)

0.000 130.0 2.500 130.0



Appendix F

Post-development surface water volume calculations

RCD								Pag	e 7
9 Birchtree Wa	ау		6	65-69 H	HOLMES	ROAD			
Maidstone			1	LONDON				4	A .
Kent ME15 7RI	P							N/G	- Um
Date 05/04/203	18 14:53	3	I	Designe	ed by R	AC			
File 1158-1003	3 180504	.MDX	0	Checked	d by JD				ainage
Micro Drainage	9		1	Networ}	c 2016.	1.1			
Summary	of Cri	tical	Results	s by Ma	ximum	Level	(Rank 1) f	for Stor	<u>m</u>
Manhole Hea Foul Sewa	Hot Hot Star adloss Co age per h Tumber of	Start (t Level eff (Gl ectare Input H	actor 1. mins) (mm) obal) 0. (1/s) 0. Hydrograp	000 A 0 500 Flo 000	MADD w per Pe umber of	Factor Factor Interson per Storage	- % of Tota * 10m³/ha S nlet Coeffi r Day (1/pe s Structures ea Diagrams	torage 2. ecient 0. r/day) 0. s 1	000 800
							me Controls		
		all Moc Regi 15-60 (r	ion Engla	and and	FSR Wales C	Ratic v (Summe	er) 0.438 er) 0.750 er) 0.840		
Marg	in for Fl		alysis T: DTS	imestep Status Status	2.5 Sec	ond Incr	rement (Exte	450.0 ended) ON ON ON	
		s) (yea	ns) :				Summer and 40, 360, 48 2880, 4320 7200, 8640	80, 600,), 5760,	
US/MH PN Name			Climate Change	First Surcha		irst (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000 1 15	5 Winter	30	+0%						31.825
2.000 2 15 1.001 3 15	5 Winter 5 Winter 5 Winter 9 Winter	30 30 30 30	+0% +0%	30/15 s	ummer				31.825 31.769 31.115
	~					-			
		harged: epth	Flooded		Overflo	Pipe w Flow		Level	
	Jame	(m)	(m ³)	Cap.	(1/s)		Status	Exceeded	
	-	0.175	0 00-	-					
1.000 2.000	1 2	-0.175	0.000			28.4 28.4	OK OK		
1.001	2	-0.031	0.000			28.4 82.3	OK		
1.002	4	1.565	0.000	1.42			SURCHARGED		
			©1982-2	2016 XF	° Solut	ions			

