

Land East of Hook Lane, Westergate

West Sussex

OWNERS MANUAL

Relating to Surface Water Drainage Maintenance

BSO/E4462/16108

The site has been designed in accordance with Sustainable Drainage Systems (SUDS) techniques.

The SUDS Manual (CIRIA C697) states that “Sedimentation is one of the primary removal mechanisms in SUDS. Most pollution in runoff is attached to sediment particles and therefore removal of sediment results in a significant reduction in pollutant loads”.

In order to remove sedimentation the surface water drainage design utilises deep seal trapped gullies throughout, catchpit manholes upstream of the surface water storage/infiltration devices and distribution tanks within the permeable paved areas.

Detailed drawings are attached for the permeable paving, cellular infiltration blankets and distribution tanks

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1) Explanation of the Surface Water Drainage System

The Principle of SUDs has been adopted for the whole of the site, calculations have been carried out using MicroDrainage with a storm return period of 100 years and an allowance of 30% for climate change.

Generally roof water drains direct to the domestic drainage system within each curtilage and from there will be directed to the below ground surface water network

Hardstanding areas and access roads or drives, drain to trapped gullies. All of these systems outfall to the surface water drainage system within the site.

The parking bays within the site are proposed to be lined permeable paving systems to provide a level of pre-treatment of surface water prior to discharging to the below ground surface water network.

Plots 1-79

Attenuation of the surface water flows is proposed using below ground cellular storage tanks as well as a SuDS attenuation basin at the south eastern corner of the site.

The final discharge from the site will be passed via a petrol interceptor to provide the required level of treatment in accordance with the SuDS manual Ciria C753.

The run-off from the site will eventually discharge to the existing ordinary watercourse along the eastern boundary of the site via a surface water pumping station.

A 3m easement will be kept between the fences of plots 58-60, 66 and the edge of the existing ditch to allow a route for future maintenance. The fences along the edge of these plots will have removable panels to allow for major maintenance operations if required in the future.

Maintenance of the surface water pumping system and petrol interceptor will be in accordance with the manufacturer's recommendations.

2) Operating and Maintenance Responsibility

Barratt David Wilson Homes are responsible for maintaining the surface water drainage systems on this site during the construction period. A management company will be set up in the name The Furlongs Management Company Ltd which during the construction period will have BDW as the sole directors. Upon handover and occupation a Maintenance Company will be handed over to residents who will take over as Directors. The Management company will appoint a managing agent who will ensure that the SuDS to include the pumping station is operated and maintained as set out in this document. The maintenance and operation will be funded through contributions from the Residents to the maintenance company.

3) Maintenance Schedule for permeable paving

Maintenance Schedule	Required Action	Frequency
Regular maintenance	Brushing & vacuuming	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weed.	As required.
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required.
	Remedial work to any depression's, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required.
	Rehabilitation of surface and	As required (if infiltration

	upper sub-structure.	performance is reduced as a result of significant clogging).
Monitoring	Initial Inspection	Monthly for 3 months after installation.
	Inspect for evidence of poor operation and/or weed growth.	3-monthly, 48h after large storms.
	If required take remedial action.	
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor inspection chambers.	Annually.

4) Maintenance Schedule for catchpits, control chambers, flow control devices and gullies

Flow Control Maintenance

Normally, little maintenance is required as there are no moving parts within the Flow Control. The Flow Control is fitted with pivoting by-pass door, which allows the manhole to be drained down should blockage occur. It is recommended that the unit be inspected at six monthly intervals with hose down if required. 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.

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Remove sediment and oil deposits from all trapped gullies.	Annually, or as required.
	Remove sediment structures upstream of the cellular storage tanks.	Annually, or as required.

Remedial actions	Repair/rehabilitation of inlets, outlets, 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 and after large storms

5) Maintenance Schedule Cellular storage

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Inspect catchpits and clear silt / debris as necessary	Monthly for 3 months, then six monthly.
Remedial actions	Repair/rehabilitation of inlets, outlets, 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 and after large storms

6) Maintenance Schedule for Detention basins

Maintenance Schedule	Required Action	Recommended Frequency
	Litter and debris removal.	Monthly

Regular maintenance	Grass cutting – for spillways and access routes.	Monthly (during growing season), or as required.
	Grass cutting – meadow grass in and around basin.	Half yearly (spring before nesting season, and autumn).
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
	Tidy all dead growth before start of growing season.	Annually.
	Remove sediment from inlets, outlet and forebay.	Annually (or as required).
Occasional maintenance	Re-seed areas of poor vegetation growth.	Annually (or as required).
	Prune and trim trees and remove cuttings.	2 years (or as required).
Remedial actions	Repair of erosion or other damage by re-turfing or reseedling.	As required
	Re-level uneven surfaces and reinstate design levels.	As required.
	Repair/rehabilitation of inlets, outlets and overflows.	As required.
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly/ after large storms.
	Inspect banksides, structures, pipework etc. for evidence of physical damage.	Monthly/ after large storms.
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.
	Check flow control device and other mechanical devices.	Half yearly.

