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REPORT

GallifordTry

PROJECT No	FR1636
PROJECT TITLE	BARRY – BIOMASS UK Number 2 LTD
CLIENT	GALLIFORD TRY

DISCIPLINE	CIVIL / STRUCTURAL
DOCUMENT TITLE	SURFACE WATER DRAINAGE DESIGN
DOCUMENT NUMBER	BARRY_01_REP_01_20063

ISSUE	CREATED BY	DATE	CHECKED BY	APPROVED BY	REASON FOR ISSUE
			M. Sm.	KC	
A	HA	12/07/17	MS	GB	FOR INFORMATION

BARRY_01_REP_01_20063

REPORT

CHANGE TRACKING LOG		
Revision	Date	Description
A	12/07/2017	First issue

BARRY_01_REP_01_20063

REPORT

CONTENTS

REPORT

PART A – INTRODUCTION

A1- DESCRITPION

This report covers the design of the surface water drainage network for the Barry EFW project.

Drawings are attached in the Appendix D highlighting layouts of the drainage network.

A2- STRUCTURAL FORM

The surface water drainage network utilises a Tubosider attenuation tank for storage capacity and ACO drains.

A restricted discharge for the surface water drainage of 3 l/s has been imposed by PCML.

A3- SURFACE WATER DRAINAGE DESIGN PARAMETERS

Design of the network is carried out using MicroDrainage System 1 to set up the network and Simulation to run the storm events through the network.

The following parameters were used to assess the new surface water drainage network on the site:

- 1:1 year storm event (+20% for future anticipated climate change BS EN 752 Cl. 8.4.3.3) to check the manholes are not surcharged where possible (BS EN 752 NA.4.1.2 & 4.2.3.3).
- Surcharging of individual manholes is considered acceptable, in a 1:1 year storm event, provided that the surcharging does not pose a flood risk. A manhole will pose a flood risk when the surcharge level is within 300mm of the manhole cover level.
- 1:30 year storm event (+20% for future anticipated climate change BS EN 652 Cl. 8.4.3.3) to check the network does not flood (BS EN 752 NA.4.1.2).
- 1:100 year storm event (+20% for future anticipated climate change BS EN 752 Cl. 8.4.3.3) to check that any flood that occurs is contained on site.
- Various storm durations between 15 minutes and 10080 minutes (7 days) are analysed to find the critical storm for design.
- An infiltration rate of 0% was used to all concrete/tarmac hardstanding areas.
- Due to the levels of the site the discharge will be pumped at a restricted discharge rate imposed by PCML (3 l/s).
- Pipes are to be laid generally with a minimum 1:300 fall, with a steeper gradient where required to avoid clashes with other services.
- Surface water from the hardstanding areas and the roof areas are to be laid to gravity falls into a Tubosider Storm Water Retention tank.

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A4- ACO DRAINAGE DESIGN PARAMETERS

ACO drainage design is carried out using ACO's online design programme at www.acodesign.co.uk.

The following parameters were used to design the kerb drains and slot drains on the site:

- 1:30 year storm event to check the system has the required flow capacity.
- An infiltration rate of 0% was used to all concrete/tarmac hardstanding areas.
- All kerb drains and slot drains are assumed to have a level invert, with stepped transitions between different sized sections (where applicable).

A5- DESIGN DECISIONS TAKEN BY OTHERS

- PCML discharge consent flow rate 3 l/s.

A6- DESIGN ASSUMPTIONS

- No allowance has been made for run-off from grass verges or surrounding landscaping. These areas are assumed to have a 100% infiltration rate.
- Pipes in the network are assumed to have a roughness coefficient of 0.6mm.

A7- DESIGN EXCLUSIONS

- Temporary works.
- Foul sewer network.
- Rainwater harvesting tanks.

REPORT

A8- REFERENCES

Document Reference	*Title*
[1] BS EN 752:2008	Drain and sewer systems outside buildings
[2] BARRY_01_DWG_01_20131 to 20136	Site services Gas & schedule
[3] TUB/15257	Storm Water Retention Tank for Barry Biomass

REPORT

APPENDIX A – DESIGN RISK ASSESSMENT

DESIGN RISK MANAGEMENT LOG PROJECT: Surface Water Drainage

Rating	Impact
3	Fatality, Major Environmental incident involving threat to Public Health, Criminal Liability
2	Major Injury to worker / 1/3 party, Operation likely to cause damage, complaint or nuisance
1	Minor injury to worker, 1/3 party Env impact requiring management response to cover.

		Degree of Risk		
Impact	3	3	6	9
	2	2	4	6
	1	1	2	3
		1	2	3
		Likelihood		

Likelihood:
'3' - Almost certain (>70%)
'2' - Possible(20-70%)
'1' - Neglible -(<20%).

Degree of Risk	Risk level
1 to 2	Low
3 to 4	Medium
6 to 9	High

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Checked by:	M SPENCER
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Document Ref:	BARRY_01_REP_01_20063
Revision:	A
Documentation Referred to:	BARRY_01_REP_01_20063

THINK ABOUT HOW THE DESIGN IS TO BE BUILT, OPERATED, MAINTAINED, IMPACTS ON THE PUBLIC AND IS LATER DEMOLISHED

CONCEPT AND DEFINITION STAGE | **IMPLEMENTATION STAGE**

No.	Date	Originator (Name)	Location / Structure	Hazard	Risk	Original Asssmnt			Designer Measures Taken to Reduce/Eliminate Hazard by Design	Revsd Assmnt			Comment on Residual Issues, hazards or Risks *(Significant Risks)*	Design Assumptions and Info to be provided about the residual hazards - Idenfied on Drwg/ Doc No.	Status
						Impact	Likelihood	Degree		Impact	Likelihood	Degree			Active / Closed
Design															
1	Jul-17	H Ashraf	Surface water Drainage	Buried Services	Striking live services during construction.	3	2	6	All known services detailed on drawings. Risk of encountering unknown services shown on drawings. Site investigation including CAT SCAN to locate all chartered and unchartered services. Notes added to drawing regarding risk.	3	1	3	SHE Box to be added to drawings.		ACTIVE
2	Jul-17	H Ashraf	Surface water Drainage	Vehicle impact on ACO KerbDrains	Damage to the kerb drainage system	3	2	6	ACO KerbDrains to be installed in accordance with the manufacturer's installation detail, which includes a mass concrete surround.	3	1	3	Notes and construction details to be added to drawings.		ACTIVE
3	Jul-17	H Ashraf	Surface water Drainage	Vehicle loading on ACO Q-Max slot drainage system	Damage to the slot drainage system	3	2	6	ACO Q-Max slot drainage system to be installed in accordance with the manufacturer's installation detail, which includes a mass concrete surround. System to be provided with D400 access covers.	3	1	3	Notes and construction details to be added to drawings.		ACTIVE

Operation / Maintenance Period

Impacts on the Public

Demolition

Designers have to consider ALL HAZARDS and do what is reasonable to eliminate if feasible, or reduce risks where hazards remain. But, when it comes to PASSING ON INFORMATION, Designers do not need to mention every hazard or assumption, but they MUST POINT OUT SIGNIFICANT RISKS. These are not necessarily those that result in greatest risk, but those that are:- a) not likely to be obvious to a competent Designer or Contractor, b) unusual, or c) likely to be difficult to manage effectively.

Note 1: The Appointed Temporary Works Coordinator must ensure that any temporary works designs are undertaken by a suitably competent person and be risk assessed.

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APPENDIX B – MICRODRAINAGE OUTPUT

Reference

MICRO DRAINAGE OUTPUT

DESIGN OF THE SURFACE WATER DRAINAGE IS CARRIED OUT USING MICRO DRAINAGE.

THE DESIGN IS BASED ON DRAINAGE AREAS MARKED ON A DRAWING IN APPENDIX D.

THE ANALYSIS INCLUDES:

- 1:1 YEAR STORM + 20% CLIMATE CHANGE
- 1:30 YEAR STORM + 20% CLIMATE CHANGE
- 1:100 YEAR STORM + 20% CLIMATE CHANGE

THE STORM DURATIONS VARY BETWEEN 15 MINS - 10080 MINS.

George Hutchison Associates Limited		Page 1
The Studio 51 Brookfield Road Cheadle SK8 1ES	BARRY EFW SURFACE DRAINAGE	Micro Drainage®
Date 06/07/2017 File MODEL HA1.SUM	Designed By HA Checked By MG	
Micro Drainage	Simulation W.11.2	

On-Line Controls (Pump)

US/PN	Volume (m^3)	Ctrl MH Name	Invert (m)	Headloss (m)	Flow (l/s)
1.006	606.202	20	5.300	0.2	3.0
				0.4	3.0
				0.6	3.0
				0.8	3.0
				1.0	3.0
				1.4	3.0
				1.8	3.0
				2.2	3.0
				2.6	3.0
				3.0	3.0
				3.4	3.0
				3.8	3.0
				4.2	3.0

Network Details

* - Indicates pipe has been modified outside of WinDes's Storm/Foul & Schedules

PN	Length (m)	Fall (m)	Slope (1:x)	Area (ha)	T.E. (mins)	Rain Pro	k (mm)	Hyd Sect	Dia (mm)
1.000	31.10	0.104	299.0	0.124	5.00	1	0.600	o	225
1.001	16.20	0.054	300.0	0.064	0.00	1	0.600	o	300
1.002	28.15	0.094	299.5	0.058	0.00	1	0.600	o	300
2.000	29.20	0.097	301.0	0.058	5.00	1	0.600	o	225
2.001	18.58	0.062	299.7	0.016	0.00	1	0.600	o	225
1.003	9.61	0.048	200.2	0.000	0.00	1	0.600	o	300
3.000	12.88	0.043	299.5	0.008	5.00	1	0.600	o	150
3.001	19.00	0.063	301.6	0.000	0.00	1	0.600	o	150
3.002	10.92	0.037	295.1	0.036	0.00	1	0.600	o	225
3.003	11.06	0.037	298.9	0.027	0.00	1	0.600	o	300
3.004	29.60	0.100	296.0	0.058	0.00	1	0.600	o	300
3.005	25.46	0.090	282.9	0.047	0.00	1	0.600	o	300
4.000	19.26	0.064	300.9	0.052	5.00	1	0.600	o	225
3.006	27.21	0.091	299.0	0.000	0.00	1	0.600	o	300
3.007	11.08	0.939	11.8	0.035	0.00	1	0.600	o	300
1.004	31.60	0.131	240.5	0.116	0.00	1	0.600	o	600
5.000	8.79	0.051	171.0	0.036	5.00	1	0.600	o	225
1.005	10.00	0.239	41.9	0.000	0.00	1	0.600	o	600
1.006	140.00	0.050	2800.0	0.000	0.00	1	0.600	o	2400
1.007	5.00	0.300	16.7	0.000	0.00	1	0.600	o	150

PN	USMH No.	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl No.	US/MH (mm)
1.000	SW06	8.350	6.660	1.465	8.440	6.556	1.659		1200
1.001	SW05	8.440	6.556	1.584	8.477	6.502	1.675		1200
1.002	SW04	8.477	6.502	1.675	8.911	6.408	2.203		1200
2.000	SW09	8.667	7.100	1.342	8.580	7.003	1.352		1200
2.001	SW08	8.580	7.003	1.352	8.911	6.941	1.745		1200
1.003	SW03	8.911	6.408	2.203	8.990	6.360	2.330		1200
3.000	SW17	8.530	7.760	0.620	8.530	7.717	0.663		1200
3.001	SW16	8.530	7.717	0.663	8.675	7.654	0.871		1200
3.002	SW15	8.675	7.654	0.796	8.675	7.617	0.833		1200
3.003	SW14	8.675	7.617	0.758	8.640	7.580	0.760		1200
3.004	SW13	8.640	7.580	0.760	8.640	7.480	0.860		1200
3.005	SW12	8.640	7.480	0.860	9.300	7.390	1.610		1200
4.000	SW10	9.300	7.450	1.625	9.300	7.386	1.689		1800
3.006	SW11	9.300	7.390	1.610	8.900	7.299	1.301		1800
3.007	SW07	8.900	7.299	1.301	8.990	6.360	2.330		1200
1.004	SW02	8.990	6.360	2.030	9.000	6.229	2.171		1800
5.000	SW18	9.000	6.280	2.495	9.000	6.229	2.546		1800
1.005	SW01	9.000	6.229	2.171	9.000	5.990	2.410		1800
1.006	tubosider tank	9.000	5.400	1.200	9.000	5.350	1.250		10500
1.007	20	9.000	5.300	3.550	9.300	5.000	4.150	5	1500

MANHOLE SCHEDULES

M/Hole Number	Cover Level (m)	M/Hole Depth (m)	M/Hole Diam.,L*W (mm)	Pipes Out PN	Pipes Out IL.(m)	Pipes Out D (mm)	Pipes In PN	Pipes In IL.(m)	Pipes In D (mm)
SW06	8.350	1.690	1200	1.000	6.660	225			
SW05	8.440	1.884	1200	1.001	6.556	300	1.000	6.556	225
SW04	8.477	1.975	1200	1.002	6.502	300	1.001	6.502	300
SW09	8.667	1.567	1200	2.000	7.100	225			
SW08	8.580	1.577	1200	2.001	7.003	225	2.000	7.003	225
SW03	8.911	2.503	1200	1.003	6.408	300	1.002	6.408	300
							2.001	6.941	225
SW17	8.530	0.770	1200	3.000	7.760	150			
SW16	8.530	0.813	1200	3.001	7.717	150	3.000	7.717	150
SW15	8.675	1.021	1200	3.002	7.654	225	3.001	7.654	150
SW14	8.675	1.058	1200	3.003	7.617	300	3.002	7.617	225
SW13	8.640	1.060	1200	3.004	7.580	300	3.003	7.580	300
SW12	8.640	1.160	1200	3.005	7.480	300	3.004	7.480	300
SW10	9.300	1.850	1800	4.000	7.450	225			
SW11	9.300	1.910	1800	3.006	7.390	300	3.005	7.390	300
							4.000	7.386	225
SW07	8.900	1.601	1200	3.007	7.299	300	3.006	7.299	300
SW02	8.990	2.630	1800	1.004	6.360	600	1.003	6.360	300
							3.007	6.360	300
SW18	9.000	2.720	1800	5.000	6.280	225			
SW01	9.000	2.771	1800	1.005	6.229	600	1.004	6.229	600
							5.000	6.229	225
tubosider tank	9.000	3.600	10500	1.006	5.400	2400	1.005	5.990	600
20	9.000	3.700	1500	1.007	5.300	150	1.006	5.350	2400
Road	9.300	4.300	1200		OUTFALL		1.007	5.000	150

Summary Wizard of "CRITICAL BY RETURN PERIOD"(Rank 1 by Max Level)
Results for Design Storms

Margin for Flood Risk warning (mm) 300 Inertia Status OFF
DTS Status ON Analysis Time Step Fine
DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 20, 20, 20

PN	Storm	Return Period	Climate Change	Rank	First X Surcharge	First Y Flood	First Z Overflow	O/F Act
1.000	15 Winter	1	20%	1	30/15 Summer			
1.001	15 Winter	1	20%	1	30/15 Summer			
1.002	15 Winter	1	20%	1	30/15 Summer			
2.000	15 Winter	1	20%	1				
2.001	15 Winter	1	20%	1				
1.003	15 Winter	1	20%	1	30/15 Summer			
3.000	15 Winter	1	20%	1	100/15 Summer			
3.001	15 Winter	1	20%	1	100/15 Summer			
3.002	15 Winter	1	20%	1	100/15 Summer			
3.003	15 Winter	1	20%	1	100/15 Winter			
3.004	15 Winter	1	20%	1	100/15 Summer			
3.005	15 Winter	1	20%	1	100/15 Summer			
4.000	15 Winter	1	20%	1	30/15 Summer			
3.006	15 Winter	1	20%	1	100/15 Summer			
3.007	15 Winter	1	20%	1				
1.004	15 Winter	1	20%	1				
5.000	15 Winter	1	20%	1	30/15 Winter			
1.005	15 Winter	1	20%	1	100/960 Winter			
1.006	960 Winter	1	20%	1				
1.007	960 Winter	1	20%	1	1/15 Summer			

Lvl Ex.	PN	Water Lvl. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
	1.000	6.786	-0.099	0.000	0.58	0.0	16.2	O K
	1.001	6.699	-0.157	0.000	0.42	0.0	22.6	O K
	1.002	6.653	-0.149	0.000	0.50	0.0	28.6	O K
	2.000	7.181	-0.144	0.000	0.27	0.0	7.6	O K
	2.001	7.094	-0.134	0.000	0.35	0.0	9.3	O K
	1.003	6.579	-0.129	0.000	0.61	0.0	37.2	O K
	3.000	7.794	-0.116	0.000	0.11	0.0	1.1	O K
	3.001	7.752	-0.115	0.000	0.11	0.0	1.0	O K
	3.002	7.729	-0.150	0.000	0.19	0.0	4.9	O K
	3.003	7.705	-0.212	0.000	0.15	0.0	7.9	O K
	3.004	7.681	-0.199	0.000	0.24	0.0	14.1	O K
	3.005	7.597	-0.183	0.000	0.32	0.0	18.7	O K
	4.000	7.543	-0.132	0.000	0.24	0.0	6.5	O K
	3.006	7.526	-0.164	0.000	0.42	0.0	24.1	O K
	3.007	7.366	-0.233	0.000	0.11	0.0	27.2	O K
	1.004	6.546	-0.414	0.000	0.21	0.0	75.3	O K
	5.000	6.392	-0.113	0.000	0.13	0.0	4.1	O K
	1.005	6.388	-0.441	0.000	0.16	0.0	78.2	O K
	1.006	5.983	-1.817	0.000	0.00	0.0	8.0	O K
	1.007	5.984	0.534	0.000	0.09	0.0	3.0	SURCH'ED

Summary Wizard of "CRITICAL BY RETURN PERIOD"(Rank 1 by Max Level)
Results for Design Storms

Margin for Flood Risk warning (mm) 300 Inertia Status OFF
DTS Status ON Analysis Time Step Fine
DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 20, 20, 20

