BRYNEITHIN, DINAS POWYS

Discharge of Condition 9: Details of foul and surface water drainage proposals – Designer's Response

Intelle Construction

C15241-REP02-A
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TECHNICAL NOTE

This technical note has been produced in response to the information requested by Vale of Glamorgan Council (VOGC) to discharge Condition 9: *'Full details of a scheme for foul and sustainable surface water drainage shall be submitted to and approved in wring by the Local Planning Authority and the approved scheme shall be fully implemented in accordance with the approved details at the time of the development'* in relation to planning application No. 2015/00954/1/CD.

Hydraulic Calculations for the three surface water networks

The proposed surface water drainage serving the proposed development is split into three networks due to the topography of the site. Both surface water network 1 and surface water network 2 are entirely private as they both discharge to separate soakaways. Surface water network 3 is offered for adoption to Dwr Cymru Welsh Water (DCWW) as it discharges at an agreed managed rate into the DCWW combined sewer.

Surface water network 1

This surface water network serves plots 13, 19-23, and the community building. This non-adoptable network discharges into Soakaway 1, via an upstream catchpit. The soakaway has been designed to accommodate the 1 in 100 year storm return period with an additional 30% allowance for climate change. Refer to Appendix A for calculations.

Surface water network 2

This surface water network serves plots 11-12, 14-18, and the upper half of the access road. This non-adoptable network discharges into Soakaway 2, via two upstream catchpits. The soakaway has been designed to accommodate the 1 in 100 year storm return period with an additional 30% allowance for climate change. Refer to Appendix A for calculations.

Surface water network 3

This surface water network serves plots 1-6, 7-10 and the lower half of the access road. This network is offered for adoption and discharges at a managed rate into the DCWW combined sewer at the southern site boundary. The proposed network discharges at the minimum controllable discharge rate of 5l/s, and provides a 20% betterment/reduction in contributing impermeable catchment in comparison to the previous impermeable catchment from the former care home discharging into the DCWW combined sewer. To meet DCWW adoption requirements, the proposed network incorporates an adoptable lower level 1 in 30 year online attenuation tank, and an upper 1 in 100 year non-adoptable offline attenuation tank. The private 1 in 100 year tank sits above the 1 in 30 year adoptable tank, and doesn't attenuate any surface water during return periods up to and including the 1 in 30 year return period. During all return periods exceeding the 1 in 30 year, and up to the 1 in 100 year return period, the private attenuation tank attenuates surface water. The proposed network is simulated so that no-flooding occurs during all return periods up to and including the 1 in 100 year return period with an additional 30% allowance for climate change. Refer to Appendix A for calculations.

Greenfield Run-off Rates

The proposed development is located in an area where the topography of the site and the adjacent land falls north to south. This results in an area of agricultural land north of the development being elevated higher than the development and falling south into the site. The catchment falling towards the site has a catchment area of approximately 0.4ha. The topography of the land to the west, east and south of the development doesn't fall towards the site. The greenfield surface water run-off for the catchment immediately north of the site is calculated to be 0.5l/s for the 1 in 100 year return period with a 30% allowance for climate change. To protect the development from any potential overland flows, an interceptor drain is to be located at the northern extent of the development. The proposed drainage network serving the site has been designed not to have a detrimental impact on the downstream receptors by providing a betterment to the existing site discharge from the former care home into the DCWW public sewer. Refer to Appendix B for Greenfield Run-off and interceptor calculations.

Infiltration Rates

The infiltration rates for the site have been tested in accordance with BRE 365, the industry standard for soakaway testing. Refer to Appendix C for a summary of the infiltration test results and locations. The infiltration testing includes an initial test at TP4 during the design stage, and two further tests were undertaken at the location of the two soakaways. Refer to Appendix C for infiltration test location plan and test results.

The infiltration testing for the Soakaway 1 illustrates an infiltration rate of 5.78×10^{-5} m/s and 2.21×10^{-5} m/s for two cycles. As a third cycle wasn't completed a conservative infiltration rate of 1.0×10^{-5} m/s, less than half the rate of the second cycle was used for the design of Soakaway 1.

The infiltration testing for Soakaway 2 illustrates infiltration rates of 5.82×10^{-5} m/s, 3.56×10^{-5} m/s and 3.43×10^{-5} m/s. An infiltration rate of 2.0×10^{-5} m/s was used at the initial design stage, therefore the infiltration rates tested on site confirm that the size of Soakaway 2 is adequate.

APPENDIX A

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)	1	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.316	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.091	4-8	0.024

Total Area Contributing (ha) = 0.115

Total Pipe Volume (m³) = 3.667

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	18.415	1.700	10.8	0.022	5.00	0.0	0.600	o	150	
2.000	12.727	0.800	15.9	0.016	5.00	0.0	0.600	o	150	
1.001	5.940	0.425	14.0	0.007	0.00	0.0	0.600	o	150	
1.002	11.799	0.300	39.3	0.000	0.00	0.0	0.600	o	225	
1.003	19.585	0.200	97.9	0.021	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	45.84	5.10	44.000	0.022	0.0	0.0	0.0	3.08	54.4	2.7
2.000	45.90	5.08	43.100	0.016	0.0	0.0	0.0	2.54	44.9	2.0
1.001	45.71	5.14	42.300	0.045	0.0	0.0	0.0	2.71	47.9	5.6
1.002	45.37	5.23	41.800	0.045	0.0	0.0	0.0	2.09	83.2	5.6
1.003	44.52	5.48	41.500	0.066	0.0	0.0	0.0	1.32	52.5	8.0

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
1.004	9.442	0.100	94.4	0.019	0.00	0.0	0.600	o	225	
3.000	5.000	0.300	16.7	0.000	5.00	0.0	0.600	o	150	
1.005	5.051	0.100	50.5	0.005	0.00	0.0	0.600	o	225	
4.000	9.343	1.825	5.1	0.005	5.00	0.0	0.600	o	150	
1.006	3.728	0.100	37.3	0.000	0.00	0.0	0.600	o	225	
1.007	12.318	0.100	123.2	0.020	0.00	0.0	0.600	o	225	
1.008	5.466	0.500	10.9	0.000	0.00	0.0	0.600	o	225	
1.009	4.483	0.400	11.2	0.000	0.00	0.0	0.600	o	150	