7) Maintenance Schedule for Filter trenches and porous pipework

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Litter and debris removal from trench surface, access chambers and pre-treatment devices.	Monthly (or as required).
	Removal and washing of exposed stones on the trench surface.	Annual (bi-annual the first year) or when silt is evident on the surface.
	Trimming of any roots that may be causing blockages.	Annual (semi-annual the first year).
	Remove weeds on the trench surface.	Monthly (at start, then as required).
Occasional maintenance	Removal of sediment from pre-treatment devices.	Six monthly
	Remove tree roots or trees that grow close to the trench.	As required.
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace filter media.	Five yearly.
Remedial actions	Clear perforated pipework of blockages.	As required.
	Rehabilitate infiltration or filtration surfaces.	As required.
	Replace geotextiles and clean and replace filter media, if clogging occurs.	As required.
	Inspect inlets, outlets and inspection points for blockages, clogging, standing water and structural damage.	As required.
Monitoring	Inspect pre-treatment systems, inlets, trench surfaces and perforated pipework for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.

8) Maintenance Schedule Ditches and Swales

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Litter and debris removal.	Monthly (or as required).
	Grass cutting – to retain grass height within specified design range. Close cut around outlet & structure. 100 – 150mm generally.	Monthly (during growing season), or as required.
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
Occasional maintenance	Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where possible.	Annually
	Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, if required.	Annually, or if bare soil is exposed over 10% or more of the swale treatment area.
Remedial actions	Repair erosion or other damage by re-turfing or reseeded.	As required
	Re-level uneven surfaces and reinstate design levels.	As required.
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	As required.
	Remove and dispose of oils or petrol residues using safe standard practices.	As required.
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation. Record areas where water is ponding for >48 hours.	Monthly, or when required.
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.

10)Maintenance Schedule Grilles

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Litter and debris removal.	Monthly (or as required).
Occasional maintenance	Check moving parts and locks. Oil and ensure free moving. Replace when necessary.	As required.
Remedial actions	Remove build-up of sediment.	As required.
Monitoring	Inspect for blockages, and clear if required.	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.

11)Maintenance Schedule for solid wall pipes

Maintenance Schedule	Required Action	Recommended Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Inspect chambers and manholes for evidence of pipes operating correctly and take remedial action if necessary, to include jetting of pipework.	Monthly for 3 months, then annually

12)Reasons for Maintenance

Surface water contains variable amounts of sediment which settles out at certain locations and could cause blockages if left.

Road gullies also trap oil and prevent it entering the surface water sewer system.

BSO/E4462/16108

APPENDIX (1)

DRAINAGE LAYOUTS

DWG Nos.BSO/E4462/450,451,452&453

BSO/E4462/16108

The Crofton

Oak Bank

Cherry

The Hame

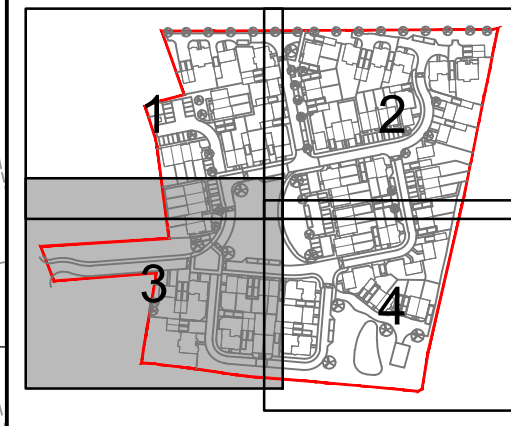
Refer to Section 278
Drawings for details of
works within Hook Lane.

NEW 1.8m HIGH CLOSE BOARD
FENCING WITH 300mm HIGH
CONCRETE GRAVEL BOARD
TO PREVENT OVERLAND
FLOW INTO THE REAR
GARDEN OF CHERRY TREES.
FILTER/LAND DRAIN TO BE
CONSTRUCTED IN FRONT OF
CGB AND CONNECTED TO THE
SURFACE WATER HOUSE
DRAINAGE.