Birc											Pa	ge 1
	htree	Way				-69 HOLME:	S ROAI	D				
laidst					LO	NDON					4	<u> </u>
	ME15 7										M	licro
Date 0	5/04/2	018 1	4:54		1	signed by						rainaq
File 1	158-10	03 18	0504.	MDX		ecked by						
1icro	Draina	ge			Ne	twork 201	6.1.1					
		STOR	1 SEW	ER DESI	IGN by	the Modif	ied R	atior	nal M	Metho	<u>d</u>	
				Des	ign Cr:	iteria for	r Stor	<u>rm</u>				
			Pi	pe Sizes	STANDA	RD Manhole	Sizes	STAND	ARD			
			5			del - Engla:	nd and	Wales	5			
		Retur	n Per	iod (yea M5-60 (1 600	Add F	low /	Clim		PIMP (^s ange (^s	
						438					ight (r	
Ma	Ma	aximum	Rainf	all (mm/	hr)	1 20 Min Dec						m) 10.00
Maximur	n Time o	DÍ Conc Foul	centra Sewa	tion (mi	.ns) `ha) ∩ (30 Min Des 000 Min						
	Vo										on (1:2	
				De	signed w	ith Level I	Inverts	5				
				Time	Area I	Diagram fo	or Sto	orm				
					Time Au nins) (1	rea Time na) (mins)						
				(1								
					0-4 0.	162 4-8	0.083					
				Total A	Area Con	tributing (ha) = (0.245				
						-						
						tributing (Volume (m³)						
				Tota	al Pipe V	-	= 6.7	15				
PN	Length (m)	Fall (m)	Slope (1:X)	Tota <u>Netwo</u> A I. Area	al Pipe v <u>ck Desi</u> T.E.	Volume (m³)	= 6.7	15	DIA (mm)	Secti	.on Typ	e Auto Design
	-	(m)	(1:X)	Tota <u>Networ</u> e I.Area (ha)	al Pipe v <u>ck Desi</u> T.E.	Volume (m ³) gn Table Base Flow (l/s)	= 6.73	15 torm HYD	(mm)		.on Typ	Design
1.000	(m)	(m) 0.200	(1:X)	Tota <u>Netwo</u> i I.Area (ha) 0 0.080	nl Pipe ' rk Desi T.E. (mins)	Volume (m ³) gn Table Base Flow (l/s) 0.0	= 6.73	15 torm HYD SECT	(mm) 300	Pipe/		Design
1.000 2.000 1.001	(m) 30.000	(m) 0.200 0.200 0.200	(1:X) 150.0 150.0	Tota <u>Networ</u> I.Area (ha) 0 0.080 0 0.080 0 0.085	nl Pipe v rk Desi T.E. (mins) 5.00	Volume (m ³) <u>gn Table</u> Base Flow (l/s) 0.0 0.0 0.0	= 6.7 <u>for S</u> k (mm) 0.600	15 torm HYD SECT o	(mm) 300 300 300	Pipe/ Pipe/ Pipe/	'Condui	Design t 👌 t 👌 t 🔐
1.000 2.000 1.001	(m) 30.000 30.000 30.000	(m) 0.200 0.200 0.200	(1:X) 150.0 150.0	Tota <u>Netwo</u> I.Area (ha) 0 0.080 0 0.080 0 0.085 0 0.000	al Pipe <u> rk Desi</u> T.E. (mins) 5.00 5.00 0.00 0.00	Volume (m ³) <u>gn Table</u> Base Flow (l/s) 0.0 0.0 0.0	= 6.7 for S k (mm) 0.600 0.600 0.600 0.600	15 torm HYD SECT 0 0	(mm) 300 300 300	Pipe/ Pipe/ Pipe/	'Condui 'Condui	Design t 👌 t 👌 t 🔐
1.000 2.000 1.001	(m) 30.000 30.000 20.000 N Ra:	(m) 0.200 0.200 0.200 0.200	(1:X) 150.0 150.0 150.0 100.0	Tota <u>Netwon</u> i I.Area (ha) 0 0.080 0 0.085 0 0.000 <u>N</u> US/IL Σ	Al Pipe (<u>rk Desi</u> T.E. (mins) 5.00 5.00 0.00 0.00 <u>etwork</u> : I.Area	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results 1 Σ Base	= 6.7 for S k (mm) 0.600 0.600 0.600 0.600 <u>Fable</u> Foul	15 HYD SECT 0 0 0 0	(mm) 300 300 300 150	Pipe/ Pipe/ Pipe/ Pipe/ Vel	'Condui 'Condui 'Condui 'Condui Cap	Design t 👘 t 👘 t 👘 Flow
1.000 2.000 1.001 1.002	(m) 30.000 30.000 20.000 V Ra: (mm/	(m) 0.200 0.200 0.200 0.200 in T hr) (m	(1:X) 150.0 150.0 150.0 100.0 2.C. hins)	Tota <u>Networ</u> i I.Area (ha) 0 0.080 0 0.085 0 0.000 <u>N</u> US/IL Σ (m)	Al Pipe ' CK Desi T.E. (mins) 5.00 5.00 0.00 0.00 etwork : I.Area (ha)	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results T E Base Flow (l/s)	= 6.7 for S k (mm) 0.600 0.600 0.600 0.600 <u>Fable</u> Foul (1/s)	15 HYD SECT 0 0 0	(mm) 300 300 150 Flow (s)	Pipe/ Pipe/ Pipe/ Pipe/ Vel (m/s)	Condui Condui Condui Condui Condui	Design t 1 t 1 t 1 t t 1 t t t t t t t t t t t
1.000 2.000 1.001 1.002	(m) 30.000 30.000 20.000 V Ra: (mm/	(m) 0.200 0.200 0.200 0.200 in T hr) (m	(1:X) 150.0 150.0 150.0 100.0 2.C. hins)	Tota <u>Netwon</u> i I.Area (ha) 0 0.080 0 0.085 0 0.000 <u>N</u> US/IL Σ	Al Pipe (<u>rk Desi</u> T.E. (mins) 5.00 5.00 0.00 0.00 <u>etwork</u> : I.Area	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results 1 Σ Base	= 6.7 for S k (mm) 0.600 0.600 0.600 0.600 <u>Fable</u> Foul (1/s)	15 HYD SECT 0 0 0 0	(mm) 300 300 300 150	Pipe/ Pipe/ Pipe/ Pipe/ Vel	'Condui 'Condui 'Condui 'Condui Cap	Design t 👘 t 👘 t 👘 Flow
