From: Richard Henderson <rhenderson@davidsonsgroup.co.uk>
Sent: 25 June 2025 17:16
To: Alex Jelley; Planning Folder New
Cc: Matthew Sanders; Aimee Cocking; Bailey Taberham
Subject: 24/00709/REM Desford - Response to LLFA
Attachments: Technical Note - Response to LLFA.pdf; 1089-ENG-0600 Surface Water Drainage Area Plan.pdf; 1089-ENG-1050 Contour Layout.pdf; Davidsons Desford Drainage Calculations.pdf; 1089-ENG-0950 Pond and Swale General Arrangement.pdf; E1089-ENG-0005A - Viability Levels and Drainage Strategy.pdf

Categories: Yasmin

Alex,

Please find attached the response to the latest LLFA comments. I would be grateful if you can undertake relevant further Consultation with the LLFA. Davidsons will also be sending them this information direct.

Kind Regards

Richard Henderson

Planning Manager

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DAVIDSONS HOMES

Drainage Technical Note-Response to LLFA

DESFORD

1089-TN-0001

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1.0 Introduction and Background

The proposed development at Desford is a residential development of 120 dwellings benefitting from outline planning permission (22/01227/OUT). A Flood Risk Assessment and Drainage Strategy was produced by ADC as part of the approved outline planning consent following significant correspondence with LLFA.

As part of the outline approval, the below condition has been secured:

Condition 9 - "*With or before the submission of Reserved Matters a surface water drainage scheme has been submitted to and approved in writing by the Local Planning Authority. The scheme shall include evidence to confirm or otherwise, the suitability of the site for the use of infiltration as a drainage element. The development must be carried out in accordance with these approved details and completed prior to first occupation.*"

Previous responses from LLFA and HBBC Drainage have been received between 8/10/24 and 14/5/25 raised no concerns, objections or comments and, whilst there has been a re-consultation since this date no notable change has been made to the site that impacts upon its drainage.

A subsequent response has been received from LLFA on 5/6/25 raising a number of points. It is noted that this is from a different reviewing officer and Davidsons' acknowledges that there is significant background and history with the site that may not have been fully available prior to the return of the officer's comments.

This Technical Note has been prepared to identify the relevant background and set out Davidsons' response to these comments. It is Davidsons view that the site has not been substantially altered since the previous LLFA comments of 14/5/25.

2.0 LLFA Response 05/06/25

Below is the response provided by the LLFA (identified by quotation marks and italics), broken down into sections as there are numerous points within to address separately.

2.1 Layout and Attenuation Capacity

"The proposed site layout has altered slightly from the previous consultation, and from the layout that was approved in 22/01227/OUT. The latest changes show a reduction in the capacity of the attenuation basin from 1413m3 to 1355m3. This change is mostly due to a reduction in the freeboard of the pond from 595mm to 300mm, which is still compliant with freeboard requirements."

As noted, this is compliant with requirements.

2.2 Runoff Rate Calculations/Catchment Area

"The catchment area used to derive the greenfield runoff rate is 5.35ha as summarised above, however, much of the perimeter of the site remains undeveloped and the LLFA questions the suitability and appropriateness of including undeveloped areas when calculating a representative greenfield runoff rate. Section 24.2.2 of The SuDS Manual (CIRIA C753) states:

'The runoff area used… should be consistent; for example, if the whole site area is used in the greenfield runoff rate calculations, the whole site should also be represented in the runoff calculations for the proposed development.'

To compound the LLFA's concerns, it is stated on the drainage strategy drawing that the total contributing area to the attenuation volume is 2.491ha, with the hydraulic calculations only accounting for an impermeable area of 1.572ha. The LLFA is concerned that the methodology used to derive the greenfield runoff rate has not been reviewed as part of the detailed design process and as submitted the proposals will result in an increase in flood risk elsewhere, particularly to the immediate downstream community of Desford.

The site is proposed to discharge at 23.5l/s. This is the rate stipulated within the Flood Risk Assessment and below the rate stipulated as a maximum flow rate by STW as part of the original outline application (5l/s/ha).

The proposed discharge rate is consistent with the rate shown within the drainage strategy that was included within the flood risk assessment and the layout, whilst updated as part of this reserved matters application to reflect the detailed design, retains the principles of the undeveloped perimeter and development extents. As the proposed scheme does not vary in these principles from that within the Flood Risk Assessment it is considered that the proposed discharge rate remains unchanged from that approved.

The previous responses from LLFA and HBBC Drainage did not raise any concerns over the discharge rate from the site.

2.3 Infiltration Methodology and Potential

"The submitted infiltration testing suggests some parts of the site may be suitable for infiltration drainage techniques. However, as stated within the report the methodology did not fully accord with the requirements of BRE365 as only a single soakage test was undertaken for each trial pit

and results extrapolated. The applicant should ensure that further testing is undertaken to determine the areas of the site which are suitable for infiltration testing. The British Geological Survey suggests superficial glaciofluvial deposits, Mid Pleistocene - sand and gravel, supporting the initial infiltration test results that disposal of surface water to ground may be suitable in parts of the site.

Linking to the above concerns about the greenfield runoff rate calculations, the presence of sands and gravels is likely to reduce the pre-development greenfield runoff rate. The rate of 4.4l/s/ha is used for clay soils only. The applicant should ensure all opportunities to infiltrate are explored to reduce the attenuation storage volumes which may be otherwise required."

A detailed Phase 2 Ground Investigation, incorporating infiltration testing, has been undertaken on the site. This has assessed the suitability of the ground for soakaways and found that rates could not be obtained. Insufficient infiltration occurred to undertake additional tests and the BGS data is clearly superseded by the onsite observations, which encountered clays and fines within any sand and gravel deposits. This ground investigation has been submitted as part of the submission documents along with the infiltration testing results.

No concerns about the means of discharge have been raised in previous correspondence and the means of outfall were discussed at length as part of the outline permission.

Infiltration is therefore considered not to be a suitable means of discharge on this site.

