



Cwm Planning & Design Ltd.

(Civil, Structural & Architectural)

DRAINAGE DESIGN CALCULATIONS

for:

PROPOSED NEW SPLIT LEVEL DWELLING

at:

**Land adj. to
261 Graig Road,
Ynysmeudwy
Pontardawe
SA9 2NZ**

Date: August 2017

		Page 1
		
Date 07/03/2017 20:27 File	Designed by Checked by	
XP Solutions		Source Control 2016.1.1
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 2 Soil 0.400 Area (ha) 0.500 Urban 0.150 SAAR (mm) 1600 Region Number Region 9 Results 1/s QBAR Rural 4.5 QBAR Urban 5.5 Q2 years 5.2 Q1 year 4.8 Q30 years 9.3 Q100 years 11.1		
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Network 2016.1.1

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)	2	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.227	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 Area
(mins) (ha)

0-4 0.000

Total Area Contributing (ha) = 0.000

Total Pipe Volume (m³) = 3.539

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	8.650	0.087	99.4	0.000	4.00	14.4	0.600	o	225	Pipe/Conduit	Ⓢ
1.001	10.500	0.105	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	Ⓢ
1.002	15.000	6.608	2.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	Ⓢ
1.003	16.000	4.725	3.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	Ⓢ
1.004	8.300	0.700	11.9	0.000	0.00	2.5	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)
1.000	50.00	4.11	101.900	0.000	14.4	0.0	0.0	1.31	52.1	14.4
1.001	50.00	4.24	101.813	0.000	14.4	0.0	0.0	1.31	52.0	14.4
1.002	50.00	4.27	101.633	0.000	14.4	0.0	0.0	10.51	742.8	14.4
1.003	50.00	4.30	95.025	0.000	14.4	0.0	0.0	8.60	608.0	14.4
1.004	50.00	4.33	90.300	0.000	16.9	0.0	0.0	4.59	324.5	16.9



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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	Pipes In PN	Invert Level (m)	Diameter (mm)	Backdrop (mm)
HW1&2	102.500	0.600	Open Manhole	1200	1.000	101.900	225				
HW3	102.500	0.687	Open Manhole	1200	1.001	101.813	225	1.000	101.813	225	
S3	102.500	0.867	Open Manhole	1200	1.002	101.633	300	1.001	101.708	225	
S2	96.100	1.075	Open Manhole	1200	1.003	95.025	300	1.002	95.025	300	
S1	91.500	1.200	Open Manhole	1200	1.004	90.300	300	1.003	90.300	300	
EXISTING GULLY	90.410	0.810	Open Manhole	450		OUTFALL		1.004	89.600	300	



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PIPELINE SCHEDULES for StormUpstream Manhole

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
1.000	o	225	HW1&2	102.500	101.900	0.375	Open Manhole	1200
1.001	o	225	HW3	102.500	101.813	0.462	Open Manhole	1200
1.002	o	300	S3	102.500	101.633	0.567	Open Manhole	1200
1.003	o	300	S2	96.100	95.025	0.775	Open Manhole	1200
1.004	o	300	S1	91.500	90.300	0.900	Open Manhole	1200

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
1.000	8.650	99.4	HW3	102.500	101.813	0.462	Open Manhole	1200
1.001	10.500	100.0	S3	102.500	101.708	0.567	Open Manhole	1200
1.002	15.000	2.3	S2	96.100	95.025	0.775	Open Manhole	1200
1.003	16.000	3.4	S1	91.500	90.300	0.900	Open Manhole	1200
1.004	8.300	11.9	EXISTING GULLY	90.410	89.600	0.510	Open Manhole	450

Free Flowing Outfall Details for Storm

Outfall	Outfall	C. Level	I. Level	Min	D,L	W
Pipe Number	Name	(m)	(m)	I. Level (m)	(mm)	(mm)

1.004	EXISTING GULLY	90.410	89.600	89.600	450	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 Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.227		