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)
1.004	44.13	5.59	41.300	0.085	0.0	0.0	0.0	1.35	53.5	10.2
3.000	46.08	5.03	41.700	0.000	0.0	0.0	0.0	2.48	43.8	0.0
1.005	43.98	5.64	41.200	0.090	0.0	0.0	0.0	1.84	73.3	10.7
4.000	46.08	5.03	43.000	0.005	0.0	0.0	0.0	4.48	79.2	0.6
1.006	43.88	5.67	41.100	0.095	0.0	0.0	0.0	2.15	85.5	11.3
1.007	43.32	5.84	41.000	0.115	0.0	0.0	0.0	1.18	46.8	13.5
1.008	43.25	5.87	40.900	0.115	0.0	0.0	0.0	3.98	158.3	13.5
1.009	46.12	5.02	40.400	0.000	5.0	0.0	0.0	3.03	53.5	5.0

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)	Backd (mm
6	44.900	0.900	Open Manhole	600	1.000	44.000	150				
1	44.400	1.300	Open Manhole	600	2.000	43.100	150				
7	43.650	1.350	Open Manhole	600	1.001	42.300	150	1.000	42.300	150	
								2.000	42.300	150	
H9	43.000	1.200	Open Manhole	600	1.002	41.800	225	1.001	41.875	150	
H8	42.600	1.100	Open Manhole	1200	1.003	41.500	225	1.002	41.500	225	
H7	42.600	1.300	Open Manhole	1200	1.004	41.300	225	1.003	41.300	225	
100YR TANK	43.400	1.700	Open Manhole	600	3.000	41.700	150				
H6	43.400	2.200	Open Manhole	1200	1.005	41.200	225	1.004	41.200	225	
								3.000	41.400	150	
H3	44.300	1.300	Open Manhole	1200	4.000	43.000	150				
H4	43.400	2.300	Open Manhole	1200	1.006	41.100	225	1.005	41.100	225	
								4.000	41.175	150	
H5	43.100	2.100	Open Manhole	1200	1.007	41.000	225	1.006	41.000	225	
30YR TANK	42.700	1.800	Open Manhole	1200	1.008	40.900	225	1.007	40.900	225	
FCC	42.600	2.200	Open Manhole	2550 x 1500	1.009	40.400	150	1.008	40.400	225	
	42.600	2.600	Open Manhole	1200		OUTFALL		1.009	40.000	150	

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	6	44.900	44.000	0.750	Open Manhole	600
2.000	o	150	1	44.400	43.100	1.150	Open Manhole	600
1.001	o	150	7	43.650	42.300	1.200	Open Manhole	600
1.002	o	225	H9	43.000	41.800	0.975	Open Manhole	600
1.003	o	225	H8	42.600	41.500	0.875	Open Manhole	1200
1.004	o	225	H7	42.600	41.300	1.075	Open Manhole	1200
3.000	o	150	100YR TANK	43.400	41.700	1.550	Open Manhole	600
1.005	o	225	H6	43.400	41.200	1.975	Open Manhole	1200
4.000	o	150	H3	44.300	43.000	1.150	Open Manhole	1200
1.006	o	225	H4	43.400	41.100	2.075	Open Manhole	1200
1.007	o	225	H5	43.100	41.000	1.875	Open Manhole	1200
1.008	o	225	30YR TANK	42.700	40.900	1.575	Open Manhole	1200
1.009	o	150	FCC	42.600	40.400	2.050	Open Manhole	2550 x 1500

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	18.415	10.8	7	43.650	42.300	1.200	Open Manhole	600
2.000	12.727	15.9	7	43.650	42.300	1.200	Open Manhole	600
1.001	5.940	14.0	H9	43.000	41.875	0.975	Open Manhole	600
1.002	11.799	39.3	H8	42.600	41.500	0.875	Open Manhole	1200
1.003	19.585	97.9	H7	42.600	41.300	1.075	Open Manhole	1200
1.004	9.442	94.4	H6	43.400	41.200	1.975	Open Manhole	1200
3.000	5.000	16.7	H6	43.400	41.400	1.850	Open Manhole	1200
1.005	5.051	50.5	H4	43.400	41.100	2.075	Open Manhole	1200
4.000	9.343	5.1	H4	43.400	41.175	2.075	Open Manhole	1200
1.006	3.728	37.3	H5	43.100	41.000	1.875	Open Manhole	1200
1.007	12.318	123.2	30YR TANK	42.700	40.900	1.575	Open Manhole	1200
1.008	5.466	10.9	FCC	42.600	40.400	1.975	Open Manhole	2550 x 1500
1.009	4.483	11.2		42.600	40.000	2.450	Open Manhole	1200

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)
1.009		42.600	40.000	0.000	1200	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	2
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)	19.000	Storm Duration (mins)	30
Ratio R	0.316		

Online Controls for Storm

Hydro-Brake Optimum® Manhole: FCC, DS/PN: 1.009, Volume (m³): 8.6

Unit Reference	MD-SHE-0095-5000-1700-5000
Design Head (m)	1.700
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	95
Invert Level (m)	40.400
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.700	5.0
Flush-Flo™	0.417	4.5
Kick-Flo®	0.851	3.6
Mean Flow over Head Range	-	4.1

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	3.1	1.200	4.3	3.000	6.5	7.000	9.7
0.200	4.2	1.400	4.6	3.500	7.0	7.500	10.1
0.300	4.5	1.600	4.9	4.000	7.5	8.000	10.4
0.400	4.5	1.800	5.1	4.500	7.9	8.500	10.7
0.500	4.5	2.000	5.4	5.000	8.3	9.000	11.0
0.600	4.4	2.200	5.6	5.500	8.7	9.500	11.3
0.800	3.9	2.400	5.9	6.000	9.0		
1.000	3.9	2.600	6.1	6.500	9.4		

Storage Structures for Storm

Cellular Storage Manhole: 100YR TANK, DS/PN: 3.000

Invert Level (m) 41.700 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	30.0	0.0	0.401	0.0	0.0
0.400	30.0	0.0			

Tank or Pond Manhole: 30YR TANK, DS/PN: 1.008

Invert Level (m) 40.900

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	15.0	0.800	15.0	0.801	0.0

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 Storage Structures	2
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 0.324
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