2.4 Supporting Drainage Design Details

"Once the above strategic level drainage concern has been addressed, the following supporting information should be provided:

A catchment area plan to support a revised set of hydraulic calculations

Flood flow routing plan

Private drainage details

Cross-sectional details of the proposed attenuation basin and flow control chamber (site specific details, as opposed to typical details)"

Please see attached catchment plan, flood flow routing plan demonstrating overland flows and cross sections of the proposed attenuation basin. The flow control chamber will be offered for adoption as part of a separate S104 process as is standard practice and we do not consider the detailing of this to be within the planning process. Private drainage is to be produced and installed in accordance with the relevant Building Regulations and is also considered to be outside of the scope of planning.

3.0 Conclusion

As discussed above, the site remains compliant with the Flood Risk Assessment as submitted within the approved outline planning consent for the development, which underpins and informs the detailed design of the site. Appropriate infiltration testing has been undertaken and provided to demonstrate that soakaways are not a suitable means of outfall and additional details are provided as appropriate to support the design proposals.

General Notes

1. Drawing is not to be reproduced or printed at any scale or paper size other than the original scale.
2. All dimensions in meters unless otherwise stated.
3. Drawing to be read in conjunction with all other relevant Engineers, Architects and Specialist design drawings and details.
4. Any discrepancies are to be highlighted to the engineer immediately.

Pipe No.	Total IMP Area
1.000	1156.262
1.001	686.445
1.002	192.386
1.003	672.898
1.004	772.257
1.005	373.085
1.006	0.000
1.007	0.000
1.008	0.000
1.009	1338.651
1.010	0.000
1.011	1652.447
1.012	0.000
1.013	0.000
1.014	442.489
1.015	0.000
1.016	0.000
1.017	0.000
2.000	778.677
2.001	1478.761
2.002	241.294
2.003	0.000
2.004	715.557
2.005	0.000
3.000	1478.648
3.001	2380.892
3.002	311.945
4.000	1213.444
4.001	768.679
4.002	785.952
4.003	962.671
5.000	607.161
6.000	810.192
6.001	1470.298
6.002	679.076
	21970.166

Revision	Description	Date	Drawn	Check

Status: Planning

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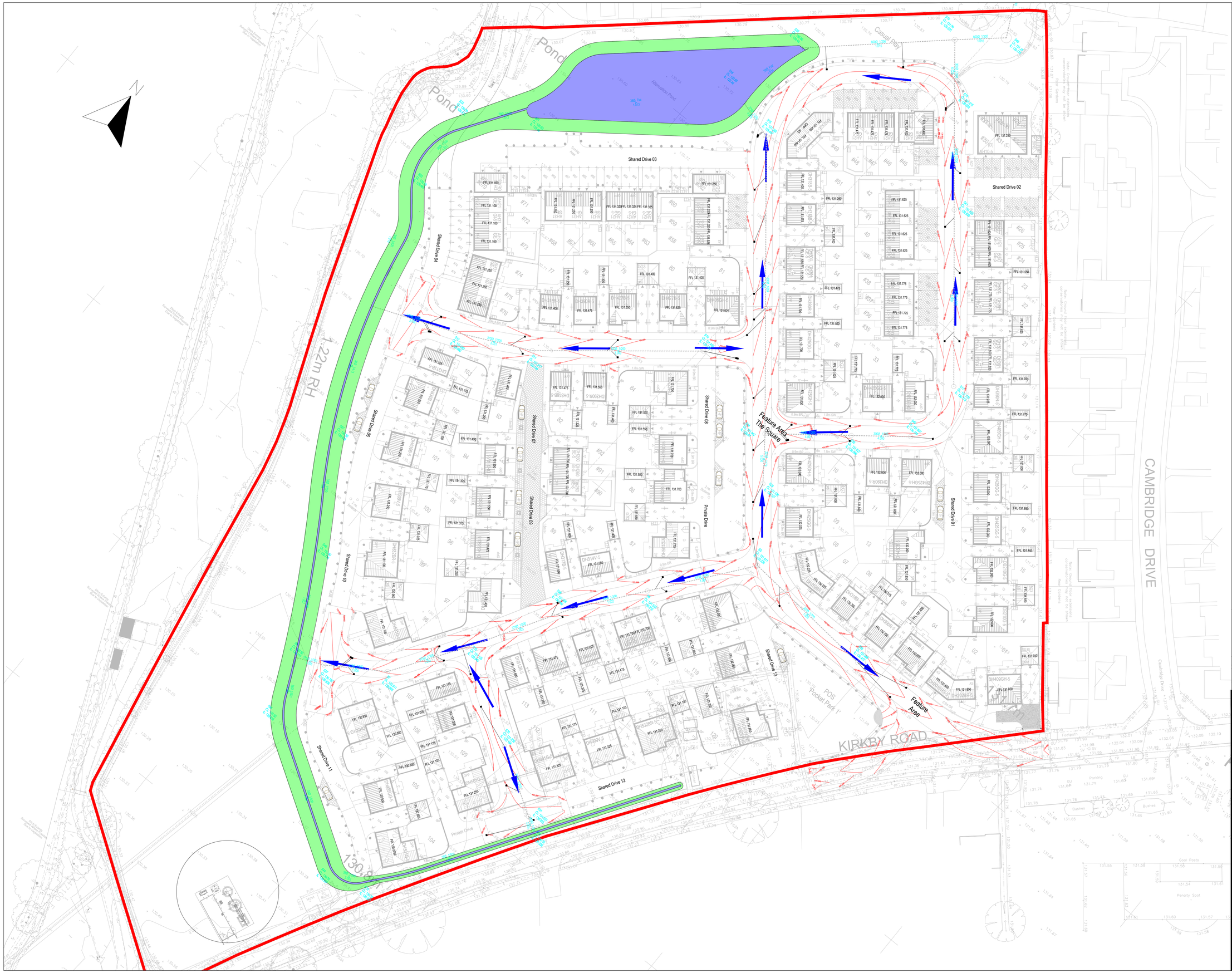
Project: DESFORD

Title: Surface Water Drainage Area Plan

Drawn:	Checked:	Date:
DP	BT	June 2025
Scale: 1:500	Rev: -	Paper Size: A1

DWG No: 1089-ENG-0600



General Notes

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2. All dimensions in meters unless otherwise stated.
3. Drawing to be read in conjunction with all other relevant Engineers, Architects and Specialist design drawings and details.
4. Any discrepancies are to be highlighted to the engineer immediately.

