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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 MCIHT,
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,
A. v.d.Merwe B.Eng (Hons)(Civ), C.Eng, MICE, Pr Eng, MAPM, PM.PMSA; J. van Wyk N.Dip HRM, M.PMSA

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.

Flow Control & Silt Traps Operation and Maintenance Requirements

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

Modular Storage Operation and Maintenance Requirements

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

Pervious Pavement Operation and Maintenance Requirements

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.

Downstream Defender Maintenance Requirements

Required Action	Frequency
Inspection	-Regularly during first year of installation. -Every six months after the first year of installation.
Oil and Floatable 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/floatables and the sediment storage volume is required.

Non-Adopted Drainage Notes

1. 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.

2. 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 toilet) 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.

3. Pipe bedding to be class 'S' bedding (100 mm granular bed and surround).

4. Where cover to soffit of pipe is less than 900mm in trafficked private areas (600mm, untrafficked), the following shall apply:-

a) Vitrified clay pipes - provide a 100mm min. thick concrete bed and surround (instead of class 'S' bedding) and a 13 mm thick compressible filler at each joint.

b) uPVC pipes - provide a concrete bridge (in addition to class 'S' bedding) in accordance with appendix A15, Building Regulations Part 'H'.

5. 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 splay from any adjoining existing foundations, are to be adequately supported for the duration of the works and pipe runs protected as note 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:-

a) Inoperative drainage shall be cut back and pipe runs filled with concrete grout.

b) '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.

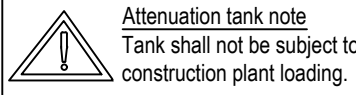


1:200 0 2m 4 6 8 10 12 14 16 18 20

APPLICATION NOTES

The Client intention is for the proposed new drainage to remain private. Therefore a S104 application is not required.

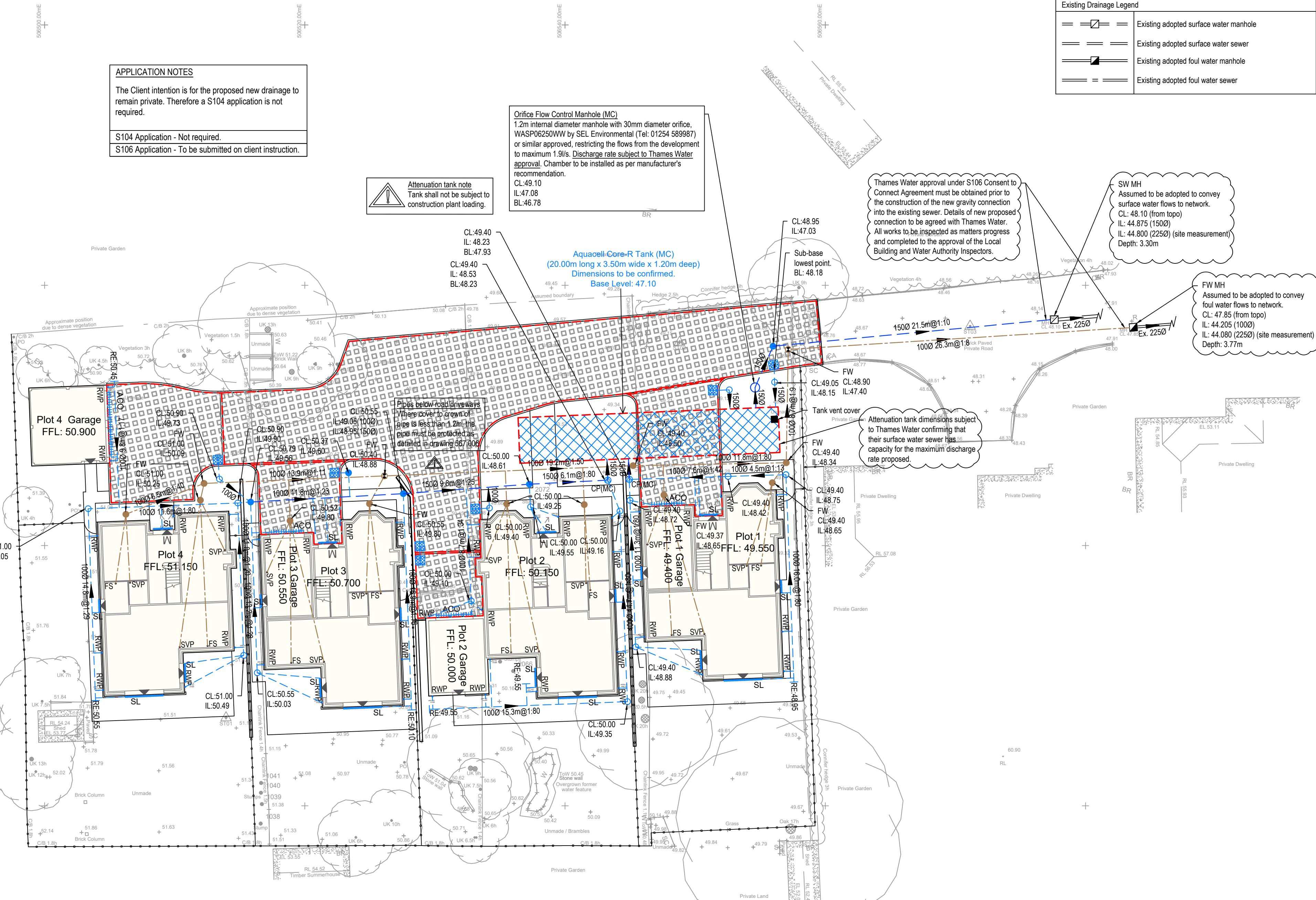
S104 Application - Not required.
S106 Application - To be submitted on client instruction.