PN	Storm	Return Period	Climate Change	Rank	First X Surcharge	First Y Flood	First Z Overflow	O/F Act
[illegible]								
1.001	15 Winter	30	20%	1	30/15 Summer			
[illegible]								
2.000	15 Winter	30	20%	1				
2.001	15 Winter	30	20%	1				
[illegible]								
3.000	15 Winter	30	20%	1	100/15 Summer			
3.001	15 Winter	30	20%	1	100/15 Summer			
3.002	15 Winter	30	20%	1	100/15 Summer			
3.003	15 Winter	30	20%	1	100/15 Winter			
3.004	15 Winter	30	20%	1	100/15 Summer			
3.005	15 Winter	30	20%	1	100/15 Summer			
4.000	15 Winter	30	20%	1	30/15 Summer			
[illegible]								
3.007	15 Winter	30	20%	1				
1.004	15 Winter	30	20%	1				
5.000	960 Winter	30	20%	1	30/15 Winter			
1.005	960 Winter	30	20%	1	100/960 Winter			
1.006	960 Winter	30	20%	1				
1.007	960 Winter	30	20%	1	1/15 Summer			

Lvl Ex.	PN	Water Lvl. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
[illegible]								
	1.001	6.998	0.142	0.000	0.98	0.0	52.9	SURCH'ED
[illegible]								
	2.000	7.238	-0.087	0.000	0.67	0.0	18.5	O K
	2.001	7.165	-0.063	0.000	0.86	0.0	23.1	O K
[illegible]								
	3.000	7.836	-0.074	0.000	0.27	0.0	2.5	O K
	3.001	7.828	-0.039	0.000	0.31	0.0	3.0	O K
	3.002	7.819	-0.060	0.000	0.54	0.0	13.6	O K
	3.003	7.803	-0.114	0.000	0.44	0.0	22.3	O K
	3.004	7.790	-0.090	0.000	0.68	0.0	39.7	O K
	3.005	7.748	-0.032	0.000	0.85	0.0	50.0	O K
	4.000	7.719	0.044	0.000	0.53	0.0	14.3	SURCH'ED
[illegible]								
	3.007	7.407	-0.192	0.000	0.28	0.0	67.0	O K
	1.004	6.670	-0.290	0.000	0.51	0.0	186.6	O K
	5.000	6.573	0.068	0.000	0.03	0.0	1.1	SURCH'ED
	1.005	6.574	-0.255	0.000	0.04	0.0	21.9	O K
	1.006	6.573	-1.227	0.000	0.00	0.0	17.2	O K
	1.007	6.573	1.123	0.000	0.09	0.0	3.0	SURCH'ED

George Hutchison Associates Limited		Page 6
The Studio 51 Brookfield Road Cheadle SK8 1ES	BARRY EFW SURFACE DRAINAGE	Micro Drainage
Date 06/07/2017 File MODEL HA1.SUM	Designed By HA Checked By MS	
Micro Drainage	Simulation W.11.2	

Summary Wizard of "CRITICAL BY RETURN PERIOD"(Rank 1 by Max Level)
Results for Design Storms

Margin for Flood Risk warning (mm) 300 Inertia Status OFF
DTS Status ON Analysis Time Step Fine
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Profile(s) Summer and Winter
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Return Period(s) (years) 1, 30, 100
Climate Change (%) 20, 20, 20

PN	Storm	Return Period	Climate Change	Rank	First X Surcharge	First Y Flood	First Z Overflow	O/F Act
2.000	15 Winter	100	20%	1				
3.000	15 Winter	100	20%	1	100/15 Summer			
3.001	15 Winter	100	20%	1	100/15 Summer			
3.002	15 Winter	100	20%	1	100/15 Summer			
3.003	15 Winter	100	20%	1	100/15 Winter			
3.004	15 Winter	100	20%	1	100/15 Summer			
4.000	15 Winter	100	20%	1	30/15 Summer			
3.007	15 Winter	100	20%	1				
1.004	960 Winter	100	20%	1				
5.000	960 Winter	100	20%	1	30/15 Winter			
1.005	960 Winter	100	20%	1	100/960 Winter			
1.006	960 Winter	100	20%	1				
1.007	960 Winter	100	20%	1	1/15 Summer			

Lvl Ex.	PN	Water Lvl. (m)	Surcharged Depth (m)	Flooded Vol (m³)	Flow/ Capacity	Overflow (l/s)	Pipe Flow (l/s)	Status
	2.000	7.296	-0.029	0.000	0.83	0.0	23.1	O K
	3.000	7.964	0.054	0.000	0.34	0.0	3.2	SURCH'ED
	3.001	7.954	0.087	0.000	0.51	0.0	4.8	SURCH'ED
	3.002	7.946	0.067	0.000	0.58	0.0	14.7	SURCH'ED
	3.003	7.925	0.008	0.000	0.48	0.0	24.2	SURCH'ED
	3.004	7.908	0.028	0.000	0.78	0.0	45.4	SURCH'ED
	4.000	7.795	0.120	0.000	0.72	0.0	19.2	SURCH'ED
	3.007	7.424	-0.175	0.000	0.36	0.0	87.1	O K
	1.004	6.856	-0.104	0.000	0.07	0.0	26.3	O K
	5.000	6.856	0.351	0.000	0.04	0.0	1.3	SURCH'ED
	1.005	6.857	0.028	0.000	0.06	0.0	27.4	SURCH'ED
	1.006	6.856	-0.944	0.000	0.00	0.0	21.6	O K
	1.007	6.856	1.406	0.000	0.09	0.0	3.0	SURCH'ED

BARRY_01_REP_01_20063

REPORT

APPENDIX C – ACO DRAINAGE DESIGN OUTPUT

CX01

ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Haroon Ashraf MS

Date: 11-07-2017

Run No.: 3 **Option No.:** A

RAINFALL INTENSITY

RETURN PERIOD	30 years	
R	0.34	
M5-60	19.0	(mm/h)

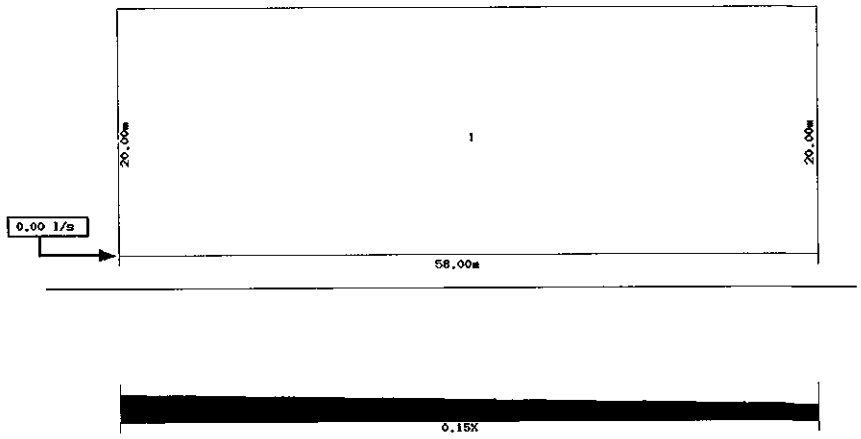
RAINFALL DATA

Duration	Intensity (mm/h)
[redacted]	[redacted]
10 mins	82.54
15 mins	**71.62**
30 mins	47.43
1 hour	**29.91**
2 hours	18.59
4 hours	**11.08**
6 hours	8.13
10 hours	**5.57**
24 hours	2.87
48 hours	**1.63**

RAINFALL SPECIFIED

ALLOWANCE FOR CLIMATE CHANGE	20.0	%
DESIGN RAINFALL INTENSITY	126.78	(mm/h)
	0.0352	l/s m²

CHANNEL LAYOUT



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CX02

ACO Design
Hydraulic Calculation:

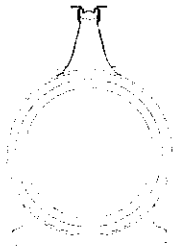
+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Haroon Ashraf/MS
Date: 11-07-2017

+ INPUT

Channel System: Qmax



	1	2	3	4	5	6	7	8	9	10
System	Qmax 150	Qmax 225	Qmax 350							
W – Width (mm)	150	225	350							
H – Invert (mm)	350	425	550							
Length (m)	8	34	16							

Kinematic Viscosity (m²/s)	1.14x10^-6	**Area Drained (m²)**	1160.00
Rainfall Intensity (l/s x m)	0.0352 (= 126.78mm/h)	**Impermeability**	1.00
		Channel Length (m)	58.00

+ RESULTS

Outflow (l/s):	40.893
Max. Velocity (m/s):	1.06
Min. Freeboard (m):	0.000
Percentage Capacity (%):	99.97%
Max. Valid Length (m):	58.00 (Full Length)

Notes:

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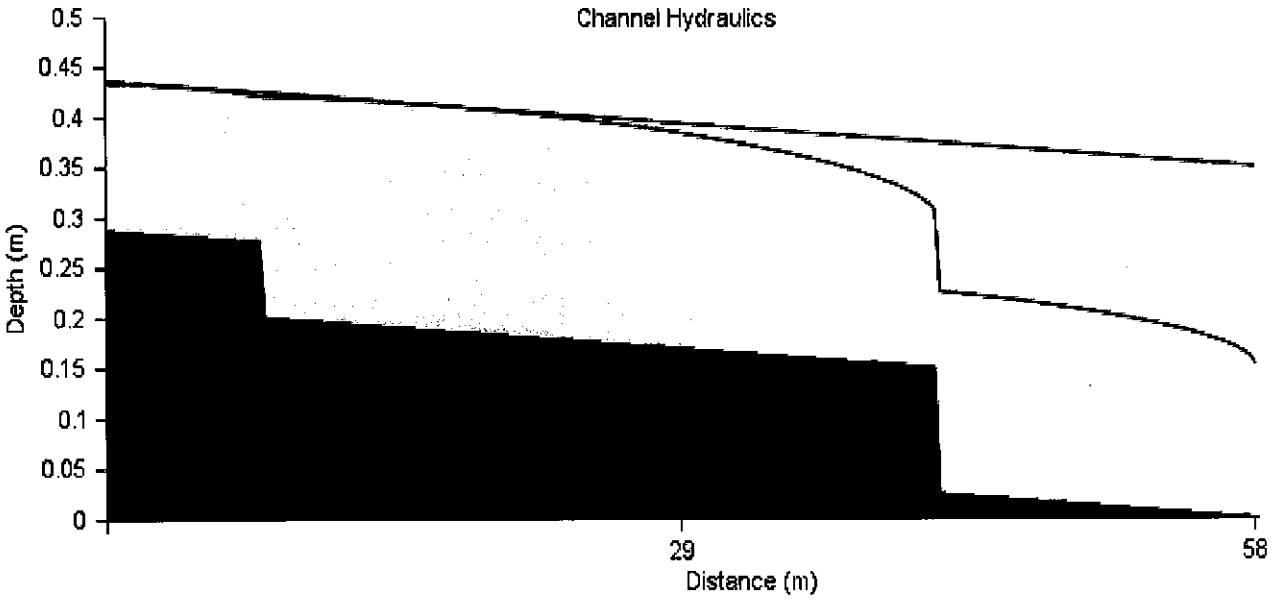
CX03

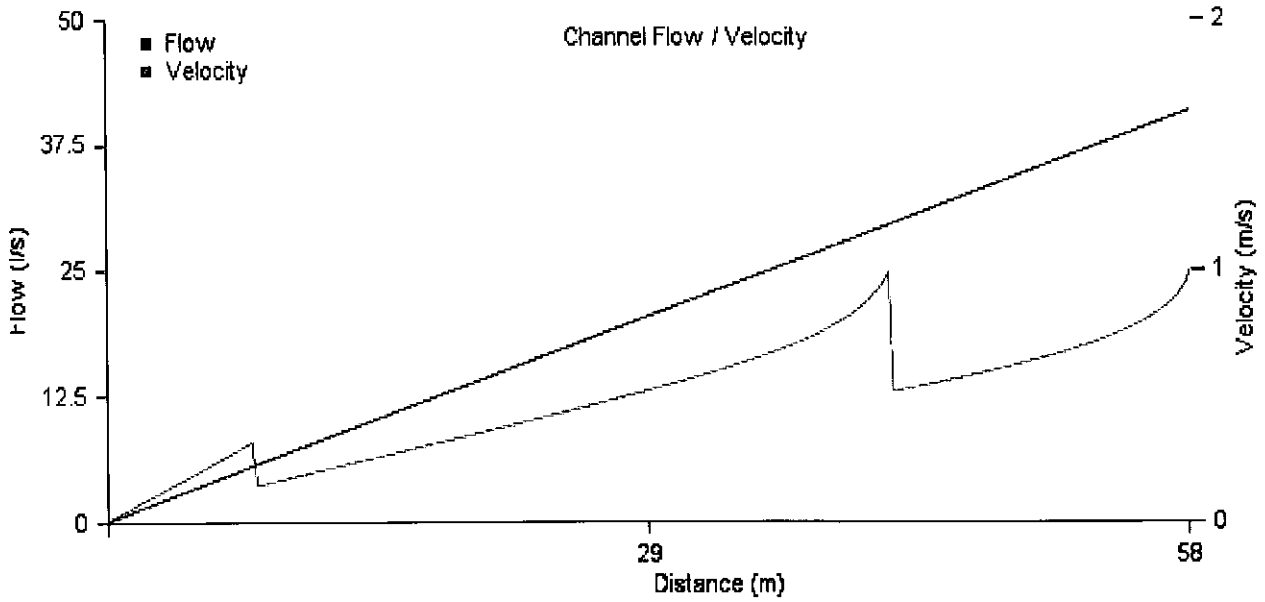
ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Haroon Ashraf /HS
Date: 11-07-2017





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CX04

ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Haroon Ashraf
Date: 11-07-2017

DISCLAIMER

This simplified estimate of storage volume determines the largest volume required using the rainfall intensities for a range of different rainfall durations, for the location and return period specified by the designer. The type of flow control device is not known, so the calculation assumes a constant rate of outfall from the storage volume for the whole duration of the storm. Please contact ACO Design Services for further advice and details of the ACO Q-Brake Vortex Flow Control and the ACO StormBrixx Cellular Storage Tank.

INPUT

CATCHMENT AREA	(m^2)
MAX PERMITTED OUTFLOW	l/s
RESULT	

OUTPUT

R	l/s	STORAGE VOLUME OF CURRENT CHANNEL	m^3
M5-60	mm/h	RETURN PERIOD	
		CLIMATE CHANGE	%

DURATION	INTENSITY mm/h	REQUIRED STORAGE VOLUME (m^3)

No Attenuation Calculation Performed.

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CKOS

ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer / HA

Date: 23-08-2016

Run No.: 4 **Option No.:** A

RAINFALL INTENSITY

RETURN PERIOD	30 years	
R	0.34	
M5-60	19.0	(mm/h)

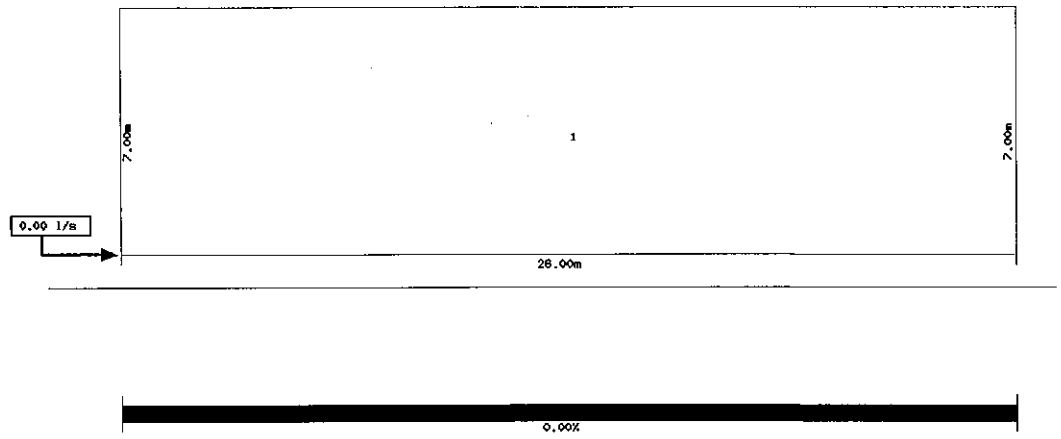
RAINFALL DATA

Duration	Intensity (mm/h)
[redacted]	[redacted]
10 mins	82.54
15 mins	**71.62**
30 mins	47.43
1 hour	**29.91**
2 hours	18.59
4 hours	**11.08**
6 hours	8.13
10 hours	**5.57**
24 hours	2.87
48 hours	**1.63**

RAINFALL SPECIFIED

ALLOWANCE FOR CLIMATE CHANGE	20.0	%
DESIGN RAINFALL INTENSITY	126.78	(mm/h)
	0.0352	l/s m²

CHANNEL LAYOUT



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CxOC

ACO Design
Hydraulic Calculation:

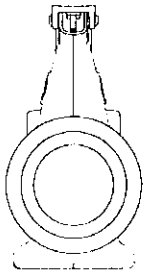
+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer /tIA
Date: 23-08-2016

+ INPUT

Channel System: Qmax



	1	2	3	4	5	6	7	8	9	10
System	Qmax 150									
W – Width (mm)	150									
H – Invert (mm)	350									
Length (m)	26.00									

Kinematic Viscosity (m²/s)	1.14x10^-6	**Area Drained (m²)**	182.00
Rainfall Intensity (l/s x m)	0.0352 (= 126.78mm/h)	**Impermeability**	1.00
		Channel Length (m)	26.00

+ RESULTS

Outflow (l/s):	6.416
Max. Velocity (m/s):	0.69
Min. Freeboard (m):	0.022
Percentage Capacity (%):	90.70%
Max. Valid Length (m):	26.00 (Full Length)

Notes:

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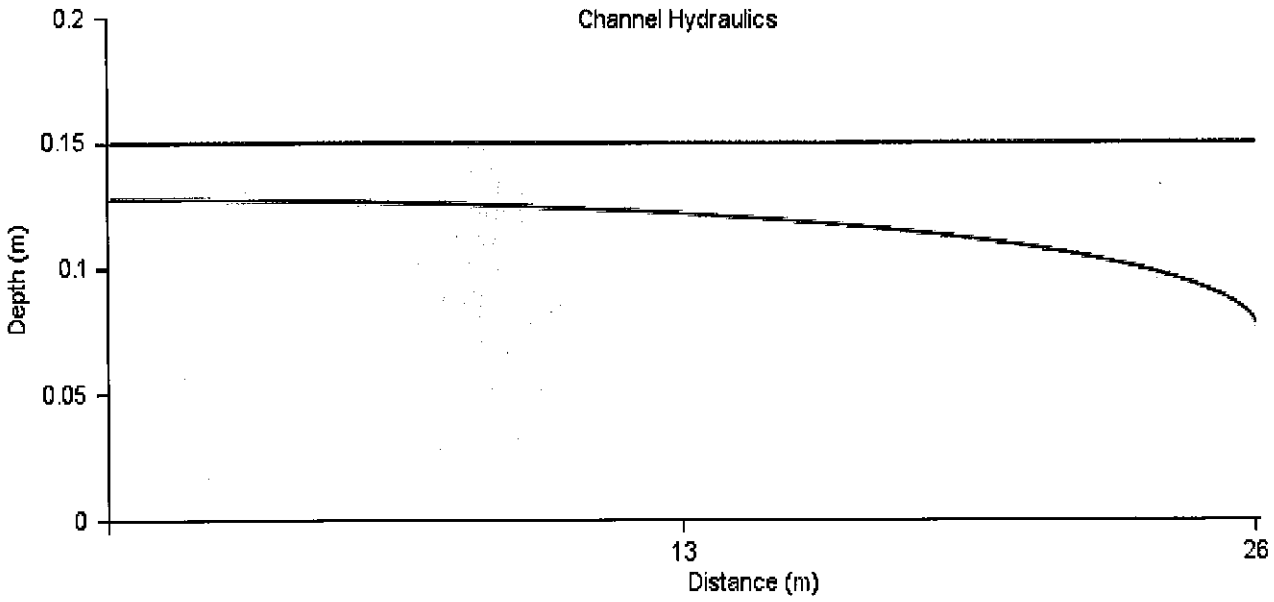
CX07

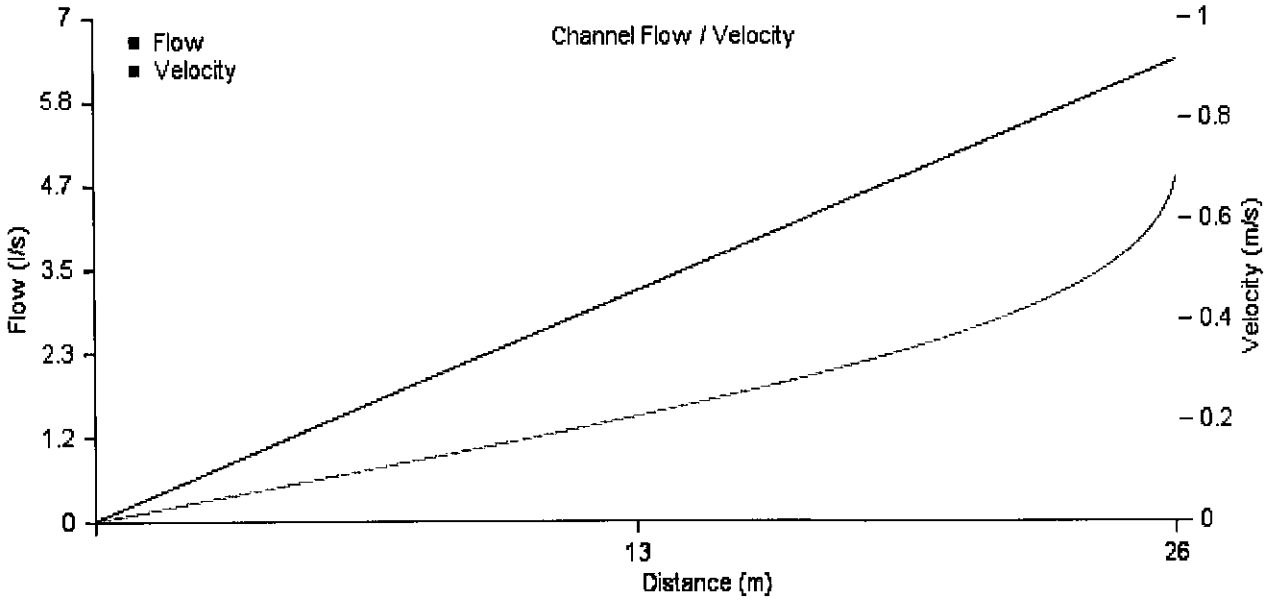
ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer / HA
Date: 23-08-2016





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CX08

ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer / HA
Date: 23-08-2016

DISCLAIMER

This simplified estimate of storage volume determines the largest volume required using the rainfall intensities for a range of different rainfall durations, for the location and return period specified by the designer. The type of flow control device is not known, so the calculation assumes a constant rate of outfall from the storage volume for the whole duration of the storm. Please contact ACO Design Services for further advice and details of the ACO Q-Brake Vortex Flow Control and the ACO StormBrixx Cellular Storage Tank.

INPUT

CATCHMENT AREA	(m^2)
MAX PERMITTED OUTFLOW	l/s
RESULT	

OUTPUT

R	l/s	STORAGE VOLUME OF CURRENT CHANNEL	m^3
M5-60	mm/h	RETURN PERIOD	
		CLIMATE CHANGE	%

DURATION	INTENSITY mm/h	REQUIRED STORAGE VOLUME (m^3)

No Attenuation Calculation Performed.

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CX09

ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer / MA

Date: 23-08-2016

Run No.: 5 **Option No.:** A

RAINFALL INTENSITY

RETURN PERIOD	30 years	
R	0.34	
M5-60	19.0	(mm/h)

WARNING CRITICAL FLOW ENCOUNTERED

The flow in this channel varies between sub-critical and super-critical conditions so the depth / velocity calculation is not precise. However, your selected channel will have sufficient capacity to accommodate the defined flow. Note that optimised solutions will only suggest non-turbulent, sub-critical flow regimes.

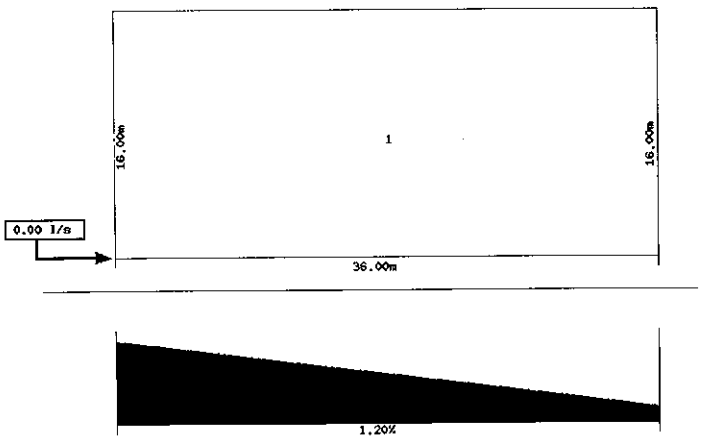
RAINFALL DATA

Duration	Intensity (mm/h)
[illegible]	[illegible]
10 mins	82.54
15 mins	**71.62**
30 mins	47.43
1 hour	**29.91**
2 hours	18.59
4 hours	**11.08**
6 hours	8.13
10 hours	**5.57**
24 hours	2.87
48 hours	**1.63**

RAINFALL SPECIFIED

ALLOWANCE FOR CLIMATE CHANGE	20.0	%
DESIGN RAINFALL INTENSITY	126.78	(mm/h)
	0.0352	l/s m²

CHANNEL LAYOUT



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CK10

ACO Design
Hydraulic Calculation:

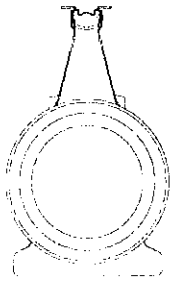
+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer / HA
Date: 23-08-2016

+ INPUT

Channel System: Qmax



	1	2	3	4	5	6	7	8	9	10
System	Qmax 225									
W – Width (mm)	225									
H – Invert (mm)	425									
Length (m)	36.00									

Kinematic Viscosity (m²/s)	1.14x10^-6	**Area Drained (m²)**	576.00
Rainfall Intensity (l/s x m)	0.0352 (= 126.78mm/h)	**Impermeability**	1.00
		Channel Length (m)	36.00

+ RESULTS

Outflow (l/s):	20.305
Max. Velocity (m/s):	0.91
Min. Freeboard (m):	0.102
Percentage Capacity (%):	55.98%
Max. Valid Length (m):	36.00 (Full Length)

Notes:

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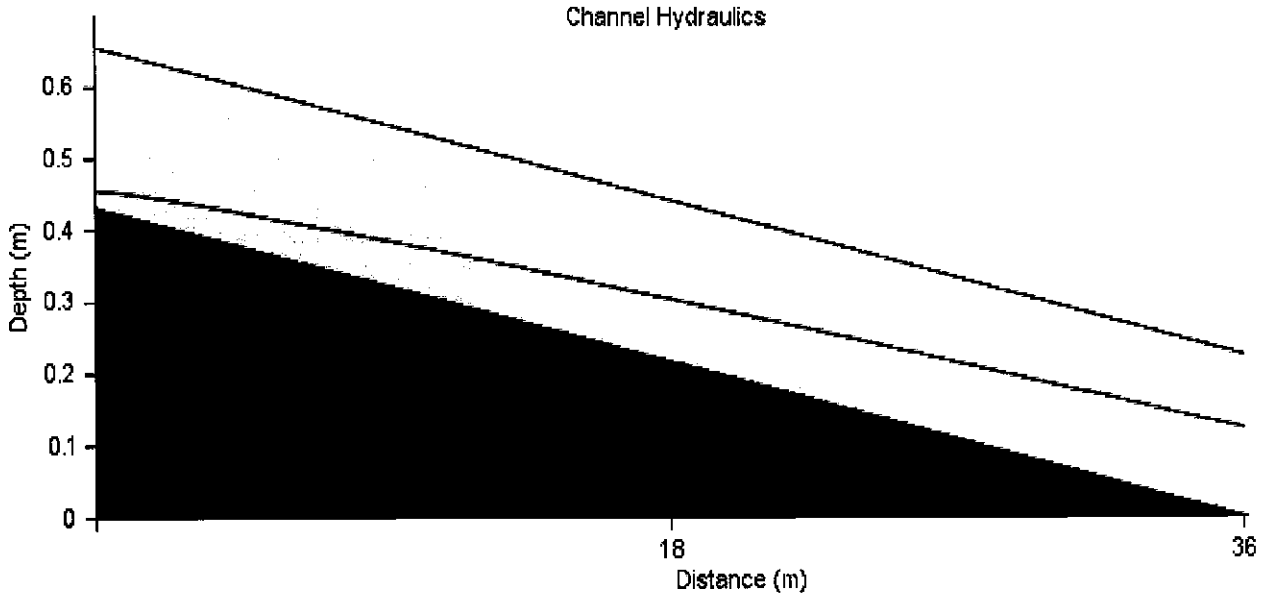
CAU

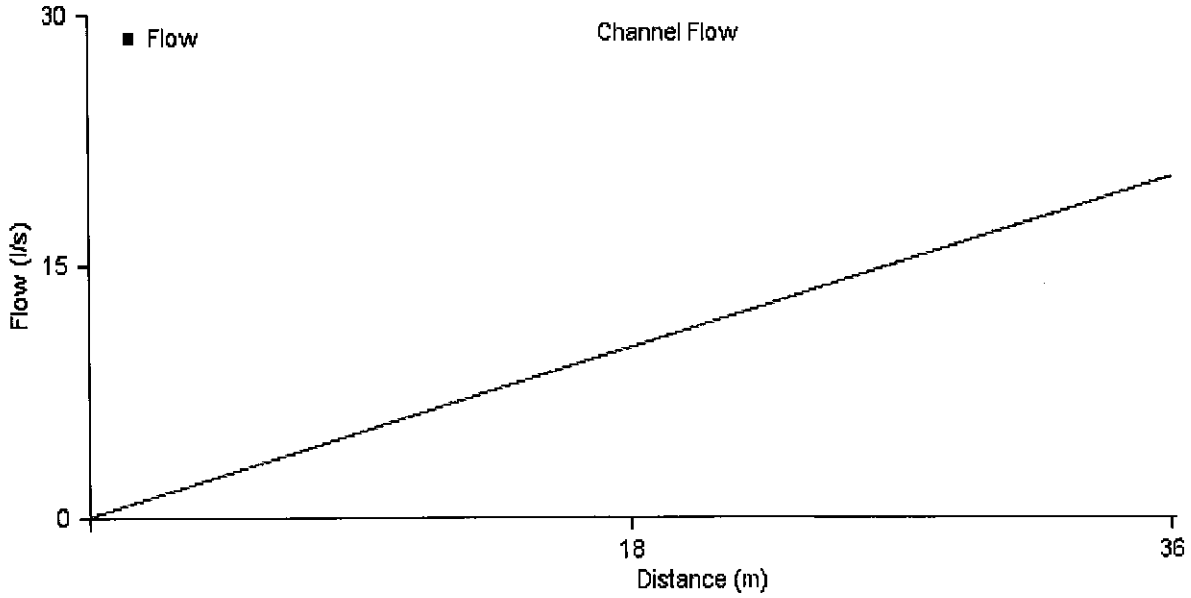
ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer / HA
Date: 23-08-2016





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CX12

ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer / HA
Date: 23-08-2016

DISCLAIMER

This simplified estimate of storage volume determines the largest volume required using the rainfall intensities for a range of different rainfall durations, for the location and return period specified by the designer. The type of flow control device is not known, so the calculation assumes a constant rate of outfall from the storage volume for the whole duration of the storm. Please contact ACO Design Services for further advice and details of the ACO Q-Brake Vortex Flow Control and the ACO StormBrixx Cellular Storage Tank.

INPUT

CATCHMENT AREA	(m^2)
MAX PERMITTED OUTFLOW	l/s
RESULT	

OUTPUT

R	l/s	STORAGE VOLUME OF CURRENT CHANNEL	m^3
M5-60	mm/h	RETURN PERIOD	
		CLIMATE CHANGE	%

DURATION	INTENSITY mm/h	REQUIRED STORAGE VOLUME (m^3)

No Attenuation Calculation Performed.

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CX13

ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Haroon Ashraf /MS

Date: 11-07-2017

Run No.: 6 **Option No.:** A

RAINFALL INTENSITY

RETURN PERIOD	30 years	
R	0.34	
M5-60	19.0	(mm/h)

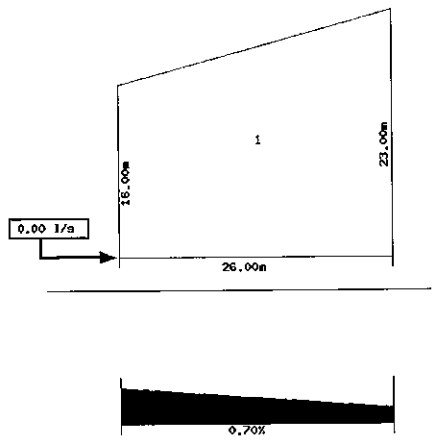
RAINFALL DATA

Duration	Intensity (mm/h)
10 mins	82.54
15 mins	**71.62**
30 mins	47.43
1 hour	**29.91**
2 hours	18.59
4 hours	**11.08**
6 hours	8.13
10 hours	**5.57**
24 hours	2.87
48 hours	**1.63**

RAINFALL SPECIFIED

ALLOWANCE FOR CLIMATE CHANGE	20.0	%
DESIGN RAINFALL INTENSITY	126.78	(mm/h)
	0.0352	l/s m²

CHANNEL LAYOUT



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CX14

ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

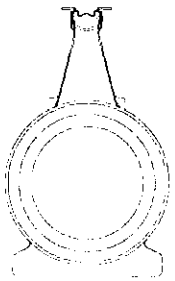
Project Name:
Barry EFW

Designer: Haroon Ashraf /MS

Date: 11-07-2017

+ INPUT

Channel System: Qmax



	1	2	3	4	5	6	7	8	9	10
System	Qmax 150	Qmax 225								
W – Width (mm)	150	225								
H – Invert (mm)	350	425								
Length (m)	20	6								

Kinematic Viscosity (m²/s)	1.14x10^-6	**Area Drained (m²)**	507.00
Rainfall Intensity (l/s x m)	0.0352 (= 126.78mm/h)	**Impermeability**	1.00
		Channel Length (m)	26.00

+ RESULTS

Outflow (l/s):	17.876
Max. Velocity (m/s):	0.94
Min. Freeboard (m):	0.010
Percentage Capacity (%):	96.99%
Max. Valid Length (m):	26.00 (Full Length)

Notes:

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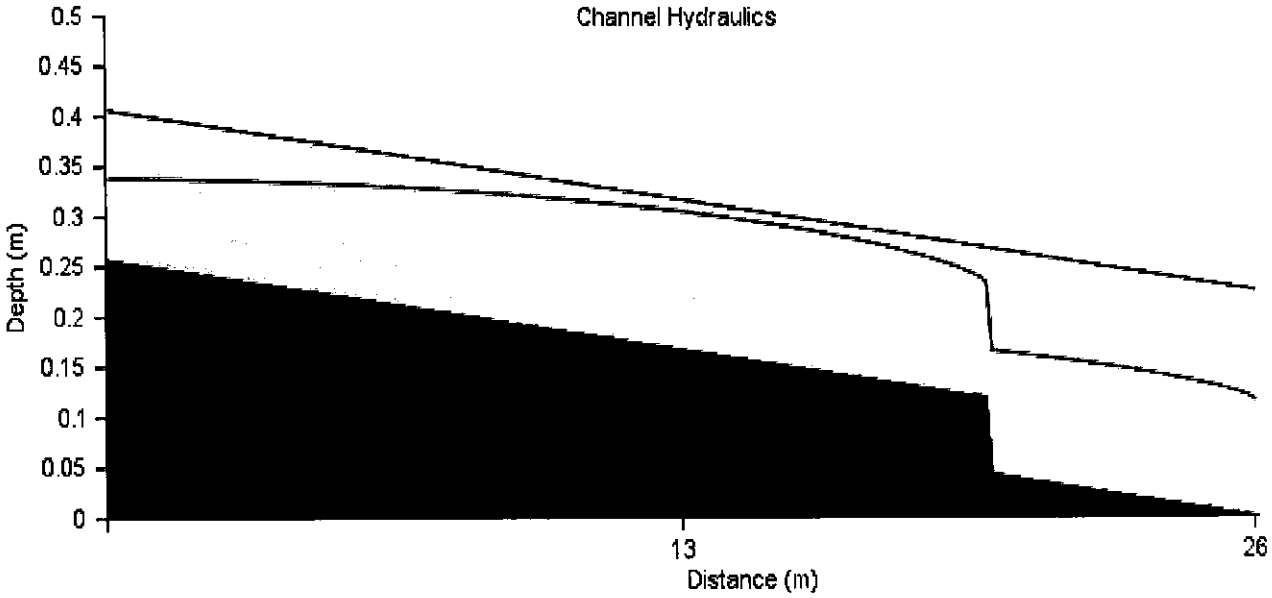
Ex: 5

