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CONSULTING
ENGINEERS LTD

11-12 INGESTRE ROAD, LONDON, NW5 1UX

SuDS ProForma

Surface Water Drainage Pro-forma for new developments

This pro-forma accompanies our advice note on surface water drainage. Developers should complete this form and submit it to the Local Planning Authority, referencing from where in their submission documents this information is taken. The pro-forma is supported by the Defra/EA guidance on Rainfall Runoff Management and uses the storage calculator on www.UKsuds.com. This pro-forma is based on current industry best practice and focuses on ensuring surface water drainage proposals meet national and local policy requirements. The pro-forma should be considered alongside other supporting SuDS Guidance.

1. Site Details

Site	Ingestre Road
Address & post code or LPA reference	Ingestre Road, London, NW5 1UX
Grid reference	TQ 28796 85768
Is the existing site developed or Greenfield?	Developed
Is the development in a LFRZ or in an area known to be at risk of surface or ground water flooding? If yes, please demonstrate how this is managed, in line with DP23?	The site is not within a LFRZ. EA flood maps show the site to be at very low risk of surface water flooding. The site is also not shown to be at risk of ground water flooding, or in any groundwater source protection zones. A Thames Water Sewer Flooding History Enquiry (Appendix A) reported no historic records of any surcharging sewers in the vicinity of the site.
Total Site Area served by drainage system (excluding open space) (Ha)*	Existing: 0.213ha / Proposed: Site area - 0.23 ha (Blue roof drains 0.09 ha; Geocellular drains 0.14 ha).

***** The Greenfield runoff off rate from the development which is to be used for assessing the requirements for limiting discharge flow rates and attenuation storage from a site should be calculated for the area that forms the drainage network for the site whatever size of site and type of drainage technique. Please refer to the Rainfall Runoff Management document or CIRIA manual for detail on this.

2. Impermeable Area

	Existing	Proposed	Difference (Proposed-Existing)	Notes for developers
Impermeable area (ha)	0.213	0.23	0.017	If the proposed amount of impermeable surface is greater, then runoff rates and volumes will increase. Section 6 must be filled in. If proposed impermeability is equal or less than existing, then section 6 can be skipped and section 7 filled in.
Drainage Method (infiltration/sewer/watercourse)	Sewer	Sewer	N/A	If different from the existing, please fill in section 3. If existing drainage is by infiltration and the proposed is not, discharge volumes may increase. Fill in section 6.

3. Proposing to Discharge Surface Water via

	Yes	No	Evidence that this is possible	Notes for developers
Existing and proposed MicroDrainage calculations	Y		Proposed Microdrainage calculations are included in Appendix C.	Please provide MicroDrainage calculations of existing and proposed run-off rates and volumes in accordance with a recognised methodology or the results of a full infiltration test (see line below) if infiltration is proposed.
Infiltration		NN	Not proposed - underlying bedrock geology is London Clay.	e.g. soakage tests. Section 6 (infiltration) must be filled in if infiltration is proposed.
To watercourse		NN	The nearest watercourse is approximately 1.5 km south of the site.	e.g. Is there a watercourse nearby?
To surface water sewer		N	Thames Water Pre Development Enquiry (Appendix D) confirms there is sufficient capacity in the combined sewer network	Confirmation from sewer provider that sufficient capacity exists for this connection.
Combination of above		N	Will only be discharged to combined sewer in the Thames Water public sewer network.	e.g. part infiltration part discharge to sewer or watercourse. Provide evidence above.
Has the drainage proposal had regard to the SuDS hierarchy?	Y		Rainwater will be attenuated by both a blue roof and geocellular storage, for gradual release into a combined sewer as there are no watercourses or surface water sewers in the vicinity of the site. Other forms of SuDS have been assessed and determined as unsuitable for use on the site.	Evidence must be provided to demonstrate that the proposed Sustainable Drainage strategy has had regard to the SuDS hierarchy as outlined in Section 2.5 above.
Layout plan showing where the sustainable drainage infrastructure will be located on site.	Y		Appendix E - Sustainable Drainage Infrastructure Location Plan	Please provide plan reference numbers showing the details of the site layout showing where the sustainable drainage infrastructure will be located on the site. If the development is to be constructed in phases this should be shown on a separate plan and confirmation should be provided that the sustainable drainage proposal for each phase can be constructed and can operate independently and is not reliant on any later phase of development.

4. Peak Discharge Rates – This is the maximum flow rate at which storm water runoff leaves the site during a particular storm event.

	Existing Rates (l/s)	Proposed Rates (l/s)	Difference (l/s) (Proposed-Existing)	% Difference (difference /existing x 100)	Notes for developers
Greenfield QBAR		N/A	N/A	N/A	QBAR is approx. 1 in 2 storm event. Provide this if Section 6 (QBAR) is proposed.
1 in 1	26.06	8.5	-17.56	-67%	Proposed discharge rates (with mitigation) should aim to be equivalent to greenfield rates for all corresponding storm events. As a minimum, peak discharge rates must be reduced by 50% from the existing sites for all corresponding rainfall events.
1 in 30	63.89	8.5	-55.39	-87%	
1in 100	82.38	8.5	-73.88	-90%	
1 in 100 plus climate change	N/A	8.5	-73.88	-90%	The proposed 1 in 100 +CC peak discharge rate (with mitigation) should aim to be equivalent to greenfield rates. As a minimum, proposed 1 in 100 +CC peak discharge rate must be reduced by 50% from the existing 1 in 100 runoff rate sites.

5. Calculate additional volumes for storage –The total volume of water leaving the development site. New hard surfaces potentially restrict the amount of stormwater that can go to the ground, so this needs to be controlled so not to make flood risk worse to properties downstream.

	Greenfield runoff volume (m^3)	Existing Volume (m^3)	Proposed Volume (m^3)	Difference (m^3) (Proposed-Existing)	Notes for developers
1 in 1	10.39	37.07	25.9	-11.17	Proposed discharge volumes (with mitigation) should be constrained to a value as close as is reasonably practicable to the greenfield runoff volume wherever practicable and as a minimum should be no greater than existing volumes for all corresponding storm events. Any increase in volume increases flood risk elsewhere. Where volumes are increased section 6 must be filled in.
1 in 30	25.10	86.96	57.0	-29.96	
1in 100 6 hour	35.45	113.82	73.9	-39.92	
1 in 100 6 hour plus climate change	N/A	155.6	103.6	-52.0	The proposed 1 in 100 +CC discharge volume should be constrained to a value as close as is reasonably practicable to the greenfield runoff volume wherever practicable. As a minimum, to mitigate for climate change the proposed 1 in 100 +CC volume discharge from site must be no greater than the existing 1 in 100 storm event. If not, flood risk increases under climate change.

6. Calculate attenuation storage – Attenuation storage is provided to enable the rate of runoff from the site into the receiving watercourse to be limited to an acceptable rate to protect against erosion and flooding downstream. The attenuation storage volume is a function of the degree of development relative to the greenfield discharge rate.

		Notes for developers
Storage Attenuation volume (Flow rate control) required to meet greenfield run off rates (m^3)	190	Volume of water to attenuate on site if discharging at a greenfield run off rate. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to reduce rates by 50% (m^3)	90	Volume of water to attenuate on site if discharging at a 50% reduction from existing rates. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to meet [OTHER RUN OFF RATE (as close to greenfield rate as possible] (m^3)	8.5 l/s: 102	Volume of water to attenuate on site if discharging at a rate different from the above – please state in 1st column what rate this volume corresponds to. On previously developed sites, runoff rates should not be more than three times the calculated greenfield rate. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to retain rates as existing (m^3)	68	Volume of water to attenuate on site if discharging at existing rates. Can't be used where discharge volumes are increasing
Percentage of attenuation volume stored above ground,	48	Percentage of attenuation volume which will be held above ground in swales/ponds/basins/green roofs etc. If 0, please demonstrate why.

