

APPENDIX D

PROPOSED SITE WIDE EXTERNAL WORKS DRAWING

NOTE
THIS DRAWING IS INTENDED TO BE A LIVE WORKING DOCUMENT FOR FURTHER DEVELOPMENT AND DISCUSSION WITH ALL CONCERNED INCLUDING BIKE PARK WALES, PROJECT DESIGN TEAM MEMBERS, THE SUD'S APPROVAL BODY AND NRW TOGETHER WITH ALL APPROPRIATE REGULATORS

R	CM	27.05.22	UPDATED MASTERPLAN
S	CM	11.11.20	FILTER DRAINS / SWALES CLARIFIED IN RELATION TO DETAILS SHEET - SEE CLOUDED
Q	RC	01.10.20	FLOW CONTROL, CHAMBER ADDED
P	RC	01.10.20	SURFACE WATER NETWORK REVISED
O	CM	24.01.19	ADDITIONAL SDS AQUA SWIRL UNITS TO NORTH-EAST AND SOUTH EAST CAR PARKS
N	CM	13.11.19	UPDATED IN ACCORDANCE WITH LANDSCAPE MASTER PLAN REV H
M	CM	04.10.19	UPDATED TO SUIT LANDSCAPE ARCHITECTS PLAN
L	CM	02.10.19	UPDATED TO SUIT LANDSCAPE ARCHITECTS COMMENTS & INFILTRATION TEST RESULTS
K	CM	21.08.19	SCHEME UPDATED FOLLOWING LAB SOILS CONSULTATION
J	CM	17.07.19	SCHEME PROPOSED GENERALLY UPDATED
H	PH	12.05.19	SEALED TANK PROVIDED FOR FOUL WATERS FROM MOTORHOME AREA
G	PH	14.03.19	NOTE AMENDED ON EXISTING TREATMENT PLANT
F	PH	12.03.19	LODGE AREA LAYOUT UPDATED TO LS ARCHITECTS LAYOUT, GABION WALL REMOVED.
E	PH	11.03.19	LODGE AREA LAYOUT UPDATED TO LS ARCHITECTS LAYOUT.
D	PH	04.03.19	FW PART DRAINAGE RE-ROUTED TO COMMENTS FROM LS ARCHITECT.
C	PH	01.03.19	RE-DRAWN, LEVELS & BANKS ADDED.
B	PH	19.11.18	SOME VAWN CAR PARKS ADDED AT BOTTOM OF SITE SECTION 7 DUE TO STEEPNESS OF EXISTING GROUND. DRAINAGE RE-ROUTED FROM LODGES. CESSPIT MOVED DUE TO STEEPNESS OF EXISTING GROUND, FW DRAINS ADDED ON SHEPHERDS HEDG. SECTION MARKS 9-11 ADDED.
A	PH	19.11.18	DRAINAGE LAYOUTED, NEW ARCHITECTS LAYOUT ADDED.
Rev	By	Date	Revision

Drawing Status		PLANNING			
Architect		LeTrucco			
Client		RIDE BIKE WALES			
Scale	Drawn	Drawing Size	Date	Checked	
1:500	PH	A1	13/11/19	RG	

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Project Title							
PROPOSED EXPANSION AT RIDE BIKE WALES							
Drawing Title							
PROPOSED SITE WIDE EXTERNAL WORKS SCHEME							
Project No.	Originator	Volume	Level	Type	Role	Number	Rev
6655	BHP	ZZ	XX	DR	S	(60)P01	S

Registered in England + Wales No: 05348301

APPENDIX E

PLASTIC SOLUTIONS (ALDRIDGE) LIMITED,
TUFF TANK FOUL WASTE COLLECTION SYSTEM TRADE
LITERATURE

BLOG POST

May 16, 2018

NEW PRODUCTS

An Easier Tip for the Camping (or Glamping) Trip



A quick check on the forums for boaters, campers, caravanners, motor home owners and yachtspeople shows that disposing of the contents of chemical toilets is a major talking point. For those of you who haven't had the pleasure then the phrase "Many a slip 'twixt cup an lip" may provide an appropriate (if unappealing) explanation.

A quick check on the forums for boaters, campers, caravanners, motor home owners and yachtspeople shows that disposing of the contents of chemical toilets is a major talking point. For those of you who haven't had the pleasure then the phrase "Many a slip 'twixt cup an lip" may provide an appropriate (if unappealing) explanation.



Fundamentally, tipping the contents of a toilet bucket or cassette into a effluent tank can be quite tricky. Think heavy toilets, narrow hole in the effluent tank, difficult to access site, muddy field or in the middle of the night as just a few factors that could cause splashes or complete misses.

It's not a great experience for the "designated disposer" in the holiday party or amongst the crew. Neither is it what the owner of the site, marina or boat-yard wants to be dealing with.

So Plastic Solutions is delighted to offer a brand-new product to reduce the thrills and spills of chemical toilet emptying.

The Elsan® Tipping Point works with a variety of waste and effluent disposal tanks (and especially well with our very own Tuff Tank and Mini Tuff Tank) to provide an easy, spill-free method of toilet waste disposal. The Tipping Point stands at a convenient height of 1000mm and features a broad rim to support the toilet bucket or cassette while tipping.



In fact the Elsan® Tipping Point isn't limited to making toilet waste disposal easier. There are lots of circumstances where waste liquids have to be transferred from small to larger containers - waste oil disposal for example - where this new product could help.

