

DRAINAGE STRATEGY

for

BANK TOP FARM

PROPOSED UNIT

at

BANK TOP FARM

HOLLINGWORTH ROAD, LITTLEBOROUGH, OL15 0AU

JULY 2022

REFORD

Consulting Engineers Limited

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B	United Utilities sewer records
C	Surface water drainage design

1. INTRODUCTION

- 1.1 This surface water and foul water drainage strategy has been produced on behalf of Bank Top Farm in support of a planning application for the erection of a farm shop and community use building with associated parking and outdoor elements at Bank Top Farm, Hollingworth Road, Littleborough, OL15 0AU. A location plan is included within Appendix A.
- 1.2 This drainage strategy describes the existing site conditions and proposed development. It assesses the potential impact of proposals on existing drainage and includes a proposed strategy for the provision of new drainage to serve the proposed development.

2. BASE INFORMATION

Existing site

- 2.1 The proposal relates to land (approx. 0.1ha) at Bank Top Farm, Hollingworth Road, Littleborough, which lies to the south of the centre of Littleborough.
- 2.2 Hollingworth Road (B6225) lies along the site's western boundary of the site. An access track to the farm that is to the north of the proposed site lies along the site's eastern boundary.
- 2.3 A topographical survey has been carried out on the site. The site has a steep fall towards the west and Hollingworth Road, and comprises grassland.

Site geology

- 2.4 The online Soilscales viewer has identified the geology of this parcel of land as slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage.
- 2.5 Based upon the ground conditions identified, infiltration is unlikely to provide a viable drainage solution for surface water runoff generated by the site. Infiltration tests have therefore not been carried out.

Understanding of existing drainage local to the site

- 2.6 There are no watercourses local to the site.
- 2.7 United Utilities sewer records identify a 225mm diameter public combined sewer lying within Hollingworth Road that flows to the north. The sewer records are included within Appendix B.
- 2.8 There is no private drainage within the site.

Proposed development

- 2.9 The proposed development will comprise the erection of a farm shop and community use building with associated parking and outdoor elements.

3. PROPOSED DRAINAGE STRATEGY

Surface water drainage

- 3.1 In accordance with the National Standards for Sustainable Drainage, the drainage strategy should incorporate the use of Sustainable Drainage (SuDS) where possible. The approach promotes the use infiltration features in the first instance. If drainage cannot be achieved solely through infiltration due to site conditions or contamination risks, the preferred options are (in order of preference):
- (i) a controlled discharge to a local waterbody or watercourse, or
 - (ii) a controlled discharge into the public sewer network (depending on availability and capacity).
- 3.2 The rate and volume of discharge should strive to provide betterment and be restricted to the pre-development values as far as practicable.
- 3.3 Due to the nature of the geology of the site, it is considered that infiltration is unlikely to provide a viable drainage solution for surface water runoff generated by the site.
- 3.4 The proposed development will comprise the erection of a farm shop and community use building with associated parking and outdoor elements. Hardstanding areas are to comprise permeable paving in front of the building, 'Grasscrete' for the car parking area and tarmac for the access into the site. Part of the building is to have a 'living roof'.
- 3.5 Due to the size of the site, it is intended that surface water runoff from the development will be restricted to 5 l/s allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 45% on stored volumes, to discharge into the public combined sewer that lies within Hollingworth Road. The additional 45% is to allow for climate change and has been included in the surface water volume.
- 3.6 A surface water drainage design has been carried out for the proposed development for all rainfall events up to the 100 year critical rain storm plus 45% included for

climate change on stored volumes. Attenuation is provided by underground storage located within the site access and the permeable paving area.

