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Reg. No. 7180851 Vat No. 989 4278 44

Ref. FD/629/L001

FAO. Jon Furneaux
Land Director
Palatine Homes

Date: 9th May 2025

Dear Jon,

Re: Land at Johnson Drive, Finchampstead, RG40 3NW – Planning application 233086

This letter provides the necessary information that may be required to support the discharge of a drainage related planning condition for the abovementioned planning application (8-unit scheme). In compiling this letter and preparing the supporting documents, we have considered the comments made by the LLFA under planning application 223592 (5-unit scheme).

The proposed drainage solution for the site is shown in appendix A.

The drainage calculations, attached in appendix B, have been produced considering the following:

- FEH rainfall data series.
- A coefficient of runoff of 0.90 for the summer and 0.95 for the winter.
- Runoff from the areas detailed in table 1.
- 10% urban creep factor applied to all private impermeable areas (ie areas within the plot curtilage).

Breakdown of impermeable areas (post-development)	
Roof	1419m ²
Access road	1208m ²
Driveway (shared)	149m ²
Driveway (private)	616m ²

Table 1

The calculations demonstrates that the proposed discharge rates into the ditch will be lower than the greenfield rates, as detailed in table 2 below. Therefore, the proposed drainage solution for the development will not cause an increase of the risk of flooding off-site.

	Greenfield rates (l/s)	Proposed rates (l/s)	% Reduction
1 year	5	4.2	16 %
30 year	13.3	13.0	2 %
100 year + 40% cc	18.7 (0% cc)	18.3	2 %

Table 2

Yours sincerely,

Felice Dileo

Civil Engineer

On behalf of BEAL Consulting Engineers Ltd

Directors:

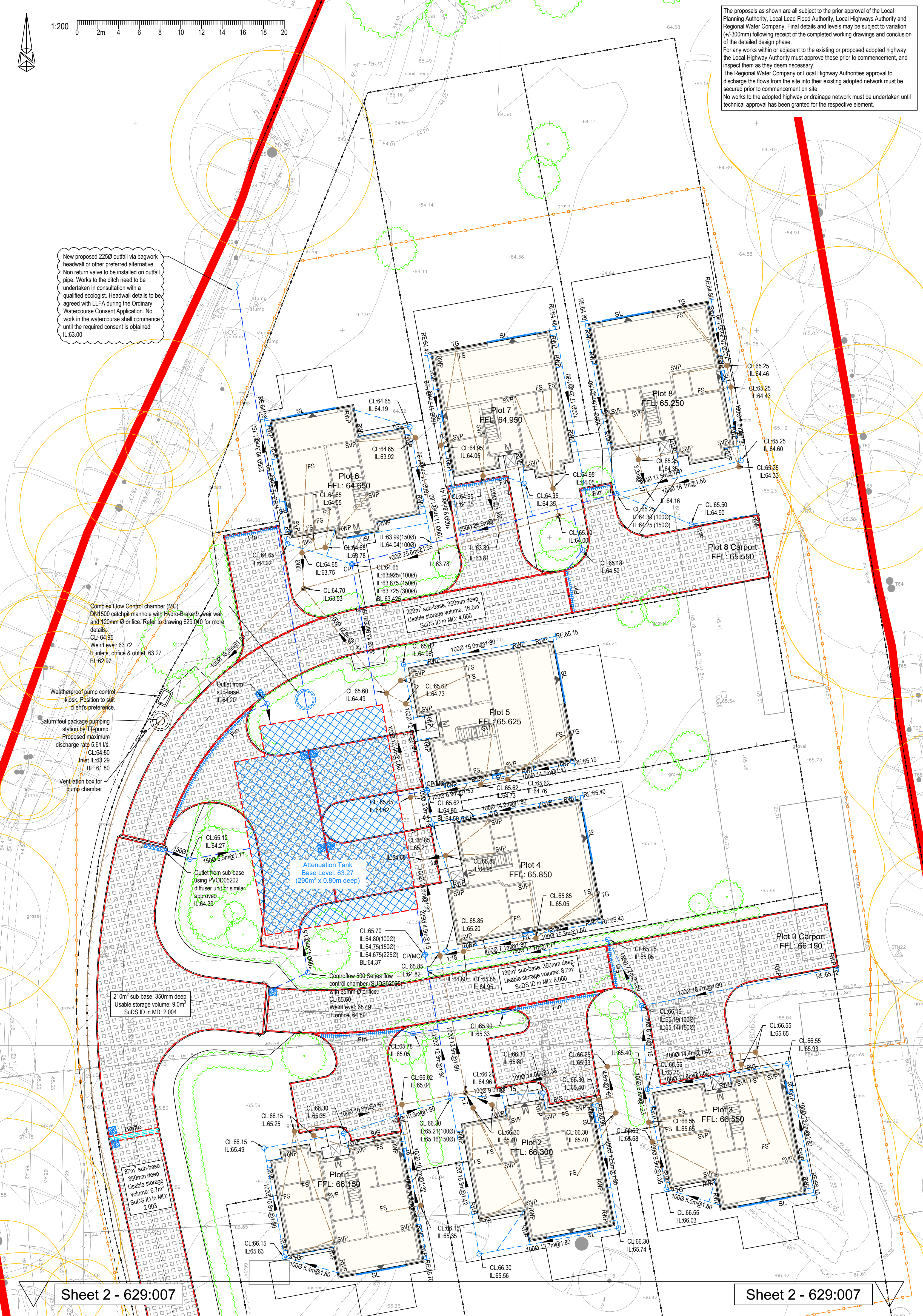
N.D.P. Blowfield M.Eng, C.Eng, MICE; S. H. Hastie B.Eng (Hons), C.Eng, MICE MCIHT,
A. v.d.Merwe B.Eng (Hons)(Civ), C.Eng, MICE, Pr Eng, MAPM, PM.PMSA; J. van Wyk N.Dip HRM, M.PMSA

