Report No:	Date:
DW1815-C	**27th February 2020**
Project:	
BASE **Manchester Science Park** **SuDS / Drainage Strategy**	
Client:	
Bruntwood SciTech Limited	

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Report status: **Rev C**

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1.0 Introduction

1.1 It is proposed to provide a new office building on the site of the existing Base Building off Greenheys Lane, at Manchester Science Park.

1.2 This assessment considers the previous drainage from the site, the proposed site requirements and the application of sustainable methods of drainage.

1.3 This assessment has been prepared following an instruction by Mr Colm Donaghy on behalf of Bruntwood SciTech.

2.0 Existing Site and Watercourse / River System

2.1 The site is approx. 5,370m^2 in size and lies to the East of Greenheys Lane. The site generally appears relatively flat but has a fall of approx. 600mm from East to West over a distance in excess of 100m.

2.2 The site currently contains the existing Base Buildings together with an access road and car parking, together with areas of landscaping and trees. Refer to the Topographical Survey in Appendix A.

2.3 The Public Sewer records from United Utilities indicate an Adopted 225mm diameter Combined sewer within the site which discharges to the main Adopted Sewer in Greenheys Lane. The combined sewer on the site currently serves the discharge of all foul and surface water from the site. Refer to the Sewer Records in Appendix A.

2.4 The existing site 'hard' areas that are drained to the existing combined sewer comprises 902m^2 building plus 1,590m^2 of roadways and car parking; total existing area drained to combined sewer = 2,492m^2.

2.5 The site is shown to be in Flood Zone 1, above any localised 1 in 1000-year river or stream flood events, as shown on the Environment Agency Flood Map for Planning and as such a site specific Flood Risk Assessment is not needed as the site is also well below 1 Ha in size. However, a site wide FRA has been produced and this accompanies this drainage strategy.

3.0 Proposals, New Drainage and Ground Conditions

3.1 The proposed site will have a new building, access road, car parking and hard landscaping together with retained and new soft landscaping. The current site proposal is contained in Appendix B.

The proposed hard surface area will be approximately:-

New Building	- 2,062 m^2
Road & Car Parking	- 530 m^2
Other Hardstanding Areas	- 1,508 m^2
Total Drained Area	- 4,100 m^2

3.2 The Phase 2 site investigation report indicates a variable depth of made ground underlain by 'heavy' clays.

3.3 Ground percolation tests were not carried out on this site due to the nature of the 'heavy' clay and reference to previous soakaway testing which indicated that the ground is not suitable for any large areas of infiltration drainage methods.

4.0 Sustainable Drainage Options

4.1 We have considered the full range of sustainable drainage options for the site, which are listed as follows:-

a) Watercourses – See surface water sewers below.
b) Surface Water Sewers – A 'private' surface water sewer is indicated on the UU sewer records to the far side of Greenheys Lane; this is understood to be the culverted Corn Brook. However, it is private and the riparian owners have refused consent to discharge to it under their property, but, verbal approval to connect into the culvert has been given by MCC where it exists under Greenheys Lane..
c) Soakaways – The underlying strata is not suitable for any type of soakaway drainage due to the heavy clay soils.
d) Rainwater Harvesting – We examined the overall benefit of rainwater harvesting on the scheme but the very limited potential use for harvested rainwater, together with there being zero effect upon the amount of water entering the underground system during wet conditions has led us to discount this as an option.
e) Permeable Surfacing – We have used this on several schemes previously and looked closely at the merits of using the system on this scheme but mainly due to the inability to 'discharge' any surface water into the ground, any water passing through the permeable paving would require collection via perforated land drains to discharge into the main site system, but, MCC and United Utilities do not accept ANY water from land drainage into their systems.
f) Swales – We have examined the potential for the incorporation of a Swale into the scheme, but this was discounted due to the size of the scheme but more importantly the ground conditions and site topography.

5.0 New Drainage Proposals

5.1 The existing Adopted combined sewer on site is proposed to be partially 'unadopted' and this process in ongoing with United Utilities. However, the final Adopted manhole close to the site boundary is to remain Adopted along with the connection into the main Adopted combined sewer in Greenheys Lane.

