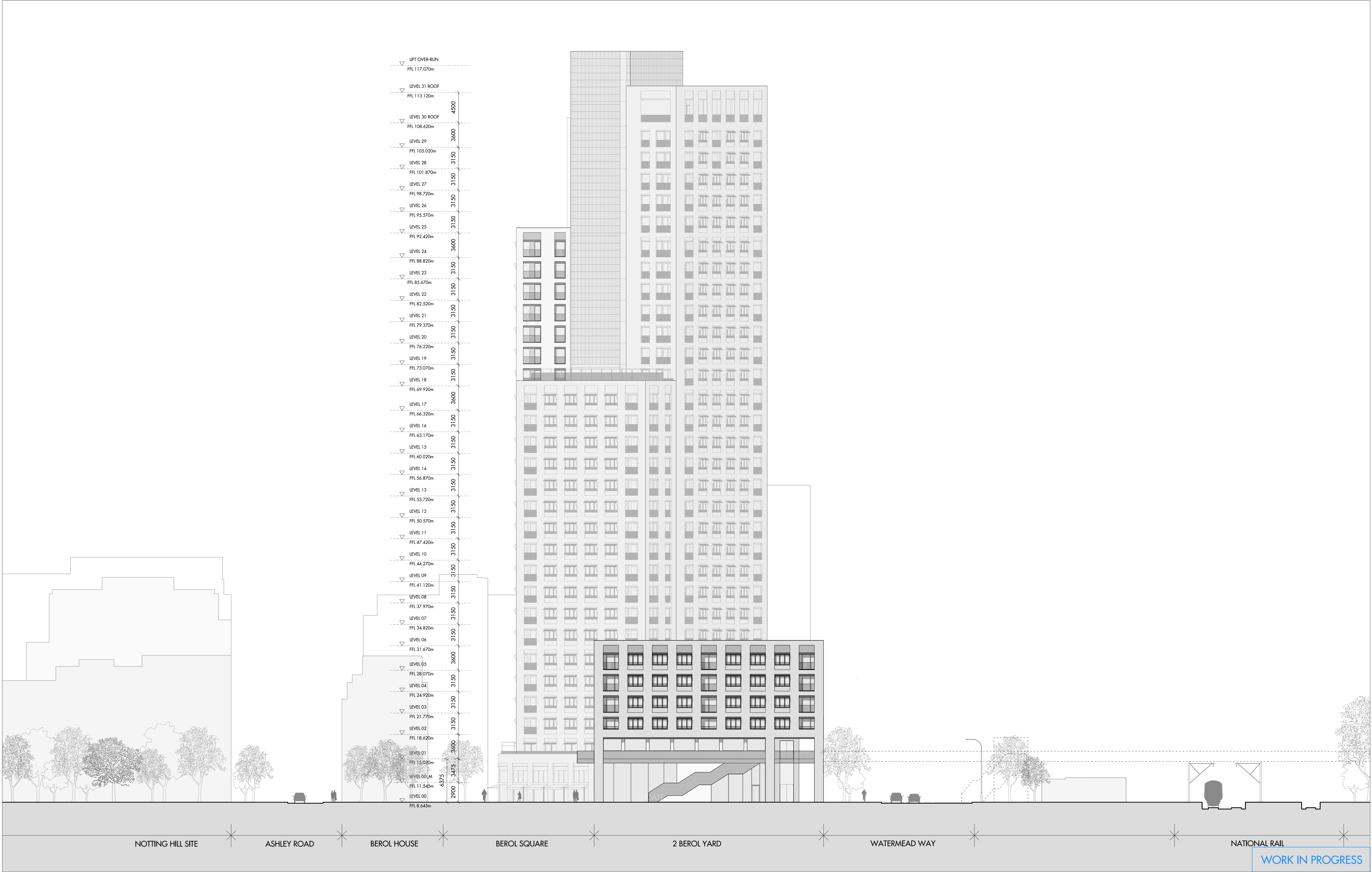


Do not scale from this drawing. Use figured dimensions only. Figured dimensions are in millimetres. All levels are in metres. All dimensions and levels shall be verified on site before proceeding with works. Detailed site survey to be carried out to verify positions and level relationships with site features and ordnance survey. The Architect must be notified of any discrepancy. Boundaries are indicative only and are to be verified by others. Where building components are described in the specification or Descriptive Specification - (Contractor Design) elements shown on this drawing pertaining to those components are to be read as 'Issued for Design Intent only'.
Allies & Morrison LLP is not responsible for any errors caused by the transmission, translation, software or computer systems. Allies & Morrison LLP is not responsible for nor shall be liable for the consequences of any use made of the drawings or models other than that for which they were produced by Allies & Morrison LLP for the Client.

REV	DATE	DESCRIPTION	CKD	REV	DATE	DESCRIPTION	CKD
P1	18.10.2022	FOR INFORMATION	ID				

Allies and Morrison LLP
85 Southwark Street
London SE1 0HX
020 7921 0100
020 7921 0101
studio@alliesandmorrison.com

2 BEROL YARD
STREET ELEVATION - BLOCK E
GENERAL ARRANGEMENT
22049_06_200

SCALE 1:250 @A1 1:500 @A3

Appendix C

STAKEHOLDER CORRESPONDENCE



Appendix C.1

THAMES WATER



Sewer Flooding

History Enquiry



Property
Searches

WSP UK Ltd

2 Grosvenor Square

Search address supplied

Ben Tv
Berol House
25
Ashley Road
London
N17 9LJ

Your reference

Tottenham

Our reference

SFH/SFH Standard/2022_4734905

Received date

14 October 2022

Search date

14 October 2022



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



0800 009 4540

Sewer Flooding

History Enquiry



Property
Searches

Search address supplied: Ben Tv,Berol House,25,Ashley Road,London,N17
9LJ

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



0800 009 4540

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



0800 009 4540



Andres Perez Gonzalez
WSP UK
Matrix House
Basing View
Hampshire
RG21 4FF



21 November 2022

Pre-planning enquiry: Confirmation of sufficient capacity (foul water only)

Site: Berol Quarter, Berol Yard, Ashley Road, London Borough Of Haringey, Greater London, N17 9LJ

Dear Mr Perez Gonzales,

Thank you for providing information on your development.

*Proposed site: **Berol House: - Retail (452m²), Commercial (176m²), Offices (3717m²)**
2 Berol Yard: - Flats (210 units), Retail (639m²),*

Proposed foul water discharge by gravity into 225mm foul water sewer in Ashley Road upstream of manhole TQ34893602 for Berol House and into 300mm foul water sewer via 2 outfalls upstream and downstream of manhole TQ34894603 for 2 Berol Yard.

Proposed surface water discharge by gravity at 6.3l/s for all storm events up to and including 1:100yr+40%CC into 225mm surface water sewer in Ashley Road downstream of manhole TQ34893601

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 sewerage capacity within the existing Thames Water sewer network.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the adjacent foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.



Surface Water

Our sewerage network will not be able to accommodate your surface water flows at the discharge rates proposed.

When developing a 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.

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water 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. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you have followed the sequential approach to the disposal of surface water and considered all practical means.

The disposal hierarchy being:

1. store rainwater for later use.
2. use infiltration techniques where possible.
3. attenuate rainwater in ponds or open water features for gradual release.
4. attenuate rainwater by storing in tanks or sealed water features for gradual release.
5. discharge rainwater direct to a watercourse.
6. discharge rainwater to a surface water sewer/drain.
7. discharge rainwater to the combined sewer.
8. discharge rainwater to the foul sewer

Where connection to the public sewerage network is still required to manage surface water flows, we will accept these flows at a discharge rate in line with CIRIA's best practice guide on SuDS or that stated within the sites planning approval.

Please see the attached 'Planning your wastewater' leaflet for additional information.