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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 Coefficient 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 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.225 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 Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.
1.000	HW1&2	30 Summer	100	+30%					101.991	-0.134	0.000	0.35
1.001	HW3	30 Summer	100	+30%					101.906	-0.132	0.000	0.34
1.002	S3	15 Winter	1	+0%					101.666	-0.267	0.000	0.02
1.003	S2	15 Winter	1	+0%					95.060	-0.265	0.000	0.03
1.004	S1	30 Summer	100	+30%					90.357	-0.243	0.000	0.08

PN	US/MH Name	Pipe Overflow (l/s)	Pipe Flow (l/s)	Level Status Exceeded
1.000	HW1&2		14.4	OK
1.001	HW3		14.6	OK
1.002	S3		14.6	OK
1.003	S2		14.4	OK
1.004	S1		16.9	OK

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Ystalyfera
Drainage Design



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

Half Drain Time : 24 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	90.679	0.279	0.0	2.5	2.5	4.0	Flood Risk
30 min Summer	90.761	0.361	0.0	2.5	2.5	5.1	Flood Risk
60 min Summer	90.811	0.411	0.0	2.5	2.5	5.9	Flood Risk
120 min Summer	90.807	0.407	0.0	2.5	2.5	5.8	Flood Risk
180 min Summer	90.762	0.362	0.0	2.5	2.5	5.2	Flood Risk
240 min Summer	90.704	0.304	0.0	2.5	2.5	4.3	Flood Risk
360 min Summer	90.610	0.210	0.0	2.5	2.5	3.0	Flood Risk
480 min Summer	90.546	0.146	0.0	2.5	2.5	2.1	O K
600 min Summer	90.510	0.110	0.0	2.5	2.5	1.6	O K
720 min Summer	90.494	0.094	0.0	2.3	2.3	1.3	O K
960 min Summer	90.479	0.079	0.0	1.9	1.9	1.1	O K
1440 min Summer	90.463	0.063	0.0	1.5	1.5	0.9	O K
2160 min Summer	90.453	0.053	0.0	1.1	1.1	0.7	O K
2880 min Summer	90.447	0.047	0.0	0.9	0.9	0.7	O K
4320 min Summer	90.440	0.040	0.0	0.7	0.7	0.6	O K
5760 min Summer	90.436	0.036	0.0	0.6	0.6	0.5	O K
7200 min Summer	90.433	0.033	0.0	0.5	0.5	0.5	O K
8640 min Summer	90.431	0.031	0.0	0.4	0.4	0.4	O K
10080 min Summer	90.429	0.029	0.0	0.4	0.4	0.4	O K
15 min Winter	90.721	0.321	0.0	2.5	2.5	4.6	Flood Risk
30 min Winter	90.812	0.412	0.0	2.5	2.5	5.9	Flood Risk
60 min Winter	90.863	0.463	0.0	2.5	2.5	6.6	Flood Risk
120 min Winter	90.833	0.433	0.0	2.5	2.5	6.2	Flood Risk
180 min Winter	90.751	0.351	0.0	2.5	2.5	5.0	Flood Risk
240 min Winter	90.655	0.255	0.0	2.5	2.5	3.6	Flood Risk
360 min Winter	90.530	0.130	0.0	2.5	2.5	1.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	104.720	0.0	5.5	15
30 min Summer	75.901	0.0	8.0	26
60 min Summer	52.662	0.0	11.1	44
120 min Summer	34.888	0.0	14.6	78
180 min Summer	26.776	0.0	16.9	112
240 min Summer	22.171	0.0	18.6	144
360 min Summer	16.924	0.0	21.3	202
480 min Summer	13.934	0.0	23.4	258
600 min Summer	11.965	0.0	25.1	312
720 min Summer	10.554	0.0	26.6	370
960 min Summer	8.642	0.0	29.0	490
1440 min Summer	6.496	0.0	32.7	734
2160 min Summer	4.885	0.0	36.9	1092
2880 min Summer	3.995	0.0	40.3	1444
4320 min Summer	3.018	0.0	45.6	2180
5760 min Summer	2.483	0.0	50.0	2888
7200 min Summer	2.142	0.0	54.0	3640
8640 min Summer	1.905	0.0	57.6	4280
10080 min Summer	1.727	0.0	60.9	5016
15 min Winter	104.720	0.0	6.2	16
30 min Winter	75.901	0.0	8.9	27
60 min Winter	52.662	0.0	12.4	46
120 min Winter	34.888	0.0	16.4	84
180 min Winter	26.776	0.0	18.9	122
240 min Winter	22.171	0.0	20.9	150

