

Project Name : Arborfield Garrison Parcel S

Job No : 25-136

Note Title : Drainage Strategy Technical Note

Author : BJ

Checked : LH

Approved : LH

Date : July 2025

1.0 INTRODUCTION

1.1.1 This Drainage Technical Note has been prepared by Odyssey on behalf of Hicks Developments Ltd to support the Reserved Matters Application (RMA) for Parcel S at Arborfield Garrison.

1.1.2 Parcel S is part of the wider development which has outline planning consent (Reference O/2014/2280). The description of the application is as follows:

Reserved Matters (RM) Application for four detached dwellings at Parcel S, which will be accessed via the same road which will provide access to the Moat House (Refs. 242252 & 242253), from Buttenshaw Avenue.

The intended Description of Development is:

'Application for approval of Reserved Matters pursuant to O/2014/2280 for the erection of 4 detached dwellings and associated infrastructure.'

1.1.3 A number of plans, supporting drawings and documents were submitted as part of the outline planning application. Those documents provide a framework within which a future detailed planning application (the reserved matters) would be submitted. Numerous planning conditions were additionally attached to the outline permission, some of which required details to be submitted to the planning authority with any subsequent reserved matters application.



1.1.4 The purpose of this report is to support the discharge of Planning Conditions 43, 44 and 45 associated with the outline consent. These Conditions are for convenience quoted below:

Condition 43:

“The development hereby permitted shall be carried out in accordance with the approved Foul and Surface Water Drainage Strategy Revision 3 Updated drainage strategy plan and phasing plan included dated 03/03/15 Job No 60312043 Reference DS/001 including the mitigation measures detailed in this strategy unless otherwise agreed in writing by the Local Planning Authority. In addition, an off-site drainage strategy will be submitted to and approved in writing by the Local Planning Authority (in consultation with the Sewage Undertaker) prior to the commencement of development and in any relevant phase. No discharge of foul water from the site shall be accepted into the public system until the drainage works relevant to that phase have been completed in accordance with the approved Foul and Surface Water Drainage Strategy Revision 3 Updated drainage strategy plan and phasing plan included dated 03/03/15 Job No 60312043 Reference DS/001 and the approved off-site drainage strategy.”

Condition 44:

“No part of the development within a phase shall take place until a surface water drainage scheme for the phase, based on sustainable drainage principles outlined in the agreed FRA (Foul and Surface Water Drainage Strategy Revision 3 Updated drainage strategy plan and phasing plan included dated 03/03/15 Job No 60312043 Reference DS/001) and an assessment of the hydrological and hydrogeological context of the development, has been submitted to and approved in writing by the local planning authority. The scheme shall subsequently be implemented in accordance with the approved details before the development is completed. The scheme shall also include:

- a. Detailed surface water drainage calculations for all rainfall events (1 in 1, 1 in 30 and 1 in 100) up to and including the 1 in 100 plus climate change storm event.*
- b. Demonstration that there will be no flooding on the site up to the 1 in 30 storm event and that and flooding up to the 1 in 100 plus climate change storm event can be safely stored within the site without increasing flood risk to the surrounding area.*
- c. SuDS features shall be located outside of the 1 in 100 year plus 20% allowance for climate change flood level.*
- d. Limiting the discharge rate from the entire site to Greenfield rates*
- e. Details of the feasibility of the use of soakaways in line with BRE 365 to demonstrate whether they are technically feasible and confirmation that there will be a minimum of 1 metre between the base of the infiltration device and the water table.*
- f. Information on the hierarchy of options to explain the choice of any proposed SuDS technique.*



g. Details of how the scheme shall be maintained and managed after completion.”

Condition 45:

No development shall take place within each phase until full details of the Drainage System(s) have been submitted to and approved in writing by the Local Planning Authority. These shall include:

- a. Wherever practical, measures to manage surface water at the surface through incorporation of SuDS that integrate with wider landscape proposals and provide a range of benefits in terms of amenity provision, ecological enhancements and water quality;*
- b. Demonstration of where and how surface water attenuation shall be provided across the site and that attenuation features are adequately sized to serve the development for all events up to and including the 1 in 100 year plus Application No: O/2014/2280 - 23 - allowances for climate change taking into consideration detailed intrusive site investigations at the site;*
- c. Details of the phased implementation of the drainage system(s) and demonstration that flood risk will not be exacerbated at any time during installation;*
- d. Details of the implementation of the drainage system(s) and demonstration that water quality will not be impacted at any time during installation;*
- e. Details of the implementation and final state of the drainage system(s) and demonstration that the structural integrity of receiving watercourses will not be impacted at any time;*
- f. Clear definition of where surface water outfalls will discharge and demonstration that discharges and attenuation volumes have accounted for the effect of flood levels on receiving water bodies;*
- g. Demonstration that any seasonal variation in groundwater levels has been considered in the sizing and location of SuDS features;*
- h. Details of the freeboard allowance for any structures required to cross ditches and/or watercourses requiring demonstration that structures do not increase flood risk in all areas upstream and downstream of the proposed development;*
- i. Detailed hydraulic modelling of the drainage system(s) incorporating the watercourses, SuDS features both online and offline and demonstration that SuDS storage is not compromised by fluvial flood flows / levels;*
- j. Full details of the maintenance and/or adoption proposals /agreements for the development covering all aspects of the proposed drainage system(s), with provision for annual inspection reports to be submitted to the Local Authority for any SUDS that will be retained by private management companies.*

Development should be implemented in accordance with the approved details and thereafter retained unless otherwise agreed in writing by the Local Planning Authority.”



