



Consulting Civil Engineers

SuDS Maintenance and Management Plan

283-285a Chichester Road, Bognor Regis

For

Mr Jason Weller

Rev - **A**

Reference **C1113**

Date **3rd August 2020**

Contents

1. Introduction.....	3
2. Sustainable Drainage Systems (SuDS)	3
3. SuDS at Chichester Road, Bognor Regis	4
4. Managing SuDS.....	4
5. SuDS Drainage Maintenance Specification	5
5.1. Attenuation Tank.....	5
6. General Drainage Maintenance Specification	6
6.1. Inlet Structures and Inspection Chambers	6
6.2. Below ground drainage pipes	7

1. Introduction

CGS Civils Ltd have been appointed to undertake a drainage design using sustainable techniques for a proposed development in Chichester Road, Bognor Regis.

The site will consist of the development of a new block of flats which is to be constructed in an existing courtyard. The new block of flats will consist of 6 no. 2 bedroom flats and 2 no. 1 bedroom flats. A new access road is to be constructed, which will replace the existing access road. Car parking areas and foot access is to be constructed also.

2. Sustainable Drainage Systems (SuDS)

The surface water management strategy has been developed using best practice Sustainable Drainage Systems (SuDS) techniques. Guidance on suitable techniques and methods has been obtained from the EA, and the SuDS manual (CIRIA C753).

The National Planning Policy Framework (NPPF) recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface runoff from development sites and recommends that priority is given to the use of Sustainable Drainage Systems (SuDS) in new development.

The overall philosophy of SuDS is to replicate, as closely as possible, the natural drainage process of a site prior to development to mitigate the adverse effect of storm water runoff on the environment. SuDS not only provide the ability to control surface water flows, but also improve water quality, amenity and bio-diversity within the development.

The Building Regulations Requirement H3 stipulates that rainwater from roofs and paved areas is carried away from the surface to discharge to one of the following, listed in order of priority:

- 1- Discharge into the ground
- 2- Discharge to a surface water body
- 3- Discharge to a surface water sewer

The client will employ a maintenance company to carry out the below tasks to the schedule that is specified. The eventual users/occupants of the buildings will then take on the responsibility of employing the company. This information will be made available at an appropriate time during the scheme but before occupation.

3. SuDS at Chichester Road, Bognor Regis

The British Geological Survey confirms that the bedrock of the site to be Lambeth Group and local boreholes confirm the site to be underlain by Clay and dense sand.

Intrusive ground investigation works on site confirm the presence of clays along with poor soakage test results and high ground water. Infiltration therefore will not work on site. It is therefore proposed to connect the runoff from the roof and external areas into the existing surface water sewer at a restricted rate of 2l/s which is the generally agreed practical minimum. The drainage system will make use of tanked porous paving which will provide a primary source of treatment as well as a singular geocellular attenuation tank which will provide adequate storage for the 1 in 100 year +40% storm.

Foul water will be discharged into the local foul sewer and this connection and the surface water sewer will require approval from Southern Water prior to construction.

4. Managing SuDS

The SuDS have been designed for easy maintenance and comprise:

- Regular day-to-day care – litter collection, regular gardening to control vegetation growth and checking inlets where water enters the SuDS feature
- Occasional tasks – checking the SUDS feature and removing any silt that builds up in the SuDS feature
- Remedial work – repairing damage where necessary

5. SuDS Drainage Maintenance Specification

5.1. Attenuation Tank

In order to maintain the functioning of the attenuation tanks, the following maintenance requirements should be adhered to:

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

6. General Drainage Maintenance Specification

6.1. Inlet Structures and Inspection Chambers

- Inlet structures such as rain water downpipes, road gullies and channel drains should be free from obstruction at all times to allow free flow through the SuDS.
- Inspection Chambers and rodding eyes are used on bends or where pipes come together. They allow access and cleaning to the system if necessary.