Appendix A

Drainage Layout

Directors:

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



Sheet 2 - 629:007

Sheet 2 - 629:007

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

Surface and Foul Water Drainage Notes

The surface water drainage strategy for the site is based on an attenuated discharge into the ditch present along the western boundary. The discharge rates will be restricted to less than the greenfield rates for the 1, 30, and 100-year return period (5 l/s, 13.3 l/s and 18.7 l/s respectively), in general accordance with the drainage strategy by Lanmor Consulting submitted to the planning authority.

The attenuation storage has been sized to prevent any flooding from occurring for the most critical 100y+40% climate change storm event. For further details refer to the Micro Drainage Calculations.

Discharges from the driveway area will be adequately treated by the permeable block paving which includes an Imbitex geo-textile, that in conjunction with its stone attenuation storage beneath will slow and treat the surface water which passes through it. Discharges from the roof will be directed to catch pits for the collection of roof debris and prevent it from entering the attenuation storage.

A Land Drainage Consent is anticipated to be required by Wokingham Borough Council prior to the construction of the new outfall into the watercourse.

With regard to the foul strategy, a S106 Consent to Connect will need to be submitted to Thames Water to obtain legal consent to connect to the existing network.

All works to the existing foul water connection will be agreed with The Building Inspector/Thames Water prior to commencement of the works and inspected as required.

Foul package pumping station maintenance note

The package pumping station should be serviced regularly to ensure optimal performance. As per the recommendation of TT-pump, the package pumping station should be serviced twice a year. In addition, it is recommended to consider subscribing to a 24/7 monitoring service that will allow for early detection of any potential issues and ensure minimum disruption and downtime. By subscribing to this service, the package pumping station can be closely monitored and any concerns identified and addressed in a timely manner.

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 access road, shared driveways, attenuation tank, catch pits, flow control chamber and the outfall into the ditch. The maintenance of the drainage elements and driveways serving a single property is 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 drawing 629:007.

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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 Local Highway Authorities 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 Regional Water company 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
- New surface water catchpit chamber (typ. 600mm dia. for pipe greater than 1500 and 450mm dia. for pipe up to 1500) up to 3m deep. Restrict access opening to 350mm Ø for depth greater than 1.2m (cover level to base of chamber).
- New surface water rodding eye
- New rain water down pipe with rodding access point
- Slot drain, Aco Hexdrain brickslot drainage system.
- Aco Channel, Aco HexDrain Garage System.
- Formpave SC Findrain or similar approved laid at the base of the permeable paving sub-base to collect/transport surface water to outlet.
- Baffle
- 450mm concrete baffle, see details.
- 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.
- New SEL Permaflow diffuser unit PVOD05101 (or similar approved) pre-wrapped in 2mm mesh with 110mm Ø socket used as outlet of permeable paving sub-base. Dimensions: 710 x 710 x 150mm
- 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).
- Root protection areas.
- Potential surface water flood exceedance route. For storm events in excess of design storm event (1:100y + 40% c/c).
- Proposed landscaping.

