History.

Revision	Date	Reason
0	Nov 2018	B.Regs & LPA Approval

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Background.

To appraise existing and proposed drainage characteristics at the site in order to design the detailed site drainage for development.

The Site is located within the former garden area of No.662 Bury Road. To the immediate N & E of the Site is a low lying area approx 6m below Bury Road. Historically it comprised an open watercourse which has since been culverted beneath the E boundary of the Site (off-site), and below Bury Road, flowing to the S.

The proposed development is for the construction of 1No. detached residential dwelling.

Drainage Hierarchy.

National Planning Policy stipulates a hierarchical order of preference for the discharge of surface water from new developments to off site sources in the following order:

- infiltration;
- watercourse;
- sewer (first to SW sewer, and then to combined if SW not available).

The Site has been assessed from the BGS geological maps and also the HR Wallingford UK SUDS interactive map, both of which indicate the Site is underlain by a Class 4 Heavy Clay subsoil. Thus infiltration is not a suitable way of disposing of surface water fromimpermeable areas of the Site.

The closest watercourse as indicated in the background section of the Site was historically to the E side of the Site which has been culverted in to a 1050mm diameter pipe, and is now part of the United Utilities Surface Water Network. Surface water discharges from the Site will be disposed of in to this SW drain.

Predevelopment Land Usage.

Pre-development site area (greenfield area)	0.115 Ha.	(1150 sqm)
Total Site	**0.115 Ha.**	**(1150 sqm)**

Proposed Development Land Usage.

Gardens (inc. paths with falls to soft landscaping)	0.0895 Ha	(895 sqm)
Roofs & access road	0.0255 Ha	(255 sqm)
Total Proposed Site	**0.1150 Ha**	**(1150 sqm)**

Pre-development Rainfall Runoff.

The Site is to be considered greenfield for the purposes of this assesssment & calculated as follows:

EXISTING GREENFIELD RUNOFF

EXISTING RUNOFF CALCULATION

Attenuation design in accordance with CIRIA publication C753 - The SUDS Manual

Tedds calculation version 1.0.03

EA_Defra method

Site characteristics

Location;	Manchester
Hydrological region;	10
Soil type (Wallingford Procedure W.R.A.P map);	4
Standard percentage runoff;	SPR = **0.47**
Average annual rainfall;	SAAR = **1122** mm
5 year return period rainfall of 60 minute duration;	M5_60min = **20.0** mm
Ratio 60-minute to 2 day rainfalls of 5 year return;	r = **0.30**
Rainfall intensity increase due to global warming;	$p_{climate}$ = **0**%
Impervious area req. attenuation storage;	· = **100.0** %

Catchment details

Subcatchment	Name	Area (ha)	PIMP (%);	Impermeable. area (ha)
1;	**SITE;**	**0.12;**	**0.0;**	**0.00;**
	Total	**0.12;**	**0.0;**	**0.00;**

Greenfield runoff rates

Catchment area;	AREA = **50.00** hectare
Greenfield runoff rate (50 hectare site);	$\cdot Q_{rural}$ = 0.00108m^3/s · (AREA/1km^2)$^{0.89}$ · (SAAR/1mm)$^{1.17}$ · SPR$^{2.17}$ = **419.2** l / s
Greenfield runoff rate;	$\cdot Q = \cdot Q_{rural}$ / AREA · A = **1.0** l / s
Greenfield runoff rate per unit area;	$\cdot Q_A = \cdot Q$ / A = **8.4** l / s / hectare

Estimated site discharges

FSR growth rate (1 year);	FSR_{1yr} = **0.87**
Discharge (1 year);	$Q_{1yr} = \cdot Q \cdot FSR_{1yr}$ = **0.8** l/s
FSR growth rate (30 year);	FSR_{30yr} = **1.70**
Discharge (30 year);	$Q_{30yr} = \cdot Q \cdot FSR_{30yr}$ = **1.6** l/s
FSR growth rate (100 year);	FSR_{100yr} = **2.08**
Discharge (100 year);	$Q_{100yr} = \cdot Q \cdot FSR_{100yr}$ = **2.0** l/s

In line with current guidance, the proposed surface water discharge rate from the Site is to be kept to peak pre-development discharge flow rates for up to and including the 100yr +30% rainfall event but not less than 5l/s to avoid blockages to the system. As the existing Site discharge is less than this, a peak rate of 5l/s discharge will be used for the development.