5.2 Foul and surface water drainage within the site will be kept separate.

5.3 Foul water will discharge into the existing Adopted combined sewer manhole close to the site boundary.

5.4 The discharge point for the surface water is to be to the culverted Corn Brook, in Greenheys Lane.

5.5 The surface water discharge from site must be limited to prevent overloading the existing culvert. Subject to agreement with MCC this would be restricted to 'Green field Runoff'. Refer to calculation sheets DW1815 / SD-01-C to SD-03-C Incl. for details.

5.6 The proposed 'hard' drained area is approx. 4,100m^2.

5.7 Surface water will be attenuated in an underground tank, with a small area of surface flooding available to the car park during a 1 in 100 year storm. Surface water discharge from site is to be agreed with MCC to a 'Green field' run-off of 7 litres / second, as shown in the calculations in Appendix B.

5.8 The attenuation will be calculated based upon a 1 in 100-year storm event plus 40% increase to allow for Climate Change. Storage calculations are contained in Appendix B.

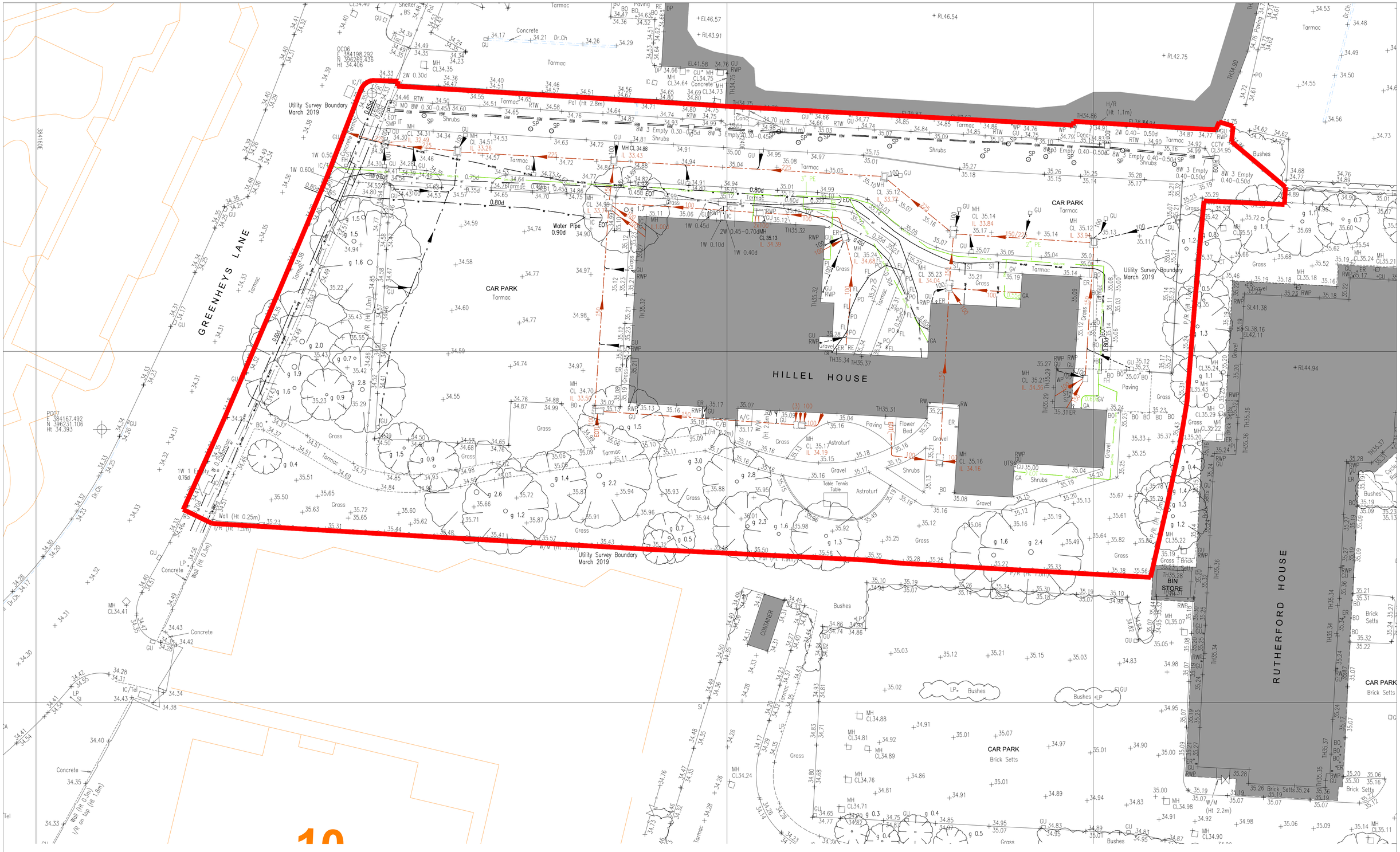
5.9 Based upon the site area of 5,370m^2 and a 'drained' area of 4,100m^2 the attenuation provided will be approximately 187m^3 for a discharge rate of 7 l/s. The attenuation will comprise a 'crate' system under the landscaping and car park areas; there will also be a small amount of surface level storage available on the car park but this is not considered in the tank sizing. The 'top water' level in the attenuation tank will be kept below the lowest proposed level on site and on the adjacent Greenheys Lane.