Diversion

There are existing public sewers crossing the site. New buildings will need to be kept between 3 and 6.5m away from existing sewer depending on the size and depth of the sewer. Alternatively, it may be possible for sewers to be diverted around the new development. If you wish us to review a diversion proposal, please submit this via a Section 185 Diversion application. On some occasions it may be possible to abandon existing public sewers. Please contact us for further information on this process.

Source Protection Zone

The development site boundary falls within a Source Protection Zone for groundwater abstraction. These zones may be at particular risk from polluting activities on or below the land surface. To prevent pollution, the Environment Agency and Thames Water (or other local water undertaker) will use a tiered, risk-based approach to regulate activities that may impact groundwater resources, this may potentially affect your drainage or surface water strategies where deep or infiltration systems are proposed. The applicant is encouraged to read the Environment Agency's approach to groundwater protection (available at <https://www.gov.uk/government/publications/groundwater-protection-position-statements> and



may wish to discuss the full implications for their development with a suitably qualified environmental consultant.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

If you have any further questions, please contact me on 0800 009 3921.

Kind Regards,

A handwritten signature in black ink, appearing to read "Kojo Howard", with a long, sweeping underline.

Kojo Howard

Developer Services – Adoptions Engineer, Sewer Adoptions Team

Tel: 0800 009 3921

Get advice on making your sewer connection correctly at connectright.org.uk

Clearwater Court, Vastern Road, Reading, RG1 8DB

Find us online at developers.thameswater.co.uk



Planning your wastewater

We've put together some information on sewerage to help you plan your new development.

How long does it take to get consent to connect to a sewer?

If you're applying for consent to connect to a sewer under Section 106 of the Water Industry Act 1991, you'll need to give us 21 days' notice.

I think I'll need to connect to a trunk sewer – is that possible?

Connecting directly to trunk sewers can be complex and dangerous, and we won't permit this at all in London. If you're considering a trunk sewer as a point of connection, please contact us as soon as possible to discuss.

How do I handle trade effluent and groundwater discharges?

You mustn't discharge non-domestic waste to our sewers without a valid trade effluent consent - doing this is an offence under Section 109(1) of the Water Industry Act 1991. You can call our trade effluent team on 0203 577 9200 to get help with trade effluent consents and ground water discharge permits.

Where can I discharge surface water?

The Lead Local Flood Authority, or if you are in a London Borough, 'The London Plan', advises that your development should utilise sustainable drainage systems (SuDS) unless there are practical reasons for not doing so. You should aim to achieve greenfield run-off rates and ensure you manage surface water run-off as close to its source as possible in line with the following drainage hierarchy:

- 1 Store rainwater for later use.
- 2 Use infiltration techniques, such as porous surfaces in non-clay areas.
- 3 Attenuate rainwater in ponds or open water features for gradual release.
- 4 Attenuate rainwater by storing in tanks or sealed water features for gradual release.
- 5 Discharge rainwater direct to a watercourse.
- 6 Discharge rainwater to a surface water sewer or drain.
- 7 Discharge rainwater to a combined sewer.

Please note that if you're discharging surface water anywhere other than to a public sewer – such as to a watercourse – you'll need approval from the relevant authority, for example the Environment Agency, the local authority or the Canals and Rivers Trust.

If you don't follow the surface water hierarchy you may not be granted planning permission, and Thames Water may seek to put conditions on the planning application.

There's no right of discharge of highway drainage into the public sewerage system, and we'd need to agree this with the relevant highway authority under Section 115 of the Water Industry Act 1991. You can contact us to discuss this further.

What can I do about redundant sewers and rising mains on my site?

On brownfield sites where existing sewers or rising mains need to be made redundant or diverted, the developer will need to fund the work, as set out in Section 185 of the Water Industry Act. If there's no practical way of making a diversion, we'll apply the standoff distances in Sewers for Adoption 7th edition to assess the width of easement required.

Appendix D

DRAINAGE STRATEGY



Appendix D.1

HR WALLINGFORD GREENFILED
RUNOFF RATE CALCULATION



[Print](#)[Close Report](#)

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

Default Edited

SOIL type:

HOST class:

SPR/SPRHOST:

Hydrological characteristics

Default Edited

SAAR (mm):

Hydrological region:

Growth curve factor 1 year:

Growth curve factor 30 years:

Growth curve factor 100 years:

Growth curve factor 200 years:

Notes

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

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

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

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default Edited

Q_{BAR} (l/s):

1 in 1 year (l/s):

1 in 30 years (l/s):

1 in 100 year (l/s):

1 in 200 years (l/s):

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

Appendix D.2

SOURCE CONTROL QUICK STORAGE ESTIMATE



MICRODRAINAGE SOURCE CONTROL QUICK STORAGE ESTIMATE

CALCULATIONS SCREENSHOTS FOR THE IMPERMEABLE AREA OF 4,465 m²

The screenshot shows the 'Quick Storage Estimate' window with the 'Variables' tab selected. The left sidebar contains a 'Micro Drainage' logo and a list of tabs: Variables, Results, Design, Overview 2D, Overview 3D, and Vt. The main area is divided into two columns. The left column contains input fields for 'FEH Rainfall' (a dropdown), 'Return Period (years)' (100), 'Version' (2013), and 'Site' (GB 534436 189699 TQ 34436 89699). The right column contains input fields for 'Cv (Summer)' (0.750), 'Cv (Winter)' (0.840), 'Impemeable Area (ha)' (0.447), 'Maximum Allowable Discharge (l/s)' (5.9), 'Infiltration Coefficient (m/hr)' (0.00000), 'Safety Factor' (2.0), and 'Climate Change (%)' (40). At the bottom right are buttons for 'Analyse', 'OK', 'Cancel', and 'Help'. A status bar at the bottom reads 'Enter Climate Change between -100 and 600'.

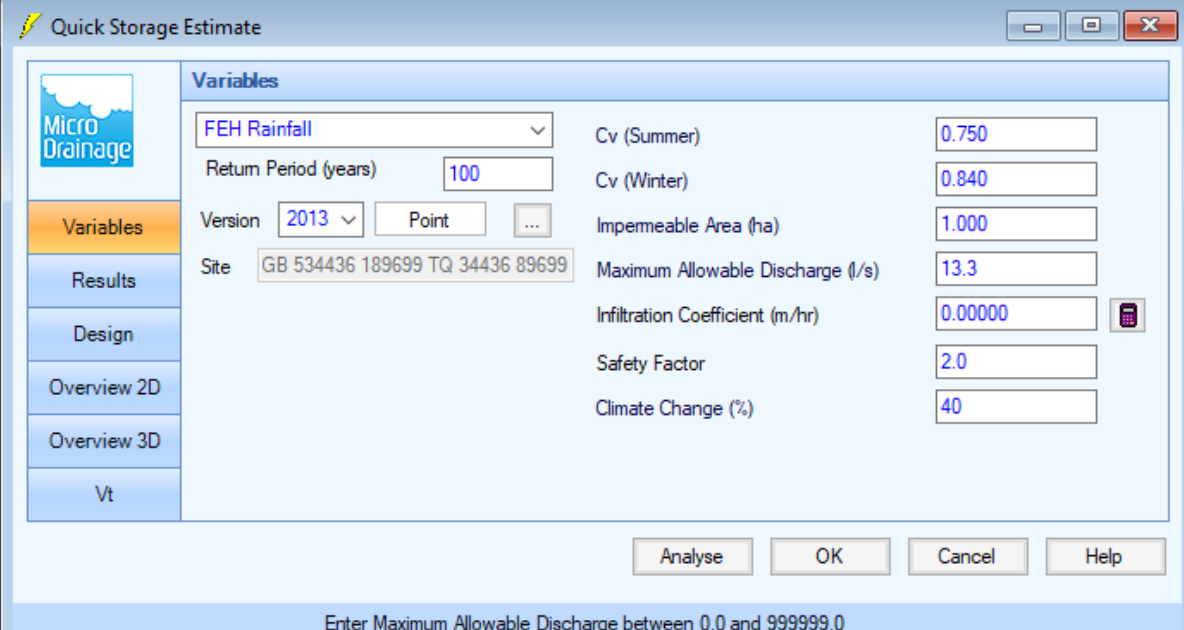
Variable	Value
FEH Rainfall	[Dropdown]
Return Period (years)	100
Version	2013
Site	GB 534436 189699 TQ 34436 89699
Cv (Summer)	0.750
Cv (Winter)	0.840
Impemeable Area (ha)	0.447
Maximum Allowable Discharge (l/s)	5.9
Infiltration Coefficient (m/hr)	0.00000
Safety Factor	2.0
Climate Change (%)	40

The screenshot shows the 'Quick Storage Estimate' window with the 'Results' tab selected. The left sidebar is the same as the previous screenshot. The main area displays the following text: 'Global Variables require approximate storage of between 309 m³ and 411 m³. These values are estimates only and should not be used for design purposes.' At the bottom right are buttons for 'Analyse', 'OK', 'Cancel', and 'Help'. A status bar at the bottom reads 'Enter Climate Change between -100 and 600'.