3.7 Any exceedance flows will run off the site to the west and Hollingworth Road.

3.8 The surface water drainage design is included within Appendix C.

Foul Water Drainage

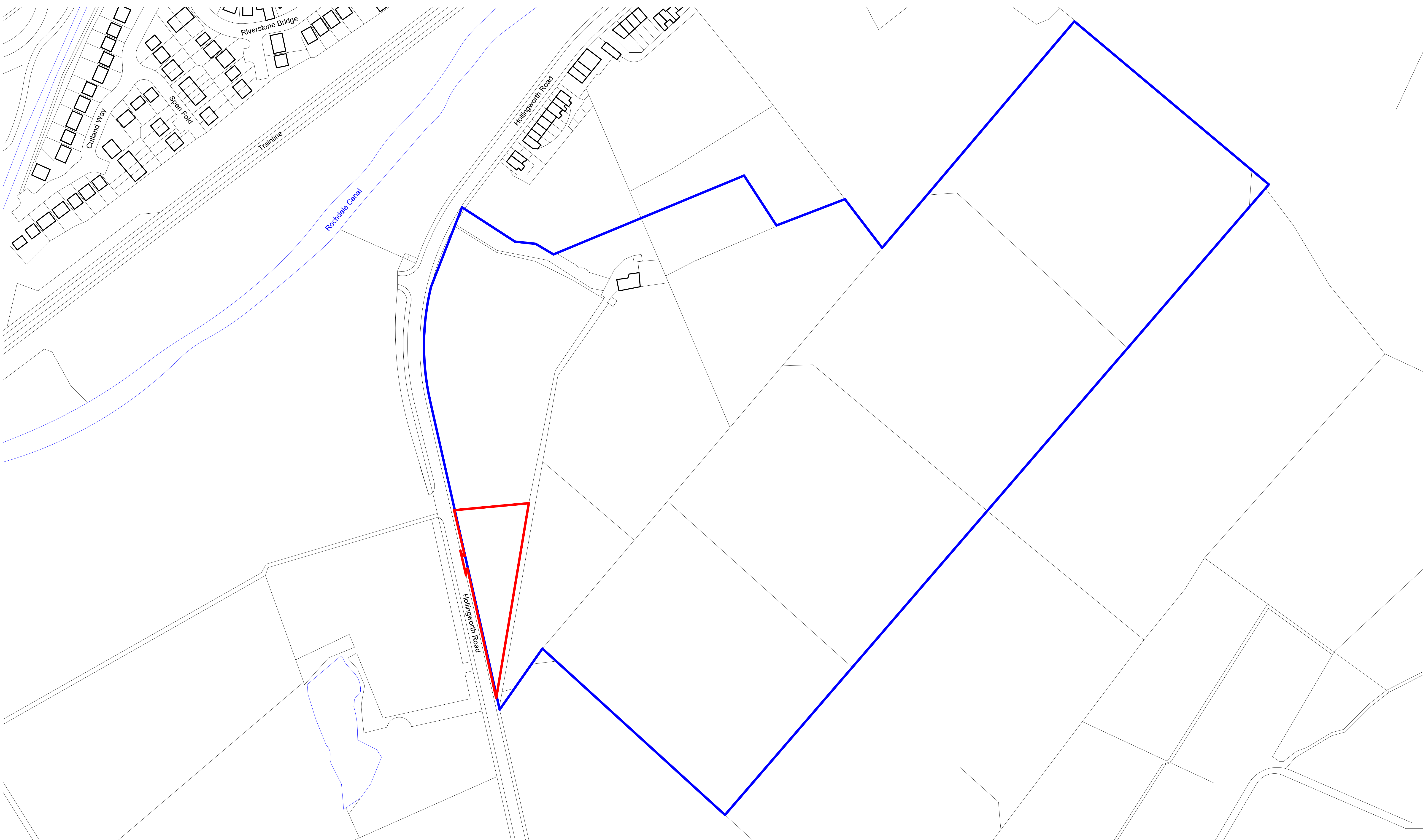
3.9 United Utilities sewer records identify a 225mm diameter public combined sewer lying within Hollingworth Road that flows to the north.

3.10 It is intended that foul water from the development will discharge into the public combined sewer that lies within Hollingworth Road.

