

Ref. FD/567/L001
Application ref: 77265/APP/2022/2845

FAO Hillingdon Borough Council
Development Management
Directorate of Place, Hillingdon Council
3 North, Civic Centre, High Street, Uxbridge, UB8 1UW

Date: 24th May 2023

Dear Development Management Team,

Re: Land rear of 25-31 Warren Road, Ickenham

Further to Planning Consent dated 14th December 2022 for the above referenced application, we have considered the drainage requirements listed in point i, ii, iii, iv and v of condition 9 and compiled the necessary information within this letter.

Point i

The proposed surface water drainage system for the site is detailed in appendix A. The system has been designed to cope with the most critical 100 year return period storm event, including a 40% allowance for climate change, as demonstrated by the hydraulic calculations attached in appendix B. To adequately manage the risk of pollution to the receiving surface water sewer, runoff from the roof will be directed to catchpit for the collection of silt and debris while the runoff from the access road and driveway will be treated via the permeable paving system.

Point ii

Due to the relatively small-scale size of this development site, the proposed foul and surface water drainage systems will be installed in a single operation in accordance with the proposed details. Once installed they will be appropriately protected by the Contractor in accordance with good practice during the remaining site works. Once the site works are completed the drainage will be cleaned and inspected, all to the approval of the Building Control Inspector to ensure it is suitable for its future use.

Point iii

Detail of the management and maintenance plan are included within the drainage layout attached in appendix A.

Point iv

To limit the maximum surface water discharge rates from the site to 1.9l/s, excess rainwater will be collected and stored within the proposed attenuation tank located in front of plot 1 & 2.

Point v

To promote the use of rainwater, each dwelling will be equipped with a water butt. This will enable residents to collect and store rainwater for a variety of purposes and therefore help reduce the demand on the local water supply.

We trust that the information and enclosures provided with this letter is sufficient to demonstrate compliance with the points above. However, if you wish to discuss any aspect further then please do not hesitate to contact us directly.

We look forward to receiving your response in due course.

Yours sincerely,

Felice Dileo
Civil Engineer

On behalf of BEAL Consulting Engineers Ltd

Directors:

N.D.P. Blowfield M.Eng, C.Eng, MICE; S. H. Hastie B.Eng (Hons), C.Eng, MICE MCIIHT,
A. v.d.Merwe B.Eng (Hons)(Civ), C.Eng, MICE, Pr Eng, MAPM, PM.PMSA; J. van Wyk N.Dip HRM, M.PMSA

Appendix A

Drainage Layout

Directors:

N.D.P. Blowfield M.Eng, C.Eng, MICE; S. H. Hastie B.Eng (Hons), C.Eng, MICE MCIHT,
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Surface Water Drainage Notes
 The proposed drainage strategy has been prepared considering the hierarchy of discharge set in Building Regulations, Part H and the criteria laid out in The SuDS Manual (C753). Due to infiltration into the ground not being viable and considering that the nearest watercourse is more than 300m away from the site, it is proposed to discharge the surface water runoff from the development into the adopted surface water sewer present near the site.

A S106 Consent to Connect will need to be submitted to Thames Water to obtain legal consent to connect into their existing network. All works to the existing sewer will need to be agreed with The Building Inspector/Thames Water prior to commencement of the works and inspected as required.

The attenuation storage provided on site has been designed so that no flooding occurs up to the 100 year return period storm event, including a 40% climate change allowance. The highest anticipated discharge rate from the site will be 1.9l/s, and will occur only during the most extreme design storm event (100 year - 40% climate change allowance). For the 1 year and 30 year return period, the maximum discharge rate will be 0.9l/s and 1.4l/s respectively. Refer to the hydraulic calculations for more details.

