

EXEMPLAR BURY - SITE 1 DRAINAGE STRATEGY AND CALCULATIONS



Client: **Exemplar Health Care**

Site Address: **Proposed Care Home,
Irwell Str & Lower Bank Str,
Bury, BL9 0HD**

Project Number: **23389**

Reference (Revision): **CALC01 (-)**

Date: **14/03/2024**

Author: George Dermentzoglou Date: March 2024

Checker: Sebastian Reid Date: March 2024

Ref No.	23389-CALC01(-)	Sheet No.	i
Calcs By:	George D	Date	14/03/2024

CLIENT:	Exemplar Health Care
PROJECT TITLE:	Exemplar Bury
ARCHITECT:	Watson Batty

EXISTING SITE

The site is located in the former Bury Police Headquarters and is bounded by Irwell Street to the west, Lower Bank Street to the north, Castle Leisure Centre car park to the east and Jubilee Way (A58) to the south. Please refer to the below image with the overall site boundary indicated in red.



Existing Site Overview

The site is on brownfield land and the buildings of the former police station have been demolished about 7 years ago. The police station was served by an existing drainage system which most of it has been removed as part of the demolition works. The existing connections to the public combined sewers around the site have been retained and these have been confirmed by a CCTV drainage investigation survey, which can be found in the appendices.

The site falls from east to west in an average slope of 1:20 and has a retaining wall, along the whole length of the eastern boundary, which supports the adjacent car park. An existing substation is located at the northeast corner of the site whilst several trees are present at the south of the site.

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PROPOSED DEVELOPMENT

The proposed development will be split into two sites, Site 1 occupying the north and Site 2 the south parcel of the site. Both sites will be developed as residential care buildings with associated car parking and landscaping. The existing site accesses off Irwell Street and Lower Bank Street will be both closed up and a new entrance will be formed on the southwest corner of Site 1 car park.

This report has been produced for Site 1 and describes the proposed strategy for the north parcel only. The external areas will be traditionally paved with parking areas constructed from traditional asphalt as these will be used for construction traffic and compounds. Rear patio levels will fall away of the building and water will be collected via linear drainage along the edge. The car park has been designed to collect water via gullies and channel drains and with levels to tie into the new entrance.

SURFACE WATER HIERARCHY

Infiltration into the ground has been discounted for the wider development due to the underlying made ground on top of sandy and clayey soils, in accordance with the Site Investigation report.

The site is located about 300m east of River Irwell, however a direct connection to this watercourse cannot be achieved due to the presence of A58 and other highways as well as third party lands.

There are two public combined sewers, one in Irwell Street and one in Lower Bank Street, as indicated on UU Sewer Records in the appendices. The site has two existing connections, one at the north and one at the southwest, which were serving the former police station. As the existing private drainage system has been made redundant following the demolition of the old buildings, the site is considered to drain naturally towards Irwell Street and discharge at a greenfield runoff rate via road gullies into the 300Ø public combined sewer in Irwell Street. Site 1 is proposed to replicate how the existing site currently drains and discharge at a greenfield rate of 3.0l/s into the above combined sewer, with adequate attenuation and flow restriction to be provided within the development.

SURFACE WATER STRATEGY

Site 1 surface water drainage system will remain private and will connect into a proposed private combined manhole in the car park, before it discharges into a new adopted combined manhole which will be built along the existing 300Ø combined sewer in Irwell Street. The combined connection is subject to Section 106 approval by United Utilities.

Rainwater from the roof will be collected via downpipes into the surface water piped system whilst rainwater from the car park and patios will be picked up by gullies and channel drains or similar.

The proposed system will manage water on site with a geocellular attenuation tank to be provided within the car park to cater for the 1:100 + 45% climate change storm scenario. The proposed peak flow from Site 1 will be restricted at a greenfield rate of 3.0l/s and will be maintained up to and including the 1:100 + 45% climate change rainfall scenario without any flooding as it is demonstrated in the hydraulic calculations included in the appendices.

An SDS Aqua Swirl hydrocarbon vortex separator is proposed upstream of the tank to mitigate any pollution risk from the use of the car park, even though the risk is low due to residential use.

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FLOOD RISK AND EXCEEDANCE

The site is located in Flood Zone 1, as per Environment Agency flood map in the appendices, which indicates a low risk of flooding for the proposed development. The following flood risk statement reviews available information and establishes the risk of flooding from the sources below:

- Fluvial (rivers)
- Surface water: sheet run-off from adjacent land (urban or rural)
- Groundwater: most common in low-lying areas underlain by permeable rock (aquifers)
- Sewers: combined, foul or surface water sewers
- Reservoirs, canals and other artificial sources

Fluvial Flooding

The figure below shows the map from the Environment Agency of the fluvial flooding from the site. As the site is located at a much higher level from River Irwell, and other watercourses or land drains, there is therefore no risk of flooding from fluvial sources.



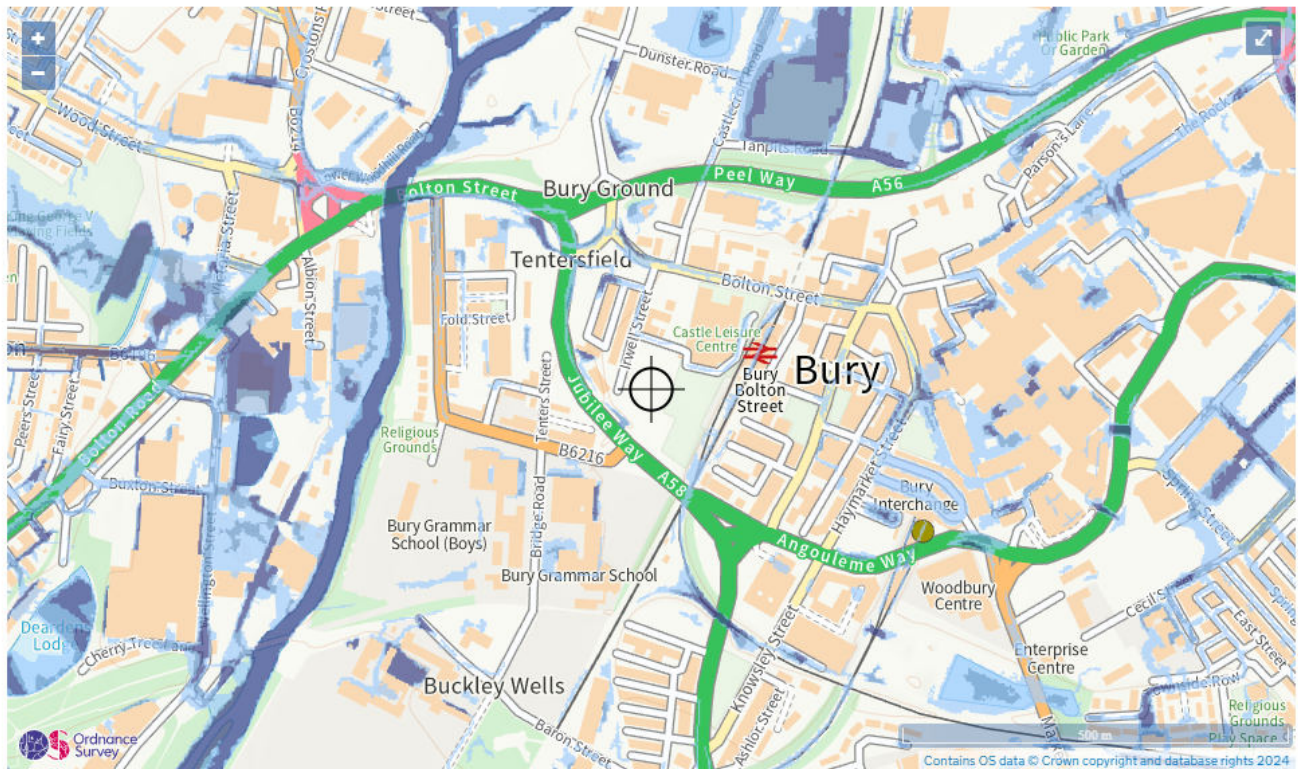
Extent of flooding from rivers or the sea

● High
 ● Medium
 ● Low
 ● Very low
 ⊕ Location you selected

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Surface Water Flooding

The figure below shows the map from the Environment Agency of the surface water flooding from the site. As described above, the site falls from east to west and any water is directed towards the highway, there is therefore no risk of flooding from pluvial (surface water) sources.



Extent of flooding from surface water

● High
 ● Medium
 ● Low
 ● Very low
 ⊕ Location you selected

Groundwater Flooding

The underlying ground conditions are predominantly made ground with sand and clay soils. Groundwater was identified in some locations during the Phase 1 SI at depths between 3.0 and 4.0m below ground level and this will be considered as part of the foundations design of the development. Flooding from groundwater is therefore considered a low risk on this site.

Sewer Flooding

The site is surrounded by public combined sewers owned and maintained by United Utilities. Any remaining private drainage sewers within the site will be removed as part of the enabling works and a new system will be installed having appropriate provisions of attenuation, flow control and preventing flood risk on and off site. On this basis there is a low risk on the site from sewer flooding.

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Reservoir and other artificial sources of flooding

The figure below shows the map from the Environment Agency of the reservoir flooding from the site. As the site is higher than surrounding areas of land, there is therefore no risk of flooding from reservoir sources or from a combined scenario including river flooding. Additionally, there are no recorded other artificial structures which may be a source of flooding nearby to the site.



Flood Exceedance

While the system is designed to attenuate flows within the site and manage extreme events up to 1:100 + 45% climate change underground, it is envisaged that in a more extreme storm scenario water may exceed the capacity of this system and water will leave the drainage system causing flooding. In such event beyond the design, water will be directed towards the low points of the car park and the site entrance and then to Irwell Street, away of the proposed care home building.

AMENITY

The proposed development will include a landscaping scheme which will include new planting at the north and east of the building providing an accessible garden area to its residents. The development will consider using green retaining features to also promote plant growth and improve amenity.

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BIODIVERSITY

The landscape and ecology scheme will additionally include elements of biodiversity improvement, and this is the remit of another designer on the scheme.

SUSTAINABLE DRAINAGE SYSTEMS

The following SUDS methods have been considered but discounted as a part of this development:

- Rainwater Harvesting – This has been considered, but as there isn't a proposed demand for the water recovered within the scheme at this stage in the design, it is discounted initially.
- Rain Gardens – These may be used, but a design is not produced at this date. There is scope for raingardens to be used in the landscaped areas within the garden, and this could utilise some water from the drainage system for irrigation.
- Permeable Pavements – These could be suggested for the site, but due to the use of the car park for compound and material management during construction, this is not viable.
- Filter Drain – This is a potential option to replace the linear drainage along the edge of the rear patios however it must be assessed further considering the type of vulnerable users.

WATER QUALITY AND POLLUTION CONTROL

The site has a general low risk of pollution in accordance with Table 26.2 of the CIRIA SUDS Manual 2016. Following this guidance, and the simple index approach, the required mitigation is as follows.

Proposed Pollution Risk				
	Hazard Level	TSS	Metals	Hydrocarbons
Residential Roof	Very Low	0.2	0.2	0.05
Residential Car Park	Low	0.5	0.4	0.4
Proposed Pollution Mitigation				
SDS Aqua Swirl Vortex Separator	x 1.0	0.8	0.5	0.7
Mitigation Index Achieved		0.8	0.5	0.7
Mitigation Index Required		0.5	0.4	0.4
		OK	OK	OK

FOUL WATER STRATEGY

The site foul water system will remain private and will collect foul flows from the proposed building. It will connect into a proposed private combined manhole in the car park before it discharges into a new adopted combined manhole which will be built along the existing 300Ø combined sewer in Irwell Street. The combined connection is subject to Section 106 approval by United Utilities.