Proposed SW Flood Attenuation System

The roof areas, drive and footpaths that do not fall to soft landscaping will provide the peak amount of flow unable to be infiltrated in to the exising ground will be piped in to the drainage system. This will then be attenuated using an oversized manhole, and the flow controlled by a Hydro-brake Optimum flow control device.

Flood Storage Attenuation & Discharges.

100 Year +CC Return Period.

The following indicates the flow control and storage for each of the plots.

Storage required	Max storage required 2.6m3.
Storage provided	MH area = 2.54m2 x 1.25m = 3.18m3.
Refer to TJBA calculation spreadsheet in appendix.	All calculation are run with a 30% allowance for climate change.
Critical storm	30min WINTER.
Max water level	135.825m aOD.
Control	Hydro-brake Optimum 103mm, 5.0l/s @ 1.2m head.
Max control discharge	= 5 l/s max.
Allowable discharge	= 5 l/s. **OK**.

The Source Control storm water attenuation calculations can be found in the appendix.

Appendix.

1:100yr+CC Source Control SW Attenuation.

T J Booth Associates		Page 1
104 Yorkshire St Rochdale Lancashire OL16 1JY	riley 662 bury rd rochdale	Micro Drainage
Date nov 2018 File CALC-T~1.SRC	Designed By ds Checked By	
Micro Drainage	Source Control W.10.4	

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

Storm Duration (mins)	Maximum Control (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m³)	Status
15 Summer	5.0	5.0	135.5233	0.7233	1.8	O K
30 Summer	5.0	5.0	135.7078	0.9078	2.3	O K
60 Summer	5.0	5.0	135.5383	0.7383	1.8	O K
120 Summer	5.0	5.0	135.2332	0.4332	1.1	O K
180 Summer	4.7	4.7	135.0157	0.2157	0.5	O K
240 Summer	4.1	4.1	134.9512	0.1512	0.4	O K
360 Summer	3.2	3.2	134.8932	0.0933	0.2	O K
480 Summer	2.6	2.6	134.8768	0.0768	0.2	O K
600 Summer	2.2	2.2	134.8647	0.0648	0.2	O K
720 Summer	1.9	1.9	134.8573	0.0573	0.1	O K
960 Summer	1.6	1.6	134.8457	0.0457	0.1	O K
1440 Summer	1.2	1.2	134.8343	0.0342	0.1	O K
2160 Summer	0.9	0.9	134.8253	0.0252	0.1	O K
2880 Summer	0.7	0.7	134.8203	0.0202	0.1	O K
4320 Summer	0.5	0.5	134.8152	0.0153	0.0	O K
5760 Summer	0.4	0.4	134.8123	0.0123	0.0	O K
7200 Summer	0.4	0.4	134.8108	0.0108	0.0	O K
8640 Summer	0.3	0.3	134.8092	0.0093	0.0	O K
10080 Summer	0.3	0.3	134.8083	0.0083	0.0	O K
15 Winter	5.0	5.0	135.8153	1.0153	2.5	O K
30 Winter	5.0	5.0	135.8248	1.0248	2.6	O K
60 Winter	5.0	5.0	135.7078	0.9078	2.3	O K
120 Winter	4.8	4.8	135.0287	0.2287	0.6	O K
180 Winter	3.8	3.8	134.9277	0.1278	0.3	O K
240 Winter	3.1	3.1	134.8913	0.0913	0.2	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	89.23	13
30 Summer	61.54	22
60 Summer	40.51	38
120 Summer	25.63	70
180 Summer	19.23	96
240 Summer	15.63	126
360 Summer	11.65	186
480 Summer	9.44	244
600 Summer	8.01	304
720 Summer	7.00	364
960 Summer	5.65	480
1440 Summer	4.17	734
2160 Summer	3.07	1104
2880 Summer	2.46	1468
4320 Summer	1.81	2176
5760 Summer	1.45	2864
7200 Summer	1.23	3672
8640 Summer	1.07	4384
10080 Summer	0.95	5128
15 Winter	89.23	14
30 Winter	61.54	23
60 Winter	40.51	42
120 Winter	25.63	68
180 Winter	19.23	96
240 Winter	15.63	124