2.0 PROPOSED SURFACE WATER DRAINAGE STRATEGY

2.1.1 The surface water drainage strategy is presented on the drawing listed below which is included at **Appendix A**:

- 25-136/100 Drainage Strategy

2.1.2 The surface water drainage strategy for Parcel S has been designed in accordance with the strategy for the development set out in AECOM's Flood Risk Assessment (FRA) and as illustrated on Crest Surface Water Drainage plan, drawing number CNC-AG-S-002B, included in Appendix D.

2.1.3 The above plan proposes a surface water connection for Parcel S to be made to the west of the parcel, within Buttenshaw Avenue.

2.1.4 The proposed drainage strategy for Parcel S illustrates that surface water runoff from impermeable areas within the individual catchments would be conveyed via gravity fed surface water pipe networks to a surface water pumping chamber. The surface water would then be pumped and conveyed via a rising main prior to connecting to the surface water outfall stub for Parcel S.

2.1.5 Crest have undertaken further modelling and informed Odyssey of the maximum allowable discharge rates into each stub.

2.1.6 The allowable discharge rates and proposed modelled discharge rates for each stub are listed below:

Table 2.1: Maximum Allowable and Proposed Discharge Rates

Stub (Connection Point)	Discharge Rate Provided by Crest	100 Year Plus 45% Climate Change Discharge Rate
Buttenshaw Avenue	42.4 l/s	42.4 l/s

2.1.7 The surface water system has been designed to cater for a 1 in 100-year storm event with an additional allowance for 30% climate change as stated within the FRA. Any flooding arising during this extreme event would be contained within carriageways and would be routed away from properties back into the drainage network or into open spaces as shown on Odyssey Overland Flow Route drawing 25-136/102 included at **Appendix B**. Relevant MicroDrainage calculations are included at **Appendix C**.



2.8 The CIRIA SuDS Manual sets out the pollution hazard level for different land use classifications, as shown below in **Table 2.2**:

Table 2.2: Pollution Hazard Levels (CIRIA SuDS Manual)

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7

2.1.8 Based upon the nature and size of the proposed development, the proposed development is considered to have a low pollution hazard level.

2.1.9 Surface water runoff from the proposed on-site highway and hard-standing areas would be conveyed to one of the attenuation ponds located offsite which would provide treatment for pollutants prior to discharging into the existing surface water network.

2.1.10 The CIRIA SuDS Manual Methodology has been applied to the drainage design. The mitigation indices in **Table 2.3** show that flows draining directly to a pond would receive sufficient treatment.

Table 2.3: SuDS Mitigation Indices – Pond Only Catchment

Type of SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Pond/wetland	0.8	0.8	0.8

2.1.11 In addition to the above, described system, trapped gullies and catchpits that form part of the piped network would provide further treatment of surface water.



3.0 PROPOSED FOUL WATER DRAINAGE STRATEGY

3.1.1 The foul water drainage strategy is presented on the Odyssey drawing listed below which is included at **Appendix A**.

- 25-136/100 Drainage Strategy

3.1.2 The foul drainage strategy has been designed in accordance with Crest's Foul Water Drainage plan, drawing number CNC-AG-S-002A, included in **Appendix D**.

3.1.3 The proposed drainage strategy for Parcel S illustrates that foul flows from the residential units would be conveyed via gravity fed foul water pipe networks to a foul water pumping chamber. The foul water would then be pumped and conveyed via a rising main prior to connecting to the foul water outfall stub for Parcel S.

3.1.4 Private foul and surface water drainage is to be in accordance with Approved Document H of the Building Regulations. Any foul and surface water sewers being considered for Thames Water adoption are to be in accordance with Code for Adoption and Thames Water requirements.

4.0 MAINTENANCE

4.1.1 Any foul and surface water sewer networks offered for adoption by Thames Water would be maintained by Thames Water in accordance with their maintenance and management program.

4.1.2 Any drainage features not offered for adoption are to be maintained by a private management company in accordance with the following information, tables and any recommendations made by manufacturers.

Pipe Systems, Gullies and Manholes

4.1.3 Drainage systems comprising of pipe runs, manholes and gullies are a more conventional method of draining surface water run-off from highway areas.

4.1.4 Surface water falling on impermeable areas, such as roads and footways, drain at surface level to gullies which convey the water below ground to the main drainage network. Manholes are also provided on the main drainage system at regular intervals, changes in sewer direction, gradient or pipe diameter. This type of drainage system can be accessed from the gullies or manholes for routine inspection and maintenance.



4.1.5 Gullies are to be ‘trapped’ such that on collecting and conveying surface water they trap sediment and prevent any unpleasant odours returning from the sewers.

Table 4.1: Pipe Systems, Gullies and Manholes Maintenance Activities & Frequency

Maintenance Category	Maintenance Activity	Comments	Frequency
Routine Maintenance	Inspect and identify any areas that are not operating correctly.	Gullies and manholes.	Monthly (for the first 3 months) then annually.
	Remove debris from gratings, sumps / silt traps.		Annually
Infrequent Maintenance	Clear blockages.	Piped system.	As required.

4.1.6 The above maintenance and inspection regime is recommended however reference should also be made to the appropriate manufacturer’s guidance and recommendations and the more frequent maintenance and inspection regime implemented.

5.0 CONCLUSION

5.1.1 Odyssey has been commissioned by Hicks Developments Ltd to prepare a Drainage Technical Note to support the discharge of Conditions 43, 44 and 45 associated with the outline planning consent for Arborfield Garrison Parcel S.