4. SUMMARY AND CONCLUSIONS

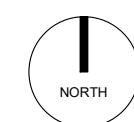
- 4.1 This surface water and foul water drainage strategy has been produced on behalf of Bank Top Farm in support of a planning application for the erection of a farm shop and community use building with associated parking and outdoor elements at Bank Top Farm, Hollingworth Road, Littleborough, OL15 0AU.
- 4.2 Surface water runoff from the development will be restricted to 5 l/s allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 45% on stored volumes, to discharge into the public combined sewer that lies within Hollingworth Road.
- 4.3 Foul water from the development will discharge into the public combined sewer that lies within Hollingworth Road.

APPENDIX A



SITE LOCATION PLAN

1 : 1250



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Rev.	Description	Date	Drw.	Chk

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Sue Davies

Project:
Bank Top Farm, Littleborough

Drawing Title:
Site Location Plan

Drawing Status:

Corstorphine & Wright

Manchester Studio
The Stables, Paradise Wharf, Ducie Street, Manchester, M1 2JN

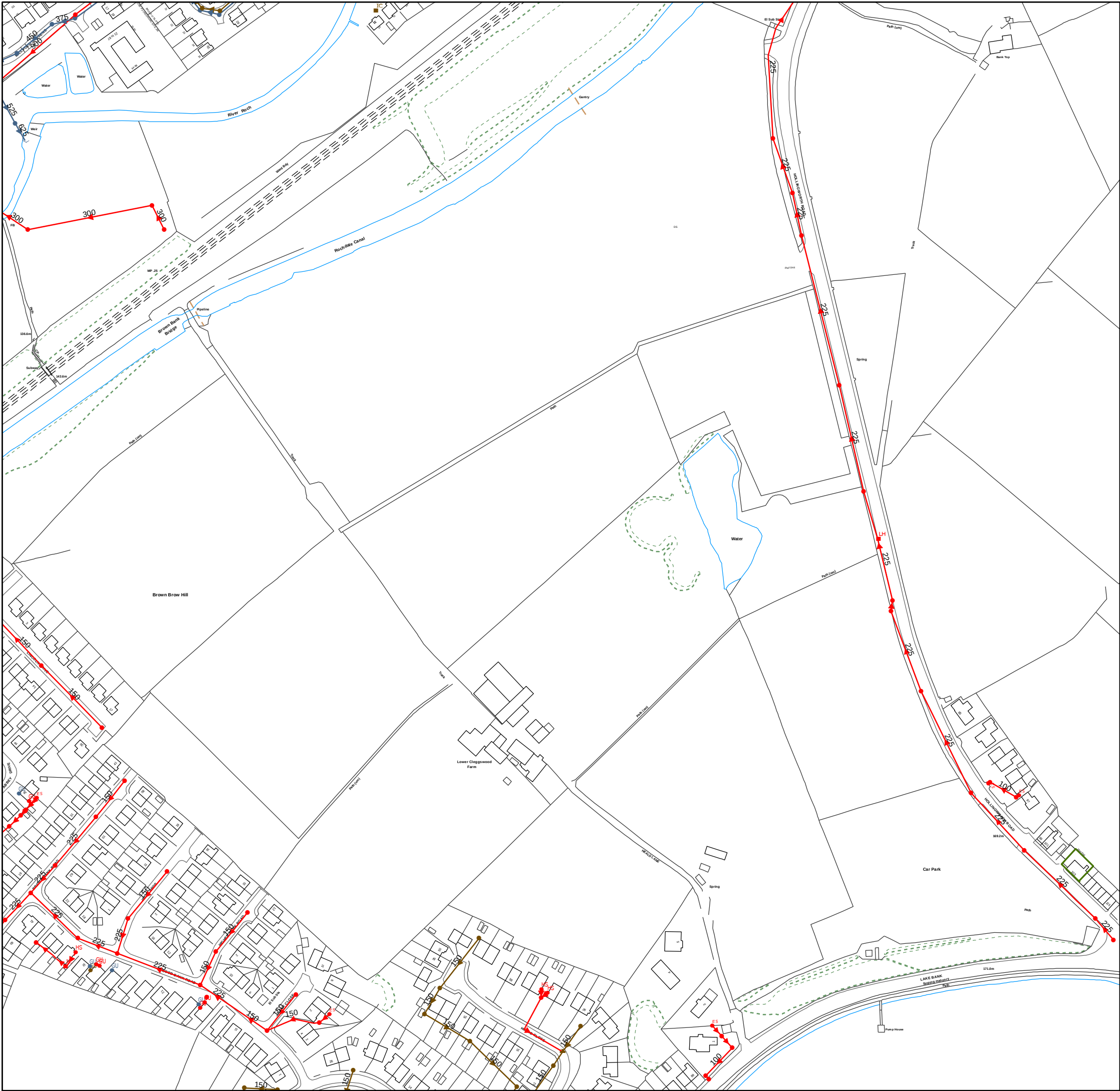
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21358-0201