Overland Flow Route Notes

1. Flow routes are required to facilitate the potential flow in events exceeding the 1:100+40%CC event as required by the Design and Construction Guidance (DCG) and NPPF.
2. Flow routes also provide additional resilience to failure events.
3. The routes illustrated on this drawing shall be kept clear of permanent physical obstructions which may impede surface water flows.
4. House levels, external works levels and driveway/garden levels shall be designed to minimise the risk to properties adjacent to flow routes.

Overland Flow Route

Revision	Description	Date	Drawn	Check

Planning

Status

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Project:

DESFORD

Title:

Contour Layout

Drawn:	Checked:	Date:
DP	BT	June 2025
Scale: 1:500	Rev: -	Paper Size: A1

DWG No:

1089-ENG-1050

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	20.300	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

Network Design Table for Surface Network 1

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	40.910	0.136	300.8	0.116	5.00	0.0	0.600		o	300	Pipe/Conduit	🔒
1.001	33.144	0.110	301.3	0.069	0.00	0.0	0.600		o	300	Pipe/Conduit	🔒
1.002	22.420	0.075	298.9	0.019	0.00	0.0	0.600		o	300	Pipe/Conduit	🔒
1.003	33.214	0.111	299.2	0.067	0.00	0.0	0.600		o	375	Pipe/Conduit	🔒
1.004	24.245	0.081	299.3	0.077	0.00	0.0	0.600		o	375	Pipe/Conduit	🔒
1.005	18.728	0.062	302.1	0.037	0.00	0.0	0.600		o	375	Pipe/Conduit	🔒
1.006	8.695	0.029	300.0	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	🔒
2.000	21.728	0.109	200.0	0.078	5.00	0.0	0.600		o	300	Pipe/Conduit	🔒
2.001	5.121	0.026	200.0	0.148	0.00	0.0	0.600		o	300	Pipe/Conduit	🔒
2.002	51.046	0.102	500.5	0.024	0.00	0.0		0.045	\/	38	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	5.76	130.457	0.116	0.0	0.0	0.0	0.90	63.7	15.7
1.001	49.66	6.37	130.320	0.185	0.0	0.0	0.0	0.90	63.7	24.9
1.002	48.16	6.78	130.210	0.204	0.0	0.0	0.0	0.90	63.9	26.6
1.003	46.38	7.31	130.060	0.271	0.0	0.0	0.0	1.04	115.1	34.0
1.004	45.17	7.70	129.949	0.348	0.0	0.0	0.0	1.04	115.1	42.6
1.005	44.28	8.00	129.868	0.385	0.0	0.0	0.0	1.04	114.6	46.2
1.006	43.88	8.14	129.806	0.385	0.0	0.0	0.0	1.04	115.0	46.2
2.000	50.00	5.33	130.164	0.078	0.0	0.0	0.0	1.11	78.3	10.5
2.001	50.00	5.40	130.055	0.226	0.0	0.0	0.0	1.11	78.3	30.6
2.002	47.45	6.99	130.030	0.250	0.0	0.0	0.0	0.54	822.7	32.1

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
2.003	10.184	0.020	509.2	0.000	0.00	0.0		0.045	\/	38	Pipe/Conduit	
2.004	45.314	0.091	498.0	0.072	0.00	0.0		0.045	\/	38	Pipe/Conduit	
2.005	19.734	0.039	506.0	0.000	0.00	0.0		0.045	\/	38	Pipe/Conduit	
1.007	33.696	0.067	502.9	0.000	0.00	0.0		0.045	\/	38	Pipe/Conduit	
1.008	35.113	0.070	501.6	0.000	0.00	0.0		0.045	\/	38	Pipe/Conduit	
1.009	36.856	0.089	414.1	0.134	0.00	0.0		0.045	\/	38	Pipe/Conduit	
3.000	50.171	0.251	200.0	0.148	5.00	0.0	0.600		o	300	Pipe/Conduit	
3.001	23.204	0.116	200.0	0.238	0.00	0.0	0.600		o	375	Pipe/Conduit	
3.002	25.927	0.130	200.0	0.031	0.00	0.0	0.600		o	375	Pipe/Conduit	
1.010	40.434	0.065	622.1	0.000	0.00	0.0		0.045	\/	38	Pipe/Conduit	
1.011	24.705	0.049	504.2	0.165	0.00	0.0		0.045	\/	38	Pipe/Conduit	
1.012	17.674	0.035	505.0	0.001	0.00	0.0		0.045	\/	38	Pipe/Conduit	
1.013	59.395	0.000	0.0	0.000	0.00	0.0		0.045	\/	38	Pipe/Conduit	
4.000	17.448	0.087	200.0	0.121	5.00	0.0	0.600		o	300	Pipe/Conduit	
4.001	25.278	0.126	200.0	0.077	0.00	0.0	0.600		o	300	Pipe/Conduit	
5.000	14.694	0.082	179.2	0.061	5.00	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)
2.003	46.39	7.31	129.927	0.250	0.0	0.0	0.0	0.53	815.6	32.1
2.004	42.34	8.72	129.907	0.321	0.0	0.0	0.0	0.54	824.8	36.9
2.005	40.89	9.33	129.816	0.321	0.0	0.0	0.0	0.53	818.2	36.9
1.007	38.66	10.38	129.777	0.706	0.0	0.0	0.0	0.53	820.7	74.0
1.008	36.63	11.48	129.710	0.706	0.0	0.0	0.0	0.54	821.8	74.0
1.009	34.91	12.52	129.639	0.840	0.0	0.0	0.0	0.59	904.4	79.4
3.000	50.00	5.75	130.122	0.148	0.0	0.0	0.0	1.11	78.3	20.0
3.001	50.00	6.06	129.796	0.386	0.0	0.0	0.0	1.28	141.1	52.2
3.002	49.57	6.40	129.680	0.417	0.0	0.0	0.0	1.28	141.1	56.0
1.010	32.87	13.92	129.550	1.257	0.0	0.0	0.0	0.48	737.9	111.9
1.011	31.86	14.69	129.485	1.422	0.0	0.0	0.0	0.53	819.7	122.7
1.012	31.18	15.24	129.435	1.423	0.0	0.0	0.0	0.53	819.0	122.7
1.013	23.97	23.46	129.400	1.423	0.0	0.0	0.0	0.12	185.0	122.7
4.000	50.00	5.26	130.184	0.121	0.0	0.0	0.0	1.11	78.3	16.4
4.001	50.00	5.64	130.096	0.198	0.0	0.0	0.0	1.11	78.3	26.8
5.000	50.00	5.25	130.127	0.061	0.0	0.0	0.0	0.97	38.7	8.2

