

WIC House, Transport Way

Surface Water Management Strategy

On behalf of T-Squared P4 Ltd

Project Ref: 48055 | Rev: A | Date: January 2021

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Document Control Sheet

Project Name:	WIC House, Transport Way
Project Ref:	48055
Report Title:	Surface Water Management Strategy
Doc Ref:	48055-STN-ZZ-XX-RP-C-1001
Date:	January 2021

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For and on behalf of Stantec UK Limited									

Revision	Date	Description	Prepared	Reviewed	Approved
-	27/01/21	First Issue	JS	SH	TE
A	29/01/21	Revision to Site Layout included in Appendix A	JS	SH	TE

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1 Introduction

1.1 Summary

- 1.1.1 Stantec UK Ltd (Stantec) have been commissioned by T-Squared P4 Ltd to assist with the drainage input to the planning application for the proposed redevelopment of WIC House, Transport Way, Oxford.
- 1.1.2 The purpose of this report is to identify and describe the proposed site drainage, with consideration to ground conditions, geology, contamination, ground water across the site; and best Sustainable Drainage (SuDS) practice.

1.2 Site Proposals

- 1.2.1 The proposal for the site is to demolish the existing building comprising office and laboratory spaces and erect a new building on a similar footprint. The new building will comprise office and laboratory space, optimised for present and future uses of the building.
- 1.2.2 The site is fully occupied by the existing building and car parking, with only small borders comprising soft landscaping; the impermeable area is approaching 100% of the site area. The site proposals will retain a similar layout, so no significant change in impermeable area will occur. The gross internal area of the proposal is approximately 6,300m³. Through redevelopment of the site there is potential for green roofs to be installed to parts of the roof structure to intercept and reduce run-off via evapotranspiration.
- 1.2.3 A site layout is included in Appendix A.

1.3 Reference Documents

- 1.3.1 This surface water and foul water management strategy has been designed and prepared with reference to documents and information sources provided and/or published by the following bodies:
 - a. CIRIA C753 The SUDs Manual and SUDs Hierarchy;
 - b. National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG);
 - c. Oxfordshire County Council Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire (November 2018);
 - d. Environment Agency (EA) Standing Advice;
 - e. Thames Water;
 - f. Code for Adoption / Sewerage Sector Guidance where applicable;
 - g. Relevant Building Regulations where applicable;
 - h. Best practice;



2 Site Context

2.1 Site Description and Location

- 2.1.1 The site is located in Cowley, Oxford, on Transport Way. The postcode is OX4 6LT and the National Grid Reference (NGR) is 455740E, 203470N. The site area is approximately 4,750m² (0.48ha).
- 2.1.2 The existing site consists of a 2 storey office block with a rear extension forming a single floor of lab spaces with a mezzanine. Staff parking is provided to the side and rear of the building.
- 2.1.3 The surrounding area includes further light industrial uses along Transport Way, to the north lies the BMW Mini plant, and to the west of Garsington Road lies Blackbird Leys and Greater Leys residential developments.

2.2 Flood Risk

- 2.2.1 A site-specific Flood Risk Assessment (FRA) is not required as Environment Agency (EA) standing advice, updated October 2015, states that an FRA is only required when the development area is greater than 1 ha or will change the use to a more vulnerable category for a proposed development within Flood Zone 1. This site is less than 1 ha in area, and the site use following redevelopment will remain as before.
- 2.2.2 The site is located entirely within Flood Zone 1 and therefore has a low probability of flooding from nearby watercourses. The nearest watercourse is Northfield Brook, a tributary to the River Thames, located 850m to the south-east of the site. Figure 2.1, below, shows the site on the EA flood mapping service.



Figure 2.1: Site Location and Flood Zones (.gov.uk flood map)



2.2.3 The Long Term Flood Risk Map for England (gov.uk) shows the site to be at negligible to no risk of flooding from rivers, the sea or reservoirs. However, the mapping tool does show the site to be at *medium to high* risk of surface water flooding across part of its extent corresponding to the car parking areas. The flood risk map is based on mathematical modelling, considering surfaces, topology and existing land uses. This modelling suggests the site has some surface water flooding, which is shown to originate from the existing development only (see Figure 2.2, below). The proposed design for the site does not produce any surface flooding in the 1 in 100 year (+ 40% climate change allowance). Consequently, there should be no source for this flooding post-development.



2.3 Site Topography

2.3.1 The site levels lie between 70.10mAOD at the junction on to Transport Way, to high points of 71.20mAOD along the back boundary of the site. The site is currently occupied by a large building and car parking, with limited soft landscaping.

🕒 Over 900mm 🔵 300 to 900mm 🛑 Below 300mm 🕁 Location you selected

2.4 Geology and Hydrology

- 2.4.1 The geological record data from the British Geological Society (BGS) indicate that the bedrock geology of the Site is the Beckley Sand Member. No superficial deposits were identified.
- 2.4.2 The permeability of the Beckley Sand Member varies with its silt/clay content although is predominantly sandy, it may be suitable for infiltration drainage. This suitability can be confirmed by site-specific infiltration testing as part of routine ground investigation at the detailed design phase of the project. See Figure 2.3 for British Geological Society mapping.





Figure 2.3: BGS Surface Geology Mapping

2.5 Existing Drainage Regime

- 2.5.1 The site is a brownfield site with almost 100% impermeable area of 0.475ha. The existing onsite surface water network is a simple piped system with road gullies draining the parking areas and direct connections from rainwater pipes (RWPs). No attenuation is present on-site, so the site discharges at brownfield rates which are unrestricted via a 300mm connection to the Thames Water surface water sewer within Transport Way.
- 2.5.2 In line with the now-withdrawn Pollution Prevention Guidance 3, as the on-site parking provides more than 50 parking spaces, the surface water discharges via a petrol interceptor to the Thames Water sewer.
- 2.5.3 Brownfield discharge rates for the Sites were calculated using Microdrainage to determine the present discharge rates from each Site. These can be seen in Table 2.1, below, and the calculations are in Appendix B.

Return Period (Years)	Brownfield Discharge Rate (I/s)
1 in 1	57.8
1 in 30	123.2
1 in 100	155.5



2.5.4 The Rural Run-off function within Microdrainage was used to determine the calculated Greenfield Run-off rate of the Sites, shown in Table 2.2 below. Refer to Microdrainage Greenfield Runoff Calculations in Appendix C.

Return Period	Greenfield Run-off Rates						
(Years)	Per Hectare (I/s/ha)	Site (0.475ha) (l/s)					
1 in 1	3.4	1.6					
QBAR	3.8	1.8					
1 in 30	8.6	4.1					
1 in 100	12.2	5.8					

Table 2.2: Greenfield Rates for the Sites.

2.5.5 A foul water network is also present on-site, discharging by gravity to the Thames Water foul water sewer within Transport Way.



3 Surface Water Drainage

3.1 Treatment of Existing Drainage

- 3.1.1 In line with local policy existing drainage shall be reused where possible. As the existing network does not provide any flow control or attenuation storage these will be added to the network, as outlined below.
- 3.1.2 Although the petrol interceptor will not be necessary for the treatment of surface water following the below proposals, it will be retained as a secondary treatment system.
- 3.1.3 The foul water network will be retained where possible and diverted where it falls within the footprint of the proposed building.

3.2 Climate Change Allowances

- 3.2.1 In February 2016 the Environment Agency released 'Flood risk assessments: climate change allowances' guidance to support the NPPF. Within this guidance it states that the appropriate allowances for increases in peak rainfall intensity for the proposed development over the next 100 years are the central and upper end allowances for increases in peak rainfall intensity of 20% and 40% respectively.
- 3.2.2 This SWMS has undertaken calculations to inform the design of surface water systems based on a 40% increase in peak rainfall intensity (the upper end allowance).

3.3 **Proposed Surface Water Drainage**

3.3.1 Following the SuDS hierarchy as outlined in the Planning Policy Guidance, see Figure 3.1, the preferable outfall option is an infiltration system. Due to limited space on site an infiltration solution is impractical. No surface water body is located close by and hence the third option is the most reasonably practicable. Hence the site redevelopment will re-use the existing surface water discharge, with modification, to the Thames Water surface water sewer in Transport Way.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

- 1. into the ground (infiltration);
- 2. to a surface water body;
- 3. to a surface water sewer, highway drain, or another drainage system;
- 4. to a combined sewer.

Figure 3.1: Extract of Planning Policy Guidance on Flood Risk and Coastal Change.

- 3.3.2 Whilst the existing run-off discharged at unrestricted, brownfield, rates, in accordance with current guidance this run-off rate must be improved through the redevelopment. This has been achieved by the use of porous sub-base and filter drain systems and a double orifice plate flow control.
- 3.3.3 The site has negligible soft landscaping, consequently any attenuation storage required will be placed beneath the existing / proposed car park. The car park at present is surfaced with an impermeable concrete surface, drained by road gullies into the piped surface water network. The redevelopment will amend the parking layout slightly to suit the proposals, resulting in 700m² of parking bays and 650m² of circulation space.



- 3.3.4 Oxfordshire County Council's "Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire" document outlines that new development, including on brownfield sites, should always discharge at greenfield rates unless this is impractical. Calculations using Microdrainage's Quick Storage Estimate function (Appendix D) shows that limiting the discharge rate to QBar (1.8l/s) in the 1 in 100 year + 40% climate change rainfall event would require 340 to 450m³ of attenuation storage. This would require in the region of 1,300m³ of open graded coarse aggregate to be imported to site (with a similar volume of spoil exported); installed either as a 2.0m thickness of porous sub-base beneath the parking bays, or a 1.0m thickness if the whole concrete car park was replaced with a new surface with porous sub-base. This is an impractical solution and hence an approach seeking betterment over the existing discharge rates has been sought.
- 3.3.5 To achieve a practical volume of attenuation storage we have limited the attenuation storage to a 500mm blanket beneath the parking bays, for a total storage volume of 105m³. This has allowed a betterment of 48 70% to be achieved over the design rainfall events (Table 3.1).