Check out the product page on our website for the full specification. To get a quote today call freephone [0800 3345742](tel:0800 3345742) or email using our [contact form](#).

APPENDIX F

GREENFIELD RUNOFF CALCULATIONS

Bingham Hall Partnership Ltd		Page 1																										
5 Ty Nant Court, Morganstown Cardiff CF15 8LW																												
Date 03/10/2019 09:30	Designed by RussellC																											
File	Checked by																											
Micro Drainage	Source Control 2019.1																											
<u>Greenfield Runoff Volume</u> FSR Data <table><tr><td>Return Period (years)</td><td>100</td></tr><tr><td>Storm Duration (mins)</td><td>360</td></tr><tr><td>Region</td><td>England and Wales</td></tr><tr><td>MS-60 (mm)</td><td>19,300</td></tr><tr><td>Ratio R</td><td>0.276</td></tr><tr><td>Areal Reduction Factor</td><td>1.00</td></tr><tr><td>Area (ha)</td><td>0.794</td></tr><tr><td>SAAR (mm)</td><td>1490</td></tr><tr><td>CWI</td><td>124.440</td></tr><tr><td>Urban</td><td>0.000</td></tr><tr><td>SPR</td><td>30.000</td></tr></table> Results <table><tr><td>Percentage Runoff (%)</td><td>34.73</td></tr><tr><td>Greenfield Runoff Volume (m³)</td><td>193.142</td></tr></table>			Return Period (years)	100	Storm Duration (mins)	360	Region	England and Wales	MS-60 (mm)	19,300	Ratio R	0.276	Areal Reduction Factor	1.00	Area (ha)	0.794	SAAR (mm)	1490	CWI	124.440	Urban	0.000	SPR	30.000	Percentage Runoff (%)	34.73	Greenfield Runoff Volume (m³)	193.142
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APPENDIX G

PROPOSED SURFACE WATER CALCULATIONS

CALCULATIONS FOR THE SURFACE WATER DRAINAGE

These calculations cover the proposed surface water drainage for the developed site. The network assessed in the following calculations, is based on the drainage scheme shown on BHPL's drawings, reference: 6655-(60)001; a copy of which have been appended to these calculations for reference. The analysis of the network has been undertaken using design software 'MicroDrainage' with the following design parameters:

M5-60 (mm) = 19.300; Ratio R = 0.275;

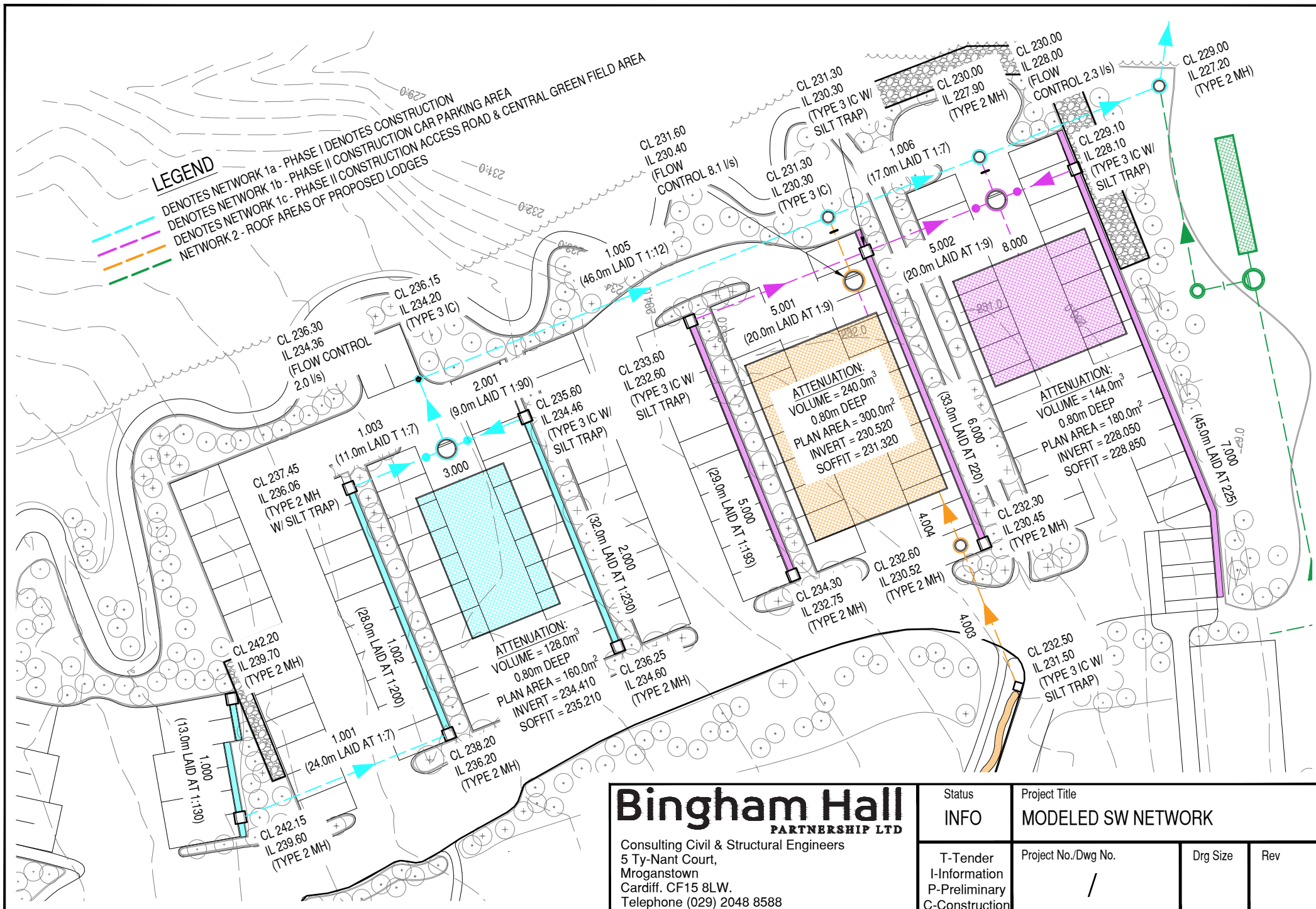
The proposed network has been designed in accordance with the SUDS manual and CIRIA document C753. The two networks considered in the following calculations have been designed with restricted flows and thus have attenuation facilities accommodating all storm durations for the 1 in 100 return period along with an allowance of 30% for climate change.