5.10 Microdrainage calculations for the site and attenuation are also provided separately from this report.

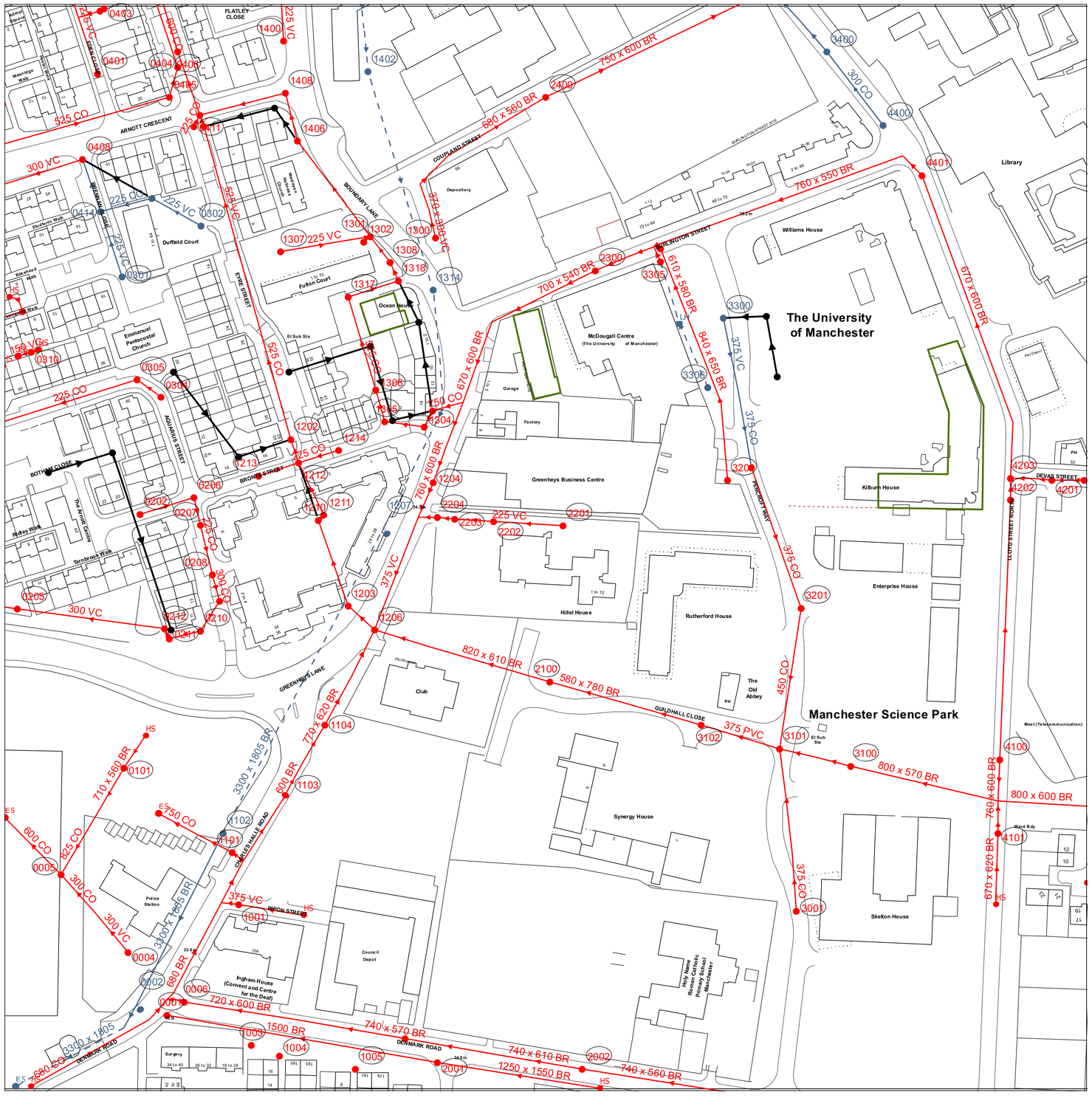
Appendix A

Topographical Survey

United Utilities Sewer Records



Site Topographical Survey - 1:200 at A1



Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
0001	33.36	CO							
0002	33.39	SW	0	3300	1805	EG	BR	12.53	3
0004	33.33	CO	31.09	300		CI	VC	23.43	0
0005	33.37	CO							
0006	33.67	CO							
0101	33.37	CO	30.42	710	560	EG	BR	27.78	1
0202		CO	0	225		CI	CO	25.83	17
0205	33.91	CO							
0206		CO							
0207		CO							
0208		CO							
0209		CO							
0210		CO							
0211		CO							
0212		CO	31.19	300		CI	VC	68.48	2
0301	34.32	SW	32.36	225		CI	VC	31.78	1
0302	34.71	SW	32.55	225		CI	VC	26.09	0
0304		CO	0	225		CI	CO	13.64	9
0305		CO							
0307		CO							
0310		CO							
0401	34.42	CO	32.33	225		CI	VC	69.57	2
0402	34.39	CO	32.72	150		CI	VC	10.44	0
0403	34.45	CO	32.6	150		CI	VC	2.24	7
0404	34.63	CO	28.83	600		CI	CO	92.97	4
0405	34.66	CO							
0406	34.63	CO	27.12	525		CI	VC	51.24	2
0407	34.72	CO							
0408	34.5	CO							
0410		CO	27.55	525		CI	VC	30.84	1
0411		CO	0	225		CI	CO	6.07	4
0412		SW	0	225		CI	CO	24.5	16
0414		SW	0	225		CI	VC	25.31	10
1001	33.84	CO	31.11	375		CI	VC	8.06	0
1002	33.59	CO							
1003	33.9	CO							
1004	33.98	CO							
1005	34.11	CO							
1101	33.63	CO							
1102	33.71	SW	0	3300	1805	EG	BR	88.55	22
1103	34.01	CO	31.76	600		CI	BR	20.59	0
1104	34.19	CO							
1202	34.62	CO	28.38	525		CI	CO	74.8	3
1203	34.28	CO							
1204	34.08	CO							
1206	33.73	CO							
1207	34.3	SW	31.38	3300	1805	HO	BR	159.24	