Return Period (years)	Brownfield Discharge Rate (I/s)	Proposed Discharge Rate (I/s)	Betterment Achieved
1 in 1	57.8	30.2	48%
1 in 30	123.2	37.7	69%
1 in 100	155.5	-	-
1 in 100 (+40% climate change)	-	46.0	70%

Table 3.1: Existing and Proposed Discharge Rates and Betterment Achieved.

- 3.3.6 To maximise the utilisation of the attenuation storage and the betterment across the rainfall events, a complex flow control is proposed for the outfall. This will comprise 2no. orifice plates. The lower orifice plate will be a 125mm diameter orifice, mounted at the invert level of the flow control chamber. The upper orifice plate, utilised in 1 in 30 year rainfall event and higher order events, will be mounted 1m above the invert level of the flow control chamber and comprise a 75mm orifice plate.
- 3.3.7 The porous sub-base of the parking bays will be connected to the existing piped network by filter drains. Where possible rainwater pipes will discharge directly into the porous sub-base via rainwater diffuser units, rather than into the piped network; this will add in attenuation of these flows.
- 3.3.8 It is proposed to resurface the parking bays with a porous surface course over the porous subbase, and hence their surface area will drain directly into the porous sub-base. The majority of the remaining concrete surfacing, forming the circulation spaces of the car park, will drain by cross-fall onto the new porous-surfaced parking bays and hence into the drainage network. This mimics the existing drainage of the car park as the gullies where located along the edge of the parking bays, maintaining the same site levels will retain these low points at the edge of the porous paving. In accordance with CIRIA C753 (Section 20.5.1b), the approximately 1:1 ratio of the car parking bays to the remaining concrete area is acceptable for the discharge of the surface water flows from the concrete areas directly onto the porous surfacing.
- 3.3.9 The proposals have been calculated using Microdrainage, a Network Model report is included in Appendix E. The site is currently shown as being of medium to high risk of surface water flooding arising on-site (see Section 2.2.3). The calculations show the proposals will not flood up to and including the 1 in 100 year (+ 40% climate change) rainfall event; and hence will



eliminate surface water flooding on site for the design rainfall events and reduce the surface water flood risk for higher order rainfall events.

3.3.10 The drainage layout is included on drawing 48055-STN-ZZ-XX-DR-C-1001, Appendix F, with standard details included on drawing 48055-STN-ZZ-XX-DR-C-5001, Appendix G.

3.4 Volumetric Run-off Coefficient

- 3.4.1 In considering suitable volumetric run-off coefficients (C_v) values for the development we consulted Oxfordshire County Council's Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire document; however, no guidance on C_v values suitable for use locally in Oxfordshire was suggested.
- 3.4.2 The Wallingford Procedure Volume 4 states the average value of the Volumetric Run-off Coefficient (C_v) is 0.75. This value reflects the loss of some rainfall from impervious areas through cracks, into depressions and by drainage onto pervious areas. We have included an uplift in the value of C_v to 0.84 for winter rainfall events to reflect the higher antecedent wetness of the soils and surfaces due to winter weather conditions.
- 3.4.3 Whilst in some situations C_v values up to 0.95 may be necessary, this is commonly used where a roof catchment is collected directly into a sealed network via rainwater pipes. This scheme will direct roof run-off into the porous sub-base system and the external surfacing drain into the porous surfacing; these areas will not pass all surface water through the network as some will evaporate, infiltrate or run-off into soft landscaping areas. Consequently, we have used a C_v of 0.84 during winter events and a C_v value of 0.75 during summer events.

3.5 **Contamination and Treatment**

- 3.5.1 Guidance on contamination hazard levels, and suitable treatment, is given in the SuDS Manual 2015, CIRIA C753. The two sources of pollution the surface water network of this site may experience are rainfall-borne contaminants and contamination associated with the car park. In accordance with Table 26.2, these are classified as resulting as of *very low* and *medium* pollution hazard levels respectively.
- 3.5.2 CIRIA C753 outlines treatment indices in Table 26.3 (CIRIA C753), to quantify the treatment potential of differing SuDS systems as compared to the pollution hazard level of Table 26.2 (CIRIA C753). This table shows that filter drains will provide suitable treatment for the rainfall flows from the roofs. The pollution hazard associated with the car parking is higher, but the tables indicate the porous surfacing will provide sufficient treatment for this higher pollution load. This is also corroborated by the design notes accompanying section 9.7.3 of the Oxford City Council SuDS Guide (2018), showing permeable pavement systems provide sufficient treatment prior to infiltration of rainwater into the ground for the low to medium pollution hazard level classes, which includes car parking.
- 3.5.3 The site outfall at present includes a petrol interceptor. As this interceptor is understood to be functional it will be retained as a secondary treatment system in addition to the above outlined SuDS features.

3.6 Maintenance

Description of Features

3.6.1 With reference to the design proposals set out in drawing 48055-STN-ZZ-XX-DR-C-1001 (Appendix F), Table 3.2 below outlines which organisation or person is responsible for the maintenance of each of the elements of the sustainable drainage systems for this scheme.



Proposed SuDS Feature	Maintenance Responsibility
Porous Surfacing and Sub-base	Private Maintenance Company
Filter Drains	Private Maintenance Company
Catchpits	Private Maintenance Company
Flow Control Device	Private Maintenance Company

Table 3.2: Proposed SuDS Features Maintenance Responsibility

Types of maintenance

- 3.6.2 Maintenance requirements for the features in Table 3.2 have been reviewed and summarised in accordance with C753, the SuDS maintenance manual 2015, below:
 - Regular Maintenance: consists of basic tasks carried out to a frequent and predictable schedule, including inspections/monitoring, silt or oil removal if required more frequently than once per year, vegetation management, sweeping of surfaces and litter and debris removal.
 - Occasional Maintenance: comprises tasks that are likely to be required periodically, but on a much less frequent (typically less than yearly) and much less predictable basis than the regular tasks. Tasks considered occasional maintenance include sediment removal and filter replacement.
 - Remedial Actions: describes the intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by regular maintenance activities. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and so timings are difficult to predict. Remedial maintenance can comprise activities such as: inlet and outlet repairs, reinstatement or realignment of edgings, infiltration surface rehabilitation, replacement of blocked filter materials/fabrics, construction stage sediment removal (although this activity should have been undertaken before the start of the maintenance contract) and system rehabilitation immediately following a pollution event.
- 3.6.3 It is important to note that all maintenance operations should be undertaken in accordance with the chosen manufacturer's guidance, recommendations and best practice.
- 3.6.4 Figure 3.2, below, an extract from CIRIA C753, shows anticipated maintenance requirements of SuDS features.



Operation and maintenance activity	SuDS component												
	Pond	Wetland	Detention basin	Infiltration basin	Soakaway	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swale/bioretention/ trees	Filter strip	Green roofs	Proprietary treatment systems
Regular maintenance				1	1					1			
Inspection													
Litter and debris removal													
Grass cutting													
Weed and invasive plant control													
Shrub management (including pruning)													
Shoreline vegetation management													
Aquatic vegetation management													
Occasional maintenance	_	-											1
Sediment management ¹													
Vegetation replacement													
Vacuum sweeping and brushing													
Remedial maintenance	_			-									-
Structure rehabilitation /repair													
Infiltration surface reconditioning													

Key

will be required

may be required

Notes

1 Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

Figure 3.2: Extract from CIRIA C753, summary of SuDS Maintenance Requirements.

3.6.5 Regular maintenance of the surface water network and SuDS features will ensure their continued operation and effectiveness in managing surface water and reducing local flood risks.

3.7 Further Drainage Design Notes

- 3.7.1 Catchpits are proposed for all new inspection chambers to capture silt where possible.
- 3.7.2 An allowance for urban creep has not been included in calculations; the impermeable area that is proposed cannot increase over the development's lifetime as it has been assumed to be 100% of the site area.
- 3.7.3 Flood exceedance flows are shown on drawing 48055-STN-ZZ-XX-DR-C-1002, Appendix H, showing that any potential flooding in extreme rainfall events will be channelled away for the proposed building on site.



4 Summary

- 4.1.1 It is proposed to redevelop the WIC House site to provide a new office and laboratory complex. This redevelopment will not change the impermeable area of the site, which is almost 100% impermeable.
- 4.1.2 The surface water drainage strategy has been designed in accordance with Lead Local Flood Authority guidance for Major Developments. The site will re-use the existing outfall to the Thames Water surface water sewer in Transport Way. The site currently discharges at unrestricted brownfield rates, and the redevelopment will utilise porous paving and sub-base to provide treatment and attenuation storage before discharge at restricted rates. A betterment in discharge rates of 48 – 70% will be achieved across the design rainfall events.
- 4.1.3 The site is currently shown on Environment Agency data as being at medium to high risk of surface water flooding from on-site sources. The drainage design proposed will eliminate any causes of on-site flooding up to and including 1 in 100 year (+ 40% climate change allowance) rainfall event and hence will reduce the risk of surface water flooding on-site. Flood exceedance flows show that any potential flooding in rainfall events exceeding the design events will be directed away from the proposed building.
- 4.1.4 The presented drainage strategy demonstrates that the site boundary can be drained in a sustainable manner without increasing the risk of flooding to neighbouring properties for events up to and including the 1 in 100 year (plus 40% climate change) rainfall event.
- 4.1.5 This surface water drainage strategy has been prepared to demonstrate that the proposed development can meet national and local requirements.