NETWORK 1:

The following network serves the car park facilities to the north of the site along with the access road between this car park and the south car park (served by a different surface water system). These impermeable areas have been identified on the following Network Diagram / Impermeable Areas Diagram. The water from the northern car park shall utilise the existing topography of the site to drain to constructed dry swales located between the rows of car parking bays. The dry swales shall act as a form of storage and treatment for the collected runoff water as well as dramatically slowing down the discharge.

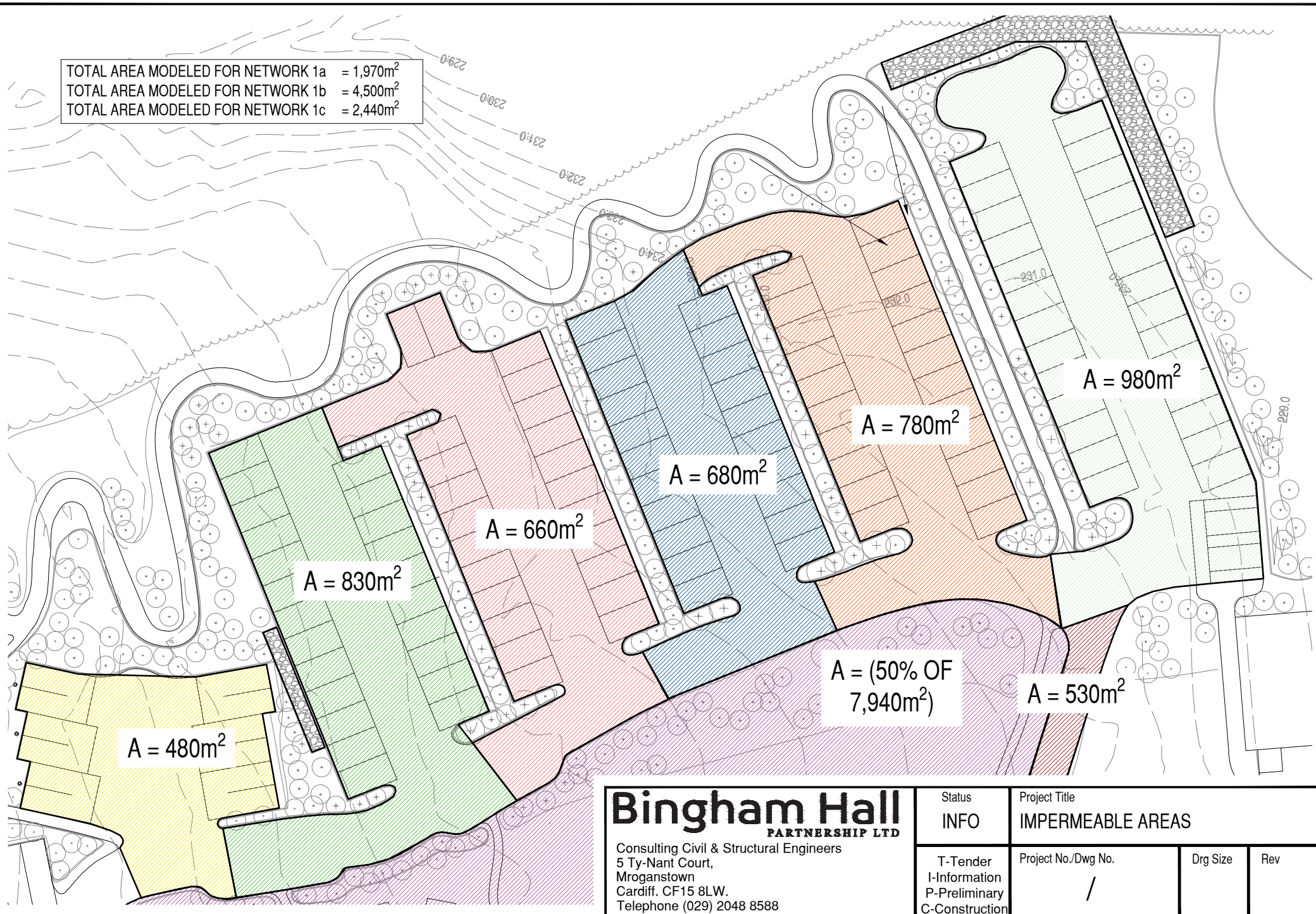
In addition, to the areas described above an allowance has been made for the greenfield area, central to the site. Due to the topography of the site, this will undoubtedly drain to the swale running adjacent to the access road described above and will consequently discharge to Network 1, with its restricted flow and attenuation facility.