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DRAINAGE MAINTENANCE STRATEGY

The private systems will be managed by the landowner and the individual tenant for the site. The system has been designed so that the drainage system is fully accessible and maintainable with flooding easily visible if it occurs. The maintenance schedule for the individual elements of the scheme is as per manufacturer's recommendations and as per the following minimum standards in accordance with CIRIA SuDS Manual.

Pipe Network

Operation	Frequency
Inspect and identify any areas that are not operating correctly, if required, take remedial actions.	Monthly for 3 months as a part of normal post completion monitoring, then biannually. If flooding is identified, take immediate action.
Debris removal from manholes (where may cause risk performance)	As required, but at least twice a year
Where rainfall into network from above, check surface or filter for blockage or silt, algae or other matter by jetting	As required, but at least twice a year
Remove sediment from pipework by jetting.	Annually or as required
Inspect/check all inlets, outlets, and overflow pipes to ensure that they are in good condition and operating as designed	Annually, or as required and after large storms

Vortex Separator

Operation	Frequency
Desludging and removal of debris	Every 3 months or as recommended by the Manufacturer
Inspect and identify any areas that are not operating correctly, if required, take remedial actions	Monthly for first half year of operation, then every six months, or as required by the Manufacturer.
Repair/check all inlets, outlets and overflow pipes	As required
Replace malfunctioning parts or structures	As required
Inspect filter media and establish appropriate replacement frequencies	Six monthly or as required by the Manufacturer.
Note – All Vortex Separators should be maintained and monitored under a Service Plan which is compatible with the Manufacturer's warranty and suited to the plant used.	

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Attenuation Tank

Operation	Frequency / Action
Inspect and identify any areas that are not operating correctly, if required, take remedial actions	Monthly for 3 months, then six monthly
Debris removal from attenuation tank (where may cause risk performance)	As required, but at least twice a year
Where rainfall into attenuation tank from above, check surface or filter for blockage or silt, algae or other matter by jetting	As required, but at least twice a year
Remove sediment from upstream surface water network by jetting.	Annually or as required
Inspect/check all inlets, outlets, and overflow pipes to ensure that they are in good condition and operating as designed.	Annually and after large storms with remedials as required.
Survey inside of tank for sediment build up and remove if necessary.	Every 5 years.

Flow Control

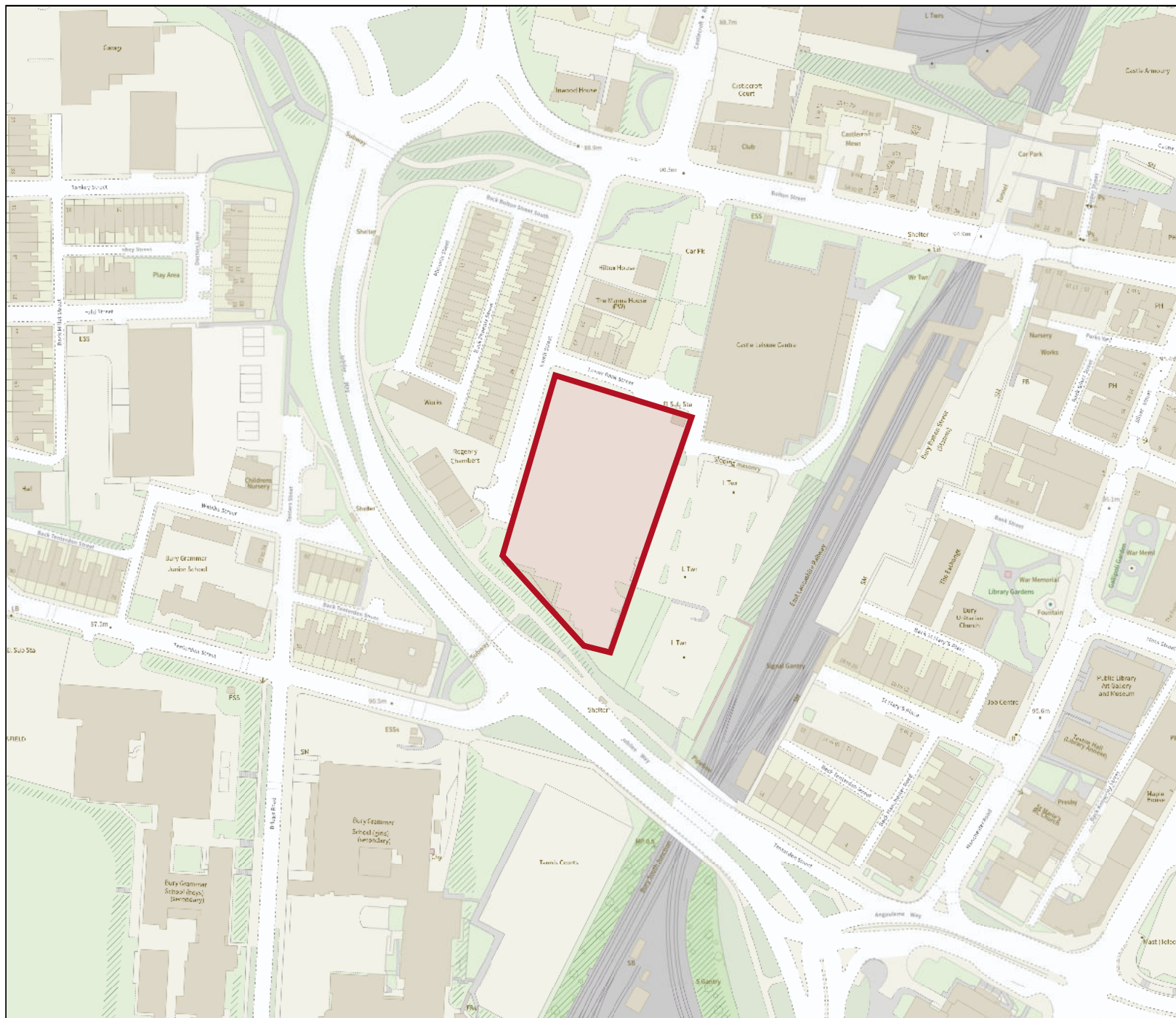
Operation	Frequency
Inspect and identify any areas that are not operating correctly, if required, take remedial actions.	Monthly for 3 months as a part of normal post completion monitoring, then biannually
Debris removal from manholes (where may cause risk performance)	Monthly
Where rainfall into network from above, check surface or filter for blockage or silt, algae or other matter by jetting	As required, but at least twice a year
Remove sediment from pipework by jetting.	Annually or as required
Repair/check all inlets, outlets and overflow pipes	As required
Inspect/check all inlets, outlets, and overflow pipes to ensure that they are in good condition and operating as designed	Annually and after large storms

Linked and Further Maintenance Activities

The maintenance of the drainage network and SuDS features are to be linked with the wider site maintenance. A log of all maintenance activities is to be kept and made available to the local planning authority (LPA) and / or the Lead Local Flood Authority (LLFA) on request.

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CODES OF PRACTICE		
Drainage Outfalls	Proposed Discharge Outfall Point	Public Combined Sewer in Irwell Str.
	Soakaways Viable	Not viable, due to made ground and sandy and clayey underlying soils
	Watercourse Discharge Available	No
	Surface Water Sewer	No
	Combined Sewer	Yes, United Utilities combined sewer
	Invert Level of Outfall	88.090 (300Ø) to be confirmed on site
Drainage Assessment Constants	Scenarios to be Tested	1:1, 1:30 + 40% CC, 1:100 + 45% CC
	Total Site 1 Area	3,810 m ² / 0.381 ha
	Proposed Impermeable Area	2,790 m ² / 0.279 ha
	Proposed discharge rate	Greenfield Rate 3.0 l/s
	Attenuation Storage Method	SDS GEOLight 400 Geocellular Tank
	Proposed Attenuation Volume	18.5x6.0x1.875m x 95% = 197.7m ³
	Flow Control Unit	Hydrobrake Optimum SHE-0075-3000-1500-3000 1.5m Head, 3.0l/s Flow
Hydraulic Modelling	M5-60 / R	19.000 / 0.300
	MADD	0
	Global Time of Entry	5 mins
	Summer / Winter CV	1.0 / 1.0
SuDS	Water Quality Methods Used	Hydrodynamic Vortex Separator
	Hydrocarbon Interception	Provided in SDS Aqua Swirl
	Silt Capture	Yes, prior to the attenuation tank
	Ponds / Swales	Not used.
	Permeable Pavement	Not used.
Appendices	Environment Agency Flood Map for planning United Utilities Sewer Records CCTV Drainage Investigation Survey Greenfield Runoff Rate calculations 23389-DCE-XX-XX-D-C-101-P01 Site 1 Drainage Strategy 23389-DCE-XX-XX-D-C-103-P01 Site 1 Impermeable Areas Surface Water Hydraulic Calculations V1 Vortex Separator Specification and Mitigation Indices Attenuation Tank Specification Flow Control Specification	



Flood map for planning

Your reference
Exemplar Bury

Location (easting/northing)
380081/410695

Scale
1:2500

Created
19 Feb 2024 11:49

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area

0 20 40 60m



environmental
drainage solutions ltd

DRAINAGE INVESTIGATION REPORT

CLIENT DUDLEYS CONSULTING
ENGINEERS

SITE IRWIN STREET, BURY

DATE 20/12/2023 JOB No. 8468

- **Comprehensive Site Surveys**
- **Drainage Rehabilitation**
- **Pipeline and Ancillary Installation**
- **Maintenance Programme
Appraisal & implementation**

LIBERTY STEEL MILLS, SHEFFIELD RD, S60 1BN
Telephone 0845 2300 939
email: cctv@eds.uk.net www.eds.uk.net

CCTV REPORT HEADER CODE EXPLANATION



Detailed below are explanations for the standard Water Research Council (WRC) CCTV report header codes. Whilst WRC defect codes are also included within the body of the report, they are accompanied by an explanation in the "Observation" column. Please contact Environmental Drainage Solutions on the number below if you wish to discuss any aspect of this report.

CODE	LOCATION DESCRIPTION
A	Main road - urban (town or city centre with heavy goods vehicles)
B	Main road - suburban/rural (all other roads with heavy goods vehicles)
C	Light road (rural roads with light traffic, town and city back streets, estate roads and parking areas)
D	Footpath or verge (within the highway boundary)
E	Fields (farmland and public open space)
F	Gardens (within private property)
G	Woodland
X	Difficult access (Motorway, railway, watercourse, inside building).

CODE	PIPE MATERIAL DESCRIPTION
AC	Asbestos cement
AK	Alkathene
BR	Brick
CC	Concrete box culvert
CI	Cast Iron
CO	Concrete
CSB	Concrete segments (bolted)
CSU	Concrete segments (unbolted)
DI	Ductile iron
GRC	Glass reinforced cement
GRP	Glass reinforced plastic
MAC	Masonry - in regular courses
MAR	Masonry - randomly coursed
PE	Polyethylene
PF	Pitch fibre
PP	Polypropylene
PSC	Plastic/steel composite
PVC	Polyvinyl chloride
RPM	Reinforced plastic matrix
SI	Spun (grey) iron
ST	Steel
VC	Vitrified clay (ie all clayware)
XXX	Other (state in comments)
ZZZ	Not known

CODE	PIPE SHAPE DESCRIPTION
A	Arched (with flat bottom)
B	Barrel (e.g. beer barrel shape)
C	Circular
E	Egg shaped
H	Horshoe (i.e. inverted U)
O	Oval
R	Rectangular
S	Square
T	Trapezoidal
U	U-shaped with flat top
X	Other (state in comments)

CODE	WEATHER DESCRIPTION
1	Dry
2	Heavy rain
3	Light rain
4	Showers
5	Snow

CODE	PIPE LINING DESCRIPTION
BL	Bitumen
CL	Cement
IS	Soft inversion type liner
PL	Plastic
RL	Resin
XXX	Other (state in comments)
ZZZ	Not known

CODE	PIPE USE DESCRIPTION
C	Combined
F	Foul
S	Surface Water
T	Trade Effluent
W	Watercourse
X	Other
Z	Not known

CODE	SURVEY DIRECTION DESCRIPTION
D	Downstream
U	Upstream

STRUCTURAL PERFORMANCE ASSESSMENT CRITERIA

CLAYWARE AND CONCRETE DRAINAGE

Detailed below are the criteria used for the assessment of severity of defects in accordance with the Water Research Council (WRC). Proposed remedial works are based upon these assessments in conjunction with many other issues such as nature of original problem (if any), implications of collapse (depth, location etc), frequency of surcharging, and many more. Most drainage systems exhibit structural defects of some sort and the WRC assessments can only be a guideline. In the right ground conditions, quite serious defects can be stable for many years. We aim to provide a reasonable, balanced recommendation for remedial works, based upon our experience and following consultation with the client. Please contact Environmental Drainage Solutions if you wish to discuss any aspect of this report.