DOMESTIC FOUL WATER MANHOLE SCHEDULE			
M/H No.	COVER LEVEL	INVERT LEVEL	M/H TYPE
F14.1	10.53	9.23	4
F14.2	10.72	8.78	3
F14.3	10.60	9.63	5
F14.4	10.62	9.85	6
F27.4	10.38	9.56	5
F28.1	10.05	8.75	4
F28.2	10.20	9.40	4

DOMESTIC SURFACE WATER MANHOLE SCHEDULE			
M/H No.	COVER LEVEL	INVERT LEVEL	M/H TYPE
S14.1	10.66	9.56	5
S18.2	10.42	9.26	3
S18.3	10.22	9.37	3
S18.4	10.32	9.62	5
S19.1	10.70	9.30	3
S19.2	10.69	9.39	4
S19.3	10.67	9.52	3
S19.4	10.64	9.58	3
S19.5	10.71	9.65	3
S19.6	10.85	9.75	4
S19.7	10.85	9.83	4
S19.8	10.70	9.86	4
S19.9	10.65	9.45	4
S31.1	10.10	9.17	5
S31.2	10.15	9.25	3
S33.1	10.09	9.05	4
S33.2	10.07	9.13	3
S33.3	10.20	9.31	3
S33.4	10.32	9.35	6
S33.5	10.20	9.43	6
S33.6	10.00	9.18	6
S33.7	10.15	9.34	5

1:200 KEYPLAN



All works within tree root protection areas
must be in accordance with the
arboricultural method statement and
subject to approval by the arboriculturalist.

CONSTRUCTION ISSUE
SUBJECT TO ADOPTING AUTHORITY APPROVAL

NOTES

1. F/W & SW house drainage is to be constructed in accordance with the Building Regulations & BS8301 & the WRC Guide Sewers for Adoption 6th Edition & Interim Addendum.
 2. Drains are to be constructed using factory jointed vitrified clay pipes to BS EN 205-191 "Super Strength" specification (i.e. 1000mm Superstrength or similar) or uPVC drainage pipework to BS4644 & BS4644, bedded & backfilled in accordance with manufacturers instructions.
 3. Location of sewers & lateral drains to be in accordance with the WRC Guide Sewers for Adoption 6th Edition & Interim Addendum and specific requirements of Southern Water.
 4. Backfilling of drain trenches adjacent to dwelling or other structure to be in accordance with BS8301 Fig. 9.
 5. Access fittings & inspection chambers as table below:
- | TYPE | DEPTH RANGE | DESCRIPTION |
|------|--------------|--|
| 1 | 0.6m to 1.0m | Access chamber (PVC) in areas subject to vehicle loading |
| 2 | 0.6m to 2.0m | Access chamber (PVC) in areas subject to vehicle loading |
| 3 | 0.6m to 1.0m | Access chamber (PVC) in areas subject to vehicle loading |
| 4 | 0.6m to 1.0m | Access chamber (PVC) in areas subject to vehicle loading |
| 5 | 0.6m to 1.0m | Access chamber (PVC) in areas subject to vehicle loading |
| 6 | 0.6m to 2.0m | 180 or 270 degree access chamber (PVC) in areas subject to vehicle loading |
| 7 | 0.6m to 2.0m | 180 or 270 degree access chamber (PVC) in areas subject to vehicle loading |
| 8 | 0.6m to 2.0m | 180 or 270 degree access chamber (PVC) in areas subject to vehicle loading |
| 9 | 0.6m to 2.0m | 180 or 270 degree access chamber (PVC) in areas subject to vehicle loading |
| 10 | 0.6m to 2.0m | 180 or 270 degree access chamber (PVC) in areas subject to vehicle loading |
6. As an alternative to the construction of domestic drainage chambers deeper than 1.0m, the "Dema Non-entry Inspection Chamber", 500mm dia, polypropylene chamber to a maximum depth of 3.0m may be used subject to the approval of the local building inspector or the MRC Inspector.
 7. Cover levels indicated on the Drainage Schedules are nominal & may be adjusted to suit finished ground levels as necessary. Generally inspection chamber covers should be Grade D400 in trafficked areas Grade B125 in parking areas and occasional traffic and B15 in pedestrian only areas.
 8. Rainwater downpipes to be connected direct to drain using an appropriate adaptor & removable section of downpipe to permit rodding access.
 9. The positions of SVPs, sub stacks, WC outlets, Back inlet gullies etc. & rainwater downpipes are to be accurately located from the house type working drawings.
 10. Generally FW drains are to be laid to falls of 1 in 40. SW drains are to be laid to falls of 1 in 60, both in 100mm diameter pipes. SW pipes are to be 150mm diameter when serving 2 dwellings or more. FW pipes are to be 150mm diameter when serving 10 dwellings or more unless stated otherwise, or where a schedule is provided.
 11. Gullies situated in areas accessible to wheeled vehicles to be of suitable construction for trafficked areas.
 12. Where land drain is identified on the Architect's details, connect into nearest SW gully.
 13. This drawing should be read in conjunction with the Architect's and Structural Engineer's design drawings and specification.
 14. Site report based on Cartlon Design Partnership Site Layout, drawing number 1000421, dated November 2016.
 15. Topographic Survey as per Site Line Survey, drawing number 30WZ001 A, dated February 2016.
 16. Architectural Blocks based on Cartlon Design Partnership Sub-Floor Plans, drawing numbers 1000421/1 to 11, dated November 2016.
 17. This drawing should be read in conjunction with Foul Water Sewer Longitudinal Sections (BSO/E4462/21 & 212), Surface Water Longitudinal Sections (BSO/E4462/22 & 222), S104 Adoption Layout (BSO/E4462/401), FW & SW Manhole Schedules & S104 Construction Details (BSO/E4462/411 to 414), other Domestic Drainage Layouts, Domestic Drainage Construction Details (BSO/E4462/461 & 462), Surface Water Attenuation Details (BSO/E4462/463, 464, 470 & 471) and Control Chamber Construction Details (BSO/E4462/465 & 466).
 18. Where buildings are less than 1.0m for domestic drainage, backing to be accommodated with internal benching.
 19. ANY VARIANCE OR DISCREPANCY MUST BE REPORTED BACK TO RCP ENGINEERING BEFORE WORK BEGINS.