Network 1 has been divided into three parts, each utilising their own Hydrobrake and attenuation facility. The separate systems have been introduced to accommodate for the phased construction of the site.



Status INFO	Project Title MODELED SW NETWORK		
	T-Tender I-Information P-Preliminary C-Construction	Project No./Dwg No. /	Drg Size Rev

TOTAL AREA MODELED FOR NETWORK 1a = 1,970m²
TOTAL AREA MODELED FOR NETWORK 1b = 4,500m²
TOTAL AREA MODELED FOR NETWORK 1c = 2,440m²



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Status
INFO

T-Tender
I-Information
P-Preliminary
C-Construction

Project Title
IMPERMEABLE AREAS

Project No./Dwg No.

/

Drg Size

Rev

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5 Ty Nant Court, Morganstown Cardiff CF15 8LW	Bike Park Wales Network 1 - SW Parameters & Q100 Simulations	
Date 02/10/2020 15:53 File 6655 - Phase II.MDX	Designed by RC Checked by RG	
Innovyze	Network 2019.1	

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)	19.200	Add Flow / Climate Change (%)	0
Ratio R	0.282	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	100	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 Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.182	4-8	0.449	8-12	0.196	12-16	0.060	16-20	0.005

Total Area Contributing (ha) = 0.891

Total Pipe Volume (m³) = 245.151

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	13.000	0.100	130.0	0.048	10.00	0.0		0.035	→\-/→		Dry Swale	⚠
S1.001	24.000	3.400	7.1	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	⚠
S1.002	28.000	0.140	200.0	0.083	0.00	0.0		0.035	→\-/→		Dry Swale	⚠
S1.003	11.000	1.700	6.5	0.000	0.00	0.0	0.600		o	150	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)
S1.000	41.24	10.34	239.700	0.048	0.0	0.0	0.0	0.63	527.8	5.4
S1.001	41.04	10.45	239.600	0.048	0.0	0.0	0.0	3.82	67.5	5.4
S1.002	39.54	11.28	236.200	0.131	0.0	0.0	0.0	0.57	342.7	14.0
S1.003	39.47	11.32	236.060	0.131	0.0	0.0	0.0	3.99	70.5	14.0

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5 Ty Nant Court, Morganstown Cardiff CF15 8LW	Bike Park Wales Network 1 - SW Parameters & Q100 Simulations	
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Innovyze	Network 2019.1	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S2.000	32.000	0.140	228.6	0.066	10.00	0.0		0.035	→\-/→		Dry Swale	
S2.001	9.000	0.100	90.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S3.000	10.000	0.001	10000.0	0.000	10.00	0.0	0.600		o	225	Pipe/Conduit	
S1.004	8.000	0.160	50.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S1.005	46.000	3.900	11.8	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S4.000	100.000	0.850	117.6	0.150	10.00	0.0		0.035	→\-/→		Dry Swale	
S4.001	50.000	0.250	200.0	0.150	0.00	0.0		0.035	→\-/→		Dry Swale	
S4.002	50.000	0.900	55.6	0.150	0.00	0.0		0.035	→\-/→		Dry Swale	
S4.003	15.000	0.950	15.8	0.000	0.00	0.0		0.035	o	300	Pipe/Conduit	
S4.004	30.000	0.120	250.0	0.000	0.00	0.0		0.035	o	300	Pipe/Conduit	
S4.005	5.000	0.100	50.0	0.000	0.00	0.0		0.035	o	150	Pipe/Conduit	
S1.006	17.000	2.400	7.1	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S5.000	29.000	0.150	193.3	0.068	10.00	0.0		0.035	→\-/→		Dry Swale	
S5.001	20.000	2.150	9.3	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
S6.000	33.000	0.150	220.0	0.078	10.00	0.0		0.035	→\-/→		Dry Swale	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S2.000	40.08	10.97	234.600	0.066	0.0	0.0	0.0	0.55	307.5	7.2
S2.001	39.82	11.12	234.460	0.066	0.0	0.0	0.0	1.06	18.7	7.2
S3.000	39.39	11.37	234.361	0.000	0.0	0.0	0.0	0.12	4.8	0.0
S1.004	39.23	11.46	234.360	0.197	0.0	0.0	0.0	1.43	25.2	20.9
S1.005	38.79	11.72	234.200	0.197	0.0	0.0	0.0	2.95	52.1	20.9
S4.000	38.25	12.05	233.500	0.150	0.0	0.0	0.0	0.81	540.7	15.5
S4.001	36.26	13.41	232.650	0.300	0.0	0.0	0.0	0.62	425.5	29.5
S4.002	35.32	14.12	232.400	0.450	0.0	0.0	0.0	1.17	807.3	43.0
S4.003	35.08	14.31	231.500	0.450	0.0	0.0	0.0	1.28	90.4	43.0
S4.004	33.26	15.87	230.520	0.450	0.0	0.0	0.0	0.32	22.7	43.0
S4.005	33.06	16.05	230.400	0.450	0.0	0.0	0.0	0.45	8.0	43.0
S1.006	32.98	16.13	230.300	0.647	0.0	0.0	0.0	3.81	67.3	57.8
S5.000	40.38	10.80	232.750	0.068	0.0	0.0	0.0	0.60	313.9	7.4
S5.001	40.20	10.90	232.600	0.068	0.0	0.0	0.0	3.32	58.7	7.4
S6.000	40.07	10.98	230.450	0.078	0.0	0.0	0.0	0.56	294.3	8.5