Appendix A Site Layout



Proposed Site Plan

Super Market 2x Existing Trees Tenant Parking 29x spaces 56 Proposed - Automatic Security Gate to Parking Parking Spaces Tenant Parking 21x spaces 1x Disabled Bay, 14x Car charging points. 56 Bike Parking spaces with 3x Ev Charging points ____ 0 0 0 0 0 É Windrush Court





Appendix B Brownfield Run-off Calculations

Peter Br	ett Asso	ciates	LLP								Pag	ge 1
Marlboro	ugh House	9		Bro	ownfi	eld C	alcul	ation	IS			
High Str	eet			WIC	C Hou	ise						
Kidlingt	on OX5 2	2 DN									N/I	icco
Date 07/	12/2020 1	L5:02		Des	signe	d by	B. Hi	llery	7			
File 201	207 Brown	nfield	Run-o.	Che	ecked	l by J	. Sym	.s				ainage
Micro Dr	ainage			Net	zwork	: 2019	.1					
	STOP	M SEWE	R DESIC	SN by	the N	<u>lodifi</u>	ed Ra	tiona	al M	ethod	<u>1</u>	
			<u>Desi</u>	gn Cri	teri	a for	Stor	<u>m</u>				
		Pipe	e Sizes	STANDAF	RD Mar	hole S	izes S	TANDAF	RD			
		न	SR Rainf	all Moc	1e1 -	Englan	d and	Wales				
	Ret	urn Peri	od (year	s)	1						PIMP (%) 100
			M5-60 (n	nm) 20.	000		Add Fl	low /	Clima	ate Ch	ange (응) 0
	Mavimu	m Rainfo	Ratio	or RO.	400 200		Mini Mavi	imum B	ackd:	rop He	eight (m) 0.200 m) 1 500
Maximum	Time of Co	ncentrat	ion (mir	ns)	30 M	in Desi	ign Dep	oth fo	r Op	timisa	ition (m) 1.200
	Fo	ul Sewag	re (l/s/ł	na) 0.	000	Min V	Vel foi	r Auto	Des	ign or	uly (m/	s) 1.00
	Volume	tric Run	off Coef	f. 0.	750	Mir	n Slope	e for (Optin	nisati	on (1:	X) 500
			Des	igned w	ith L	evel Ir	nverts					
	Time Area Diagram for Storm											
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PN Le	ength Fall	Slope	I.Area	T.E.	В	ase	k	HYD	DIA	Sect	ion Tyj	pe Auto
	(m) (m)	(1:X)	(na)	(mins)	FTOM	(1/S)	(mm)	SECT	(mm)			Design
S1.000 57	7.370 0.430	133.4	0.062	5.00		0.0	0.600	0	225	Pipe	/Condu:	it 🔒
S1.001 10	$0.640 \ 0.100$) 106.4	0.200	0.00		0.0	0.600	0	225	Pipe	/Condu:	it 🤒
SI.002 23	3.140 0.010) 2314.0	0.129	0.00		0.0	0.600	0	300	Ріре	/Condu	it 🎁
			Ne	twork	Resu	<u>lts T</u>	<u>able</u>					
PN	Rain	т.с. т	JS/IL Σ	I.Area	ΣΙ	Base	Foul	Add F	low	Vel	Cap	Flow
	(mm/hr)	(mins)	(m)	(ha)	Flow	(l/s)	(l/s)	(1/s	s)	(m/s)	(l/s)	(1/s)
s1.000	50.98	5.85 <mark>6</mark>	9.000	0.062		0.0	0.0		0.0	1.13	44.9	8.6
S1.001	50.42	5.99 6	8.570	0.262		0.0	0.0		0.0	1.27	50.4	35.8
S1.002	46.08	7.20 <mark>6</mark>	8.470	0.391		0.0	0.0		0.0	0.32	22.5«	48.8
			©	1982-2	2019	Innov	yze					

Peter Brett Associates LLP		Page 2
Marlborough House	Brownfield Calculations	
High Street	WIC House	
Kidlington OX5 2DN		Micro
Date 07/12/2020 15:02	Designed by B. Hillery	
File 201207 Brownfield Run-o	Checked by J. Syms	Diamage
Micro Drainage	Network 2019.1	

<u>Manhole Schedules for Storm</u>

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diamet (mm)	er	Backdrop (mm)
S1	70.480	1.480	Open Manhole	1200	S1.000	69.000	225					
s2	70.370	1.800	Open Manhole	1200	S1.001	68.570	225	s1.000	68.570	2	25	
s3	70.390	1.920	Open Manhole	1200	S1.002	68.470	300	S1.001	68.470	2	25	
S	70.070	1.610	Open Manhole	0		OUTFALL		S1.002	68.460	3	00	

No coordinates have been specified, layout information cannot be produced.

Peter Brett Associates LLP		Page 3
Marlborough House	Brownfield Calculations	
High Street	WIC House	
Kidlington OX5 2DN		Micro
Date 07/12/2020 15:02	Designed by B. Hillery	
File 201207 Brownfield Run-o	Checked by J. Syms	Diamage
Micro Drainage	Network 2019.1	

PIPELINE SCHEDULES for Storm

<u>Upstream Manhole</u>

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
S1.000	0	225	S1	70.480	69.000	1.255	Open Manhole	1200
S1.001	0	225	S2	70.370	68.570	1.575	Open Manhole	1200
S1.002	0	300	S3	70.390	68.470	1.620	Open Manhole	1200

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)
s1.000	57.370	133.4	S2	70.370	68.570	1.575	Open Manhole	1200
S1.001	10.640	106.4	S3	70.390	68.470	1.695	Open Manhole	1200
S1.002	23.140	2314.0	S	70.070	68.460	1.310	Open Manhole	0

Peter Brett Associates LLP		Page 4
Marlborough House	Brownfield Calculations	
High Street	WIC House	
Kidlington OX5 2DN		Mirro
Date 07/12/2020 15:02	Designed by B. Hillery	
File 201207 Brownfield Run-o	Checked by J. Syms	Diamage
Micro Drainage	Network 2019.1	

Area Summary for Storm

Pipe Number	РІМР Туре	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.062	0.062	0.062
1.001	-	-	100	0.200	0.200	0.200
1.002	-	-	100	0.129	0.129	0.129
				Total	Total	Total
				0.391	0.391	0.391

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Peter Bre	ett A	ssoci	lates L	LP					Page 5
Marlborou	ıgh H	ouse			Brownf	ield Ca	lculatio	ns	
High Stre	et				WIC Ho	use			
Kidlingto	on Ož	X5 21	ON						Micco
Date 07/1	2/20	20 15	5:02		Design	ed by B	. Hiller	У	
File 2012	207 B	rowni	field R	un-o	Checke	d by J.	Syms		Digiliada
Micro Dra	inag	е			Networ	k 2019.	1		
			Net	work Cla	assifica	ations	for Stor	<u>m</u>	
PN	USMH	Pipe	Min Cove	er Max Co	ver Pip	e Type	MH MH	MH Ring	МН Туре
	Name	Dia (mm)	Depth (m)	Dept	h		Dia Widt	h Depth	
		(11111)	(11)	(111)			(1111) (1111)	, (,	
S1.000	S1	225	1.25	55 1.	575 Uncla	assified	1200	0 1.255	Unclassified
S1.001	S2	225	1.5	75 1. 10 1	695 Uncla	assified	1200	0 1.575	Unclassified
51.002	55	500	1.0	10 1.	020 011016	133111eu	1200	0 1.020	UNCLASSIFIED
			Free 1	Flowing	Outfall	Detail	.s for St	lorm	
		Ou	tfall	Outfall C	C. Level	I. Level	Min	D,L W	
		Pipe	Number	Name	(m)	(m)	I. Level	(mm) (mm)	
							(111)		
			S1.002	S	70.070	68.460	68.090	0 0	
				©19	82-2019	Innovy	ze		

Peter B	rett	Associat	es LLP						Page	6
Marlbor	ough	House		E	Brownfi	eld Ca	lculati	ons		
High St	reet			V	VIC Hou	ise				
Kidling	ton	OX5 2DN							Mic	
Date 07	/12/2	020 15:0	2	I	Designe	d by B	. Hille	ery		
File 20	1207	Brownfie	ld Run-	-0 0	Checked	l by J.	Syms	-	Uld	mage
Micro D	raina	ge		l	letwork	2019.	1			
<u>1 year</u> Mar	<u>Retu</u>	rn Perio Areal Redu Hot Stan eadloss Co wage per H Number of Number o Number o Rain	d Summa action Fr Start (1 ct Level beff (Gl- bectare Input F of Onlir f Offlir fall Mod	<u>Simu</u> actor 1. mins) (mm) obal) 0. (1/s) 0. lydrograp le Contro le Contro <u>Synthet:</u> del .on Engla	<u>Critica</u> <u>for St</u> <u>lation (</u> 000 A 0 500 Flow 000 0hs 0 Nu 0ls 0 Nu 0ls 0 Nu 0ls 0 Nu 0ls 0 Nu	al Resu orm Criteria dditiona MADD w per Pe umber of umber of imber of fsR Wales C	lts by lts by Factor * Factor * rrson per Storage Time/Ar Real Tim ails Ratio	Maximum I % of Total 10m³/ha St ilet Coeffic Day (l/per Structures ea Diagrams me Controls R 0.400 r) 0.750	2evel (R 5000 0.0 5000 2.0 5000 2.0 5000 0.0 5000 0.0 0 0 0 0 0	ank 1) 000 000 000
	Retu	Margin fo Duration rn Periodo Climate	Profile (s) (year Change	Risk Wa Analysi (s) hs) (%)	rning (n s Timest DTS Stat 15, 30, 720, 9	nm) 300. tep Fin tus O 60, 120, 60, 1440	0 DV e Inerti N , 180, 2- 0, 2160,	7D Status OF a Status OF Summer and 40, 360, 48 2880, 4320 7200, 8640 1, 2, 0,	FF FF 0, 600, , 5760, , 10080 30, 100 0, 0, 0	
PN	US/MH Name	Storm	Return Period	Climate Change	First Surcha	(X) F arge	irst (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	1	+0%	30/15 S	Summer				69.068
S1.001	S2	15 Winter	1	+0%	1/15 S	ummer				68.852
51.002	PN \$1.000	Suz US/MH Name	ccharged Depth (m) -0.157	+0% Flooded Volume (m ³) 0.000	1/15 S Flow / Cap.	Overflc (1/s)	Pipe 5W Flow (1/s) 8.3	Status OK	Level Exceeded	68.191
	S1.001 S1.002	s∠ S3	0.027	0.000	2.17		45.3	SURCHARGED		
				©1982	-2019	Innovv	7.e			