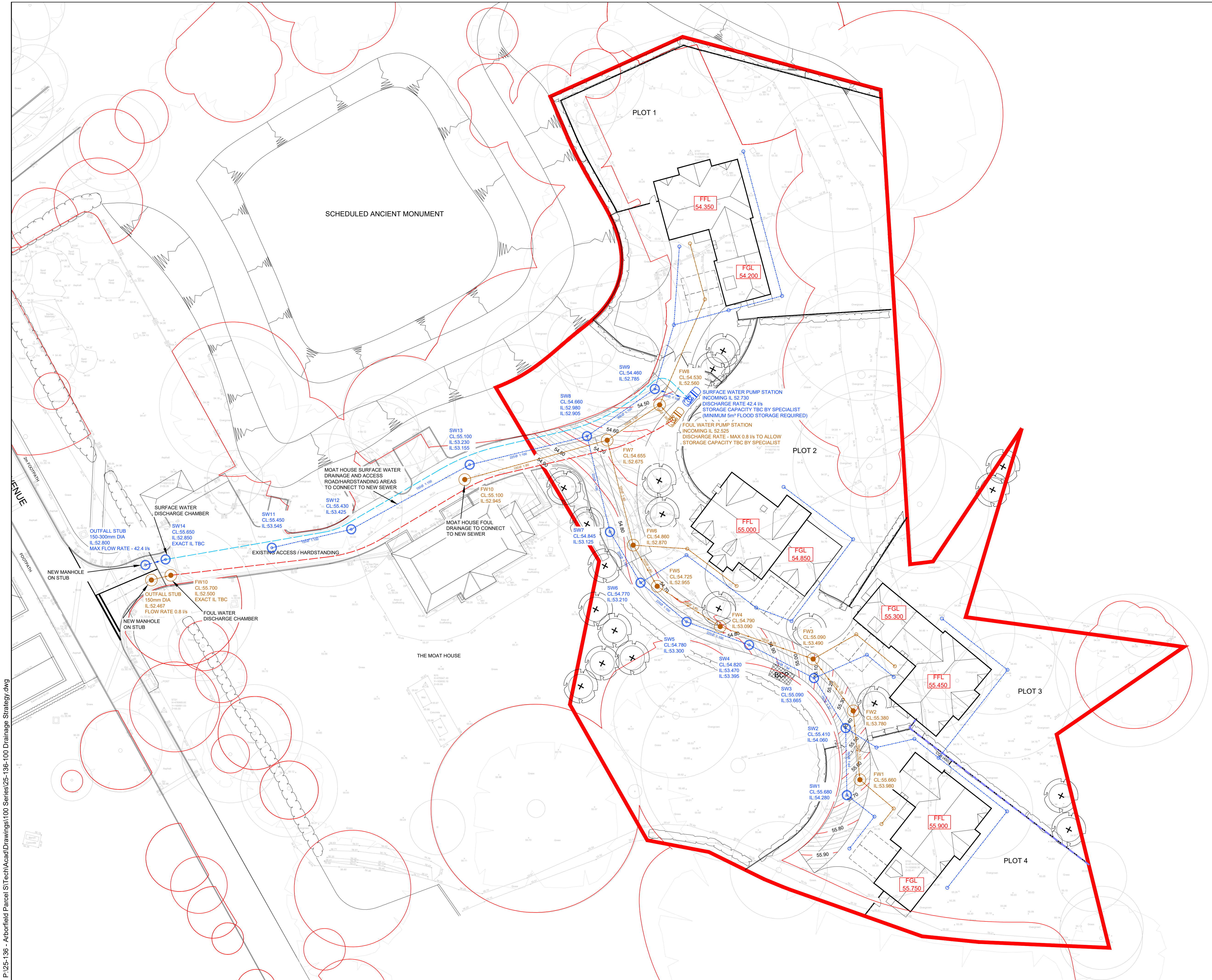
5.1.2 This technical note provides details of the proposed surface water and foul drainage systems proposed within the site, had has shown how the proposals accord with the overarching strategy set out by AECOM within the FRA, and the dedicate parcel flows rates as provided by Crest.

5.1.3 A maintenance and management schedule for the surface water design has been provided within this technical note.

5.1.4 This note has displayed how the proposals accord with the FRA, NPPF and Local Planning Policies with regards to surface water and foul water drainage.

APPENDIX A

Odyssey Drainage Strategy Drawing



NOTES

- DO NOT SCALE FROM THIS DRAWING. WORK TO FIGURED DIMENSIONS ONLY.
- ALL DIMENSIONS ON THIS DRAWING ARE IN METRES UNLESS NOTED OTHERWISE.
- THIS DRAWING IS A PRELIMINARY REVIEW ONLY AND SUBJECT TO DETAILED DESIGN.
- THIS DRAWING IS BASED UPON ASCOT DESIGN LAYOUT. DRAWING NUMBER 24-J4649-01-002.
- CONTOURS SHOWN ON THIS DRAWING ARE AT 25mm VERTICAL INTERVALS.
- THE LEVELS SHOWN ON THIS DRAWING ARE PRELIMINARY AND SUBJECT TO CHANGE. NOTE THERE COULD BE A VARIANCE OF +/- 300mm BETWEEN PRELIMINARY LEVELS AND DETAILED DESIGN LEVELS.

LEGEND

- PARCEL S BOUNDARY
- SURFACE WATER SEWER AND MANHOLE
- FOUL SEWER AND MANHOLE
- PROPOSED HIGHWAY CONTOUR. CONTOUR INTERVALS AT 25mm
- PRIVATE SURFACE WATER MANHOLE AND PIPE
- PRIVATE FOUL WATER MANHOLE AND PIPE
- ROOT PROTECTION ZONE
- DRAINAGE STUBS AS PER CREST DRAWINGS CNC-AG-S-002A AND CNC-AG-S-002B
- SURFACE WATER RISING MAIN
- FOUL WATER RISING MAIN