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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design																																																																																																																																																																								
S5.002	15.000	2.300	6.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit																																																																																																																																																																									
S7.000	45.000	0.200	225.0	0.098	10.00	0.0		0.035	→\-/→		Dry Swale																																																																																																																																																																									
S7.001	9.000	0.100	90.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit																																																																																																																																																																									
S8.000	10.000	0.001	10000.0	0.000	10.00	0.0	0.600		o	300	Pipe/Conduit																																																																																																																																																																									
S5.003	5.000	0.100	50.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit																																																																																																																																																																									
S1.007	20.300	0.700	29.0	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit																																																																																																																																																																									
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)																																																																																																																																																																										
S5.002	39.99	11.02	230.300	0.146	0.0	0.0	0.0	5.16	205.1	15.8																																																																																																																																																																										
S7.000	39.44	11.33	228.300	0.098	0.0	0.0	0.0	0.56	288.5	10.5																																																																																																																																																																										
S7.001	39.26	11.44	228.100	0.098	0.0	0.0	0.0	1.38	54.8	10.5																																																																																																																																																																										
S8.000	39.81	11.13	228.001	0.000	0.0	0.0	0.0	0.15	10.5	0.0																																																																																																																																																																										
S5.003	39.16	11.50	228.000	0.244	0.0	0.0	0.0	1.43	25.2«	25.9																																																																																																																																																																										
S1.007	32.79	16.31	227.900	0.891	0.0	0.0	0.0	1.88	33.2«	79.1																																																																																																																																																																										
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S7, DS/PN: S1.004, Volume (m³): 2.9

Unit Reference MD-SHE-0070-2000-0800-2000
Design Head (m) 0.800
Design Flow (l/s) 2.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 70
Invert Level (m) 234.360
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.0
Flush-Flo™	0.240	2.0
Kick-Flo®	0.504	1.6
Mean Flow over Head Range	-	1.7

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	1.8	1.200	2.4	3.000	3.7	7.000	5.5
0.200	2.0	1.400	2.6	3.500	3.9	7.500	5.6
0.300	2.0	1.600	2.7	4.000	4.2	8.000	5.8
0.400	1.9	1.800	2.9	4.500	4.4	8.500	6.0
0.500	1.6	2.000	3.0	5.000	4.7	9.000	6.2
0.600	1.8	2.200	3.2	5.500	4.9	9.500	6.3
0.800	2.0	2.400	3.3	6.000	5.1		
1.000	2.2	2.600	3.4	6.500	5.3		

Hydro-Brake® Optimum Manhole: S14, DS/PN: S4.005, Volume (m³): 3.4

Unit Reference MD-SHE-0134-8100-0900-8100
Design Head (m) 0.900
Design Flow (l/s) 8.1
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 134
Invert Level (m) 230.400
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

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Hydro-Brake® Optimum Manhole: S14, DS/PN: S4.005, Volume (m³): 3.4

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	8.1
Flush-Flo™	0.274	8.1
Kick-Flo®	0.610	6.8
Mean Flow over Head Range	-	6.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.8	1.200	9.3	3.000	14.3	7.000	21.5
0.200	8.0	1.400	10.0	3.500	15.4	7.500	22.2
0.300	8.1	1.600	10.6	4.000	16.4	8.000	22.9
0.400	7.9	1.800	11.2	4.500	17.4	8.500	23.6
0.500	7.6	2.000	11.8	5.000	18.3	9.000	24.2
0.600	6.9	2.200	12.3	5.500	19.1	9.500	24.8
0.800	7.7	2.400	12.9	6.000	19.9		
1.000	8.5	2.600	13.4	6.500	20.7		

Hydro-Brake® Optimum Manhole: S17, DS/PN: S5.003, Volume (m³): 6.6

Unit Reference	MD-SHE-0068-2300-1250-2300
Design Head (m)	1.250
Design Flow (l/s)	2.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	68
Invert Level (m)	228.000
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.250	2.3
Flush-Flo™	0.301	2.0
Kick-Flo®	0.610	1.7
Mean Flow over Head Range	-	1.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.7	0.300	2.0	0.500	1.9	0.800	1.9
0.200	2.0	0.400	2.0	0.600	1.7	1.000	2.1

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<u>Hydro-Brake® Optimum Manhole: S17, DS/PN: S5.003, Volume (m³): 6.6</u>							
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.200	2.3	2.400	3.1	5.000	4.4	8.000	5.4
1.400	2.4	2.600	3.2	5.500	4.6	8.500	5.6
1.600	2.6	3.000	3.4	6.000	4.8	9.000	5.8
1.800	2.7	3.500	3.7	6.500	4.9	9.500	5.9
2.000	2.9	4.000	3.9	7.000	5.1		
2.200	3.0	4.500	4.2	7.500	5.3		