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

Storm Duration (mins)	Maximum Control (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Maximum Volume (m^3)	Status
360 Winter	2.3	2.3	134.8683	0.0683	0.2	O K
480 Winter	1.9	1.9	134.8553	0.0553	0.1	O K
600 Winter	1.6	1.6	134.8473	0.0472	0.1	O K
720 Winter	1.4	1.4	134.8418	0.0417	0.1	O K
960 Winter	1.1	1.1	134.8338	0.0337	0.1	O K
1440 Winter	0.9	0.9	134.8253	0.0252	0.1	O K
2160 Winter	0.6	0.6	134.8183	0.0183	0.0	O K
2880 Winter	0.5	0.5	134.8148	0.0148	0.0	O K
4320 Winter	0.4	0.4	134.8112	0.0113	0.0	O K
5760 Winter	0.3	0.3	134.8092	0.0092	0.0	O K
7200 Winter	0.3	0.3	134.8078	0.0078	0.0	O K
8640 Winter	0.2	0.2	134.8073	0.0073	0.0	O K
10080 Winter	0.2	0.2	134.8063	0.0063	0.0	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
360 Winter	11.65	182
480 Winter	9.44	238
600 Winter	8.01	300
720 Winter	7.00	364
960 Winter	5.65	480
1440 Winter	4.17	716
2160 Winter	3.07	1116
2880 Winter	2.46	1444
4320 Winter	1.81	2096
5760 Winter	1.45	2816
7200 Winter	1.23	3592
8640 Winter	1.07	4472
10080 Winter	0.95	4960

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104 Yorkshire St Rochdale Lancashire OL16 1JY	riley 662 bury rd rochdale	
Date nov 2018 File CALC-T~1.SRC	Designed By ds Checked By	
Micro Drainage	Source Control W.10.4	

Rainfall Details

Region	ENG+WAL	Shortest Storm (mins)	15
Return Period (years)	100	Longest Storm (mins)	10080
M5-60 (mm)	20.000	Summer Storms	Yes
Ratio-R	0.300	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+30
Cv (Winter)	0.840		

Pipe Network

Volume in Pipe Network (m^3)	1	Dia of Outfall Pipe (m)	0.100
Slope of Outfall Pipe (1:x)	60.0	Roughness of Outfall Pipe	0.600

Time / Area Diagram

Total Area (ha) = 0.026

Time from:	(mins) to:	Area (ha)
0	4	0.026

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Tank/Pond Details

Invert Level (m) 134.800 Ground Level (m) 136.400

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.00	2.5	0.50	2.5	1.00	2.5	1.50	2.5	2.00	2.5	2.50	2.5
0.10	2.5	0.60	2.5	1.10	2.5	1.60	2.5	2.10	2.5		
0.20	2.5	0.70	2.5	1.20	2.5	1.70	2.5	2.20	2.5		
0.30	2.5	0.80	2.5	1.30	2.5	1.80	2.5	2.30	2.5		
0.40	2.5	0.90	2.5	1.40	2.5	1.90	2.5	2.40	2.5		