7. How is Storm Water stored on site?

Storage is required for the additional volume from site but also for holding back water to slow down the rate from the site. This is known as attenuation storage and long term storage. The idea is that the additional volume does not get into the watercourses, or if it does it is at an exceptionally low rate. You can either infiltrate the stored water back to ground, or if this isn't possible hold it back with on site storage. Firstly, can infiltration work on site?

			Notes for developers
Infiltration	**State the Site's Geology and known Source Protection Zones (SPZ)**	Bedrock geology - London Clay; Site not in SPZ.	Avoid infiltrating in made ground. Infiltration rates are highly variable and refer to Environment Agency website to identify and source protection zones (SPZ)
	Are infiltration rates suitable?	N/A	Infiltration rates should be no lower than $1x10^{-6}$ m/s.
	State the distance between a proposed infiltration device base and the ground water (GW) level	N/A	Need 1m (min) between the base of the infiltration device & the water table to protect Groundwater quality & ensure GW doesn't enter infiltration devices. Avoid infiltration where this isn't possible.

	Were infiltration rates obtained by desk study or infiltration test?	N/A	Infiltration rates can be estimated from desk studies at most stages of the planning system if a back up attenuation scheme is provided..
	Is the site contaminated? If yes, consider advice from others on whether infiltration can happen.	N/A	Advice on contaminated Land in Camden can be found on our supporting documents webpage Water should not be infiltrated through land that is contaminated. The Environment Agency may provide bespoke advice in planning consultations for contaminated sites that should be considered.
In light of the above, is infiltration feasible?	**Yes/No? If the answer is No, please identify how the storm water will be stored prior to release**	No - storm water will be stored in geocellular storage, and in a blue roof.	If infiltration is not feasible how will the additional volume be stored?. The applicant should then consider the following options in the next section.

Storage requirements

The developer must confirm that either of the two methods for dealing with the amount of water that needs to be stored on site.

Option 1 Simple – Store both the additional volume and attenuation volume in order to make a final discharge from site at the greenfield run off rate. This is preferred if no infiltration can be made on site. This very simply satisfies the runoff rates and volume criteria.

Option 2 Complex – If some of the additional volume of water can be infiltrated back into the ground, the remainder can be discharged at a very low rate of 2 l/sec/hectare. A combined storage calculation using the partial permissible rate of 2 l/sec/hectare and the attenuation rate used to slow the runoff from site.

		Notes for developers
Please confirm what option has been chosen and how much storage is required on site.	Option 1	The developer at this stage should have an idea of the site characteristics and be able to explain what the storage requirements are on site and how it will be achieved.

8. Please confirm

		Notes for developers
Which Drainage Systems measures have been used, including green roofs?	Blue roofs; geocellular storage	SUDS can be adapted for most situations even where infiltration isn't feasible e.g. impermeable liners beneath some SUDS devices allows treatment but not infiltration. See CIRIA SUDS Manual C697.
Drainage system can contain in the 1 in 30 storm event without flooding	Yes	This a requirement for sewers for adoption & is good practice even where drainage system is not adopted.
Will the drainage system contain the 1 in 100 +CC storm event? If no please demonstrate how buildings and utility plants will be protected.	Yes	National standards require that the drainage system is designed so that flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.
Any flooding between the 1 in 30 & 1 in 100 plus climate change storm events will be safely contained on site.	Yes	**Safely:** not causing property flooding or posing a hazard to site users i.e. no deeper than 300mm on roads/footpaths. Flood waters must drain away at section 6 rates. Existing rates can be used where runoff volumes are not increased.
How will exceedance events be catered on site without increasing flood risks (both on site and outside the development)?	• The external areas will be profiled away from entrances of buildings and towards the site drainage to prevent flooding of buildings during an exceedance/infrastructure failure events. • Routine inspection and maintenance of the site and public drainage systems by the site owner and Thames Water will help prevent infrastructure failure events. • Monitor flood risk throughout the life of the development in order to confirm the risk posed to the scheme over time. • The site is currently at a very low risk of surface water flooding as shown on the EA's surface water flood mapping.	**Safely:** not causing property flooding or posing a hazard to site users i.e. no deeper than 300mm on roads/footpaths. Flood waters must drain away at section 6 rates. Existing rates can be used where runoff volumes are not increased. Exceedance events are defined as those larger than the 1 in 100 +CC event.
How are rates being restricted (vortex control, orifice etc)	Hydro brake / syphonic drainage feature	Detail of how the flow control systems have been designed to avoid pipe blockages and ease of maintenance should be provided.
Please confirm the owners/adopters of the entire drainage systems throughout the development. Please list all the owners.	Four Quarters (Ingestre Road) Ltd.	If these are multiple owners then a drawing illustrating exactly what features will be within each owner's remit must be submitted with this Proforma.
How is the entire drainage system to be maintained?	• Regular inspection and maintenance of highway drainage, public and private drainage by Camden Council, Thames Water, and site management respectively, will minimise the residual risks associated with surface water/sewers. • Maintenance schedule is included in Appendix G.	If the features are to be maintained directly by the owners as stated in answer to the above question please answer yes to this question and submit the relevant maintenance schedule for each feature. If it is to be maintained by others than above please give details of each feature and the maintenance schedule. Clear details of the maintenance proposals of all elements of the proposed drainage system must be provided. Details must demonstrate that maintenance and operation requirements are economically proportionate. Poorly maintained drainage can lead to increased flooding problems in the future.

9. Evidence Please identify where the details quoted in the sections above were taken from. i.e. Plans, reports etc. Please also provide relevant drawings that need to accompany your proforma, in particular exceedance routes and ownership and location of SuDS (maintenance access strips etc

Pro-forma Section	Document reference where details quoted above are taken from	Page Number
Section 2	SECTION 1: Appendix A - Sewer Flooding History; SECTION 2: Appendix B - Existing and Proposed Plans	10; 14
Section 3	Appendix C - MicroDrainage Calculations; Appendix D - Pre Development Enquiry; Appendix E - Sustainable Drainage Location Plan	18; 27; 39
Section 4	Appendix F - Impervious Runoff Calculations	41
Section 5		
Section 6		
Section 7		
Section 8	Appendix G - Maintenance Schedule	43

The above form should be completed using evidence from the Flood Risk Assessment and site plans. It should serve as a summary sheet of the drainage proposals and should clearly show that the proposed rate and volume as a result of development will not be increasing. If there is an increase in rate or volume, the rate or volume section should be completed to set out how the additional rate/volume is being dealt with.

This form is completed using factual information from the Flood Risk Assessment and Site Plans and can be used as a summary of the surface water drainage strategy on this site.

Form Completed By Elen Wyatt / Edward Funnell
Qualification of person responsible for signing off this pro-forma Graduate Water Consultant / Associate

Company Create Consulting Engineers
On behalf of (Client's details) Four Quarters (Ingestre Road) Ltd
Date: 28/06/2018

APPENDICES

APPENDIX A

Sewer Flooding
History Enquiry

Property Searches

Create Consulting Engineers Ltd

Princes Street

Search address supplied	Ingestre Road London NW5 1UX
Your reference	P17-1282
Our reference	SFH/SFH Standard/2017_3612613
Received date	**17 July 2017**
Search date	**17 July 2017**

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0845 070 9148

Sewer Flooding
History Enquiry

Property Searches

Search address supplied: Ingestre Road,London,NW5 1UX

This search is recommended to check for any sewer flooding in a specific address or area

TWUL, trading as Property Searches, are responsible in respect of the following:-

(i) any negligent or incorrect entry in the records searched;

(ii) any negligent or incorrect interpretation of the records searched;

(iii) and any negligent or incorrect recording of that interpretation in the search report