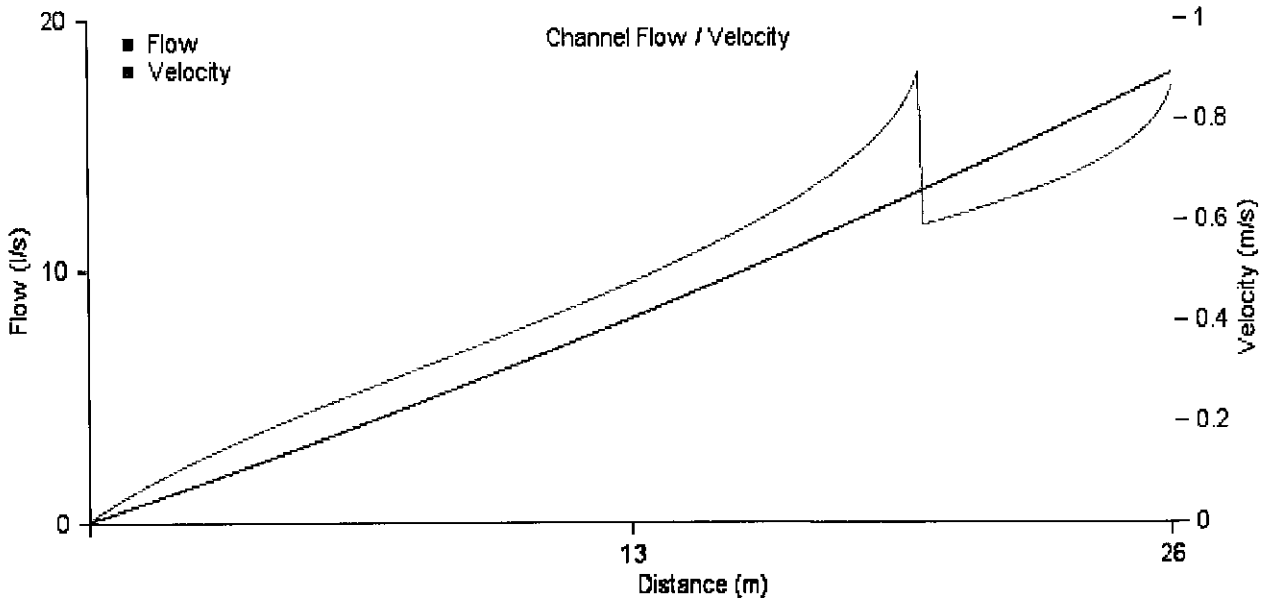
ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Haroon Ashraf /MS
Date: 11-07-2017





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CX16

ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Haroon Ashraf /MS
Date: 11-07-2017

DISCLAIMER

This simplified estimate of storage volume determines the largest volume required using the rainfall intensities for a range of different rainfall durations, for the location and return period specified by the designer. The type of flow control device is not known, so the calculation assumes a constant rate of outfall from the storage volume for the whole duration of the storm. Please contact ACO Design Services for further advice and details of the ACO Q-Brake Vortex Flow Control and the ACO StormBrixx Cellular Storage Tank.

INPUT

CATCHMENT AREA	(m^2)
MAX PERMITTED OUTFLOW	l/s
RESULT	

OUTPUT

R	l/s	STORAGE VOLUME OF CURRENT CHANNEL	m^3
M5-60	mm/h	RETURN PERIOD	
		CLIMATE CHANGE	%

DURATION	INTENSITY mm/h	REQUIRED STORAGE VOLUME (m^3)

No Attenuation Calculation Performed.

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CR17

ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer / HA

Date: 23-08-2016

Run No.: 7 **Option No.:** A

RAINFALL INTENSITY

RETURN PERIOD	30 years	
R	0.34	
M5-60	19.0	(mm/h)

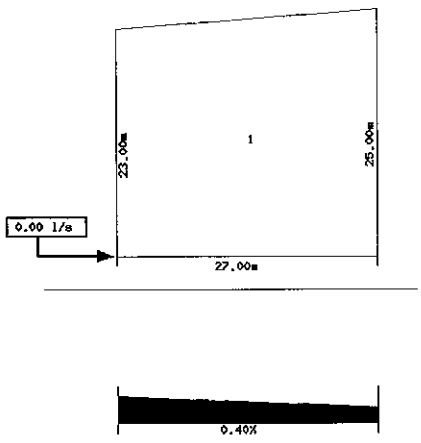
RAINFALL DATA

Duration	Intensity (mm/h)
[illegible]	[illegible]
10 mins	82.54
15 mins	**71.62**
30 mins	47.43
1 hour	**29.91**
2 hours	18.59
4 hours	**11.08**
6 hours	8.13
10 hours	**5.57**
24 hours	2.87
48 hours	**1.63**

RAINFALL SPECIFIED

ALLOWANCE FOR CLIMATE CHANGE	20.0	%
DESIGN RAINFALL INTENSITY	126.78	(mm/h)
	0.0352	l/s m²

CHANNEL LAYOUT



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email: technologies@aco.co.uk
www.aco.co.uk

CX18

ACO Design
Hydraulic Calculation:

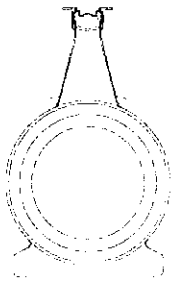
+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer JHA
Date: 23-08-2016

+ INPUT

Channel System: Qmax



	1	2	3	4	5	6	7	8	9	10
System	Qmax 225									
W – Width (mm)	225									
H – Invert (mm)	425									
Length (m)	27.00									

Kinematic Viscosity (m²/s)	1.14x10^-6	**Area Drained (m²)**	648.00
Rainfall Intensity (l/s x m)	0.0352 (= 126.78mm/h)	**Impermeability**	1.00
		Channel Length (m)	27.00

+ RESULTS

Outflow (l/s):	0.000
Max. Velocity (m/s):	0.00
Min. Freeboard (m):	0.000
Percentage Capacity (%):	0.00%
Max. Valid Length (m):	27.00 (Full Length)

Notes:

ACO Technologies plc
ACO Business Park
Hitchin Road, Shefford
Bedfordshire SG17 5TE

Tel: +44 (0)1462 816666
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email: technologies@aco.co.uk
www.aco.co.uk

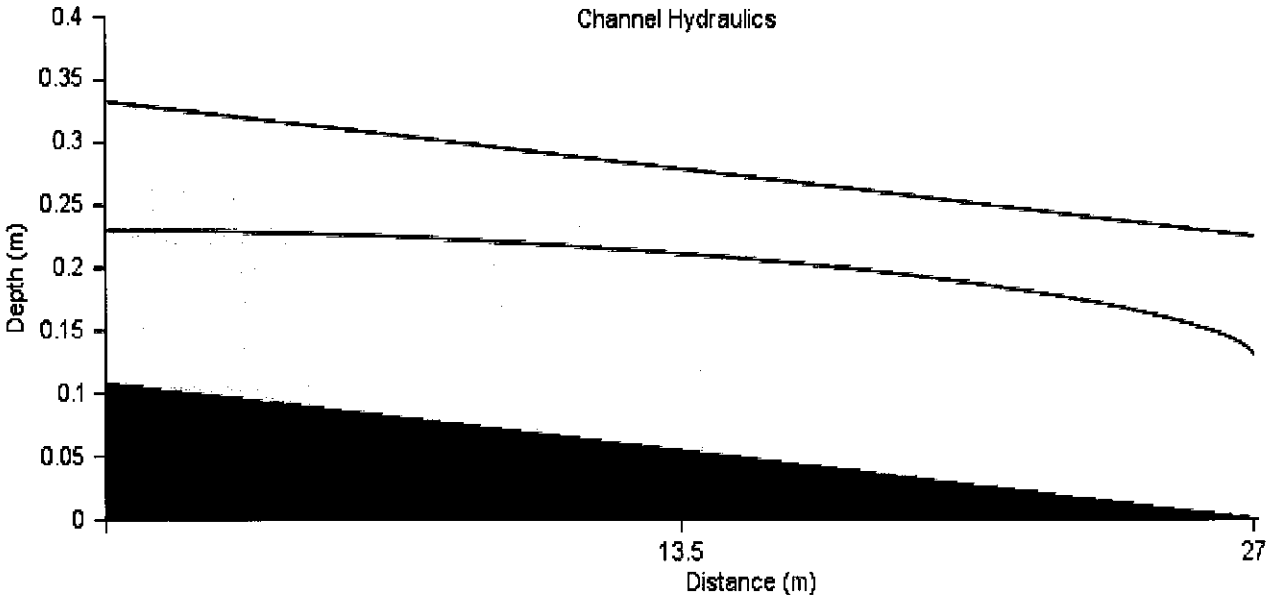
CX19

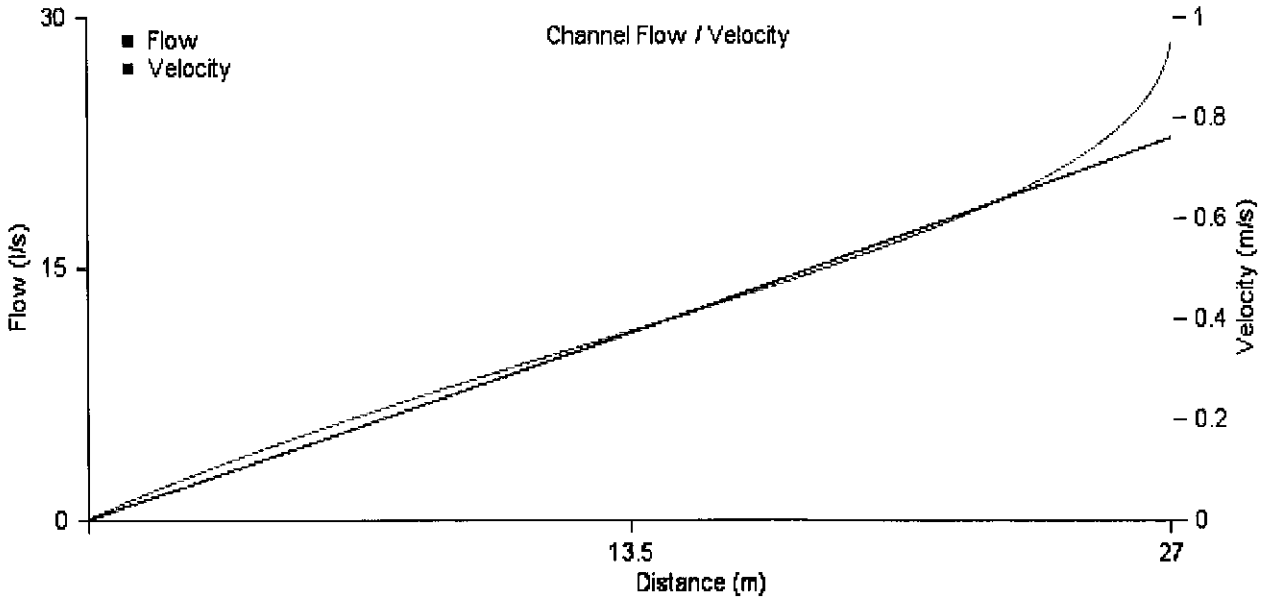
ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer /MA
Date: 23-08-2016





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CX20

ACO Design
Hydraulic Calculation:

+ PROJECT DETAILS

Project Name:
Barry EFW

Designer: Matthew Spencer / HA
Date: 23-08-2016

DISCLAIMER

This simplified estimate of storage volume determines the largest volume required using the rainfall intensities for a range of different rainfall durations, for the location and return period specified by the designer. The type of flow control device is not known, so the calculation assumes a constant rate of outfall from the storage volume for the whole duration of the storm. Please contact ACO Design Services for further advice and details of the ACO Q-Brake Vortex Flow Control and the ACO StormBrixx Cellular Storage Tank.

INPUT

CATCHMENT AREA	(m^2)
MAX PERMITTED OUTFLOW	l/s
RESULT	

OUTPUT

R	l/s	STORAGE VOLUME OF CURRENT CHANNEL	m^3
M5-60	mm/h	RETURN PERIOD	
		CLIMATE CHANGE	%

DURATION	INTENSITY mm/h	REQUIRED STORAGE VOLUME (m^3)

No Attenuation Calculation Performed.

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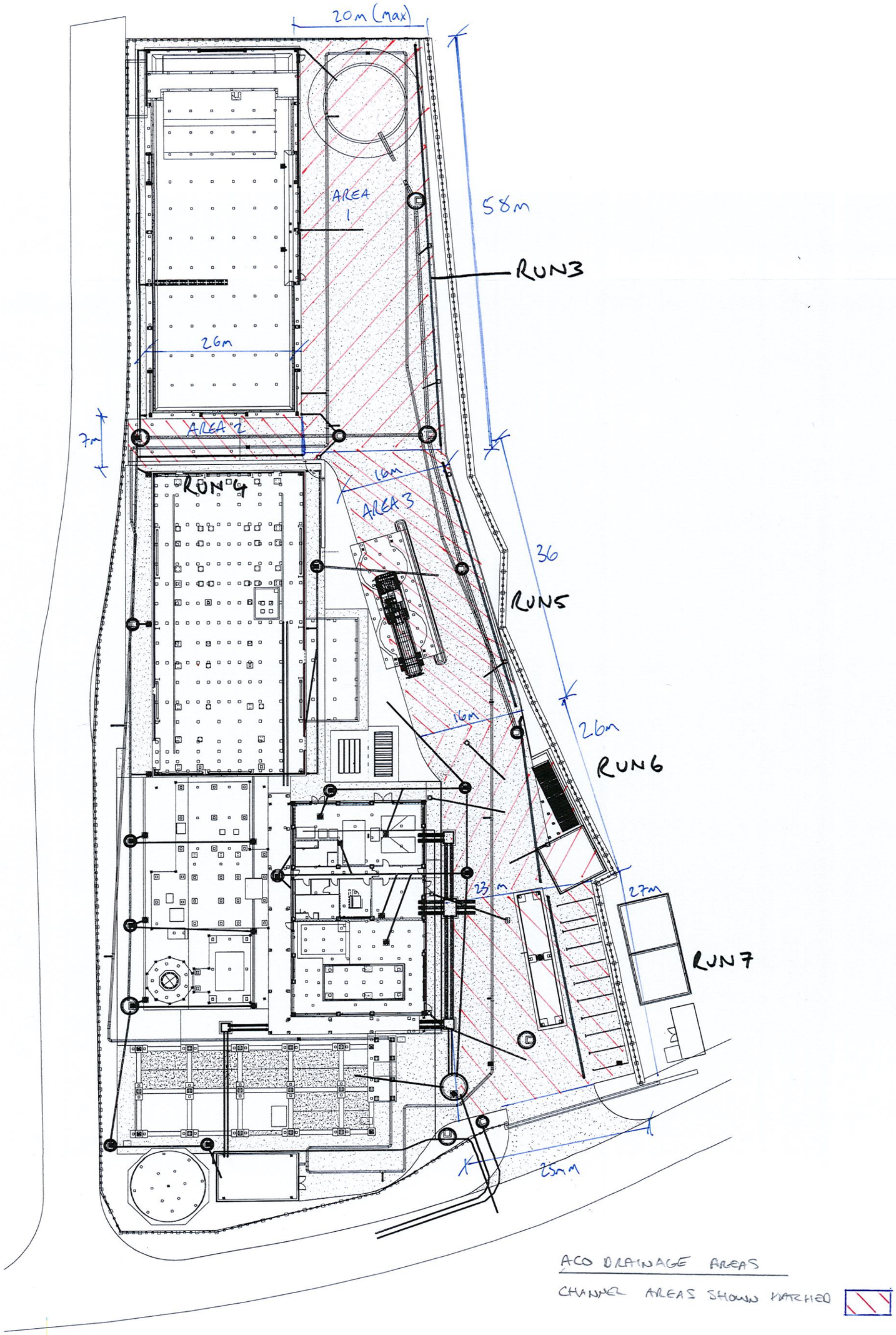
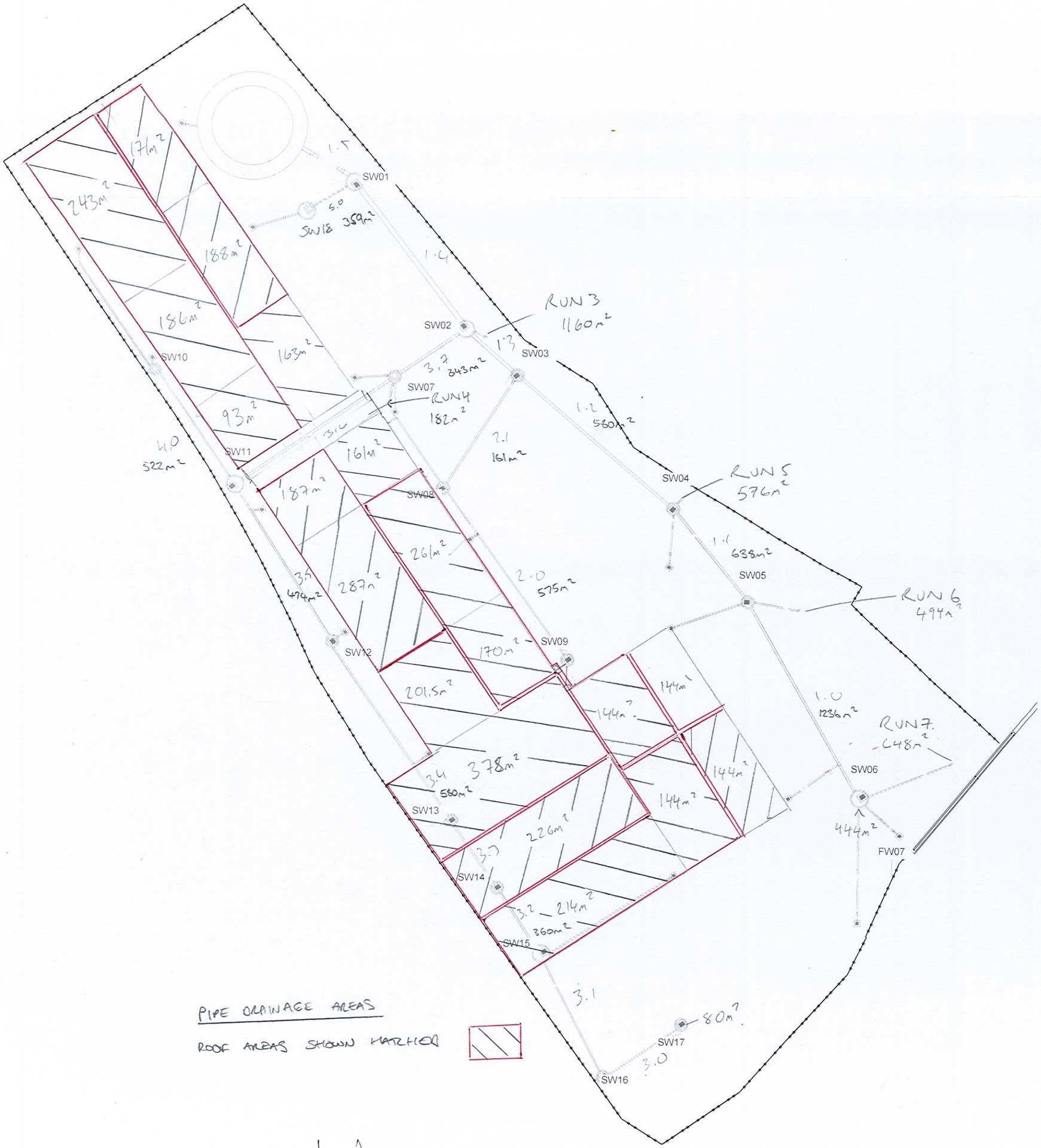
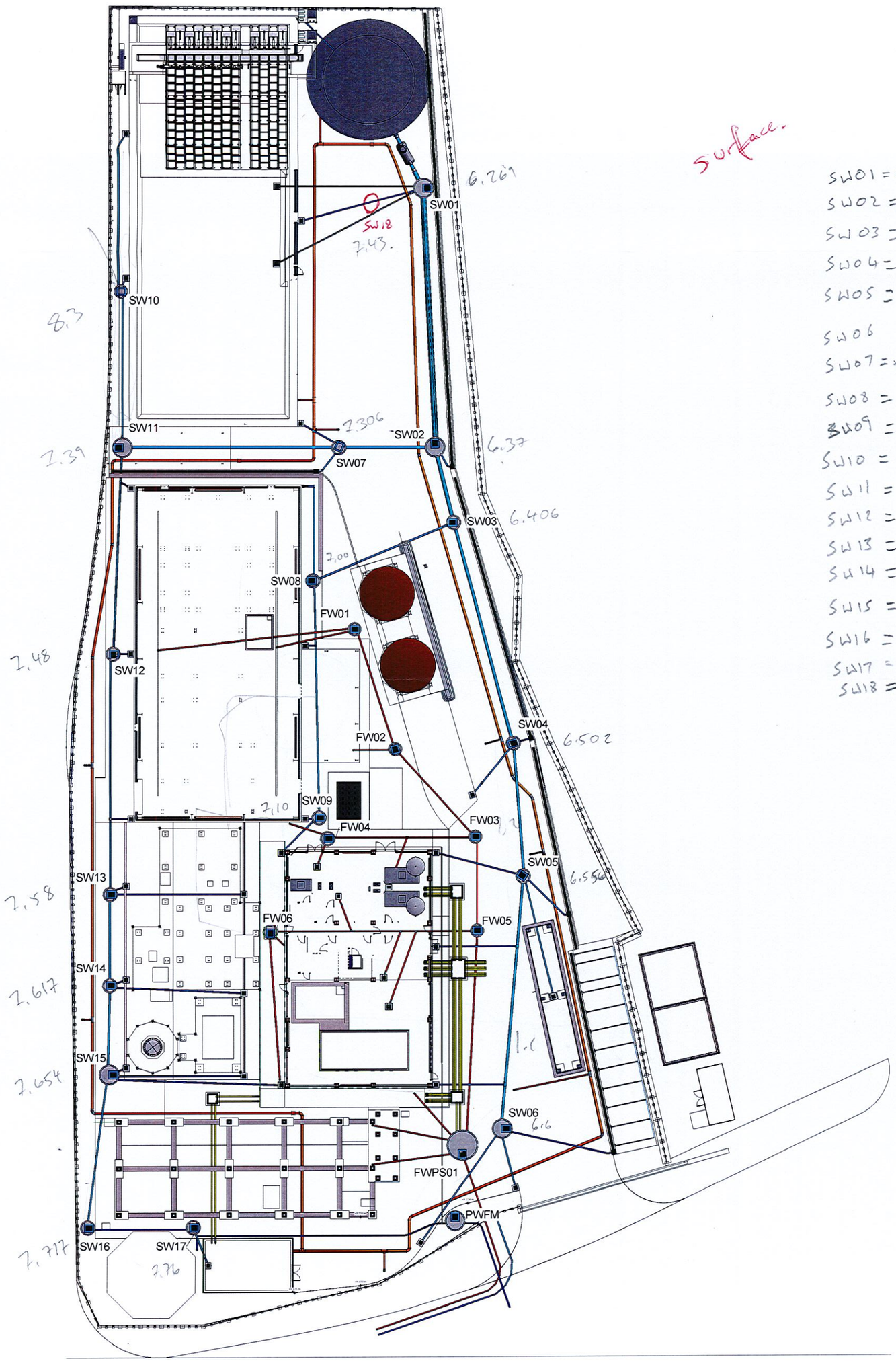
REPORT