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Drawn	Checked	Paper Size	Scale	Date
FG	RE	A1	1 : 1250	16/05/22

APPENDIX B



Extract from Map of Public Sewers

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available.

The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded.

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Land off Hollowingworth Lane
Littleborough Rochdale

Printed By: Property Searches Date: 04/10/2017

DO NOT SCALE
Approximate Scale: 1:2500



Wastewater Symbolology

Combined	Foul	Surface	Overflow	
				Manhole
				Manhole, side entry
				Public sewer
				Private sewer
				S104 sewer
				Rising main, public
				Rising main, private
				Rising main, S104
				Highway drain, private
				Screen chamber
				Discharge point
				Outfall
				Control kiosk
				Sludge main

Abandoned pipe

	Public sewer
	Rising main
	Private sewer
	Sludge main

Manhole function

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

Sewer shape

CI	Circular	U	Unspecified
EG	Egg	SQ	Square
OV	Oval	TR	Trapezoidal
FT	Flat top	AR	Arch
RE	Rectangular	BA	Barrel
		HO	Horse shoe

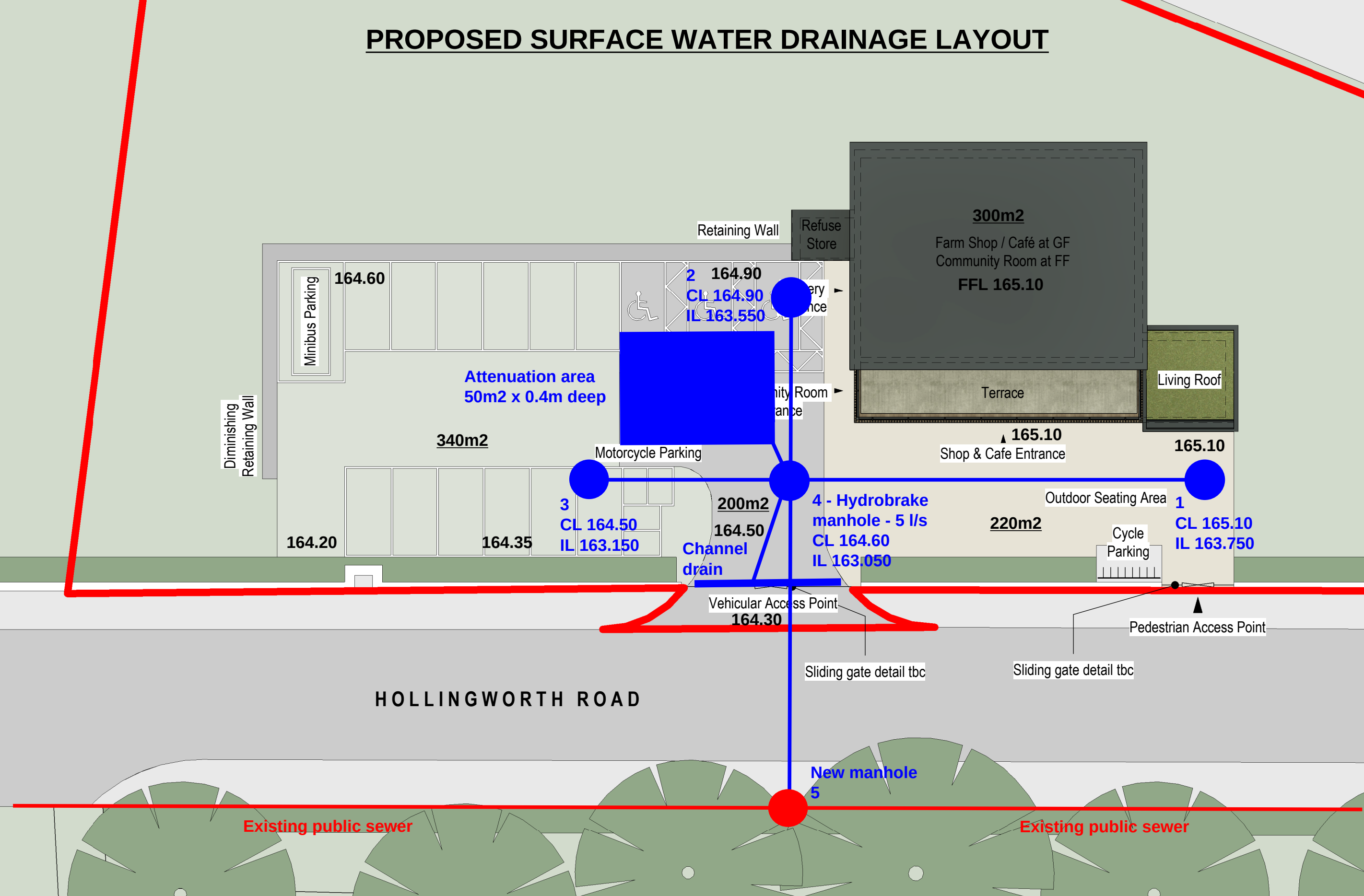
Sewer material

AC	Asbestos cement	DI	Ductile iron
BR	Brick	VC	Vitrified clay
CO	Concrete	PP	Polypropylene
CSB	Concrete segment	PF	Pitched fibre
CSU	Concrete segment	MA	Masonry, coursed
CC	Concrete box culverted	MA	Masonry, random
PSC	Plastic	RP	Reinforced plastic
GR	Glass reinforced	CI	Cast iron
GRP	Glass reinforced	SI	Spun iron
PVC	Polyvinyl chloride	ST	Steel