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
4.002	87.215	0.428	204.0	0.079	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.003	15.495	0.067	229.6	0.096	0.00	0.0	0.600		o	375	Pipe/Conduit	
1.014	23.159	0.000	0.0	0.044	0.00	0.0		0.045	\/	38	Pipe/Conduit	
1.015	44.782	0.175	256.5	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	
6.000	51.812	0.259	200.0	0.081	5.00	0.0	0.600		o	225	Pipe/Conduit	
6.001	31.790	0.159	200.0	0.147	0.00	0.0	0.600		o	300	Pipe/Conduit	
6.002	18.066	0.090	200.0	0.068	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.016	15.116	0.050	300.0	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.017	24.000	0.100	240.0	0.000	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)
4.002	47.53	6.97	129.970	0.338	0.0	0.0	0.0	1.10	77.5	43.4
4.003	46.80	7.18	129.467	0.434	0.0	0.0	0.0	1.19	131.6	55.0
1.014	22.14	26.66	129.400	1.901	0.0	0.0	0.0	0.12	185.0	122.7
1.015	21.89	27.15	129.400	1.901	0.0	0.0	0.0	1.52	428.6	122.7
6.000	50.00	5.94	130.173	0.081	0.0	0.0	0.0	0.92	36.6	11.0
6.001	49.49	6.42	129.839	0.228	0.0	0.0	0.0	1.11	78.3	30.6
6.002	48.50	6.69	129.680	0.296	0.0	0.0	0.0	1.11	78.3	38.9
1.016	21.80	27.33	129.225	2.197	0.0	0.0	0.0	1.40	396.0	129.7
1.017	21.56	27.81	129.175	2.197	0.0	0.0	0.0	0.84	33.4«	129.7

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.017	S49	131.000	129.075	0.000	1200	0

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Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
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	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.300	Storm Duration (mins)	30
Ratio R	0.400		

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Storage Structures for Surface Network 1

Tank or Pond Manhole: S19, DS/PN: 1.016

Invert Level (m) 129.225

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1243.4	0.400	1466.8	0.800	1700.5	1.200	1943.5
0.100	1297.5	0.500	1524.4	0.900	1760.4		
0.200	1353.4	0.600	1582.5	1.000	1820.8		
0.300	1409.8	0.700	1641.2	1.100	1881.9		

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.300 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S38	15 Winter	1	+0%	100/15 Summer				130.565
1.001	S5	15 Winter	1	+0%	100/15 Summer				130.453
1.002	S6	15 Winter	1	+0%	30/15 Winter				130.350
1.003	S36	15 Winter	1	+0%	30/15 Winter				130.203
1.004	S35	15 Winter	1	+0%	30/15 Summer				130.121
1.005	S7	30 Winter	1	+0%	30/15 Summer				130.075
1.006	S27	30 Winter	1	+0%	30/15 Winter				130.049
2.000	S30	15 Winter	1	+0%	30/15 Summer				130.257
2.001	S31	15 Winter	1	+0%	30/15 Summer				130.225
2.002	S32	15 Winter	1	+0%					130.212
2.003	S33	15 Winter	1	+0%					130.116
2.004	S44	15 Winter	1	+0%					130.104
2.005	S45	30 Winter	1	+0%					130.049
1.007	S9	30 Winter	1	+0%					130.036
1.008	S46	30 Winter	1	+0%					129.975
1.009	S47	30 Winter	1	+0%					129.916
3.000	S10	15 Winter	1	+0%	100/15 Summer				130.231
3.001	S11	15 Winter	1	+0%	30/15 Summer				129.961
3.002	S12	30 Winter	1	+0%	30/15 Summer				129.900
1.010	S13	30 Winter	1	+0%					129.870
1.011	S23	30 Winter	1	+0%					129.805