APPENDIX D – REFERENCE DRAWINGS

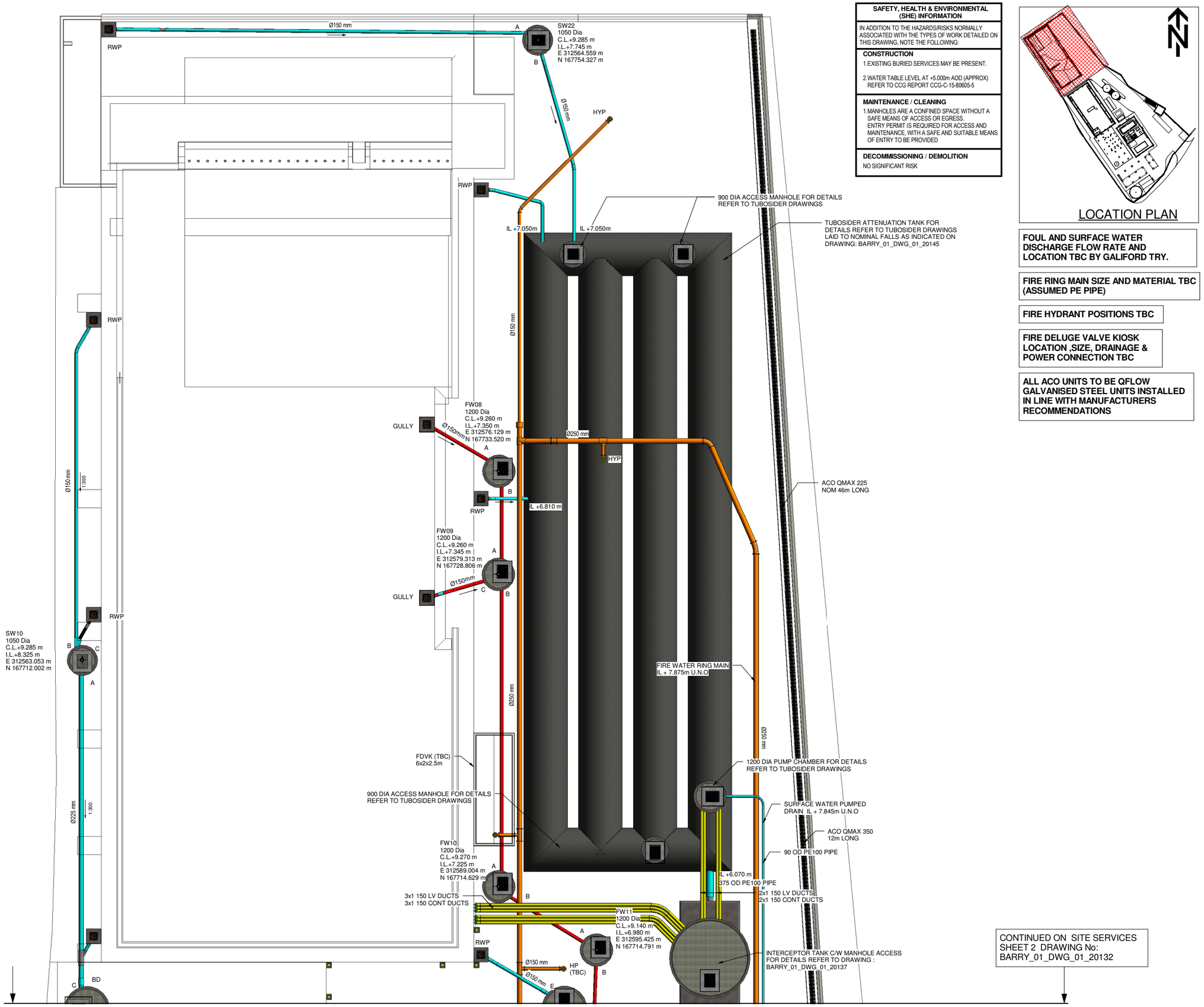

20m (max)
58m
RUN3
AREA 1
26m
7m
AREA 2
16m
AREA 3
RUN4
36
RUN5
16m
26m
RUN6
23m
27m
RUN7
25m
ACO DRAINAGE AREAS
CHANNEL AREAS SHOWN HATCHED


SW01
SW18 359m²
1.5
1.4
SW02
RUN 3
1160m²
1.3
SW03
SW10
243m²
17/m²
188m²
186m²
163m²
3.7
343m²
SW07
RUN 4
182m²
93m²
4.0
522m²
SW11
3.6
16/m²
2.1
161m²
1.2
580m²
SW04
RUN 5
576m²
187m²
SW08
26/m²
1.1
638m²
SW05
2.0
575m²
3.5
474m²
287m²
SW12
170m²
SW09
RUN 6
494m²
201.5m²
144m²
144m²
144m²
1.0
1236m²
RUN 7
648m²
SW06
3.4
378m²
580m²
SW13
144m²
226m²
444m²
FW07
3.3
SW14
3.2
214m²
360m²
SW15
3.1
80m²
SW17
3.0
SW16
PIPE DRAINAGE AREAS
ROOF AREAS SHOWN HATCHED



surface.

SW01 = +5.915m
SW02 = + 5.995m
SW03 = + 6.128m
SW04 = + 6.265m
SW05 = + 6.568m.
SW06 + 6.469m
SW07 = + 7.105.
SW08 = + 6.922
SW09 = + 7.125m
SW10 = + 8.325m
SW11 = + 7.140m
SW12 = + 7.223m
SW13 = + 7.480
SW14 = + 7.409
SW15 = + 7.445
SW16 = + 7.725
SW17 = + 7.765
SW18 = + 7.432m



CONTINUED ON SITE SERVICES SHEET 2 DRAWING No: BARRY_01_DWG_01_20132

SAFETY, HEALTH & ENVIRONMENTAL (SHE) INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

CONSTRUCTION

1. EXISTING BURIED SERVICES MAY BE PRESENT.
2. WATER TABLE LEVEL AT +5.000m AOD (APPROX) REFER TO CCG REPORT CCG-C-15-80605-5

MAINTENANCE / CLEANING

1. MANHOLES ARE A CONFINED SPACE WITHOUT A SAFE MEANS OF ACCESS OR EGRESS. ENTRY PERMIT IS REQUIRED FOR ACCESS AND MAINTENANCE, WITH A SAFE AND SUITABLE MEANS OF ENTRY TO BE PROVIDED

DECOMMISSIONING / DEMOLITION

NO SIGNIFICANT RISK

LOCATION PLAN

FOUL AND SURFACE WATER DISCHARGE FLOW RATE AND LOCATION TBC BY GALIFORD TRY.

FIRE RING MAIN SIZE AND MATERIAL TBC (ASSUMED PE PIPE)

FIRE HYDRANT POSITIONS TBC

FIRE DELUGE VALVE KIOSK LOCATION ,SIZE, DRAINAGE & POWER CONNECTION TBC

ALL ACO UNITS TO BE QFLOW GALVANISED STEEL UNITS INSTALLED IN LINE WITH MANUFACTURERS RECOMMENDATIONS

DO NOT SCALE - IF IN DOUBT ASK

NOTES

GENERAL

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES (mm) & ALL LEVELS ARE IN METRES (m) AOD, UNLESS STATED OTHERWISE.
3. ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE AND ANY DISCREPANCIES SHOULD BE REPORTED TO GHD LIVIGUNN.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT PROJECT STANDARDS AND SPECIFICATIONS.

DRAINAGE:

1. ALL DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH CESWI 7TH EDITION
2. NEW DRAINS ARE UNDERGROUND PVC-U IIACCORDANCE WITH BS 4660. PROCESS WATER DRAINS TO BE HATHERNWARE CHEMICAL RESISTANCE - TBC
3. PIPE JOINTS IMMEDIATELY ADJACENT TO STRUCTURES AND CHAMBERS ARE FULLY ARTICULATED ROCKER PIPE JOINTS.
4. ROCKER PIPES ARE 600mm LONG U.N.O ROCKER PIPES TO BE POSITIONED MINIMUM ACHIEVABLE DISTANCE FROM MANHOLE OR CHAMBER WITH ALLOWANCE FOR INSTALLATION OF FLEXIBLE JOINT
5. ALL BURIED PIPES AND DUCTS UNDER STRUCTURE TO BE ENCASED IN MIN 150mm THICK C16/20 MASS CONCRETE. ALSO WHERE GROUND COVER IS LESS THAN 900mm.
6. DOUBLE STEPS SHALL BE PLASTIC ENCAPSULATED CARBON STEEL MANHOLE STEPS TO BS 1247-2. STEP IRONS AT 250/300 CENTRES HORIZONTALLY AND VERTICALLY MAY BE USED AS AN ALTERNATIVE TO DOUBLE STEPS.
7. PIPE BEDDING DETAILS SHOWN ON DRAWING: BARRY_01_DWG_01_20135

LEGEND:

- HYDRANT RING MAIN
- SURFACE WATER DRAIN
- FOUL WATER DRAIN
- PROCESS WATER DRAIN (AS HATHERNWARE THERMACHEM PIPEWORK)
- ELECTRICAL DUCTS
- POTABLE WATER MAIN (AS PURITON BARRIER PIPE OSA)

SW	SURFACE WATER MANHOLE
FW	FOUL WATER MANHOLE
DP	ELECTRICAL DRAWPIT
RWP	RAIN WATER PIPE
GU	ROAD GULLY
HYP	HYDRANT POINT (PROPOSED)
IV	ISOLATION VALVE (PROPOSED)
BD	BACK DROP
FDVK	FIRE DELUGE VALVE KIOSK

REFERENCE DRAWINGS :

BARRY_01_DWG_01_20131 - SITE SERVICES GA SHEET 1 OF 4
BARRY_01_DWG_01_20132 - SITE SERVICES GA SHEET 2 OF 4
BARRY_01_DWG_01_20133 - SITE SERVICES GA SHEET 3 OF 4
BARRY_01_DWG_01_20134 - SITE SERVICES GA SHEET 4 OF 4
BARRY_01_DWG_01_20135 - SITE SERVICES DETAILS SHEET 1
BARRY_01_DWG_01_20136 - SITE SERVICES SCHEDULE

2D EXPORT FROM A 3D MODEL
ALL ALTERATIONS TO BE MADE IN THE MODEL FILE

DRAWING TO BE REPRODUCED IN COLOUR

PRELIMINARY

Rev	Date	Description	By	Chk	App
E	19.07.17	SERVICES & DNOC AREA UPDATED	JW	MS	GB
D	15.05.17	FOUL DRAIN & SURFACE RISING MAIN UPDATED	JW	MS	GB
C	19.01.17	SERVICES UPDATED	JW	MS	GB
B	04.10.16	UPDATED FOR ATTENUATION	JW	MS	GB
A	01.06.16	FIRST ISSUE	JW	MS	GB

Revision

GHD LIVIGUNN
The Studio
51 Brookfield Road
Cheadle
SK8 1ES
0161 491 4600
info@ghdlivigunn.com

CLIENT: GallifordTry

PROJECT: BARRY BIOMASS UK NO 2 LIMITED

TITLE: SITE SERVICES. SHEET 1

SCALE: 1:100

DRAWING SIZE: A1

DWG No.: BARRY_01_DWG_01_20131

REV.: E

DO NOT SCALE - IF IN DOUBT ASK

NOTES

GENERAL

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4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT PROJECT STANDARDS AND SPECIFICATIONS.

DRAINAGE:

1. ALL DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH CESWI 7TH EDITION
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7. PIPE BEDDING DETAILS SHOWN ON DRAWING: BARRY_01_DWG_01_20135

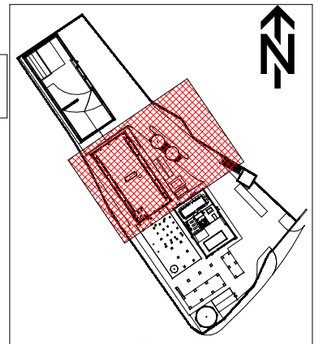
LEGEND:

- HYDRANT RING MAIN
- SURFACE WATER DRAIN
- FOUL WATER DRAIN
- PROCESS WATER DRAIN (AS HATHERNWARE THERMACHEM PIPEWORK)
- ELECTRICAL DUCTS
- POTABLE WATER MAIN (AS PURITON BARRIER PIPE OSA)

SW	SURFACE WATER MANHOLE
FW	FOUL WATER MANHOLE
DP	ELECTRICAL DRAWPIT
RWP	RAIN WATER PIPE
GU	ROAD GULLY
HYP	HYDRANT POINT (PROPOSED)
IV	ISOLATION VALVE (PROPOSED)
BD	BACK DROP
FDVK	FIRE DELUGE VALVE KIOSK

REFERENCE DRAWINGS :

BARRY_01_DWG_01_20131 - SITE SERVICES GA SHEET 1 OF 4
BARRY_01_DWG_01_20132 - SITE SERVICES GA SHEET 2 OF 4
BARRY_01_DWG_01_20133 - SITE SERVICES GA SHEET 3 OF 4
BARRY_01_DWG_01_20134 - SITE SERVICES GA SHEET 4 OF 4
BARRY_01_DWG_01_20135 - SITE SERVICES DETAILS SHEET 1
BARRY_01_DWG_01_20136 - SITE SERVICES SCHEDULE



LOCATION PLAN

SAFETY, HEALTH & ENVIRONMENTAL (SHE) INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

CONSTRUCTION

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MAINTENANCE / CLEANING

1. MANHOLES ARE A CONFINED SPACE WITHOUT A SAFE MEANS OF ACCESS OR EGRESS. ENTRY PERMIT IS REQUIRED FOR ACCESS AND MAINTENANCE, WITH A SAFE AND SUITABLE MEANS OF ENTRY TO BE PROVIDED

DECOMMISSIONING / DEMOLITION

NO SIGNIFICANT RISK

FOUL AND SURFACE WATER DISCHARGE FLOW RATE AND LOCATION TBC BY GALIFORD TRY.