1210		CO							
1211		CO							
1212		CO	28.68	525		CI	CO	11.42	0
1213		CO	0	225		CI	CO	19.67	13
1214		CO	0	225		CI	CO	19.3	12
1300	34.61	CO	32.72	370	300	EG	VC	13.34	0
1301	34.82	CO							
1302	34.71	CO	32.22	225		CI	VC	1.89	6
1304		CO							
1305		CO							
1306		CO							
1307	34.55	CO	32.49	225		CI	VC	38.49	1
1308	34.88	CO	29.89	525		CI	CO	14.99	0
1310	34.35	CO							
1314	34.68	SW							
1317		CO							
1318		CO	0	525		CI	CO	9.33	1
1400	35.02	CO	33.05	225		CI	VC	59.14	1
1402	34.95	SW	32.6	3300	1805	HO	BR	105.36	3
1406		CO							
1408		CO							
2001	33.6	CO	31.19	1500		CI	BR	126.92	4
2002	33.85	CO							
2100	34.69	CO							
2201	34.69	CO	33.34	225		CI	VC	32.06	1
2202	34.41	CO							
2203	34.04	CO							
2204	33.91	CO							
2300	34.52	CO							
2400	34.87	CO	31.41	750	600	EG	BR	57.7	2
3001	34.73	CO	32.78	375		CI	CO	27.07	0
3100	34.74	CO	32	800	570	EG	BR	16.49	0
3101	34.34	CO							
3102	34.23	CO							
3201	35.23	CO	32.53	450		CI	CO	65.76	2
3202	34.84	CO							
3204	34.72	CO	0	840	650	EG	BR	74.75	30
3300	35.43	SW	33.13	375		CI	VC	34.71	1
3304	34.59	CO							
3305	34.74	CO	31.59	300		CI	VC	7.62	0
3306	34.36	SW	31.86	300		CI	VC	62.14	2
3400	35.33	SW	31.86	300		CI	CO	19.85	0
4100	34.88	CO	32.38	760	600	EG	BR	19.03	0
4101	34.85	CO	32.79	600	570	EG	BR	8	0
4200	35.48	CO							
4201	35.28	CO							
4202	34.9	CO							
4203		CO							
4400	35.1	SW	32.15	300		CI	CO	42.8	1
4401	35.03	CO	0	670	600	EG	BR	12.73	4
0007		SW							
0008		CO	0	680		CI	CO	63.13	24
0010		CO	0	680		CI	BR	12.04	4
0011		CO	30.95	300		CI	CO	24.08	0
0013		CO	0	680	580	EG	BR	4	1
0102		CO	30.46	825		CI	CO	29.15	1