SuDS Maintenance Details
 The extent of the new proposed shared surface water drainage network marked with 'MC' or drawn with a dashed dark blue line as shown in the legend is proposed to fall under the maintenance responsibility of the appointed Management Company. This includes the permeable shared access road, the attenuation tank and the Downstream Defender unit. The maintenance of the remaining drainage elements and private driveways is proposed to be undertaken by the respective property owners. For further operation and maintenance requirements associated with the respective drainage elements refer to the tables in this drawing.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then every six months
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Inspection of silt traps and catch pits to assess silt accumulation	Monthly (and after large storms)
Remedial Actions	Repair/rehabilitation of inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually and after large storms

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then every six months
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Remove sediment from pre-treatment structures	Annually, or as required
Remedial Actions	Repair/rehabilitation of inlets, outlet, overflows and vents	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually and after large storms

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Brushing and vacuuming.	Three times/year at end of winter, mid summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weed.	As required.
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of paving.	As required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or hazard to users.	As required.
	Rehabilitation of surface and upper sub-structure.	As required (if infiltration performance is reduced as a result of significant clogging).
Monitoring	Initial inspection.	Monthly for 3 months after installation.
	Inspect for evidence of poor operation and/or weed growth. If required take remedial action	3-monthly, 48h after large storms.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor inspection chambers.	Annually.

Required Action	Frequency
Inspection	Regularly during first year of installation. Every six months after the first year of installation.
Oil and Flammable Removal	Once per year, with sediment removal. Following a spill within the drainage area.
Sediment Removal	At intervals established by the inspections during the first year of installation Following a spill within the drainage area.

Note: For most cleanouts it is not necessary to remove the entire volume of liquid within the vessel. Only removing the first few inches of oil/flamable and the sediment storage volume is required.

Non-Adopted Drainage Notes

- All new private surface water and foul drainage shall be constructed and tested in accordance with BS EN 752, Building Regulations Approved Document Part 'H' and NHBC Chapter 5.3, as appropriate.
- Pipes shall be 100 mm diameter, flexibly jointed manufactured from vitrified clay or uPVC, and constructed to a minimum fall of 1:80 (min. 1:10) or 1:40 (no toilet), unless noted otherwise. Sewers and drains of different diameters to be laid soffit to soffit. All non straight junctions between pipes to be formed using preformed connections (curved square or oblique junctions) laid in the direction of the flow.
- Pipe bedding to be class 'S' bedding (100 mm granular bed and surround).
- Where cover to soffit of pipe is less than 900mm in trafficked private areas (600mm, untrafficked), the following shall apply:
 - Vitrified clay pipes - provide a 100mm min. thick concrete bed and surround (instead of class 'S' bedding) and a 13mm thick compressible filler at each joint.
 - uPVC pipes - provide a concrete bridge (in addition to class 'S' bedding) in accordance with appendix A15, Building Regulations Part 'H'.
- Unless noted otherwise concrete indicated in the construction of drainage infrastructure (pipe bedding, bridging, manholes etc) shall be standardised prescribed concrete ST2 and is to conform to BS EN 206-1 and BS 8500-2. The maximum aggregate size shall be 20mm.

6. Pipe runs adjacent to proposed foundations are to be installed in accordance with appendix A11, Building Regulations Part 'H'.

7. Excavations for manholes, pipe runs etc. located within a 45 degree load distribution spray from any adjoining existing foundations, are to be adequately supported for the duration of the works and pipe runs protected as noted 6 above.