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Ystalyfera
Drainage Design



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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
480 min Winter	90.492	0.092	0.0	2.3	2.3	1.3	O K
600 min Winter	90.480	0.080	0.0	2.0	2.0	1.1	O K
720 min Winter	90.471	0.071	0.0	1.7	1.7	1.0	O K
960 min Winter	90.462	0.062	0.0	1.4	1.4	0.9	O K
1440 min Winter	90.451	0.051	0.0	1.1	1.1	0.7	O K
2160 min Winter	90.443	0.043	0.0	0.8	0.8	0.6	O K
2880 min Winter	90.439	0.039	0.0	0.7	0.7	0.6	O K
4320 min Winter	90.433	0.033	0.0	0.5	0.5	0.5	O K
5760 min Winter	90.430	0.030	0.0	0.4	0.4	0.4	O K
7200 min Winter	90.428	0.028	0.0	0.4	0.4	0.4	O K
8640 min Winter	90.426	0.026	0.0	0.3	0.3	0.4	O K
10080 min Winter	90.425	0.025	0.0	0.3	0.3	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
480 min Winter	13.934	0.0	26.2	250
600 min Winter	11.965	0.0	28.1	308
720 min Winter	10.554	0.0	29.8	370
960 min Winter	8.642	0.0	32.5	494
1440 min Winter	6.496	0.0	36.7	734
2160 min Winter	4.885	0.0	41.4	1100
2880 min Winter	3.995	0.0	45.1	1456
4320 min Winter	3.018	0.0	51.1	2172
5760 min Winter	2.483	0.0	56.1	2936
7200 min Winter	2.142	0.0	60.5	3616
8640 min Winter	1.905	0.0	64.5	4360
10080 min Winter	1.727	0.0	68.2	5024

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Drainage Design



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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)	20.000	Shortest Storm (mins)	15
Ratio R	0.224	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.028

Time (mins)	Area
From:	To: (ha)

0	4	0.028
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Model Details

Storage is Online Cover Level (m) 90.900

Cellular Storage Structure

Invert Level (m) 90.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	15.0	15.0	0.500	15.0	26.5	0.600	0.0	26.5