0103		CO	0	750		CI	CO	19.24	6
0105		CO	0	710	560	EG	BR	18.03	6
0306		CO		150		CI	VC	3.49	
0309		CO		150		CI	VC	10.29	
1006		CO	0	375		CI	VC	30.41	11
1008		CO	30.99	720	600	FT	BR	51.62	1
1106		CO	31.33	770	620	UN	BR	19.72	0
1107		CO	30.05	375		CI	VC	24.6	0
110B		CO	0	820	570	UN	BR	3.61	1
1205		CO							
1208		CO	0	600		CI	VC	8.86	4
1303		CO	27.98	525		CI	VC	75.27	3
1404		SW							
1405		CO							
2003		CO	0	1250	1550	UN	BR	75.95	31
2004		CO	31.08	740	570	FT	BR	41.59	1
2101		CO	31.83	580	780	EG	BR	36.4	1
2205		CO	24.19	760	600	EG	BR	18.03	0
2302		CO	0	760	600	EG	BR	26.83	3
2305		CO	0	670	560	FT	BR	15.23	4
2401		CO							
3104		CO							
3105		CO	32.05	375		CI	PVC	17.46	0
3310		SW	32.99	375		CI	CO	35.51	1
3311		CO	0	760	550	EG	BR	1.41	0
3312		CO	0	610	580	RE	BR	37.7	17
3401		CO	31.48	750	600	RE	BR	57.7	2
3402		SW	31.82	300		CI	VC	19.1	0
4001		CO	0	670	620	EG	BR	33.02	16
4103		CO	0	760	600	EG	BR	7	3
4204		CO	33.21	650	620	FT	BR	8	0
4205		CO	0	670	600	EG	BR	10	5
4402		CO							
5004		CO	0	225		CI	VC	18.11	9
0012		CO							
0409		CO							
1007		CO							
1105		CO							
1209		CO							
1316		CO							
1350		CO							
2303		CO							
2304		CO							
3301		SW							
3307		CO							
3308		CO							
4102		CO							

Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
0201	33.37	SW							
0203	33.9	CO							
0204	33.52	CO							
0303	34.5	CO							
0413		SW							
1201	34.34	CO							
1215		CO							
1309	34.63	CO							
1311	33.94	CO							
1312	33.85	CO							
1313	34	CO							
1319		CO							
1401	34.79	CO							
1407		CO							
3302	35.64	SW							
3303	35.81	SW							