KEY

- Site Boundary
(Based on Cartlon Design Partnership Site Layout, drawing number 1000421, Revision V dated March 2017)
- Finished Floor Level & Garage Finished Floor Level
- 10.000
- Hydrobrake
- Private Surface Water Rising Main
- Adaptable Foul Water Rising Main
- Private Surface Water Domestic Drainage
- Private Foul Water Domestic Drainage
- House connection via 300mm dia. shallow access chamber not more than 600mm deep
- Rodding Eye
- Road Gully and Connection
- Kerb Outlet Gully and Connection to swale drainage
- Yard Gully and Connection
- 'Asp' Channel or similar
- Threshold drain
- Permeable Paving
- Fin Drain
- Cellular Storage
- Root Protection Areas
(Refer to ACD Tree Reference Plan Drawing Number BOWS20440-03 received in .dwg format 22/11/2016 for details)
- Tree Protection Fencing
(Refer to ACD Tree Reference Plan Drawing Number BOWS20440-03 received in .dwg format 22/11/2016 for details)
- Extent of 'No Dig' Road & Footway Construction.
Subject to Approval from Arboriculturalist.
- Extent of 20-40mm No Fines Stone to BS EN 12342 F1 Material over 'No Dig' Areas.
Subject to Approval from Arboriculturalist.
- Knee Rail - Subject to External Works
Indicative low level landscaping. Subject to Landscaping Information

CDM NOTES			
1.	EXISTING SERVICES	Depth of existing services must be determined prior to works commencing. The contractor is responsible for establishing underground services in accordance with ISE Guidance note HS (G) 47. Any services which would be within the proposed construction layers must be lowered to below the sub-base.	

SCALE BAR 1:200 at A1			
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C2	15.06.17	Fence/CGB & land drain to side of Plot 79 as requested by SWS	SLW SRV TS
C1	27.07.17	Threshold drains to plots 75 & 76 added.	VI SLW TS
Key annotation amended. Issued for Construction.			
G	12.07.17	Finished levels around pumping station, ponds, ditches & attenuation tanks updated. Catchpits renumbered.	SLW IDC TS
F	02.06.17	Knee rail & indicative landscaping around Pond 2 added	SLW KJ TS
E	09.05.17	300mm Ø culvert and headwalls under access road, and weir kerbs at site entrance removed.	VI SLW TS
D	08.03.17	Personnel Doors removed from garages as per CDP's dwgs.	KJ SLW TS
C	07.03.17	Sheds & Bin locations updated to accord with External Works Layouts. Parking areas revised. Issued for Tender	SLW IDC TS
Rev.	Date	Details	By Chkd/Appd

Client:-

DAVID WILSON HOMES
WHERE QUALITY LIVES

Site:-
Hook Lane
Westergate
West Sussex

Drawing Title:-
DOMESTIC
DRAINAGE
LAYOUT

SHEET 3 OF 4

Date: January 2017
Drawn: AC
Checked: TRS
Approved: TRS

Scales: 1:200 at A1

BSO/E4462/453 C2

FOR CONSTRUCTION

Rogers Cory Partnership
Civil, Structural and Architectural Consultants

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Path (um)