DEFECT	STRUCTURAL IMPLICATION
CIRCUMFERENTIAL CRACK MEDIUM JOINT DISPLACEMENT MEDIUM OPEN JOINT SLIGHT SPALLING OR WEAR	MINIMAL COLLAPSE RISK IN SHORT TERM, BUT POTENTIAL FOR FURTHER DETERIORATION MINIMAL COLLAPSE RISK IN SHORT TERM, BUT POTENTIAL FOR FURTHER DETERIORATION MINIMAL COLLAPSE RISK IN SHORT TERM, BUT POTENTIAL FOR FURTHER DETERIORATION MINIMAL COLLAPSE RISK IN SHORT TERM, BUT POTENTIAL FOR FURTHER DETERIORATION
FRACTURE WITH DEFORMATION <5% LONGITUDINAL OR MULTIPLE CRACKING MINOR LOSS OF LEVEL (i.e. DIP IN PIPE) LARGE DISPLACED JOINT LARGE OPEN JOINT SLIGHT SPALLING OR WEAR	COLLAPSE UNLIKELY IN NEAR FUTURE BUT FURTHER DETERIORATION LIKELY COLLAPSE UNLIKELY IN NEAR FUTURE BUT FURTHER DETERIORATION LIKELY COLLAPSE UNLIKELY IN NEAR FUTURE BUT FURTHER DETERIORATION LIKELY COLLAPSE UNLIKELY IN NEAR FUTURE BUT FURTHER DETERIORATION LIKELY COLLAPSE UNLIKELY IN NEAR FUTURE BUT FURTHER DETERIORATION LIKELY COLLAPSE UNLIKELY IN NEAR FUTURE BUT FURTHER DETERIORATION LIKELY
BROKEN PIPEWORK BROKEN PIPEWORK WITH DEFORMATION <10% FRACTURE WITH DEFORMATION <10% MULTIPLE FRACTURE SERIOUS LOSS OF LEVEL LARGE SPALLING OR WEAR	COLLAPSE LIKELY IN FORESEEABLE FUTURE COLLAPSE LIKELY IN FORESEEABLE FUTURE COLLAPSE LIKELY IN FORESEEABLE FUTURE COLLAPSE LIKELY IN FORESEEABLE FUTURE COLLAPSE LIKELY IN FORESEEABLE FUTURE COLLAPSE LIKELY IN FORESEEABLE FUTURE
ALREADY COLLAPSED BROKEN PIPEWORK WITH DEFORMATION >10% EXTENSIVE AREAS OF FABRIC MISSING FRACTURE WITH DEFORMATION >10%	COLLAPSED OR COLLAPSE IMMINENT COLLAPSED OR COLLAPSE IMMINENT COLLAPSED OR COLLAPSE IMMINENT COLLAPSED OR COLLAPSE IMMINENT

CCTV REPORT INDEX



SITE ADDRESS: IRWIN STREET, BURY

DATE: 20/12/2023

No.	FROM	TO	DIR	DIA(MM)	JET	COMMENTS
1	EDS1	EDS2	D	300		
2	EDS1	BR A	U	300		
3	EDS1	EDS3	U	225		
4	EDS2	EDS1	U	300		
5	EDS2	EDS4	U	300		
6	EDS4	EDS2	D	300		
7	EDS4	EDS5	U	300		
8	EDS6	BR X	D	225		FUNCTION NOT KNOWN
9	EDS6	BR A	U	225		FUNCTION NOT KNOWN
10	EDS6	BR B	U	100		FUNCTION NOT KNOWN
11	EDS6	BR C	U	100		FUNCTION UNKNOWN
12	EDS3	BR B	U	225		

Client:		DUDLEYS CONSULTING ENGINEERS					Sheet No:		1		
Site:							Date:		20/12/2023		
Job No.		Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.			
8468		KB	C	1		C		1			
Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)		
EDS1	2.62	EDS2	2.94	D	300	0	VC	C			
General comments											
Count	Code	Observation			Remarks						
0.0	ST	Start of survey									
0.0	MH	Manhole or node			EDS1						
0.0	WL	Water Level			20%						
0.0	DE	Debris			10% SILT ND RUBBLE						
0.4	SA	Survey abandoned			DUE TO DEBRIS						

Client:		DUDLEYS CONSULTING ENGINEERS					Sheet No:		2		
Site:		BR A = NO DEPTH UNKNOWN					Date:		20/12/2023		
Job No.		Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.			
8468		KB	C	1		C		1			
Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)		
EDS1	2.62	BR A		U	300	0	VC	C			
General comments											
		BR A = NO DEPTH UNKNOWN									
Count	Code	Observation			Remarks						
0.0	ST	Start of survey									
0.0	MH	Manhole or node			EDS1						
0.0	WL	Water Level			20%						
0.6	DC	Dimension of pipe changes			TO 225MM DIA						
0.6	WL	Water Level			50%						
0.8	DES	Debris silt			50%						
0.8	SA	Survey abandoned			DUE TO DEBRIS						

CCTV REPORT SHEET

Client:	DUDLEYS CONSULTING ENGINEERS	Sheet No:	3
Site:		Date:	20/12/2023

Job No.	Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.
8468	KB	C	1		C		1

Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)
EDS1	2.62	EDS3	2.2	U	225	0	VC	C	

General comments	

Count	Code	Observation	Remarks
0.0	ST	Start of survey	
0.0	MH	Manhole or node	EDS1
0.0	WL	Water Level	5%
5.1	JN	Junction	100MM DIA @ 2 O'CLOCK
5.7	JN	Junction	100MM DIA @ 11 O'CLOCK
8.0	D	Deformed pipe	STARTS
8.0	CL	Longitudinal crack at	STARTS
9.5	D	Deformed pipe	ENDS
9.5	CL	Longitudinal crack at	ENDS
10.5	JN	Junction	100MM DIA @ 11 O'CLOCK
31.1	MH	Manhole or node	EDS3
31.1	FH	Finish survey	

CCTV REPORT SHEET

Client:	DUDLEYS CONSULTING ENGINEERS	Sheet No:	4
Site:		Date:	20/12/2023

Job No.	Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.
8468	KB	C	1		C		1

Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)
EDS2	2.94	EDS1	2.62	U	300	0	VC	C	

General comments	

Count	Code	Observation	Remarks
0.0	ST	Start of survey	
0.0	MH	Manhole or node	EDS2
0.0	WL	Water Level	5%
0.3	DE	Debris	5% SILT/PAPER
5.2	JN	Junction	100MM DIA @ 11 O'CLOCK
6.8	JN	Junction	100MM DIA @ 1 O'CLOCK
6.8	CL	Longitudinal crack at	12 O'CLOCK STARTS
15.9	JN	Junction	100MM DIA @ 3 O'CLOCK
22.5	DE	Debris	10% RUBBLE/SILT
22.5	JN	Junction	100MM DIA @ 2 O'CLOCK
22.5	SA	Survey abandoned	DUE TO DEBRIS

CCTV REPORT SHEET

Client:	DUDLEYS CONSULTING ENGINEERS	Sheet No:	5
Site:		Date:	20/12/2023

Job No.	Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.
8468	KB	C	1		C		1

Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)
EDS2	2.94	EDS4	3.06	U	300	0	VC	C	

General comments	

Count	Code	Observation	Remarks
0.0	ST	Start of survey	
0.0	MH	Manhole or node	EDS2
0.0	WL	Water Level	5%
4.7	JN	Junction	100MM DIA @ 11 O'CLOCK
5.6	JN	Junction	100MM DIA @ 2 O'CLOCK
7.0	JN	Junction	100MM DIA @ 11 O'CLOCK
7.7	JN	Junction	100MM DIA @ 2 O'CLOCK
8.6	JN	Junction	100MM DIA @ 10 O'CLOCK
14.9	JN	Junction	100MM DIA @ 10 O'CLOCK
17.1	JN	Junction	100MM DIA @ 1 O'CLOCK
19.4	EM	Encrustation medium	5% AT JOINT
19.4	SA	Survey abandoned	DUE TO ENCRUSTATION

CCTV REPORT SHEET

Client:	DUDLEYS CONSULTING ENGINEERS	Sheet No:	6
Site:		Date:	20/12/2023

Job No.	Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.
8468	KB	C	1		C		1

Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)
EDS4	3.06	EDS2	2.94	D	300	0	VC	C	

General comments	

Count	Code	Observation	Remarks
0.0	ST	Start of survey	
0.0	MH	Manhole or node	EDS4
0.0	WL	Water Level	5%
0.7	JN	Junction	100MM DIA @ 2 O'CLOCK
0.9	JN	Junction	100MM DIA @ 11 O'CLOCK
9.1	JN	Junction	100MM DIA @ 1 O'CLOCK
13.5	JN	Junction	100MM DIA @ 1 O'CLOCK
16.1	JN	Junction	100MM DIA @ 2 O'CLOCK
24.5	JN	Junction	100MM DIA @ 9 O'CLOCK
30.7	JN	Junction	100MM DIA @ 2 O'CLOCK
31.6	JN	Junction	100MM DIA @ 9 O'CLOCK
32.7	JN	Junction	100MM DIA @ 1 O'CLOCK
33.3	JN	Junction	100MM DIA @ 3 O'CLOCK
37.5	EH	Encrustation heavy	30% SCALE
37.5	SA	Survey abandoned	DUE TO SCALE
37.5	GO	General observation	CAMERA TIPPED ON REVERSE

CCTV REPORT SHEET

Client:	DUDLEYS CONSULTING ENGINEERS	Sheet No:	7
Site:	EDS5 = NO DEPTH UNABLE TO RAISE	Date:	20/12/2023

Job No.	Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.
8468	KB	C	1		C		1

Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)
EDS4	3.06	EDS5		U	300	0	VC	C	

General comments	
	EDS5 = NO DEPTH UNABLE TO RAISE

Count	Code	Observation	Remarks
0.0	ST	Start of survey	
0.0	MH	Manhole or node	EDS4
0.0	WL	Water Level	5%
6.7	LR	Line of pipe deviates right	SIGHT
18.4	MH	Manhole or node	EDS5
19.2	DC	Dimension of pipe changes	TO 225MM OR 150MM
19.2	SA	Survey abandoned	UNABLE TO PRECEED

CCTV REPORT SHEET

Client:	DUDLEYS CONSULTING ENGINEERS	Sheet No:	8
Site:	BR X = NO DEPTH BLIND CONNECTION TO MAIN	Date:	20/12/2023

Job No.	Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.
8468	KB	C	1		C		1

Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)
EDS6	3.16	BR X		D	225	0	VC	Z	

General comments	FUNCTION NOT KNOWN
	BR X = NO DEPTH BLIND CONNECTION TO MAIN

Count	Code	Observation	Remarks
0.0	ST	Start of survey	
0.0	MH	Manhole or node	EDS6
0.0	WL	Water Level	0%
0.1	DE	Debris	5% RUBBLE
10.5	LR	Line of pipe deviates right	SLIGHT
10.5	GO	General observation	MAIN LINE IN VIEW
10.5	FH	Finish survey	

CCTV REPORT SHEET

Client:	DUDLEYS CONSULTING ENGINEERS	Sheet No:	9
Site:	BR A = NO DEPTH UNKNOWN	Date:	20/12/2023