WASTE WATER SYMBOLOGY

Foul	Surface	Combined	Overflow	
				Manhole
				Manhole, Side Entry
				MainSewer, Public
				MainSewer, Private
				MainSewer, S104
				Rising Main, Public
				Rising Main, Private
				Rising Main, S104
				Highway Drain, Private

Foul	Surface	Combined	
			WW Site Termination
AV	AV	AV	Air Valve
CA	CA	CA	Cascade
NRV	NRV	NRV	Non Return Valve
ES	ES	ES	Extent of Survey
FM	FM	FM	Flow Meter
GU	GU	GU	Gulley
HA	HA	HA	Hatch Box
HS	HS	HS	Head of System
HT	HT	HT	Hydrobrake / Vortex
IN	IN	IN	Inlet
IC	IC	IC	Inspection Chamber
			Bifurcation
CA	CA	CA	Catchpit
			Contaminated Surface Water
			WW Pumping Station
			Sludge Pumping Station
			Sewer Overflow
			T Junction/Saddle
LH	LH	LH	LampHole
OI	OI	OI	OilInterceptor
PE	PE	PE	PenStock
			Pump
RE	RE	RE	RoddingEye
SO	SO	SO	Soakaway
SM	SM	SM	Summit
VA	VA	VA	Valve
VC	VC	VC	Valve Chamber
WO	WO	WO	Washout Chamber
DS	DS	DS	DropShaft
WTW			WW Treatment Works
ST		ST	Septic Tank
			Vent Column
			Network Storage Tank
OP	OP	OP	Orifice Plate
			Vortex Chamber
			Penstock Chamber
			Blind Manhole
Foul	Surface	Combined	Overflow
			Screen Chamber
			Discharge Point
			Outfall

Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE
MainSewer
Rising Main
Highway Drain
Sludge Main

CK Control Kiosk
Unspecified

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

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OS Sheet No: SJ8496SW

Scale: 1: 1250 Date: 17/02/2014

166 Nodes

Sheet 1 of 1

Printed By: Nicola Morris

OS Sheet No: SJ8496SW

Scale: 1: 1250 Date: 17/02/2014

United Utilities

SEWER RECORDS

Appendix B

Current Site Proposals and Drainage Strategy Drawings:-

Drawing BB-DWC-ZZ-C-DR101-T5 Schematic Drainage Layout.

Drainage Calculations

10

KEY

- F1 — NEW PRIVATE FOUL MANHOLE
- S1 — NEW PRIVATE SURFACE WATER MANHOLE
- NEW PRIVATE FOUL DRAIN + FLOW DIRECTION (HEPWORTH SUPERSLEVE/HEPSLEVE) - - CLASS S BEDDING
- NEW PRIVATE SURFACE WATER DRAIN + FLOW DIRECTION (HEPWORTH SUPERSLEEVE/ HEPSLEVE) - CLASS S BEDDING
- EX ADOPTED COMBINED SEWER
- GATIC 150mm WIDE SLOT DRAIN (MEDIUM DUTY) WITH D400 COVER (U.N.O.) - 200mm C28/35 CONCRETE BED + SURROUND WITH TRAPPED, RODDABLE SUMP OUTLET AND ACCESS POINTS
- MD — MEDIUM DUTY (GRADE C250)
- HD — HEAVY DUTY (GRADE D400)
- MAC — 300Ø x 600dp MINI ACCESS CHAMBER (To foul or surface water) (Hepworth code Ref:- SDAC1/1)
- FG — FLOOR GULLY, TRAPPED WITH RODDABLE OUTLET
- PU — POP-UP IN FLOOR
- SO — ACO SILT PIT WITH OUTLET AND + MD COVER TO BE TRAPPED AND RODDABLE
- AP — ACO ACCESS POINT
- SVP — SOIL VENT PIPE
- RWP — RAIN WATER PIPE

GENERAL NOTES

Do not scale this drawing.

Contractor to check all dimensions and report all errors and omissions to the engineer.