Rev	Amendments	Dim	Chk	App	Date

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Job Title

ARBORFIELD PARCEL S

Drawing Title

DRAINAGE STRATEGY

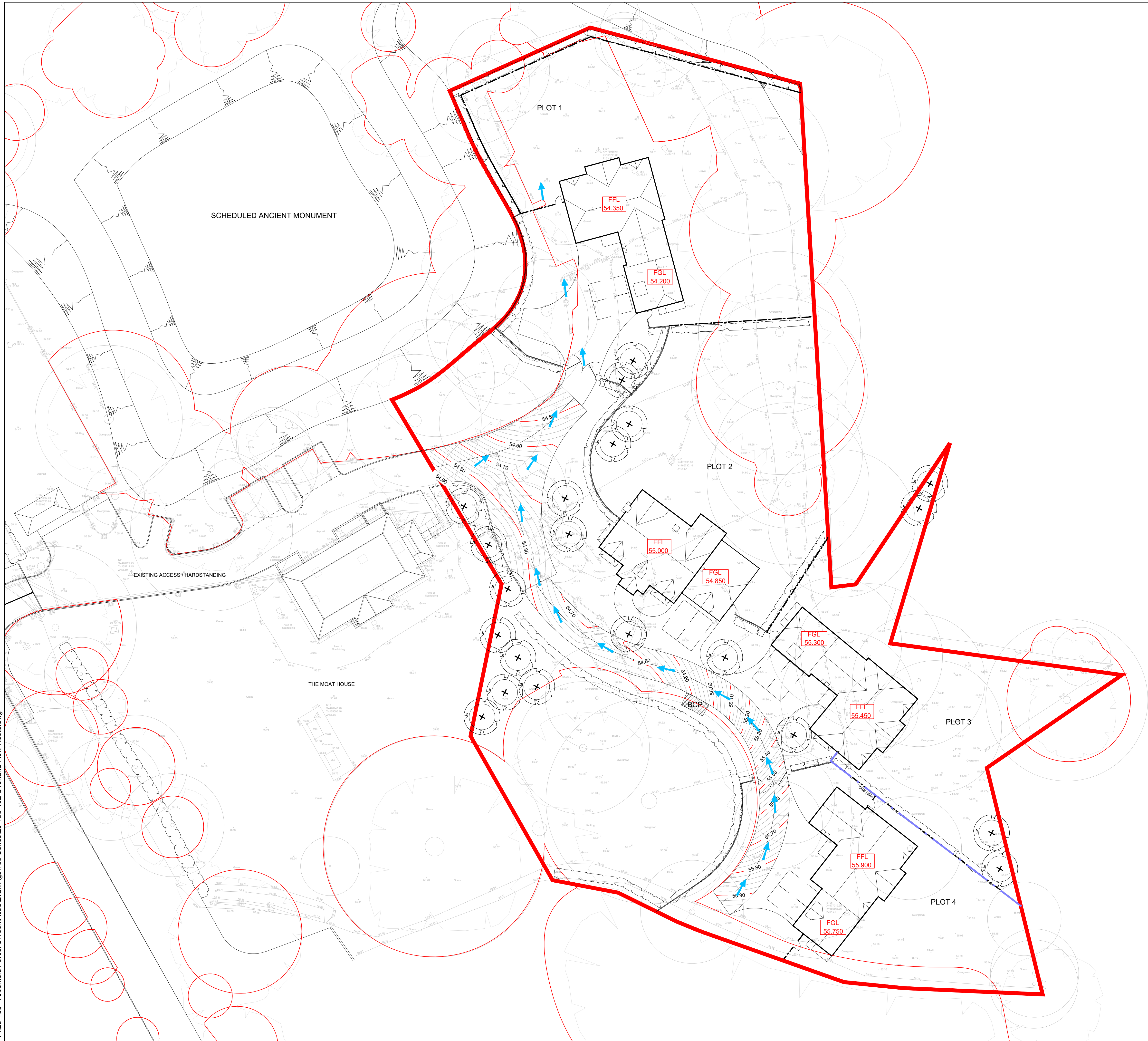
Client

HICKS DEVELOPMENT LTD

Scale	Date	Designed
1:250 @A1	JULY 25	TB
Drawn	Checked	Approved
TB	BJ	LH
Job No	Drawing No	Rev
25-136	25-136/100	

APPENDIX B

Odyssey Overland Flow Drawing



- NOTES
- DO NOT SCALE FROM THIS DRAWING. WORK TO FIGURED DIMENSIONS ONLY.
 - ALL DIMENSIONS ON THIS DRAWING ARE IN METRES UNLESS NOTED OTHERWISE.
 - THIS DRAWING IS A PRELIMINARY REVIEW ONLY AND SUBJECT TO DETAILED DESIGN.
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- LEGEND
- PARCEL S BOUNDARY
 - DENOTES OVERLAND FLOW ROUTE
 - PROPOSED FINISHED FLOOR LEVEL (mAOD)
 - PROPOSED HIGHWAY CONTOUR. CONTOUR INTERVALS AT 20mm

Rev	Amendments	Dim	Chk	App	Date

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Job Title ARBORFIELD PARCEL S		
Drawing Title OVERLAND FLOW ROUTE		
Client HICKS DEVELOPMENT LTD		
Scale 1:250 @A1	Date JULY 25	Designed TB
Drawn TB	Checked BJ	Approved LH
Job No 25-136	Drawing No 25-136/102	Rev

APPENDIX C

Odyssey MicroDrainage Calculations

Odyssey Markides LLP		Page 1
Tuscany House White Hart Lane Basingstoke RG21 4AF	ARBORFIELD PARCEL S	
Date 21/07/2025 17:02 File 25-136-D01.MDX	Designed by BJ Checked by LH	
Innovyze	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.300	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	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	0.205	4-8	0.035