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, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	6	15 Winter	1	+0%				
2.000	1	15 Winter	1	+0%				
1.001	7	15 Winter	1	+0%				
1.002	H9	15 Winter	1	+0%				
1.003	H8	15 Winter	1	+0%	100/15 Summer			
1.004	H7	15 Winter	1	+0%	100/15 Summer			
3.000	100YR TANK	360 Winter	1	+0%	100/30 Winter			
1.005	H6	15 Winter	1	+0%	30/30 Winter			
4.000	H3	15 Winter	1	+0%				
1.006	H4	15 Winter	1	+0%	30/15 Winter			
1.007	H5	15 Winter	1	+0%	30/15 Summer			
1.008	30YR TANK	30 Winter	1	+0%	30/15 Summer			
1.009	FCC	30 Winter	1	+0%	1/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	6	44.022	-0.128	0.000	0.05		2.7	OK	
2.000	1	43.121	-0.129	0.000	0.05		2.0	OK	
1.001	7	42.337	-0.113	0.000	0.13		5.4	OK	
1.002	H9	41.841	-0.184	0.000	0.08		5.3	OK	
1.003	H8	41.560	-0.165	0.000	0.16		7.6	OK	
1.004	H7	41.371	-0.154	0.000	0.22		9.6	OK	
3.000	100YR TANK	41.700	-0.150	0.000	0.00		0.0	OK	
1.005	H6	41.272	-0.153	0.000	0.23		10.1	OK	
4.000	H3	43.006	-0.144	0.000	0.01		0.6	OK	
1.006	H4	41.174	-0.151	0.000	0.24		10.6	OK	
1.007	H5	41.087	-0.138	0.000	0.31		12.6	OK	
1.008	30YR TANK	41.001	-0.124	0.000	0.11		10.7	OK	
1.009	FCC	40.997	0.447	0.000	0.11		4.4	SURCHARGED	

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 Storage Structures	2
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	0.324
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

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, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	6	15 Winter	30	+0%				
2.000	1	15 Winter	30	+0%				
1.001	7	15 Winter	30	+0%				
1.002	H9	15 Winter	30	+0%				
1.003	H8	15 Winter	30	+0%	100/15 Summer			
1.004	H7	60 Winter	30	+0%	100/15 Summer			
3.000	100YR TANK	360 Winter	30	+0%	100/30 Winter			
1.005	H6	60 Winter	30	+0%	30/30 Winter			
4.000	H3	15 Winter	30	+0%				
1.006	H4	60 Winter	30	+0%	30/15 Winter			
1.007	H5	60 Winter	30	+0%	30/15 Summer			
1.008	30YR TANK	60 Winter	30	+0%	30/15 Summer			
1.009	FCC	60 Winter	30	+0%	1/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	6	44.036	-0.114	0.000	0.13		6.6	OK	
2.000	1	43.134	-0.116	0.000	0.12		4.8	OK	
1.001	7	42.361	-0.089	0.000	0.34		13.6	OK	
1.002	H9	41.867	-0.158	0.000	0.19		13.5	OK	
1.003	H8	41.604	-0.121	0.000	0.42		20.1	OK	
1.004	H7	41.490	-0.035	0.000	0.32		14.3	OK	
3.000	100YR TANK	41.700	-0.150	0.000	0.00		0.0	OK	
1.005	H6	41.487	0.062	0.000	0.34		15.1	SURCHARGED	
4.000	H3	43.015	-0.135	0.000	0.02		1.5	OK	
1.006	H4	41.484	0.159	0.000	0.35		15.6	SURCHARGED	
1.007	H5	41.482	0.257	0.000	0.44		17.7	SURCHARGED	
1.008	30YR TANK	41.476	0.351	0.000	0.12		11.6	SURCHARGED	
1.009	FCC	41.473	0.923	0.000	0.11		4.4	SURCHARGED	

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 Storage Structures	2
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	0.324
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	0.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

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, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	6	15 Winter	100	+30%				
2.000	1	15 Winter	100	+30%				
1.001	7	15 Winter	100	+30%				
1.002	H9	60 Winter	100	+30%				
1.003	H8	60 Winter	100	+30%	100/15 Summer			
1.004	H7	60 Winter	100	+30%	100/15 Summer			
3.000	100YR TANK	60 Winter	100	+30%	100/30 Winter			
1.005	H6	60 Winter	100	+30%	30/30 Winter			
4.000	H3	15 Winter	100	+30%				
1.006	H4	60 Winter	100	+30%	30/15 Winter			
1.007	H5	60 Winter	100	+30%	30/15 Summer			
1.008	30YR TANK	60 Winter	100	+30%	30/15 Summer			
1.009	FCC	60 Winter	100	+30%	1/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	6	44.048	-0.102	0.000	0.22		11.2	OK	
2.000	1	43.145	-0.105	0.000	0.20		8.1	OK	
1.001	7	42.382	-0.068	0.000	0.57		22.9	OK	
1.002	H9	42.003	-0.022	0.000	0.18		12.9	OK	
1.003	H8	41.989	0.264	0.000	0.39		18.3	SURCHARGED	
1.004	H7	41.964	0.439	0.000	0.46		20.4	SURCHARGED	
3.000	100YR TANK	41.957	0.107	0.000	0.09		3.2	SURCHARGED	
1.005	H6	41.959	0.534	0.000	0.43		19.1	SURCHARGED	
4.000	H3	43.018	-0.132	0.000	0.04		2.5	OK	
1.006	H4	41.956	0.631	0.000	0.43		19.1	SURCHARGED	
1.007	H5	41.954	0.729	0.000	0.58		23.4	SURCHARGED	
1.008	30YR TANK	41.946	0.821	0.000	0.14		13.6	SURCHARGED	
1.009	FCC	41.942	1.392	0.000	0.12		4.8	SURCHARGED	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 907 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	45.249	0.249	0.2	9.5	O K
30 min Summer	45.338	0.338	0.2	12.8	O K
60 min Summer	45.434	0.434	0.3	16.5	O K
120 min Summer	45.531	0.531	0.3	20.2	O K
180 min Summer	45.581	0.581	0.3	22.1	O K
240 min Summer	45.610	0.610	0.3	23.2	O K
360 min Summer	45.645	0.645	0.3	24.5	O K
480 min Summer	45.662	0.662	0.3	25.1	O K
600 min Summer	45.667	0.667	0.3	25.4	O K
720 min Summer	45.667	0.667	0.3	25.3	O K
960 min Summer	45.661	0.661	0.3	25.1	O K
1440 min Summer	45.642	0.642	0.3	24.4	O K
2160 min Summer	45.607	0.607	0.3	23.0	O K
2880 min Summer	45.570	0.570	0.3	21.7	O K
4320 min Summer	45.500	0.500	0.3	19.0	O K
5760 min Summer	45.436	0.436	0.3	16.6	O K
7200 min Summer	45.378	0.378	0.2	14.4	O K
8640 min Summer	45.326	0.326	0.2	12.4	O K
10080 min Summer	45.280	0.280	0.2	10.6	O K
15 min Winter	45.280	0.280	0.2	10.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	112.032	0.0	19
30 min Summer	76.515	0.0	34
60 min Summer	49.937	0.0	64
120 min Summer	31.438	0.0	122
180 min Summer	23.589	0.0	182
240 min Summer	19.078	0.0	242
360 min Summer	14.159	0.0	362
480 min Summer	11.440	0.0	480
600 min Summer	9.687	0.0	600
720 min Summer	8.450	0.0	674
960 min Summer	6.805	0.0	790
1440 min Summer	5.004	0.0	1040
2160 min Summer	3.670	0.0	1452
2880 min Summer	2.941	0.0	1872
4320 min Summer	2.148	0.0	2680
5760 min Summer	1.718	0.0	3464
7200 min Summer	1.446	0.0	4256
8640 min Summer	1.256	0.0	5016
10080 min Summer	1.116	0.0	5744
15 min Winter	112.032	0.0	19