Job No.	Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.
8468	KB	C	1		C		1

Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)
EDS6	3.16	BR A		U	225	0	VC	Z	

General comments	FUNCTION NOT KNOWN
	BR A = NO DEPTH UNKNOWN

Count	Code	Observation	Remarks
0.0	ST	Start of survey	
0.0	MH	Manhole or node	EDS6
0.0	WL	Water Level	5%
1.1	DE	Debris	100% GRAVEL - POSSIBLE COLLAPSE
1.1	SA	Survey abandoned	

Client:		DUDLEYS CONSULTING ENGINEERS					Sheet No:		10		
Site:		BR B = NO DEPTH UNKNOWN					Date:		20/12/2023		
Job No.		Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.			
8468		KB	C	1		C		1			
Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)		
EDS6	3.16	BR B		U	100	0	VC	Z			
General comments		FUNCTION NOT KNOWN									
		BR B = NO DEPTH UNKNOWN									
Count	Code	Observation			Remarks						
0.0	ST	Start of survey									
0.0	MH	Manhole or node			EDS6						
0.0	WL	Water Level			0%						
2.4	DE	Debris			90% SOIL						
2.4	GO	General observation			LINE RIGHT SEVERE IN VIEW						
2.4	SA	Survey abandoned			DUE TO DEBRIS						

CCTV REPORT SHEET

Client:	DUDLEYS CONSULTING ENGINEERS	Sheet No:	11
Site:	BR C = NO DEPTH UNKNOWN	Date:	20/12/2023

Job No.	Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.
8468	KB	C	1		C		1

Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)
EDS6	3.16	BR C		U	100	0	VC	Z	

General comments	FUNCTION UNKNOWN
	BR C = NO DEPTH UNKNOWN

Count	Code	Observation	Remarks
0.0	ST	Start of survey	
0.0	MH	Manhole or node	EDS6
0.0	WL	Water Level	0%
0.2	LL	Line of pipe deviates left	MEDUIM IN CHAMBER
1.8	JDL	Large joint displacement	
1.8	GO	General observation	SEVERE LINE UP AFTER JOINT DISPLACEMENT
1.8	SA	Survey abandoned	

CCTV REPORT SHEET

Client:	DUDLEYS CONSULTING ENGINEERS	Sheet No:	12
Site:	BR B = NO DEPTH UNKNOWN	Date:	20/12/2023

Job No.	Operator	Location code	Weather	Pre clean	Shape	Lining	Tape No.
8468	KB	C	1		C		1

Start MH	Depth(m)	Finish MH	Depth(m)	Direction	Dia(mm)	Dim(mm)	Material	Use	Length(M)
EDS3	2.2	BR B		U	225	0	VC	C	

General comments	
	BR B = NO DEPTH UNKNOWN

Count	Code	Observation	Remarks
0.0	ST	Start of survey	
0.0	MH	Manhole or node	EDS3
0.0	WL	Water Level	5%
0.2	LR	Line of pipe deviates right	SLIGHT
1.9	JN	Junction	100MM DIA @ 2 O'CLOCK
2.0	DE	Debris	5% STONES STARTS
3.6	JN	Junction	100MM DIA @ 2 O'CLOCK
3.9	JN	Junction	100MM DIA @ 2 O'CLOCK
7.8	JN	Junction	100MM DIA @ 2 O'CLOCK
10.4	JN	Junction	100MM DIA @ 3 O'CLOCK
11.0	JN	Junction	100MM DIA @ 3 O'CLOCK
19.5	CX	Defective connection at	100MM DIA @ 11 O'CLOCK
19.5	DE	Debris	5% SOIL STARTS
21.0	JN	Junction	100MM DIA @ 2 O'CLOCK
21.0	RFJ	Roots fine at joint	
21.1	JN	Junction	100MM DIA @ 2 O'CLOCK
22.2	JN	Junction	100MM DIA @ 9 O'CLOCK
22.9	DE	Debris	30% SOIL
22.9	SA	Survey abandoned	DUE TO DEBRIS

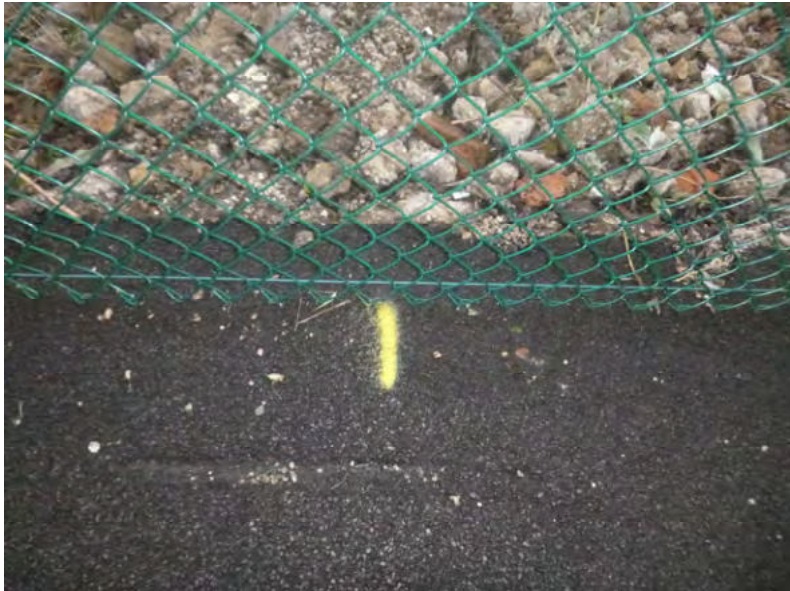
GENERAL SITE PHOTOS

JOB No.	8468	SHEET 1 OF 6	DATE	20/12/23
CLIENT	DUDLEYS		SITE	IRWELL STREET, BURY

GP1	
REMARKS	EDS5 TO U/S – UNABLE TO ACCESS LEISURE CENTRE CAR PARK WITH VAN DUE TO BARRIER.
GP2	
REMARKS	EDS4 BR X – CHAINAGE OF CONNECTION FROM EDS6 MARKED ON KERBLINE

GENERAL SITE PHOTOS

JOB No.	8468	SHEET 2 OF 6	DATE	20/12/23
CLIENT	DUDLEYS	SITE	IRWELL STREET, BURY	

GP3	
REMARKS	EDS4 BR X – CHAINAGE OF ROAD GULLY CONNECTION MARKED ON KERBLINE.
GP4	
REMARKS	EDS4 BR X – CHAINAGE OF ROAD GULY CONNECTION MARKED ON KERBLINE.

GENERAL SITE PHOTOS

JOB No. 8468**SHEET** 3 OF 6**DATE**

20/12/23

CLIENT

DUDLEYS

SITE

IRWELL STREET, BURY

GP5	
REMARKS	EDS2 BR B – CONNECTION FROM ROAD GULLY PROVEN BY FLOW TEST.
GP6	
REMARKS	EDS2 BR A – BLOCKED GULLY, UNABLE TO PROVE CONECTIVITY.

GENERAL SITE PHOTOS

JOB No.	8468	SHEET 4 OF 6	DATE	20/12/23
CLIENT	DUDLEYS	SITE	IRWELL STREET, BURY	

GP7	
REMARKS	UNABLE TO LOCATE CHAMBER U/S OF EDS3
GP8	
REMARKS	UNABLE TO LOCATE CHAMBER U/S OF EDS3

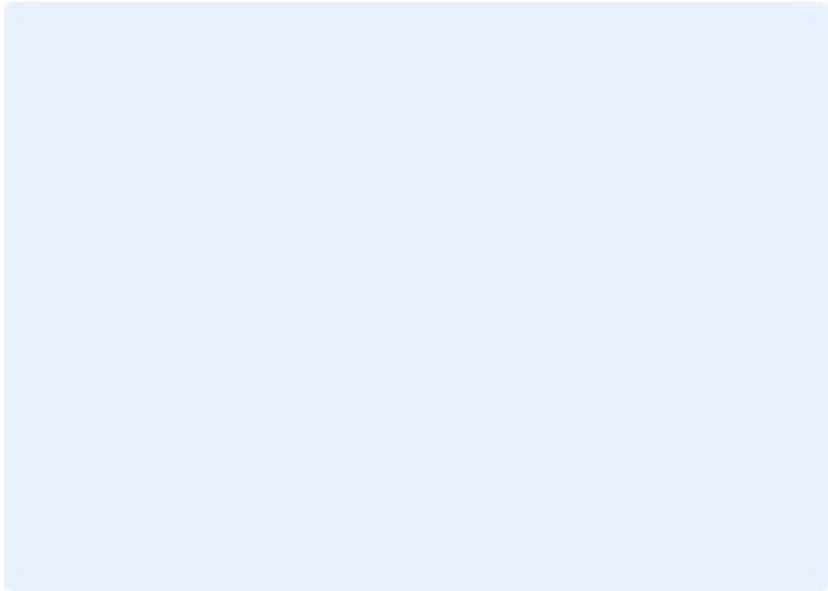
GENERAL SITE PHOTOS

JOB No.	8468	SHEET 5 OF 6	DATE	20/12/23
CLIENT	DUDLEYS	SITE	IRWELL STREET, BURY	

GP9	
REMARKS	UNABLE TO LOCATE CHAMBER U/S OF EDS3
GP10	
REMARKS	UNABLE TO LOCATE CHAMBER U/S OF EDS3

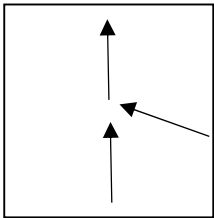
GENERAL SITE PHOTOS

JOB No.	8468	SHEET 6 OF 6	DATE	20/12/23
CLIENT	DUDLEYS		SITE	IRWELL STREET, BURY

GP11	
REMARKS	UNABLE TO LOCATE CHAMBER U/S OF EDS3
GP12	
REMARKS	

MANHOLE RECORD CARD

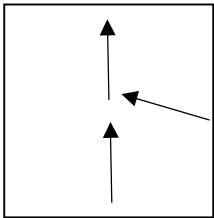
JOB No.	8468	SHEET 1 OF 6	DATE	20/12/23
CLIENT	DUDLEYS		SITE	IRWELL STREET, BURY

<table border="1"> <tr> <td>NODE REF</td> <td>EDS1</td> </tr> <tr> <td>SURVEY DATE</td> <td></td> </tr> <tr> <td>NODE TYPE</td> <td>MH</td> </tr> <tr> <td>STATUS</td> <td>PU</td> </tr> <tr> <td>FUNCTION</td> <td>C</td> </tr> <tr> <td>INVERT (M)</td> <td>2.62M</td> </tr> <tr> <td>CONSTRUCTION</td> <td>BR</td> </tr> </table>	NODE REF	EDS1	SURVEY DATE		NODE TYPE	MH	STATUS	PU	FUNCTION	C	INVERT (M)	2.62M	CONSTRUCTION	BR	Branch X 300mm  A 300mm B 225mm
NODE REF	EDS1														
SURVEY DATE															
NODE TYPE	MH														
STATUS	PU														
FUNCTION	C														
INVERT (M)	2.62M														
CONSTRUCTION	BR														
REMARKS (Photos etc)															
DETAIL PHOTO															
LOCATION PHOTO															

MH – MANHOLE, PPIC – POLYPROPYLENE INSPECTION CHAMBER, PU – PUBLIC, PR – PRIVATE, F – FOUL,
SW – SURFACE WATER, C – COMBINED, BR – BRICK, PCC – PRE-CAST CONCRETE,

MANHOLE RECORD CARD

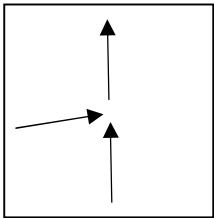
JOB No.	8468	SHEET 2 OF 6	DATE	20/12/23
CLIENT	DUDLEYS		SITE	IRWELL STREET, BURY