(iv) compensation payments

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0845 070 9148

Sewer Flooding
History Enquiry

Thames Water Property Searches

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

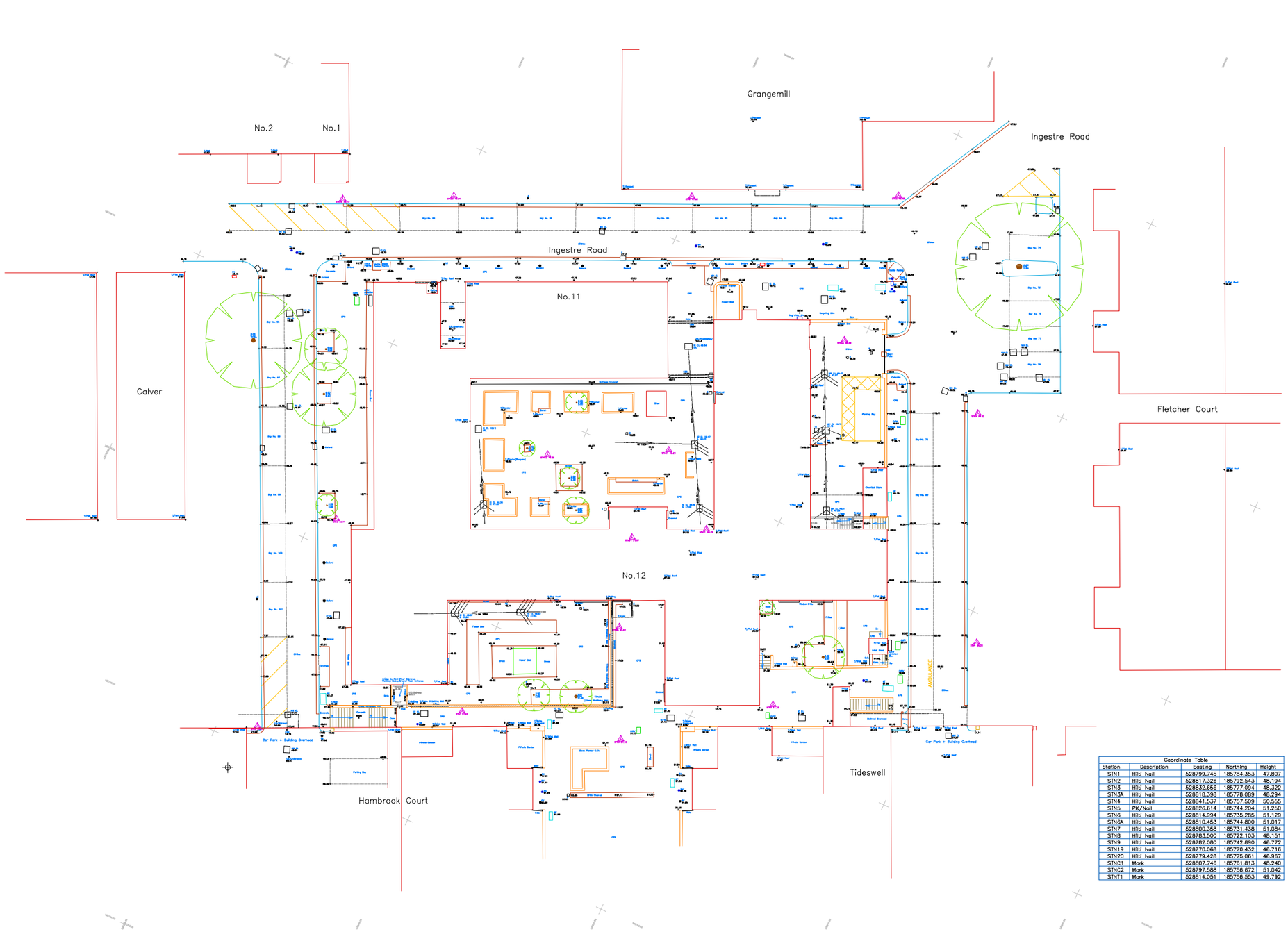
- A sewer is “overloaded” when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- “Internal flooding” from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- “At Risk” properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company’s reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0845 070 9148

APPENDIX B



Coordinate Table				
Station	Description	Easting	Northing	Height
STN1	Hilti Nail	528799.745	185784.353	47.807
STN2	Hilti Nail	528817.326	185792.543	48.194
STN3	Hilti Nail	528832.656	185777.094	48.322
STN3A	Hilti Nail	528818.398	185778.089	48.294
STN4	Hilti Nail	528841.537	185757.509	50.555
STN5	PK/Nail	528826.614	185744.204	51.250
STN6	Hilti Nail	528814.994	185735.285	51.129
STN6A	Hilti Nail	528810.453	185744.800	51.017
STN7	Hilti Nail	528800.358	185731.438	51.084
STN8	Hilti Nail	528783.500	185722.103	48.151
STN9	Hilti Nail	528782.080	185742.890	46.772
STN19	Hilti Nail	528770.068	185770.432	46.716
STN20	Hilti Nail	528779.428	185775.061	46.967
STNC1	Mark	528807.746	185761.813	48.240
STNC2	Mark	528797.588	185756.672	51.042
STNT1	Mark	528814.051	185756.553	49.792

Revision History:

Site Legend:

AB	Air Brick	GV	Gas Valve	SYL	Single Yellow Line
ACU	Air Conditioning Unit	IC	Inspection Cover	TCB	Telephone Call Box
ASP	Artificial Stone Paving	IL	Invert level	TP	Telegraph Pole
BT	British Telecom	LP	Lamp Post	TW	Top of Wall
CL	Cover Level	MKR	Marker (Service)	TF	Top of Fence
DYL	Double Yellow Line	MP	Metal Post	UTL	Unable To Lift
EL	Electricity	OH	Overhead	VP	Vent Pipe
FAI	Fresh Air Inlet	OST	Oil Storage Tank	WV	Water Valve
FB	Flower Bed	PB	Post Box	CP/	Concrete Post
FH	Fire Hydrant	PL	Pavement Light	WP/	Wooden Post
G	Gully	RE	Rodding Eye	/CB	Close Boarded Fence
		RS	Road Sign	/IW	Interwoven Panel
		SNP	Street Name Plate	/VB	Vertical Board

Building Legend:

CA	Centre of Arch	RWP	Rain Water Pipe
CH	Ceiling Height	SA	Spring of Arch
CWT	Cold Water Tank	SCH	Suspended Ceiling Height
DH	Door Head	SD	Sliding Door
ESP	Electricity Switch Panel	SP	Soil Pipe
F	Frame Height	SVP	Soil and Vent Pipe
GDH	Glazed Door Height	USB	Underside of Beam
GRL	Glazed Roof Light	WP	Waste Pipe
HWT	Hot Water Tank	WST	Water Storage Tank
RSD	Roller Shutter Door		

Levels:

Level data has been obtained with Kinematic GPS corrections via the Ordnance Survey's network, OS Net.

Project: 12 Ingestre Road. London. NW5 1UX

Drawing Title: Site Survey

Scale: 1:200 @ A1

Date: April 2013

Drawing No: 01 of 03

Blueprint Surveys Ltd
Land and Measured Building Surveys
Tel: 0844 5610758
E Mail: admin@blueprintsurveys.co.uk

The scaling of this drawing cannot be assured

Revision		Date	Drn	Ckd
A	Minor Amendments	06/06/18	DC	PN
B	Drawings for final review pre-planning issue	23/07/18	DC	PN
C	Red Line updated	06/09/18	DC	PN

INGESTRE ROAD

Deliveries/ drop off point

Bed 14.5 m²
En Suite 3.5 m²
Cupb'd 0.8 m²
Bath 4.3 m²
Cupb'd 1.9 m²
Hall 8.2 m²
Bed 12.2 m²
A-G.01
K/L/D 27.0 m²
Winter Garden

Bed 13.3 m²
En Suite 3.4 m²
Bath 4.3 m²
Hall 5.0 m²
Cupb'd 2.4 m²
Bed 12.4 m²
A-G.02
K/L/D 27.0 m²
Winter Garden

Bed 13.4 m²
En Suite 3.4 m²
Bath 4.3 m²
Cupb'd 1.2 m²
Cupb'd 1.3 m²
Hall 4.5 m²
Cupb'd 1.6 m²
Bed 12.1 m²
A-G.03
K/L/D 27.2 m²
Winter Garden
Lightwell