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Area (m²)	0.000	160.0	160.0	5.200	0.0	200.5	0.400	160.0	180.2	5.600	0.0	200.5	0.800	160.0	200.5	6.000	0.0	200.5	0.801	0.0	200.5	6.400	0.0	200.5	1.201	0.0	200.5	6.800	0.0	200.5	2.000	0.0	200.5	7.200	0.0	200.5	2.400	0.0	200.5	7.600	0.0	200.5	2.800	0.0	200.5	8.000	0.0	200.5	3.200	0.0	200.5	8.400	0.0	200.5	3.600	0.0	200.5	8.800	0.0	200.5	4.000	0.0	200.5	9.200	0.0	200.5	4.400	0.0	200.5	9.600	0.0	200.5	4.800	0.0	200.5	10.000	0.0	200.5	Manning's N	0.035	Trench Length (m)	100.0	Infiltration Coefficient Base (m/hr)	0.00000	Trench Infiltration Side (m/hr)	0.00000	Infiltration Coefficient Side (m/hr)	0.00000	Trench Porosity	0.30	Safety Factor	2.0	Side Slope (1:X)	3.0	Swale Porosity	1.00	Slope (1:X)	117.6	Invert Level (m)	233.500	Cap Volume Depth (m)	0.900	Trench Height (m)	0.600	Cap Infiltration Depth (m)	0.900	Trench Width (m)	0.8			Depth above Invert Level (m)	0.000	Number of Pipes	1	Diameter (m)	0.150	Manning's N	0.035	Manning's N	0.035	Trench Length (m)	50.0	Infiltration Coefficient Base (m/hr)	0.00000	Trench Infiltration Side (m/hr)	0.00000	Infiltration Coefficient Side (m/hr)	0.00000	Trench Porosity	0.30	Safety Factor	2.0	Side Slope (1:X)	3.0	Swale Porosity	1.00	Slope (1:X)	200.0	Invert Level (m)	232.650	Cap Volume Depth (m)	1.000	Trench Height (m)	0.700	Cap Infiltration Depth (m)	1.000	Trench Width (m)	0.8			Depth above Invert Level (m)	0.000	Number of Pipes	1	Diameter (m)	0.150	Manning's N	0.035	Manning's N	0.035	Swale Porosity	1.00	Infiltration Coefficient Base (m/hr)	0.00000	Invert Level (m)	232.400	Infiltration Coefficient Side (m/hr)	0.00000	Trench Height (m)	0.700	Safety Factor	2.0	Trench Width (m)	0.8
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Dry Swale Pipe: S4.002 Trench Length (m)50.0Slope (1:X)55.6 Trench Infiltration Side (m/hr)0.00000Cap Volume Depth (m)1.000 Trench Porosity0.30Cap Infiltration Depth (m)1.000 Side Slope (1:X)3.0 Under Drain Details Depth above Invert Level (m)0.000Number of Pipes1 Diameter (m)0.150Manning's N0.035 Cellular Storage Manhole: S14, DS/PN: S4.004 Invert Level (m)230.520Safety Factor2.0 Infiltration Coefficient Base (m/hr)0.00000Porosity0.95 Infiltration Coefficient Side (m/hr)0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>300.0</td><td>300.0</td><td>5.200</td><td>0.0</td><td>355.5</td></tr><tr><td>0.400</td><td>300.0</td><td>327.7</td><td>5.600</td><td>0.0</td><td>355.5</td></tr><tr><td>0.800</td><td>300.0</td><td>355.4</td><td>6.000</td><td>0.0</td><td>355.5</td></tr><tr><td>0.801</td><td>0.0</td><td>355.5</td><td>6.400</td><td>0.0</td><td>355.5</td></tr><tr><td>1.600</td><td>0.0</td><td>355.5</td><td>6.800</td><td>0.0</td><td>355.5</td></tr><tr><td>2.000</td><td>0.0</td><td>355.5</td><td>7.200</td><td>0.0</td><td>355.5</td></tr><tr><td>2.400</td><td>0.0</td><td>355.5</td><td>7.600</td><td>0.0</td><td>355.5</td></tr><tr><td>2.800</td><td>0.0</td><td>355.5</td><td>8.000</td><td>0.0</td><td>355.5</td></tr><tr><td>3.200</td><td>0.0</td><td>355.5</td><td>8.400</td><td>0.0</td><td>355.5</td></tr><tr><td>3.600</td><td>0.0</td><td>355.5</td><td>8.800</td><td>0.0</td><td>355.5</td></tr><tr><td>4.000</td><td>0.0</td><td>355.5</td><td>9.200</td><td>0.0</td><td>355.5</td></tr><tr><td>4.400</td><td>0.0</td><td>355.5</td><td>9.600</td><td>0.0</td><td>355.5</td></tr><tr><td>4.800</td><td>0.0</td><td>355.5</td><td>10.000</td><td>0.0</td><td>355.5</td></tr></table> Dry Swale Pipe: S5.000 Manning's N0.035Trench Length (m)29.0 Infiltration Coefficient Base (m/hr)0.00000Trench Infiltration Side (m/hr)0.00000 Infiltration Coefficient Side (m/hr)0.00000Trench Porosity0.30 Safety Factor2.0Side Slope (1:X)3.0 Swale Porosity1.00Slope (1:X)193.3 Invert Level (m)232.750Cap Volume Depth (m)0.700 Trench Height (m)0.400Cap Infiltration Depth (m)0.700 Trench Width (m)0.6 Dry Swale Pipe: S6.000 Manning's N0.035Trench Length (m)33.0 Infiltration Coefficient Base (m/hr)0.00000Trench Infiltration Side (m/hr)0.00000 Infiltration Coefficient Side (m/hr)0.00000Trench Porosity0.30 Safety Factor2.0Side Slope (1:X)3.0 Swale Porosity1.00Slope (1:X)220.0 Invert Level (m)230.450Cap Volume Depth (m)0.700 Trench Height (m)0.400Cap Infiltration Depth (m)0.700 Trench Width (m)0.6			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	300.0	300.0	5.200	0.0	355.5	0.400	300.0	327.7	5.600	0.0	355.5	0.800	300.0	355.4	6.000	0.0	355.5	0.801	0.0	355.5	6.400	0.0	355.5	1.600	0.0	355.5	6.800	0.0	355.5	2.000	0.0	355.5	7.200	0.0	355.5	2.400	0.0	355.5	7.600	0.0	355.5	2.800	0.0	355.5	8.000	0.0	355.5	3.200	0.0	355.5	8.400	0.0	355.5	3.600	0.0	355.5	8.800	0.0	355.5	4.000	0.0	355.5	9.200	0.0	355.5	4.400	0.0	355.5	9.600	0.0	355.5	4.800	0.0	355.5	10.000	0.0	355.5
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Innovyze	Network 2019.1	