1.000 2.000 1.001 1.002	(m) 30.000 30.000 20.000 N Ra: (mm/ 00 1	(m) 0.200 0.200 0.200 0.200 in T hr) (m	(1:X) 150.0 150.0 150.0 100.0 2.C. iins) 5.39	Tota <u>Networ</u> i I.Area (ha) 0 0.080 0 0.085 0 0.000 <u>N</u> US/IL Σ (m)	Al Pipe ' CK Desi T.E. (mins) 5.00 5.00 0.00 0.00 etwork : I.Area (ha)	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results T E Base Flow (l/s)	= 6.7 for S k (mm) 0.600 0.600 0.600 0.600 <u>Foul</u> (1/s) 0.0	15 torm HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm) 300 300 150 Flow (s)	Pipe/ Pipe/ Pipe/ Pipe/ Vel (m/s)	Condui Condui Condui Condui Condui	Design t 1 t 1 t 1 t t 1 t t t t t t t t t t t
1.000 2.000 1.001 1.002 P1 1.0 2.0 1.0	(m) 30.000 30.000 20.000 N Ra: (mm/ 00 1 00 1 01 1	(m) 0.200 0.200 0.200 0.200 0.200 in T hr) (m .00 .00	(1:x) 150.0 150.0 150.0 150.0 100.0 2.C. ins) 5.39 5.39 5.39	Tota <u>Netwoi</u> i I.Area (ha) 0 0.080 0 0.085 0 0.000 <u>N</u> US/IL Σ (m) 31.700 31.700 31.500	Al Pipe (ck Desi T.E. (mins) 5.00 5.00 0.00 0.00 etwork Cha) 0.080 0.080 0.080 0.245	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results T Σ Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	= 6.7: for S k (mm) 0.600 0.600 0.600 0.600 <u>Fable</u> Foul (1/s) 0.0 0.0	15 torm HYD SECT 0 0 0 0 Add : (1/	(mm) 300 300 150 Flow 's) 0.0 0.0	<pre>Pipe/ Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28 1.28 1.28</pre>	Condui Condui Condui Condui Condui Cap (l/s) 90.6 90.6	Design t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1
1.000 2.000 1.001 1.002 Pt 1.0 2.0	(m) 30.000 30.000 20.000 N Ra: (mm/ 00 1 00 1 01 1	(m) 0.200 0.200 0.200 0.200 0.200 in T hr) (m .00 .00	(1:x) 150.0 150.0 150.0 150.0 100.0 2.C. ins) 5.39 5.39 5.39	Tota <u>Networ</u> i I.Area (ha) 0 0.080 0 0.085 0 0.000 <u>N</u> US/IL Σ (m) 31.700	Al Pipe ' Ck Desi T.E. (mins) 5.00 5.00 0.00 0.00 etwork Cha) 0.080 0.080	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results T E Base Flow (l/s) 0.0 0.0 0.0	= 6.7: for S k (mm) 0.600 0.600 0.600 0.600 0.600 Foul (1/s) 0.0 0.0	15 torm HYD SECT 0 0 0 0 Add : (1/	(mm) 300 300 150 Flow (s) 0.0	<pre>Pipe/ Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28 1.28</pre>	Condui Condui Condui Condui Condui Cap (l/s) 90.6 90.6	Design t 1 t 1 t 1 t 1 t t 1 t 1
1.000 2.000 1.001 1.002 P1 1.0 2.0 1.0	(m) 30.000 30.000 20.000 N Ra: (mm/ 00 1 00 1 01 1	(m) 0.200 0.200 0.200 0.200 0.200 in T hr) (m .00 .00	(1:x) 150.0 150.0 150.0 150.0 100.0 2.C. ins) 5.39 5.39 5.39	Tota <u>Netwoi</u> i I.Area (ha) 0 0.080 0 0.085 0 0.000 <u>N</u> US/IL Σ (m) 31.700 31.700 31.500	Al Pipe (ck Desi T.E. (mins) 5.00 5.00 0.00 0.00 etwork Cha) 0.080 0.080 0.080 0.245	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results T Σ Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	= 6.7: for S k (mm) 0.600 0.600 0.600 0.600 <u>Fable</u> Foul (1/s) 0.0 0.0	15 torm HYD SECT 0 0 0 0 Add : (1/	(mm) 300 300 150 Flow 's) 0.0 0.0	<pre>Pipe/ Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28 1.28 1.28</pre>	Condui Condui Condui Condui Condui Cap (l/s) 90.6 90.6	Design t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1
1.000 2.000 1.001 1.002 P1 1.0 2.0 1.0	(m) 30.000 30.000 20.000 N Ra: (mm/ 00 1 00 1 01 1	(m) 0.200 0.200 0.200 0.200 0.200 in T hr) (m .00 .00	(1:x) 150.0 150.0 150.0 150.0 100.0 2.C. ins) 5.39 5.39 5.39	Netword Netword a I.Area (ha) 0 0.080 0 0.080 0 0.085 0 0.085 0 0.085 0 0.085 0 0.085 0 0.080 0	Al Pipe ' rk Desi T.E. (mins) 5.00 5.00 0.00 0.00 etwork : I.Area (ha) 0.080 0.080 0.245 0.245	Volume (m ³) gn Table Base Flow (l/s) 0.0 0.0 0.0 0.0 Results T Σ Base Flow (l/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	= 6.7: <u>for S</u> k (mm) 0.600 0.600 0.600 0.600 <u>Table</u> Foul (1/s) 0.0 0.0 0.0	15 torm HYD SECT 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm) 300 300 150 Flow 's) 0.0 0.0	<pre>Pipe/ Pipe/ Pipe/ Pipe/ Vel (m/s) 1.28 1.28 1.28</pre>	Condui Condui Condui Condui Condui Cap (l/s) 90.6 90.6	Design t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1 t 1