CONSTRUCTION ISSUE
SUBJECT TO ADOPTING AUTHORITY APPROVAL

See BSO/E4462/471 for
details of swale 2 drainage

See BSO/E4462/471 for
details of swale 3 drainage

1:200 KEYPLAN

NOTES

1. F/W & SW foul drainage is to be constructed in accordance with the Building Regulations & BS8301 & the WRC Guide Sewers for Adoption 6th Edition & Interim Addendum.
 2. Drains are to be constructed using factory jointed vitrified clay pipes to BS EN 252-1991 "Super Strength" specification (e.g. Newporth Superflow or similar) or UPVC drainage pipework to BS4640 & BS4641, bedded & backfilled in accordance with manufacturers instructions.
 3. Location of sewers & lateral drains to be in accordance with the WRC Guide Sewers for Adoption 6th Edition & Interim Addendum and specific requirements of Southern Water.
 4. Backfilling of drain trenches adjacent to dwelling or other structure to be in accordance with BS8301 Fig. 9.
 5. Access fittings & inspection chambers as table below:
- | TYPE | DEPTH RANGE | DESCRIPTION |
|------|----------------|-------------------------------------|
| 1 | 0.6m to 0.9m | Access chamber for 150mm dia. pipes |
| 2 | 0.9m to 1.2m | Access chamber for 150mm dia. pipes |
| 3 | 1.2m to 1.5m | Access chamber for 150mm dia. pipes |
| 4 | 1.5m to 1.8m | Access chamber for 150mm dia. pipes |
| 5 | 1.8m to 2.1m | Access chamber for 150mm dia. pipes |
| 6 | 2.1m to 2.4m | Access chamber for 150mm dia. pipes |
| 7 | 2.4m to 2.7m | Access chamber for 150mm dia. pipes |
| 8 | 2.7m to 3.0m | Access chamber for 150mm dia. pipes |
| 9 | 3.0m to 3.3m | Access chamber for 150mm dia. pipes |
| 10 | 3.3m to 3.6m | Access chamber for 150mm dia. pipes |
| 11 | 3.6m to 3.9m | Access chamber for 150mm dia. pipes |
| 12 | 3.9m to 4.2m | Access chamber for 150mm dia. pipes |
| 13 | 4.2m to 4.5m | Access chamber for 150mm dia. pipes |
| 14 | 4.5m to 4.8m | Access chamber for 150mm dia. pipes |
| 15 | 4.8m to 5.1m | Access chamber for 150mm dia. pipes |
| 16 | 5.1m to 5.4m | Access chamber for 150mm dia. pipes |
| 17 | 5.4m to 5.7m | Access chamber for 150mm dia. pipes |
| 18 | 5.7m to 6.0m | Access chamber for 150mm dia. pipes |
| 19 | 6.0m to 6.3m | Access chamber for 150mm dia. pipes |
| 20 | 6.3m to 6.6m | Access chamber for 150mm dia. pipes |
| 21 | 6.6m to 6.9m | Access chamber for 150mm dia. pipes |
| 22 | 6.9m to 7.2m | Access chamber for 150mm dia. pipes |
| 23 | 7.2m to 7.5m | Access chamber for 150mm dia. pipes |
| 24 | 7.5m to 7.8m | Access chamber for 150mm dia. pipes |
| 25 | 7.8m to 8.1m | Access chamber for 150mm dia. pipes |
| 26 | 8.1m to 8.4m | Access chamber for 150mm dia. pipes |
| 27 | 8.4m to 8.7m | Access chamber for 150mm dia. pipes |
| 28 | 8.7m to 9.0m | Access chamber for 150mm dia. pipes |
| 29 | 9.0m to 9.3m | Access chamber for 150mm dia. pipes |
| 30 | 9.3m to 9.6m | Access chamber for 150mm dia. pipes |
| 31 | 9.6m to 9.9m | Access chamber for 150mm dia. pipes |
| 32 | 9.9m to 10.2m | Access chamber for 150mm dia. pipes |
| 33 | 10.2m to 10.5m | Access chamber for 150mm dia. pipes |
| 34 | 10.5m to 10.8m | Access chamber for 150mm dia. pipes |
| 35 | 10.8m to 11.1m | Access chamber for 150mm dia. pipes |
| 36 | 11.1m to 11.4m | Access chamber for 150mm dia. pipes |
| 37 | 11.4m to 11.7m | Access chamber for 150mm dia. pipes |
| 38 | 11.7m to 12.0m | Access chamber for 150mm dia. pipes |
| 39 | 12.0m to 12.3m | Access chamber for 150mm dia. pipes |
| 40 | 12.3m to 12.6m | Access chamber for 150mm dia. pipes |
| 41 | 12.6m to 12.9m | Access chamber for 150mm dia. pipes |
| 42 | 12.9m to 13.2m | Access chamber for 150mm dia. pipes |
| 43 | 13.2m to 13.5m | Access chamber for 150mm dia. pipes |
| 44 | 13.5m to 13.8m | Access chamber for 150mm dia. pipes |
| 45 | 13.8m to 14.1m | Access chamber for 150mm dia. pipes |
| 46 | 14.1m to 14.4m | Access chamber for 150mm dia. pipes |
| 47 | 14.4m to 14.7m | Access chamber for 150mm dia. pipes |
| 48 | 14.7m to 15.0m | Access chamber for 150mm dia. pipes |
| 49 | 15.0m to 15.3m | Access chamber for 150mm dia. pipes |
| 50 | 15.3m to 15.6m | Access chamber for 150mm dia. pipes |
| 51 | 15.6m to 15.9m | Access chamber for 150mm dia. pipes |
| 52 | 15.9m to 16.2m | Access chamber for 150mm dia. pipes |
| 53 | 16.2m to 16.5m | Access chamber for 150mm dia. pipes |
| 54 | 16.5m to 16.8m | Access chamber for 150mm dia. pipes |
| 55 | 16.8m to 17.1m | Access chamber for 150mm dia. pipes |
| 56 | 17.1m to 17.4m | Access chamber for 150mm dia. pipes |
| 57 | 17.4m to 17.7m | Access chamber for 150mm dia. pipes |
| 58 | 17.7m to 18.0m | Access chamber for 150mm dia. pipes |
| 59 | 18.0m to 18.3m | Access chamber for 150mm dia. pipes |
| 60 | 18.3m to 18.6m | Access chamber for 150mm dia. pipes |
| 61 | 18.6m to 18.9m | Access chamber for 150mm dia. pipes |
| 62 | 18.9m to 19.2m | Access chamber for 150mm dia. pipes |
| 63 | 19.2m to 19.5m | Access chamber for 150mm dia. pipes |