Attenuation tank note
Tank shall not be subject to construction plant loading.

Orifice Flow Control Manhole (MC)
1.2m internal diameter manhole with 30mm diameter orifice, WASP06250WW by SEL Environmental (Tel: 01254 589987) or similar approved, restricting the flows from the development to maximum 1.9l/s. Discharge rate subject to Thames Water approval. Chamber to be installed as per manufacturer's recommendation.
CL: 49.10
IL: 47.08
BL: 46.78

Aquacell Core-R Tank (MC)
(20.00m long x 3.50m wide x 1.20m deep)
Dimensions to be confirmed.
Base Level: 47.10



The proposals as shown are all subject to the prior approval of the Local Planning Authority, Local Lead Flood Authority, Local Highways Authority and Thames Water. Final details and levels may be subject to variation (+/-300mm) following receipt of the completed working drawings and conclusion of the detailed design phase.
For any works within or adjacent to the existing or proposed adopted highway the Local Highway Authority must approve these prior to commencement, and inspect them as they deem necessary.
Thames Water approval to discharge the flows from the site into their existing adopted network must be secured prior to commencement on site.
No works to the adopted highway or drainage network must be undertaken until technical approval has been granted for the respective element.

Foul Water Drainage Legend

---	New foul drain/sewer (see 'Non Adopted Drainage Notes' for requirements)
●	New shallow foul water inspection chamber (typ. 450mm dia.) up to 1200mm deep
●	New deep foul water inspection chamber (typ. 450mm dia.) up to 3m deep with access opening restricted to 350mm diameter
FS	New floor socket
SVP	New soil and vent pipe
TG/BIG	New trapped bottle gully / back inlet gully
AAV	New air admittance valve

Existing Drainage Legend

==	Existing adopted surface water manhole
==	Existing adopted surface water sewer
==	Existing adopted foul water manhole
==	Existing adopted foul water sewer

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NOTES:

- Do not scale from this drawing. This drawing shall be read in conjunction with all other relevant Architect's and Engineer's drawings.
- Any discrepancies, ambiguities, or anomalies in the information provided on this or any of the engineering drawings package must be reported prior to work proceeding.
- All accommodation work deemed necessary to facilitate a satisfactory link between the new works and the existing to be undertaken by the developer.
- It is the contractor's responsibility to locate all existing services and verify their level & location prior to commencing any works. Should they be affected by the works then the respective statutory undertaker should be contacted and any special protection requirements agreed.
- All highway works shall be undertaken in accordance with the London Borough of Hillingdon's Highway Design Guide and Specification and strictly in accordance with the 'Specification for Highway Works'. All drainage works shall be undertaken in accordance with the 'Design & Construction Guidance', and any other Thames Water requirements. All works to be supervised/inspected as required by the relevant Inspector.
- All works must comply with current Health and Safety guidance & standards. All temporary signing to comply with Traffic Signs Manual - Chapter 8.
- All products are to be installed and maintained strictly in accordance with manufacturer's recommendations & guidelines.