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	45.379	0.379	0.2	14.4	O K
60 min Winter	45.488	0.488	0.3	18.5	O K
120 min Winter	45.599	0.599	0.3	22.7	O K
180 min Winter	45.658	0.658	0.3	25.0	O K
240 min Winter	45.692	0.692	0.3	26.3	O K
360 min Winter	45.737	0.737	0.3	28.0	O K
480 min Winter	45.760	0.760	0.3	28.9	O K
600 min Winter	45.771	0.771	0.3	29.3	O K
720 min Winter	45.775	0.775	0.3	29.4	O K
960 min Winter	45.768	0.768	0.3	29.2	O K
1440 min Winter	45.743	0.743	0.3	28.2	O K
2160 min Winter	45.693	0.693	0.3	26.3	O K
2880 min Winter	45.639	0.639	0.3	24.3	O K
4320 min Winter	45.532	0.532	0.3	20.2	O K
5760 min Winter	45.436	0.436	0.3	16.6	O K
7200 min Winter	45.352	0.352	0.2	13.4	O K
8640 min Winter	45.278	0.278	0.2	10.6	O K
10080 min Winter	45.214	0.214	0.2	8.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	76.515	0.0	33
60 min Winter	49.937	0.0	62
120 min Winter	31.438	0.0	122
180 min Winter	23.589	0.0	180
240 min Winter	19.078	0.0	238
360 min Winter	14.159	0.0	354
480 min Winter	11.440	0.0	468
600 min Winter	9.687	0.0	578
720 min Winter	8.450	0.0	688
960 min Winter	6.805	0.0	894
1440 min Winter	5.004	0.0	1112
2160 min Winter	3.670	0.0	1580
2880 min Winter	2.941	0.0	2020
4320 min Winter	2.148	0.0	2896
5760 min Winter	1.718	0.0	3744
7200 min Winter	1.446	0.0	4536
8640 min Winter	1.256	0.0	5272
10080 min Winter	1.116	0.0	5960

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.319	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.046

Time (mins) From:	To:	Area (ha)
0	4	0.046

Model Details

Storage is Online Cover Level (m) 46.400

Cellular Storage Structure

Invert Level (m) 45.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.03600 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	40.0	40.0	0.801	0.0	60.3
0.800	40.0	60.2			

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 496 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	42.894	0.294	0.9	22.4	O K
30 min Summer	42.996	0.396	0.9	30.1	O K
60 min Summer	43.103	0.503	1.0	38.3	O K
120 min Summer	43.204	0.604	1.0	45.9	O K
180 min Summer	43.249	0.649	1.0	49.3	O K
240 min Summer	43.268	0.668	1.0	50.8	O K
360 min Summer	43.282	0.682	1.0	51.8	O K
480 min Summer	43.279	0.679	1.0	51.6	O K
600 min Summer	43.272	0.672	1.0	51.1	O K
720 min Summer	43.264	0.664	1.0	50.4	O K
960 min Summer	43.244	0.644	1.0	48.9	O K
1440 min Summer	43.201	0.601	1.0	45.7	O K
2160 min Summer	43.135	0.535	1.0	40.7	O K
2880 min Summer	43.072	0.472	1.0	35.8	O K
4320 min Summer	42.957	0.357	0.9	27.2	O K
5760 min Summer	42.864	0.264	0.9	20.0	O K
7200 min Summer	42.791	0.191	0.9	14.5	O K
8640 min Summer	42.734	0.134	0.8	10.2	O K
10080 min Summer	42.692	0.092	0.8	7.0	O K
15 min Winter	42.931	0.331	0.9	25.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	112.032	0.0	19
30 min Summer	76.515	0.0	33
60 min Summer	49.937	0.0	62
120 min Summer	31.438	0.0	122
180 min Summer	23.589	0.0	182
240 min Summer	19.078	0.0	242
360 min Summer	14.159	0.0	360
480 min Summer	11.440	0.0	414
600 min Summer	9.687	0.0	476
720 min Summer	8.450	0.0	540
960 min Summer	6.805	0.0	674
1440 min Summer	5.004	0.0	952
2160 min Summer	3.670	0.0	1360
2880 min Summer	2.941	0.0	1760
4320 min Summer	2.148	0.0	2512
5760 min Summer	1.718	0.0	3280
7200 min Summer	1.446	0.0	3968
8640 min Summer	1.256	0.0	4664
10080 min Summer	1.116	0.0	5336
15 min Winter	112.032	0.0	18

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	43.046	0.446	1.0	33.9	O K
60 min Winter	43.168	0.568	1.0	43.2	O K
120 min Winter	43.286	0.686	1.0	52.1	O K
180 min Winter	43.341	0.741	1.1	56.3	O K
240 min Winter	43.367	0.767	1.1	58.3	O K
360 min Winter	43.392	0.792	1.1	60.2	O K
480 min Winter	43.393	0.793	1.1	60.2	O K
600 min Winter	43.382	0.782	1.1	59.4	O K
720 min Winter	43.371	0.771	1.1	58.6	O K
960 min Winter	43.345	0.745	1.1	56.6	O K
1440 min Winter	43.280	0.680	1.0	51.7	O K
2160 min Winter	43.179	0.579	1.0	44.0	O K
2880 min Winter	43.082	0.482	1.0	36.6	O K
4320 min Winter	42.915	0.315	0.9	23.9	O K
5760 min Winter	42.785	0.185	0.9	14.1	O K
7200 min Winter	42.694	0.094	0.8	7.1	O K
8640 min Winter	42.650	0.050	0.8	3.8	O K
10080 min Winter	42.644	0.044	0.7	3.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	76.515	0.0	33
60 min Winter	49.937	0.0	62
120 min Winter	31.438	0.0	120
180 min Winter	23.589	0.0	178
240 min Winter	19.078	0.0	236
360 min Winter	14.159	0.0	348
480 min Winter	11.440	0.0	454
600 min Winter	9.687	0.0	548
720 min Winter	8.450	0.0	572
960 min Winter	6.805	0.0	724
1440 min Winter	5.004	0.0	1036
2160 min Winter	3.670	0.0	1472
2880 min Winter	2.941	0.0	1900
4320 min Winter	2.148	0.0	2680
5760 min Winter	1.718	0.0	3400
7200 min Winter	1.446	0.0	3968
8640 min Winter	1.256	0.0	4408
10080 min Winter	1.116	0.0	5136