Peter Br	ett 2	Associate	es LLP						Page	7
Marlborc	ugh l	House		E	Brownfi	eld Ca	lculati	ons		
High Str	reet			V	NIC Hou	se				
Kidlingt	on (OX5 2DN							Mic	
Date 07/	12/2	020 15:02	2	Γ	esigne	d by B	. Hille	ery		in ago
File 201	207 1	Brownfie	ld Run-	·o 0	Checked	by J.	Syms		DIC	inage
Micro Dr	aina	ge		N	letwork	2019.	1		1	
<u>2 year</u>	<u>Retu</u>	rn Perioo Areal Redu Hot Hot Star	d Summa action Fa Start (r t Level	<u>ry of (</u> <u>Simu</u> actor 1. nins) (mm)	<u>for St</u> <u>lation (</u> 000 Ac 0 0	al Resu orm Criteria dditiona MADD	lts by I Flow - Factor * In	Maximum I % of Total 10m³/ha St let Coeffie	Level (Ra Flow 0.0 corage 2.0 ecient 0.8	ank 1) 000 000 000
Manh Fc	ole H oul Se	eadloss Co wage per h Number of	eff (Glo ectare Input H	obal) 0. (l/s) 0. ydrograp	500 Flow 000 Dhs 0 Nu	w per Pe mber of	erson per Storage	Day (l/per Structures	0.0	000
		Number o	of Onlin f Offlin	e Contro e Contro	ols O Nu ols O Nu	mber of mber of	Time/Aro Real Tin	ea Diagrams me Controls	0 0	
		Rain	fall Mod Regi M5-60 (m	<u>Synthet</u> el on Engla m)	ic Rainf and and 2	FSR Wales Cr 0.000 Cr	ails Ratio v (Summe: v (Winte:	R 0.400 r) 0.750 r) 0.840		
		Margin fo	or Flood	Risk Wa Analysi	rning (m s Timest DTS Stat	nm) 300. cep Fin cus O	0 DV e Inerti N	7D Status OH .a Status OH	FF	
		Duration	Profile((s) (mir	(s) ns) 1	15, 30, 720, 9	60, 120, 60, 1440	, 180, 24), 2160,	Summer and 40, 360, 48 2880, 4320 7200, 8640	Winter 0, 600, , 5760,	
	Retu	rn Period(Climate	s) (year Change (îs) (응)				1, 2, 3	30, 100 0, 0, 0	
U PN S	JS/MH Name	Storm	Return Period	Climate Change	First Surcha	(X) F. arge	irst (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000 S1.001 S1.002	S1 S2 S3	15 Winter 15 Winter 15 Winter	2 2 2	+0% +0% +0%	30/15 s 1/15 s 1/15 s	ummer Summer				69.078 68.919 68.830
	PN	Sur US/MH 1 Name	charged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflo (l/s)	Pipe w Flow (l/s)	Status	Level Exceeded	
S S S	1.000 1.001 1.002	S1 S2 S3	-0.147 0.124 0.060	0.000 0.000 0.000	0.25 0.93 2.77		10.8 39.5 57.8	OK SURCHARGED SURCHARGED		
				e1 000	2010	Taxa				
				⊜⊥90 ∠	-2019	TUUOVA	2 U			

Peter B	Brett	Associat	es LLP						Page	e 8
Marlbon	rough	House			Brownfi	eld Ca	lculati	ons		
High St	reet				WIC Hou	ise				
Kidling	gton	OX5 2DN							Mic	
Date 07	7/12/2	020 15:0	2		Designe	ed by B	. Hille	ery		
File 20	01207	Brownfie	eld Run-	-0	Checked	l by J.	Syms		DIC	maye
Micro I	Draina	ge			Network	2019.	1		I	
<u>30 yea</u>	r Reti	urn Perio	od Summ	ary of	Critic	al Res	ults by	Maximum	Level (H	Rank 1)
					<u>for St</u>	orm				
				C i mu	lotion	~~				
		Areal Red	uction F	actor 1	.000 A	dditiona	al Flow -	- % of Tota	l Flow 0.	000
		Hot	Start (mins)	0	MADD	Factor *	* 10m³/ha St	torage 2.	000
		Hot Sta	rt Level	(mm)	0		Ir	nlet Coeffie	ecient 0.	800
Mai	nhole H Foul Se	Headloss C ewage per	oeff (Gl hectare	obal) 0. (1/s) 0.	.500 Flo [,] .000	w per Pe	erson per	r Day (l/pe:	r/day) 0.	000
				(_, _, _,						
		Number of	Input H	lydrogra	phs 0 Nu	mber of	Storage	Structures	0	
		Number	of Onlin	ne Contr	ols 0 Nu ols 0 Nu	umber of	Time/Ar	ea Diagrams me Controls	0	
		Nulliber (ie conci	OIS U NU	under or	Neal II.	INE CONCLOIS	0	
				Synthet	ic Rainf	all Det	ails			
		Rair	nfall Mod	lel an Engl		FSR Welse C	Ratio	R 0.400		
			M5-60 (m	.on Engi um)	and and 2	0.000 C	v (Summe v (Winte	r) 0.750 r) 0.840		
			,	,				,		
		Margin f	or Flood	Risk Wa	rning (n	nm) 300.	.0 DV	/D Status O	FF	
				Analysi	s Timest DTS Stat	tep Fin	ne Inerti NN	La Status O	FF	
					DID Stat		711			
			Ductile					Cummon and	Minton	
		Duratio	Profile n(s) (min	(s) ns)	15, 30,	60, 120	, 180, 2	Summer and 40, 360, 48	0, 600,	
					720, 9	60, 144	0, 2160,	2880, 4320	, 5760,	
								7200, 8640	, 10080	
	Retu	Irn Period	(s) (yea: Change	rs) (응)				1, 2,	30, 100	
		CIIMACC	chunge	(0)				0,	0, 0, 0	
	US/MH		Return	Climate	First	(X) F	'irst (Y)	First (Z)	Overflow	Water Level
PN	Name	Storm	Period	Change	Surch	arge	Flood	Overflow	Act.	(m)
C1 000	01	15 Minton	20	1.0.0	20/15 0	1				CO E00
S1.000 S1.001	S1 S2	15 Winter 15 Winter	: 30 : 30	+0% +0%	30/15 S	Summer Summer				69.590 69.519
S1.002	S3	15 Winter	30	+0%	1/15 S	Summer				69.138
		S11	raharged	Flooder	1		Pipe			
		US/MH	Depth	Volume	Flow /	Overflo	ow Flow		Level	
	PN	Name	(m)	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded	L
	01 000	0.1	0 265	0 000			01 0	OLID CHAR CER		
	S1.000	51 52	0.365	0.000) 1.94		∠⊥.6 82.0	SURCHARGED	I	
	S1.002	S3	0.368	0.000	5.90		123.2	SURCHARGED	I.	
				@1 0 0 /	2_2010	Topossi				
I				OT 287	2-2019	тшолд	ze			

								5	
Peter Brett	Associate	s LLP						Page	. 9
Marlborough	House		B	rownfie.	ld Cald	culati	ons		
High Street			W	IC House	9				· · · · ·
Kidlington	OX5 2DN							Mir	ſſ
Date 07/12/2	020 15:02		D	esigned	by B.	Hille	ry		inago
File 201207	Brownfiel	d Run-o	c	hecked b	by J. S	Syms		DIC	inage
Micro Draina	ge		N	etwork 2	2019.1				
Micro Draina <u>100 year Re</u> Manhole F Foul Se	ge eturn Peri Areal Reduc Hot S Hot Start leadloss Coe ewage per he Number of Number of Number of Rainf Margin for	od Summ stion Fac Start (min tevel (n eff (Globa ectare (1) Input Hyd f Online Offline Offline Stall Model Region 5-60 (mm) c Flood R.	N ary o <u>1</u>) tor 1.(ns) nm) al) 0.5 (s) 0.0 (s) 0.0 (f Critic for Sto for Sto lation Cr. 000 Add 0 0500 Flow p 000 hs 0 Numb ls 0 Numb ls 0 Numb ls 0 Numb c. Rainfal .c. Rainfal .c. Rainfal .c. Rainfal .c. Rainfal .c. Rainfal .c. Status	2019.1 2019.1 2al Res orm iteria itional MADD Fa per Pers per of S per of T per of R l Detai FSR les Cv 000 Cv 300.0 p Fine S ON	Flow - actor * In son per torage ime/Arce eal Tir <u>ls</u> Ratio (Summer (Winter DV Inerti	% of Total 10m³/ha St let Coeffie Day (1/per Structures a Diagrams ne Controls R 0.400 c) 0.750 c) 0.840 D Status OF a Status OF	n Level Flow 0.0 orage 2.0 ccient 0.8 /day) 0.0 0 0 0	(Rank 000 000 000
Retu	F Duration(rn Period(s Climate C	Profile(s) s) (mins) (years) Change (%)	1	5, 30, 60 720, 960	, 120, , 1440,	180, 24 2160,	Summer and 10, 360, 480 2880, 4320, 7200, 8640, 1, 2, 3 0, 0	Winter 0, 600, 5760, 10080 30, 100 0, 0, 0	
US/MH		Return Cl	imate	First ()	X) Fir	st (Y)	First (Z)	Overflow	Water Level
PN Name	Storm	Period C	hange	Surchar	ge F	lood	Overflow	Act.	(m)
G1 000 G1	1 E 1074	100	100	20/15 0					70 004
S1.000 S1 S1.001 S2	15 Winter 15 Winter	100	+0% +0%	1/15 Sum	mer				70.094
S1.002 S3	15 Winter	100	+0%	1/15 Sum	mer				69.367
PN S1.000 S1.001 S1.002	Surc US/MH Do Name S1 S2 S3	charged F epth V (m) 0.869 1.164 0.597	looded /olume (m ³) 0.000 0.000 0.000	Flow / O Cap. 0.65 2.43 7.45	verflow (l/s)	Pipe Flow (1/s) 28.0 102.9 155.5	Status SURCHARGED SURCHARGED SURCHARGED	Level Exceeded	
			©1982	-2019 In	novyze	2			