Foul Water Drainage Legend

- New foul drain/sewer (see 'Non Adopted Drainage Notes' for requirements)
- New shallow foul water inspection chamber (typ. 225mm dia.) up to 0.6m deep
- New shallow foul water inspection chamber (typ. 450mm dia.) up to 1.2m deep
- New deep foul water inspection chamber (typ. 450mm dia.) up to 3m deep with access opening restricted to 350mm diameter
- New soil and vent pipe
- New floor socket
- New trapped bottle gully

Existing Drainage Legend

- Existing adopted foul water manhole
- Existing adopted foul water sewer
- Existing adopted rising main foul water sewer
- Existing adopted surface water manhole
- Existing adopted surface water sewer

Note

The proposals as shown are all subject to the prior approval of the Local Planning Authority, Local Highway Authority and Local Water Authority. No works to the adopted highway or drainage network must be undertaken until technical approval has been granted for the respective element.

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 - Submitted. Waiting for Thames Water capacity assessment and confirmation of point of connection.	
Ordinary Watercourse Consent - In progress.	

PRELIMINARY

P5	09/05/25	Minor adjustments to plot 1&2 drainage.
P4	28/04/25	Drawing updated to suit latest Architect's layouts.
P3	13/02/25	Drawing updated to suit latest site layout/working drawings and address client/LLFA comments.
P2	07/01/25	Drawing updated to suit latest site layout and working drawings and address client comments.
P1	20/11/24	Foul drainage adjusted to suit updated working drawings. Pump details and maintenance tables added.
Rev:	Date:	Description:

Client:

Project:

Johnson Drive, Finchampstead

Drawing Title:

Drainage Layout (Sheet 1 of 2)

Designed: SRC

Scale: 1:200 @ A1

Drawn: SRC

Date: Oct 2024

Checked: SRC

Approved: SRC

Drawing Number: 629:006

Revision:

P5

BEAL CONSULTING ENGINEERS

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Appendix B

Hydraulic Calculations

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model	
Return Period (years)	100
Site Location GB 480850 165550	
C (1km)	-0.029
D1 (1km)	0.269
D2 (1km)	0.274
D3 (1km)	0.311
E (1km)	0.304
F (1km)	2.678
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.241	4-8	0.119

Total Area Contributing (ha) = 0.360

Total Pipe Volume (m³) = 3.093

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
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Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.000	13.900	0.093	149.5	0.083	5.00	0.0	0.600	o	300	
2.000	1.000	0.010	100.0	0.014	5.00	0.0	0.600	o	100	
2.001	1.000	0.010	100.0	0.014	0.00	0.0	0.600	o	100	
2.002	1.000	0.010	100.0	0.013	0.00	0.0	0.600	o	100	
2.003	1.000	0.010	100.0	0.013	0.00	0.0	0.600	o	100	
2.004	5.900	0.350	16.9	0.030	0.00	0.0	0.600	o	150	
3.000	4.500	0.905	5.0	0.118	5.00	0.0	0.600	o	225	
4.000	2.000	0.230	8.7	0.021	5.00	0.0	0.600	o	100	
5.000	2.500	0.880	2.8	0.038	5.00	0.0	0.600	o	150	
6.000	3.700	0.046	80.4	0.016	5.00	0.0	0.600	o	100	
6.001	4.300	0.920	4.7	0.000	0.00	0.0	0.600	o	100	
1.001	1.000	0.000	0.0	0.000	0.00	0.0	0.600	o	300	
1.002	40.300	0.269	149.8	0.000	0.00	0.0	0.600	o	225	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.18	63.725	0.083	0.0	0.0	0.0	1.28	90.7	11.2
2.000	50.00	5.02	66.210	0.014	0.0	0.0	0.0	0.77	6.0	1.9
2.001	50.00	5.04	65.730	0.028	0.0	0.0	0.0	0.77	6.0	3.8
2.002	50.00	5.07	65.400	0.041	0.0	0.0	0.0	0.77	6.0	5.6
2.003	50.00	5.09	64.950	0.054	0.0	0.0	0.0	0.77	6.0«	7.3
2.004	50.00	5.13	64.270	0.084	0.0	0.0	0.0	2.47	43.6	11.4
3.000	50.00	5.01	64.750	0.118	0.0	0.0	0.0	5.91	234.9	16.0
4.000	50.00	5.01	64.200	0.021	0.0	0.0	0.0	2.64	20.7	2.8
5.000	50.00	5.01	64.800	0.038	0.0	0.0	0.0	6.02	106.5	5.1
6.000	50.00	5.07	64.940	0.016	0.0	0.0	0.0	0.86	6.7	2.2
6.001	50.00	5.09	64.890	0.016	0.0	0.0	0.0	3.60	28.3	2.2
1.001	50.00	5.29	63.270	0.360	0.0	0.0	0.0	0.15	10.5«	48.7
1.002	50.00	5.92	63.270	0.360	0.0	0.0	0.0	1.07	42.4«	48.7