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.319	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.110

Time (mins) From:	To:	Area (ha)
0	4	0.110

Model Details

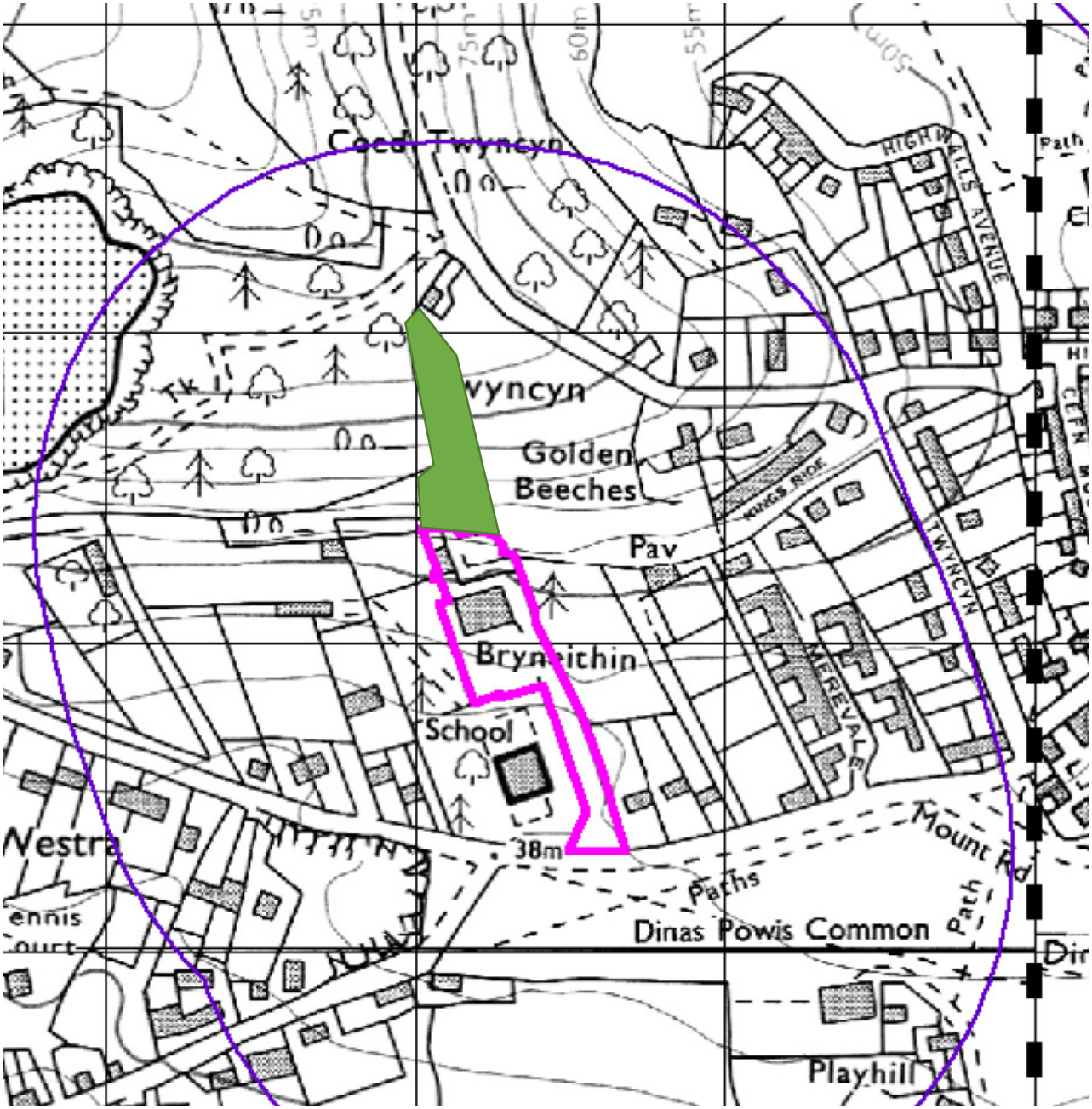
Storage is Online Cover Level (m) 44.400

Cellular Storage Structure

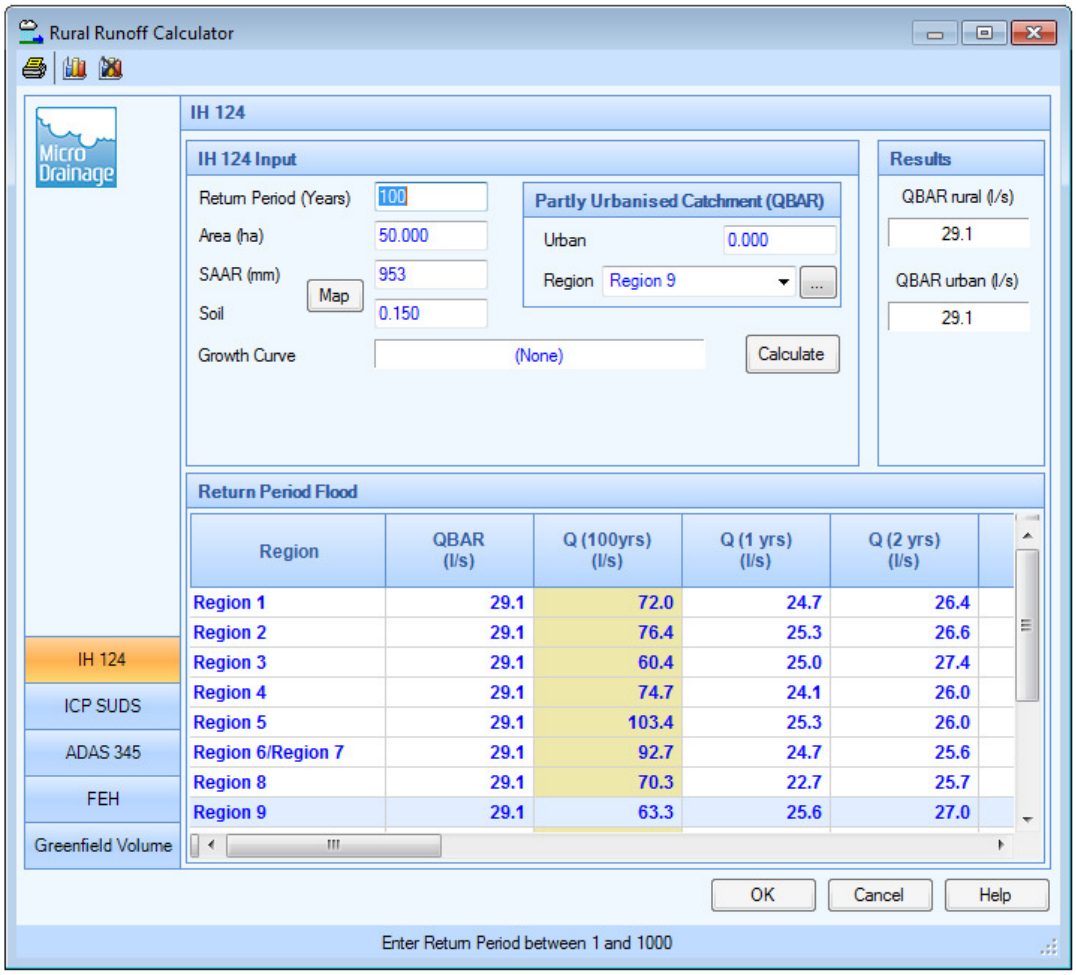
Invert Level (m) 42.600 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.07200 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.07200