Bath 4.4 m²
A-G.04
K/L/D 30.3 m²
Bed 13.4 m²

Reception 104.7 m²
Riser 1.8 m²
Smoke vent 1.5 m²
Riser 1.9 m²

Cafe/Newsagents 94.5 m²
Riser 1.9 m²
Smoke vent 1.5 m²
Riser 1.8 m²

Hairdressers 37.0 m²
Cycle/Scooter Store 33.5 m²
Louvred door

Multi-use 21.4 m²
Multi-use 21.4 m²
Residens Lounge 268.3 m²

Female WC 14.8 m²
Bar store 10.8 m²
Male WC 11.7 m²
Accessible WC 3.7 m²
Staff WC 3.9 m²

En Suite 4.7 m²
Guest Acco. 25.0 m²
high level glazing
Guest Acco. 25.0 m²
high level glazing
En Suite 4.7 m²

Vent 0.6 m²
Kitchen Store 8.0 m²
Staff facilities 43.8 m²
Commercial Kitchen 35.2 m²
Staff office 11.4 m²

Rooflight to basement
Rooflight to basement
Bridge above dotted

Plant screening for privacy
PRIVATE COURTYARD
Plant screening for privacy
PRIVATE COURTYARD
Plant screening to provide privacy to residential amenity
Air conditioning units to Mckee Associates details

Application boundary
Extents of property boundary

00 Ground Floor Plan
1 : 100

0m 2m 4m 6m 8m 10m
VISUAL SCALE 1:100 @ A1

PLANNING

Project
11-12 Ingestre Road, Camden
Assisted Living Development
Drawing Title
Proposed Plans
Ground Floor

Date	Scale	Drawn by	Check by
05/06/18	As indicated @ A1	DC	PN
Project No	Drawing No		Revision
27463	A-P11-01		C

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London Manchester Newcastle Reading Solihull Southampton

The scaling of this drawing cannot be assured

Revision		Date	Drn	Ckd
A	Drawings for final review pre-planning issue	23/07/18	DC	PN
B	Red Line updated	06/09/18	DC	PN

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PLANNING

Project
11-12 Ingestre Road, Camden
Assisted Living Development

Drawing Title
Site Plan - Ground Floor

Date	Scale	Drawn by	Check by
05/06/18	1 : 200 @ A1	DC	PN
Project No	**Drawing No**		**Revision**
27463	A-P11-10		B

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APPENDIX C

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 82 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	47.048	0.248	0.0	3.5	3.5	20.0	O K
30 min Summer	47.111	0.311	0.0	3.5	3.5	25.1	O K
60 min Summer	47.149	0.349	0.0	3.5	3.5	28.2	O K
120 min Summer	47.148	0.348	0.0	3.5	3.5	28.1	O K
180 min Summer	47.131	0.331	0.0	3.5	3.5	26.8	O K
240 min Summer	47.109	0.309	0.0	3.5	3.5	25.0	O K
360 min Summer	47.062	0.262	0.0	3.5	3.5	21.2	O K
480 min Summer	47.021	0.221	0.0	3.5	3.5	17.8	O K
600 min Summer	46.986	0.186	0.0	3.5	3.5	15.0	O K
720 min Summer	46.958	0.158	0.0	3.5	3.5	12.7	O K
960 min Summer	46.920	0.120	0.0	3.5	3.5	9.7	O K
1440 min Summer	46.891	0.091	0.0	2.9	2.9	7.4	O K
2160 min Summer	46.873	0.073	0.0	2.2	2.2	5.9	O K
2880 min Summer	46.863	0.063	0.0	1.7	1.7	5.1	O K
4320 min Summer	46.852	0.052	0.0	1.3	1.3	4.2	O K
5760 min Summer	46.846	0.046	0.0	1.0	1.0	3.7	O K
7200 min Summer	46.841	0.041	0.0	0.8	0.8	3.3	O K
8640 min Summer	46.838	0.038	0.0	0.7	0.7	3.0	O K
10080 min Summer	46.835	0.035	0.0	0.6	0.6	2.8	O K
15 min Winter	47.081	0.281	0.0	3.5	3.5	22.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	150.535	0.0	23.0	23
30 min Summer	97.157	0.0	29.7	36
60 min Summer	59.609	0.0	36.6	62
120 min Summer	35.314	0.0	43.4	96
180 min Summer	25.660	0.0	47.3	130
240 min Summer	20.345	0.0	50.0	164
360 min Summer	14.664	0.0	54.0	228
480 min Summer	11.616	0.0	57.1	292
600 min Summer	9.689	0.0	59.5	350
720 min Summer	8.351	0.0	61.5	406
960 min Summer	6.601	0.0	64.9	518
1440 min Summer	4.732	0.0	69.7	750
2160 min Summer	3.388	0.0	75.0	1108
2880 min Summer	2.670	0.0	78.8	1472
4320 min Summer	1.907	0.0	84.3	2204
5760 min Summer	1.501	0.0	88.6	2936
7200 min Summer	1.246	0.0	91.9	3672
8640 min Summer	1.070	0.0	94.7	4400
10080 min Summer	0.940	0.0	97.0	5144
15 min Winter	150.535	0.0	25.8	24

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	47.153	0.353	0.0	3.5	3.5	28.5	O K
60 min Winter	47.197	0.397	0.0	3.5	3.5	32.0	O K
120 min Winter	47.194	0.394	0.0	3.5	3.5	31.8	O K
180 min Winter	47.170	0.370	0.0	3.5	3.5	29.9	O K
240 min Winter	47.139	0.339	0.0	3.5	3.5	27.4	O K
360 min Winter	47.069	0.269	0.0	3.5	3.5	21.7	O K
480 min Winter	47.006	0.206	0.0	3.5	3.5	16.6	O K
600 min Winter	46.957	0.157	0.0	3.5	3.5	12.6	O K
720 min Winter	46.923	0.123	0.0	3.5	3.5	9.9	O K
960 min Winter	46.896	0.096	0.0	3.0	3.0	7.8	O K
1440 min Winter	46.875	0.075	0.0	2.2	2.2	6.0	O K
2160 min Winter	46.861	0.061	0.0	1.6	1.6	4.9	O K
2880 min Winter	46.853	0.053	0.0	1.3	1.3	4.2	O K
4320 min Winter	46.844	0.044	0.0	0.9	0.9	3.5	O K
5760 min Winter	46.838	0.038	0.0	0.7	0.7	3.1	O K
7200 min Winter	46.835	0.035	0.0	0.6	0.6	2.8	O K
8640 min Winter	46.832	0.032	0.0	0.5	0.5	2.5	O K
10080 min Winter	46.830	0.030	0.0	0.5	0.5	2.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	97.157	0.0	33.3	36
60 min Winter	59.609	0.0	41.0	62
120 min Winter	35.314	0.0	48.6	102
180 min Winter	25.660	0.0	53.0	140
240 min Winter	20.345	0.0	56.0	178
360 min Winter	14.664	0.0	60.5	246
480 min Winter	11.616	0.0	63.9	308
600 min Winter	9.689	0.0	66.7	362
720 min Winter	8.351	0.0	68.9	412
960 min Winter	6.601	0.0	72.6	516
1440 min Winter	4.732	0.0	78.1	752
2160 min Winter	3.388	0.0	84.0	1116
2880 min Winter	2.670	0.0	88.2	1500
4320 min Winter	1.907	0.0	94.5	2196
5760 min Winter	1.501	0.0	99.2	2888
7200 min Winter	1.246	0.0	103.0	3648
8640 min Winter	1.070	0.0	106.1	4320
10080 min Winter	0.940	0.0	108.7	5008

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Shortest Storm (mins)	15
Ratio R	0.439	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.082