| 64 | 19.5m to 19.8m | Access chamber for 150mm dia. pipes |
| 65 | 19.8m to 20.1m | Access chamber for 150mm dia. pipes |
| 66 | 20.1m to 20.4m | Access chamber for 150mm dia. pipes |
| 67 | 20.4m to 20.7m | Access chamber for 150mm dia. pipes |
| 68 | 20.7m to 21.0m | Access chamber for 150mm dia. pipes |
| 69 | 21.0m to 21.3m | Access chamber for 150mm dia. pipes |
| 70 | 21.3m to 21.6m | Access chamber for 150mm dia. pipes |
| 71 | 21.6m to 21.9m | Access chamber for 150mm dia. pipes |
| 72 | 21.9m to 22.2m | Access chamber for 150mm dia. pipes |
| 73 | 22.2m to 22.5m | Access chamber for 150mm dia. pipes |
| 74 | 22.5m to 22.8m | Access chamber for 150mm dia. pipes |
| 75 | 22.8m to 23.1m | Access chamber for 150mm dia. pipes |
| 76 | 23.1m to 23.4m | Access chamber for 150mm dia. pipes |
| 77 | 23.4m to 23.7m | Access chamber for 150mm dia. pipes |
| 78 | 23.7m to 24.0m | Access chamber for 150mm dia. pipes |
| 79 | 24.0m to 24.3m | Access chamber for 150mm dia. pipes |
| 80 | 24.3m to 24.6m | Access chamber for 150mm dia. pipes |
| 81 | 24.6m to 24.9m | Access chamber for 150mm dia. pipes |
| 82 | 24.9m to 25.2m | Access chamber for 150mm dia. pipes |
| 83 | 25.2m to 25.5m | Access chamber for 150mm dia. pipes |
| 84 | 25.5m to 25.8m | Access chamber for 150mm dia. pipes |
| 85 | 25.8m to 26.1m | Access chamber for 150mm dia. pipes |
| 86 | 26.1m to 26.4m | Access chamber for 150mm dia. pipes |
| 87 | 26.4m to 26.7m | Access chamber for 150mm dia. pipes |
| 88 | 26.7m to 27.0m | Access chamber for 150mm dia. pipes |
| 89 | 27.0m to 27.3m | Access chamber for 150mm dia. pipes |
| 90 | 27.3m to 27.6m | Access chamber for 150mm dia. pipes |
| 91 | 27.6m to 27.9m | Access chamber for 150mm dia. pipes |
| 92 | 27.9m to 28.2m | Access chamber for 150mm dia. pipes |
| 93 | 28.2m to 28.5m | Access chamber for 150mm dia. pipes |
| 94 | 28.5m to 28.8m | Access chamber for 150mm dia. pipes |
| 95 | 28.8m to 29.1m | Access chamber for 150mm dia. pipes |
| 96 | 29.1m to 29.4m | Access chamber for 150mm dia. pipes |
| 97 | 29.4m to 29.7m | Access chamber for 150mm dia. pipes |
| 98 | 29.7m to 30.0m | Access chamber for 150mm dia. pipes |
| 99 | 30.0m to 30.3m | Access chamber for 150mm dia. pipes |
| 100 | 30.3m to 30.6m | Access chamber for 150mm dia. pipes |
6. As an alternative to the construction of domestic drainage chambers deeper than 1.0m, the "Dema Non-entry Inspection Chamber", 500mm dia, polypropylene chamber to a maximum depth of 3.0m may be used subject to the approval of the local Building Inspector or the MRC Inspector.
 7. Cover levels indicated on the Drainage Schedules are nominal & may be adjusted to suit finished ground levels as necessary.
 8. Generally inspection chamber covers should be Grade D400 in trafficked areas Grade B125 in parking areas and occasional traffic and A15 in pedestrian only areas.
 9. Rainwater downpipes to be connected direct to drain using an appropriate adaptor & removable section of downpipe to permit rodding access.
 10. The positions of SWPs, sub stacks, WC outlets, Back inlet gullies etc. & rainwater downpipes are to be accurately located from the house type wiring drawings.
 11. Generally FW drains are to be laid to falls of 1 in 40. SW drains are to be laid to falls of 1 in 60, both in 100mm diameter pipes. SW pipes are to be 150mm diameter when serving 2 dwellings or more. FW pipes are to be 150mm diameter when serving 10 dwellings or more unless stated otherwise, or where a schedule is provided.
 12. Gullies situated in areas accessible to wheeled vehicles to be of suitable construction for trafficked areas.
 13. Where land drain is identified on the Architect's details, connect into nearest SW system.
 14. This drawing should be read in conjunction with the Architect's and Structural Engineer's design drawings and specification.
 15. Site layout based on Crown Design Partnership Site Layout, drawing number 100042156, dated November 2016.
 16. Topographic Survey as per Site Line Survey, drawing number 3002001 A, dated February 2016.
 17. Architectural Blocks based on Crown Design Partnership Site Layout, drawing number 100042156 to 11, dated November 2016.
 18. This drawing should be read in conjunction with Foul Water Sewer Longitudinal Sections (BSO/E4462/471 & 210), Surface Water Longitudinal Sections (BSO/E4462/471 & 210), S104 Adoption Layout (BSO/E4462/471), FW & SW Manhole Schedules & S104 Construction Details (BSO/E4462/471 to 414), other Domestic Drainage Layouts, Domestic Drainage Construction Details (BSO/E4462/471 & 462), Surface Water Attenuation Details (BSO/E4462/471, 464, 470 & 471) and Control Chamber Construction Details (BSO/E4462/471 & 465).
 19. Where buildings are less than 1.0m for domestic drainage, backdrops to be accommodated with internal benching.
 20. ANY VARIANCE OR DISCREPANCY MUST BE REPORTED BACK TO RCP ENGINEERING BEFORE WORK BEGINS.