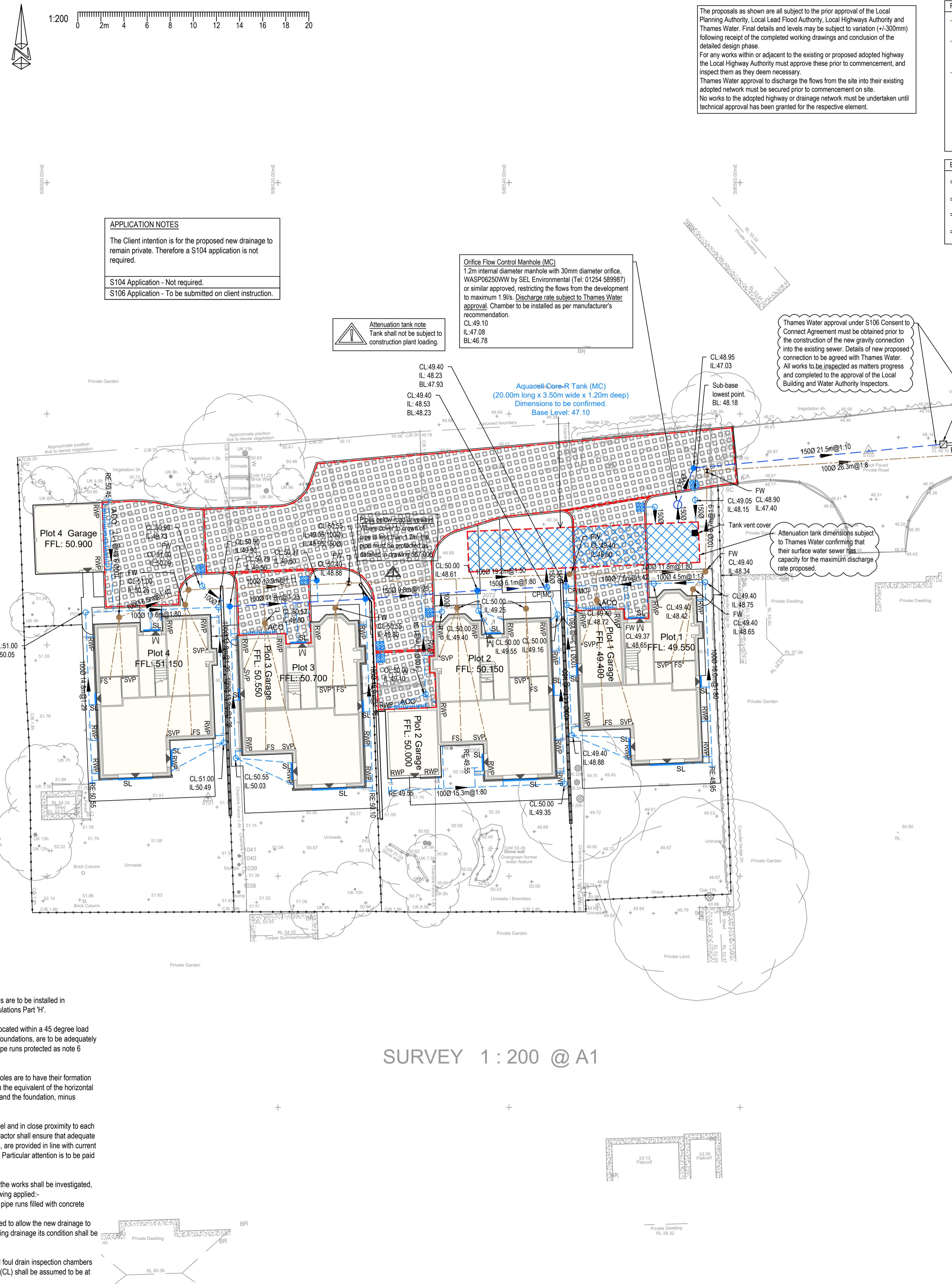
8. Foundations adjacent to pipe runs or manholes are to have their formation level set above the invert level, no higher than the equivalent of the horizontal distance between the pipe/excavation trench and the foundation, minus 500mm.

9. Where excavations for pipe runs are parallel and in close proximity to each other and/or other service trenches, the Contractor shall ensure that adequate safety measures, including temporary shoring, are provided in line with current Health & Safety legislation and good practice. Particular attention is to be paid to adjacent trenches of differing invert levels.