Appendix C Greenfield Run-off Calculations

Peter Brett Associates LLP		Page 1
Marlborough House		
High Street		
Kidlington OX5 2DN		Micro
Date 22/01/2020 11:25	Designed by gematthews	
File	Checked by	Diamage
Micro Drainage	Source Control 2018.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years) 2 Soil 0.450 Area (ha) 0.475 Urban 0.000 SAAR (mm) 624 Region Number Region 6

Results 1/s

QBAR Rural 1.8 QBAR Urban 1.8 Q2 years 1.6

Q1 year 1.6 Q30 years 4.1 Q100 years 5.8

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Appendix D Quick Storage Estimate for Greenfield Discharge Rates

\\pba\oxf\Projects\48055 - WIC House\2000 -Civils\Documents\SWMS\SWMS.docx

🖌 Quick Storage	: Estimate		
	Variables		
Micro	FSR Rainfall 🗸 🗸	Cv (Summer)	0.750
bianage	Return Period (years) 100	Cv (Winter)	0.840
Variables	Region England and Wales ~	Impermeable Area (ha)	0.490
Results	Map M5-60 (mm) 20.000	Maximum Allowable Discharge (1/s)	1.8
Design	Ratio R 0.400	Infiltration Coefficient (m/hr)	0.00000
Ourse in 2D		Safety Factor	2.0
Overview 2D	-	Climate Change (%)	40
Overview 3D			
Vt			
		Analyse OK	Cancel Help
	Enter Maximum Allowable Disc	harge between 0.0 and 999999.0	

	Results
licro rainage	Global Variables require approximate storage of between 339 m ³ and 454 m ³ .
Variables	These values are estimates only and should not be used for design purposes.
Results	
Design	
Overview 2D	
Overview 3D	
Vt	



Appendix E Surface Water Design Calculations

Stantec UK Ltd		Page 1
Caversham Bridge House	Surface Water	
Waterman Place	Drainage Calculations	
Reading, RG1 8DN	WIC House	Micro
Date 26/01/2021	Designed by B. Hillery	Desinado
File 210126 SW Drainage Design Mod	Checked by J. Syms	Diamage
Innovyze	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and WalesReturn Period (years)1PIMP (%)100M5-60 (mm)20.000Add Flow / Climate Change (%)0Ratio R0.400Minimum Backdrop Height (m)0.200Maximum Rainfall (mm/hr)200Maximum Backdrop Height (m)1.500Maximum Time of Concentration (mins)30Min Design Depth for Optimisation (m)1.200Foul Sewage (l/s/ha)0.000Min Vel for Auto Design only (m/s)1.00Volumetric Runoff Coeff.0.750Min Slope for Optimisation (1:X)500

Designed with Level Inverts

Time Area Diagram for Storm

	Time (mins)	Area (ha)	Time (mins)	Area (ha)	
	0-4	0.284	4-8	0.208	
Total	Area (Contrib	uting (1	ha) =	0.492

Total Pipe Volume (m^3) = 5.433

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length	Fall	Slope	I.Area	T.E.	Ba	ase	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)	(mins)	Flow	(l/s)	(mm)	SECT	(mm)		Design
												_
S1.000	27.500	0.180	152.8	0.031	5.00		0.0	0.600	0	225	Pipe/Conduit	
S1.001	28.685	0.215	133.4	0.094	0.00		0.0	0.600	0	225	Pipe/Conduit	- Ā
S1.002	28.685	0.215	133.4	0.120	0.00		0.0	0.600	0	225	Pipe/Conduit	Ā
S1.003	10.640	0.100	106.4	0.155	0.00		0.0	0.600	0	225	Pipe/Conduit	Ā
S1.004	23.140	0.010	2314.0	0.092	0.00		0.0	0.600	0	300	Pipe/Conduit	Ā

Network Results Table

PN	Rain	T.C.	US/IL	Σ I.Area	ΣВ	ase	Foul	Add Flow	Vel	Cap	Flow
	(mm/hr)	(mins)	(m)	(ha)	Flow	(l/s)	(l/s)	(1/s)	(m/s)	(l/s)	(l/s)
S1.000	52.72	5.43	69.180	0.031		0.0	0.0	0.0	1.06	42.0	4.4
S1.001	50.94	5.86	69.000	0.125		0.0	0.0	0.0	1.13	44.9	17.2
S1.002	49.28	6.28	68.785	0.245		0.0	0.0	0.0	1.13	44.9	32.7
S1.003	48.76	6.42	68.570	0.400		0.0	0.0	0.0	1.27	50.4«	52.8
S1.004	44.73	7.63	68.470	0.492		0.0	0.0	0.0	0.32	22.5«	59.6

Stantec UK Ltd		Page 2
Caversham Bridge House	Surface Water	
Waterman Place	Drainage Calculations	
Reading, RG1 8DN	WIC House	Micro
Date 26/01/2021	Designed by B. Hillery	
File 210126 SW Drainage Design Mod	Checked by J. Syms	Diamage
Innovyze	Network 2020.1	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	70.720	1.540	Open Manhole	1200	S1.000	69.180	225				
S1	70.480	1.480	Open Manhole	1200	S1.001	69.000	225	S1.000	69.000	225	
s3	70.425	1.640	Open Manhole	1200	S1.002	68.785	225	S1.001	68.785	225	
S2	70.370	1.800	Open Manhole	1200	S1.003	68.570	225	S1.002	68.570	225	
s3	70.390	1.920	Open Manhole	1200	S1.004	68.470	300	S1.003	68.470	225	
S	70.070	1.610	Open Manhole	0		OUTFALL		S1.004	68.460	300	

MH	Manhole	Manhole	Intersection	Intersection	Manhole	Layout
Name	Easting	Northing	Easting	Northing	Access	(North)
	(m)	(m)	(m)	(m)		
S3	288.690	167.500	288.690	167.500	Required	

Stantec UK Ltd		Page 3
Caversham Bridge House	Surface Water	
Waterman Place	Drainage Calculations	
Reading, RG1 8DN	WIC House	Micco
Date 26/01/2021	Designed by B. Hillery	
File 210126 SW Drainage Design Mod	Checked by J. Syms	Dialitacje
Innovyze	Network 2020.1	1

PIPELINE SCHEDULES for Storm

<u>Upstream Manhole</u>

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	0	225	S1	70.720	69.180	1.315	Open Manhole	1200
S1.001	0	225	S1	70.480	69.000	1.255	Open Manhole	1200
S1.002	0	225	s3	70.425	68.785	1.415	Open Manhole	1200
S1.003	0	225	S2	70.370	68.570	1.575	Open Manhole	1200
S1.004	0	300	S3	70.390	68.470	1.620	Open Manhole	1200

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
S1.000	27.500	152.8	S1	70.480	69.000	1.255	Open Manhole	1200
S1.001	28.685	133.4	s3	70.425	68.785	1.415	Open Manhole	1200
S1.002	28.685	133.4	S2	70.370	68.570	1.575	Open Manhole	1200
S1.003	10.640	106.4	S3	70.390	68.470	1.695	Open Manhole	1200
S1.004	23.140	2314.0	S	70.070	68.460	1.310	Open Manhole	0

Stantec UK Ltd		Page 4
Caversham Bridge House	Surface Water	
Waterman Place	Drainage Calculations	
Reading, RG1 8DN	WIC House	Micro
Date 26/01/2021	Designed by B. Hillery	Desinado
File 210126 SW Drainage Design Mod	Checked by J. Syms	Diamage
Innovyze	Network 2020.1	

Area Summary for Storm

Pipe Number	РІМР Туре	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.031	0.031	0.031
1.001	-	-	100	0.094	0.094	0.094
1.002	-	-	100	0.120	0.120	0.120
1.003	-	-	100	0.155	0.155	0.155
1.004	-	-	100	0.092	0.092	0.092
				Total	Total	Total
				0.492	0.492	0.492

Stantec UK Ltd		Page 5
Caversham Bridge House	Surface Water	
Waterman Place	Drainage Calculations	
Reading, RG1 8DN	WIC House	Micro
Date 26/01/2021	Designed by B. Hillery	Desinado
File 210126 SW Drainage Design Mod	Checked by J. Syms	Dialitage
Innovyze	Network 2020.1	,

Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Ріре Туре	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	МН Туре
S1.000	S1	225	1.255	1.315	Unclassified	1200	0	1.315	Unclassified
S1.001	S1	225	1.255	1.415	Unclassified	1200	0	1.255	Unclassified
S1.002	s3	225	1.415	1.575	Unclassified	1200	0	1.415	Unclassified
S1.003	S2	225	1.575	1.695	Unclassified	1200	0	1.575	Unclassified
S1.004	S3	300	1.310	1.620	Unclassified	1200	0	1.620	Unclassified

Free Flowing Outfall Details for Storm

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

S1.004 S 70.070 68.460 68.090 0 0

Simulation Criteria for Storm

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

	Rainfal	.l Model		FSR		Prof	ile Type	Summer
Return	Period	(years)		1		Cv	(Summer)	0.750
		Region	England	and Wales		Cv	(Winter)	0.840
	M5-	-60 (mm)		20.000	Storm	Duratio	n (mins)	30
		Ratio R		0.400				

Stantec UK Ltd		Page 6
Caversham Bridge House	Surface Water	
Waterman Place	Drainage Calculations	
Reading, RG1 8DN	WIC House	Mirro
Date 26/01/2021	Designed by B. Hillery	
File 210126 SW Drainage Design Mod	Checked by J. Syms	Diamage
Innovyze	Network 2020.1	*