RCD		Page 2
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 05/04/2018 14:54	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Drainage
Micro Drainage	Network 2016.1.1	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	Conr	MH nection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	32.300	0.600	Open	Manhole	300	1.000	31.700	300				
2	32.300	0.600	Open	Manhole	300	2.000	31.700	300				
3	32.300	0.800	Open	Manhole	300	1.001	31.500	300	1.000	31.500	300	
									2.000	31.500	300	
4	32.300	2.900	Open	Manhole	1500	1.002	29.400	150	1.001	31.300	300	2050
EXISTING	32.300	3.100	Open	Manhole	300		OUTFALL	1	1.002	29,200	150	
	-2.000	0.100	or cri	1.4			001111111		1002	29.200	100	

RCD										P	age 3
9 Birch		e Way					IOLMES	ROAD			
Maidsto						LONDON					Ly m
Kent I			1 4 -	1		Dec		20			Micro
Date 0						Designe	-				Drainago
File 11 Micro 1			100304	±.MDX		Checked Networł					
MICIO	DIAI	naye				Network	2010.	1.1			
				PI	PELINE	SCHEDU	LES for	Storm			
					Up	ostream I	Manhole	<u>.</u>			
	PI	-	d Diam t (mm)		C.Level (m)	I.Level (m)	D.Depth (m)	MH Connect		DIAM., L (mm)	ı*₩
	1.0		o 300			31.700		Open Mar			00
	2.0	00	o <u>300</u>	2	32.300	31.700	0.300	Open Mar	hole	3	00
	1.0	01	o 300	3	32.300	31.500	0.500	Open Mar	hole	3	00
	1.0		o 150			29.400		Open Mar			00
					Dov	vnstream	Manhol	e			
1	PN :	Length	Slope	МН	C.Le	evel I.Le	vel D.De	pth	MH	MH DIAM	., L*W
		(m)	(1:X)	Name	•	n) (m)		•	nection	(mm	
			150.0			.300 31.5		500 Open			300
2.	000	30.000	150.0		3 32	.300 31.	500 0.	500 Open	Manhole		300
			150.0 100.0		4 32 ENG 32			700 Open 950 Open			1500 300
			Fı	ree Fl	owing	Outfall	Detail	s for S	torm		
			Outfal			C. Level			D,L	W	
			pe Num		Name	(m)	(m)	I. Leve		mm)	
								(m)			
			1.	002 EX	ISTING	32.300	29.200	29.30	0 300	0	
				Sir	mulati	<u>on Crite</u>	eria fo:	<u>r Storm</u>			
		Volum	netric	Runoff	Coeff	0.750 A	.dditiona	l Flow -	% of To	tal Flow	0.000
		Area				1.000	MADD	Factor *		2	
		He			(mins) l (mm)	0 0 Flo	w per Pe		let Coef		
		e Headl	Loss Co	eff (G	lobal)	0.500	POT 10		Run Tim	e (mins)	60
	Foul	Sewage	e per h	ectare	(l/s)	0.000		Output	Interva	l (mins)	1
						raphs 0 Nu					
						trols 1 Nu trols 0 Nu			5		
				<u>S</u>	ynthet	cic Rain	fall De	tails			
			Ra	infall	Model		FSR	. Ra	tio R 0	.438	
		Ret	urn Pe		years) Decisor	Englau 1		Profile			
					Region 0 (mm)	England a		Cv (Su Cv (Wi			
					©1982	-2016 XF	Solut	ions			