Surface Water Drainage Legend

---	New surface water sewer proposed to fall under the maintenance responsibility of the Management Company (MC)
(MC)	Denotes drainage element that fall under the maintenance responsibility of the appointed Management Company
---	New surface water drainage (min gradient@1:80) to fall under the management responsibility of the property owner
○	New shallow surface water inspection chamber (typ. 450mm dia.) up to 1.2m deep
●	New deep surface water inspection chamber (typ. 450mm dia.) up to 3m deep with access opening restricted to 350mm diameter
CP	New surface water catchpit chamber (typ. 450mm dia.) up to 3m deep. Restrict access opening to 350mm Ø for depth greater than 1.2m (cover level to base of chamber)
○	New 1.2m internal diameter surface water manhole with minimum access cover opening size of 1200x675mm for depth less than 1.5m or 600mm diameter if deeper.
RE	New surface water rodding eye
RWP	New rain water down pipe with rodding access point
SL	Slot drain, Aco Hexdrain brickslot drainage system.
□	Extent of permeable paving with sub-base attenuation under, min. 350mm thick of sub-base type 4/20 (min 30% voids), sub-base formation level to fall towards outlet. Full impermeable tanking to sub-base to be provided to prevent infiltration into the ground.
□	Aquacell Core-R/Plus-R storm water storage units (each 1.0x0.5x0.4), or similar approved, installed in accordance with manufacturer's instructions (see also construction details). To be fully encapsulated with impermeable membrane to maintain storage. Vent pipe to be provided and brought up close to ground level (see details).
□	New SEL Permavoid diffuser unit PV0005101 (or similar approved), 710 x 710 x 150mm, pre-wrapped in 2mm mesh with 110mm Ø socket used as inlet or outlet of permeable paving sub-base. Where used as inlet, install a catchpit chamber upstream of the unit.
○	Root protection areas.
→	Potential surface water flood exceedance route. For storm events in excess of design storm event (1:100 + 40% c/c).

PRELIMINARY

P1	23.05.23	Outfall manhole details updated following onsite measurements.
Rev:	Date:	Description:

Client:

W E Black Ltd.

Project:

Land at Heythrop Drive, Ickenham

Drawing Title:

Drainage Layout

	Haddenham Business Centre, Chiltern House, Thame Road, Haddenham, Bucks, HP17 8BY. ☎ 01844 396233 www.beal-uk.com
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Designed: FD	Drawn: SRC	Checked: ---
Scale: 1:200 @ A1	Date: April 2023	Approved: ---
Drawing Number: 567:003	Revision:	P1


Appendix B


Hydraulic Calculations

Directors:

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

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Chiltern House Thame Road Haddenham Bucks HP17 8BY							
Date 17/04/2023 16:49							
File HYDRAULIC CALCS_100Y+40...							
Designed by Felice							
Checked by							
XP Solutions				Source Control 2015.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Half Drain Time : 361 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	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)			
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			
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Date 17/04/2023 16:49 File HYDRAULIC CALCS_100Y+40...	Designed by Felice Checked by																									
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<u>Rainfall Details</u>																										
<table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>20.000</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.400</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table>			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
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Ratio R	0.400	Longest Storm (mins)	10080																							
Summer Storms	Yes	Climate Change %	+40																							
<u>Time Area Diagram</u>																										
Total Area (ha) 0.126																										
<table> <tr> <th colspan="2">Time (mins)</th> <th>Area</th> </tr> <tr> <th>From:</th> <th>To:</th> <th>(ha)</th> </tr> <tr> <td>0</td> <td>4</td> <td>0.126</td> </tr> </table>			Time (mins)		Area	From:	To:	(ha)	0	4	0.126															
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Date 17/04/2023 16:49 File HYDRAULIC CALCS_100Y+40...	Designed by Felice Checked by	
XP Solutions Source Control 2015.1		

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

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