Global Variables require approximate storage of between 309 m³ and 411 m³.
These values are estimates only and should not be used for design purposes.

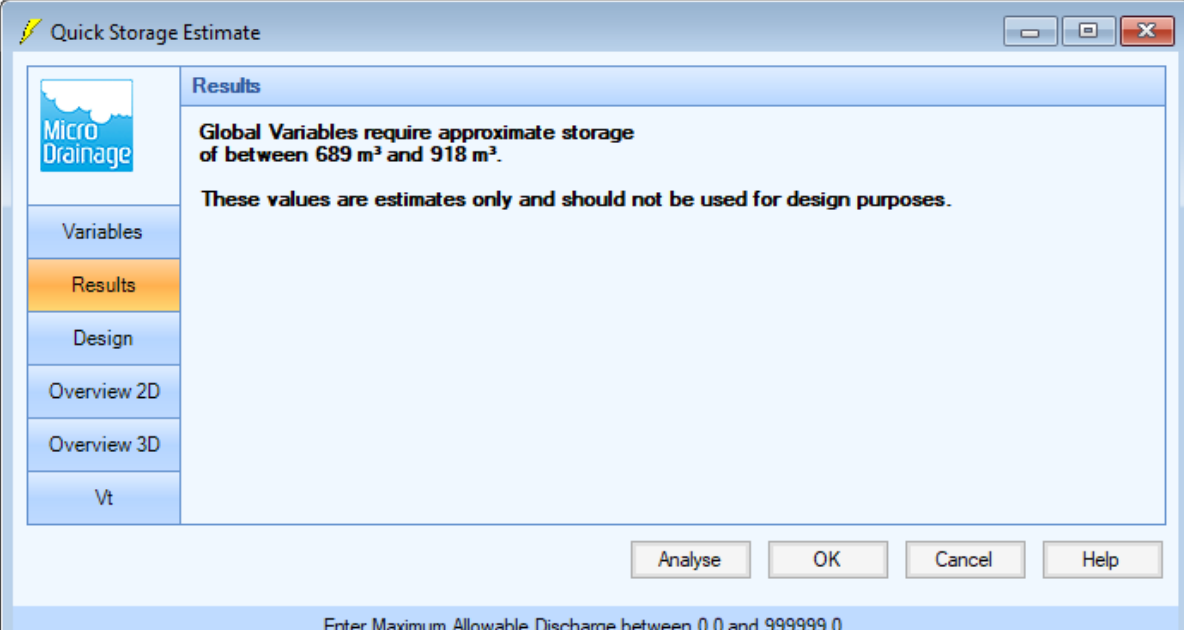
MICRODRAINAGE SOURCE CONTROL QUICK STORAGE ESTIMATE

CALCULATIONS SCREENSHOTS FOR THE IMPERMEABLE AREA OF 1 ha



The screenshot shows the 'Quick Storage Estimate' window with the 'Variables' tab selected. The left sidebar contains a 'Micro Drainage' logo and a list of tabs: Variables, Results, Design, Overview 2D, Overview 3D, and Vt. The main area is divided into two columns. The left column contains input fields for 'FEH Rainfall' (a dropdown), 'Return Period (years)' (100), 'Version' (2013), 'Point' (a dropdown), and 'Site' (GB 534436 189699 TQ 34436 89699). The right column contains input fields for 'Cv (Summer)' (0.750), 'Cv (Winter)' (0.840), 'Impemeable Area (ha)' (1.000), 'Maximum Allowable Discharge (l/s)' (13.3), 'Infiltration Coefficient (m/hr)' (0.00000), 'Safety Factor' (2.0), and 'Climate Change (%)' (40). At the bottom right are buttons for 'Analyse', 'OK', 'Cancel', and 'Help'. A status bar at the bottom reads 'Enter Maximum Allowable Discharge between 0.0 and 999999.0'.

Variable	Value
FEH Rainfall	FEH Rainfall
Return Period (years)	100
Version	2013
Point	Point
Site	GB 534436 189699 TQ 34436 89699
Cv (Summer)	0.750
Cv (Winter)	0.840
Impemeable Area (ha)	1.000
Maximum Allowable Discharge (l/s)	13.3
Infiltration Coefficient (m/hr)	0.00000
Safety Factor	2.0
Climate Change (%)	40



The screenshot shows the 'Quick Storage Estimate' window with the 'Results' tab selected. The left sidebar is the same as the previous screenshot. The main area displays the following text: 'Global Variables require approximate storage of between 689 m³ and 918 m³.' and 'These values are estimates only and should not be used for design purposes.' At the bottom right are buttons for 'Analyse', 'OK', 'Cancel', and 'Help'. A status bar at the bottom reads 'Enter Maximum Allowable Discharge between 0.0 and 999999.0'.

Global Variables require approximate storage of between 689 m³ and 918 m³.

These values are estimates only and should not be used for design purposes.