PE	Polyethylene	U	Unspecified

			WW pumping station
			Inspection chamber
			Extent of survey
			Head of system
			Soakaway
			Rodding eye
			Lamp hole
			T junction/saddle
			Gully
			Air valve
			Non return valve
			Sewer overflow
			Cascade
			Flow meter
			Hatch box
			Hydrobrake
			Inlet
			Bifurcation
			Catchpit
			Oil interceptor
			Penstock
			Summit
			Valve
			Valve chamber
			Washout chamber
			Drop shaft
			WW treatment works
			Septic tank
			Vent column
			Network storage tank
			Orifice plate
			Vortex chamber
			Penstock chamber

APPENDIX C

PROPOSED SURFACE WATER DRAINAGE LAYOUT



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	75.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.500	Minimum Backdrop Height (m)	2.000
Ratio-R	0.260	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
1	0.015	5.00	165.100	1200	1.350
2	0.015	5.00	164.900	1200	1.350
3	0.034	5.00	164.500	1200	1.350
4	0.042	5.00	164.600	1200	1.550
5			164.200	1200	1.350

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	4	22.000	0.600	163.750	163.050	0.700	31.4	150	5.20	54.1
2.000	2	4	11.000	0.600	163.550	163.050	0.500	22.0	150	5.09	54.5
3.000	3	4	10.000	0.600	163.150	163.050	0.100	100.0	150	5.17	54.2
1.001	4	5	12.000	0.600	163.050	162.850	0.200	60.0	150	5.36	53.5

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.802	31.8	2.2	1.200	1.400	0.015	0.0	27	1.036
2.000	2.156	38.1	2.2	1.200	1.400	0.015	0.0	24	1.173
3.000	1.005	17.8	5.0	1.200	1.400	0.034	0.0	54	0.863
1.001	1.301	23.0	15.4	1.400	1.200	0.106	0.0	90	1.392