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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall C. Level Name	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002		63.420	63.001	0.000	0 0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs		0	Number of Storage Structures
Number of Online Controls		3	Number of Time/Area Diagrams
Number of Offline Controls		0	Number of Real Time Controls

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.900	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Storm

Orifice Manhole: 11, DS/PN: 6.001, Volume (m³): 0.8

Diameter (m) 0.035 Discharge Coefficient 0.600 Invert Level (m) 64.890

Complex Manhole: 12, DS/PN: 1.001, Volume (m³): 2.7

Orifice

Diameter (m) 0.120 Discharge Coefficient 0.600 Invert Level (m) 63.270

Weir

Discharge Coef 0.544 Width (m) 0.700 Invert Level (m) 63.720

Hydro-Brake Optimum® Manhole: 13, DS/PN: 1.002, Volume (m³): 1.5

Unit Reference	MD-SHE-0194-1850-0800-1850
Design Head (m)	0.800
Design Flow (l/s)	18.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	194
Invert Level (m)	63.270
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	18.4
Flush-Flo™	0.308	18.4
Kick-Flo®	0.601	16.1
Mean Flow over Head Range	-	15.2

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	6.7	1.200	22.3	3.000	34.7	7.000	52.3
0.200	17.8	1.400	24.1	3.500	37.4	7.500	54.0
0.300	18.4	1.600	25.6	4.000	39.8	8.000	55.8
0.400	18.2	1.800	27.1	4.500	42.2	8.500	57.2
0.500	17.6	2.000	28.5	5.000	44.4	9.000	58.8
0.600	16.1	2.200	29.9	5.500	46.5	9.500	60.5
0.800	18.4	2.400	31.1	6.000	48.5		
1.000	20.5	2.600	32.4	6.500	50.4		

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Storage Structures for Storm

Porous Car Park Manhole: 2, DS/PN: 2.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	23.7
Max Percolation (l/s)	31.6	Slope (1:X)	25.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	66.210	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: 3, DS/PN: 2.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	19.5
Max Percolation (l/s)	26.0	Slope (1:X)	45.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	65.730	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: 4, DS/PN: 2.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	20.2
Max Percolation (l/s)	26.9	Slope (1:X)	55.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	65.400	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: 5, DS/PN: 2.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	19.2
Max Percolation (l/s)	25.6	Slope (1:X)	35.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.950	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: 6, DS/PN: 2.004

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	17.7
Max Percolation (l/s)	23.6	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.270	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: 8, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	0.00000	Max Percolation (l/s)	43.5
Membrane Percolation (mm/hr)	1000	Safety Factor	2.0