Appendix D.3

SOURCE CONTROL MODELLING



WSP Group Ltd				Page 1	
.		Berol Quarter			
.		Attenuation			
.		Global calculations			
Date 03/11/2022		Designed by ON			
File 221103 Berol Yard.SRCX		Checked by APG			
XP Solutions		Source Control 2019.1			
<u>Summary of Results for 1 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	6.263	0.063	2.0	26.1	O K
30 min Summer	6.278	0.078	2.8	32.2	O K
60 min Summer	6.290	0.090	3.5	36.9	O K
120 min Summer	6.297	0.097	3.8	39.7	O K
180 min Summer	6.300	0.100	4.0	41.0	O K
240 min Summer	6.301	0.101	4.0	41.5	O K
360 min Summer	6.301	0.101	4.0	41.4	O K
480 min Summer	6.298	0.098	3.9	40.5	O K
600 min Summer	6.296	0.096	3.8	39.4	O K
720 min Summer	6.293	0.093	3.6	38.2	O K
960 min Summer	6.288	0.088	3.4	36.1	O K
1440 min Summer	6.279	0.079	2.9	32.7	O K
2160 min Summer	6.271	0.071	2.4	29.0	O K
2880 min Summer	6.264	0.064	2.1	26.4	O K
4320 min Summer	6.256	0.056	1.6	23.0	O K
5760 min Summer	6.250	0.050	1.3	20.7	O K
7200 min Summer	6.246	0.046	1.2	19.1	O K
8640 min Summer	6.243	0.043	1.0	17.8	O K
10080 min Summer	6.241	0.041	0.9	16.9	O K
15 min Winter	6.271	0.071	2.4	29.1	O K
30 min Winter	6.288	0.088	3.4	36.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	32.227	0.0	24.1	18	
30 min Summer	20.656	0.0	31.6	32	
60 min Summer	12.800	0.0	41.3	60	
120 min Summer	7.758	0.0	50.4	92	
180 min Summer	5.757	0.0	56.2	124	
240 min Summer	4.652	0.0	60.7	158	
360 min Summer	3.438	0.0	67.4	226	
480 min Summer	2.760	0.0	72.2	292	
600 min Summer	2.327	0.0	76.1	356	
720 min Summer	2.024	0.0	79.5	420	
960 min Summer	1.624	0.0	85.0	548	
1440 min Summer	1.190	0.0	93.2	794	
2160 min Summer	0.873	0.0	104.3	1164	
2880 min Summer	0.701	0.0	111.5	1528	
4320 min Summer	0.514	0.0	121.9	2252	
5760 min Summer	0.413	0.0	132.1	2992	
7200 min Summer	0.348	0.0	139.0	3744	
8640 min Summer	0.302	0.0	144.8	4416	
10080 min Summer	0.269	0.0	149.5	5144	
15 min Winter	32.227	0.0	27.3	18	
30 min Winter	20.656	0.0	35.7	32	
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WSP Group Ltd				Page 2	
.		Berol Quarter			
.		Attenuation			
.		Global calculations			
Date 03/11/2022		Designed by ON			
File 221103 Berol Yard.SRCX		Checked by APG			
XP Solutions		Source Control 2019.1			
<u>Summary of Results for 1 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	6.301	0.101	4.0	41.4	O K
120 min Winter	6.308	0.108	4.3	44.2	O K
180 min Winter	6.310	0.110	4.4	45.1	O K
240 min Winter	6.310	0.110	4.4	45.0	O K
360 min Winter	6.306	0.106	4.3	43.7	O K
480 min Winter	6.302	0.102	4.1	41.8	O K
600 min Winter	6.297	0.097	3.8	39.8	O K
720 min Winter	6.293	0.093	3.6	38.1	O K
960 min Winter	6.285	0.085	3.2	35.1	O K
1440 min Winter	6.275	0.075	2.6	30.7	O K
2160 min Winter	6.265	0.065	2.1	26.5	O K
2880 min Winter	6.258	0.058	1.7	23.8	O K
4320 min Winter	6.249	0.049	1.3	20.3	O K
5760 min Winter	6.244	0.044	1.1	18.1	O K
7200 min Winter	6.240	0.040	0.9	16.5	O K
8640 min Winter	6.238	0.038	0.8	15.4	O K
10080 min Winter	6.235	0.035	0.7	14.4	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	12.800	0.0	46.5	60	
120 min Winter	7.758	0.0	56.6	96	
180 min Winter	5.757	0.0	63.2	134	
240 min Winter	4.652	0.0	68.2	170	
360 min Winter	3.438	0.0	75.7	242	
480 min Winter	2.760	0.0	81.1	310	
600 min Winter	2.327	0.0	85.5	378	
720 min Winter	2.024	0.0	89.2	442	
960 min Winter	1.624	0.0	95.4	570	
1440 min Winter	1.190	0.0	104.7	822	
2160 min Winter	0.873	0.0	116.9	1188	
2880 min Winter	0.701	0.0	125.0	1560	
4320 min Winter	0.514	0.0	136.9	2292	
5760 min Winter	0.413	0.0	148.0	3000	
7200 min Winter	0.348	0.0	155.8	3752	
8640 min Winter	0.302	0.0	162.4	4488	
10080 min Winter	0.269	0.0	167.8	5152	
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WSP Group Ltd				Page 1	
.		Berol Quarter			
.		Attenuation			
.		Global calculations			
Date 03/11/2022		Designed by ON			
File 221103 Berol Yard.SRCX		Checked by APG			
XP Solutions		Source Control 2019.1			
<u>Summary of Results for 2 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	6.271	0.071	2.4	29.0	O K
30 min Summer	6.286	0.086	3.3	35.2	O K
60 min Summer	6.296	0.096	3.8	39.3	O K
120 min Summer	6.323	0.123	4.9	50.5	O K
180 min Summer	6.335	0.135	5.3	55.5	O K
240 min Summer	6.340	0.140	5.4	57.7	O K
360 min Summer	6.342	0.142	5.4	58.2	O K
480 min Summer	6.337	0.137	5.4	56.3	O K
600 min Summer	6.331	0.131	5.3	54.0	O K
720 min Summer	6.326	0.126	5.1	51.7	O K
960 min Summer	6.315	0.115	4.7	47.5	O K
1440 min Summer	6.300	0.100	4.0	41.1	O K
2160 min Summer	6.286	0.086	3.3	35.2	O K
2880 min Summer	6.277	0.077	2.8	31.6	O K
4320 min Summer	6.266	0.066	2.2	27.3	O K
5760 min Summer	6.260	0.060	1.8	24.7	O K
7200 min Summer	6.256	0.056	1.6	23.0	O K
8640 min Summer	6.253	0.053	1.5	21.9	O K
10080 min Summer	6.251	0.051	1.4	20.9	O K
15 min Winter	6.279	0.079	2.9	32.4	O K
30 min Winter	6.296	0.096	3.8	39.4	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	35.983	0.0	27.2	18	
30 min Summer	22.681	0.0	34.9	32	
60 min Summer	13.693	0.0	44.3	60	
120 min Summer	9.971	0.0	65.2	92	
180 min Summer	7.898	0.0	77.7	126	
240 min Summer	6.569	0.0	86.4	160	