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	80.0	80.0	0.801	0.0	108.6
0.800	80.0	108.6			

APPENDIX B



Greenfield catchment north of the site



Calculation is for 50ha then reduced down to 0.4ha on a pro rata as per IH 124.

Greenfield run-off rate = 63.3 / (50/0.4) = 0.51 l/s

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 112 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	53.947	0.947	0.5	5.4	O K
30 min Summer	53.947	0.947	0.5	5.4	O K
60 min Summer	53.947	0.947	0.5	5.4	O K
120 min Summer	53.947	0.947	0.5	5.4	O K
180 min Summer	53.947	0.947	0.5	5.4	O K
240 min Summer	53.947	0.947	0.5	5.4	O K
360 min Summer	53.947	0.947	0.5	5.4	O K
480 min Summer	53.947	0.947	0.5	5.4	O K
600 min Summer	53.947	0.947	0.5	5.4	O K
720 min Summer	53.947	0.947	0.5	5.4	O K
960 min Summer	53.947	0.947	0.5	5.4	O K
1440 min Summer	53.947	0.947	0.5	5.4	O K
2160 min Summer	53.947	0.947	0.5	5.4	O K
2880 min Summer	53.947	0.947	0.5	5.4	O K
4320 min Summer	53.947	0.947	0.5	5.4	O K
5760 min Summer	53.947	0.947	0.5	5.4	O K
7200 min Summer	53.947	0.947	0.5	5.4	O K
8640 min Summer	53.947	0.947	0.5	5.4	O K
10080 min Summer	53.947	0.947	0.5	5.4	O K
15 min Winter	53.947	0.947	0.5	5.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	113.370	0.0	1440
30 min Summer	76.984	0.0	1440
60 min Summer	49.937	0.0	1440
120 min Summer	31.261	0.0	1440
180 min Summer	23.395	0.0	1440
240 min Summer	18.895	0.0	1440
360 min Summer	13.974	0.0	1440
480 min Summer	11.268	0.0	1440
600 min Summer	9.527	0.0	1440
720 min Summer	8.301	0.0	1440
960 min Summer	6.672	0.0	1440
1440 min Summer	4.894	0.0	1440
2160 min Summer	3.582	0.0	1440
2880 min Summer	2.866	0.0	1440
4320 min Summer	2.088	0.0	1440
5760 min Summer	1.666	0.0	1440
7200 min Summer	1.400	0.0	1440
8640 min Summer	1.215	0.0	1440
10080 min Summer	1.078	0.0	1440
15 min Winter	113.370	0.0	1440

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	53.947	0.947	0.5	5.4	O K
60 min Winter	53.947	0.947	0.5	5.4	O K
120 min Winter	53.947	0.947	0.5	5.4	O K
180 min Winter	53.947	0.947	0.5	5.4	O K
240 min Winter	53.947	0.947	0.5	5.4	O K
360 min Winter	53.947	0.947	0.5	5.4	O K
480 min Winter	53.947	0.947	0.5	5.4	O K
600 min Winter	53.947	0.947	0.5	5.4	O K
720 min Winter	53.947	0.947	0.5	5.4	O K
960 min Winter	53.947	0.947	0.5	5.4	O K
1440 min Winter	53.947	0.947	0.5	5.4	O K
2160 min Winter	53.947	0.947	0.5	5.4	O K
2880 min Winter	53.947	0.947	0.5	5.4	O K
4320 min Winter	53.947	0.947	0.5	5.4	O K
5760 min Winter	53.947	0.947	0.5	5.4	O K
7200 min Winter	53.947	0.947	0.5	5.4	O K
8640 min Winter	53.947	0.947	0.5	5.4	O K
10080 min Winter	53.947	0.947	0.5	5.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	76.984	0.0	1440
60 min Winter	49.937	0.0	1440
120 min Winter	31.261	0.0	1440
180 min Winter	23.395	0.0	1440
240 min Winter	18.895	0.0	1440
360 min Winter	13.974	0.0	1440
480 min Winter	11.268	0.0	1440
600 min Winter	9.527	0.0	1440
720 min Winter	8.301	0.0	1440
960 min Winter	6.672	0.0	1440
1440 min Winter	4.894	0.0	1440
2160 min Winter	3.582	0.0	1440
2880 min Winter	2.866	0.0	1440
4320 min Winter	2.088	0.0	1440
5760 min Winter	1.666	0.0	1440
7200 min Winter	1.400	0.0	1440
8640 min Winter	1.215	0.0	1440
10080 min Winter	1.078	0.0	1440

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.330	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.000