FIRE RING MAIN SIZE AND MATERIAL TBC (ASSUMED PE PIPE)

FIRE HYDRANT POSITIONS TBC

FIRE DELUGE VALVE KIOSK LOCATION ,SIZE, DRAINAGE & POWER CONNECTION TBC

ALL ACO UNITS TO BE QFLOW GALVANISED STEEL UNITS INSTALLED IN LINE WITH MANUFACTURERS RECOMMENDATIONS

2D EXPORT FROM A 3D MODEL
ALL ALTERATIONS TO BE MADE IN THE MODEL FILE

DRAWING TO BE REPRODUCED IN COLOUR

PRELIMINARY

Rev	Date	Description	By	Chk	App
E	19.07.17	SERVICES & DNOC AREA UPDATED	JW	MS	GB
D	15.05.17	FOUL DRAIN & SURFACE RISING MAIN UPDATED	JW	MS	GB
C	19.01.17	SERVICES UPDATED	JW	MS	GB
B	04.10.16	UPDATED FOR ATTENUATION	JW	MS	GB
A	24.03.16	FIRST ISSUE	JW	MS	GB

Revision

GHD LIVIGUNN
The Studio
51 Brookfield Road
Cheadle
SK8 1ES
0161 491 4600
info@ghdlivigunn.com

CLIENT: GallifordTry

PROJECT: BARRY BIOMASS UK NO 2 LIMITED

TITLE: SITE SERVICES. SHEET 2

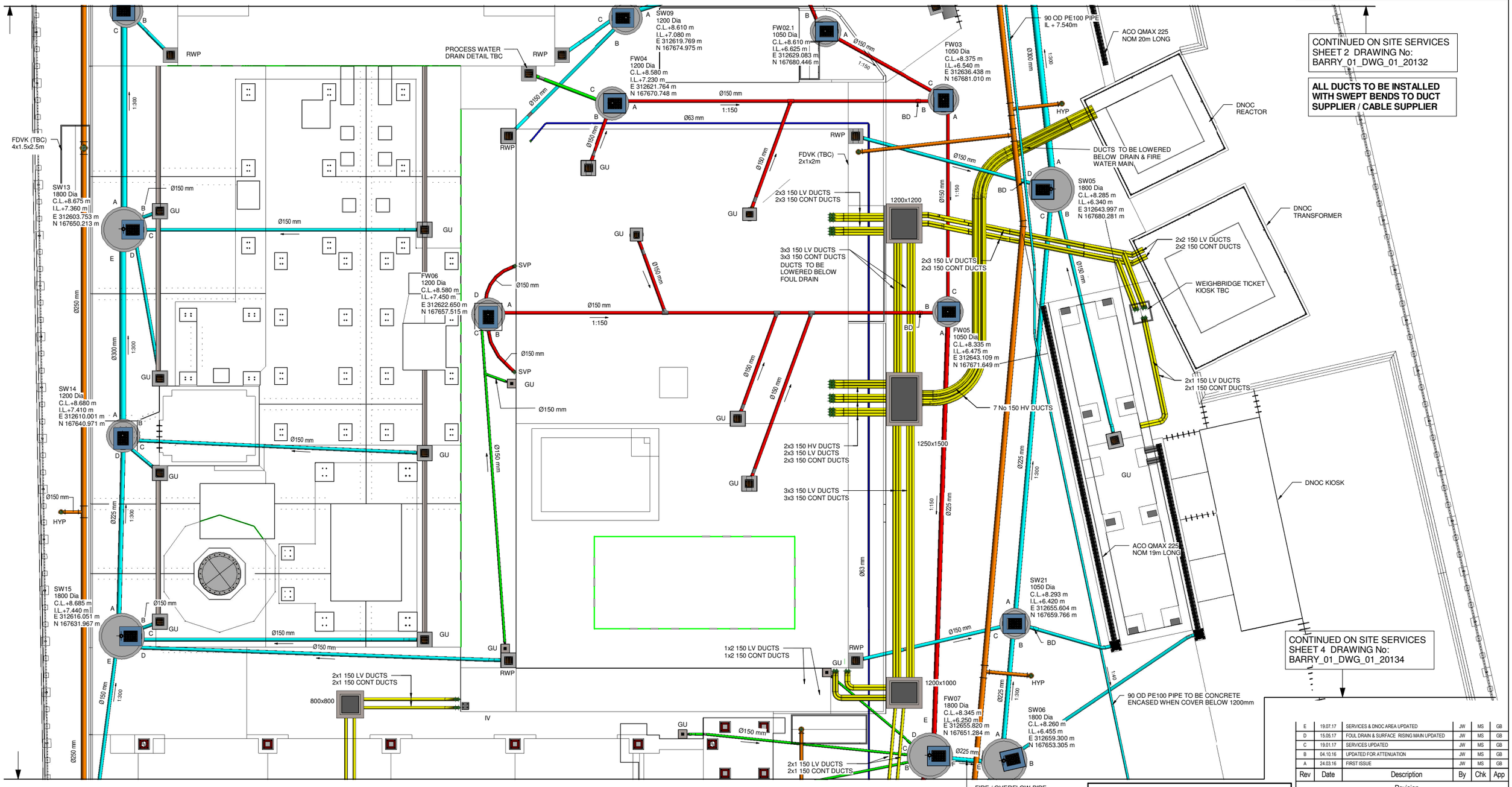
SCALE	DRAWING SIZE
1:100	A1

DWG No. BARRY_01_DWG_01_20132 REV. E

CONTINUED ON SITE SERVICES SHEET 1 DRAWING No: BARRY_01_DWG_01_20131

CONTINUED ON SITE SERVICES SHEET 3 DRAWING No: BARRY_01_DWG_01_20133

DO NOT SCALE - IF IN DOUBT ASK



CONTINUED ON SITE SERVICES
SHEET 2 DRAWING No:
BARRY_01_DWG_01_20132

ALL DUCTS TO BE INSTALLED WITH SWEPT BENDS TO DUCT SUPPLIER / CABLE SUPPLIER

CONTINUED ON SITE SERVICES
SHEET 4 DRAWING No:
BARRY_01_DWG_01_20134

NOTES

GENERAL

1. DO NOT SCALE FROM THIS DRAWING.
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3. ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE AND ANY DISCREPANCIES SHOULD BE REPORTED TO GHD LIVIGUNN.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT PROJECT STANDARDS AND SPECIFICATIONS.

REFERENCE DRAWINGS :

BARRY_01_DWG_01_20131 - SITE SERVICES GA SHEET 1 OF 4
BARRY_01_DWG_01_20132 - SITE SERVICES GA SHEET 2 OF 4
BARRY_01_DWG_01_20133 - SITE SERVICES GA SHEET 3 OF 4
BARRY_01_DWG_01_20134 - SITE SERVICES GA SHEET 4 OF 4
BARRY_01_DWG_01_20135 - SITE SERVICES DETAILS SHEET 1
BARRY_01_DWG_01_20136 - SITE SERVICES SCHEDULE

DRAINAGE:

1. ALL DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH CESWI 7TH EDITION
2. NEW DRAINS ARE UNDERGROUND PVC-U IIACCORDANCE WITH BS 4660. PROCESS WATER DRAINS TO BE HATHERNWARE CHEMICAL RESISTANCE - TBC
3. PIPE JOINTS IMMEDIATELY ADJACENT TO STRUCTURES AND CHAMBERS ARE FULLY ARTICULATED ROCKER PIPE JOINTS.
4. ROCKER PIPES ARE 600mm LONG U.N.O ROCKER PIPES TO BE POSITIONED MINIMUM ACHIEVABLE DISTANCE FROM MANHOLE OR CHAMBER WITH ALLOWANCE FOR INSTALLATION OF FLEXIBLE JOINT
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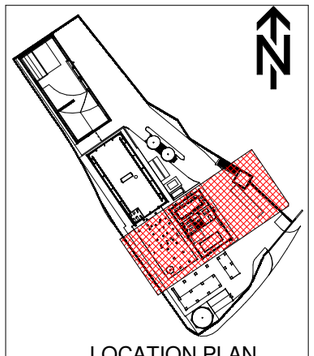
7. PIPE BEDDING DETAILS SHOWN ON DRAWING: BARRY_01_DWG_01_20135

LEGEND:

- HYDRANT RING MAIN
- SURFACE WATER DRAIN
- FOUL WATER DRAIN
- PROCESS WATER DRAIN (AS HATHERNWARE THERMACHEM PIPEWORK)
- ELECTRICAL DUCTS
- POTABLE WATER MAIN (AS PURITON BARRIER PIPE OSA)

SW SURFACE WATER MANHOLE
FW FOUL WATER MANHOLE
DP ELECTRICAL DRAWPIT
RWP RAIN WATER PIPE
GU ROAD GULLY
HYP HYDRANT POINT (PROPOSED)
IV ISOLATION VALVE (PROPOSED)
BD BACK DROP
FDVK FIRE DELUGE VALVE KIOSK



LOCATION PLAN

PRELIMINARY

FIRE DELUGE VALVE KIOSK LOCATION ,SIZE, DRAINAGE & POWER CONNECTION TBC

FOUL AND SURFACE WATER DISCHARGE FLOW RATE AND LOCATION TBC BY GALIFORD TRY.

FIRE RING MAIN SIZE AND MATERIAL TBC(ASSUMED PE PIPE)

FIRE HYDRANT POSITIONS TBC

ALL ACO UNITS TO BE QFLOW GALVANISED STEEL UNITS INSTALLED IN LINE WITH MANUFACTURERS RECOMMENDATIONS

2D EXPORT FROM A 3D MODEL
ALL ALTERATIONS TO BE MADE IN THE MODEL FILE

DRAWING TO BE REPRODUCED IN COLOUR

SAFETY, HEALTH & ENVIRONMENTAL (SHE) INFORMATION

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MAINTENANCE / CLEANING

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DECOMMISSIONING / DEMOLITION

NO SIGNIFICANT RISK

Rev	Date	Description	By	Chk	App
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D	15.05.17	FOUL DRAIN & SURFACE RISING MAIN UPDATED	JW	MS	GB
C	19.01.17	SERVICES UPDATED	JW	MS	GB
B	04.10.16	UPDATED FOR ATTENUATION	JW	MS	GB
A	24.03.16	FIRST ISSUE	JW	MS	GB

Revision

GHD LIVIGUNN
The Studio
51 Brookfield Road
Cheadle
SK8 1ES
0161 491 4600
info@ghdlivigunn.com

CLIENT: GallifordTry

PROJECT: BARRY BIOMASS UK NO 2 LIMITED

TITLE: SITE SERVICES. SHEET 3

SCALE: 1:100

DRAWING SIZE: A1

DWG No.: BARRY_01_DWG_01_20133

REV.: E

DO NOT SCALE - IF IN DOUBT ASK

CONTINUED ON SITE SERVICES SHEET 3 DRAWING No: BARRY_01_DWG_01_20133

SW15
1800 Dia
C.L.+8.685 m
I.L.+7.440 m
E 312616.051 m
N 167631.967 m

SW16
1200 Dia
C.L.+8.350 m
I.L.+7.530 m
E 312624.630 m
N 167614.776 m

SW17
1200 Dia
C.L.+8.550 m
I.L.+7.665 m
E 312635.140 m
N 167621.720 m

SW21
1050 Dia
C.L.+8.293 m
I.L.+6.420 m
E 312655.604 m
N 167659.766 m

FW07
1800 Dia
C.L.+8.345 m
I.L.+6.250 m
E 312655.820 m
N 167651.284 m

SW06
1800 Dia
C.L.+8.260 m
I.L.+6.455 m
E 312659.300 m
N 167653.305 m

FWPS01
1800 Dia
C.L.+8.340 m
I.L.+0.000 m TBC
E 312656.942 m
N 167646.212 m

EXMH1
CL +7.760
IL + 6.550
E 312680.372 m
N 167650.840 m

1200x1200
800x800
FDVK (TBC) 4x1.5x2.5m
RWP
HYP
BD
IV
GU
DNOC KIOSK
Ø225 mm
Ø150 mm
Ø250 mm
Ø63 mm
Ø150 mm TBC
Ø160 mm TBC
1:300
1:150
1:40

2x3 150 LV DUCTS
2x3 150 CONT DUCTS
1x2 150 LV DUCTS
1x2 150 CONT DUCTS
2x1 150 LV DUCTS
2x1 150 CONT DUCTS

Ø225 mm FOUL OVERFLOW PIPE I.L +6.800 m C/W NON RETURN VALVE

90 OD PE100 PIPE TO BE CONCRETE ENCASED WHEN COVER BELOW 1200mm

DRAWPIT FOR ENTRANCE GATE TBC

1 No 150 CONT DUCT

ACO GULLY WITH SILT CHAMBER (1500 dp)

90 OD PE100 PIPE IL + 6.880

POWER / CONTROL REQUIRMENTS FOR GATE TBC ON RECIPT ON SUPPLIER REQUIRMENTS

FWVC - PUMP STATION AND FOUL WATER VALVE CHAMBER DETAIL TBC

CONNECTION TO EXMH1 IL +6.838

SITE DISCHARGE SURFACE WATER PIPE

TANK CONNECTION DETAILS TBC BY TANK SUPPLIER

HYDRANT RING MAIN CONNECTION TBC

PWFM - FLOW METER CHAMBER DETAILS & ACCESS REQUIREMENTS TBC

CONNECTION TO EXISTING WATER MAIN

EXISTING BURIED HV CABLE

EXISTING OVERHEAD CABLE

NEW PUMPED FOUL WATER DRAIN FOR DETAILS REFER TO DRAWING BARRY_01_DWG_01_201110

EXISTING POTABLE WATER SUPPLY

NOTES

GENERAL

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES (mm) & ALL LEVELS ARE IN METRES (m) AOD, UNLESS STATED OTHERWISE.
3. ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE AND ANY DISCREPANCIES SHOULD BE REPORTED TO GHD LIVIGUNN.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT PROJECT STANDARDS AND SPECIFICATIONS.

REFERENCE DRAWINGS :

BARRY_01_DWG_01_20131 - SITE SERVICES GA SHEET 1 OF 4
BARRY_01_DWG_01_20132 - SITE SERVICES GA SHEET 2 OF 4
BARRY_01_DWG_01_20133 - SITE SERVICES GA SHEET 3 OF 4
BARRY_01_DWG_01_20134 - SITE SERVICES GA SHEET 4 OF 4
BARRY_01_DWG_01_20135 - SITE SERVICES DETAILS SHEET 1
BARRY_01_DWG_01_20136 - SITE SERVICES SCHEDULE

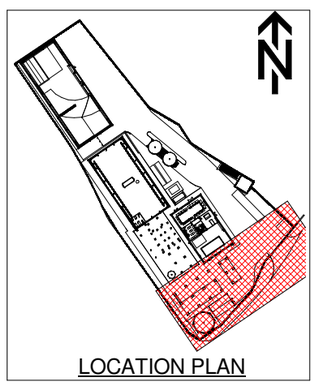
DRAINAGE:

1. ALL DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH CESWI 7TH EDITION
2. NEW DRAINS ARE UNDERGROUND PVC-U IIACCORDANCE WITH BS 4660. PROCESS WATER DRAINS TO BE HATHERNWARE CHEMICAL RESISTANCE - TBC
3. PIPE JOINTS IMMEDIATELY ADJACENT TO STRUCTURES AND CHAMBERS ARE FULLY ARTICULATED ROCKER PIPE JOINTS.
4. ROCKER PIPES ARE 600mm LONG U.N.O ROCKER PIPES TO BE POSITIONED MINIMUM ACHIEVABLE DISTANCE FROM MANHOLE OR CHAMBER WITH ALLOWANCE FOR INSTALLATION OF FLEXIBLE JOINT
5. ALL BURIED PIPES AND DUCTS UNDER STRUCTURE TO BE ENCASED IN MIN 150mm THICK C16/20 MASS CONCRETE. ALSO WHERE GROUND COVER IS LESS THAN 900mm.
6. DOUBLE STEPS SHALL BE PLASTIC ENCAPSULATED CARBON STEEL MANHOLE STEPS TO BS 1247-2. STEP IRONS AT 250/300 CENTRES HORIZONTALLY AND VERTICALLY MAY BE USED AS AN ALTERNATIVE TO DOUBLE STEPS.
7. PIPE BEDDING DETAILS SHOWN ON DRAWING: BARRY_01_DWG_01_20135

LEGEND:

- HYDRANT RING MAIN
- SURFACE WATER DRAIN
- FOUL WATER DRAIN
- PROCESS WATER DRAIN (AS HATHERNWARE THERMACHEM PIPEWORK)
- ELECTRICAL DUCTS
- POTABLE WATER MAIN (AS PURITON BARRIER PIPE OSA)

SW	SURFACE WATER MANHOLE
FW	FOUL WATER MANHOLE
DP	ELECTRICAL DRAWPIT
RWP	RAIN WATER PIPE
GU	ROAD GULLY
HYP	HYDRANT POINT (PROPOSED)
IV	ISOLATION VALVE (PROPOSED)
BD	BACK DROP
FDVK	FIRE DELUGE VALVE KIOSK



LOCATION PLAN

PRELIMINARY

FIRE DELUGE VALVE KIOSK LOCATION ,SIZE, DRAINAGE & POWER CONNECTION TBC

FOUL AND SURFACE WATER DISCHARGE FLOW RATE AND LOCATION TBC BY GALIFORD TRY.