360 min Summer	4.938	0.0	97.5	228	
480 min Summer	3.965	0.0	104.5	294	
600 min Summer	3.324	0.0	109.5	358	
720 min Summer	2.869	0.0	113.4	422	
960 min Summer	2.266	0.0	119.4	548	
1440 min Summer	1.619	0.0	127.6	794	
2160 min Summer	1.160	0.0	138.9	1152	
2880 min Summer	0.922	0.0	147.0	1528	
4320 min Summer	0.680	0.0	161.7	2248	
5760 min Summer	0.555	0.0	177.9	2992	
7200 min Summer	0.480	0.0	192.2	3680	
8640 min Summer	0.430	0.0	206.1	4408	
10080 min Summer	0.393	0.0	219.5	5144	
15 min Winter	35.983	0.0	30.7	18	
30 min Winter	22.681	0.0	39.4	32	
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<u>Summary of Results for 2 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	6.307	0.107	4.3	44.1	O K
120 min Winter	6.337	0.137	5.4	56.4	O K
180 min Winter	6.350	0.150	5.5	61.6	O K
240 min Winter	6.354	0.154	5.5	63.3	O K
360 min Winter	6.351	0.151	5.5	62.1	O K
480 min Winter	6.342	0.142	5.4	58.5	O K
600 min Winter	6.333	0.133	5.3	54.6	O K
720 min Winter	6.325	0.125	5.0	51.3	O K
960 min Winter	6.311	0.111	4.5	45.7	O K
1440 min Winter	6.293	0.093	3.6	38.1	O K
2160 min Winter	6.277	0.077	2.8	31.8	O K
2880 min Winter	6.268	0.068	2.3	28.1	O K
4320 min Winter	6.258	0.058	1.7	23.8	O K
5760 min Winter	6.252	0.052	1.4	21.4	O K
7200 min Winter	6.248	0.048	1.2	19.8	O K
8640 min Winter	6.245	0.045	1.1	18.7	O K
10080 min Winter	6.243	0.043	1.0	17.8	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	13.693	0.0	49.8	60	
120 min Winter	9.971	0.0	73.2	96	
180 min Winter	7.898	0.0	87.3	136	
240 min Winter	6.569	0.0	96.9	174	
360 min Winter	4.938	0.0	109.5	248	
480 min Winter	3.965	0.0	117.2	316	
600 min Winter	3.324	0.0	122.9	380	
720 min Winter	2.869	0.0	127.3	446	
960 min Winter	2.266	0.0	133.9	570	
1440 min Winter	1.619	0.0	143.2	820	
2160 min Winter	1.160	0.0	155.7	1188	
2880 min Winter	0.922	0.0	164.9	1556	
4320 min Winter	0.680	0.0	181.4	2292	
5760 min Winter	0.555	0.0	199.4	2992	
7200 min Winter	0.480	0.0	215.4	3744	
8640 min Winter	0.430	0.0	231.1	4496	
10080 min Winter	0.393	0.0	246.2	5240	
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<u>Summary of Results for 30 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	6.376	0.176	5.6	72.4	O K
30 min Summer	6.419	0.219	5.8	90.1	O K
60 min Summer	6.455	0.255	5.9	104.7	O K
120 min Summer	6.503	0.303	5.9	124.5	O K
180 min Summer	6.518	0.318	5.9	130.5	O K
240 min Summer	6.522	0.322	5.9	132.2	O K
360 min Summer	6.517	0.317	5.9	130.1	O K
480 min Summer	6.504	0.304	5.9	124.8	O K
600 min Summer	6.488	0.288	5.9	118.5	O K
720 min Summer	6.472	0.272	5.9	111.9	O K
960 min Summer	6.441	0.241	5.9	99.2	O K
1440 min Summer	6.391	0.191	5.7	78.5	O K
2160 min Summer	6.343	0.143	5.4	58.7	O K
2880 min Summer	6.320	0.120	4.8	49.2	O K
4320 min Summer	6.296	0.096	3.8	39.6	O K
5760 min Summer	6.284	0.084	3.1	34.5	O K
7200 min Summer	6.276	0.076	2.7	31.4	O K
8640 min Summer	6.271	0.071	2.4	29.2	O K
10080 min Summer	6.267	0.067	2.2	27.5	O K
15 min Winter	6.398	0.198	5.7	81.4	O K
30 min Winter	6.447	0.247	5.9	101.5	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	90.288	0.0	72.3	18	
30 min Summer	57.567	0.0	93.0	33	
60 min Summer	35.047	0.0	115.8	62	
120 min Summer	22.530	0.0	149.3	120	
180 min Summer	16.968	0.0	168.8	164	
240 min Summer	13.711	0.0	182.0	194	
360 min Summer	9.972	0.0	198.6	256	
480 min Summer	7.866	0.0	208.9	324	
600 min Summer	6.513	0.0	216.3	390	
720 min Summer	5.568	0.0	221.9	456	
960 min Summer	4.332	0.0	230.1	588	
1440 min Summer	3.028	0.0	240.9	836	
2160 min Summer	2.120	0.0	254.7	1188	
2880 min Summer	1.654	0.0	264.7	1528	
4320 min Summer	1.180	0.0	282.2	2248	
5760 min Summer	0.938	0.0	301.1	2952	
7200 min Summer	0.792	0.0	317.7	3680	
8640 min Summer	0.694	0.0	333.9	4408	
10080 min Summer	0.624	0.0	349.3	5144	
15 min Winter	90.288	0.0	81.3	18	
30 min Winter	57.567	0.0	104.5	32	
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<u>Summary of Results for 30 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	6.488	0.288	5.9	118.3	O K
120 min Winter	6.545	0.345	5.9	141.9	O K
180 min Winter	6.564	0.364	5.9	149.8	O K
240 min Winter	6.567	0.367	5.9	150.8	O K
360 min Winter	6.557	0.357	5.9	146.5	O K
480 min Winter	6.537	0.337	5.9	138.6	O K
600 min Winter	6.514	0.314	5.9	129.2	O K
720 min Winter	6.491	0.291	5.9	119.5	O K
960 min Winter	6.446	0.246	5.9	101.1	O K
1440 min Winter	6.376	0.176	5.6	72.4	O K
2160 min Winter	6.324	0.124	5.0	50.8	O K
2880 min Winter	6.302	0.102	4.1	41.9	O K
4320 min Winter	6.282	0.082	3.0	33.5	O K
5760 min Winter	6.271	0.071	2.4	29.2	O K
7200 min Winter	6.264	0.064	2.1	26.4	O K
8640 min Winter	6.260	0.060	1.8	24.5	O K
10080 min Winter	6.256	0.056	1.6	23.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	35.047	0.0	129.9	60	
120 min Winter	22.530	0.0	167.4	118	
180 min Winter	16.968	0.0	189.2	174	
240 min Winter	13.711	0.0	204.0	224	
360 min Winter	9.972	0.0	222.6	278	
480 min Winter	7.866	0.0	234.2	354	
600 min Winter	6.513	0.0	242.4	426	
720 min Winter	5.568	0.0	248.7	498	
960 min Winter	4.332	0.0	257.9	628	
1440 min Winter	3.028	0.0	270.1	868	
2160 min Winter	2.120	0.0	285.5	1192	