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<u>Porous Car Park Manhole: 8, DS/PN: 4.000</u> <table><tr><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Invert Level (m)</td><td>64.200</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Width (m)</td><td>4.1</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Length (m)</td><td>38.2</td><td>Cap Volume Depth (m)</td><td>0.350</td></tr></table> <u>Porous Car Park Manhole: 10, DS/PN: 6.000</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>4.1</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>20.0</td></tr><tr><td>Max Percolation (l/s)</td><td>22.8</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>64.940</td><td>Cap Volume Depth (m)</td><td>0.350</td></tr></table> <u>Cellular Storage Manhole: 12, DS/PN: 1.001</u> <table><tr><td>Invert Level (m)</td><td>63.270</td><td>Safety Factor</td><td>2.0</td></tr><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.95</td></tr><tr><td>Infiltration Coefficient Side (m/hr)</td><td>0.00000</td><td></td><td></td></tr></table> <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>285.0</td><td>285.0</td><td>0.801</td><td>0.0</td><td>285.0</td></tr><tr><td>0.800</td><td>285.0</td><td>285.0</td><td></td><td></td><td></td></tr></table> <u>Volume Summary (Static)</u> Length Calculations based on True Length <table><tr><th colspan="4">Storage</th></tr><tr><th>Pipe Number</th><th>USMH Name</th><th>Structure Volume (m³)</th><th>Total Volume (m³)</th></tr><tr><td>1.000</td><td>1</td><td>0.000</td><td>0.000</td></tr><tr><td>2.000</td><td>2</td><td>4.725</td><td>4.725</td></tr><tr><td>2.001</td><td>3</td><td>8.617</td><td>8.617</td></tr><tr><td>2.002</td><td>4</td><td>9.073</td><td>9.073</td></tr><tr><td>2.003</td><td>5</td><td>6.615</td><td>6.615</td></tr><tr><td>2.004</td><td>6</td><td>8.921</td><td>8.921</td></tr><tr><td>3.000</td><td>7</td><td>0.000</td><td>0.000</td></tr><tr><td>4.000</td><td>8</td><td>16.445</td><td>16.445</td></tr><tr><td>5.000</td><td>9</td><td>0.000</td><td>0.000</td></tr><tr><td>6.000</td><td>10</td><td>8.610</td><td>8.610</td></tr><tr><td>6.001</td><td>11</td><td>0.000</td><td>0.000</td></tr><tr><td>1.001</td><td>12</td><td>216.690</td><td>216.690</td></tr><tr><td>1.002</td><td>13</td><td>0.000</td><td>0.000</td></tr><tr><td colspan="2">Total</td><td>279.696</td><td>279.696</td></tr></table>				Porosity	0.30	Slope (1:X)	0.0	Invert Level (m)	64.200	Depression Storage (mm)	5	Width (m)	4.1	Evaporation (mm/day)	3	Length (m)	38.2	Cap Volume Depth (m)	0.350	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.1	Membrane Percolation (mm/hr)	1000	Length (m)	20.0	Max Percolation (l/s)	22.8	Slope (1:X)	0.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	64.940	Cap Volume Depth (m)	0.350	Invert Level (m)	63.270	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	285.0	285.0	0.801	0.0	285.0	0.800	285.0	285.0				Storage				Pipe Number	USMH Name	Structure Volume (m³)	Total Volume (m³)	1.000	1	0.000	0.000	2.000	2	4.725	4.725	2.001	3	8.617	8.617	2.002	4	9.073	9.073	2.003	5	6.615	6.615	2.004	6	8.921	8.921	3.000	7	0.000	0.000	4.000	8	16.445	16.445	5.000	9	0.000	0.000	6.000	10	8.610	8.610	6.001	11	0.000	0.000	1.001	12	216.690	216.690	1.002	13	0.000	0.000	Total		279.696	279.696
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XP Solutions						Network 2015.1			
<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>									
<u>Simulation Criteria</u>									
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000									
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000									