1. All external setting out to be confirmed on Architects drawings.
2. Manhole IL's relate to outgoing main pipe. Where incoming pipes are of a smaller diameter to the outgoing pipes they are to be positioned with pipe soffits level UNO.
3. All pipes under the building to be given Class Z conc bed + surround. In addition all pipes in vehicle paved areas where the cover is less than 750mm are to be given a Class Z concrete bed + surround. Typically pipes to have Class S bedding.
4. For exact location of all SVP's, RWP's and Pop-Ups refer to Buro Happold drawings.
5. All foul pipes to be 100Ø at min 1:60 fall unless noted otherwise.
6. All surface water pipes to be 150Ø unless noted otherwise.
7. Attenuation system and flow restrictor are based upon a max. discharge from the SW system of 7 l/s. This MUST be approved by the Local Authority and United Utilities prior to any works being carried out.
8. Legend refers to clay pipelines. Alternative twin wall pipes can be used, as DW Cnsulting Specification - contractor to choose.
9. For details of drainage refer to drawing BB-DWC-ZZ-C-DR102, DR103 & DR104.

NEW MANHOLE SCHEDULE

MH REF.	C.L. (m) TBC	I.L. (m)	MH TYPE & DETAIL No	MH SIZE	COVER & FRAME SIZE & TYPE	REMARKS
F1	35.200*	34.300	PPIC	475 DIA.	450 x 450 HD	
F2	35.200*	34.000	CONC	1050 DIA.	600 x 600 HD	
F3	34.800*	32.575	CONC	1200 DIA.	750 x 750 MD	
F4	35.150	34.550	CONC	1200 DIA.	600 x 600 MD	Double sealed internal cover.
F5	35.150	34.525	CONC	1050 DIA.	600 x 600 MD	Double sealed internal cover.
F6	35.150	34.480	CONC	1050 DIA.	600 x 600 MD	Double sealed internal cover.
F7	35.150	34.450	CONC	1200 DIA.	600 x 600 MD	Double sealed internal cover.
F8	35.150	34.400	CONC	1200 DIA.	600 x 600 MD	Double sealed internal cover.
UU Manhole 2204	34.300**	32.490**	Extg.	Extg.	Extg.	New chamber may be required subject to UU requirements.
S1	35.000*	33.800	CONC	1200 DIA.	600 x 600 HD	
S2	35.100*	33.477	CONC	1200 DIA.	600 x 600 HD	
S3	34.900*	33.167	CONC	1200 DIA.	600 x 600 HD	
S4	34.700*	33.101	CONC	1200 DIA.	600 x 600 HD	
S5	34.800*	Pipe - 33.086 Sump - 32.786	CONC	1200 DIA.	600 x 600 MD	Silt pit manhole - 300mm deep. All pipe inverts level
S6	35.200*	Pipe - 32.906 Sump - 32.606	CONC	1200 DIA.	600 x 600 MD	Silt pit manhole - 300mm deep. All pipe inverts level
S7	34.712*	Pipe - 32.795 Sump - 33.345	CONC	1500 DIA.	750 x 600 HD	450mm deep silt pit manhole with flow control fitted in MH. Flow restricted to 7.0 litres / sec with a max head of 1.2m. All pipe inverts level. Flow restrictor to have built in overflow.

* Denotes proposed levels to be confirmed on site

** Denotes existing sewer levels to be confirmed on site

Surface water discharge from site is limited to MAX 7.0 litres / second and attenuation storage is sized for a 1 in 100 year storm event + 40% extra for Climate Change.

No works should commence until the details shown on this drawing are fully approved by the Local Authority and United Utilities.

Note:
All manhole covers in external hard surfacings, and all internal covers are to be recessed to receive finishes to match their location

Note:
ALL Cover Levels to be confirmed following final confirmation of external surface levels. ALL invert levels are based upon INTERPOLATED levels of the existing adopted surface and foul runs within the site boundary.