FIRE RING MAIN SIZE AND MATERIAL TBC (ASSUMED PE PIPE)

FIRE HYDRANT POSITIONS TBC

ALL ACO UNITS TO BE QFLOW GALVANISED STEEL UNITS INSTALLED IN LINE WITH MANUFACTURERS RECOMMENDATIONS

2D EXPORT FROM A 3D MODEL
ALL ALTERATIONS TO BE MADE IN THE MODEL FILE

SAFETY, HEALTH & ENVIRONMENTAL (SHE) INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

CONSTRUCTION

1. EXISTING BURIED SERVICES MAY BE PRESENT.
2. WATER TABLE LEVEL AT +5.000m AOD (APPROX) REFER TO CCG REPORT CCG-C-15-80605-5

MAINTENANCE / CLEANING

1. MANHOLES ARE A CONFINED SPACE WITHOUT A SAFE MEANS OF ACCESS OR EGRESS. ENTRY PERMIT IS REQUIRED FOR ACCESS AND MAINTENANCE, WITH A SAFE AND SUITABLE MEANS OF ENTRY TO BE PROVIDED

DECOMMISSIONING / DEMOLITION

NO SIGNIFICANT RISK

Rev	Date	Description	By	Chk	App
E	19.07.17	DNOC AREA UPDATED	JW	MS	GB
D	15.05.17	FOUL DRAIN & SURFACE RISING MAIN UPDATED	JW	MS	GB
C	19.01.17	SERVICES UPDATED	JW	MS	GB
B	04.10.16	UPDATED FOR ATTENUATION	JW	MS	GB
A	24.03.16	FIRST ISSUE	JW	MS	GB

Revision

GHD LIVIGUNN
The Studio
51 Brookfield Road
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SK8 1ES
0161 491 4600
info@ghdlivigunn.com

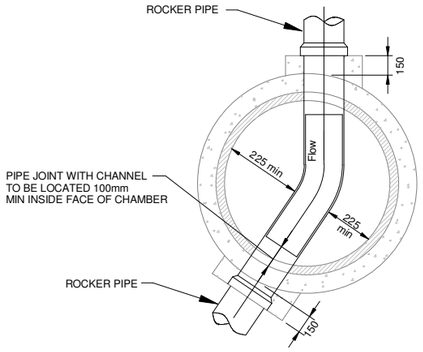
CLIENT: GallifordTry

PROJECT: BARRY BIOMASS UK NO 2 LIMITED

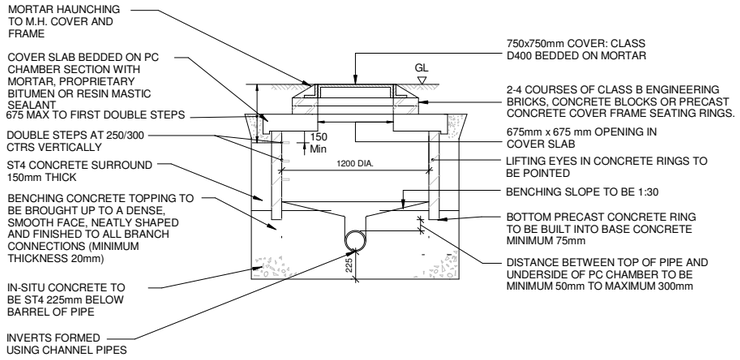
TITLE: SITE SERVICES. SHEET 4

SCALE: 1:100
DRAWING SIZE: A1

DWG No.: BARRY_01_DWG_01_20134
REV.: E

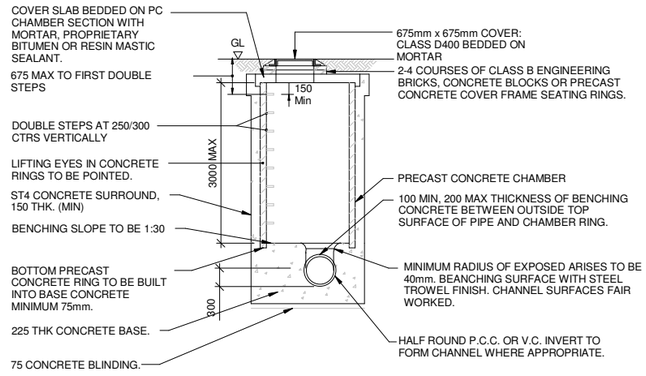


TYPICAL MANHOLE PLAN
N.T.S.



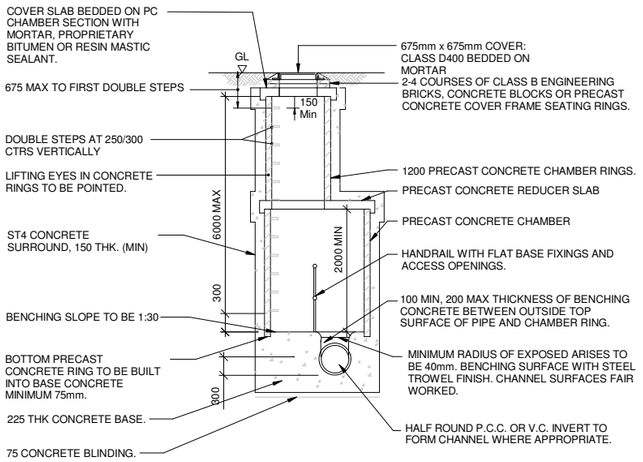
TYPE A - TYPICAL MANHOLE DETAIL
N.T.S

(DEPTH TO SOFFIT < 1500mm)



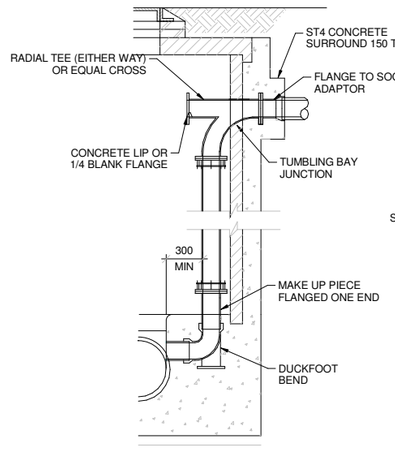
TYPE B - TYPICAL MANHOLE DETAIL
N.T.S.

(DEPTH TO SOFFIT >1500, <3000)

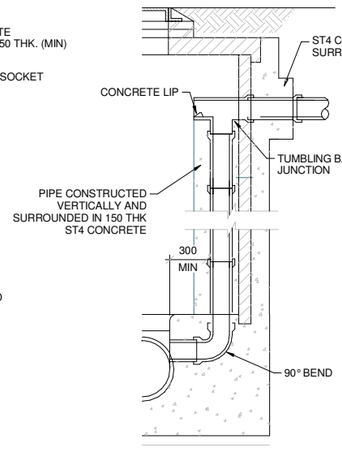


TYPE C - TYPICAL MANHOLE DETAIL
N.T.S.

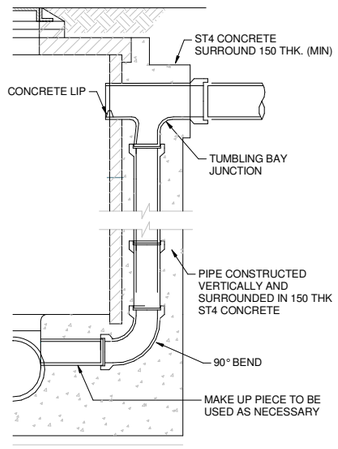
(DEPTH TO SOFFIT >3000)



INTERNAL FLANGED CONNECTED PIPEWORK

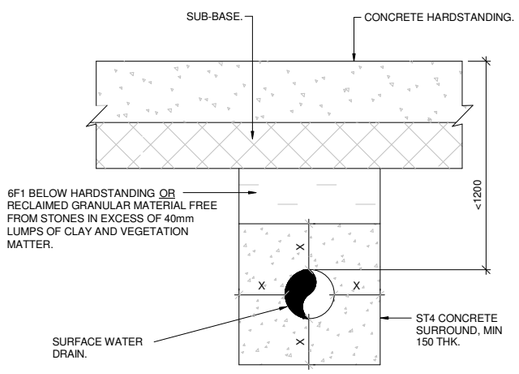


INTERNAL SPIGOT AND SOCKET PIPEWORK



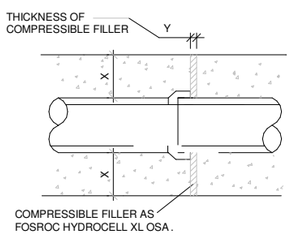
EXTERNAL SPIGOT AND SOCKET PIPEWORK

TYPICAL ARRANGEMENTS FOR BACKDROP DETAILS
N.T.S

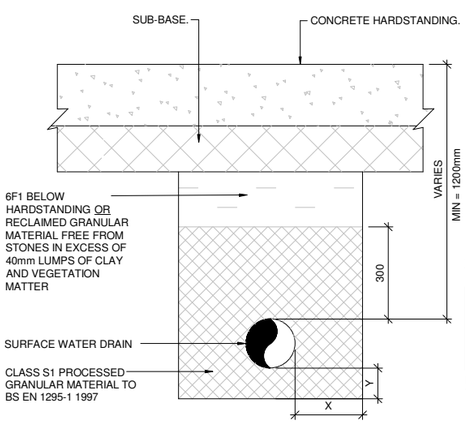


TRENCH DIMENSIONS

NOMINAL EXT. PIPE DIAMETER	X (mm)	Y (mm)
<400	150	18
400 - 700	200	36
725 -1200	300	36



PIPE ENCASEMENT DETAIL (WHERE COVER TO PIPE < 1200mm)
SCALE 1:10

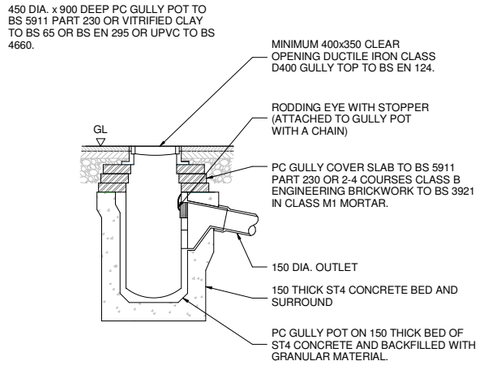


TRENCH DIMENSIONS

NOMINAL EXT. PIPE DIAMETER	X (mm)	
<400	150	
400 - 700	225	

NOTE: VALUES ASSUME EVEN TRENCH BOTTOM. IF UNEVEN INCREASE VALUE Y BY 100mm.

PIPE BEDDING DETAIL FOR FLEXIBLE PIPES
SCALE 1:10



ROAD GULLY DETAIL
SCALE 1:25

DO NOT SCALE - IF IN DOUBT ASK

NOTES

GENERAL

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES (mm) & ALL LEVELS ARE IN METRES (m) AOD, UNLESS STATED OTHERWISE.
3. ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE AND ANY DISCREPANCIES SHOULD BE REPORTED TO GHD LIVIGUNN.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT PROJECT STANDARDS AND SPECIFICATIONS.

DRAINAGE:

1. ALL DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH CESWI 7TH EDITION
2. NEW DRAINS ARE UNDERGROUND PVC-U IN ACCORDANCE WITH BS 4660. PROCESS WATER DRAINS TO BE HATHERNWARE CHEMICAL RESISTANCE - TBC
3. PIPE JOINTS IMMEDIATELY ADJACENT TO STRUCTURES AND CHAMBERS ARE FULLY ARTICULATED ROCKER PIPE JOINTS.
4. ROCKER PIPES ARE 600mm LONG U.N.O ROCKER PIPES TO BE POSITIONED MINIMUM ACHIEVABLE DISTANCE FROM MANHOLE OR CHAMBER WITH ALLOWANCE FOR INSTALLATION OF FLEXIBLE JOINT
5. ALL BURIED PIPES AND DUCTS UNDER STRUCTURE TO BE ENCASED IN MIN 150mm THICK C16/20 MASS CONCRETE. ALSO WHERE GROUND COVER IS LESS THAN 900mm.
6. DOUBLE STEPS SHALL BE PLASTIC ENCAPSULATED CARBON STEEL MANHOLE STEPS TO BS 1247-2. STEP IRONS AT 250/300 CENTRES HORIZONTALLY AND VERTICALLY MAY BE USED AS AN ALTERNATIVE TO DOUBLE STEPS.
7. PIPE BEDDING DETAILS SHOWN ON DRAWINGS: BARRY_01_DWG_01_20135 &20136

REFERENCE DRAWINGS :

BARRY_01_DWG_01_20131 - SITE SERVICES GA SHEET 1 OF 4
BARRY_01_DWG_01_20132 - SITE SERVICES GA SHEET 2 OF 4
BARRY_01_DWG_01_20133 - SITE SERVICES GA SHEET 3 OF 4
BARRY_01_DWG_01_20134 - SITE SERVICES GA SHEET 4 OF 4
BARRY_01_DWG_01_20135 - SITE SERVICES DETAILS SHEET 1
BARRY_01_DWG_01_20136 - SITE SERVICES DETAILS SHEET 2

SEE DETAILED DRAWINGS FOR HATHERNWARE THERMACHEM GULLY DETAILS AND STD GULLY DETAILS WHERE CAST INTO SLABS.

2D EXPORT FROM A 3D MODEL
ALL ALTERATIONS TO BE MADE IN THE MODEL FILE

PRELIMINARY

Rev	Date	Description	By	Chk	App
A	17.10.16	FIRST ISSUE	JW	MS	GB

Revision

GHD LIVIGUNN
The Studio
51 Brookfield Road
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SK8 1ES
0161 491 4600
info@ghdlivigunn.com

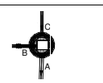
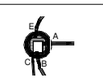
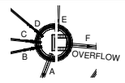
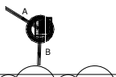
CLIENT: GallifordTry

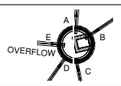
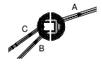
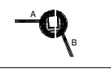
PROJECT: BARRY BIOMASS UK NO 2 LIMITED

TITLE: SITE SERVICES - DETAILS SHEET 1

SCALE	DRAWING SIZE
N.T.S	A1

DWG No.	REV.
BARRY_01_DWG_01_20135	A

MANHOLE No.	COVER LEVEL (m)	DIAGRAMATIC LAYOUT	EASTING (m)	NORTHING (m)	INTERNAL DIAMETER (mm)	PIPE REF	PIPE INVERL Lvl (m)	BACKDROP ENTRY	PIPE DIAMETER (mm)	CHAMBER TYPE	COVER GRADE
EXMH01	7.760		312680.372	167650.840	1800	A B	+6.550 +6.838	N/A N/A	90 300	EXISTING	D400
FW01	8.750		312606.628	167696.682	1200	A B C D E	+6.825 +7.000 +6.950 +6.840 +6.990	N/A N/A N/A N/A N/A	150 150 150 150 150	TYPE B	D400
FW02	8.680		312617.800	167687.663	1200	A B C D E	+6.725 +6.935 +6.910 +6.935 +6.735	N/A N/A N/A N/A N/A	150 150 150 150 150	TYPE B	C250
FW02.1	8.610		312629.083	167680.446	1050	A B	+6.625 +6.643	N/A N/A	150 150	TYPE B	D400
FW03	8.375		312636.438	167681.010	1050	A B C	+6.540 +7.125 +6.582	N/A Y N/A	150 150 150	TYPE B	D400
FW04	8.580		312621.764	167670.748	1200	A B C	+7.230 +7.290 +7.290	N/A N/A N/A	150 150 150	TYPE B	D400
FW05	8.335		312643.109	167671.649	1050	A B C	+6.475 +7.130 +6.435	N/A Y N/A	150 150 225	TYPE B	D400
FW06	8.580		312622.650	167657.515	1200	A B C D	+7.450 +7.500 +7.500 +7.525	N/A N/A N/A N/A	150 150 150 150	TYPE A	D400
FW07	8.345		312655.820	167651.284	1800	A B C D E F	+6.250 +7.300 +.7300 +6.550 +6.325 +6.800	N/A N/A N/A N/A N/A N/A	225 150 150 150 225 225	TYPE B	D400
FW08	9.260		312576.129	167733.520	1200	A B	+7.355 +7.350	N/A N/A	150 150	TYPE A	D400
FW09	9.260		312579.317	167728.801	1200	A B C	+7.350 +7.345 +7.345	N/A N/A N/A	150 150 150	TYPE A	D400
FW10	9.270		312589.004	167714.629	1200	A B	+7.230 +7.228	N/A N/A	150 150	TYPE A	D400
FW11	9.140		312595.425	167714.791	1200	A B	+6.985 +6.980	N/A N/A	150 150	TYPE B	D400
FWPS01	8.340		312656.942	167646.212	1800	A B	TBC +6.300	N/A N/A	80 150	TBC	D400
FWVC	0.000		312662.098	167642.735	1200	A B	TBC TBC	N/A N/A	150 150 100 150	TBC	D400
PWFM	8.305		312660.730	167640.126	1200	A B	TBC TBC	N/A N/A	150 150	TBC	D400
SW02	8.970		312606.510	167709.565	1800	A B C D	+6.130 +6.160 +6.135 +6.135	N/A Y N/A N/A	375 150 450 300	TYPE B	D400

MANHOLE No.	COVER LEVEL (m)	DIAGRAMATIC LAYOUT	EASTING (m)	NORTHING (m)	INTERNAL DIAMETER (mm)	PIPE REF	PIPE INVERL Lvl (m)	BACKDROP ENTRY	PIPE DIAMETER (mm)	CHAMBER TYPE	COVER GRADE
SW03	8.815		312612.496	167711.422	1200	A B C	+6.172 +6.190 +6.580	N/A N/A N/A	450 300 225	TYPE B	D400
SW04	8.445		312633.387	167692.537	1800	A B C D E	+6.279 +6.420 +6.293 +6.420 +7.260	N/A Y N/A Y Y	300 150 300 150 225	TYPE B	D400
SW05	8.285		312643.997	167680.281	1800	A B C D	+6.340 +7.210 +6.375 +6.358	N/A N/A N/A Y	300 150 225 150	TYPE B	D400
SW06	8.260		312659.300	167653.305	1800	A B C D E	+6.455 +7.160 +7.155 +6.780 +6.750	N/A N/A N/A N/A N/A	225 150 150 150 225	TYPE B	D400
SW07	9.150		312595.781	167711.146	1800	A B C D E	+6.190 +7.110 +7.100 +7.025 +7.100	N/A N/A Y Y Y	300 150 150 300 150	TYPE C	D400
SW08	8.665		312600.997	167698.246	1200	A B C D	+7.115 +7.165 +7.235 +7.455	N/A N/A N/A Y	225 150 225 150	TYPE B	D400
SW09	8.610		312619.769	167674.975	1200	A B C	+7.080 +7.465 +7.645	N/A N/A N/A	225 150 150	TYPE B	D400
SW10	9.285		312563.053	167712.002	1050	A B C	+8.325 +8.330 +8.330	N/A N/A N/A	225 150 150	TYPE A	C250
SW11	9.250		312574.059	167696.310	1800	A B C	+7.105 +7.120 +.7120	N/A N/A Y	300 300 225	TYPE B	D400
SW12	8.635		312597.203	167660.044	1200	A B C	+7.315 +7.325 +7.330	N/A N/A N/A	300 150 300	TYPE A	D400
SW13	8.675		312603.753	167650.213	1800	A B C D E	+7.360 +7.440 +7.440 +7.450 +7.380	N/A N/A N/A N/A N/A	300 150 150 150 300	TYPE A	D400
SW14	8.680		312610.001	167640.971	1200	A B C D	+7.410 +7.490 +7.490 +7.420	N/A N/A N/A N/A	300 150 150 225	TYPE A	D400
SW15	8.685		312616.051	167631.967	1800	A B C D E	+7.440 +7.500 +7.500 +7.500 +7.460	N/A N/A N/A N/A N/A	225 150 150 150 150	TYPE A	D400
SW16	8.350		312624.630	167614.776	1200	A B	+7.530 +7.625	N/A N/A	150 150	TYPE A	C250
SW17	8.550		312635.140	167621.720	1200	A B	+7.665 +7.675	N/A N/A	150 150	TYPE A	C250
SW19	8.725		312604.816	167693.251	1200	A B C	+7.235 +7.265 +7.275	N/A N/A N/A	225 150 150	TYPE A	D400
SW20	8.580		312587.253	167676.880	1200	A B C D	+7.150 +7.250 +7240 +7.250	N/A N/A N/A	300 150 300 150	TYPE B	D400
SW21	8.293		312655.604	167659.766	1050	A B C D	+6.420 +7.135 +6.430 +6.450	N/A Y N/A N/A	225 150 225 150	TYPE B	D400
SW22	9.285		312564.559	167754.327	1050	A B	+7.775 +7.745	N/A N/A	150 150	TYPE A	D400

DO NOT SCALE - IF IN DOUBT ASK

NOTES

GENERAL

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES (mm) & ALL LEVELS ARE IN METRES (m) AOD, UNLESS STATED OTHERWISE.
3. ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE AND ANY DISCREPANCIES SHOULD BE REPORTED TO GHD LIVIGUNN.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT PROJECT STANDARDS AND SPECIFICATIONS.