Depth / Flow Outflow Control

Invert Level of Control 134.800

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.10	3.4	0.80	4.1	2.00	5.4	4.00	5.4	7.00	5.4
0.20	4.7	1.00	4.6	2.20	5.4	4.50	5.4	7.50	5.4
0.30	5.0	1.20	5.0	2.40	5.4	5.00	5.4	8.00	5.4
0.40	5.0	1.40	5.4	2.60	5.4	5.50	5.4	8.50	5.4
0.50	4.9	1.60	5.4	3.00	5.4	6.00	5.4	9.00	5.4
0.60	4.7	1.80	5.4	3.50	5.4	6.50	5.4	9.50	5.4

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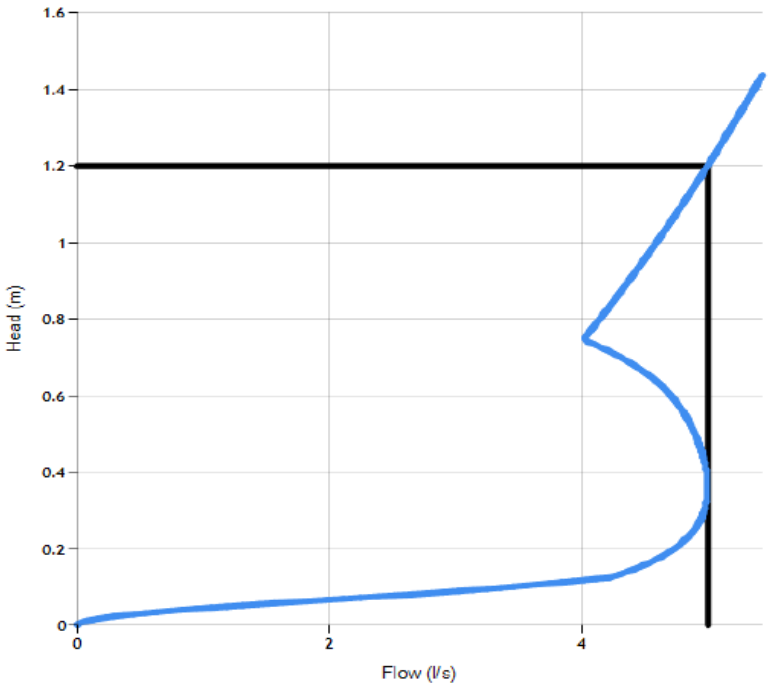
T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project: Riley - 662 Bury Rd			Job Ref.: calc-tjba-riley-662 bury rd-detailed drainage design-060918.docx	
	Section: Detailed Drainage			Sheet no./rev.: 8	
	Calc. by: ds	Date: 30-Nov-18	Chk'd by:	Date:	App'd by: / Date:

Hydro-Break Optimum Flow Control Hydraulic Characteristics.

Technical Specification		
Control Point	Head (m)	Flow (l/s)
Primary Design	1.200	4.997
Flush-Flo™	0.354	4.998
Kick-Flo®	0.745	4.010
Mean Flow		4.368

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4596

WRc APPROVED
PT/329/0412



Head (m)	Flow (l/s)
0.000	0.000
0.041	0.876
0.083	2.748
0.124	4.215
0.166	4.548
0.207	4.761
0.248	4.891
0.290	4.963
0.331	4.994
0.372	4.995
0.414	4.976
0.455	4.943
0.497	4.896
0.538	4.835
0.579	4.753
0.621	4.643
0.662	4.493
0.703	4.290
0.745	4.026
0.786	4.110
0.828	4.209
0.869	4.304
0.910	4.398
0.952	4.489
0.993	4.578
1.034	4.665
1.076	4.751
1.117	4.835
1.159	4.917
1.200	4.997

DESIGN ADVICE !

The head/flow characteristics of this SHE-0103-5000-1200-5000 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International®

DATE	06/09/2018 15:02:30
SITE	662 bury rd
DESIGNER	Daniel Slattery
REF	Site SW Control MH

SHE-0103-5000-1200-5000
Hydro-Brake Optimum®