Time (mins) From:	To:	Area (ha)
0	4	0.000

Model Details

Storage is Online Cover Level (m) 54.000

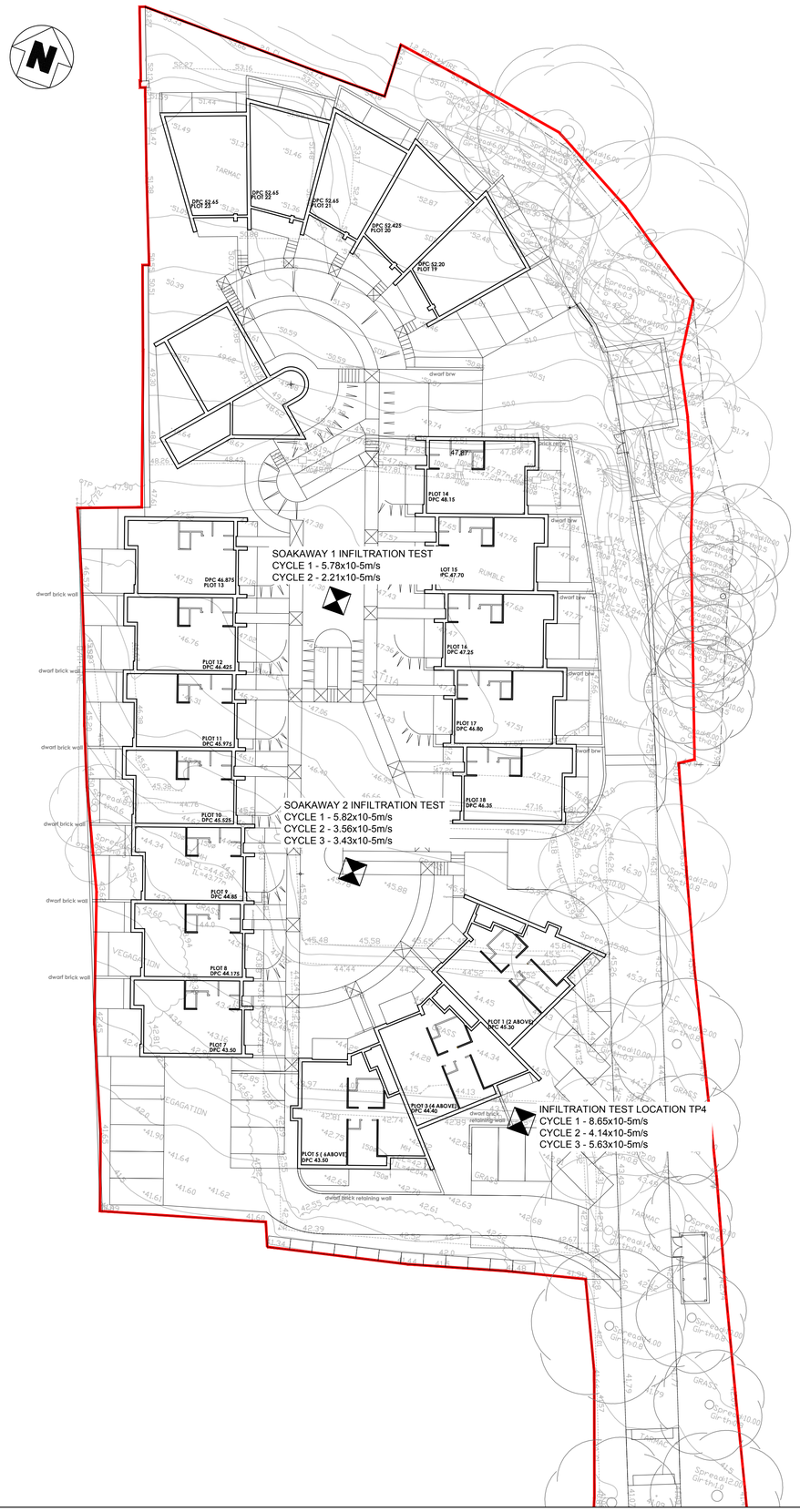
Infiltration Trench Structure

Infiltration Coefficient Base (m/hr)	0.03600	Trench Width (m)	0.5
Infiltration Coefficient Side (m/hr)	0.03600	Trench Length (m)	53.0
Safety Factor	2.0	Slope (1:X)	100.0
Porosity	0.30	Cap Volume Depth (m)	1.000
Invert Level (m)	53.000	Cap Infiltration Depth (m)	1.000

Additional Hydrograph #1

Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)
360	0.5	720	0.5	1080	0.5	1440	0.5

APPENDIX C



KEY:

DEVELOPMENT BOUNDARY

NOTES:

1. INFILTRATION TESTING WAS CARRIED OUT IN ACCORDANCE WITH BRE 365.

Rev	Date	Description	By	Apvd
P1	10.10.16	FIRST ISSUE	SJ	CP

Project
BRYN EITHIN
DINAS POWYS

Title
INFILTRATION TESTING
LOCATION PLAN

Client
PORTABELLA

Scale @ A1
1:250

Project Ref	Drawing No	Rev
C15241	510	P1

REVISION REFERENCING
P = Preliminary A = Approval T = Tender C = Construction

Jubb
Suite B,Ground Floor West,St James Court
St James Parade,Bristol,BS1 3LH
TEL-0117 922 6266 Email-Bristol@jubb.uk.com

BRYN ETHIN
SOAK AWAY 1

The Information on this form is in the Public Domain

Building Regulations No.

CHECK SHEET

Please fill in the relevant information below and return both copies to Building Control as soon as possible.

1. Please specify the size of the soakaway that you are proposing to use:

   Width (m) _____ **Length (m)** _____ **Depth (m)** _____

2. Please specify the area that is to be drained to the soakaway: _____ m^2

3. Please specify the size of the trial pit:

   Width (m) 0.7 **Length (m)** 1.9 **Depth (m)** 1.2

4. Please specify the proposed invert level of the drain: _____ m

5. Below is a table for you to input the data (times) gathered from the Soil Infiltration Rate tests:

Test Number	75%	25%	25% - 75%
1	1320	4440	
2	4050	12150	
3			

Key:

75% - The time taken in minutes for the water level to fall to 75% full.

25% - The time taken in minutes for the water level to fall to 25% full.

25% - 75% - The 25% time minus the 75% time. (This will give the time for the water level to fall from 75% full to 25% full.)

Name: **Signature:** **Date:**

BRYN ETHIN
SOAK AWAY 2

The Information on this form is in the Public Domain

Building Regulations No.

CHECK SHEET

Please fill in the relevant information below and return both copies to Building Control as soon as possible.

1. Please specify the size of the soakaway that you are proposing to use:

   Width (m) _____ **Length (m)** _____ **Depth (m)** _____

2. Please specify the area that is to be drained to the soakaway: _____ m^2

3. Please specify the size of the trial pit:

   Width (m) 0.5 **Length (m)** 1.8 **Depth (m)** 1.1

4. Please specify the proposed invert level of the drain: _____ m

5. Below is a table for you to input the data (times) gathered from the Soil Infiltration Rate tests:

Test Number	75%	25%	25% - 75%
1	1134	3614	
2	2025	6075	
3	2100	6300	

Key:

75% - The time taken in minutes for the water level to fall to 75% full.

25% - The time taken in minutes for the water level to fall to 25% full.

25% - 75% - The 25% time minus the 75% time. (This will give the time for the water level to fall from 75% full to 25% full.)