DRAINAGE:

1. ALL DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH CESWI 7TH EDITION
2. NEW DRAINS ARE UNDERGROUND PVC-U IIACCORDANCE WITH BS 4660. PROCESS WATER DRAINS TO BE HATHERNWARE CHEMICAL RESISTANCE - TBC
3. PIPE JOINTS IMMEDIATELY ADJACENT TO STRUCTURES AND CHAMBERS ARE FULLY ARTICULATED ROCKER PIPE JOINTS.
4. ROCKER PIPES ARE 600mm LONG U.N.O ROCKER PIPES TO BE POSITIONED MINIMUM ACHIEVABLE DISTANCE FROM MANHOLE OR CHAMBER WITH ALLOWANCE FOR INSTALLATION OF FLEXIBLE JOINT
5. ALL BURIED PIPES AND DUCTS UNDER STRUCTURE TO BE ENCASED IN MIN 150mm THICK C16/20 MASS CONCRETE. ALSO WHERE GROUND COVER IS LESS THAN 900mm.
6. DOUBLE STEPS SHALL BE PLASTIC ENCAPSULATED CARBON STEEL MANHOLE STEPS TO BS 1247-2. STEP IRONS AT 250/300 CENTRES HORIZONTALLY AND VERTICALLY MAY BE USED AS AN ALTERNATIVE TO DOUBLE STEPS.
7. PIPE BEDDING DETAILS SHOWN ON DRAWING: BARRY_01_DWG_01_20135

REFERENCE DRAWINGS :

BARRY_01_DWG_01_20131 - SITE SERVICES GA SHEET 1 OF 4
BARRY_01_DWG_01_20132 - SITE SERVICES GA SHEET 2 OF 4
BARRY_01_DWG_01_20133 - SITE SERVICES GA SHEET 3 OF 4
BARRY_01_DWG_01_20134 - SITE SERVICES GA SHEET 4 OF 4
BARRY_01_DWG_01_20135 - SITE SERVICES DETAILS SHEET 1
BARRY_01_DWG_01_20136 - SITE SERVICES SCHEDULE

2D EXPORT FROM A 3D MODEL
ALL ALTERATIONS TO BE MADE IN THE MODEL FILE

PRELIMINARY

Rev	Date	Description	By	Chk	App
C	19.07.17	SCHEDULE UPDATED	JW	MS	GB
B	15.05.17	SCHEDULE UPDATED	JW	MS	GB
A	19.01.17	FIRST ISSUE	JW	MS	GB

Revision

GHD LIVIGUNN
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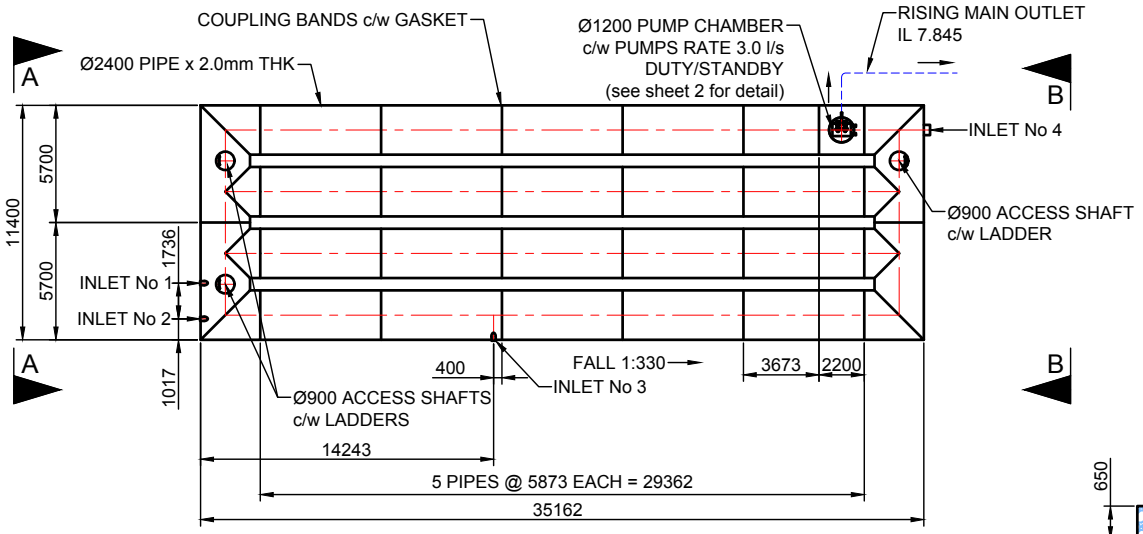
CLIENT
GallifordTry

PROJECT
BARRY BIOMASS UK NO 2 LIMITED

TITLE
SITE SERVICES
MANHOLE SCHEDULE

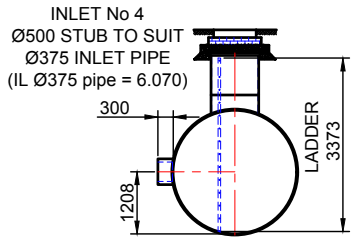
SCALE	DRAWING SIZE
N.T.S	A1

DWG No.	REV.
BARRY_01_DWG_01_20136	C



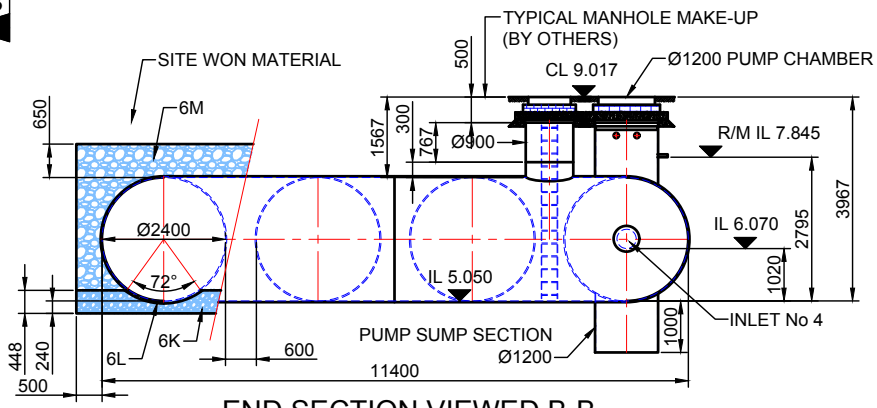
PLAN VIEW

SCALE 1:250



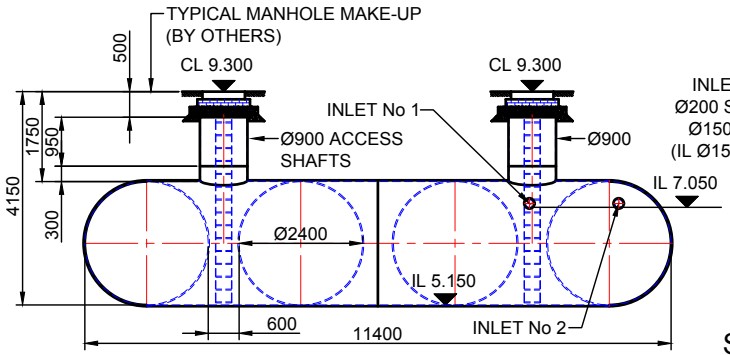
SIDE ELEVATION INLET No 4

SCALE 1:100



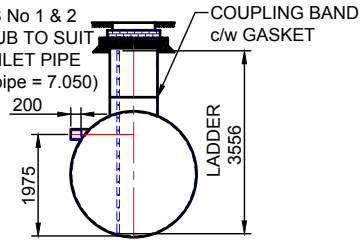
END SECTION VIEWED B-B

SCALE 1:100



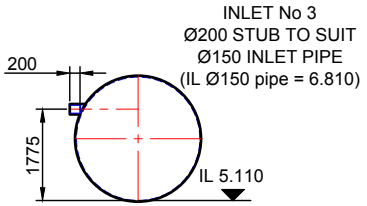
END SECTION VIEWED A-A

SCALE 1:100



SIDE ELEVATION INLETS No 1 & 2

SCALE 1:100



SECTION THROUGH INLET No 3

SCALE 1:100

Rev.	Date	Drawn	Description
E	26.07.17	MR	Amend Cable Ducts
D	25.07.17	MR	Amend Inlet Number 3 Position
C	25.07.17	MR	Amend To Engineers Comments
B	21.07.17	MR	Issued For Comment
A	27.06.17	MH	Amended Sales Drawing
-	20.06.17	MH	Sales Drawing

TITLE

Storm Water Retention Tank For
Barry Biomass

Cubic Capacity = 652m3
EN17/17652 3073/14297

CHK.

SCALE	DRAWING No.	REV.
Various (A3)	TUB/15257 - Sheet 1 of 3	E

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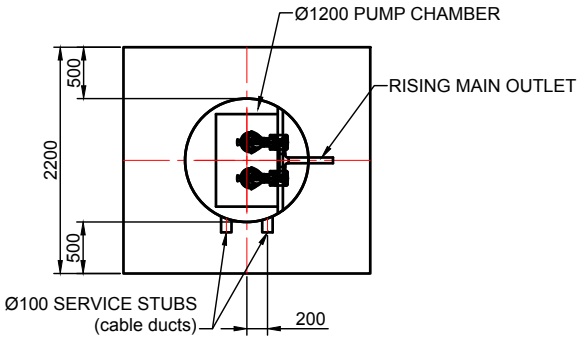
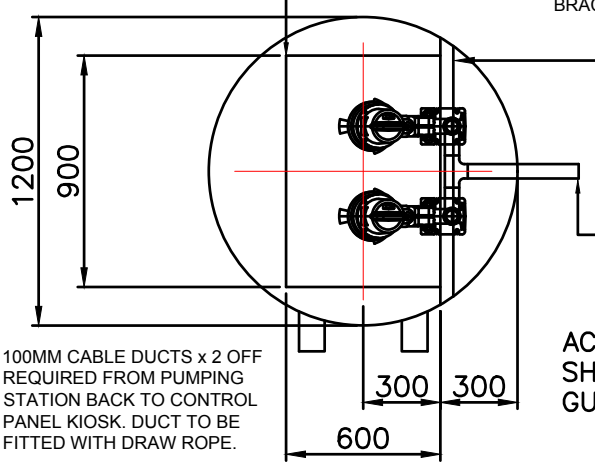
PUMP RATE 3.0 L/S

PLAN VIEW
SCALE 1:50

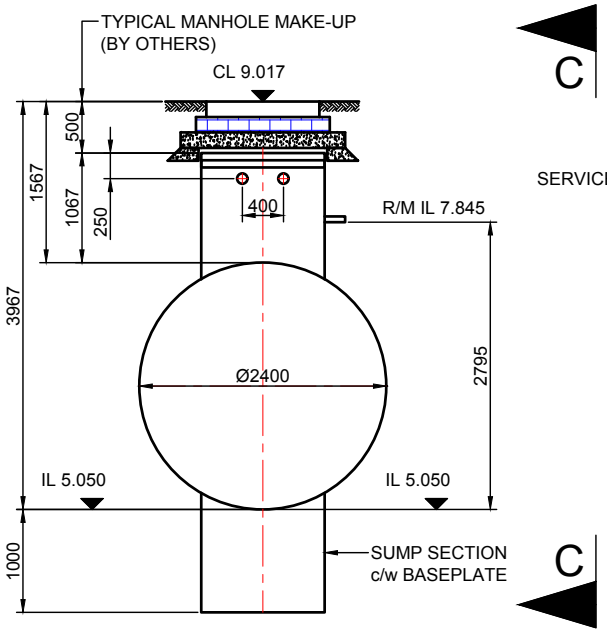


ACCESS OPENING TO BE POSITIONED AS SHOWN RELATIVE TO THE TOP ANGLE IRON SUPPORT, AS SHOWN.

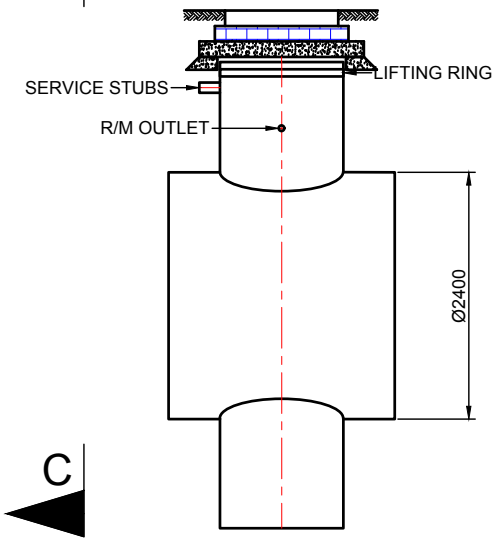


100MM CABLE DUCTS x 2 OFF REQUIRED FROM PUMPING STATION BACK TO CONTROL PANEL KIOSK. DUCT TO BE FITTED WITH DRAW ROPE.

ACCESS OPENING TO BE POSITIONED AS SHOWN RELATIVE TO TO THE 50X50 TOP GUIDERAIL SUPPORT ANGLE.



ELEVATION THROUGH Ø1200 PUMP CHAMBER
SCALE 1:50



VIEW C-C
SCALE 1:50

IMPORTANT NOTE:
FAILURE TO POSITION AND MAINTAIN CLEAR OPENING AS SHOWN MAY RESULT IN CANCELLATION OF INSTALLATION.

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TITLE
Storm Water Retention Tank For Barry Biomass

Cubic Capacity = 652m3
EN17/17652 3073/14297

CHK.

SCALE	DRAWING No.	REV.
Various (A3)	TUB/15257 - Sheet 2 of 3	E

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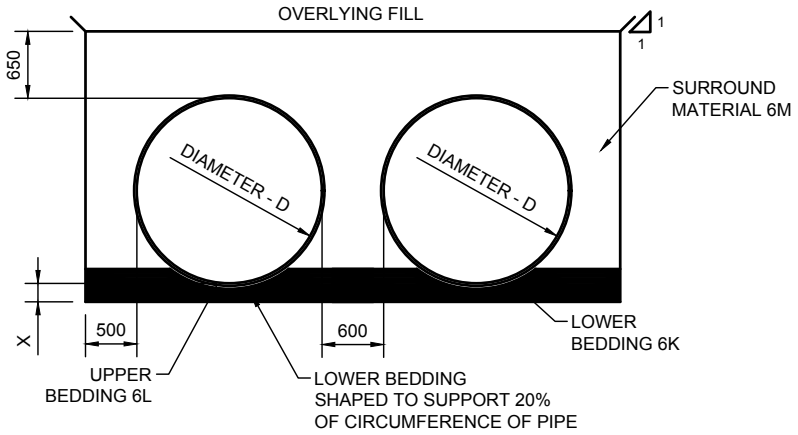
EXCAVATION AND BACKFILL REQUIREMENTS
Multiple Pipe Run



Minimum depth (X) of Lower Bedding material to be equal to Diameter (D) divided by 10. Therefore for 1.8m pipe, X = 180mm etc.

Backfill & Bedding Materials Specification

Lower bedding material	6K	Natural gravel, natural sand, crushed gravel, crushed rock other than argillaceous rock, crushed concrete, well - burnt colliery spoil or any combination thereof.
Upper bedding material	6L	Natural gravel, natural sand, crushed gravel, crushed rock other than argillaceous rock, crushed concrete, well - burnt colliery spoil or any combination thereof.
Surround material	6M	Natural gravel, natural sand, crushed gravel, crushed rock other than argillaceous rock, crushed concrete, well - burnt colliery spoil or any combination thereof.

Material	PERCENTAGE BY MASS PASSING THE SIZE SHOWN									
	Size (mm) BS Series						Size (um) BS Series			
	75	20	10	5	2	1.18	600	300	150	63
Lower bedding 6K		100								0-10
Upper bedding 6L			100	89 - 100	60 - 100	30 - 100	15 - 100	5 - 70	0 - 15 except 0-20 for crushed rock	
Surround 6M	100									0 - 10

The above information is drawn from the design manual tor roads and bridges. The materials listed below are as described in series 600 MCHW1.

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TITLE
Storm Water Retention Tank For
Barry Biomass

Cubic Capacity = 652m3
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SCALE: Various (A3)
DRAWING No.: TUB/15257 - Sheet 3 of 3
REV.: E

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