<table border="1"> <tr> <td>NODE REF</td> <td>EDS2</td> </tr> <tr> <td>SURVEY DATE</td> <td></td> </tr> <tr> <td>NODE TYPE</td> <td>MH</td> </tr> <tr> <td>STATUS</td> <td>PU</td> </tr> <tr> <td>FUNCTION</td> <td>C</td> </tr> <tr> <td>INVERT (M)</td> <td>2.94M</td> </tr> <tr> <td>CONSTRUCTION</td> <td>BR</td> </tr> </table>	NODE REF	EDS2	SURVEY DATE		NODE TYPE	MH	STATUS	PU	FUNCTION	C	INVERT (M)	2.94M	CONSTRUCTION	BR	Branch X 300mm  A 300mm B 300mm
NODE REF	EDS2														
SURVEY DATE															
NODE TYPE	MH														
STATUS	PU														
FUNCTION	C														
INVERT (M)	2.94M														
CONSTRUCTION	BR														
REMARKS (Photos etc)															
DETAIL PHOTO															
LOCATION PHOTO															

MH – MANHOLE, PPIC – POLYPROPYLENE INSPECTION CHAMBER, PU – PUBLIC, PR – PRIVATE, F – FOUL,
SW – SURFACE WATER, C – COMBINED, BR – BRICK, PCC – PRE-CAST CONCRETE,

MANHOLE RECORD CARD

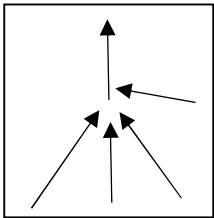
JOB No.	8468	SHEET 3 OF 6	DATE	20/12/23
CLIENT	DUDLEYS		SITE	IRWELL STREET, BURY

<table border="1"> <tr> <td>NODE REF</td> <td>EDS3</td> </tr> <tr> <td>SURVEY DATE</td> <td></td> </tr> <tr> <td>NODE TYPE</td> <td>MH</td> </tr> <tr> <td>STATUS</td> <td>PU</td> </tr> <tr> <td>FUNCTION</td> <td>C</td> </tr> <tr> <td>INVERT (M)</td> <td>2.2M</td> </tr> <tr> <td>CONSTRUCTION</td> <td>BR</td> </tr> </table>	NODE REF	EDS3	SURVEY DATE		NODE TYPE	MH	STATUS	PU	FUNCTION	C	INVERT (M)	2.2M	CONSTRUCTION	BR	Branch X 225mm  B 225mm A 225mm
NODE REF	EDS3														
SURVEY DATE															
NODE TYPE	MH														
STATUS	PU														
FUNCTION	C														
INVERT (M)	2.2M														
CONSTRUCTION	BR														
REMARKS (Photos etc)	BR A 60% RUBBLE – UNABLE TO SURVEY														
DETAIL PHOTO															
LOCATION PHOTO															

MH – MANHOLE, PPIC – POLYPROPYLENE INSPECTION CHAMBER, PU – PUBLIC, PR – PRIVATE, F – FOUL, SW – SURFACE WATER, C – COMBINED, BR – BRICK, PCC – PRE-CAST CONCRETE,

MANHOLE RECORD CARD

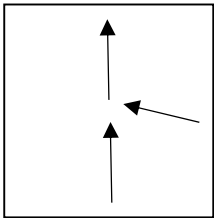
JOB No.	8468	SHEET 4 OF 6	DATE	20/12/23
CLIENT	DUDLEYS		SITE	IRWELL STREET, BURY

<table border="1"> <tr> <td>NODE REF</td> <td>EDS4</td> </tr> <tr> <td>SURVEY DATE</td> <td></td> </tr> <tr> <td>NODE TYPE</td> <td>MH</td> </tr> <tr> <td>STATUS</td> <td>PU</td> </tr> <tr> <td>FUNCTION</td> <td>C</td> </tr> <tr> <td>INVERT (M)</td> <td>3.06M</td> </tr> <tr> <td>CONSTRUCTION</td> <td>BR</td> </tr> </table>	NODE REF	EDS4	SURVEY DATE		NODE TYPE	MH	STATUS	PU	FUNCTION	C	INVERT (M)	3.06M	CONSTRUCTION	BR	Branch X 300mm  A 300mm D 150mm C 150mm
NODE REF	EDS4														
SURVEY DATE															
NODE TYPE	MH														
STATUS	PU														
FUNCTION	C														
INVERT (M)	3.06M														
CONSTRUCTION	BR														
REMARKS (Photos etc)															
DETAIL PHOTO															
LOCATION PHOTO															

MH – MANHOLE, PPIC – POLYPROPYLENE INSPECTION CHAMBER, PU – PUBLIC, PR – PRIVATE, F – FOUL, SW – SURFACE WATER, C – COMBINED, BR – BRICK, PCC – PRE-CAST CONCRETE,

MANHOLE RECORD CARD

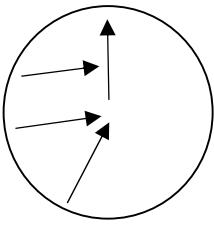
JOB No.	8468	SHEET 5 OF 6	DATE	20/12/23
CLIENT	DUDLEYS		SITE	IRWELL STREET, BURY

<table border="1"> <tr> <td>NODE REF</td> <td>EDS5</td> </tr> <tr> <td>SURVEY DATE</td> <td></td> </tr> <tr> <td>NODE TYPE</td> <td>MH</td> </tr> <tr> <td>STATUS</td> <td>PR</td> </tr> <tr> <td>FUNCTION</td> <td>C</td> </tr> <tr> <td>INVERT (M)</td> <td></td> </tr> <tr> <td>CONSTRUCTION</td> <td></td> </tr> </table>	NODE REF	EDS5	SURVEY DATE		NODE TYPE	MH	STATUS	PR	FUNCTION	C	INVERT (M)		CONSTRUCTION		Branch X 300mm 
NODE REF	EDS5														
SURVEY DATE															
NODE TYPE	MH														
STATUS	PR														
FUNCTION	C														
INVERT (M)															
CONSTRUCTION															
REMARKS (Photos etc)	UNABLE TO RAISE DUE TO LOCATION IN ACCESS TO LEISURE CENTRE POSITIVE SOUND TEST TO EDS4														
DETAIL PHOTO															
LOCATION PHOTO															

MH – MANHOLE, PPIC – POLYPROPYLENE INSPECTION CHAMBER, PU – PUBLIC, PR – PRIVATE, F – FOUL, SW – SURFACE WATER, C – COMBINED, BR – BRICK, PCC – PRE-CAST CONCRETE,

MANHOLE RECORD CARD

JOB No.	8468	SHEET 6 OF 6	DATE	20/12/23
CLIENT	DUDLEYS		SITE	IRWELL STREET, BURY

<table border="1"> <tr> <td>NODE REF</td> <td>EDS6</td> </tr> <tr> <td>SURVEY DATE</td> <td></td> </tr> <tr> <td>NODE TYPE</td> <td>MH</td> </tr> <tr> <td>STATUS</td> <td>PR</td> </tr> <tr> <td>FUNCTION</td> <td>UNKNOWN</td> </tr> <tr> <td>INVERT (M)</td> <td>3.16M</td> </tr> <tr> <td>CONSTRUCTION</td> <td>PCC</td> </tr> </table>	NODE REF	EDS6	SURVEY DATE		NODE TYPE	MH	STATUS	PR	FUNCTION	UNKNOWN	INVERT (M)	3.16M	CONSTRUCTION	PCC	Branch X 225mm C 100mm B 100mm A 225mm 
NODE REF	EDS6														
SURVEY DATE															
NODE TYPE	MH														
STATUS	PR														
FUNCTION	UNKNOWN														
INVERT (M)	3.16M														
CONSTRUCTION	PCC														
REMARKS (Photos etc)															
DETAIL PHOTO															
LOCATION PHOTO															

MH – MANHOLE, PPIC – POLYPROPYLENE INSPECTION CHAMBER, PU – PUBLIC, PR – PRIVATE, F – FOUL,
SW – SURFACE WATER, C – COMBINED, BR – BRICK, PCC – PRE-CAST CONCRETE,

Calculated by:	George Dermentzoglou
Site name:	Exemplar
Site location:	Bury

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:	53.59266° N
Longitude:	2.3024° W
Reference:	1740794
Date:	Feb 19 2024 11:56

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.381
-----------------------	-------

Methodology

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

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.

Soil characteristics

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

(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.

Hydrological characteristics

	Default	Edited
SAAR (mm):	1066	1066
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

(3) Is $SPR/SPRHOST \leq 0.3$?

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

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	3.01	3.01
1 in 1 year (l/s):	2.62	2.62
1 in 30 years (l/s):	5.11	5.11
1 in 100 year (l/s):	6.26	6.26
1 in 200 years (l/s):	7.13	7.13

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.



Pre-development discharge

Site Makeup	Greenfield
Greenfield Method	IH124
Positively Drained Area (ha)	0.381
SAAR (mm)	1066
Soil Index	4
SPR	0.47
Region	10
Betterment (%)	0
	Calc
QBar (l/s)	3.0

Return Period (years)	Growth Factor	Q (l/s)
1	0.87	2.6
30	1.70	5.1
100	2.08	6.3



DO NOT SCALE

DESIGNERS HAZARD IDENTIFICATION

IT IS ASSUMED THAT ALL WORKS WILL BE UNDERTAKEN BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT. IN ADDITION TO THE HAZARDS TYPICALLY ASSOCIATED WITH THE TYPES OF CONSTRUCTION DETAILED ON THIS DRAWING, ANY KNOWN ABNORMAL HAZARDS SPECIFIC TO THIS SCHEME HAVE BEEN IDENTIFIED.

ABNORMAL HAZARD REFERENCE

!

NOTES

1. DO NOT SCALE FROM THIS DRAWING.

2. IF ANY DISCREPANCIES ARE FOUND IN THIS DRAWING, PLEASE REPORT TO DUDLEYS CONSULTING ENGINEERS.

3. THIS DRAWING IS BASED ON THE FOLLOWING INFORMATION:

3.1. 60307MCLS-01A - TOPOGRAPHICAL SURVEY BY SURVEY SOLUTIONS DATED DECEMBER 2023

3.2. JS8468 - DRAINAGE INVESTIGATION SURVEY BY ENVIRONMENTAL DRAINAGE SOLUTIONS DATED DECEMBER 2023

3.3. IRVEL-WBA-SI-ZZ-DR-A-PL-003-P14 - PROPOSED SITE PLAN BY WATSON BATTY ARCHITECTS DATED MARCH 2024

4. ALL WORK TO BE UNDERTAKEN IN ACCORDANCE WITH THE CURRENT EDITION OF THE BUILDING REGULATIONS, SEWERAGE SECTOR CODES OF PRACTICE, AND THE RELEVANT LOCAL HIGHWAY AUTHORITY STANDARDS.

5. THE SITE'S SURFACE WATER WILL DISCHARGE INTO UNITED UTILITIES PUBLIC COMBINED SEWER IN IRWELL STREET AT A GREENFIELD RATE.

6. THE TOTAL PROPOSED IMPERMEABLE AREA FOR THE SITE HAS BEEN CALCULATED AT 2,790m² / 0.279ha.

14.03.24

PRELIMINARY ISSUE

OB

GD

P01

DATE

REVISION DESCRIPTION

BY

CHK.

REV.

DUDLEYS

CONSULTING ENGINEERS

Tithe House

35 Town Street

Leeds, LS18 5UJ

0113 258 3611

info@dudleys.co.uk

PROJECT

EXEMPLAR HEALTH CARE

IRWELL STR. & LOWER BANK STR.

BURY, BL9 0HD

TITLE

SITE 1 IMPERMEABLE AREAS

SCALE

1:200

PAPER

A1

STATUS

PRELIMINARY

DRAWING NO.

23389-DCE-XX-XX-D-C-103

REV.