2880 min Winter	1.654	0.0	296.7	1556	
4320 min Winter	1.180	0.0	316.5	2288	
5760 min Winter	0.938	0.0	337.3	3000	
7200 min Winter	0.792	0.0	356.0	3744	
8640 min Winter	0.694	0.0	374.2	4408	
10080 min Winter	0.624	0.0	391.7	5144	
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<u>Summary of Results for 100 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	6.435	0.235	5.8	96.5	O K
30 min Summer	6.496	0.296	5.9	121.7	O K
60 min Summer	6.549	0.349	5.9	143.4	O K
120 min Summer	6.623	0.423	5.9	174.0	O K
180 min Summer	6.656	0.456	5.9	187.5	O K
240 min Summer	6.668	0.468	5.9	192.5	O K
360 min Summer	6.668	0.468	5.9	192.2	O K
480 min Summer	6.655	0.455	5.9	186.9	O K
600 min Summer	6.637	0.437	5.9	179.7	O K
720 min Summer	6.618	0.418	5.9	171.6	O K
960 min Summer	6.577	0.377	5.9	154.9	O K
1440 min Summer	6.503	0.303	5.9	124.4	O K
2160 min Summer	6.420	0.220	5.8	90.4	O K
2880 min Summer	6.368	0.168	5.6	68.8	O K
4320 min Summer	6.320	0.120	4.8	49.2	O K
5760 min Summer	6.300	0.100	4.0	40.9	O K
7200 min Summer	6.288	0.088	3.4	36.4	O K
8640 min Summer	6.281	0.081	3.0	33.3	O K
10080 min Summer	6.275	0.075	2.7	31.0	O K
15 min Winter	6.464	0.264	5.9	108.4	O K
30 min Winter	6.533	0.333	5.9	136.9	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	119.558	0.0	96.7	18	
30 min Summer	76.794	0.0	124.9	33	
60 min Summer	46.918	0.0	155.5	62	
120 min Summer	30.193	0.0	200.5	122	
180 min Summer	22.932	0.0	228.7	180	
240 min Summer	18.665	0.0	248.3	238	
360 min Summer	13.706	0.0	273.5	294	
480 min Summer	10.869	0.0	289.3	354	
600 min Summer	9.021	0.0	300.1	418	
720 min Summer	7.720	0.0	308.2	484	
960 min Summer	6.000	0.0	319.3	616	
1440 min Summer	4.165	0.0	332.2	878	
2160 min Summer	2.874	0.0	345.7	1232	
2880 min Summer	2.210	0.0	354.2	1584	
4320 min Summer	1.534	0.0	367.8	2248	
5760 min Summer	1.191	0.0	382.7	2952	
7200 min Summer	0.987	0.0	396.3	3680	
8640 min Summer	0.852	0.0	409.8	4408	
10080 min Summer	0.755	0.0	422.9	5144	
15 min Winter	119.558	0.0	108.6	18	
30 min Winter	76.794	0.0	140.2	33	
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<u>Summary of Results for 100 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	6.594	0.394	5.9	161.8	O K
120 min Winter	6.681	0.481	5.9	197.7	O K
180 min Winter	6.722	0.522	5.9	214.6	O K
240 min Winter	6.740	0.540	5.9	222.0	O K
360 min Winter	6.739	0.539	5.9	221.7	O K
480 min Winter	6.719	0.519	5.9	213.3	O K
600 min Winter	6.695	0.495	5.9	203.4	O K
720 min Winter	6.667	0.467	5.9	192.1	O K
960 min Winter	6.609	0.409	5.9	168.2	O K
1440 min Winter	6.502	0.302	5.9	124.2	O K
2160 min Winter	6.391	0.191	5.7	78.5	O K
2880 min Winter	6.333	0.133	5.3	54.8	O K
4320 min Winter	6.298	0.098	3.9	40.4	O K
5760 min Winter	6.283	0.083	3.1	34.0	O K
7200 min Winter	6.274	0.074	2.6	30.2	O K
8640 min Winter	6.267	0.067	2.2	27.6	O K
10080 min Winter	6.263	0.063	2.0	25.8	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	46.918	0.0	174.3	62	
120 min Winter	30.193	0.0	224.8	120	
180 min Winter	22.932	0.0	256.3	176	
240 min Winter	18.665	0.0	278.2	232	
360 min Winter	13.706	0.0	306.5	340	
480 min Winter	10.869	0.0	324.2	384	
600 min Winter	9.021	0.0	336.3	456	
720 min Winter	7.720	0.0	345.3	530	
960 min Winter	6.000	0.0	357.8	674	
1440 min Winter	4.165	0.0	372.3	938	
2160 min Winter	2.874	0.0	387.3	1280	
2880 min Winter	2.210	0.0	396.9	1584	
4320 min Winter	1.534	0.0	412.3	2288	
5760 min Winter	1.191	0.0	428.7	2992	
7200 min Winter	0.987	0.0	444.0	3712	
8640 min Winter	0.852	0.0	459.1	4416	
10080 min Winter	0.755	0.0	474.1	5144	
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<u>Summary of Results for 100 year Return Period (+40%)</u>						
Storm Event		Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer		6.531	0.331	5.9	136.2	O K
30 min Summer		6.620	0.420	5.9	172.6	O K
60 min Summer		6.700	0.500	5.9	205.3	O K
120 min Summer		6.818	0.618	5.9	254.2	O K
180 min Summer		6.881	0.681	5.9	279.7	O K
240 min Summer		6.911	0.711	5.9	292.4	O K
360 min Summer		6.926	0.726	5.9	298.2	O K
480 min Summer		6.910	0.710	5.9	292.0	O K
600 min Summer		6.888	0.688	5.9	282.9	O K
720 min Summer		6.864	0.664	5.9	272.8	O K
960 min Summer		6.807	0.607	5.9	249.6	O K
1440 min Summer		6.706	0.506	5.9	208.1	O K
2160 min Summer		6.585	0.385	5.9	158.3	O K
2880 min Summer		6.495	0.295	5.9	121.3	O K
4320 min Summer		6.387	0.187	5.7	76.7	O K
5760 min Summer		6.336	0.136	5.3	55.7	O K
7200 min Summer		6.315	0.115	4.7	47.5	O K
8640 min Summer		6.303	0.103	4.1	42.4	O K
10080 min Summer		6.295	0.095	3.7	39.0	O K
15 min Winter		6.572	0.372	5.9	152.9	O K
30 min Winter		6.672	0.472	5.9	194.1	O K
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer		167.382	0.0	136.4	19	
30 min Summer		107.511	0.0	175.9	33	
60 min Summer		65.685	0.0	218.3	62	
120 min Summer		42.270	0.0	281.3	122	
180 min Summer		32.105	0.0	320.6	182	
240 min Summer		26.131	0.0	348.0	242	
360 min Summer		19.188	0.0	383.4	360	
480 min Summer		15.217	0.0	405.4	448	
600 min Summer		12.630	0.0	420.6	502	
720 min Summer		10.808	0.0	431.8	564	
960 min Summer		8.400	0.0	447.4	674	
1440 min Summer		5.832	0.0	465.6	924	