10. All existing drainage found on site during the works shall be investigated, its operational status confirmed, and the following applied:

- Inoperative drainage shall be cut back and pipe runs filled with concrete grout.
- 'Live' drainage shall be temporarily re-routed to allow the new drainage to be constructed. Prior to the reuse of any existing drainage its condition shall be verified and its suitability for reuse confirmed.

11. All new private shallow surface water and foul drain inspection chambers and rodding eyes shown without cover levels (CL) shall be assumed to be at external ground level.



Appendix B

Hydraulic Calculations

Directors:

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BEAL Consulting Engineers Ltd							Page 1
Chiltern House Thame Road Haddenham Bucks HP17 8BY							
Date 17/04/2023 16:49		Designed by Felice					
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Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 361 minutes.

Storm Event	Max Level	Max Depth	Max Infiltration	Max Control	Max Σ	Max Outflow	Max Volume	Status
	(m)	(m)	(l/s)	(l/s)	(l/s)		(m³)	
15 min Summer	0.497	0.477		0.0	1.3	1.3	31.7	O K
30 min Summer	0.636	0.616		0.0	1.5	1.5	41.0	O K
60 min Summer	0.767	0.747		0.0	1.6	1.6	49.7	O K
120 min Summer	0.870	0.850		0.0	1.7	1.7	56.5	O K
180 min Summer	0.904	0.884		0.0	1.8	1.8	58.8	O K
240 min Summer	0.908	0.888		0.0	1.8	1.8	59.1	O K
360 min Summer	0.903	0.883		0.0	1.8	1.8	58.7	O K
480 min Summer	0.893	0.873		0.0	1.8	1.8	58.0	O K
600 min Summer	0.879	0.859		0.0	1.7	1.7	57.1	O K
720 min Summer	0.862	0.842		0.0	1.7	1.7	56.0	O K
960 min Summer	0.824	0.804		0.0	1.7	1.7	53.5	O K
1440 min Summer	0.749	0.729		0.0	1.6	1.6	48.5	O K
2160 min Summer	0.650	0.630		0.0	1.5	1.5	41.9	O K
2880 min Summer	0.570	0.550		0.0	1.4	1.4	36.6	O K
4320 min Summer	0.449	0.429		0.0	1.2	1.2	28.6	O K
5760 min Summer	0.365	0.345		0.0	1.1	1.1	22.9	O K
7200 min Summer	0.303	0.283		0.0	1.0	1.0	18.8	O K
8640 min Summer	0.256	0.236		0.0	0.9	0.9	15.7	O K
10080 min Summer	0.219	0.199		0.0	0.8	0.8	13.2	O K
15 min Winter	0.555	0.535		0.0	1.4	1.4	35.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
		(m³)	(m³)	
15 min Summer	138.153	0.0	32.6	19
30 min Summer	90.705	0.0	42.8	33
60 min Summer	56.713	0.0	53.6	62
120 min Summer	34.246	0.0	64.7	122
180 min Summer	25.149	0.0	71.3	180
240 min Summer	20.078	0.0	75.9	234
360 min Summer	14.585	0.0	82.7	288
480 min Summer	11.622	0.0	87.8	350
600 min Summer	9.738	0.0	92.0	418
720 min Summer	8.424	0.0	95.5	488
960 min Summer	6.697	0.0	101.2	626
1440 min Summer	4.839	0.0	109.7	896
2160 min Summer	3.490	0.0	118.7	1296
2880 min Summer	2.766	0.0	125.4	1676
4320 min Summer	1.989	0.0	135.3	2420
5760 min Summer	1.573	0.0	142.7	3168
7200 min Summer	1.311	0.0	148.6	3888
8640 min Summer	1.129	0.0	153.5	4584
10080 min Summer	0.994	0.0	157.8	5336
15 min Winter	138.153	0.0	36.5	18