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800									
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000									
Foul Sewage per hectare (l/s) 0.000									
Number of Input Hydrographs 0 Number of Storage Structures 8									
Number of Online Controls 3 Number of Time/Area Diagrams 0									
Number of Offline Controls 0 Number of Real Time Controls 0									
<u>Synthetic Rainfall Details</u>									
Rainfall Model FEH D3 (1km) 0.311									
Site Location GB 480850 165550 E (1km) 0.304									
C (1km) -0.029 F (1km) 2.678									
D1 (1km) 0.269 Cv (Summer) 0.950									
D2 (1km) 0.274 Cv (Winter) 0.950									
Margin for Flood Risk Warning (mm) 300.0									
Analysis Timestep 2.5 Second Increment (Extended)									
DTS Status ON									
DVD Status OFF									
Inertia Status OFF									
Profile(s) Summer and Winter									
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080									
Return Period(s) (years) 1, 30, 100									
Climate Change (%) 0, 0, 40									
<u>Water Level</u>									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
1.000	1	15 Summer	1	+0%	100/15 Summer				63.825
2.000	2	15 Summer	1	+0%	30/15 Summer				66.271
2.001	3	15 Summer	1	+0%	30/15 Summer				65.814
2.002	4	30 Summer	1	+0%	1/15 Summer				65.512
2.003	5	30 Summer	1	+0%	1/15 Summer				65.073
2.004	6	30 Summer	1	+0%	100/15 Summer				64.317
3.000	7	15 Summer	1	+0%	100/15 Summer				64.817
4.000	8	60 Summer	1	+0%	100/15 Summer				64.221
5.000	9	15 Summer	1	+0%					64.837
6.000	10	60 Summer	1	+0%	30/15 Summer				64.977
6.001	11	60 Summer	1	+0%	30/15 Summer				64.974
1.001	12	480 Summer	1	+0%	30/15 Summer				63.445
1.002	13	480 Summer	1	+0%	100/15 Summer				63.347
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	1	-0.200	0.000	0.24		18.0	OK	
2.000	2	-0.039	0.000	0.67		2.6	OK	
2.001	3	-0.016	0.000	1.00		3.9	OK	
2.002	4	0.012	0.000	1.15		4.5	SURCHARGED	
2.003	5	0.023	0.000	1.37		5.4	SURCHARGED	
2.004	6	-0.103	0.000	0.22		7.9	OK	
3.000	7	-0.158	0.000	0.19		25.6	OK	
4.000	8	-0.079	0.000	0.10		1.3	OK	
5.000	9	-0.113	0.000	0.14		8.3	OK	
6.000	10	-0.063	0.000	0.15		0.8	OK	
6.001	11	-0.016	0.000	0.03		0.7	OK	
1.001	12	-0.125	0.000	0.07		4.2	OK	
1.002	13	-0.148	0.000	0.10		4.2	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged Flooded		Flow / Overflow		Pipe Flow	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Cap.	(l/s)	(l/s)		
1.000	1	-0.100	0.000	0.77		57.8	OK	
2.000	2	0.076	0.000	2.12		8.3	SURCHARGED	
2.001	3	0.150	0.000	2.87		11.3	SURCHARGED	
2.002	4	0.166	0.000	3.01		11.8	FLOOD RISK	
2.003	5	0.199	0.000	3.27		12.9	FLOOD RISK	
2.004	6	-0.044	0.000	0.84		30.4	OK	
3.000	7	-0.097	0.000	0.61		82.3	OK	
4.000	8	-0.039	0.000	0.67		8.9	OK	
5.000	9	-0.079	0.000	0.45		26.5	OK	
6.000	10	0.044	0.000	0.22		1.3	SURCHARGED	
6.001	11	0.089	0.000	0.04		1.1	SURCHARGED	
1.001	12	0.099	0.000	0.23		13.0	SURCHARGED	
1.002	13	-0.074	0.000	0.32		13.0	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Flooded		Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)				
1.000	1	0.377	0.000	0.59	44.3	FLOOD RISK	
2.000	2	0.245	0.000	3.57	14.0	FLOOD RISK	
2.001	3	0.347	0.000	4.20	16.5	FLOOD RISK	
2.002	4	0.345	0.000	4.24	16.7	FLOOD RISK	
2.003	5	0.410	0.000	4.61	18.1	FLOOD RISK	
2.004	6	0.126	0.000	1.17	42.5	SURCHARGED	
3.000	7	0.529	0.000	1.26	169.0	FLOOD RISK	
4.000	8	0.037	0.000	1.09	14.5	SURCHARGED	
5.000	9	-0.033	0.000	0.96	56.4	OK	
6.000	10	0.235	0.000	0.31	1.8	FLOOD RISK	
6.001	11	0.279	0.000	0.06	1.5	SURCHARGED	
1.001	12	0.827	0.000	0.35	20.2	FLOOD RISK	
1.002	13	0.499	0.000	0.45	18.3	SURCHARGED	