KEY

- Site Boundary
(Based on Crown Design Partnership Site Layout, drawing number 100042156, Revision V dated March 2017)
- Finished Floor Level & Garage Finished Floor Level
- 10.000
- Hydrobrake S1
- Private Surface Water Sewers
- Private Surface Water Rising Main
- Adoptable Foul Water Sewers
- Adoptable Foul Water Rising Main
- Private Surface Water Domestic Drainage
- Private Foul Water Domestic Drainage
- House connection via 300mm dia. shallow access chamber not more than 600mm deep
- Rodding Eye
- Road Gully and Connection
- Kerb Outlet Gully and Connection to swale drainage
- Yard Gully and Connection
- 'A' or Channel or similar
- Threshold drain
- Permeable Paving
- Fin Drain
- Cellular Storage
- Root Protection Areas
(Refer to ACD Tree Reference Plan Drawing Number BDWS20440-03 received in dwg format 22/11/2016 for details)
- Tree Protection Fencing
(Refer to ACD Tree Reference Plan Drawing Number BDWS20440-03 received in dwg format 22/11/2016 for details)
- Extent of 'No Dig' Road & Footway Construction, Subject to Approval from Arboriculturalist
- Extent of 'No Dig' Areas, Subject to Approval from Arboriculturalist
- Knee Rail - Subject to External Works
- Indicative low level landscaping - Subject to Landscaping Information

CDM NOTES

1. EXISTING SERVICES: Depth of existing services must be determined prior to works commencing. The contractor is responsible for establishing underground services in accordance with ISE Guidance note HS (G) 47. Any services which would be within the proposed construction layers must be lowered to below the sub-base.

SCALE BAR 1:200 at A1

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Rev.	Date	Details	By	Chkd	Appd
C1	27.07.17	Key annotation amended. Issued for Construction.	VI	SLW	TS
F	12.07.17	Swale details, & catchpits added	SLW	IDC	TS
E	02.06.17	Trash screen added to outfall	SLW	KJ	TS
D	08.03.17	Personnel Doors removed from garages as per CDP's dwgs.	KJ	SLW	TS
C	07.03.17	Sheds & Bin locations updated to accord with External Works Layouts. Parking areas & swales revised. Issued for Tender	SLW	IDC	TS
B	17.02.17	Surface water drainage revised to accommodate swales	SLW	IDC	TS
		Notes added to outfall			
		S27 removed from scheme			

Client:

DAVID WILSON HOMES

WHERE QUALITY LIVES

Site:-

Hook Lane

Westergate

West Sussex

Drawing Title:-

DOMESTIC

DRAINAGE

LAYOUT

SHEET 2 OF 4

Date: January 2017

Drawn: AC

Checked: TRS

Approved: TRS

Drawing No.