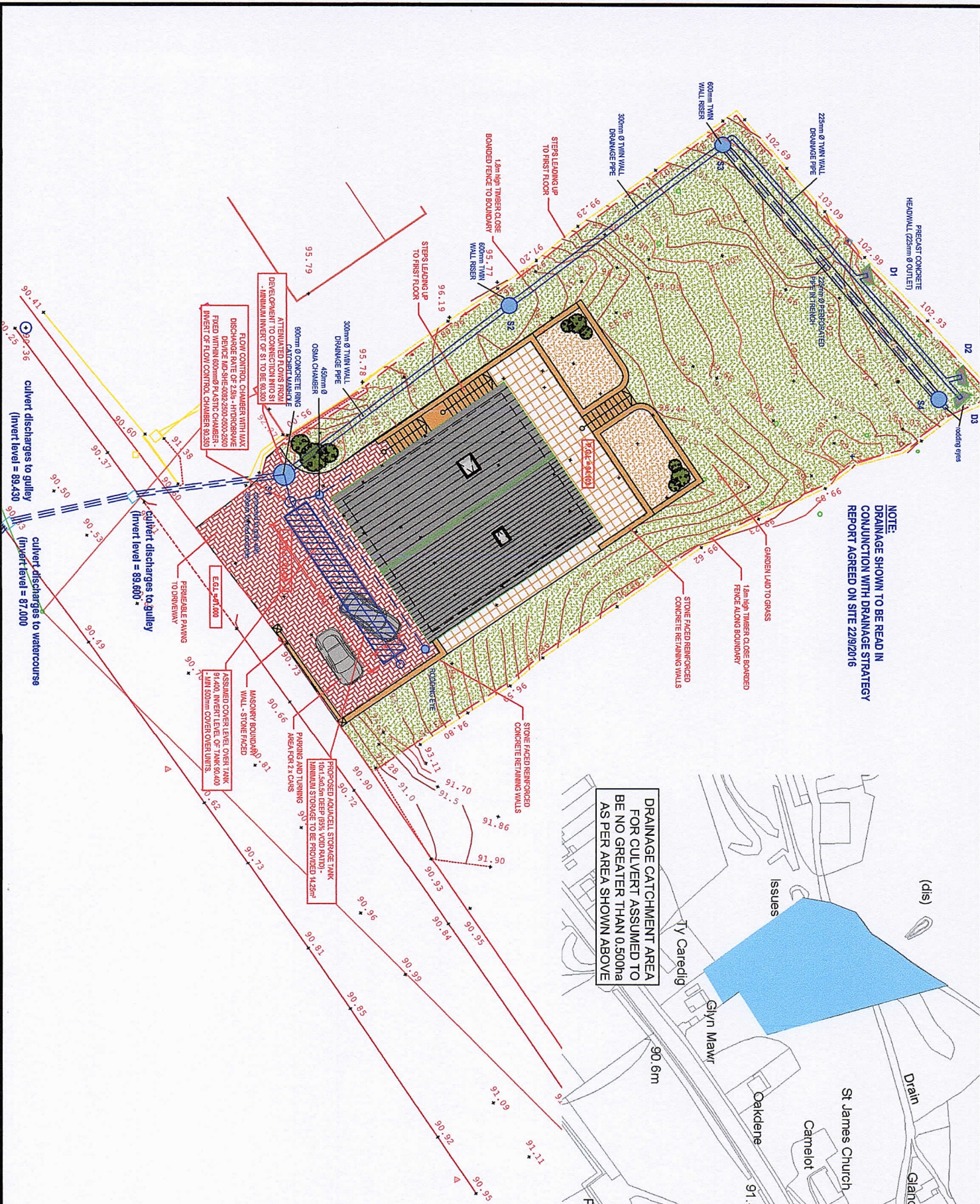
Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0082-2500-0500-2500
Design Head (m) 0.500
Design Flow (l/s) 2.5
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 82
Invert Level (m) 90.400
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	2.5	Kick-Flo®	0.349	2.1
Flush-Flo™	0.152	2.5	Mean Flow over Head Range	-	2.1

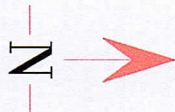
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	0.800	3.1	2.000	4.7	4.000	6.6	7.000	8.6
0.200	2.5	1.000	3.4	2.200	5.0	4.500	6.9	7.500	8.9
0.300	2.3	1.200	3.7	2.400	5.2	5.000	7.3	8.000	9.2
0.400	2.3	1.400	4.0	2.600	5.4	5.500	7.6	8.500	9.5
0.500	2.5	1.600	4.3	3.000	5.7	6.000	8.0	9.000	9.8
0.600	2.7	1.800	4.5	3.500	6.2	6.500	8.3	9.500	10.0



NOTE:
DRAINAGE SHOWN TO BE READ IN
CONJUNCTION WITH DRAINAGE STRATEGY
REPORT AGREED ON SITE 22/9/2016

DRAINAGE CATCHMENT AREA
FOR CULVERT ASSUMED TO
BE NO GREATER THAN 0.500ha
AS PER AREA SHOWN ABOVE



Client: Mr. & Mrs. H. Jones

Drawing Title: PROPOSED DETACHED DWEL on land adjacent to 261 Craig Road Goder Craig Swansea

Drawing Issue: 003

Date: 01-08-2016

Scale(s): 1:200

General Notes:
1. Draw made by the property, land, ground & boundaries only.
2. Dimensions are by measurement unless otherwise stated.

Drawing Issue: 003

Revised: 07.1

Proper Size:

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