Total Area Contributing (ha) = 0.240

Total Pipe Volume (m³) = 4.746

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)	Section Type	Auto Design
1.000	9.657	0.220	43.9	0.020	4.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	8.513	0.395	21.6	0.028	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	10.502	0.195	53.9	0.021	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	9.595	0.095	101.0	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	8.695	0.090	96.6	0.004	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	8.541	0.085	100.5	0.033	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	14.172	0.145	97.7	0.008	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	11.729	0.120	97.7	0.020	4.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	19.423	0.195	99.6	0.013	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	17.382	0.175	99.3	0.036	0.00	0.0	0.600	o	225	Pipe/Conduit	

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	4.11	54.280	0.020	0.0	0.0	0.0	1.52	26.9	2.7
1.001	50.00	4.17	54.060	0.048	0.0	0.0	0.0	2.18	38.5	6.5
1.002	50.00	4.30	53.665	0.069	0.0	0.0	0.0	1.37	24.3	9.3
1.003	50.00	4.42	53.395	0.074	0.0	0.0	0.0	1.30	51.7	10.0
1.004	50.00	4.53	53.300	0.078	0.0	0.0	0.0	1.33	52.9	10.6
1.005	50.00	4.64	53.210	0.111	0.0	0.0	0.0	1.30	51.9	15.0
1.006	50.00	4.82	53.125	0.119	0.0	0.0	0.0	1.32	52.6	16.1
2.000	50.00	4.19	53.545	0.020	0.0	0.0	0.0	1.02	18.0	2.7
2.001	50.00	4.51	53.425	0.033	0.0	0.0	0.0	1.01	17.8	4.5
2.002	50.00	4.73	53.155	0.069	0.0	0.0	0.0	1.31	52.2	9.3

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)	Section Type	Auto Design
1.007	11.904	0.120	99.2	0.013	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	5.191	0.055	94.4	0.039	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.009	2.252	0.025	90.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

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)
1.007	50.00	4.94	52.905	0.201	0.0	0.0	0.0	1.58	111.6	27.2
1.008	50.00	5.00	52.785	0.240	0.0	0.0	0.0	1.62	114.4	32.5
1.009	50.00	5.02	52.730	0.240	0.0	0.0	0.0	1.66	117.2	32.5

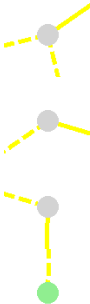


Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SW1	55.680	1.400	Open Manhole	1200	1.000	54.280	150				
SW2	55.410	1.350	Open Manhole	1200	1.001	54.060	150	1.000	54.060	150	
SW3	55.090	1.425	Open Manhole	1200	1.002	53.665	150	1.001	53.665	150	
SW4	54.820	1.425	Open Manhole	1200	1.003	53.395	225	1.002	53.470	150	
SW5	54.780	1.480	Open Manhole	1200	1.004	53.300	225	1.003	53.300	225	
SW6	54.770	1.560	Open Manhole	1200	1.005	53.210	225	1.004	53.210	225	
SW7	54.845	1.720	Open Manhole	1200	1.006	53.125	225	1.005	53.125	225	
SW11	55.450	1.905	Open Manhole	1200	2.000	53.545	150				
SW12	55.430	2.005	Open Manhole	1200	2.001	53.425	150	2.000	53.425	150	
SW13	55.100	1.945	Open Manhole	1200	2.002	53.155	225	2.001	53.230	150	
SW8	54.660	1.755	Open Manhole	1200	1.007	52.905	300	1.006	52.980	225	
								2.002	52.980	225	
SW9	54.460	1.675	Open Manhole	1200	1.008	52.785	300	1.007	52.785	300	
PUMP	54.600	1.870	Open Manhole	1200	1.009	52.730	300	1.008	52.730	300	
	54.600	1.895	Open Manhole	0		OUTFALL		1.009	52.705	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SW1	477008.169	165679.353	477008.169	165679.353	Required	
SW2	477007.985	165689.008	477007.985	165689.008	Required	
SW3	477003.437	165696.205	477003.437	165696.205	Required	
SW4	476994.090	165700.994	476994.090	165700.994	Required	
SW5	476985.088	165704.314	476985.088	165704.314	Required	
SW6	476978.461	165709.944	476978.461	165709.944	Required	
SW7	476974.057	165717.261	476974.057	165717.261	Required	
SW11	476925.379	165714.982	476925.379	165714.982	Required	
SW12	476936.803	165717.638	476936.803	165717.638	Required	
SW13	476953.856	165726.935	476953.856	165726.935	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SW8	476970.747	165731.041	476970.747	165731.041	Required	
SW9	476980.515	165737.844	476980.515	165737.844	Required	
PUMP	476985.491	165736.366	476985.491	165736.366	Required	
	476985.428	165734.116			No Entry	