Online Controls for Storm

Complex Manhole: S3, DS/PN: S1.004, Volume (m³): 2.5

<u>Orifice</u>

Diameter (m) 0.125 Discharge Coefficient 0.600 Invert Level (m) 68.470

<u>Orifice</u>

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 69.470

Stantec UK Ltd					Page 7
Caversham Bridge House	Surfac	e Wate	r		
Waterman Place	Draina	.ge Cal	culations		
Reading, RG1 8DN	WIC Ho	use			Micco
Date 26/01/2021	Design	ed by	B. Hillery		
File 210126 SW Drainage Design Mod	Checke	d by J	. Syms		Drainage
Innovyze	Networ	k 2020	.1		
			• -		
<u>Storage</u>	Struct	tures f	for Storm		
<u>Porous Car Par</u>	k Manho	ble: S1	, DS/PN: S1.000		
Infiltration Coefficient Bas	e (m/hr)	0 00000	Width (m)	10 0	
Membrane Percolation	(mm/hr)	1000	Length (m)	5.0	
Max Percolati	on (l/s)	13.9	Slope (1:X)	0.0	
Safet	y Factor	2.0	Depression Storage (mm)	5	
Invert L	evel (m)	69.500	Cap Volume Depth (m)	0.500	
Porous Car Par	k Manho	ole: S1	, DS/PN: S1.001		
Infiltration Coefficient Bas	e (m/hr)	0.00000	Width (m)	5.0	
Max Percolati	on $(1/s)$	61.1	Slope (1:X)	0.0	
Safet	y Factor	2.0	Depression Storage (mm)	5	
	Porosity	0.30	Evaporation (mm/day)	3	
Invert L	evel (m)	69.500	Cap Volume Depth (m)	0.500	
Porous Car Par	k Manho	ole: S3	3, DS/PN: S1.002		
Infiltration Coefficient Bas	e (m/hr)	0.00000	Width (m)	5.0	
Membrane Percolation	(mm/hr)	1000	Length (m)	40.0	
Max Percolati	on (1/s) v Factor	55.6	Slope (1:X)	0.0	
Salet	Porosity	0.30	Evaporation (mm/day)	3	
Invert L	evel (m)	69.500	Cap Volume Depth (m)	0.500	
<u>Porous Car Par</u>	k Manho	ole: S2	2, DS/PN: S1.003		
Infiltration Coefficient Bas	e (m/hr)	0.00000	Width (m)	5.0	
Membrane Percolation	(mm/hr)	1000	Length (m)	35.0	
Max Percolati	on (l/s)	48.6	Slope (1:X)	0.0	
Safet	y Factor	2.0	Depression Storage (mm)	5	
Invert L	evel (m)	69.500	Cap Volume Depth (m)	0.500	
Porous Car Par	k Manho	ole: S3	3, DS/PN: S1.004		
	, , , ,	0.0005			
Infiltration Coefficient Bas	e (m/hr)	0.00000	Width (m)	5.0	
Max Percolation	on $(1/s)$	17.4	Slope (1:X)	0.0	
Safet	y Factor	2.0	Depression Storage (mm)	5	
	Porosity	0.30	Evaporation (mm/day)	3	
Invert L	evel (m)	69.500	Cap Volume Depth (m)	0.500	
Manhol	e Headl	loss fo	or Storm		
	PN US/ Nam	MH US/	MH Loss		
	1 000	Q1 0	500		
S. 	L.000	51 Ο. S1 Ο	.500		
S.	1.002	s3 0.	.500		
S	1.003	S2 0.	.500		
S	1.004	S3 0.	.500		

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	IK LTA								Page 8	
Caversham	Bridge Hou	se	Sı	urface Wa	ater					
Waterman	Place		Di	rainage (Calculat	ions				
Reading,	RG1 8DN		W	IC House					Micco	
Date 26/0	1/2021		De	esigned 1	ov B. Hi	llerv				J
File 2101	26 SW Drain	age Design	Mod Cł	hecked by	J J Svm	0- <i>1</i>			Drain	lage
IIIC ZIOI	20 SW DIGIN	age Debign	Net Net	stwork 2	$\frac{1}{20}$					
<u>1 year</u>	<u>Return Peri</u>	od Summary.	of Criti	<u>cal Resu</u>	lts by M	aximum	Level	(Rank 1)	for St	orm
	Manhole Foul S	Areal Reducti Hot Sta Hot Start I Headloss Coeff ewage per hect	<u>Sim</u> on Factor 1 rt (mins) evel (mm) (Global) 0 are (l/s) 0	ulation Cr: .000 Add: 0 .500 Flow p .000	<u>teria</u> tional Flo MADD Facto per Person	ow - % of or * 10m³/ Inlet Co per Day (Fotal F. na Stora effiecie l/per/da	low 0.000 age 2.000 ent 0.800 ay) 0.000		
	Number of Inpu Number of On	t Hydrographs line Controls	0 Number of	of Offline Storage St	Controls (ructures !) Number c 5 Number c	f Time/ f Real	Area Diagra Time Contro	ms O ls O	
	Rai	nfall Model Region E Margin for F	<u>Synthet</u> ngland and W 'lood Risk Wa	<u>cic Rainfal</u> FSR M5-60 ales Ra arning (mm)	<u>l Details</u> (mm) 20.0 tio R 0.4 300.0	00 Cv (Sun 00 Cv (Win DVD Stat	nmer) 0 iter) 0	.750 .840		
			Analysi	is Timester	Fine Ind					
				DTS Status	ON	ertia Stat	is OFF			
	Dura Return Per Clir	Profile(s ation(s) (mins riod(s) (years mate Change (%	15, 30, 6	DTS Status 0, 120, 180 2160	ON 0, 240, 360 0, 2880, 43	ertia Stat , 480, 60 20, 5760,	Summer), 720, 7200, 8	and Winter 960, 1440, 3640, 10080 1, 30, 100 0, 0, 40		
	Dura Return Per Clir	Profile(s ation(s) (mins riod(s) (years mate Change (%	15, 30, 6	DTS Status 0, 120, 180 2160	ON 0, 240, 360 0, 2880, 43	ertia Stat , 480, 60 20, 5760,	Summer), 720, 7200, 8 Water	and Winter 960, 1440, 3640, 10080 1, 30, 100 0, 0, 40 Surcharged	Flooded	
US/	Dura Return Per Clir MH Ro	Profile(s ation(s) (mins riod(s) (years mate Change (%	15, 30, 6	DTS Status 0, 120, 180 2160 First (Y)	ON 0, 240, 360 0, 2880, 43 First (Z)	<pre>ertia Stat , 480, 60 20, 5760, Overflow</pre>	Summer), 720, 7200, 8 Water Level	and Winter 960, 1440, 3640, 10080 1, 30, 100 0, 0, 40 Surcharged Depth	Flooded Volume	Flow /
US/ PN Nai	Dura Return Per Clir MH R me Storm Pa	Profile(s ation(s) (mins riod(s) (years mate Change (% eturn Climate eriod Change	15, 30, 6 First (X) Surcharge	DTS Status 0, 120, 180 2160 First (Y) Flood	ON 0, 240, 360 0, 2880, 43 First (Z) Overflow	<pre>ertia Stat , 480, 60 ,20, 5760, Overflow</pre>	Summer), 720, 7200, 8 Water Level (m)	and Winter 960, 1440, 3640, 10080 1, 30, 100 0, 0, 40 Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
US/ PN Nar 51.000	Dura Return Per Clir MH Ro me Storm Po S1 30 Winter	Profile(s ation(s) (mins riod(s) (years mate Change (% eturn Climate eriod Change 1 +0%	15, 30, 6 First (X) Surcharge 1/15 Winter	DTS Status 0, 120, 180 2160 First (Y) Flood	ON 0, 240, 360 0, 2880, 43 First (Z) Overflow	<pre>ertia Stat , 480, 60 ,20, 5760, Overflow Act.</pre>	Summer 0, 720, 7200, 8 Water Level (m) 69.503	and Winter 960, 1440, 3640, 10080 1, 30, 100 0, 0, 40 Surcharged Depth (m) 0.098	Flooded Volume (m ³) 0.000	Flow / Cap. 0.08
US/ PN Nar S1.000 S1.001 S1.002	Dura Return Per Clir MH Ro me Storm Po S1 30 Winter S1 30 Winter S2 30 Winter	Profile(s ation(s) (mins riod(s) (years mate Change (% eturn Climate eriod Change 1 +0% 1 +0%	<pre>15, 30, 60 First (X) Surcharge 1/15 Winter 1/15 Summer 1/15 Summer</pre>	DTS Status 0, 120, 180 2160 First (Y) Flood	ON 0, 240, 360 0, 2880, 43 First (Z) Overflow	ertia Stat 2, 480, 60 20, 5760, Overflow Act.	Summer 0, 720, 7200, 8 Water Level (m) 69.503 69.499	and Winter 960, 1440, 3640, 10080 1, 30, 100 0, 0, 40 Surcharged Depth (m) 0.098 0.274	Flooded Volume (m ³) 0.000 0.000	Flow / Cap. 0.08 0.25
US/ PN Nau S1.000 S1.001 S1.002 S1.003	Dura Return Per Clin MH Ro me Storm Po S1 30 Winter S1 30 Winter S3 30 Winter S2 30 Winter	Profile(s ation(s) (mins riod(s) (years mate Change (% eturn Climate eriod Change 1 +0% 1 +0% 1 +0% 1 +0%	15, 30, 6 First (X) Surcharge 1/15 Winter 1/15 Summer 1/15 Summer 1/15 Summer	DTS Status 0, 120, 180 2160 First (Y) Flood	ON 0, 240, 360 0, 2880, 43 First (Z) Overflow	ertia Stat 2, 480, 60 20, 5760, Overflow Act.	Summer 0, 720, 7200, 8 Water Level (m) 69.503 69.499 69.482 69.447	and Winter 960, 1440, 3640, 10080 1, 30, 100 0, 0, 40 Surcharged Depth (m) 0.098 0.274 0.472 0.652	Flooded Volume (m ³) 0.000 0.000 0.000 0.000	Flow / Cap. 0.08 0.25 0.36 0.54