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S38	-0.192	0.000	0.27			15.9	OK	
1.001	S5	-0.167	0.000	0.40			23.3	OK	
1.002	S6	-0.160	0.000	0.44			24.9	OK	
1.003	S36	-0.232	0.000	0.30			31.3	OK	
1.004	S35	-0.203	0.000	0.38			37.3	OK	
1.005	S7	-0.168	0.000	0.37			35.2	OK	
1.006	S27	-0.132	0.000	0.41			33.8	OK	
2.000	S30	-0.207	0.000	0.16			10.7	OK	
2.001	S31	-0.130	0.000	0.53			27.8	OK	
2.002	S32	-0.612	0.000	0.04			29.1	OK	
2.003	S33	-0.605	0.000	0.04			22.9	OK	
2.004	S44	-0.597	0.000	0.03			27.4	OK	
2.005	S45	-0.561	0.000	0.03			23.0	OK	
1.007	S9	-0.535	0.000	0.06			50.5	OK	
1.008	S46	-0.529	0.000	0.06			48.9	OK	
1.009	S47	-0.517	0.000	0.06			52.6	OK	
3.000	S10	-0.191	0.000	0.27			20.3	OK	
3.001	S11	-0.209	0.000	0.40			48.4	OK	
3.002	S12	-0.155	0.000	0.34			42.0	OK	
1.010	S13	-0.474	0.000	0.09			67.8	OK	
1.011	S23	-0.474	0.000	0.09			71.8	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.012	S22	30 Winter	1	+0%				
1.013	S21	30 Winter	1	+0%				
4.000	S40	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
4.001	S39	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
5.000	S29	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
4.002	S14	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
4.003	S15	30 Winter	1	+0%	30/15 Winter			
1.014	S16	60 Winter	1	+0%				
1.015	S20	60 Winter	1	+0%	100/120 Winter			
6.000	S17	15 Winter	1	+0%	100/15 Summer			
6.001	S41	15 Winter	1	+0%	30/15 Summer			
6.002	S18	15 Winter	1	+0%	30/15 Summer			
1.016	S19	360 Winter	1	+0%	100/60 Winter			
1.017	S48	360 Winter	1	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.012	S22	129.766	-0.463	0.000	0.11			71.7	OK	
1.013	S21	129.742	-0.452	0.000	0.13			71.4	OK	
4.000	S40	130.287	-0.197	0.000	0.25			17.0	OK	4
4.001	S39	130.224	-0.172	0.000	0.37			26.1	OK	4
5.000	S29	130.204	-0.148	0.000	0.25			8.5	OK	4
4.002	S14	130.134	-0.136	0.000	0.54			40.8	OK	4
4.003	S15	129.683	-0.159	0.000	0.41			43.2	OK	
1.014	S16	129.662	-0.532	0.000	0.24			87.5	OK	
1.015	S20	129.585	-0.415	0.000	0.21			87.4	OK*	
6.000	S17	130.262	-0.136	0.000	0.31			11.0	OK	
6.001	S41	129.971	-0.168	0.000	0.39			28.1	OK	
6.002	S18	129.837	-0.144	0.000	0.53			35.8	OK	
1.016	S19	129.436	-0.389	0.000	0.05			14.1	OK	
1.017	S48	129.282	-0.118	0.000	0.46			14.1	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.300 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S38	15 Winter	30	+0%	100/15 Summer				130.652
1.001	S5	15 Winter	30	+0%	100/15 Summer				130.598
1.002	S6	30 Winter	30	+0%	30/15 Winter				130.523
1.003	S36	30 Winter	30	+0%	30/15 Winter				130.448
1.004	S35	30 Winter	30	+0%	30/15 Summer				130.361
1.005	S7	30 Winter	30	+0%	30/15 Summer				130.277
1.006	S27	30 Winter	30	+0%	30/15 Winter				130.196
2.000	S30	15 Winter	30	+0%	30/15 Summer				130.532
2.001	S31	15 Winter	30	+0%	30/15 Summer				130.441
2.002	S32	15 Winter	30	+0%					130.338
2.003	S33	15 Winter	30	+0%					130.242
2.004	S44	15 Winter	30	+0%					130.230
2.005	S45	30 Winter	30	+0%					130.187
1.007	S9	30 Winter	30	+0%					130.175
1.008	S46	30 Winter	30	+0%					130.121
1.009	S47	30 Winter	30	+0%					130.070
3.000	S10	15 Winter	30	+0%	100/15 Summer				130.331
3.001	S11	30 Winter	30	+0%	30/15 Summer				130.234
3.002	S12	30 Winter	30	+0%	30/15 Summer				130.133
1.010	S13	30 Winter	30	+0%					130.029
1.011	S23	30 Winter	30	+0%					129.963

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S38	-0.105	0.000	0.65			38.8	OK	
1.001	S5	-0.022	0.000	0.97			56.8	OK	
1.002	S6	0.013	0.000	0.92			51.9	SURCHARGED	
1.003	S36	0.013	0.000	0.61			62.4	SURCHARGED	
1.004	S35	0.037	0.000	0.76			75.3	SURCHARGED	
1.005	S7	0.034	0.000	0.83			78.7	SURCHARGED	
1.006	S27	0.015	0.000	0.92			74.9	SURCHARGED	
2.000	S30	0.068	0.000	0.39			26.7	SURCHARGED	
2.001	S31	0.086	0.000	1.52			79.3	SURCHARGED	
2.002	S32	-0.486	0.000	0.10			81.6	OK	
2.003	S33	-0.479	0.000	0.12			64.1	FLOOD RISK	
2.004	S44	-0.471	0.000	0.09			73.9	FLOOD RISK	
2.005	S45	-0.423	0.000	0.09			57.5	OK	
1.007	S9	-0.396	0.000	0.14			118.1	OK	
1.008	S46	-0.383	0.000	0.15			114.1	OK	
1.009	S47	-0.363	0.000	0.14			123.5	OK	
3.000	S10	-0.090	0.000	0.67			49.3	OK	
3.001	S11	0.064	0.000	0.78			94.5	SURCHARGED	
3.002	S12	0.078	0.000	0.80			98.2	SURCHARGED	
1.010	S13	-0.315	0.000	0.23			166.6	OK	
1.011	S23	-0.316	0.000	0.23			177.0	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.012	S22	30 Winter	30	+0%				
1.013	S21	30 Winter	30	+0%				
4.000	S40	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
4.001	S39	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
5.000	S29	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
4.002	S14	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
4.003	S15	30 Winter	30	+0%	30/15 Winter			
1.014	S16	30 Winter	30	+0%				
1.015	S20	30 Winter	30	+0%	100/120 Winter			
6.000	S17	15 Winter	30	+0%	100/15 Summer			
6.001	S41	15 Winter	30	+0%	30/15 Summer			
6.002	S18	15 Winter	30	+0%	30/15 Summer			
1.016	S19	240 Winter	30	+0%	100/60 Winter			
1.017	S48	360 Winter	30	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.012	S22	129.922	-0.307	0.000	0.28			175.5	OK
1.013	S21	129.894	-0.300	0.000	0.31			175.0	OK
4.000	S40	130.826	0.343	0.000	0.57			38.0	SURCHARGED
4.001	S39	130.740	0.343	0.000	0.86			60.0	SURCHARGED
5.000	S29	130.692	0.340	0.000	0.56			19.1	SURCHARGED
4.002	S14	130.644	0.374	0.000	1.27			95.1	SURCHARGED
4.003	S15	129.893	0.050	0.000	0.91			96.8	SURCHARGED
1.014	S16	129.805	-0.389	0.000	0.63			230.1	OK
1.015	S20	129.717	-0.283	0.000	0.55			229.0	OK*
6.000	S17	130.373	-0.025	0.000	0.75			26.4	OK
6.001	S41	130.220	0.080	0.000	1.01			72.4	SURCHARGED
6.002	S18	130.052	0.072	0.000	1.38			93.0	SURCHARGED
1.016	S19	129.661	-0.164	0.000	0.08			23.4	OK
1.017	S48	129.322	-0.078	0.000	0.76			23.4	OK