Inlet Structures and Inspection Chambers	
Regular Maintenance	Frequency
Inlet Structures Inspect rainwater downpipes, channel drains and road gullies, removing obstructions and silt as necessary. Check that there is no physical damage. Strim vegetation 1m min surround to structures and keep area free from silt and debris	Monthly
Inspections Chambers and below ground control chambers Remove cover and inspect, ensuring that the water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in Autumn	Annually
Occasional Maintenance Check topsoil levels are 20mm above edges of chambers to avoid mower damage.	As necessary
Remedial Work Repair physical damage if necessary	As required

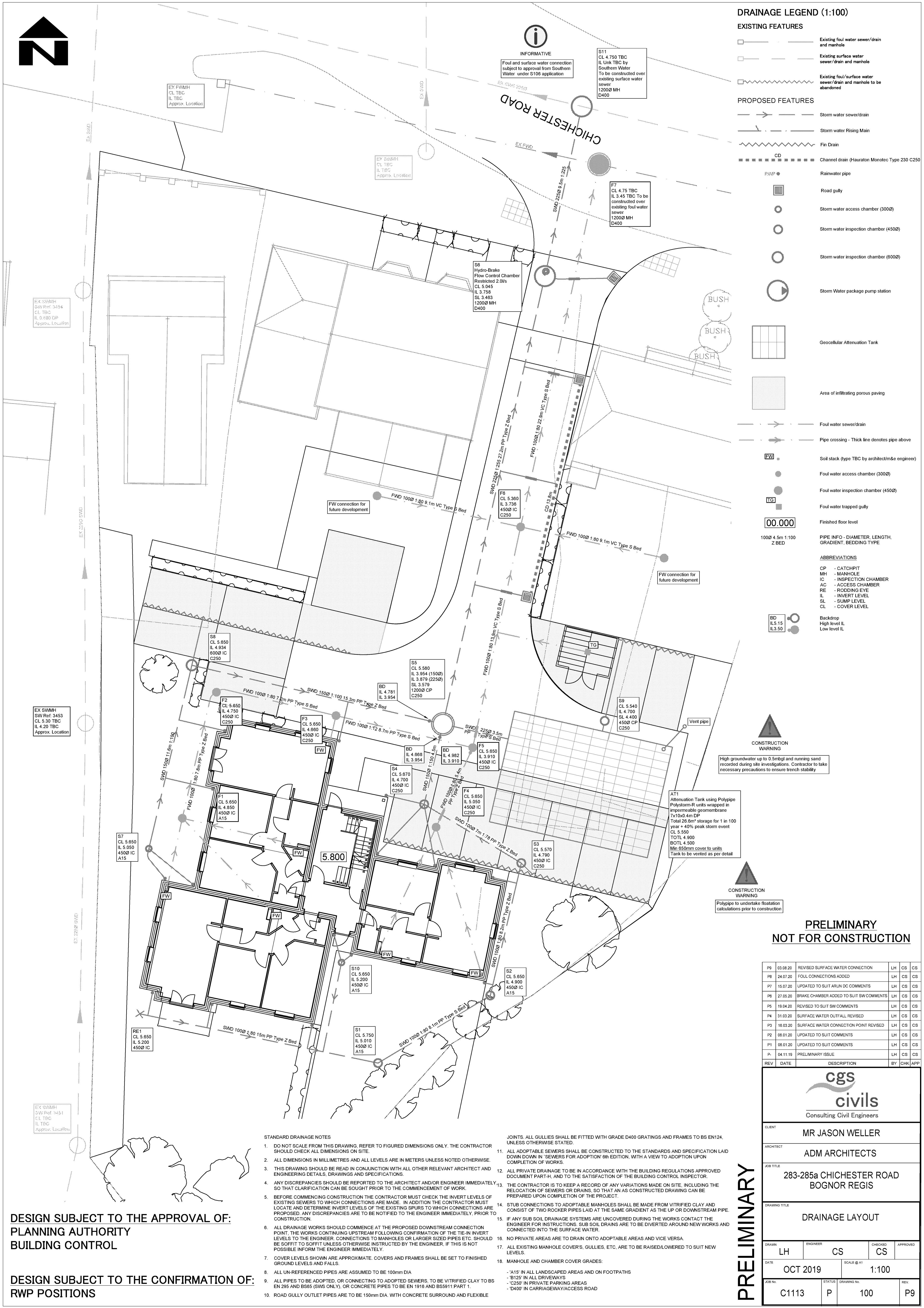
6.2. Below ground drainage pipes

- Below ground drainage pipes convey water to the SuDS system. They should always be free from obstruction to allow free flow.