Dry Swale Pipe: S7.000

Manning's N	0.035	Trench Length (m)	45.0
Infiltration Coefficient Base (m/hr)	0.00000	Trench Infiltration Side (m/hr)	0.00000
Infiltration Coefficient Side (m/hr)	0.00000	Trench Porosity	0.30
Safety Factor	2.0	Side Slope (1:X)	3.0
Swale Porosity	1.00	Slope (1:X)	225.0
Invert Level (m)	228.300	Cap Volume Depth (m)	0.650
Trench Height (m)	0.350	Cap Infiltration Depth (m)	0.650
Trench Width (m)	0.6		

Cellular Storage Manhole: S16, DS/PN: S8.000

Invert Level (m)	228.050	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)
0.000	180.0	180.0	5.200	0.0	223.0
0.400	180.0	201.5	5.600	0.0	223.0
0.800	180.0	222.9	6.000	0.0	223.0
0.801	0.0	223.0	6.400	0.0	223.0
1.201	0.0	223.0	6.800	0.0	223.0
2.000	0.0	223.0	7.200	0.0	223.0
2.400	0.0	223.0	7.600	0.0	223.0
2.800	0.0	223.0	8.000	0.0	223.0
3.200	0.0	223.0	8.400	0.0	223.0
3.600	0.0	223.0	8.800	0.0	223.0
4.000	0.0	223.0	9.200	0.0	223.0
4.400	0.0	223.0	9.600	0.0	223.0
4.800	0.0	223.0	10.000	0.0	223.0

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Cardiff
CF15 8LW

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Network 2019.1

Micro Drainage

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 Storage Structures 12

Number of Online Controls 3

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 0.275

Region England and Wales Cv (Summer) 0.750

M5-60 (mm)

19.300 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)

100.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status

ON

DVD Status

ON

Inertia Status

ON

Profile(s)

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)

100

Climate Change (%)

30

US/MH

PN

Name

Storm

Return Period

Climate Change

First (X) Surge

First (Y) Flood

First (Z) Overflow

Overflow Act.