P01

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	x
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
RE1.00	0.009	5.00	91.950	230	380106.323	410717.991	0.450
SW1.01	0.014	5.00	91.925	450	380111.369	410732.568	0.810
SW1.02	0.021	5.00	91.925	450	380091.120	410739.652	1.170
SW1.03	0.028	5.00	91.550	1200	380069.125	410747.366	1.260
SW1.04	0.032	5.00	91.420	1200	380062.968	410729.762	1.440
SW1.05	0.025	5.00	91.950	450	380079.945	410723.739	2.270
SW1.06	0.060	5.00	91.750	1200	380074.390	410707.771	2.925
SW1.07			91.650	1050	380072.368	410708.472	3.025
SW1.08	0.033	5.00	90.950	1500	380052.061	410715.533	2.500
CW1.09			91.050	1200	380054.505	410723.936	2.710
RE2.00	0.009	5.00	91.950	230	380104.052	410714.281	0.450
SW2.01	0.011	5.00	91.950	450	380099.305	410700.660	0.810
SW2.02	0.016	5.00	91.950	450	380093.434	410683.749	1.260
SW2.03	0.021	5.00	91.950	450	380078.004	410689.123	1.670
CW1.10			90.750	1200	380046.633	410726.226	2.510

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	RE1.00	SW1.01	15.426	0.600	91.500	91.115	0.385	40.1	150	5.16	44.5
1.001	SW1.01	SW1.02	21.452	0.600	91.115	90.755	0.360	59.6	150	5.44	43.4
1.002	SW1.02	SW1.03	23.308	0.600	90.755	90.365	0.390	59.8	150	5.73	42.5
1.003	SW1.03	SW1.04	18.650	0.600	90.290	89.980	0.310	60.2	225	5.92	41.8
1.004	SW1.04	SW1.05	18.014	0.600	89.980	89.680	0.300	60.0	225	6.09	41.0
1.005	SW1.05	SW1.06	16.907	0.600	89.680	88.825	0.855	19.8	225	6.19	40.5
1.006	SW1.06	SW1.07	2.140	0.600	88.825	88.625	0.200	10.7	225	6.20	40.4
1.007	SW1.07	SW1.08	21.500	0.600	88.625	88.500	0.125	172.0	225	6.56	39.3
1.008	SW1.08	CW1.09	8.751	0.600	88.450	88.340	0.110	79.6	150	6.69	39.1

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	1.594	28.2	1.4	0.300	0.660	0.009	0.0	23	0.840
1.001	1.305	23.1	3.6	0.660	1.020	0.023	0.0	40	0.954
1.002	1.303	23.0	6.8	1.020	1.035	0.044	0.0	55	1.132
1.003	1.689	67.2	10.9	1.035	1.215	0.072	0.0	61	1.251
1.004	1.691	67.2	15.4	1.215	2.045	0.104	0.0	73	1.382
1.005	2.956	117.5	18.9	2.045	2.700	0.129	0.0	61	2.191
1.006	4.023	159.9	35.9	2.700	2.800	0.246	0.0	73	3.270
1.007	0.994	39.5	34.9	2.800	2.225	0.246	0.0	165	1.118
1.008	1.128	19.9	39.4	2.350	2.560	0.279	0.0	150	1.149

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)
1.009	CW1.09	CW1.10	8.198	0.600	88.340	88.240	0.100	82.0	150	6.81	39.0
2.000	RE2.00	SW2.01	14.424	0.600	91.500	91.140	0.360	40.1	150	5.49	43.3
2.001	SW2.01	SW2.02	17.901	0.600	91.140	90.690	0.450	39.8	150	5.71	42.7
2.002	SW2.02	SW2.03	16.339	0.600	90.690	90.280	0.410	39.9	150	5.88	42.1
2.003	SW2.03	SW1.06	18.995	0.600	90.280	88.900	1.380	13.8	150	5.95	41.9

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)
1.009	1.111	19.6	39.3	2.560	2.360	0.279	0.0	150	1.132
2.000	1.594	28.2	1.4	0.300	0.660	0.009	0.0	23	0.826
2.001	1.600	28.3	3.1	0.660	1.110	0.020	0.0	33	1.047
2.002	1.599	28.3	5.5	1.110	1.520	0.036	0.0	45	1.243
2.003	2.729	48.2	8.6	1.520	2.700	0.057	0.0	43	2.078

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	15.426	40.1	150	Circular	91.950	91.500	0.300	91.925	91.115	0.660
1.001	21.452	59.6	150	Circular	91.925	91.115	0.660	91.925	90.755	1.020
1.002	23.308	59.8	150	Circular	91.925	90.755	1.020	91.550	90.365	1.035
1.003	18.650	60.2	225	Circular	91.550	90.290	1.035	91.420	89.980	1.215
1.004	18.014	60.0	225	Circular	91.420	89.980	1.215	91.950	89.680	2.045
1.005	16.907	19.8	225	Circular	91.950	89.680	2.045	91.750	88.825	2.700
1.006	2.140	10.7	225	Circular	91.750	88.825	2.700	91.650	88.625	2.800
1.007	21.500	172.0	225	Circular	91.650	88.625	2.800	90.950	88.500	2.225
1.008	8.751	79.6	150	Circular	90.950	88.450	2.350	91.050	88.340	2.560
1.009	8.198	82.0	150	Circular	91.050	88.340	2.560	90.750	88.240	2.360
2.000	14.424	40.1	150	Circular	91.950	91.500	0.300	91.950	91.140	0.660
2.001	17.901	39.8	150	Circular	91.950	91.140	0.660	91.950	90.690	1.110
2.002	16.339	39.9	150	Circular	91.950	90.690	1.110	91.950	90.280	1.520
2.003	18.995	13.8	150	Circular	91.950	90.280	1.520	91.750	88.900	2.700

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RE1.00	230	Manhole	Adoptable	SW1.01	450	Manhole	Adoptable
1.001	SW1.01	450	Manhole	Adoptable	SW1.02	450	Manhole	Adoptable
1.002	SW1.02	450	Manhole	Adoptable	SW1.03	1200	Manhole	Adoptable
1.003	SW1.03	1200	Manhole	Adoptable	SW1.04	1200	Manhole	Adoptable
1.004	SW1.04	1200	Manhole	Adoptable	SW1.05	450	Manhole	Adoptable
1.005	SW1.05	450	Manhole	Adoptable	SW1.06	1200	Manhole	Adoptable
1.006	SW1.06	1200	Manhole	Adoptable	SW1.07	1050	Manhole	Adoptable
1.007	SW1.07	1050	Manhole	Adoptable	SW1.08	1500	Manhole	Adoptable
1.008	SW1.08	1500	Manhole	Adoptable	CW1.09	1200	Manhole	Adoptable
1.009	CW1.09	1200	Manhole	Adoptable	CW1.10	1200	Manhole	Adoptable
2.000	RE2.00	230	Manhole	Adoptable	SW2.01	450	Manhole	Adoptable
2.001	SW2.01	450	Manhole	Adoptable	SW2.02	450	Manhole	Adoptable
2.002	SW2.02	450	Manhole	Adoptable	SW2.03	450	Manhole	Adoptable
2.003	SW2.03	450	Manhole	Adoptable	SW1.06	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
RE1.00	380106.323	410717.991	91.950	0.450	230				
						0	1.000	91.500	150
SW1.01	380111.369	410732.568	91.925	0.810	450		1	1.000	91.115
						0	1.001	91.115	150
SW1.02	380091.120	410739.652	91.925	1.170	450		1	1.001	90.755
						0	1.002	90.755	150
SW1.03	380069.125	410747.366	91.550	1.260	1200		1	1.002	90.365
						0	1.003	90.290	225
SW1.04	380062.968	410729.762	91.420	1.440	1200		1	1.003	89.980
						0	1.004	89.980	225
SW1.05	380079.945	410723.739	91.950	2.270	450		1	1.004	89.680
						0	1.005	89.680	225
SW1.06	380074.390	410707.771	91.750	2.925	1200		1	2.003	88.900
						2	1.005	88.825	225
						0	1.006	88.825	225
SW1.07	380072.368	410708.472	91.650	3.025	1050		1	1.006	88.625
						0	1.007	88.625	225
SW1.08	380052.061	410715.533	90.950	2.500	1500		1	1.007	88.500
						0	1.008	88.450	150
CW1.09	380054.505	410723.936	91.050	2.710	1200		1	1.008	88.340
						0	1.009	88.340	150
RE2.00	380104.052	410714.281	91.950	0.450	230				
						0	2.000	91.500	150
SW2.01	380099.305	410700.660	91.950	0.810	450		1	2.000	91.140
						0	2.001	91.140	150
SW2.02	380093.434	410683.749	91.950	1.260	450		1	2.001	90.690
						0	2.002	90.690	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SW2.03	380078.004	410689.123	91.950	1.670	450		1	2.002	90.280	150
							0	2.003	90.280	150
CW1.10	380046.633	410726.226	90.750	2.510	1200		1	1.009	88.240	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	19.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	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 %)
1	0	0	0
30	40	0	0
100	45	0	0

Node SW1.08 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	88.450	Product Number	CTL-SHE-0075-3000-1500-3000
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

Node SW1.08 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	88.450
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	111.0	0.0	1.875	111.0	0.0	1.876	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.35%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1.00	10	91.523	0.023	1.4	0.0009	0.0000	OK
15 minute summer	SW1.01	10	91.154	0.039	3.6	0.0063	0.0000	OK
15 minute summer	SW1.02	11	90.811	0.056	6.7	0.0090	0.0000	OK
15 minute summer	SW1.03	11	90.351	0.061	10.8	0.0686	0.0000	OK
15 minute summer	SW1.04	11	90.059	0.079	15.5	0.0888	0.0000	OK
15 minute summer	SW1.05	11	89.741	0.061	19.3	0.0098	0.0000	OK
15 minute summer	SW1.06	11	88.929	0.104	36.8	0.1172	0.0000	OK
15 minute summer	SW1.07	11	88.810	0.185	36.8	0.1603	0.0000	OK
360 minute summer	SW1.08	248	88.776	0.326	11.9	34.9982	0.0000	SURCHARGED
240 minute summer	CW1.09	160	88.378	0.038	2.6	0.0433	0.0000	OK
15 minute summer	RE2.00	10	91.523	0.023	1.4	0.0009	0.0000	OK
15 minute summer	SW2.01	10	91.173	0.033	3.1	0.0053	0.0000	OK
15 minute summer	SW2.02	10	90.736	0.046	5.5	0.0073	0.0000	OK
15 minute summer	SW2.03	11	90.324	0.044	8.6	0.0070	0.0000	OK
240 minute summer	CW1.10	160	88.277	0.037	2.6	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 summer	RE1.00	1.000	SW1.01	1.4	0.524	0.049	0.0413	
15 minute summer	SW1.01	1.001	SW1.02	3.5	0.728	0.152	0.1045	
15 minute summer	SW1.02	1.002	SW1.03	6.6	1.114	0.288	0.1389	
15 minute summer	SW1.03	1.003	SW1.04	10.8	1.034	0.160	0.1952	
15 minute summer	SW1.04	1.004	SW1.05	15.6	1.480	0.231	0.1900	
15 minute summer	SW1.05	1.005	SW1.06	19.3	1.474	0.164	0.2249	
15 minute summer	SW1.06	1.006	SW1.07	36.8	1.438	0.230	0.0565	
15 minute summer	SW1.07	1.007	SW1.08	36.9	1.126	0.934	0.7027	
360 minute summer	SW1.08	Hydro-Brake®	CW1.09	2.6				
240 minute summer	CW1.09	1.009	CW1.10	2.6	0.752	0.132	0.0282	53.8
15 minute summer	RE2.00	2.000	SW2.01	1.4	0.612	0.049	0.0327	
15 minute summer	SW2.01	2.001	SW2.02	3.0	0.813	0.107	0.0668	
15 minute summer	SW2.02	2.002	SW2.03	5.4	1.226	0.192	0.0724	
15 minute summer	SW2.03	2.003	SW1.06	8.6	2.033	0.178	0.0803	