Below Ground Drainage Pipes	
Regular Maintenance	Frequency
Inspect and identify any areas that are not operating correctly. If required take remedial action.	Monthly for 3 months then annually
Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
Remove sediment from pre-treatment inlet structures and inspection chambers.	Annually or as required
Maintain vegetation to designed limits within the vicinity of below ground drainage pipes and tanks to avoid	Monthly or as required
Remedial Work	
Repair physical damage if necessary	As required
Monitoring	
Inspect all inlets, outlets and vents to ensure that they are in good conditions and operating as designed.	Annually
Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required

Appendix A

Drainage Strategy

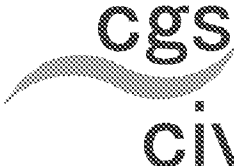


DESIGN SUBJECT TO THE CONFIRMATION OF:
RWP POSITIONS

1. DO NOT SCALE FROM THIS DRAWING. REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
2. ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
4. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
5. BEFORE COMMENCING CONSTRUCTION THE CONTRACTOR MUST CHECK THE INVERT LEVELS OF ALL EXISTING DRAINAGE WORK. ANY DISCREPANCIES ARE TO BE MADE. IN ADDITION THE CONTRACTOR MUST LOCATE AND DETERMINE INVERT LEVELS OF THE EXISTING SPURS TO WHICH CONNECTIONS ARE PROPOSED. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER IMMEDIATELY, PRIOR TO CONSTRUCTION.
6. ALL DRAINAGE WORKS SHOULD COMMENCE AT THE PROPOSED DOWNSTREAM CONNECTION POINT. THE WORKS CONTINUING UPSTREAM FOLLOWING CONFIRMATION OF THE TIE-IN INVERT LEVELS TO THE ENGINEER. CONNECTIONS TO MANHOLES OR LARGER SIZE PIPES ETC. SHOULD BE SOFFIT TO SOFFIT UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER. IF THIS IS NOT POSSIBLE, REPORT TO THE ENGINEER IMMEDIATELY.
7. COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
8. ALL UN-REFERENCED PIPES ARE ASSUMED TO BE 100mm DIA.
9. ALL PIPES TO BE ADOPTED, OR CONNECTING TO ADOPTED SEWERS, TO BE VITRIFIED CLAY TO BS EN 295 AND BS65 (SWS ONLY), OR CONCRETE PIPES TO BE EN 1916 AND BS5911 PART 1.
10. ROAD GULLY OUTLET PIPES ARE TO BE 150mm DIA. WITH CONCRETE SURROUND AND FLEXIBLE

- 'A15' IN ALL LANDSCAPED AREAS AND ON FOOTPATHS
- 'B125' IN ALL DRIVEWAYS
- 'C250' IN PRIVATE PARKING AREAS
- 'D400' IN CARRIAGEWAY/ACCESS ROAD

PRELIMINARY
NOT FOR CONSTRUCTION

 Consulting Civil Engineers				
CLIENT				
MR ARCHITECT WELER				
ARCHITECT				
ADM ARCHITECTS				
JOB TITLE				
283-285a CHICHESTER ROAD BOGNOR REGIS				
DRAWING TITLE				
DRAINAGE LAYOUT				
DRAWN		ENGINEER		CHECKED
LH		CS		CS
DATE		SCALE @ 1"		APPROVED
OCT 2019		1:100		
JOB NO.		STATUS		DRAWING No.
C1113		P		100
				Rev
				P9