PN	US/MH Name	Level Exceeded
1.012	S22	
1.013	S21	
4.000	S40	4
4.001	S39	4
5.000	S29	4
4.002	S14	4
4.003	S15	
1.014	S16	

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

PN	US/MH Name	Level Exceeded
1.015	S20	
6.000	S17	
6.001	S41	
6.002	S18	
1.016	S19	
1.017	S48	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.300 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S38	15 Winter	100	+40%	100/15 Summer				131.807
1.001	S5	15 Winter	100	+40%	100/15 Summer				131.651
1.002	S6	15 Winter	100	+40%	30/15 Winter				131.343
1.003	S36	15 Winter	100	+40%	30/15 Winter				131.096
1.004	S35	15 Winter	100	+40%	30/15 Summer				130.908
1.005	S7	15 Winter	100	+40%	30/15 Summer				130.691
1.006	S27	15 Winter	100	+40%	30/15 Winter				130.476
2.000	S30	15 Winter	100	+40%	30/15 Summer				130.883
2.001	S31	15 Winter	100	+40%	30/15 Summer				130.790
2.002	S32	15 Winter	100	+40%					130.446
2.003	S33	30 Winter	100	+40%					130.367
2.004	S44	30 Winter	100	+40%					130.362
2.005	S45	30 Winter	100	+40%					130.334
1.007	S9	30 Winter	100	+40%					130.325
1.008	S46	30 Winter	100	+40%					130.276
1.009	S47	30 Winter	100	+40%					130.230
3.000	S10	15 Winter	100	+40%	100/15 Summer				131.413
3.001	S11	15 Winter	100	+40%	30/15 Summer				131.053
3.002	S12	15 Winter	100	+40%	30/15 Summer				130.608
1.010	S13	30 Winter	100	+40%					130.192
1.011	S23	30 Winter	100	+40%					130.128

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S38	1.050	0.000	1.05			62.3	FLOOD RISK	
1.001	S5	1.031	0.000	1.63			94.9	FLOOD RISK	
1.002	S6	0.833	0.000	1.82			102.5	FLOOD RISK	
1.003	S36	0.661	0.000	1.27			130.6	FLOOD RISK	
1.004	S35	0.584	0.000	1.65			164.0	FLOOD RISK	
1.005	S7	0.448	0.000	1.88			179.1	FLOOD RISK	
1.006	S27	0.295	0.000	2.17			177.7	FLOOD RISK	
2.000	S30	0.419	0.000	0.71			49.2	SURCHARGED	
2.001	S31	0.434	0.000	2.77			144.6	FLOOD RISK	
2.002	S32	-0.378	0.000	0.18			150.8	OK	
2.003	S33	-0.354	0.000	0.18			95.1	FLOOD RISK	
2.004	S44	-0.339	0.000	0.15			116.4	FLOOD RISK	
2.005	S45	-0.276	0.000	0.15			98.8	FLOOD RISK	
1.007	S9	-0.246	0.000	0.28			233.8	FLOOD RISK*	
1.008	S46	-0.228	0.000	0.29			224.7	FLOOD RISK	
1.009	S47	-0.203	0.000	0.28			241.6	FLOOD RISK	
3.000	S10	0.992	0.000	1.18			87.4	FLOOD RISK	
3.001	S11	0.882	0.000	1.89			228.0	FLOOD RISK	
3.002	S12	0.553	0.000	2.01			246.1	SURCHARGED	
1.010	S13	-0.152	0.000	0.45			330.0	OK	
1.011	S23	-0.151	0.000	0.46			346.1	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.012	S22	360 Winter	100	+40%				
1.013	S21	360 Winter	100	+40%				
4.000	S40	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
4.001	S39	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
5.000	S29	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
4.002	S14	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
4.003	S15	30 Winter	100	+40%	30/15 Winter			
1.014	S16	360 Winter	100	+40%				
1.015	S20	360 Winter	100	+40%	100/120 Winter			
6.000	S17	15 Winter	100	+40%	100/15 Summer			
6.001	S41	15 Winter	100	+40%	30/15 Summer			
6.002	S18	15 Winter	100	+40%	30/15 Summer			
1.016	S19	480 Winter	100	+40%	100/60 Winter			
1.017	S48	480 Summer	100	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.012	S22	130.100	-0.129	0.000	0.18			111.2	OK
1.013	S21	130.084	-0.110	0.000	0.19			109.7	OK
4.000	S40	131.900	1.416	2.770	0.90			60.3	FLOOD
4.001	S39	131.829	1.433	2.673	1.23			86.3	FLOOD
5.000	S29	131.727	1.375	0.371	1.00			34.0	FLOOD
4.002	S14	131.645	1.375	2.328	1.93			144.3	FLOOD
4.003	S15	130.098	0.255	0.000	1.62			172.0	SURCHARGED
1.014	S16	130.046	-0.148	0.000	0.39			143.8	OK
1.015	S20	130.038	0.038	0.000	0.34			141.3	SURCHARGED*
6.000	S17	131.500	1.101	0.000	1.37			48.0	FLOOD RISK
6.001	S41	131.051	0.912	0.000	1.83			131.0	SURCHARGED
6.002	S18	130.480	0.500	0.000	2.55			171.7	SURCHARGED
1.016	S19	129.972	0.147	0.000	0.08			23.4	SURCHARGED
1.017	S48	129.322	-0.078	0.000	0.76			23.4	OK

PN	US/MH Name	Level Exceeded
1.012	S22	
1.013	S21	
4.000	S40	4
4.001	S39	4
5.000	S29	4
4.002	S14	4
4.003	S15	
1.014	S16	

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

PN	US/MH Name	Level Exceeded
1.015	S20	
6.000	S17	
6.001	S41	
6.002	S18	
1.016	S19	
1.017	S48	