Odyssey Markides LLP		Page 5
Tuscany House White Hart Lane Basingstoke RG21 4AF	ARBORFIELD PARCEL S	
Date 21/07/2025 17:02 File 25-136-D01.MDX	Designed by BJ Checked by LH	
Innovyze	Network 2020.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	SW1	55.680	54.280	1.250	Open Manhole	1200
1.001	o	150	SW2	55.410	54.060	1.200	Open Manhole	1200
1.002	o	150	SW3	55.090	53.665	1.275	Open Manhole	1200
1.003	o	225	SW4	54.820	53.395	1.200	Open Manhole	1200
1.004	o	225	SW5	54.780	53.300	1.255	Open Manhole	1200
1.005	o	225	SW6	54.770	53.210	1.335	Open Manhole	1200
1.006	o	225	SW7	54.845	53.125	1.495	Open Manhole	1200
2.000	o	150	SW11	55.450	53.545	1.755	Open Manhole	1200
2.001	o	150	SW12	55.430	53.425	1.855	Open Manhole	1200
2.002	o	225	SW13	55.100	53.155	1.720	Open Manhole	1200
1.007	o	300	SW8	54.660	52.905	1.455	Open Manhole	1200
1.008	o	300	SW9	54.460	52.785	1.375	Open Manhole	1200
1.009	o	300	PUMP	54.600	52.730	1.570	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	9.657	43.9	SW2	55.410	54.060	1.200	Open Manhole	1200
1.001	8.513	21.6	SW3	55.090	53.665	1.275	Open Manhole	1200
1.002	10.502	53.9	SW4	54.820	53.470	1.200	Open Manhole	1200
1.003	9.595	101.0	SW5	54.780	53.300	1.255	Open Manhole	1200
1.004	8.695	96.6	SW6	54.770	53.210	1.335	Open Manhole	1200
1.005	8.541	100.5	SW7	54.845	53.125	1.495	Open Manhole	1200
1.006	14.172	97.7	SW8	54.660	52.980	1.455	Open Manhole	1200
2.000	11.729	97.7	SW12	55.430	53.425	1.855	Open Manhole	1200
2.001	19.423	99.6	SW13	55.100	53.230	1.720	Open Manhole	1200
2.002	17.382	99.3	SW8	54.660	52.980	1.455	Open Manhole	1200
1.007	11.904	99.2	SW9	54.460	52.785	1.375	Open Manhole	1200
1.008	5.191	94.4	PUMP	54.600	52.730	1.570	Open Manhole	1200
1.009	2.252	90.1		54.600	52.705	1.595	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.020	0.020	0.020
1.001	-	-	100	0.028	0.028	0.028
1.002	-	-	100	0.021	0.021	0.021
1.003	-	-	100	0.005	0.005	0.005
1.004	-	-	100	0.004	0.004	0.004
1.005	-	-	100	0.033	0.033	0.033
1.006	-	-	100	0.008	0.008	0.008
2.000	-	-	100	0.020	0.020	0.020
2.001	-	-	100	0.013	0.013	0.013
2.002	-	-	100	0.036	0.036	0.036
1.007	-	-	100	0.013	0.013	0.013
1.008	-	-	100	0.039	0.039	0.039
1.009	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.240	0.240	0.240

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Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
1.000	SW1	150	1.200	1.250	Unclassified	1200	0	1.250	Unclassified
1.001	SW2	150	1.200	1.275	Unclassified	1200	0	1.200	Unclassified
1.002	SW3	150	1.200	1.275	Unclassified	1200	0	1.275	Unclassified
1.003	SW4	225	1.200	1.255	Unclassified	1200	0	1.200	Unclassified
1.004	SW5	225	1.255	1.335	Unclassified	1200	0	1.255	Unclassified
1.005	SW6	225	1.335	1.495	Unclassified	1200	0	1.335	Unclassified
1.006	SW7	225	1.455	1.495	Unclassified	1200	0	1.495	Unclassified
2.000	SW11	150	1.755	1.855	Unclassified	1200	0	1.755	Unclassified
2.001	SW12	150	1.720	1.855	Unclassified	1200	0	1.855	Unclassified
2.002	SW13	225	1.455	1.720	Unclassified	1200	0	1.720	Unclassified
1.007	SW8	300	1.375	1.455	Unclassified	1200	0	1.455	Unclassified
1.008	SW9	300	1.375	1.570	Unclassified	1200	0	1.375	Unclassified
1.009	PUMP	300	1.570	1.595	Unclassified	1200	0	1.570	Unclassified

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.009		54.600	52.705	0.000	0	0
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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 Coefficient	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 Offline Controls	0
Number of Online Controls	1	Number of Storage Structures	0
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0

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)	18.300	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: PUMP, DS/PN: 1.009, Volume (m³): 2.4

Unit Reference	MD-SHE-0249-4240-2800-4240
Design Head (m)	2.800
Design Flow (l/s)	42.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	249
Invert Level (m)	52.730
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.800	42.4	Kick-Flo®	1.698	33.3
Flush-Flo™	0.798	42.3	Mean Flow over Head Range	-	36.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.1	0.800	42.3	2.000	36.0	4.000	50.3	7.000	66.0
0.200	25.4	1.000	41.9	2.200	37.7	4.500	53.3	7.500	68.3
0.300	36.3	1.200	40.9	2.400	39.3	5.000	56.1	8.000	70.4
0.400	39.1	1.400	39.2	2.600	40.9	5.500	58.7	8.500	72.5
0.500	40.8	1.600	35.9	3.000	43.8	6.000	61.2	9.000	74.6
0.600	41.7	1.800	34.3	3.500	47.2	6.500	63.7	9.500	76.6

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

Simulation Criteria

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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.300 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 30

										Water	Surcharged
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)
1.000	SW1	15 Summer	1	+0%	100/15 Summer					54.314	-0.116
1.001	SW2	15 Winter	1	+0%	100/15 Summer					54.101	-0.109
1.002	SW3	15 Winter	1	+0%	30/15 Summer					53.728	-0.087
1.003	SW4	15 Winter	1	+0%	30/15 Summer					53.463	-0.157
1.004	SW5	15 Winter	1	+0%	30/15 Summer					53.370	-0.155
1.005	SW6	15 Winter	1	+0%	30/15 Summer					53.295	-0.140
1.006	SW7	15 Winter	1	+0%	30/15 Summer					53.207	-0.143
2.000	SW11	15 Summer	1	+0%	30/15 Winter					53.586	-0.109
2.001	SW12	15 Winter	1	+0%	30/15 Summer					53.475	-0.100
2.002	SW13	15 Winter	1	+0%	30/15 Summer					53.218	-0.162
1.007	SW8	15 Winter	1	+0%	30/15 Summer					53.009	-0.196
1.008	SW9	15 Winter	1	+0%	30/15 Summer	100/15 Summer				52.952	-0.133
1.009	PUMP	15 Winter	1	+0%	30/15 Summer					52.941	-0.089