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.027	4	8	0.027	8	12	0.027

Model Details

Storage is Online Cover Level (m) 48.000

Cellular Storage Structure

Invert Level (m) 46.800 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	85.0	0.0	0.401	0.0	0.0
0.400	85.0	0.0	1.200	0.0	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0097-3500-0400-3500
Design Head (m)	0.400
Design Flow (l/s)	3.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	97
Invert Level (m)	46.800
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	3.5
Flush-Flo™	0.149	3.5
Kick-Flo®	0.302	3.1
Mean Flow over Head Range	-	2.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.2	1.200	5.8	3.000	9.0	7.000	13.5
0.200	3.4	1.400	6.3	3.500	9.6	7.500	14.0
0.300	3.1	1.600	6.7	4.000	10.3	8.000	14.5
0.400	3.5	1.800	7.0	4.500	10.8	8.500	14.9
0.500	3.9	2.000	7.4	5.000	11.4	9.000	15.4
0.600	4.2	2.200	7.7	5.500	12.0	9.500	15.8
0.800	4.8	2.400	8.1	6.000	12.5		
1.000	5.3	2.600	8.4	6.500	13.1		

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 76 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	45.849	0.249	0.0	2.5	2.5	13.3	O K
30 min Summer	45.912	0.312	0.0	2.5	2.5	16.6	O K
60 min Summer	45.946	0.346	0.0	2.5	2.5	18.4	O K
120 min Summer	45.941	0.341	0.0	2.5	2.5	18.2	O K
180 min Summer	45.921	0.321	0.0	2.5	2.5	17.1	O K
240 min Summer	45.897	0.297	0.0	2.5	2.5	15.8	O K
360 min Summer	45.845	0.245	0.0	2.5	2.5	13.0	O K
480 min Summer	45.802	0.202	0.0	2.5	2.5	10.7	O K
600 min Summer	45.766	0.166	0.0	2.5	2.5	8.8	O K
720 min Summer	45.738	0.138	0.0	2.5	2.5	7.3	O K
960 min Summer	45.703	0.103	0.0	2.5	2.5	5.5	O K
1440 min Summer	45.678	0.078	0.0	2.0	2.0	4.2	O K
2160 min Summer	45.662	0.062	0.0	1.5	1.5	3.3	O K
2880 min Summer	45.654	0.054	0.0	1.2	1.2	2.9	O K
4320 min Summer	45.644	0.044	0.0	0.8	0.8	2.4	O K
5760 min Summer	45.639	0.039	0.0	0.7	0.7	2.1	O K
7200 min Summer	45.635	0.035	0.0	0.6	0.6	1.9	O K
8640 min Summer	45.632	0.032	0.0	0.5	0.5	1.7	O K
10080 min Summer	45.630	0.030	0.0	0.4	0.4	1.6	O K
15 min Winter	45.884	0.284	0.0	2.5	2.5	15.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	150.535	0.0	15.5	23
30 min Summer	97.157	0.0	20.0	36
60 min Summer	59.609	0.0	24.6	60
120 min Summer	35.314	0.0	29.1	94
180 min Summer	25.660	0.0	31.7	128
240 min Summer	20.345	0.0	33.5	162
360 min Summer	14.664	0.0	36.3	226
480 min Summer	11.616	0.0	38.3	288
600 min Summer	9.689	0.0	39.9	346
720 min Summer	8.351	0.0	41.3	402
960 min Summer	6.601	0.0	43.5	510
1440 min Summer	4.732	0.0	46.8	744
2160 min Summer	3.388	0.0	50.3	1108
2880 min Summer	2.670	0.0	52.8	1472
4320 min Summer	1.907	0.0	56.6	2204
5760 min Summer	1.501	0.0	59.4	2936
7200 min Summer	1.246	0.0	61.7	3648
8640 min Summer	1.070	0.0	63.5	4336
10080 min Summer	0.940	0.0	65.1	5056
15 min Winter	150.535	0.0	17.3	24

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	45.954	0.354	0.0	2.5	2.5	18.8	O K
60 min Winter	45.995	0.395	0.0	2.5	2.5	21.0	O K
120 min Winter	45.987	0.387	0.0	2.5	2.5	20.6	O K
180 min Winter	45.959	0.359	0.0	2.5	2.5	19.1	O K
240 min Winter	45.924	0.324	0.0	2.5	2.5	17.2	O K
360 min Winter	45.846	0.246	0.0	2.5	2.5	13.1	O K
480 min Winter	45.781	0.181	0.0	2.5	2.5	9.6	O K
600 min Winter	45.732	0.132	0.0	2.5	2.5	7.0	O K
720 min Winter	45.702	0.102	0.0	2.5	2.5	5.4	O K
960 min Winter	45.682	0.082	0.0	2.1	2.1	4.4	O K
1440 min Winter	45.664	0.064	0.0	1.5	1.5	3.4	O K
2160 min Winter	45.652	0.052	0.0	1.1	1.1	2.7	O K
2880 min Winter	45.645	0.045	0.0	0.9	0.9	2.4	O K
4320 min Winter	45.637	0.037	0.0	0.6	0.6	2.0	O K
5760 min Winter	45.633	0.033	0.0	0.5	0.5	1.7	O K
7200 min Winter	45.629	0.029	0.0	0.4	0.4	1.6	O K
8640 min Winter	45.627	0.027	0.0	0.4	0.4	1.4	O K
10080 min Winter	45.625	0.025	0.0	0.3	0.3	1.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	97.157	0.0	22.4	36
60 min Winter	59.609	0.0	27.5	62
120 min Winter	35.314	0.0	32.6	100
180 min Winter	25.660	0.0	35.5	138
240 min Winter	20.345	0.0	37.6	176
360 min Winter	14.664	0.0	40.6	244
480 min Winter	11.616	0.0	42.9	302
600 min Winter	9.689	0.0	44.7	356
720 min Winter	8.351	0.0	46.3	400
960 min Winter	6.601	0.0	48.7	512
1440 min Winter	4.732	0.0	52.4	744
2160 min Winter	3.388	0.0	56.3	1108
2880 min Winter	2.670	0.0	59.2	1472
4320 min Winter	1.907	0.0	63.4	2196
5760 min Winter	1.501	0.0	66.6	2920
7200 min Winter	1.246	0.0	69.1	3672
8640 min Winter	1.070	0.0	71.1	4440
10080 min Winter	0.940	0.0	72.9	4984

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Shortest Storm (mins)	15
Ratio R	0.439	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.055

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.018	4	8	0.018	8	12	0.018

Model Details

Storage is Online Cover Level (m) 46.800

Cellular Storage Structure

Invert Level (m) 45.600 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	56.0	0.0	0.401	0.0	0.0
0.400	56.0	0.0	1.200	0.0	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0084-2500-0400-2500
Design Head (m)	0.400
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	84
Invert Level (m)	45.600
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	2.5
Flush-Flo™	0.133	2.5
Kick-Flo®	0.293	2.2
Mean Flow over Head Range	-	2.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5	1.200	4.1	3.000	6.4	7.000	9.6
0.200	2.4	1.400	4.4	3.500	6.8	7.500	9.9
0.300	2.2	1.600	4.7	4.000	7.3	8.000	10.3
0.400	2.5	1.800	5.0	4.500	7.7	8.500	10.6
0.500	2.8	2.000	5.3	5.000	8.1	9.000	10.9
0.600	3.0	2.200	5.5	5.500	8.5	9.500	11.2
0.800	3.4	2.400	5.7	6.000	8.9		
1.000	3.8	2.600	5.9	6.500	9.3		

APPENDIX D

Miss Jessica Jordan
Create Consulting Engineers
15 Princes Street
Norwich
NR3 1AF

Your account number
DS6043232

Developer.services@thameswater.co.uk

0800 009 3921

Mon – Fri 9am-5pm,

05/01/2018

Pre Development Enquiry

Site Address: Ingestre Road, London, NW5 1UX, OS grid ref. 528689, 185814.

Proposed Development: Redevelopment of the existing care home to increase max capacity to 70 beds. Foul Water to be discharged by gravity to combined sewer in Ingestre Rd. Surface Water to be attenuated and discharged by gravity into combined sewer in Ingestre Road at 21l/s. Exist run-off for 1:1 21.19l/s, 1:30 51.95l/s, 1:100 66.99l/s.

Dear Miss Jordan,

I write in relation to the Pre-Development application submitted, we have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewer capacity within the existing Thames Water sewer network.