PRELIMINARY

Appendix B

Surface Water Drainage Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	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)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.350	Preferred Cover Depth (m)	0.500
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)	Easting (m)	Northing (m)	Depth (m)
RE1	0.000	5.00	5.650	100	492370.967	100454.922	0.450
S1	0.006	5.00	5.750	450	492385.678	100451.881	0.740
S2	0.003	5.00	5.650	450	492392.612	100456.059	0.750
S3	0.003	5.00	5.570	450	492394.525	100464.229	0.780
S4	0.008	5.00	5.670	450	492388.525	100467.859	0.970
S5	0.030	5.00	5.850	600	492389.684	100472.808	1.971
S6	0.013	5.00	5.150	1200	492395.570	100498.624	1.392
S7	0.006	5.00	5.650	450	492371.526	100465.117	0.600
S8	0.006	5.00	5.650	600	492374.178	100476.441	0.716

Links (Input)

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	S1	15.022	0.600	5.200	5.010	0.190	79.1	100	5.29	50.0
1.001	S1	S2	8.095	0.600	5.010	4.900	0.110	73.6	100	5.44	50.0
1.002	S2	S3	8.391	0.600	4.900	4.790	0.110	76.3	100	5.60	50.0
1.003	S3	S4	7.013	0.600	4.790	4.700	0.090	77.9	100	5.73	50.0
1.004	S4	S5	5.083	0.600	4.700	3.954	0.746	6.8	150	5.75	50.0
2.000	S7	S8	11.630	0.600	5.050	4.934	0.116	100.3	150	5.19	50.0
2.001	S8	S5	15.926	0.600	4.934	3.954	0.980	16.3	150	5.30	50.0
2.002	S5	S6	25.478	0.600	3.879	3.758	0.121	218.8	225	6.26	50.0

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.350	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	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	0	0	0
100	40	0	0

Node S6 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	3.758	Product Number	CTL-SHE-0062-2000-1392-2000
Design Depth (m)	1.392	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node S5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	4.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

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	70.0	0.0	0.400	70.0	0.0	0.401	0.0	0.0

Node S5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	5.170	Slope (1:X)	60.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.310
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	9.200		

Node S4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	5.310	Slope (1:X)	60.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.250
Safety Factor	2.0	Width (m)	11.000	Inf Depth (m)	
Porosity	0.30	Length (m)	10.360		

Node S8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	5.230	Slope (1:X)	60.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.250
Safety Factor	2.0	Width (m)	7.000	Inf Depth (m)	
Porosity	0.30	Length (m)	6.000		

Appendix C

Hydro-Brake Maintenance Schedule

Hydro International Warranty, Maintenance and COSHH Statement

This statement covers all Hydro International Hydro-Brake Optimum®, Hydro-Brake® and S-Type Vortex Flow Control units (hereafter referred to as "Flow Control")

Defects Liability Period Warranty

The standard Hydro International warranty covers products for one year from date of purchase and will only be considered for those defects or faults reported directly to Hydro International in writing. Warranties will not be considered for defects or faults caused by accident, acts of vandalism or unauthorised repair/rectification. Please contact Hydro International for product specific details.

Maintenance

Normally, little maintenance is required as there are no moving parts within the Flow Control. Experience has shown that if blockages occur they do so at the intake, and the cause on such occasions has been due to a lack of attention to engineering detail such as approach velocities being too low, inadequate benching, or the use of units below the minimum recommended size. The Flow Control (where applicable) is fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur. The smaller type conical units, below the minimum recommended size, are also supplied with rodding facilities or vortex suppressor pipes as standard.

Following installation of the Flow Control it is vitally important that any extraneous material i.e. Building materials are removed from the unit and the chamber. After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. If problems are experienced please do not hesitate to contact the company so that an investigation may be made.

All Flow Controls are typically manufactured from grade 304 Stainless Steel which has an estimated life span in excess of the design life of drainage systems.

COSHH

Flow Controls are manufactured from Stainless Steel, which is not regarded as hazardous to health and exhibits no chemical hazard when used under normal circumstances for the stated applications.

Manual Handling

The handling of Flow Controls should be in accordance with current legislation and regulations:

- The Health and Safety at Work Act 1972.
- The Management of Health and Safety at Work Regulations 1999.
- The Manual Handling Operations Regulations 1992.

All published and printed by the Health and Safety Executive.