		Flooded		Half Drain		Pipe			
PN	US/MH Name	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded		
1.000	SW1	0.000	0.11		2.7	OK			
1.001	SW2	0.000	0.17		5.7	OK			
1.002	SW3	0.000	0.37		8.0	OK			
1.003	SW4	0.000	0.20		8.5	OK			
1.004	SW5	0.000	0.21		9.0	OK			
1.005	SW6	0.000	0.30		12.5	OK			
1.006	SW7	0.000	0.29		13.3	OK			
2.000	SW11	0.000	0.17		2.7	OK			
2.001	SW12	0.000	0.24		4.1	OK			
2.002	SW13	0.000	0.17		7.9	OK			
1.007	SW8	0.000	0.26		22.6	OK			
1.008	SW9	0.000	0.42		26.0	OK	4		

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

PN	US/MH Name	Flooded		Half Drain		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)			
1.009	PUMP	0.000	0.44		26.0		OK	

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

Simulation Criteria

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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.300 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 30

										Water	Surcharged
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)
1.000	SW1	15 Winter	30	+0%	100/15 Summer					54.334	-0.096
1.001	SW2	15 Summer	30	+0%	100/15 Summer					54.133	-0.077
1.002	SW3	15 Winter	30	+0%	30/15 Summer					53.835	0.020
1.003	SW4	15 Winter	30	+0%	30/15 Summer					53.753	0.133
1.004	SW5	15 Winter	30	+0%	30/15 Summer					53.735	0.210
1.005	SW6	15 Winter	30	+0%	30/15 Summer					53.716	0.281
1.006	SW7	15 Winter	30	+0%	30/15 Summer					53.691	0.341
2.000	SW11	15 Winter	30	+0%	30/15 Winter					53.706	0.011
2.001	SW12	15 Winter	30	+0%	30/15 Summer					53.694	0.119
2.002	SW13	15 Winter	30	+0%	30/15 Summer					53.671	0.291
1.007	SW8	15 Winter	30	+0%	30/15 Summer					53.649	0.444
1.008	SW9	15 Winter	30	+0%	30/15 Summer	100/15 Summer				53.622	0.537
1.009	PUMP	15 Winter	30	+0%	30/15 Summer					53.604	0.574

		Flooded		Half Drain		Pipe			Level
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Exceeded	
1.000	SW1	0.000	0.28			6.7	OK		
1.001	SW2	0.000	0.48			16.0	OK		
1.002	SW3	0.000	1.02			22.3	SURCHARGED		
1.003	SW4	0.000	0.52			22.1	SURCHARGED		
1.004	SW5	0.000	0.52			22.1	SURCHARGED		
1.005	SW6	0.000	0.74			30.4	SURCHARGED		
1.006	SW7	0.000	0.62			28.6	SURCHARGED		
2.000	SW11	0.000	0.41			6.7	SURCHARGED		
2.001	SW12	0.000	0.63			10.5	SURCHARGED		
2.002	SW13	0.000	0.41			18.9	SURCHARGED		
1.007	SW8	0.000	0.43			37.0	SURCHARGED		
1.008	SW9	0.000	0.73			44.8	SURCHARGED	4	

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White Hart Lane	PARCEL S	
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

		Flooded		Half Drain		Pipe			Level
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Exceeded	
1.009	PUMP	0.000	0.71			42.3	SURCHARGED		

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

Simulation Criteria

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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.300 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 30

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
1.000	SW1	15 Winter	100	+30%	100/15 Summer				54.851	0.421
1.001	SW2	15 Winter	100	+30%	100/15 Summer				54.835	0.625
1.002	SW3	15 Winter	100	+30%	30/15 Summer				54.782	0.967
1.003	SW4	15 Winter	100	+30%	30/15 Summer				54.654	1.034
1.004	SW5	15 Winter	100	+30%	30/15 Summer				54.631	1.106
1.005	SW6	15 Winter	100	+30%	30/15 Summer				54.609	1.174
1.006	SW7	15 Winter	100	+30%	30/15 Summer				54.569	1.219
2.000	SW11	15 Winter	100	+30%	30/15 Winter				54.632	0.937
2.001	SW12	15 Winter	100	+30%	30/15 Summer				54.609	1.034
2.002	SW13	15 Winter	100	+30%	30/15 Summer				54.546	1.166
1.007	SW8	15 Winter	100	+30%	30/15 Summer				54.506	1.301
1.008	SW9	15 Winter	100	+30%	30/15 Summer	100/15 Summer			54.464	1.379
1.009	PUMP	15 Winter	100	+30%	30/15 Summer				54.500	1.470

PN	US/MH Name	Flooded		Half Drain		Pipe Flow (l/s)	Status	Level Exceeded
		Volume (m³)	Flow / Cap. (l/s)	Time (mins)	Flow (l/s)			
1.000	SW1	0.000	0.45		10.8	SURCHARGED		
1.001	SW2	0.000	0.62		20.9	SURCHARGED		
1.002	SW3	0.000	1.24		27.0	SURCHARGED		
1.003	SW4	0.000	0.57		24.5	FLOOD RISK		
1.004	SW5	0.000	0.48		20.3	FLOOD RISK		
1.005	SW6	0.000	0.70		28.7	FLOOD RISK		
1.006	SW7	0.000	0.65		29.8	FLOOD RISK		
2.000	SW11	0.000	0.54		8.9	SURCHARGED		
2.001	SW12	0.000	0.73		12.2	SURCHARGED		
2.002	SW13	0.000	0.43		19.9	SURCHARGED		
1.007	SW8	0.000	0.59		51.6	FLOOD RISK		
1.008	SW9	4.254	0.80		48.9	FLOOD		4