Foul Water

From the information you have provided, we can confirm that the existing combined sewer network does have sufficient capacity to accommodate the proposed foul water discharge from the proposed development.

Surface Water

Please note that discharging surface water to the public sewer network should only be considered after all other methods of disposal have been investigated and proven to not be viable. In accordance with the Building Act 2000 Clause H3.3, positive connection to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. The disposal hierarchy being: 1st Soakaways; 2nd Watercourses; 3rd Sewers.

Only when it can be proven that soakage into the ground or a connection into the adjacent watercourse is not possible would we consider a restricted discharge into the public surface water sewer network.

We would encourage techniques such as green roofs and/or permeable paving that restricts surface water discharge from your site.

When redeveloping an existing site, policy 5.13 of the London Plan and Policy 3.4 of the Supplementary Planning Guidance (Sustainable Design And Construction) states that every attempt should be made to use flow attenuation and SUDS/storage to reduce the surface water discharge from the site as much as possible.

If they are consulted as part of any planning application, Thames Water Planning team would ask to see why it is not practicable to attenuate the flows to Greenfield run-off rates i.e. 5l/s/hectare of the total site area or if the site is less than hectare in size then the flows should be reduced by 95% of existing flows. Should the policy above be followed, we would envisage no capacity concerns with regards to surface water for this site.

Please note that the Local Planning authority may comment on surface water discharge under the planning process.

Please Note

All connection requests are subject to a full Section 106 (Water Industry Act 1991) application before the Company can confirm approval to the connection itself. Please also note that capacity in the public sewerage system cannot be reserved.

Note on trunk sewers: Connecting directly to Trunk sewers can be complex and dangerous, which means we often refuse permission. In this case, you will need to find an alternative sewer or method of discharge. Please contact the Sewer Connections team through our Helpdesk on 0800 009 39 21 for further information.

If Thames Water permits a connection to the trunk sewer, we will insist on carrying out the connection ourselves under Section 107 of the Water Industry Act. We would advise for you to apply as soon as possible.

The discharge of non-domestic effluent is not permitted until a valid trade effluent consent has been issued by Thames Water. If anything other than domestic sewage is discharged into the public sewers without the above agreement an offence is committed and the applicant will be liable to the penalties contained in Section 109(1) (WIA 1991).

Applicants should contact Trade Effluent prior to seeking a connection approval, to discuss trade effluent consent and conditions of discharge. A Trade Effluent reference number should be obtained and included in the relevant box of the attached application form. The address for Trade Effluent is - Thames Water Utilities Limited, Waste Water Quality, Crossness Sewage Treatment Works, Belvedere Road, Abbeywood, London. SE2 9AQ. Alternatively you can telephone them on 020 8507 4321.

The views expressed by Thames Water in this letter are in response to this pre development enquiry at this time and do not represent our final views on any future planning applications made in relation to this site.

Yours sincerely,

Artur Jaroma
Developer Services

Charlotte Catchpole

From: Duwku#Mdurp d#? duwkuimdurp dC wkdp hvz dwhufr1knA
Sent: 3:#Mkqh#534;#43=53
To: Hdnq#Z |dww
Subject: UH=#JH=#LUhi=4348<<;555#JH=#Lqjhvwuh#Jrdg#Suh#Ghyhorsp hqw#Hqtxlu|#GV9376565

Dear Elen

Apologies for a late response.

Unfortunately, Thames Water would not support revised sw discharge rate.
Planning Team are happy to accept the risk with the previously quoted total surface water discharge rate of 9l/s.
You will have to liaise with your Local Planning Authority to discuss your drainage strategy and receive their acceptance.
Please note, Thame Water will be prepared to accept the agreed concept for surface water discharges, and if necessary undertake any preventing measures against hydraulic incapacity in the existing sewer network.

Kind Regards

Artur Jaroma
Developer Services – Sewer Adoptions Engineer
Office: 0203 577 8082
artur.jaroma@thameswater.co.uk

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

From: Elen Wyatt [mailto:Elen.Wyatt@createconsultingengineers.co.uk]
Sent: 05 June 2018 10:29
To: Artur Jaroma
Subject: RE: RE: IRef:1015998222 RE: Ingestre Road Pre Development Enquiry DS6043232

Hi Artur,

In regard to below emails re. Ingestre Road I was wondering when we can please expect to receive a reply?

Many thanks,

Elen Wyatt
Flood Risk Consultant
Create Consulting Engineers Ltd

From: DEVELOPER.SERVICES@THAMESWATER.CO.U [mailto:DEVELOPER.SERVICES@THAMESWATER.CO.UK]
Sent: 31 May 2018 17:03

To: Elen Wyatt
Subject: RE: RE: IRef:1015998222 RE: Ingestre Road Pre Development Enquiry DS6043232

Elen

I'm yet to receive a feedback from our planning team. I have just informed them of the new proposed rate. They potentially may want to contact local authority, to understand whether they would support this based on the flooding history in the vicinity.

I'll forward you the response shorty after receiving the comments.

Many thanks

Artur Jaroma
Developer Services – Sewer Adoptions Engineer
Office: 0203 577 8082
artur.jaroma@thameswater.co.uk

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

Original Text

From: Elen Wyatt <Elen.Wyatt@createconsultingengineers.co.uk>
To: 'DEVELOPER.SERVICES@THAMESWATER.CO. <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
CC:
Sent: 29.05.18 11:56:06
Subject: RE: IRef:1015998222 RE: Ingestre Road Pre Development Enquiry DS6043232

Dear Arthur,

Since my previous email dated 23rd May we have received updated plans for the site at Ingestre Road and have thus had to update our drainage strategy.

A blue roof is still included in the scheme, releasing at a rate of 2.5 l/s. Changes to the basement plan, and previously discussed constraints of the site means the minimum we are able to have the attenuation tank release at is now 11.0 l/s. Given this, the total release rate from the site into the Thames sewer network will be 13.5 l/s.

Although this does not quite provide the 50% betterment requested, it is a significant improvement on the existing scenario. Would you be willing to accept a release rate of 13.5 l/s given this significant improvement and consideration of the drainage hierarchy as requested?

Many thanks,

Elen Wyatt
Flood Risk Consultant
Create Consulting Engineers Ltd

From: Elen Wyatt
Sent: 23 May 2018 15:26
To: 'DEVELOPER.SERVICES@THAMESWATER.CO.U' <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Subject: RE: IRef:1015998222 RE: Ingestre Road Pre Development Enquiry DS6043232

Dear Artur,

Thank you for raising your concerns. We have revaluated the drainage strategy following these comments.

A blue roof is now included in the scheme, which will release at a rate of 2.5 l/s. Due to the constraints of the site the minimum we are able to have the attenuation tank release at is 6.5 l/s. Given this, the total release rate from the site into the Thames sewer network will be 9.0 l/s.

This provides a 58% betterment on the existing runoff rate of 21.19 l/s. Given this significant improvement, and over a 50% betterment on the existing, would you be willing to accept a release rate of 9.0 l/s?

These calculations are all based on the latest plans. Should these change, and thus the surface water drainage strategy change, we will revaluate and be in touch with our revised proposal.

Many thanks,

Elen Wyatt
Flood Risk Consultant
Create Consulting Engineers Ltd

From: DEVELOPER.SERVICES@THAMESWATER.CO.U [mailto:DEVELOPER.SERVICES@THAMESWATER.CO.UK]
Sent: 16 May 2018 11:59
To: Elen Wyatt <Elen.Wyatt@createconsultingengineers.co.uk>
Subject: IRef:1015998222 RE: Ingestre Road Pre Development Enquiry DS6043232

Elen

Thank you for providing additional information.

Can you explore other sustainable techniques e.g. blue/green roof, rainwater harvesting please?

Due to the existence of the combined sewer only and history of hydraulic flooding in this area, I would like the developer to exhaust all options of the drainage hierarchy.