RCD		Page 4
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 05/04/2018 14:54	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Drainage
Micro Drainage	Network 2016.1.1	

Synthetic Rainfall Details

Storm Duration (mins) 30

RCD		Page 5
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 05/04/2018 14:54	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Drainage
Micro Drainage	Network 2016.1.1	

Online Controls for Storm

Complex Manhole: 4, DS/PN: 1.002, Volume (m³): 7.2

<u>Orifice</u>

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 29.400

<u>Orifice</u>

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 30.400

RCD		Page 6
9 Birchtree Way	65-69 HOLMES ROAD	
Maidstone	LONDON	4
Kent ME15 7RP		Micco
Date 05/04/2018 14:54	Designed by RAC	
File 1158-1003 180504.MDX	Checked by JD	Digiligh
Micro Drainage	Network 2016.1.1	

Storage Structures for Storm

Cellular Storage Manhole: 4, DS/PN: 1.002

Invert Level (m) 29.400 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m) Area (m²) Inf. Area (m²) Depth (m) Area (m²) Inf. Area (m²)

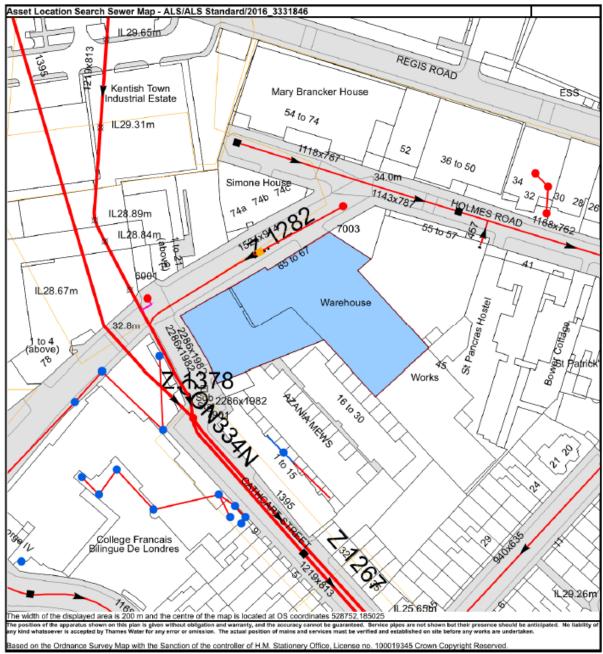
0.000	20.0	20.0	2.501	0.0	64.7
2.500	20.0	64.7			

RCD					Page 7
9 Birchtree Way		65-69 HO	LMES ROAD		
Maidstone		LONDON			4
Kent ME15 7RP					Micco
Date 05/04/2018 14:	54	Designed	by RAC		
File 1158-1003 1805)4.MDX	Checked 1	-		Drainage
Micro Drainage		Network 2	-		
<u>Summary of Cr</u>		<u>ts by Maxi</u> mulation Cr		(Rank 1) fo	<u>r Storm</u>
Hot Hot Sta Manhole Headloss C Foul Sewage per Number o	duction Factor 1 Start (mins) Art Level (mm) Coeff (Global) (1.000 Add 0 0.500 Flow 0.000 aphs 0 Numk	itional Flow MADD Factor I per Person pe per of Storage	* 10m³/ha Sto nlet Coeffieo r Day (l/per/ e Structures	orage 2.000 Sient 0.800 (day) 0.000
	of Offline Cont			2	
Rai	nfall Model	land and Wa		,	
Margin for	DT DV		.5 Second Inci		50.0 ded) ON ON ON
Return Period	Profile(s) n(s) (mins) (s) (years) Change (%)), 120, 180, 2), 1440, 2160,		, 600, 5760,
US/MH	Return Climat	e First ()	() First (Y)	First (Z) Ov	Water rerflow Level
PN Name Storm	Period Change	-			Act. (m)
1.000 1 15 Winte 2.000 2 15 Winte 1.001 3 15 Winte 1.002 4 60 Winte	r 1 +0 r 1 +0	010	ner		31.776 31.776 31.633 30.243
_					
Su US/MH	rcharged Floode Depth Volume		Pipe verflow Flow		Level
PN Name	(m) (m ³)		(1/s) (1/s)	Status E	Inceeded
		-			
1.000 1 2.000 2	-0.224 0.00 -0.224 0.00		11.6 11.6		
1.001 3	-0.224 0.00		33.5	OK	
1.002 4	0.693 0.00			SURCHARGED	
	©1982-	-2016 XP S	Solutions		



Appendix G

Thames Water Sewer Record



Sewer Asset Map showing extents of proposed development