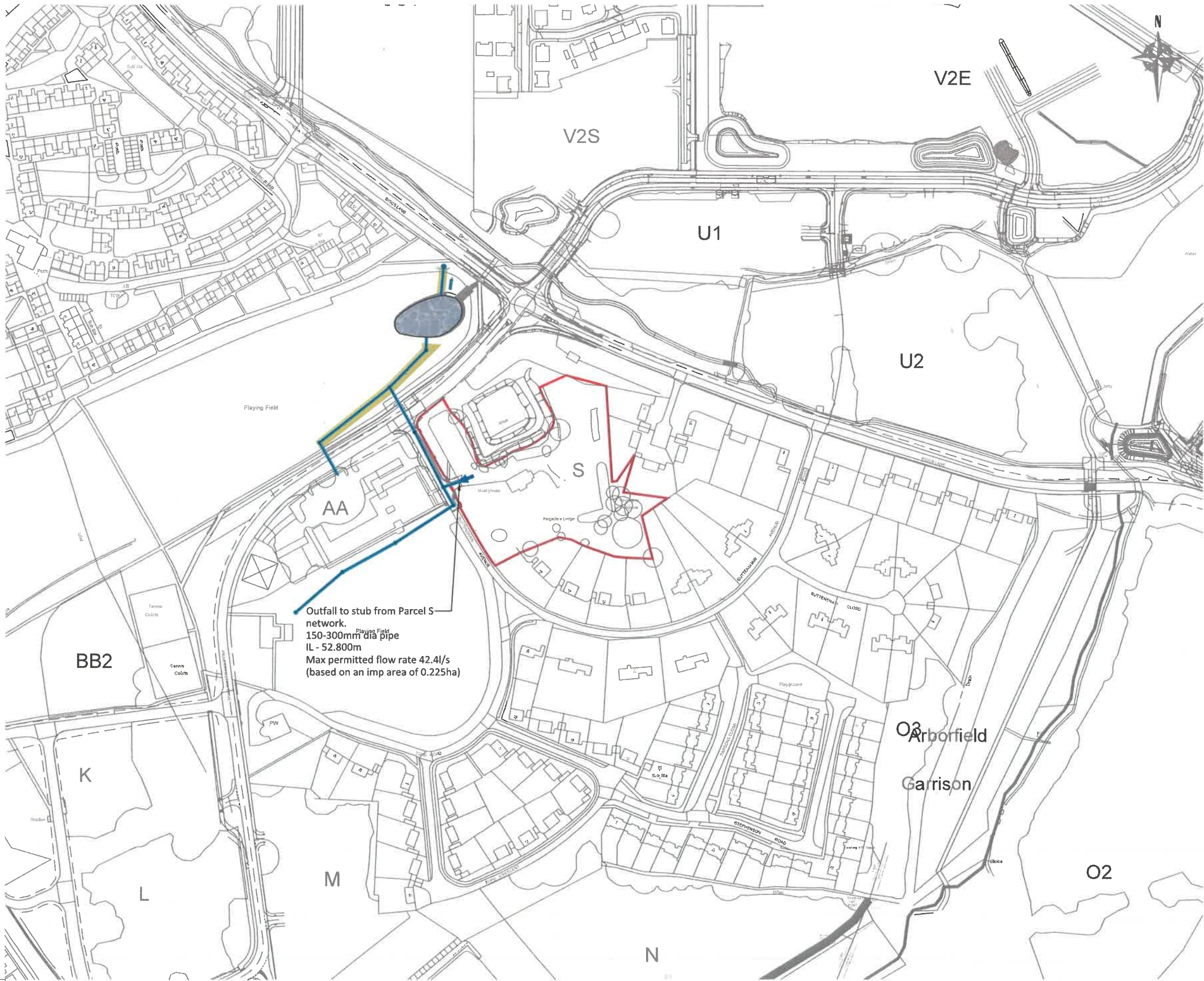
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Flooded				Half Drain Pipe			
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Level Exceeded
1.009	PUMP	0.000	0.71			42.3	FLOOD RISK

APPENDIX D

Crest Drainage Plans – CNC-AG-S-002a & CNC-AG-S-002b



LOCATION PLAN (N.T.S.)

KEY

- Red Line Boundary
- Surface Water Drainage
- Attenuation basin location
- Easement
- Surface Water Outfall

NOTE:
Indicative location of services,
subject to detailed design

Rev.	Description	Date	Initials
E	Amended red line boundary	22.11.24	CN
D	Amended red line & text	08.04.24	CN
C	Amended red line & added note	19.03.24	CN
B	Amended drainage to 60312043-CIV-S-012 P7	06.06.23	CN
A	Invert level amended to 60312043-CIV-S-005 P4	12.04.23	CN

Site:	Arborfield Parcel S
Dwg Title:	Plan 2b Surface Water Drainage Plan
Scale:	A3 1:2500
Date:	01.09.21
Drawn:	CN
Checked:	LJ
Drawing No:	CNC-AG-S-002b
Revision:	E

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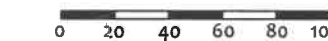


LOCATION PLAN (N.T.S.)

KEY

- Red Line Boundary
- Foul Water Drainage
- Foul Water Outfall
- Existing Thames Water FWS Trunk Sewer
- Easement

NOTE:
Indicative location of services,
subject to detailed design



D	Amended red line boundary	22.11.24	CN
C	Amended red line	08.04.24	CN
B	Amended red line and added note	19.03.24	CN
A	Amended drainage to 60310043-CHV-5-012 P7	06.06.23	CN

Rev.	Description	Date	Initial
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Site:

Arborfield

Parcel S

Orig Title:

Plan 2a

Foul Drainage Plan

Scale:	Date:	Drawn:	Checked:
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(A3) 1:3500 01.09.21 CN LJ

Drawing No: CNC-AG-S-002a Revisions: D

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