Name: **Signature:** **Date:**

Soakaway Field Record Sheet

JOHNSON POOLE & BLOOMER LIMITED
LAND CONSULTANTS
Unit 5, Neptune Court, Vanguard Way,
Cardiff, C F 2 4 5 P J , Wales.
Tel: (029) 20 451515 Fax: (029) 20 451199
E-mail: Enquiries@jpbwales.co.uk

Project Ref:-	PC060-11	Project Name:-	Bryneithin, Dinas Powys			Sheet	1 of 1
Soakaway No.	TP04	Cycle	1, 2 & 3	Date	09/12/2015	Engineer	PCB

Cycle 1

Total fall in water level (m)	0.81	base of Trial pit below datum (m)	1.60
% water drop	81.00	Drainage height (m)	1.00
Ho =	0.00	from graph	
H25 =	0.2025	t25 =	
H75 =	0.6075	t75 =	

Time (h:m:s)	depth below datum (m)	Elapsed time (h:m:s)	Total fall in water level (m)
Cycle 1			
09:51	0.600	00:00:00	0.000
09:56	0.660	00:05:00	0.060
10:00	0.760	00:09:00	0.160
10:05	0.870	00:14:00	0.270
10:11	0.980	00:20:00	0.380
10:17	1.070	00:26:00	0.470
10:32	1.230	00:41:00	0.630
10:56	1.390	01:05:00	0.790
11:03	1.410	01:12:00	0.810
		-	-
		-	-
		-	-
		-	-
		-	-

Cycle 2

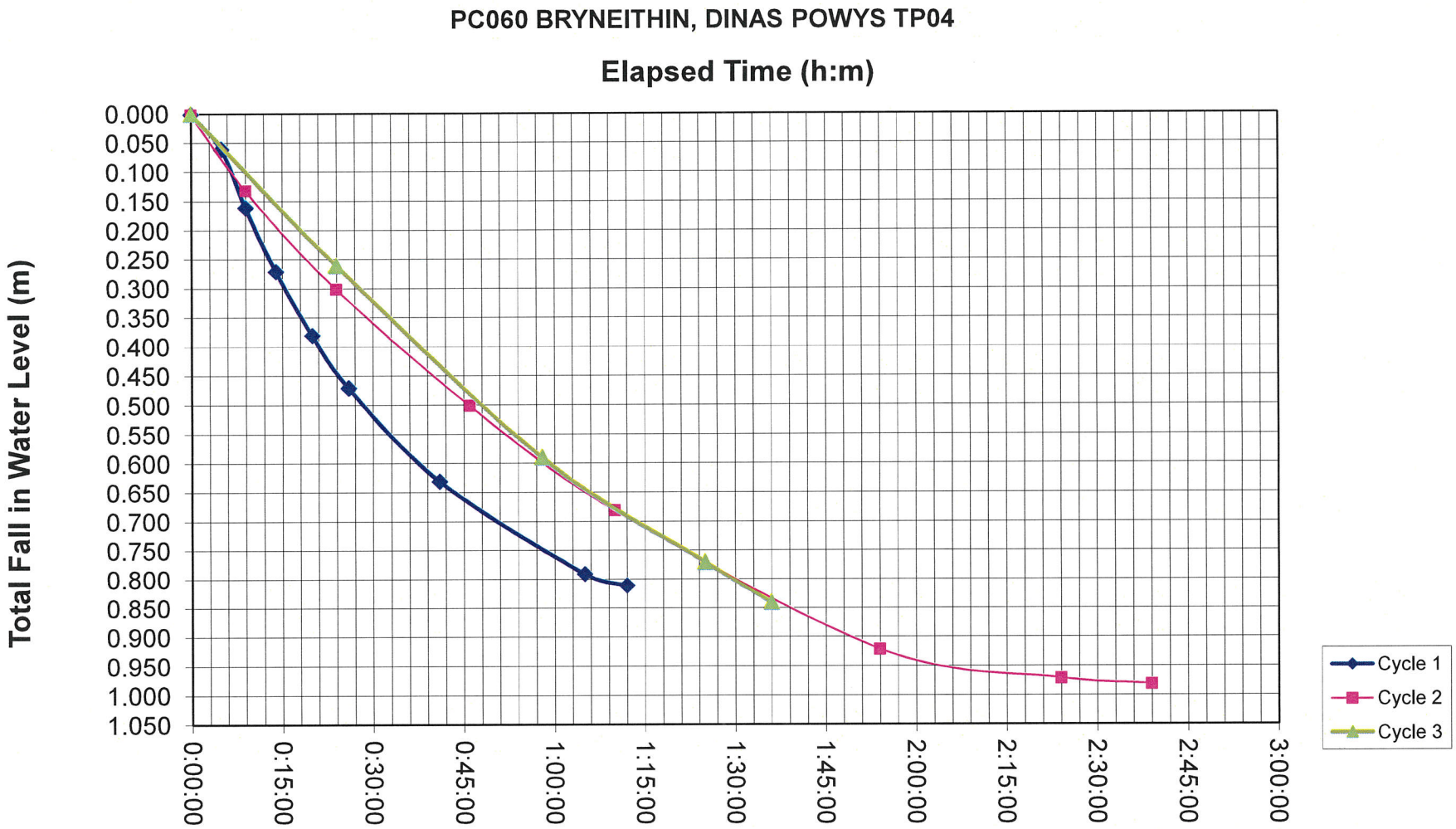
Total fall in water level (m)	0.98	base of Trial pit below datum (m)	1.60
% water drop	94.23	Drainage height (m)	1.04
Ho =	0.00	from graph	
H25 =	0.245	t25 =	
H75 =	0.735	t75 =	

Time (h:m:s)	depth below datum (m)	Elapsed time (h:m:s)	Total fall in water level (m)
Cycle 2			
11:07	0.560	00:00:00	0.00
11:16	0.690	00:09:00	0.13
11:31	0.860	00:24:00	0.30
11:53	1.060	00:46:00	0.50
12:17	1.240	01:10:00	0.68
13:01	1.480	01:54:00	0.92
13:31	1.530	02:24:00	0.97
13:46	1.540	02:39:00	0.98
		-	-
		-	-
		-	-
		-	-
		-	-

Cycle 3

Total fall in water level (m)	0.84	base of Trial pit below datum (m)	1.60
% water drop	72.41	Drainage height (m)	1.16
Ho =	0.00	from graph	
H25 =	0.21	t25 =	
H75 =	0.63	t75 =	

Time (h:m:s)	depth below datum (m)	Elapsed time (h:m:s)	Total fall in water level (m)
Cycle 3			
13:49	0.440	00:00:00	0.00
14:13	0.700	00:24:00	0.26
14:47	1.030	00:58:00	0.59
15:14	1.210	01:25:00	0.77
15:25	1.280	01:36:00	0.84
		-	-
		-	-
		-	-
		-	-
		-	-
		-	-
		-	-
		-	-
		-	-


PC060 BRYNEITHIN, DINAS POWYS TP04
Elapsed Time (h:m)
Total Fall in Water Level (m)
0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
0:00:00
0:15:00
0:30:00
0:45:00
1:00:00
1:15:00
1:30:00
1:45:00
2:00:00
2:15:00
2:30:00
2:45:00
3:00:00
Cycle 1
Cycle 2
Cycle 3