Simulation Settings

Rainfall Methodology	FSR	Summer CV	0.750	Drain Down Time (mins)	240
FSR Region	England and Wales	Winter CV	0.840	Additional Storage (m³/ha)	20.0
M5-60 (mm)	19.500	Analysis Speed	Normal	Check Discharge Rate(s)	x
Ratio-R	0.260	Skip Steady State	x	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	0	0	0
30	0	0	0	100	45	0	0

Node 4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	163.050	Product Number	CTL-SHE-0098-5000-1500-5000
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node 4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	163.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	174

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	50.0	0.0	0.400	50.0	0.0	0.401	0.0	0.0

Node 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	164.100
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	66

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	340.0	0.0	0.400	340.0	0.0	0.401	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.07%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	163.774	0.024	1.8	0.0326	0.0000	OK
15 minute winter	2	10	163.572	0.022	1.8	0.0300	0.0000	OK
15 minute winter	3	10	163.200	0.050	4.0	0.0823	0.0000	OK
60 minute winter	4	43	163.165	0.115	7.6	5.6599	0.0000	OK
15 minute summer	5	1	162.850	0.000	2.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	4	1.8	0.858	0.056	0.1269	
15 minute winter	2	2.000	4	1.8	0.981	0.047	0.0628	
15 minute winter	3	3.000	4	4.0	0.928	0.224	0.0661	
60 minute winter	4	Hydro-Brake®	5	3.7				10.8

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.07%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	163.788	0.037	4.4	0.0507	0.0000	OK
15 minute winter	2	10	163.584	0.034	4.4	0.0465	0.0000	OK
120 minute winter	3	86	163.370	0.220	3.9	0.3597	0.0000	SURCHARGED
120 minute winter	4	86	163.369	0.319	11.8	15.6934	0.0000	SURCHARGED
15 minute summer	5	1	162.850	0.000	4.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	4	4.3	0.979	0.136	0.2301	
15 minute winter	2	2.000	4	4.4	1.111	0.114	0.1128	
120 minute winter	3	3.000	4	3.6	0.684	0.202	0.1760	
120 minute winter	4	Hydro-Brake®	5	4.8				34.5

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.07%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	1	88	164.102	0.352	2.3	0.4763	0.0000	SURCHARGED
120 minute winter	2	90	164.102	0.552	2.8	0.7470	0.0000	SURCHARGED
120 minute winter	3	92	164.102	0.952	5.1	1.7744	0.0000	SURCHARGED
120 minute winter	4	90	164.101	1.051	15.5	20.7822	0.0000	SURCHARGED
15 minute summer	5	1	162.850	0.000	4.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	1	1.000	4	2.2	0.737	0.069	0.3873	
120 minute winter	2	2.000	4	2.2	0.852	0.058	0.1937	
120 minute winter	3	3.000	4	4.8	0.716	0.268	0.1760	
120 minute winter	4	Hydro-Brake®	5	4.9				45.3

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.07%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	1	96	164.260	0.510	3.2	0.6904	0.0000	SURCHARGED
120 minute winter	2	96	164.260	0.710	9.0	0.9608	0.0000	SURCHARGED
120 minute winter	3	98	164.261	1.111	17.8	18.2885	0.0000	FLOOD RISK
120 minute winter	4	96	164.260	1.210	21.9	21.0481	0.0000	SURCHARGED
15 minute summer	5	1	162.850	0.000	4.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	1	1.000	4	3.2	0.723	0.100	0.3873	
120 minute winter	2	2.000	4	-5.8	0.806	-0.151	0.1937	
120 minute winter	3	3.000	4	-10.6	0.787	-0.598	0.1760	
120 minute winter	4	Hydro-Brake®	5	4.9				66.0