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.35%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1.00	10	91.542	0.042	4.8	0.0018	0.0000	OK
15 minute summer	SW1.01	10	91.192	0.077	12.1	0.0122	0.0000	OK
15 minute summer	SW1.02	12	90.948	0.193	23.1	0.0307	0.0000	SURCHARGED
15 minute summer	SW1.03	12	90.637	0.347	37.1	0.3924	0.0000	SURCHARGED
15 minute summer	SW1.04	12	90.554	0.574	54.2	0.6488	0.0000	SURCHARGED
15 minute summer	SW1.05	12	90.387	0.707	59.7	0.1124	0.0000	SURCHARGED
15 minute summer	SW1.06	12	90.143	1.318	109.3	1.4909	0.0000	SURCHARGED
30 minute summer	SW1.07	20	89.889	1.264	101.9	1.0948	0.0000	SURCHARGED
480 minute winter	SW1.08	456	89.852	1.402	18.5	150.3553	0.0000	SURCHARGED
480 minute winter	CW1.09	456	88.381	0.041	2.9	0.0461	0.0000	OK
15 minute summer	RE2.00	10	91.542	0.042	4.8	0.0018	0.0000	OK
15 minute summer	SW2.01	10	91.203	0.063	10.5	0.0100	0.0000	OK
15 minute summer	SW2.02	11	90.785	0.095	18.8	0.0150	0.0000	OK
15 minute summer	SW2.03	12	90.610	0.330	29.9	0.0525	0.0000	SURCHARGED
480 minute winter	CW1.10	456	88.279	0.039	2.9	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)
15 minute summer	RE1.00	1.000	SW1.01	4.8	0.735	0.169	0.1008	
15 minute summer	SW1.01	1.001	SW1.02	12.0	0.946	0.521	0.2736	
15 minute summer	SW1.02	1.002	SW1.03	22.3	1.412	0.970	0.4103	
15 minute summer	SW1.03	1.003	SW1.04	37.4	1.316	0.556	0.7417	
15 minute summer	SW1.04	1.004	SW1.05	47.1	1.762	0.701	0.7164	
15 minute summer	SW1.05	1.005	SW1.06	54.6	1.459	0.465	0.6724	
15 minute summer	SW1.06	1.006	SW1.07	107.6	2.706	0.673	0.0851	
30 minute summer	SW1.07	1.007	SW1.08	100.7	2.531	2.548	0.8551	
480 minute winter	SW1.08	Hydro-Brake®	CW1.09	2.9				
480 minute winter	CW1.09	1.009	CW1.10	2.9	0.777	0.148	0.0307	104.4
15 minute summer	RE2.00	2.000	SW2.01	4.8	0.868	0.169	0.0796	
15 minute summer	SW2.01	2.001	SW2.02	10.4	1.141	0.369	0.1662	
15 minute summer	SW2.02	2.002	SW2.03	18.8	1.553	0.667	0.2393	
15 minute summer	SW2.03	2.003	SW1.06	27.8	2.065	0.576	0.3344	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.35%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	RE1.00	20	91.763	0.263	7.6	0.0110	0.0000	FLOOD RISK
30 minute summer	SW1.01	20	91.753	0.638	15.4	0.1015	0.0000	FLOOD RISK
30 minute summer	SW1.02	20	91.688	0.933	27.4	0.1483	0.0000	FLOOD RISK
30 minute summer	SW1.03	20	91.382	1.092	40.0	1.2345	0.0000	FLOOD RISK
30 minute summer	SW1.04	20	91.285	1.305	61.2	1.4762	0.0000	FLOOD RISK
30 minute summer	SW1.05	20	91.078	1.398	63.5	0.2223	0.0000	SURCHARGED
480 minute winter	SW1.06	456	90.919	2.094	22.5	2.3688	0.0000	SURCHARGED
480 minute winter	SW1.07	456	90.917	2.292	22.1	1.9847	0.0000	SURCHARGED
480 minute winter	SW1.08	456	90.914	2.464	24.7	202.1254	0.0000	FLOOD RISK
480 minute winter	CW1.09	456	88.387	0.047	3.8	0.0530	0.0000	OK
15 minute summer	RE2.00	10	91.549	0.049	6.4	0.0020	0.0000	OK
30 minute summer	SW2.01	20	91.504	0.364	13.4	0.0578	0.0000	SURCHARGED
30 minute summer	SW2.02	20	91.447	0.757	23.8	0.1204	0.0000	SURCHARGED
30 minute summer	SW2.03	20	91.277	0.997	33.4	0.1585	0.0000	SURCHARGED
480 minute winter	CW1.10	456	88.285	0.045	3.8	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)
30 minute summer	RE1.00	1.000	SW1.01	6.0	0.764	0.213	0.2716	
30 minute summer	SW1.01	1.001	SW1.02	13.7	0.955	0.595	0.3777	
30 minute summer	SW1.02	1.002	SW1.03	23.0	1.392	1.000	0.4103	
30 minute summer	SW1.03	1.003	SW1.04	41.7	1.290	0.620	0.7417	
30 minute summer	SW1.04	1.004	SW1.05	49.0	1.747	0.728	0.7164	
30 minute summer	SW1.05	1.005	SW1.06	61.8	1.555	0.526	0.6724	
480 minute winter	SW1.06	1.006	SW1.07	22.1	1.149	0.138	0.0851	
480 minute winter	SW1.07	1.007	SW1.08	21.7	0.632	0.550	0.8551	
480 minute winter	SW1.08	Hydro-Brake®	CW1.09	3.8				
480 minute winter	CW1.09	1.009	CW1.10	3.8	0.834	0.192	0.0371	121.9
15 minute summer	RE2.00	2.000	SW2.01	6.4	0.929	0.226	0.1598	
30 minute summer	SW2.01	2.001	SW2.02	13.1	1.161	0.464	0.3151	
30 minute summer	SW2.02	2.002	SW2.03	20.7	1.572	0.731	0.2876	
30 minute summer	SW2.03	2.003	SW1.06	27.1	2.116	0.561	0.3344	

SDS Aqua-Swirl™

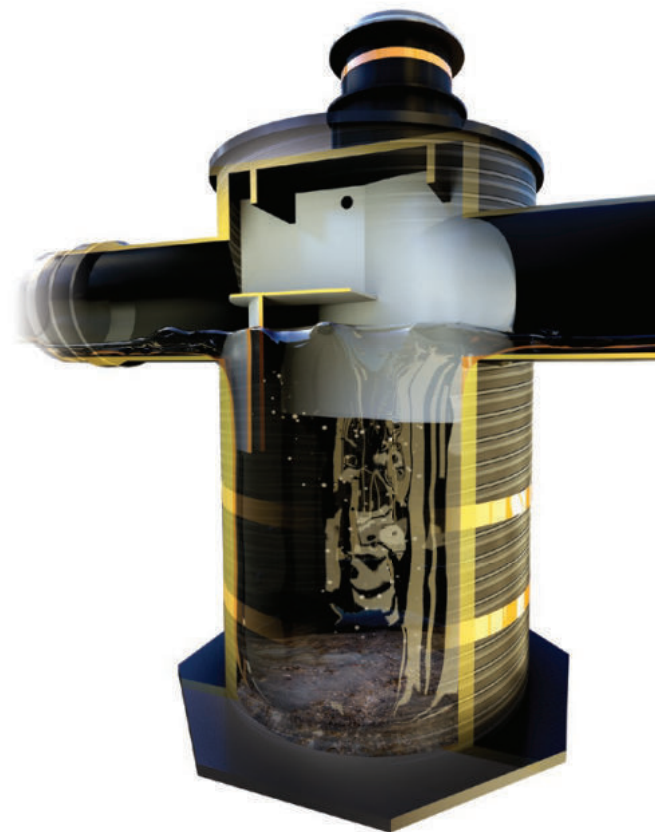
Hydrodynamic Vortex Separator

SDS Aqua-Swirl™ is a custom engineered, flow through water quality device that utilises hydrodynamic separation technology to maximise the removal of sediment, debris and free floating oil within surface water runoff.

SYMBiotic™

When connected to a SDS SYMBiotIC™ system, SDS Aqua-Swirl™ provides real time data on a broad range of key operating factors such as pollutant loads and silt capture level.

- *BBA HAPAS approved*
- *HDPE plastic construction*
- *No moving parts*
- *Sealed baffle*
- *Large debris storage chamber*
- *Lifting supports*
- *Compact dimensions*
- *Available in 9 different sizes*
- *Bespoke sizing available*



SDS Aqua-Swirl™ is sized according to water quality treatment flow rates which are based on the initial movement of pollutants into the storm drainage system. This flow rate typically represents approximately 90% to 95% of the total pollutants in the runoff volume.

The treatment flow rate of the SDS Aqua-Swirl™ system is engineered to meet or exceed the local water quality treatment criteria and form an intrinsic part of the SuDS solution train.

Features	Benefits
Available with performance monitoring via SDS SYMBiotIC™.	Provides bespoke suite of operating data, such as silt levels and pollutants, viewable via a secure web portal dashboard with live notifications via email and text.
BBA HAPAS certified.	Approved for installation under roads and pavements; adoptable by the Highways Agency.
Manufactured from HDPE high strength plastic Weholite.	Offers a durable, light weight and low cost alternative to concrete. Easy and quick to install resulting in substantial cost savings.
Specialised sealed baffle.	Delivers the most effective performance of any vortex separator.
Internal bypass with pollution retention.	Able to treat localised rain and larger storm events while retaining captured pollutants.
NJDEP verified performance.	Verification accepted by UK Government environmental regulators (as cited in the CIRIA C753 SuDS Manual).
Single swirl chamber.	Simplifies inspection and maintenance facilities with no special equipment required.
Compact dimensions.	Reduces ground excavation and product installation costs.
Small footprint design.	Can be retro-fitted with minimal disruption to existing infrastructure utilities or surface features, extending the ability to meet new regulations.
Certified installation lifting supports.	Easy installation without the need for large, expensive cranes.
Suitable for use during site construction programme.	Can be put into operation prior to completion of the site build, with the inclusion of a planned maintenance schedule.
Available in 9 different standard sizes and also bespoke.	Provides greater design flexibility and assists the removal of sediments at a greater rate than comparable systems.

SPECIFICATIONS

SDS Aqua-Swirl™ Model No.	Maximum ID pipe connection (mm) BYP ¹	Chamber Internal Diameter (mm)	Water Quality Treatment Flow Rate NJDEP (L/s) Fine	Water Quality Treatment Flow Rate (L/s) OK110 Coarse	Oil/debris storage capacity litres	Sediment storage capacity m ³	Aqua-Swirl™ Weight kg
AS-2	375	750	16	30	136	0.3	300
AS-3	500	1050	31	53	416	0.6	700
AS-4	600	1200	40	77	644	0.8	1000
AS-5	750	1500	63	120	1382	1.3	1100
AS-6	900	1800	91	173	1439	1.8	1400
AS-7	1050	2100	123	235	1987	2.5	1700
AS-8	1200	2400	161	307	2612	3.3	2200
AS-9	1350	2800	220	418	3596	4.4	2600
AS-10	1500	3000	252	480	4164	5.1	3100

¹BYP (Internal Bypass) provides full treatment of the first flush of water while the peak design storm is diverted and channelled through the main conveyance pipe.

Notes:

Details of pollution mitigation indices, head loss and CAD details, standard drawings and Installation Guides available upon request.

The sediment storage capacity has been calculated in accordance with the relevant test protocol and is not a physical maximum; any additional sediment capacity required is achieved with bespoke deeper units.

For assistance in design and specific sizing using historical rainfall data, please contact SDS.