Kind Regards

Artur Jaroma

Developer Services – Sewer Adoptions Engineer

Office: 0203 577 8082

artur.jaroma@thameswater.co.uk

Clearwater Court, Vastern Road, Reading, RG1 8DB

Find us online at developers.thameswater.co.uk

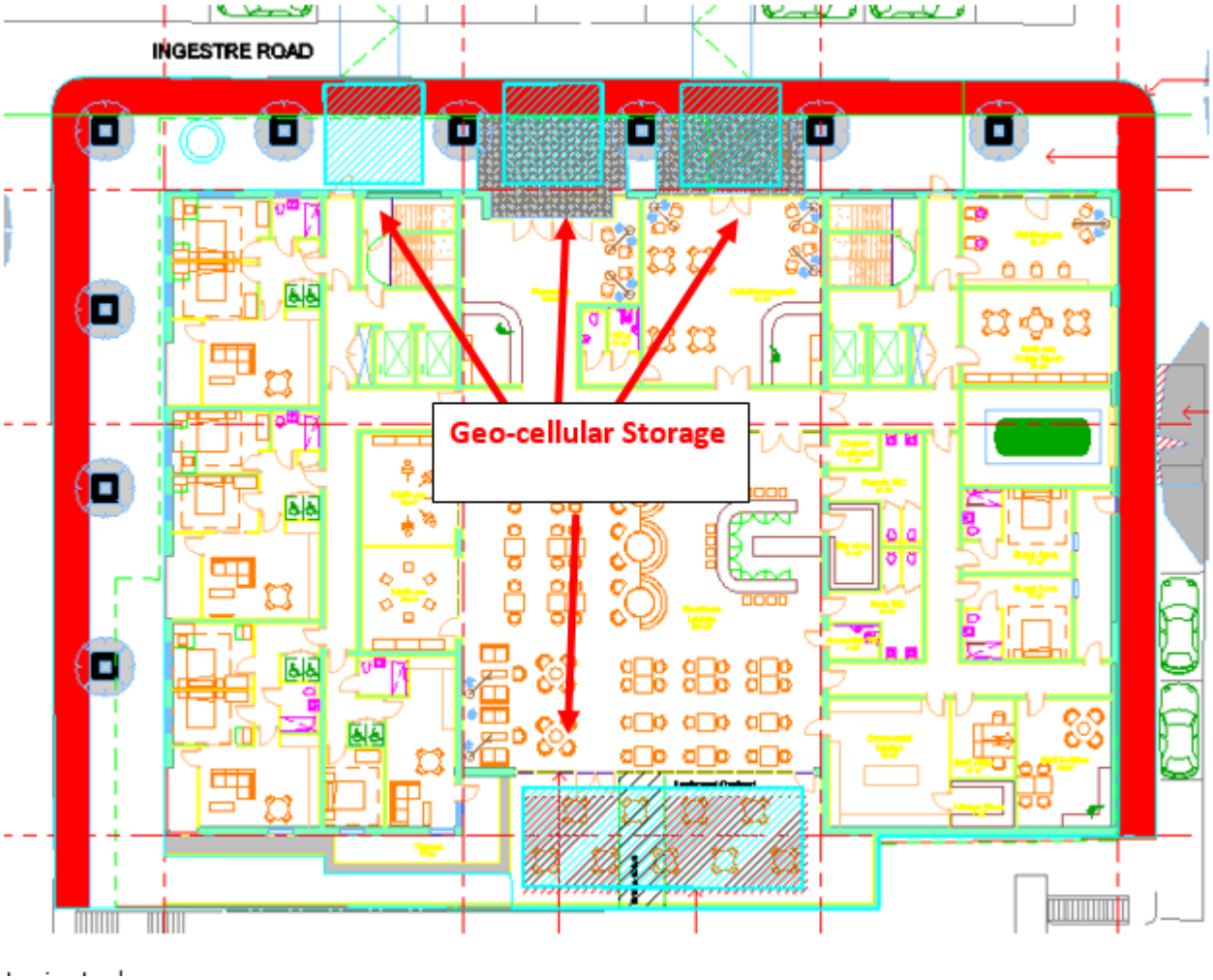
Original Text

From: Elen Wyatt <Elen.Wyatt@createconsultingengineers.co.uk>
To: 'DEVELOPER.SERVICES@THAMESWATER.CO. <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
CC:
Sent: 14.05.18 16:02:48
Subject: Ingestre Road Pre Development Enquiry

Hi Artur,

With regards to the predevelopment enquiry for Ingestre Road (attached) you have stated that the "Thames Water Planning team would ask to see why it is not practicable to attenuate the flows to Greenfield run-off rates".

Due to the nature of the local area the council have requested that trees are placed along the site. As a result we are very restricted in terms of places we can provide attenuation on the site (see image below). Unfortunately due to the location of existing services along the pavement the only feasible locations for attenuation (without providing a pumped solution below the basement) are shown in the figure below.



Given the constraints on the site would you accept a release rate of 21 l/s?

Many thanks,

Elen Wyatt
Flood Risk Consultant

Create Consulting Engineers Ltd
109-112 Temple Chambers|3-7 Temple Avenue|London|EC4Y 0HP
T 020 7822 2300

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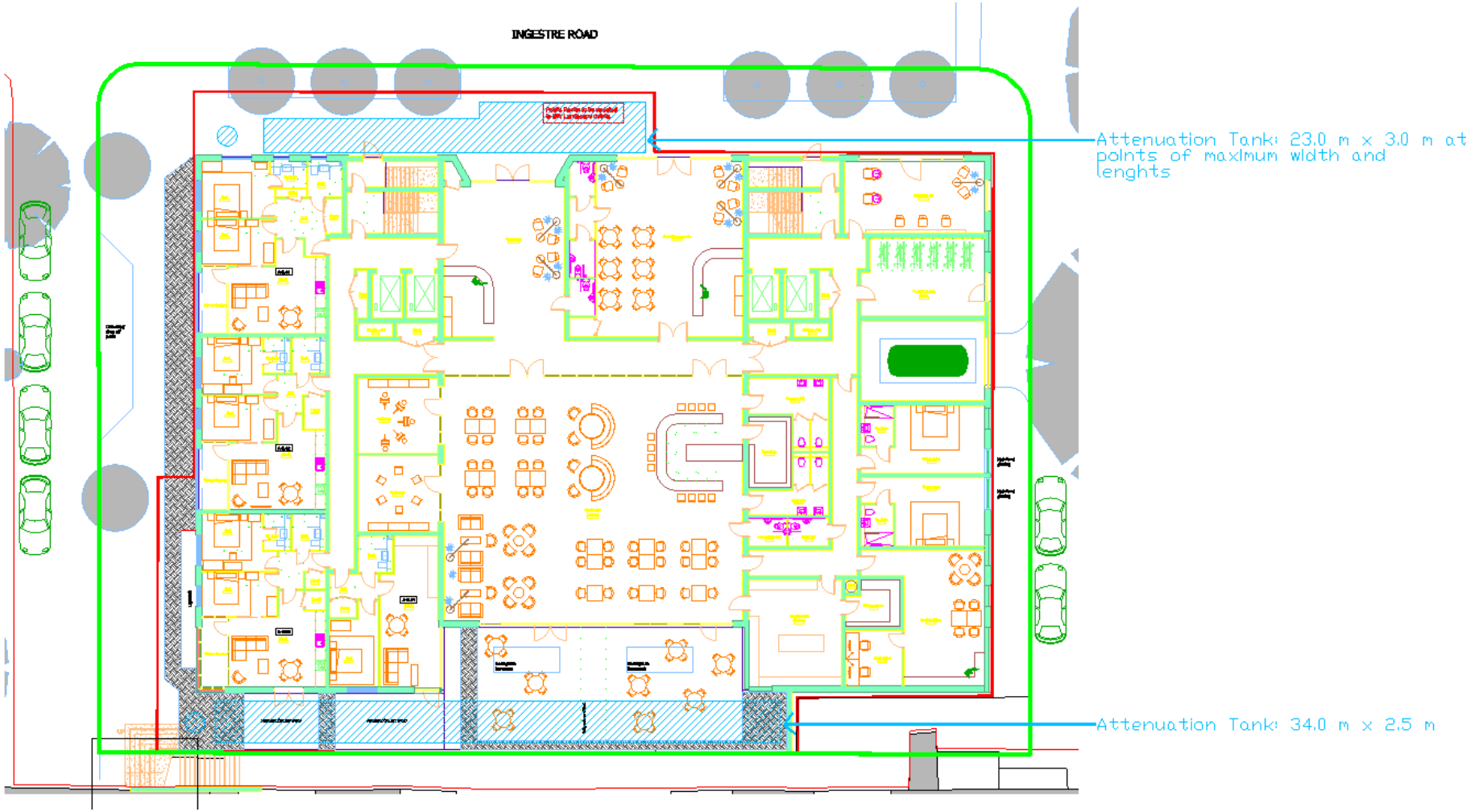
APPENDIX E