			Half Drain	Pipe		
	US/MH	Overflow	Time	Flow		Level
PN	Name	(l/s)	(mins)	(1/s)	Status	Exceeded
s1.000	S1		5	3.2	SURCHARGED	
S1.001	S1		8	10.6	SURCHARGED	
S1.002	S3		12	15.3	SURCHARGED	
S1.003	S2		15	24.4	SURCHARGED	
S1.004	S3		15	30.1	SURCHARGED	

Stantec UK Ltd		Page 9
Caversham Bridge House	Surface Water	
Waterman Place	Drainage Calculations	
Reading, RG1 8DN	WIC House	Micco
Date 26/01/2021	Designed by B. Hillery	
File 210126 SW Drainage Design Mod	Checked by J. Syms	Drainage
Innovyze	Network 2020.1	
30 year Return Period Summary of Areal Reduction F Hot Start (Hot Start Level Manhole Headloss Coeff (Gl Foul Sewage per hectare Number of Input Hydrographs 0	<u>Simulation Criteria</u> actor 1.000 Additional Flow - % of Total F mins) 0 MADD Factor * 10m ³ /ha Stor. (mm) 0 Inlet Coeffici. obal) 0.500 Flow per Person per Day (1/per/d. (1/s) 0.000 Number of Offline Controls 0 Number of Time/	(Rank 1) for Storm low 0.000 age 2.000 ent 0.800 ay) 0.000 Area Diagrams 0 Time Controls 0
Rainfall Model Region Englar Margin for Flood	Synthetic Rainfall Details FSR M5-60 (mm) 20.000 Cv (Summer) 0 ad and Wales Ratio R 0.400 Cv (Winter) 0 Risk Warning (mm) 300.0 DVD Status OFF Analysis Timestep Fine Inertia Status OFF DTS Status ON	.750 .840
Profile(s) Duration(s) (mins) 15 Return Period(s) (years) Climate Change (%) US/MH Return Climate Fir PN Name Storm Period Change Sur	Summer , 30, 60, 120, 180, 240, 360, 480, 600, 720, 2160, 2880, 4320, 5760, 7200, 8 Water st (X) First (Y) First (Z) Overflow Level charge Flood Overflow Act. (m)	and Winter 960, 1440, 8640, 10080 1, 30, 100 0, 0, 40 Surcharged Flooded Depth Volume Flow / (m) (m ³) Cap.
	analyce flood overflow Acc. (m)	(, (, Cap.
S1.000 S1 30 Winter 30 +0% 1/15	Winter 69.715	0.310 0.000 0.18
S1.001 S1 30 Winter 30 +0% 1/15	Summer 69.711	0.486 0.000 0.61
S1.002 S3 S0 Winter 30 +0% 1/15 S1 003 S2 30 Winter 30 ±0% 1/15	Summer 69.698	
S1.004 S3 15 Winter 30 +0% 1/15	Summer 69.636	0.866 0.000 1.81

			Half Drain	Pipe		
	US/MH	Overflow	Time	Flow		Level
PN	Name	(1/s)	(mins)	(l/s)	Status	Exceeded
S1.000	S1		20	7.0	SURCHARGED	
S1.001	S1		19	25.3	SURCHARGED	
S1.002	s3		19	29.0	SURCHARGED	
S1.003	S2		17	31.1	SURCHARGED	
S1.004	S3		11	37.7	SURCHARGED	

SLAILLE	c UK Ltd								Page 10)
Caverst	ham Bridge Ho		SI	irface W	ater				_ = = = = = = =	
Watorm	an Place	0400		rainago	Calculat	ione				
Deeding				Lainaye	carcurac	TOUR				
Reading	g, RGI 8DN		W.	IC House					Micro	
Date 26	6/01/2021		De	esigned	by B. Hi	llery			Dcair	าวตอ
File 21	10126 SW Dra	inage Design	Mod Cl	necked b	y J. Sym	S			Dian	iuge
Innovyz	ze		Ne	etwork 2	020.1					
<u>100 y</u>	<u>vear Return P</u>	eriod Summar	<u>y of Crit</u>	ical Res	ults by	Maximum	Level	<u>l (Rank 1</u>) for S	Storm
	Manhol Foul Number of In Number of	Areal Reducti Hot Start I Hot Start I Le Headloss Coeff Sewage per hect aput Hydrographs Online Controls Rainfall Model	Sim on Factor 1 art (mins) (Global) 0 are (1/s) 0 0 Number of 1 Number of Synthet	ulation Cr .000 Add 0 .500 Flow .000 of Offline Storage S <u>tic Rainfal</u> FSR M5-60	iteria itional Flo MADD Facto per Person Controls (tructures S . <u>1 Details</u> (mm) 20.0	ow - % of or * 10m³, Inlet Co per Day) Number o 5 Number o 00 Cv (Su	Total F ha Stor peffieci (1/per/d of Time/ of Real mmer) 0	low 0.000 age 2.000 ent 0.800 ay) 0.000 'Area Diagra Time Contro .750	ms O ls O	
		Region E	ngland and W	ales Ra	tio R 0.4	00 Cv (Wi	nter) O	.840		
		Margin for H	lood Risk Wa Analys:	arning (mm) is Timestep DTS Status	300.0 D Fine Ine S ON	DVD Stat ertia Stat	us OFF us OFF			
	D	Profile(s uration(s) (mins Period(s) (years)) 15, 30, 6)	0, 120, 18 216	0, 240, 360 0, 2880, 43), 480, 60 820, 5760,	Summer 0, 720, 7200,	and Winter 960, 1440, 8640, 10080		
	Keturn C	limate Change (%)					0, 0, 40		
PN	C US/MH Name Storm	limate Change (% Return Climate Period Change) First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	1, 30, 100 0, 0, 40 Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
PN 51.000	C US/MH Name Storm S1 60 Winter	limate Change (% Return Climate Period Change 100 +40%	First (X) Surcharge 1/15 Winter	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m) 70.123	1, 30, 100 0, 0, 40 Surcharged Depth (m) 0.718	Flooded Volume (m ³) 0.000	Flow / Cap. 0.14
PN S1.000 S1.001	C US/MH Name Storm S1 60 Winter S1 60 Winter	limate Change (% Return Climate Period Change 100 +40% 100 +40%) First (X) Surcharge 1/15 Winter 1/15 Summer	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m) 70.123 70.114	1, 30, 100 0, 0, 40 Surcharged Depth (m) 0.718 0.889	Flooded Volume (m ³) 0.000 0.000	Flow / Cap. 0.14 0.52
PN S1.000 S1.001 S1.002	C US/MH Name Storm S1 60 Winter S1 60 Winter S3 60 Winter	limate Change (% Return Climate Period Change 100 +40% 100 +40% 100 +40%	First (X) Surcharge 1/15 Winter 1/15 Summer 1/15 Summer	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m) 70.123 70.114 70.079	1, 30, 100 0, 0, 40 Surcharged Depth (m) 0.718 0.889 1.069	Flooded Volume (m ³) 0.000 0.000 0.000	Flow / Cap. 0.14 0.52 0.68

PN	US/MH Name	Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1		44	5.6	SURCHARGED	
S1.001	S1		42	21.9	SURCHARGED	
S1.002	s3		40	28.5	SURCHARGED	
S1.003	S2		30	37.4	SURCHARGED	
S1.004	S3		25	46.0	SURCHARGED	