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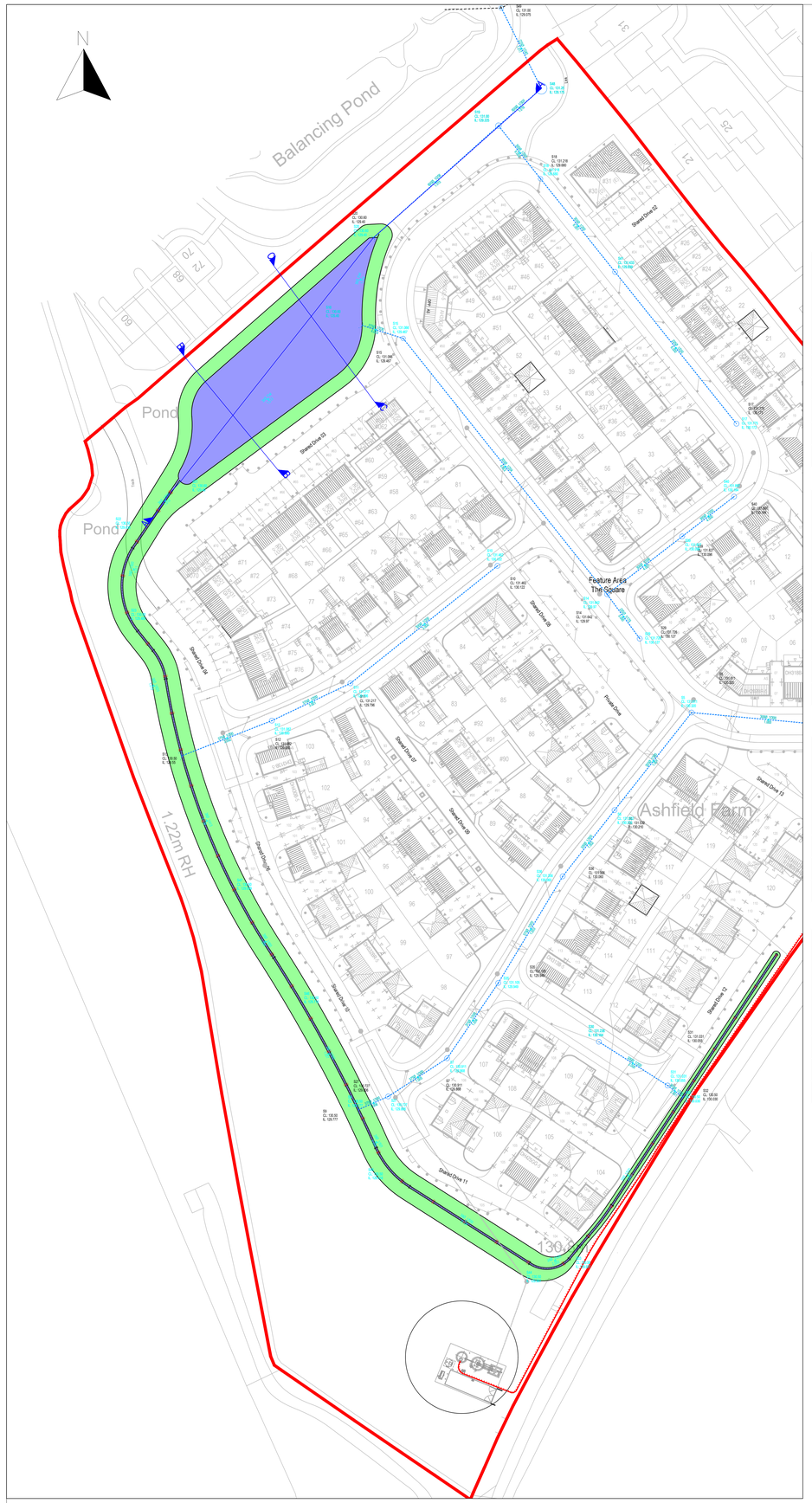
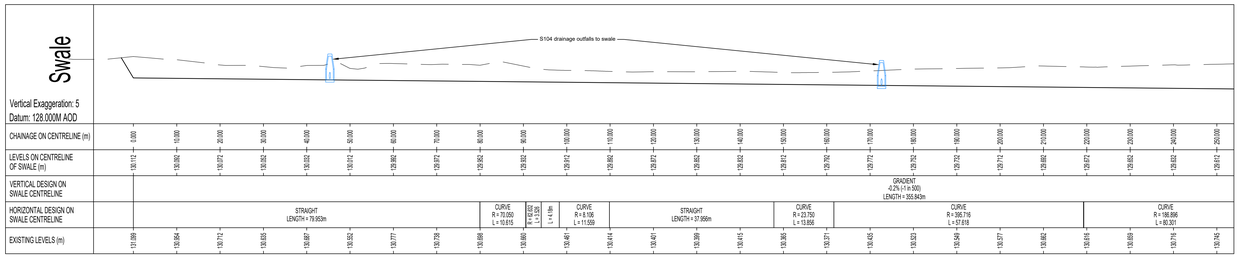
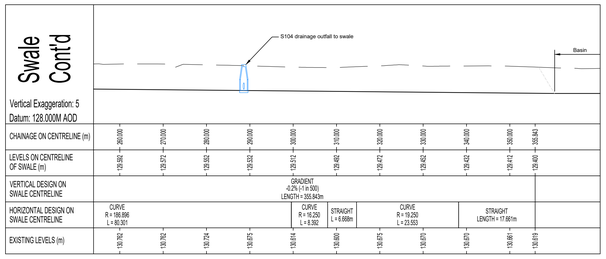
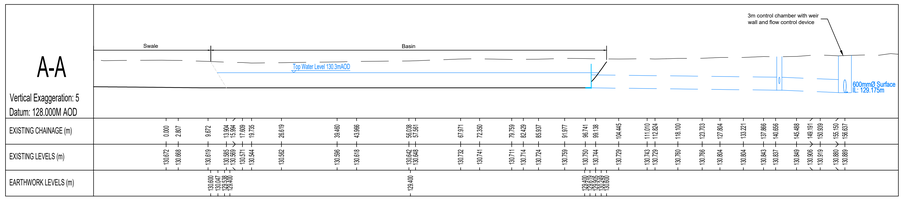
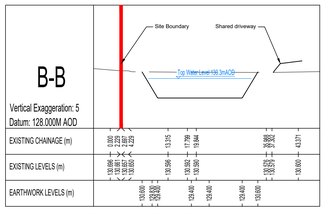