Technical Specification

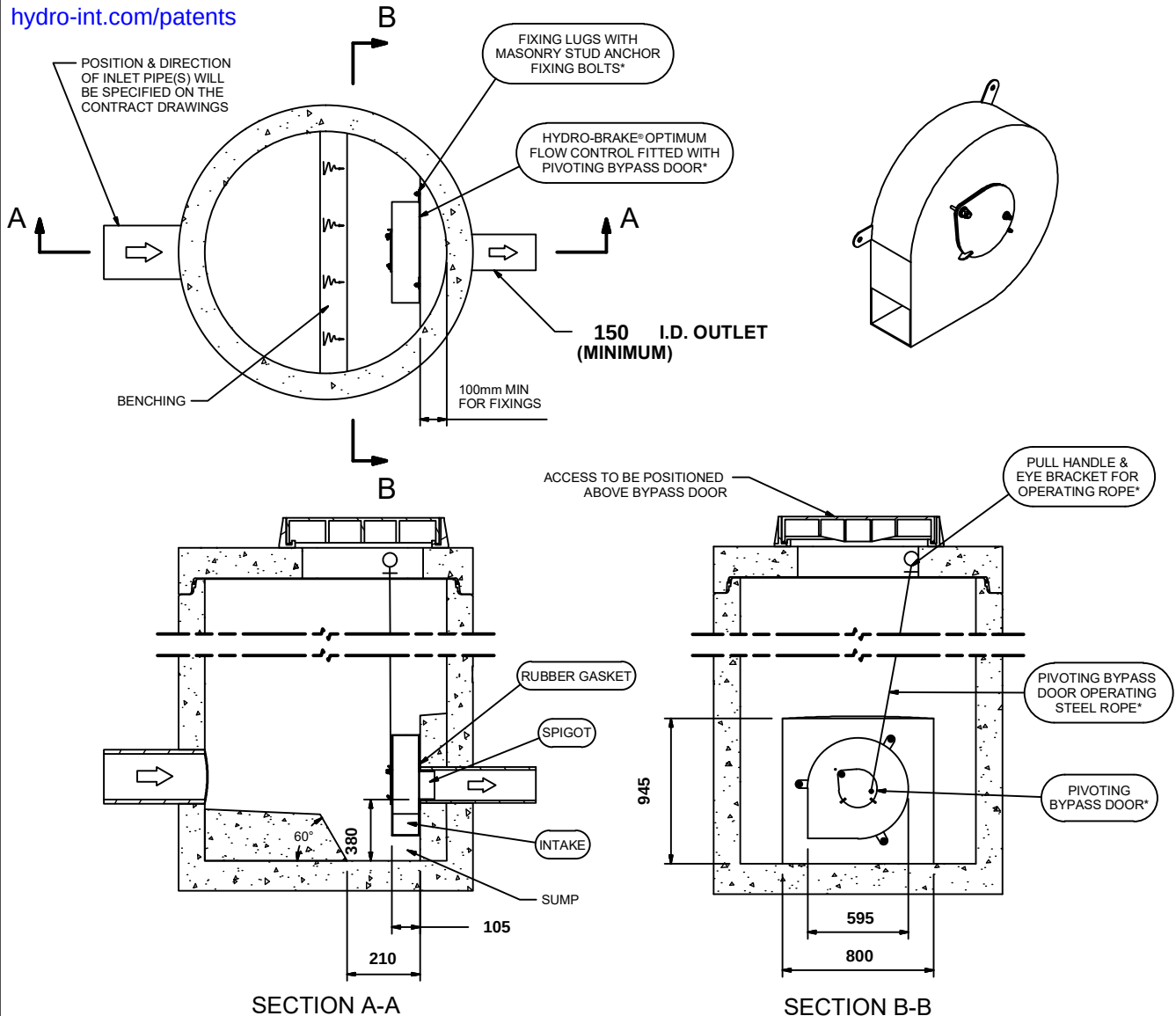
Control Point	Head (m)	Flow (l/s)
Primary Design	1.500	5.000
Flush-Flo™	0.431	4.879
Kick-Flo®	0.878	3.900
Mean Flow		4.321

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Indicative Weight: 167 kg



hydro-int.com/patents



IMPORTANT:

○ LIMIT OF HYDRO INTERNATIONAL SUPPLY

THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS

* WHERE SUPPLIED

HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW
CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE



The head/flow characteristics of this SHE-0098-5000-1500-5000 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 4/12/2022 4:17 PM

SITE Bank Top Farm

DESIGNER Robert Ford

REF 21.1095

SHE-0098-5000-1500-5000

Hydro-Brake® Optimum