S1.000

S1

30 Winter

100

+30%

S1.001

S2

30 Winter

100

+30%

S1.002

S3

15 Winter

100

+30%

S1.003

S4

15 Winter

100

+30%

S2.000

S5

480 Winter

100

+30%

S2.001

S6

480 Winter

100

+30%

100/15

Winter

S3.000

S7

480 Winter

100

+30%

100/15

Winter

S1.004

S7

480 Winter

100

+30%

100/15

Winter

S1.005

S8

4320 Winter

100

+30%

S4.000

S10

30 Winter

100

+30%

S4.001

S10

30 Winter

100

+30%

S4.002

S10

30 Winter

100

+30%

S4.003

S11

30 Winter

100

+30%

100/15

Winter

S4.004

S14

240 Winter

100

+30%

100/15

Winter

S4.005

S14

360 Winter

100

+30%

100/15

Winter

S1.006

S9

1440 Winter

100

+30%

S5.000

S10

30 Winter

100

+30%

S5.001

S11

30 Winter

100

+30%

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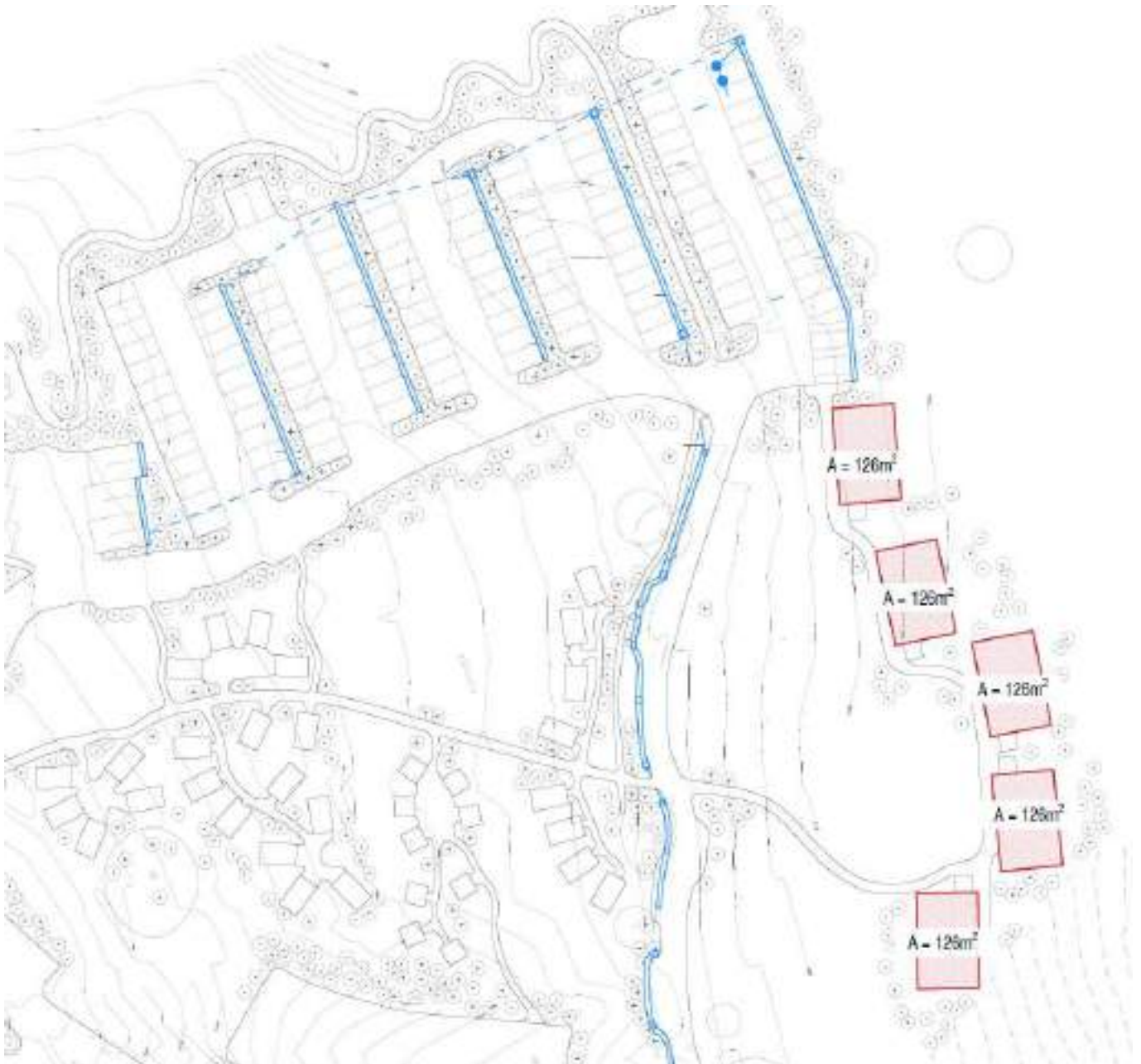
Bingham Hall Partnership Ltd		Page 11
5 Ty Nant Court, Morganstown Cardiff CF15 8LW	Bike Park Wales Network 1 - SW Parameters & Q100 Simulations	
Date 02/10/2020 15:53 File 6655 - Phase II.MDX	Designed by RC Checked by RG	
Innovyze	Network 2019.1	

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

PN	US/MH Name	Water		Surcharged		Flooded		Pipe		Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)				
S1.000	S1	239.906	-2.294	0.000	0.03		16.5			OK	
S1.001	S2	239.652	-0.098	0.000	0.26		16.5			OK	
S1.002	S3	236.993	-1.207	0.000	0.17		55.1			OK	
S1.003	S4	236.168	-0.042	0.000	0.86		54.3			OK	
S2.000	S5	235.115	-1.135	0.000	0.02		4.5			OK	
S2.001	S6	235.115	0.505	0.000	0.26		4.3			SURCHARGED	
S3.000	S7	235.113	0.527	0.000	0.15		2.3			SURCHARGED	
S1.004	S7	235.113	0.603	0.000	0.09		2.0			SURCHARGED	
S1.005	S8	234.219	-0.131	0.000	0.04		2.0			OK	
S4.000	S10	233.937	-0.563	0.000	0.10		52.0			OK	
S4.001	S10	233.383	-0.367	0.000	0.20		83.7			OK	
S4.002	S10	233.061	-0.439	0.000	0.15		118.0			OK	
S4.003	S11	232.342	0.542	0.000	1.26		111.3			SURCHARGED	
S4.004	S14	231.282	0.462	0.000	0.45		10.1			SURCHARGED	
S4.005	S14	231.290	0.740	0.000	1.03		8.1			SURCHARGED	
S1.006	S9	230.340	-0.110	0.000	0.16		10.0			OK	
S5.000	S10	233.152	-1.148	0.000	0.07		23.2			OK	
S5.001	S11	232.668	-0.082	0.000	0.42		23.2			OK	

NETWORK 2:

The following network serves the proposed accommodation to the east of the site and considers the roof areas only; see Figure 3 below, which highlights the extent of impermeable area. Surface water runoff from these roof areas shall be collected via rainwater pipes and discharged by below ground traditional gravity sewers in a northerly direction. Following this, a flow control chamber shall limit flows to a maximum discharge rate of **2.0 l/s**.



Drainage Areas Considered in the Network 2 Simulation

APPENDIX H

OVERLAND FLOW ROUTES



Rev	No	Date	Description
1	01	10/10/10	ISSUED FOR TENDER
2	02	10/11/10	DIRECTION OF FLOW REVISION
Rev	No	Date	Description
Bingham Hall PARTNERSHIP LTD Consulting Civil & Structural Engineers 21 Wood Green East Finchley Road Green Park Finchley London N12 6JG Telephone: 0208 224 4444 Fax: 0208 224 4445			
Page 108			
RIDE BIKE WALES - PROPOSED EXPANSION			
OVERLAND FLOW ROUTES			
LE TRUGGO			
RIDE BIKE WALES			
APPROVAL			
Drawn	Checked	Design	Issue
SHOWN	AT	PH	March 10
Project No.	Design No.	Drawn No.	Issue No.
6655 - BHP - D1 - XX - DR - S - (SAB)010			B

Consulting Civil & Structural Engineers

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