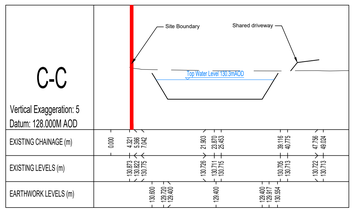
SUDS General Arrangement Plan
Scale 1:500











SUDS Long-sections
Scale 1:500 Horizontal
1:100 Vertical

General Notes

1. Drawing is not to be reproduced or printed at any scale or paper size other than the original scale.
2. All dimensions in meters unless otherwise stated.
3. Drawing to be read in conjunction with all other relevant Engineers, Architects and Specialist design drawings and details.
4. Any discrepancies are to be highlighted to the engineer immediately.

Key

- Existing Ground Level
- Proposed Finished Ground Level (S1 / DL 79.820m / IL 77.36m)
- S104 Surface Water Drainage

Revision	Description	Date	Drawn	Check

Status: Planning

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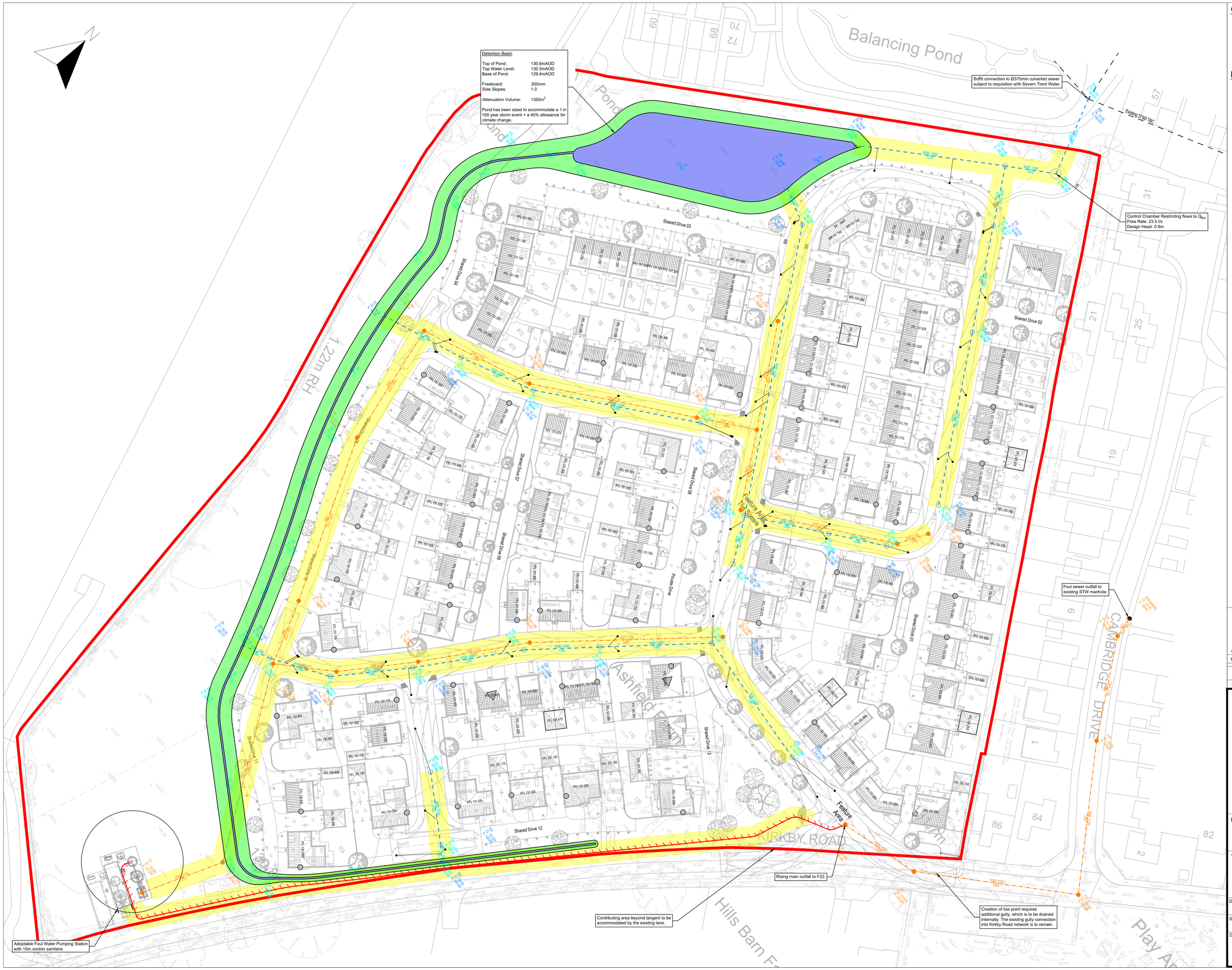
Project: Desford

Title: Pond and Swale General Arrangement

Drawn:	Checked:	Date:
JC	DP	June 2025
Scale: As Shown	Rev: -	Paper Size: A0

DWG No: 1089-ENG-0950



General Notes

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2. All dimensions in meters unless otherwise stated.
3. Drawing to be read in conjunction with all other relevant Engineers, Architects and Specialist design drawings and details.
4. Any discrepancies are to be highlighted to the engineer immediately.

Key

- FFL 61.500 — Proposed Slab Level
- Proposed S104 Surface Water Sewer
- Proposed S104 Foul Water Sewer
- Proposed S104 Easement
- Proposed SuDS Feature

Revision	Description	Date	Drawn	Check
A	Revised layout added.	25/06/25	JC	-

Status: Planning

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Title: Drainage Strategy

Drawn:	Checked:	Date:
JC	BT	May 2025
Scale: 1:500	Rev: A	Paper Size: A1

DWG No: E1089-ENG-0005