Appendix F Surface Water Drainage Layout

	PROPOSED FOUL WATER MANHOLE SCHEDULE NOTES:	
	MH NO. CL IL DEPTH PIPEØ OUT COVER TYPE MANHOLE TYPE MANHOLE SIZE Position X Position Y 1. DO NOT SCALE FROM THIS DRAWING.	
	F-001 70.65 70.00 0.65m 1000/ D400 PLASTIC IC 4500/ 455700.709 203528.339 2. THIS DRAWING IS TO BEREAD IN COLUCED IN COLUCE AND STATUS	HOULD BE REPRODUCED IN COLOUR.
	F-002 70.20 69.47 0.73m 100Ø D400 PLASTIC IC 450Ø 455720.331 203493.445 AND DOCUMENTS. ANY DISCREPANCIES BETWEEN THIS	DRAWING AND ANY OTHER RELEVANT
	F-003 70.45 69.16 1.29m 1000 D400 PLASTIC IC 4500 455730.561 203478.649 Einometerung oncomposition on OLD best of the PLASTIC IC	Lesion Engineer Immediatelt.
The second	PROPOSED SURFACE WATER MANHOLE SCHEDULE 5. ALL LEVELS ARE IN m ADD UNLESS OTHERWISE STATED 6. TOPOGRAPHICAL INFORMATION TAKEN FROM MIS SURV	EYS DRAWING NUMBER 29110
	MH NO. CL IL DEPTH PIPEØ OUT COVER TYPE MANHOLE TYPE MANHOLE SIZE Position X Position Y TOPOGRAPHICAL SURVEY DATED OCTOBER 2020.	
	S-001 70.95 69.50 1.45m 1500 (PERFORATED) D400 CATCHPIT 4500 455712.363 203534.290 TOPOGRAPHICAL AND PARTICLE VIEW	ATED OCTOBER 2020.
		RSTS DESIGN GROUP DRAWING NUMBER
	\$-003 70.24 69.50 0.74m 1500 (PERFORATED) D400 CATCHPIT 4500 455703.135 203520.964 9. ALL WORK TO ADDOTIVABLE SEWERS WILL BE CARRED CODE FOR ADDITIVATE	UT STRICTLY IN ACCORDANCE WITH THE
	S-004 70.38 69.41 0.97m 1509 (PERFORATED) D400 CATCHPIT 4509 455710.047 203508.672 ODCL OK NON MUST BE DLACE BEORD THE NEGRO COMMON SMUST BE NLACE BEORD THE NEGRO COMMON SMUST BE NLACE BEORD THE NLACE BEORD	ENCES.
10 ¹⁰ 10 ¹⁰ 10 Ex+F001	S-005 70.45 69.50 0.95m 1500 (PERFORATED) D400 CATCHPIT 4500 455727.202 203478.165 10.4LL MATERIAL USED IN THE CONSTRUCTION OF DRAINS RELEVANT BRITISH STANDARDS AND BE IN THE MARKED VIEW THE MARKED VIEW AND VIE	AND MANHOLES SHALL COMPLY TO THE /HERE APPROPRIATE.
TIME TANK THE TIME THE TIME	S-006 70.38 69.20 11.18m 1500 D400 CATCHPIT 4500 455720.497 20349.089 11.14L FOUL CONNECTIONS TO BE LAID AT A MINIMUM GR/	DIENT OF 1:40, UNLESS OTHERWISE
Participation Provide Automatical Provide Automatic	S-007 70.63 70.03 0.60m 150/0 B125 PLASTICIC 450/0 455770.162 203499.634 SPECIFIED. SPECIFIED.	RADIENT OF 1:100, UNLESS OTHERWISE
EXF-004	S-006 / U.20 b9:00 1.20m 150/2 U400 PLASTICTIC 450/2 455/42.756 20343.399 SPECIFIED.	D AT THEIR BASES (GROUND FLOOR
Event Event		
EXF-005	FOUL WATER PIPE SCHEDULE 14. ALL DRAINAGE TO BE INSTALLED IN ACCORDANCE WITH DOCUMENTS AND CURRENT CODE FOR JOINT ADDOTTION (APP	L 2020) WHERE APPLICABLE.
Existing Foul water	PIPE NO. PIPE DIAMETER PIPE GRADIENT PIPE LENGTH 15. INVERT LEVELS, SIZE AND COVER LEVELS TO EXISTING PRIOR TO ANY CONSTRUCTION ANY UNESCREPANCIEST OF	MANHOLES AND SEWERS TO BE CHECKED
F-007 Setup Annual	F-1.001 100/0 14/9 (.418 16.4LL EXISTING DRAINAGE MUST DE ACTECKED FOR AVAIL	VE CONNECTIONS BEFORE REMOVAL OR
ASSUMED REVIEW TO CONFIRM	r-1.002 1000 1.0 4.001 GROUTING, AND THE ENGINEER NOTIFIED IF UPC OFFICIAL E -1.003 1000 1.0 1.361 17. RWP POSITIONS HAVE BEEN ASSUMED AND ARE INDICA	IVE.
	F-1.004 1000 1.0 2.712	
EX5001 0 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	F-1.005 100Ø 1:55 5.504 EXISTING KEY:	
	F-1.006 1000 1:76 40.032 — EX SWS — SURFACE WATER SEWER (THAMES WAT	ER)
S1.004 Starting A	F-1.007 1000 1:35 8.821 FY.TM.S.7401 SUBFACE WATED MANHOLE (THAMES W	ATER)
	F-1.008 1000 1:68 17.716 SUBJECT WATER WANNOLE (IPAWES W	
	F-1.009 1000 1:44 10.491 → → → → → → SURFACE WATER SEWER (PRIVATE)	
	F-1.010 1000 1:48 18.891 EX-S-044 O SURFACE WATER MANHOLE (PRIVATE)	
	Image: https://www.amage.org/amag	
	F-1.012 10002 1.10 7.013 F-1.013 1500 1:82 1.4.861 — EX.FWS— FOUL WATER SEWER (THAMES WATER)	
	F-1.014 1500 1:55 20.754 EX:TW-F-7402 FOUL WATER MANHOLE /THAMES WATE	3)
		,
	SURFACE WATER PIPE SCHEDULE	
	PIPE NO. PIPE DIAMETER PIPE GRADIENT PIPE LENGTH EX-F043 O FOUL WATER MANHOLE (PRIVATE)	
	S-1.001 1500 (PERFORATED) 1:104 9.501 PROPOSED KEY:	
	S-1.002 1500 1:35 9.486 ACCHITECTS SITE LAYOUT	
	S-1.003 2250 1:136 58.541	
	S-1.004 1500 1.8 4.764	NED
	S-1.005 150/0 1:9 4.718	INED
	S=1.000 2250 1.3 2.200 SGULY TO BE ABANDONED	
	Q QEXF-015 / S-1.008 1500 1.6 4.037 PRIVATE FOUL WATER PIPEWORK	
	O O	-
	Original	_
	Original	
	Original	- - -
EXISTING FOUL WATER MANHOLE SCHEDULE	0 0 1.00 0.00 1.00 0.00<	-
EXISTING FOUL WATER MANHOLE SCHEDULE MH NO. CL IL DEPTH PIPEØ COVER TYPE MANHOLE Position X Position Y	0 0	-
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EXISTING KEY:	
EX SWS	SURFACE WATER SEWER (THAMES WATER)
EX-TW-S-7401	SURFACE WATER MANHOLE (THAMES WATER)
	SURFACE WATER SEWER (PRIVATE)
EX-S-044 O	SURFACE WATER MANHOLE (PRIVATE)
G□	SURFACE WATER GULLY
EX FWS	FOUL WATER SEWER (THAMES WATER)
EX-TW-F-7402	FOUL WATER MANHOLE (THAMES WATER)
	FOUL WATER SEWER (PRIVATE)
EX-F-043 O	FOUL WATER MANHOLE (PRIVATE)

nS	ARCHITECT'S SITE LAYOUT
x ** x · x · x	FOUL WATER SEWER TO BE ABANDONED
×-××►×-×-	SURFACE WATER SEWER TO BE ABANDONED
₿G	GULLY TO BE ABANDONED
• • •	PRIVATE FOUL WATER PIPEWORK
-001 ቀ	PRIVATE FOUL WATER CHAMBER
	PRIVATE SURFACE WATER PIPEWORK
	PRIVATE SURFACE WATER FILTER DRAIN
S-001	PRIVATE SURFACE WATER CHAMBER
□G	RELOCATED SURFACE WATER GULLY
	RAINWATER DIFFUSER UNIT
RWP •	INDICATIVE RWP LOCATIONS (REFER TO ARCHITECT'S LAYOUTS)







Appendix G Surface Water Drainage Standard Details



					J
File Location: j:\48055 -	wic house\200 -	design (all drawings)/201	all pba drawings/2000	- civils/cadidwgs/48055-stn-zz-xx-dr-c-5001.dw	9

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T-SQUARED P4 LTD





Client

А

CONSTRUCTION DETAILS

WIC HOUSE TRANSPORT WAY

awing Issue Statu

FOR PLANNING

Mark SCALING NOTE: <u>Do not</u> scale this drawing - any errors or omissions shall be reported to Stantec without delay. UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may als be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing severs, services, plant or apparatus may affect their operations.

Revision	Date	Drawn	Chkd	Appd
Drawing renumbered.	26.01.21	JL	JS	SH

angle can be used on any inlet and the outlet

Bends of up to max 45°



NOTES:

DO NOT SCALE FROM THIS DRAWING. THIS DRAWING HAS BEEN PRODUCED IN COLOUR AND SHOULD BE REPRODUCED IN COLOUR. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELATED PROJECT DRAWINGS AND DOCUMENTS. ANY DISCREPANCIES BETWEEN THIS DRAWING AND ANY OTHER RELEVANT AND DOCOMENTS AND TO SCREPARDIES BETWEEN TIJS DRAVING AND ANT OTHER RELEVANT ENGINEERING DRAVING SHOLD BE REPORTED TO THE DESIGN ENGINEER MICENTELY. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED. ALL MATERIAL USED IN THE CONSTRUCTION OF DRAINS AND MANHOLES SHALL COMPLY TO THE RELEVANT BRITISH STANDARDS AND BE KITE MARKED WHERE APPROPRIATE.



Appendix H Flood Exceedance Plan



NOTES: 1. DO NOT SCALE FROM THIS DRAWING. 2. THIS DRAWING HAS BEEN PRODUCED IN COLOUR AND SHOULD BE REPRODUCED IN COLOUR. 3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELATED PROJECT DRAWING AND DOCUMENTS. ANY DISCREPARCHES BETWEEN THIS DRAWING AND ANY OTHER RELEVANT ENGINEERING DRAWING SHOULD BE REPORTED TO THE DESIGN ENGINEER IMMEDIATELY. 4. ALL DIMENSIONS ARE IN IM ADD UNLESS OTHERWISS STATED. 5. ALL LEVELS ARE IN M ADD UNLESS OTHERWISS STATED. 6. TOPOGRAPHICAL INFORMATION TAKEN FROM MK SURVEYS DRAWING NUMBER 29110 'TOPOGRAPHICAL INFORMATION TAKEN FROM MK SURVEYS DRAWING NUMBER 29110 'TOPOGRAPHICAL SURVEY DATED OCTOBER 2020. 7. PROPOSED ARCHITECTS FLAN OBTAINED FROM FAIRHURSTS DESIGN GROUP DRAWING NUMBER 7682-FDG-A-11101, DATED DECEMBER 2020.							
KEY: ARCHITECT'S SITE LAYOUT INDICATIVE DIRECTION OF POTENTIAL FLOOD EXCEEDANCE FLOW							
A Drawing renumbered. Exceedance routing amended to suit revised architect's layout.	26.01.21	JL	JS	SH			
Mark Revision	Date	Drawn	Chkd	Appd			
UTLIFIES NOTE: <u>built state</u> the damage any ends to dimissions shall be re drawing is believed to be correct, but no warranty to this is expressed or implied, be present but not shown. The Contractor is therefore advised to undertake theil of any existing severs, services, plant or apparatus may affect their operations.	vices, plant or a Other such pla own investigat	apparatus ant or app ion when	s shown c aratus m e the pres	on this ay also sence			
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Date of 1st Issue Designed Drawn 22.01.2021 JL JL	stantec.co	n/uk					
A1 Scale Checked Approved 1:250 JS SH The copyrights to all Reproduction at the copyrights to all and the copyrights to	Copyright rese designs and drawin on or use for any pu thorised by Stantec	erved gs are the p pose other is forbidden	roperty of St than that	antec.			
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