2160 min Summer		4.024	0.0	484.4	1300	
2880 min Summer		3.094	0.0	496.4	1668	
4320 min Summer		2.148	0.0	515.8	2336	
5760 min Summer		1.668	0.0	536.1	3000	
7200 min Summer		1.382	0.0	555.1	3680	
8640 min Summer		1.192	0.0	574.2	4408	
10080 min Summer		1.057	0.0	592.9	5144	
15 min Winter		167.382	0.0	153.1	18	
30 min Winter		107.511	0.0	197.3	33	
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<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	6.764	0.564	5.9	231.6	O K
120 min Winter	6.901	0.701	5.9	288.2	O K
180 min Winter	6.972	0.772	5.9	317.1	O K
240 min Winter	7.009	0.809	5.9	332.3	O K
360 min Winter	7.030	0.830	5.9	341.3	O K
480 min Winter	7.019	0.819	5.9	336.5	O K
600 min Winter	6.992	0.792	5.9	325.5	O K
720 min Winter	6.960	0.760	5.9	312.4	O K
960 min Winter	6.898	0.698	5.9	286.8	O K
1440 min Winter	6.753	0.553	5.9	227.3	O K
2160 min Winter	6.576	0.376	5.9	154.6	O K
2880 min Winter	6.453	0.253	5.9	104.1	O K
4320 min Winter	6.335	0.135	5.3	55.4	O K
5760 min Winter	6.307	0.107	4.3	43.8	O K
7200 min Winter	6.292	0.092	3.6	37.8	O K
8640 min Winter	6.283	0.083	3.1	34.2	O K
10080 min Winter	6.277	0.077	2.8	31.7	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	65.685	0.0	244.6	62	
120 min Winter	42.270	0.0	315.2	120	
180 min Winter	32.105	0.0	359.2	178	
240 min Winter	26.131	0.0	389.9	236	
360 min Winter	19.188	0.0	429.5	350	
480 min Winter	15.217	0.0	454.1	458	
600 min Winter	12.630	0.0	471.1	560	
720 min Winter	10.808	0.0	483.7	588	
960 min Winter	8.400	0.0	501.1	734	
1440 min Winter	5.832	0.0	521.5	1012	
2160 min Winter	4.024	0.0	542.7	1388	
2880 min Winter	3.094	0.0	556.2	1732	
4320 min Winter	2.148	0.0	578.1	2332	
5760 min Winter	1.668	0.0	600.5	3000	
7200 min Winter	1.382	0.0	621.9	3680	
8640 min Winter	1.192	0.0	643.3	4416	
10080 min Winter	1.057	0.0	664.5	5144	
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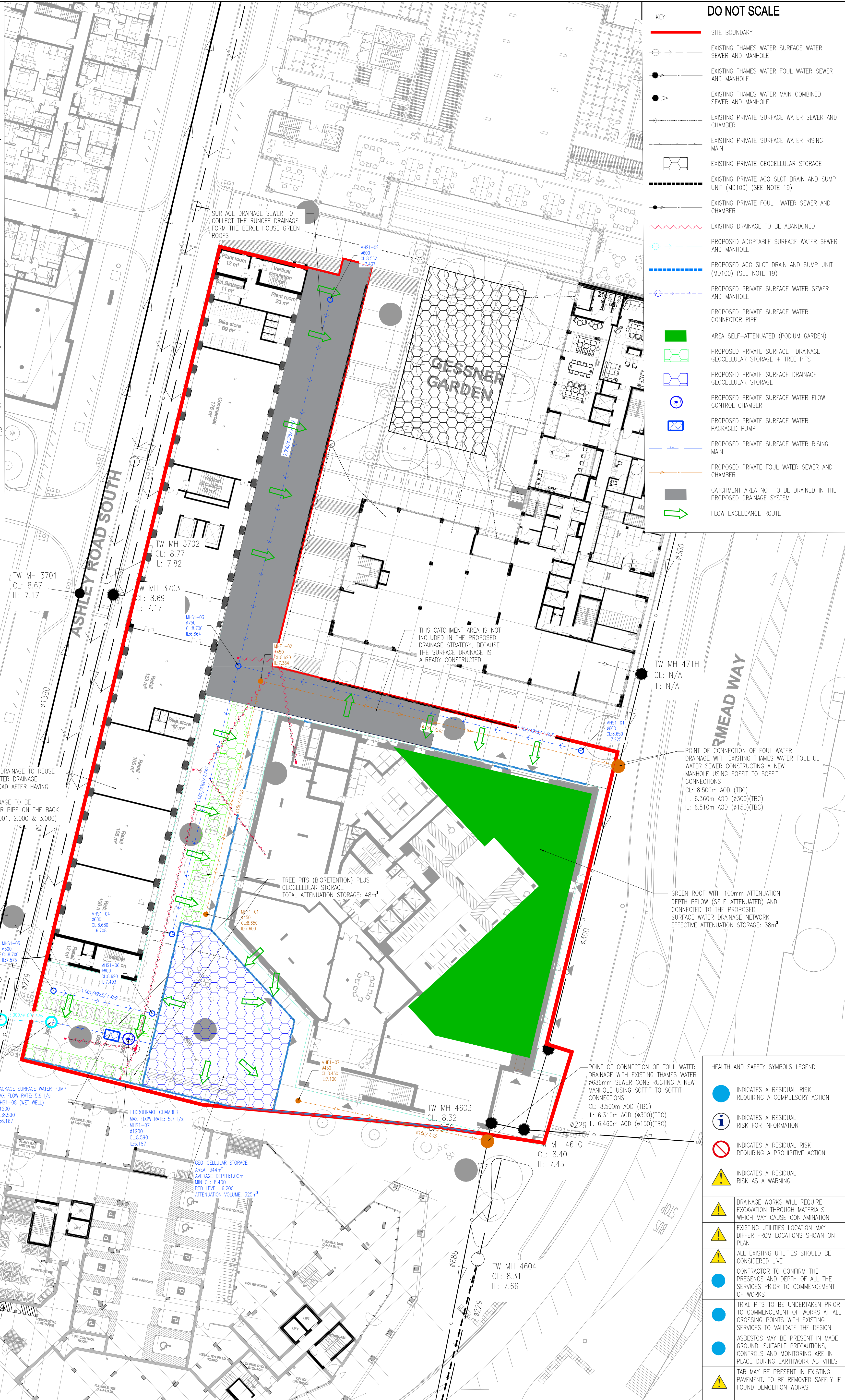
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Model Details Storage is Online Cover Level (m) 8.400 Tank or Pond Structure Invert Level (m) 6.200 <table><tr><td>Depth (m)</td><td>Area (m²)</td><td>Depth (m)</td><td>Area (m²)</td><td>Depth (m)</td><td>Area (m²)</td></tr><tr><td>0.000</td><td>411.0</td><td>1.000</td><td>411.0</td><td>1.001</td><td>0.0</td></tr></table> Hydro-Brake® Optimum Outflow Control <table><tr><td>Unit Reference</td><td>MD-SHE-0114-5900-1000-5900</td></tr><tr><td>Design Head (m)</td><td>1.000</td></tr><tr><td>Design Flow (l/s)</td><td>5.9</td></tr><tr><td>Flush-Flo™</td><td>Calculated</td></tr><tr><td>Objective</td><td>Minimise upstream storage</td></tr><tr><td>Application</td><td>Surface</td></tr><tr><td>Sump Available</td><td>Yes</td></tr><tr><td>Diameter (mm)</td><td>114</td></tr><tr><td>Invert Level (m)</td><td>6.200</td></tr><tr><td>Minimum Outlet Pipe Diameter (mm)</td><td>150</td></tr><tr><td>Suggested Manhole Diameter (mm)</td><td>1200</td></tr></table> <table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>1.000</td><td>5.9</td></tr><tr><td>Flush-Flo™</td><td>0.295</td><td>5.9</td></tr><tr><td>Kick-Flo®</td><td>0.645</td><td>4.8</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>5.1</td></tr></table> The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>4.0</td><td>1.200</td><td>6.4</td><td>3.000</td><td>9.9</td><td>7.000</td><td>14.8</td></tr><tr><td>0.200</td><td>5.7</td><td>1.400</td><td>6.9</td><td>3.500</td><td>10.6</td><td>7.500</td><td>15.3</td></tr><tr><td>0.300</td><td>5.9</td><td>1.600</td><td>7.3</td><td>4.000</td><td>11.3</td><td>8.000</td><td>15.8</td></tr><tr><td>0.400</td><td>5.8</td><td>1.800</td><td>7.8</td><td>4.500</td><td>12.0</td><td>8.500</td><td>16.2</td></tr><tr><td>0.500</td><td>5.6</td><td>2.000</td><td>8.2</td><td>5.000</td><td>12.6</td><td>9.000</td><td>16.7</td></tr><tr><td>0.600</td><td>5.2</td><td>2.200</td><td>8.5</td><td>5.500</td><td>13.2</td><td>9.500</td><td>17.1</td></tr><tr><td>0.800</td><td>5.3</td><td>2.400</td><td>8.9</td><td>6.000</td><td>13.7</td><td></td><td></td></tr><tr><td>1.000</td><td>5.9</td><td>2.600</td><td>9.2</td><td>6.500</td><td>14.3</td><td></td><td></td></tr></table>				Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	411.0	1.000	411.0	1.001	0.0	Unit Reference	MD-SHE-0114-5900-1000-5900	Design Head (m)	1.000	Design Flow (l/s)	5.9	Flush-Flo™	Calculated	Objective	Minimise upstream storage	Application	Surface	Sump Available	Yes	Diameter (mm)	114	Invert Level (m)	6.200	Minimum Outlet Pipe Diameter (mm)	150	Suggested Manhole Diameter (mm)	1200	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.000	5.9	Flush-Flo™	0.295	5.9	Kick-Flo®	0.645	4.8	Mean Flow over Head Range	-	5.1	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	4.0	1.200	6.4	3.000	9.9	7.000	14.8	0.200	5.7	1.400	6.9	3.500	10.6	7.500	15.3	0.300	5.9	1.600	7.3	4.000	11.3	8.000	15.8	0.400	5.8	1.800	7.8	4.500	12.0	8.500	16.2	0.500	5.6	2.000	8.2	5.000	12.6	9.000	16.7	0.600	5.2	2.200	8.5	5.500	13.2	9.500	17.1	0.800	5.3	2.400	8.9	6.000	13.7			1.000	5.9	2.600	9.2	6.500	14.3		
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Appendix D.4