APPENDIX E: INGESTRE ROAD SUSTAINABLE DRAINAGE INFRASTRUCTURE LOCATION PLAN



APPENDIX F

Location : **Ingestre Road**

M5-60 : 21 mm

r : 0.425

Wallingford Method - maps

\\cre001-net01\company data\Reference\Technical Library\wallingford

For different durations,

From Table 1

Duration, D	Z1			
15 min	0.65	**M5-15:**	Z1 x M5-60	13.65 mm
30 min	0.82	**M5-30:**	Z1 x M5-60	17.22 mm
60 min	1	**M5-60:**	Z1 x M5-60	21.00 mm
6hr	1.51	**M5-360:**	Z1 x M5-60	31.71 mm

For different return intervals,

From Table 2*

		Z2	
Duration, D	M1	M30	M100
15 min	0.62	1.52	1.96
30 min	0.62	1.53	2.00
60 min	0.64	1.54	2.03
6 hr	0.68	1.51	1.97

Average point intensity, API = I/(D/60)

	D min	Calculation	I mm	API mm/hr
M 1-15	15	M5-15*Z2(M1)	8.46	33.85
M 1-30	30	M5-30*Z2(M1)	10.68	21.35
M 1-60	30	M5-360*Z2(M1)	13.44	26.88
M1-360	360	M5-360*Z2(M1)	21.56	3.59
M 30-15	15	M5-15*Z2(M30)	20.75	82.99
M 30-30	30	M5-30*Z2(M30)	26.35	52.69
M 30-60	60	M5-60*Z2(M30)	32.34	32.34
M30-360	360	M5-360*Z2(M30)	47.88	7.98
M 100-15	15	M5-15*Z2(M100)	26.75	107.02
M 100-30	30	M5-30*Z2(M100)	34.44	68.88
M100-60	60	M5-60*Z2(M100)	42.63	42.63
M100-360	360	M5-360*Z2(M100)	62.47	10.41

Peak Runoff

Q=2.78CiA Rational Method, SUDS Manual Section 4.3.3

where: (1) C = Cv Cr

Cv = 1 **

Cr = 1.3 constant value for design purposes

therefore , C = 1.3

(2) i = API, defined above

(3) A = areas measured for subcatchments

Q=2.78CiA

Table 1

Rainfall Duration D

Minutes					Hours					
r	5	10	15	30	1	2	4	6	10	24
0.12	0.22	0.34	0.45	0.67	1.00	1.48	2.17	2.75	3.70	6.00
0.15	0.25	0.38	0.48	0.69	1.00	1.42	2.02	2.46	3.32	4.90
0.18	0.27	0.41	0.51	0.71	1.00	1.36	1.86	2.25	2.86	4.30
0.21	0.29	0.43	0.54	0.73	1.00	1.33	1.77	2.12	2.62	3.60
0.24	0.31	0.46	0.56	0.75	1.00	1.30	1.71	2.00	2.40	3.35
0.27	0.33	0.48	0.58	0.76	1.00	1.27	1.64	1.88	2.24	3.10
0.30	0.34	0.49	0.59	0.77	1.00	1.25	1.57	1.78	2.12	2.84
0.33	0.35	0.50	0.61	0.78	1.00	1.23	1.53	1.73	2.04	2.60
0.36	0.36	0.51	0.62	0.79	1.00	1.22	1.48	1.67	1.90	2.42
0.39	0.37	0.52	0.63	0.80	1.00	1.21	1.46	1.62	1.82	2.28
0.42	0.38	0.53	0.64	0.81	1.00	1.20	1.42	1.57	1.74	2.16
0.45	0.39	0.54	0.65	0.82	1.00	1.19	1.38	1.51	1.68	2.03

Table 2 - England and Wales

Growth Factor Z2

M5 rainfall	M1	M2	M3	M4	M5	M10	M20	M50	M100	M30 interpolated
5.00	0.62	0.79	0.89	0.97	1.02	1.19	1.36	1.56	1.79	1.25
10.00	0.61	0.79	0.90	0.97	1.03	1.22	1.41	1.65	1.91	1.49
15.00	0.62	0.80	0.90	0.97	1.03	1.24	1.44	1.70	1.99	1.53
20.00	0.64	0.81	0.90	0.97	1.03	1.24	1.45	1.73	2.03	1.54
25.00	0.66	0.82	0.91	0.97	1.03	1.24	1.44	1.72	2.01	1.53
101.92 30.00	0.68	0.83	0.91	0.97	1.03	1.22	1.42	1.70	1.97	1.51
40.00	0.70	0.84	0.92	0.97	1.02	1.19	1.38	1.64	1.89	1.47
50.00	0.72	0.85	0.93	0.98	1.02	1.17	1.34	1.58	1.81	1.42
75.00	0.76	0.87	0.93	0.98	1.02	1.14	1.28	1.47	1.64	1.34
100.00	0.78	0.88	0.94	0.98	1.02	1.13	1.25	1.40	1.54	1.30
150.00	0.78	0.88	0.94	0.98	1.01	1.12	1.21	1.33	1.45	1.25
200.00	0.78	0.88	0.94	0.98	1.01	1.11	1.19	1.30	1.40	1.23

* The rainfall depths from cells E8-E11 are compared with the depths given in cells J29-J40 and Z2 interpolated accordingly for each return period

** Cv varies between 0.6 (rapidly draining soils) and 0.9 (heavy clay) with an average of 0.75 taken if ground conditions not known.

2.78*C= **3.614**

	i mm/hr	Contributing Impermeable Area Ha: Site 0.213	Per hectare 1
M 1-15	33.85	**26.06**	122.34
M 1-30	21.35	16.44	77.17
M 1-60	26.88	20.69	77.17
M1-360	3.59	2.77	12.99
M 30-15	82.99	**63.89**	299.93
M 30-30	52.69	40.56	190.43

	i mm/hr	Contributing Impermeable Area Ha: Site 0.213	Per hectare 1
M 30-60	32.34	24.89	190.43
M30-360	7.98	6.14	28.84
M 100-15	107.02	**82.38**	386.76
M 100-30	68.88	53.02	248.93
M 100-60	42.63	32.82	248.93
M100-360	10.41	8.01	37.63

APPENDIX G

SURFACE WATER DRAINAGE FEATURES MAINTENANCE SCHEDULE

DRAINAGE FEATURE	MAINTENANCE	MAINTENANCE PERIOD
Manholes	Check free from silt and debris and water discharging freely through. Jet/clear out as necessary.	Every 6 months
Drainage Pipework	CCTV inspection/condition survey Sewer jetting	Every 5 years Every 2 years
Geo-cellular Storage	Inspection of silt traps, manholes, pipework, pre-treatment devices, and inlets Removal of unwanted sediment /debris (if required)	Monthly As required. Inspect monthly
Blue Roof	Check free from silt and debris and water discharging freely through. Remove any debris from roof ensuring it is not simply flushed down rainwater pipes. Inspect the waterproofing system visible at all upstands, to ensure it is firmly adhered to the detail this it is waterproofing. Cut back tree limbs that overhand the roof to give a 1 meter clearance outside the roof edge in order to significantly reduce the blockage of fallen leaves. Ensure that all rainwater pipes are free from blockages and that water flows freely through them.	Every 6 months As required Every 6 months Every 6 months Every 6 months