BEAL Consulting Engineers Ltd Chiltern House Thame Road Haddenham Bucks HP17 8BY		Page 2
Date 17/04/2023 16:49 File HYDRAULIC CALCS_100Y+40...	Designed by Felice Checked by	
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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level	Max Depth	Max Infiltration	Max Control	Max Σ	Max Outflow	Max Volume	Status
	(m)	(m)	(l/s)	(l/s)	(l/s)	(l/s)	(m³)	
30 min Winter	0.713	0.693	0.0	1.6	1.6	46.1	0	K
60 min Winter	0.861	0.841	0.0	1.7	1.7	56.0	0	K
120 min Winter	0.982	0.962	0.0	1.8	1.8	64.0	0	K
180 min Winter	1.026	1.006	0.0	1.9	1.9	66.9	Flood	Risk
240 min Winter	1.037	1.017	0.0	1.9	1.9	67.6	Flood	Risk
360 min Winter	1.025	1.005	0.0	1.9	1.9	66.9	Flood	Risk
480 min Winter	1.011	0.991	0.0	1.9	1.9	65.9	Flood	Risk
600 min Winter	0.991	0.971	0.0	1.9	1.9	64.5	0	K
720 min Winter	0.966	0.946	0.0	1.8	1.8	62.9	0	K
960 min Winter	0.911	0.891	0.0	1.8	1.8	59.3	0	K
1440 min Winter	0.802	0.782	0.0	1.7	1.7	52.0	0	K
2160 min Winter	0.663	0.643	0.0	1.5	1.5	42.7	0	K
2880 min Winter	0.553	0.533	0.0	1.4	1.4	35.5	0	K
4320 min Winter	0.400	0.380	0.0	1.2	1.2	25.3	0	K
5760 min Winter	0.301	0.281	0.0	1.0	1.0	18.7	0	K
7200 min Winter	0.235	0.215	0.0	0.9	0.9	14.3	0	K
8640 min Winter	0.188	0.168	0.0	0.8	0.8	11.2	0	K
10080 min Winter	0.155	0.135	0.0	0.7	0.7	9.0	0	K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
		(m³)	(m³)	
30 min Winter	90.705	0.0	48.0	33
60 min Winter	56.713	0.0	60.0	62
120 min Winter	34.246	0.0	72.5	120
180 min Winter	25.149	0.0	79.8	176
240 min Winter	20.078	0.0	85.0	232
360 min Winter	14.585	0.0	92.6	326
480 min Winter	11.622	0.0	98.4	372
600 min Winter	9.738	0.0	103.0	450
720 min Winter	8.424	0.0	107.0	526
960 min Winter	6.697	0.0	113.4	674
1440 min Winter	4.839	0.0	122.9	966
2160 min Winter	3.490	0.0	133.0	1380
2880 min Winter	2.766	0.0	140.5	1760
4320 min Winter	1.989	0.0	151.6	2512
5760 min Winter	1.573	0.0	159.8	3232
7200 min Winter	1.311	0.0	166.4	3960
8640 min Winter	1.129	0.0	172.0	4672
10080 min Winter	0.994	0.0	176.8	5352

BEAL Consulting Engineers Ltd Chiltern House Thame Road Haddenham Bucks HP17 8BY		Page 3
Date 17/04/2023 16:49 File HYDRAULIC_CALCS_100Y+40...	Designed by Felice Checked by	
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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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.126

Time (mins) Area
From: To: (ha)

0 4 0.126

BEAL Consulting Engineers Ltd Chiltern House Thame Road Haddenham Bucks HP17 8BY		Page 4
Date 17/04/2023 16:49 File HYDRAULIC_CALCS_100Y+40...	Designed by Felice Checked by	
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Model Details

Storage is Online Cover Level (m) 1.300

Cellular Storage Structure

Invert Level (m) 0.020 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	70.0	70.0	1.300	0.0	126.4
1.200	70.0	126.4			

Orifice Outflow Control

Diameter (m) 0.030 Discharge Coefficient 0.600 Invert Level (m) 0.000