DRAINAGE STRATEGY LAYOUT DRAWING



1. ALL UNITS SHOWN IN METRES UNLESS OTHERWISE STATED. ALL DIAMETERS ARE IN MILLIMETRES UNLESS STATED OTHERWISE. ALL LEVELS ARE IN METRES ABOVE ORDNANCE SURVEY UNLESS STATED OTHERWISE.
2. REFER TO ALL DOCUMENTS ASSOCIATED WITH THIS PROJECT AND REPORT DISCREPANCIES TO THE ENGINEER IF FOUND.
3. ALL DRAINAGE WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH THE BUILDING REGULATIONS PART H (LATEST), SEWERS FOR ADOPTION AND CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY (LATEST REVISIONS) WHERE APPROPRIATE.
4. ALL COVERS AND FRAMES TO BE CLASS D400.
5. ALL CAST IRON DRAINAGE TO BE TO BS 416-1 AND BS EN 877.
6. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT PROJECT DOCUMENTATION AND DRAWINGS.
7. EXISTING DRAINAGE RECORDS BASED ON SP4FLOW DRAWING PH01, RECORD OF TRACING, MAPPING AND CCTV SURVEY OF DRAINAGE, DATED NOVEMBER 2016, AND OCTOBER 2022 THAMES WATER ASSETS RECORDS.
8. DRAINAGE LAYOUT SUBJECT TO APPROVAL FROM RELEVANT APPROVING BODIES.
9. ALL PIPE CONNECTIONS WILL BE MADE SOFFIT TO SOFFIT UNLESS OTHERWISE SHOWN.
10. EXACT LOCATION OF DOWNPPNS FROM HIGH LEVEL TO BE CONFIRMED BY ARCHITECT AND MEP ENGINEER.
11. PERMISSION FROM THAMES WATER WILL BE REQUIRED TO CONNECT INTO THE EXISTING THAMES WATER SYSTEM. DRAINAGE FROM THE DEMARCATION MAN-HOLE TO THE THAMES WATER SYSTEM WILL BE ADOPTEABLE BY THAMES WATER AND WILL REQUIRE APPROVAL FROM THAMES WATER.
12. THE POSITION OF EXISTING SERVICES SHOULD BE VERIFIED PRIOR TO COMMENCEMENT OF WORKS ON-SITE.
13. FOUL WATER PIPE SIZES TO BE CONFIRMED UPON RECEIPT OF FLOW RATES FROM MEP ENGINEER.
14. SURFACE WATER DISCHARGE IS RESTRICTED TO 5.7 L/s FOR THE 1:100 YEAR +40% CLIMATE CHANGE SCENARIO AS PER THE AGREED PLANNING APPROVED SUBMISSION.
15. PRIVATE DRAINAGE PIPEWORK TO BE CONCRETE UNLESS SPECIFIED OTHERWISE. ADOPTEABLE CONNECTIONS VITRIFIED CLAY.
16. TEMPORARY WORKS DESIGN ASSOCIATED WITH THE CONSTRUCTION OF THE WORKS SHALL BE RESPONSIBILITY OF THE CONTRACTOR.
17. WHERE PIPES HAVE LESS THAN THE MINIMUM RECOMMENDED COVER IN TABLE 8, 9 OR 10 OF THE BUILDING REGULATIONS DOCUMENT H, THE PIPES SHOULD, WHERE NECESSARY, BE PROTECTED FROM DAMAGE BY A REINFORCED CONCRETE SLAB WITH A FLEXIBLE FILLER AND AT LEAST 75MM OF GRANULAR MATERIAL BETWEEN THE TOP OF THE PIPE AND THE UNDERSIDE OF THE FLEXIBLE FILLER BELOW THE SLABS (SEE DIAGRAM 11 AND PARAGRAPHS 2.28, 2.42 AND 2.43 OF THE ABOVE MENTIONED DOCUMENT).
18. PROPOSED LINEAR DRAINS TO BE CONNECTED TO THE TREE PITS WITH GEOCELLULAR STORAGE FOR RUNOFF POLLUTION MITIGATION
19. FOR THE PROPOSED SLOT DRAINS, REFER TO THE CHURCHMANM THORNHILL FINCH DRAWINGS 626-CF--XX--XX--DR-L-10011 & 10012



P01	08/11/22	APG	FIRST ISSUE	JO	JO
REV	DATE	BY	DESCRIPTION	CHK	APP

DRAWING STATUS: S2 - FOR INFORMATION



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CLIENT

BEROL QUARTER LIMITED

ARCHITECT:

JOHN McASLAN+PARTNERS

5501503

BEROL QUARTER

TIME.

PROPOSED SURFACE AND FOUL WATER DRAINAGE LAYOUT

SCALE @ A1:

1:25

CHECKED:

JO

APPROVED:

JO

PROJECT No: 70094918

DESIGNED:
APC

DRAWN:
 AWDATE: _____
N _____

DRAWING No.

70094918-WSP-XX-XX-M2-D-0501

REV: P01

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Appendix D.5

LLFA PROFORMA



1. Project & Site Details	Project / Site Name (including sub-catchment / stage / phase where appropriate)	BEROL QUARTER
	Address & post code	Ashley Road, Tottenham Hale, N17 9LJ
	OS Grid ref. (Easting, Northing)	E 534427 N 189660
	LPA reference (if applicable)	HGY/2017/2044
	Brief description of proposed work	Refurbishment, & extension of Berol House to include Use Class E floorspace. Redevelopment of 2 Berol Yard for new residential homes, Use Class E floorspace & associated landscaping, public realm improvements, associated works.
	Total site Area	5078 m ²
	Total existing impervious area	4465 m ²
	Total proposed impervious area	4465 m ²
	Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	No, identifying them as critical drainage areas (CDAs)
	Existing drainage connection type and location	Unknown, assumed to be to Thames Water (TW) sewers
	Designer Name	Andres Perez Gonzalez
	Designer Position	Senior Civil Engineer
Designer Company	WSP UK Ltd	

2. Proposed Discharge Arrangements	2a. Infiltration Feasibility		
	Superficial geology classification	Enfiled Site Member - Clay and Silt	
	Bedrock geology classification	London Clay Formation	
	Site infiltration rate	m/s	
	Depth to groundwater level	m below ground level	
	Is infiltration feasible?	No	
	2b. Drainage Hierarchy		
		Feasible (Y/N)	Proposed (Y/N)
	1 store rainwater for later use	N	N
	2 use infiltration techniques, such as porous surfaces in non-clay areas	N	N
	3 attenuate rainwater in ponds or open water features for gradual release	N	N
	4 attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Y
	5 discharge rainwater direct to a watercourse	N	N
	6 discharge rainwater to a surface water sewer/drain	Y	Y
	7 discharge rainwater to the combined sewer.	Y	N
2c. Proposed Discharge Details			
Proposed discharge location	SW: Ashley Road Ø229mm TW SW sewer FW: 2xWatermead Way Ø300mm TW FW		
Has the owner/regulator of the discharge location been consulted?	Yes (waiting for Thames Water comments)		

3. Drainage Strategy	3a. Discharge Rates & Required Storage				
		Greenfield (GF) runoff rate (l/s)	Existing discharge rate (l/s)	Required storage for GF rate (m ³)	Proposed discharge rate (l/s)
	Qbar	1.86			
	1 in 1	1.58	N/A	51	4.4
	1 in 30	4.28	N/A	187	5.9
	1 in 100	5.93	N/A	276	5.9
	1 in 100 + CC			411	5.9
	Climate change allowance used		40%		
	3b. Principal Method of Flow Control		Hydrobrake or similar approved		
	3c. Proposed SuDS Measures				
		Catchment area (m ²)	Plan area (m ²)	Storage vol. (m ³)	
	Rainwater harvesting	0		0	
	Infiltration systems	0		0	
	Green roofs	1665	1665	0	
	Blue roofs	414	414	38	
	Filter strips	0	0	0	
	Filter drains	0	0	0	
Bioretention / tree pits	14	14	0		
Pervious pavements	0	0	0		
Swales	0	0	0		
Basins/ponds	0	0	0		
Attenuation tanks	4051		373		
Total	6144	2093	411		

4. Supporting Information	4a. Discharge & Drainage Strategy	Page/section of drainage report
	Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	FRA Paragraph 8.3.3
	Drainage hierarchy (2b)	FRA Chapter 8.3
	Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	FRA Appendix D.4
	Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	FRA Appendices D.2 & D.3
	Proposed SuDS measures & specifications (3b)	FRA Chapter 8.4 & 8.5
	4b. Other Supporting Details	Page/section of drainage report
	Detailed Development Layout	FRA Appendix D.4
	Detailed drainage design drawings, including exceedance flow routes	FRA Appendix D.4
	Detailed landscaping plans	FRA Appendix D.4
	Maintenance strategy	FRA Chapter 8.7
	Demonstration of how the proposed SuDS measures improve:	
	a) water quality of the runoff?	FRA Chapter 8.4
	b) biodiversity?	N/A
	c) amenity?	N/A



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