Rev	Detail	By	Chk	Date
T5	Slot drain added to South elevation. Attenuation tank size increased to suit.			27.02.20
T4	Redrawn to suit finalised internal fwp, svp & pop-ups and to suit finalised external works setting out.			04.02.20
T3	Pipe gradients and sizes added and manhole schedule added.			16.12.19
T2	Layout changed to suit moved building, removal of soft areas and changed hardscape areas			19.11.19
T	SW Attenuation tank size confirmed.			04.11.19
A	Redrawn to suit updated site layout and confirmation to maintain SW discharge to extg combined sewer			03.11.19

Revisions

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Client: Bruntwood SciTech

Project: BASE, Manchester Science Park

Drawing Title: Underground Drainage Layout

Drawing Status: Tender

Project No.	Discipline	Drawing No.
BB-DWC-ZZ	C	DR101

Scale	Sheet Size	Revision
1:200	A0	T5

Date	Drawn	Checked	Auth
DEC'19	VE	RM	

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DWC1-MDO-ZL-DR-LP-DWG.LP-DWG.LP JOBS\DWG\BB BASE BUILDING\DRAWINGS\DW DRAWINGS\CURRENT DWGS\LBP AND DRAINAGE\BB-DWC-ZZ-C-DR101.TS

DW Consulting Engineers LLP

Project		Project No	CALCULATION SHEET
BASE – Manchester Science Park		DW1815	
Drawing No	Calculation by	Checked by	Date
Site Drainage Parameters			Calculation sheet No/revision No: SD01-C

BASE Building – Manchester Science Park

Check extg 1 in 5 year run-off.

Existing site Impermeable = 2,492m^2

Proposed site impermeable = 4,100m^2

Refer to calc sheet SD-02 for site rainfall parameters (in accordance with HR Wallingford):-

For 1 in 5 year event - approx. M_{5-10} = 8.8

Q = Api / 0.36 = 2492 x 10^{-4} x 52.8 / 0.36 = 36.5 l/s Current SW discharge

Therefore, if surface water discharge could be reduced by over 50%, say to 15 l/s.

However, MCC are likely to accept only greenfield discharge for the site to Corn Brook which has been calculated at 6.98 l/s for a 1 in 100 year event. Refer to Calc Sheet SD-02-C

Refer to calc sheet SD-03-C for attenuation required for a 1 in 100 year event + 40% Climate Change with maximum discharge of 7 l/s.

Total storage required approx. = 187m^3

Actual storage requirements will be as agreed with MCC / United Utilities.

 DW1815-SD02-C

HR Wallingford
Working with water

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by: Chris Corrigan
Site name: BASE Building
Site location: MSP

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude: 53.46265° N
Longitude: 2.23873° W
Reference: 2777205750
Date: Nov 04 2019 11:36

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.537

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR
SPR estimation method: Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	873	873
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	3.36	3.36
1 in 1 year (l/s):	2.92	2.92
1 in 30 years (l/s):	5.71	5.71
1 in 100 year (l/s):	6.98	6.98
1 in 200 years (l/s):	7.96	7.96

← GREENFIELD RUN-OFF.

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

DW1815 - SD03 - C

HR Wallingford
Working with water

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Chris Corrigan
Site name:	BASE
Site location:	MSP

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.46265° N
Longitude:	2.23868° W
Reference:	1401149787
Date:	Feb 24 2020 11:44

Site characteristics

Total site area (ha):	0.537
Significant public open space (ha):	0.127
Area positively drained (ha):	0.41000000000000003
Impermeable area (ha):	0.41
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.41
Net impermable area for storage volume design (ha):	0.41
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	55
Rainfall 100 yrs 12 hrs:	--	71.82
FEH / FSR conversion factor:	1.14	1.14
SAAR (mm):	873	873
M5-60 Rainfall Depth (mm):	17	17
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 10 year:	1.38	1.38
Growth curve factor 30 year:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Q_{BAR} for total site area (l/s):	3.36	3.36
Q_{BAR} for net site area (l/s):	2.56	2.56

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.1
Volume control approach	Use long term storage
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	7

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	7	7
1 in 30 years (l/s):	7	7
1 in 100 year (l/s):	7	7

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	187	187
Long term storage 1/100 years (m^3):	0	0
Total storage 1/100 years (m^3):	187	187

This report was produced using the storage estimation tool developed by HRWallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at http://uksuds.com/terms-and-conditions.htm. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.