A-S DS/0819

The pollution mitigation indices are as follows:

Device	Total suspended solids mitigation index	Total metals mitigation index	Soluble metals mitigation index ¹	Hydrocarbons ³
Aqua-swirl™ vortex grit separator	0.8 (0.5 on trunk roads and motorways where the suspended solids level is very high)	0.5 ⁴	The Aquaswirl™ is not designed to remove soluble pollutants	0.7 ³
Aqua-filter™ stormwater filtration unit	0.8	0.8	0.6	0.7 ³
Aqua-swirl™ and Aqua-filter™ in sequence	1.2 ²	0.9	0.6	1.0 ^{2,3}
Aqua-Xchange™	0.8 when installed as a layer in a filter drain	0.9	1.0	0.6 when installed as a layer in a filter drain

These indices can only be assumed when the treatment device is properly sized for the anticipated rate of runoff and the level of pollution in the runoff is not unusually high.

¹ When drainage schemes are designed for road developments in accordance with the Design Manual for Roads and Bridges, the mitigation index for soluble metals is required because particulate metals are considered separately in the total suspended solids assessment

² When designing in accordance with the SuDS Manual (Ciria C753), when two devices are used in sequence to target the same pollutant, half of the mitigation index of the second component should be allowed in the calculation.

³ The test procedures applied to manufactured treatment devices do not include measurement of hydrocarbon removal. Therefore, we have estimated that the Aqua-swirl™ removes free-phase hydrocarbons by flotation, and also removes hydrocarbons that are adhered to suspended solids. However, hydrocarbons are known to preferentially adhere to the smaller particles so the Aqua-filter™ will also remove a high proportion of those hydrocarbons as it is more effective at removing smaller suspended particles.

⁴ Where metals are present in the runoff in particulate form, particularly from vehicle emissions, the Aqua-swirl™ will effectively remove those particles in admixture with other suspended solids.

SDS GEOLight®

Stormwater Management System

Product Profile

SDS GEOLight® is an ultra lightweight honeycombed modular structure made from recycled PVC. The ready to install units are preformed to provide an underground stormwater storage facility, for the application of stormwater attenuation or infiltration.

The high void rate (>95%), high compressive strength (to 1000KN/m²) and low resistance to water flow makes

SDS GEOLight® an ideal material for cost efficient and maintainable underground water storage during storm conditions.

SDS GEOLight® Benefits

- High compressive strength – can be located under all roads, car parks and amenity area surfaces.
- Reduced excavation costs – the very high void rate (95%) minimises the required volume of earthworks.
- Speed of installation – 1000m³ reservoir, completed in one week.
- Light and easy to handle.
- Excellent hydraulic characteristics.
- The honeycomb structure is highly permeable, offering low resistance to water flow.
- SDS GEOLight®'s unique lateral and vertical filling arrangement requires a minimum amount of pipework and stone.
- Depth of tank invert reduced by using patented lateral supply.
- Simplified distribution pipe network, easy maintenance – dispensing with costly and complicated pipework configurations.
- Modular format offers design flexibility to overcome topographical constraints and architectural requirements.
- Greatly reduces the risk of flooding when used as stormwater storage.
- Can also be used for water recycling and combining with irrigation systems.
- Can virtually eliminate pollution when used in combination with specialist separation and filtration technology such as SDS Aqua-Swirl™ and SDS Aqua-Filter™.
- Design service available, including calculations.



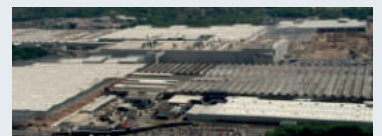
APPLICATIONS



RETAIL



INFRASTRUCTURE



INDUSTRIAL



RESIDENTIAL



COMMERCIAL



PUBLIC SECTOR



Material	Recycled Rigid PVC		
Colour	Dark grey to black		
Standard length of a block	2000 mm	2000 mm	2000 mm
Standard width of a block	500 mm	500 mm	500 mm
Standard height of a block*	750 mm	750 mm	750 mm

Void Ratio	> 95%	> 95%	> 95%
Compressive Strength	420 kN/m ²	610 kN/m ²	800 kN/m ²



SDS GEOLight® 400	SDS GEOLight® 600	SDS GEOLight® 800
APPLICATIONS		
Stormwater Management		
Attenuation / Infiltration		
Bacterial filter-bed for biological treatment		
Hydrocarbon Separation		
Filtration and Separation Units		
SPECIFICATIONS		
Recycled Rigid PVC		
Dark grey to black		
2000 mm	2000 mm	2000 mm
500 mm	500 mm	500 mm
750 mm	750 mm	750 mm
*Other block sizes available on request		
> 95%	> 95%	> 95%
420 kN/m ²	610 kN/m ²	800 kN/m ²
ADVANTAGES		
Highly cost effective		
Reduced excavation costs		
High void capacity		
Good UV resistance		
Good hydrocarbon resistance		

Technical Specification

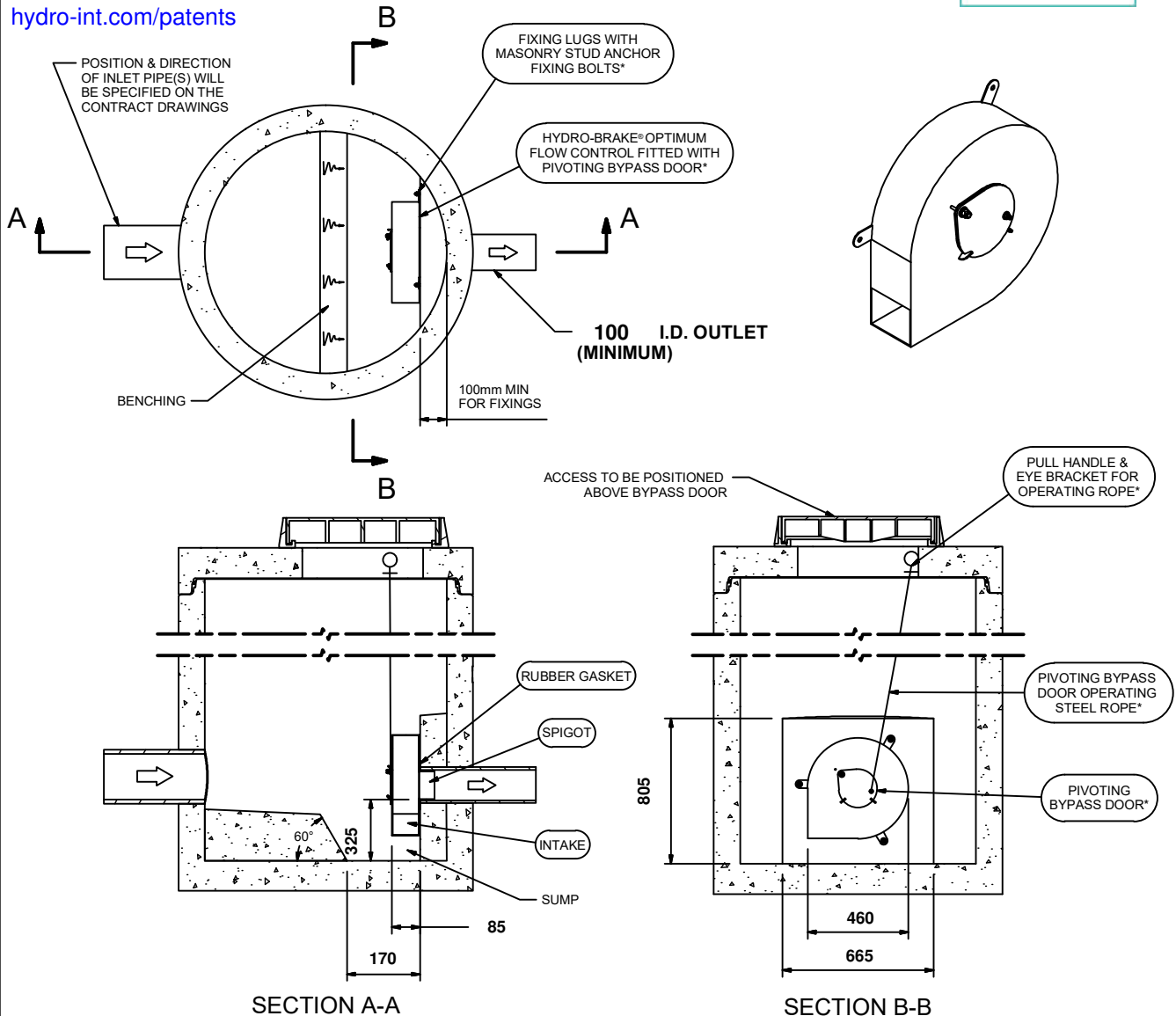
Control Point	Head (m)	Flow (l/s)
Primary Design	1.500	3.000
Flush-Flo™	0.329	2.578
Kick-Flo®	0.671	2.076
Mean Flow		2.415

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: 10 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-0075-3000-1500-3000 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.

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A CRH COMPANY

DATE	20/02/2024 12:26
SITE	Site 1
DESIGNER	George Dermentzoglou
REF	23389

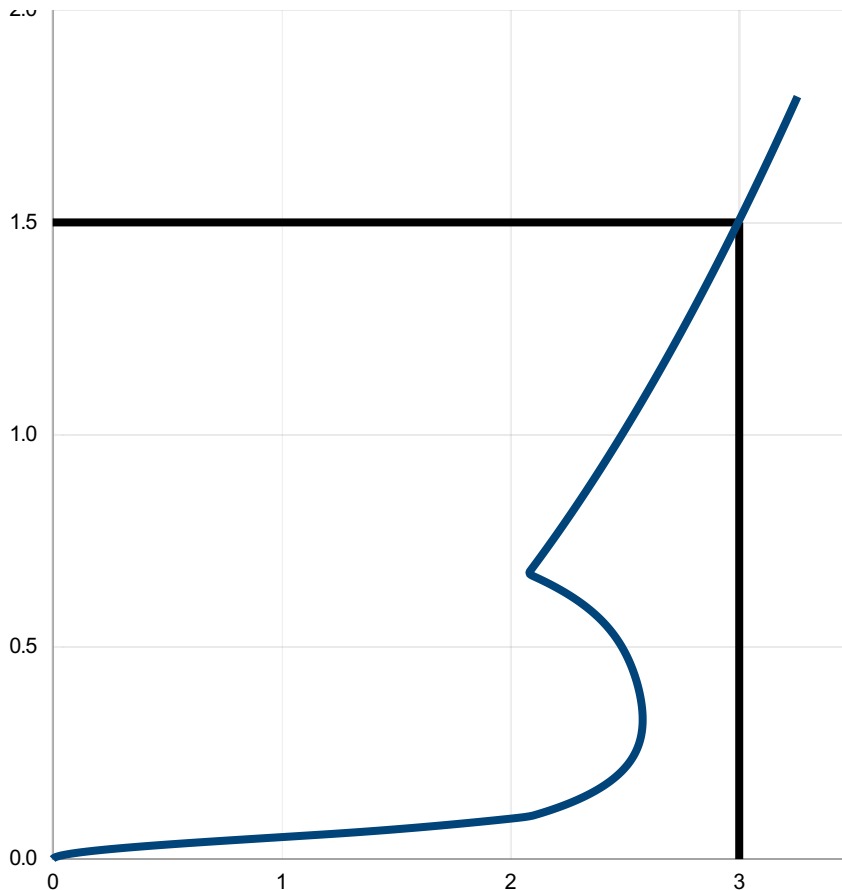
SHE-0075-3000-1500-3000
Hydro-Brake® Optimum

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.500	3.000
Flush-Flo™	0.329	2.578
Kick-Flo®	0.671	2.076
Mean Flow		2.415



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Head (m)	Flow (l/s)
0.000	0.000
0.052	0.997
0.103	2.104
0.155	2.352
0.207	2.486
0.259	2.553
0.310	2.577
0.362	2.574
0.414	2.554
0.466	2.520
0.517	2.467
0.569	2.386
0.621	2.261
0.672	2.084
0.724	2.148
0.776	2.216
0.828	2.282
0.879	2.346
0.931	2.408
0.983	2.468
1.034	2.526
1.086	2.583
1.138	2.639
1.190	2.693
1.241	2.746
1.293	2.798
1.345	2.849
1.397	2.898
1.448	2.947
1.500	2.995

DESIGN ADVICE



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