BSO/E4462/452 C1

FOR CONSTRUCTION

Rogers Cory Partnership

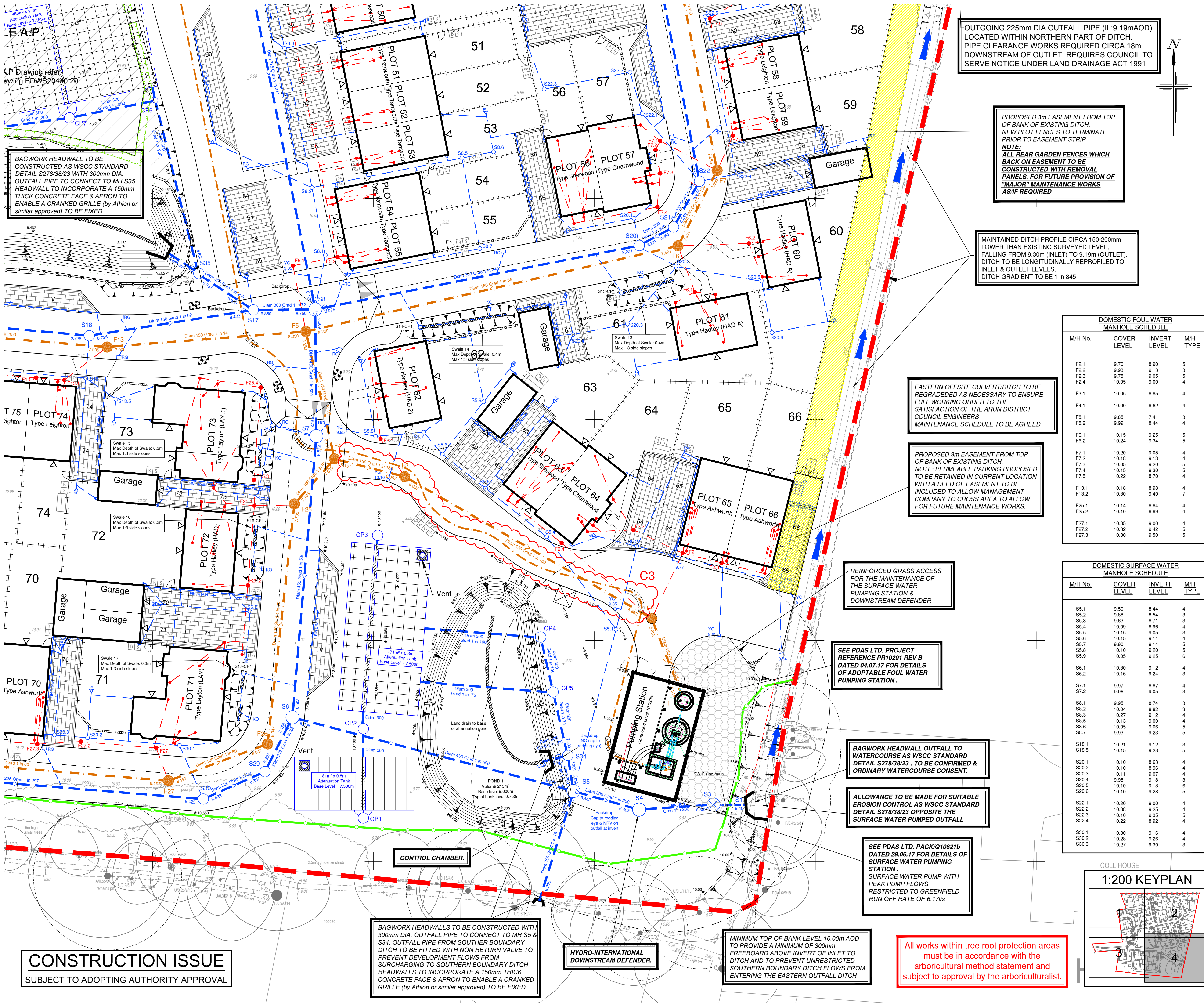
Civil, Structural and Architectural Consultants

the old school old school road

hook hamshire rd27 9nj

t 01256 769269 e mail@rcpconsultants.co.uk

f 01256 763048 w rcpconsultants.co.uk



E.A.P.
Drawing refer
aving BDWS20440 20

BAGWORK HEADWALL TO BE
CONSTRUCTED AS WSCC STANDARD
DETAIL S278/38/23 WITH 300mm DIA.
OUTFALL PIPE TO CONNECT TO MH S35.
HEADWALL TO INCORPORATE A 150mm
THICK CONCRETE FACE & APRON TO
ENABLE A CRANKED GRILLE (by Athlon or
similar approved) TO BE FIXED.

OUTGOING 225mm DIA OUTFALL PIPE (IL:9.19mAOD)
LOCATED WITHIN NORTHERN PART OF DITCH.
PIPE CLEARANCE WORKS REQUIRED CIRCA 18m
DOWNSTREAM OF OUTLET. REQUIRES COUNCIL
TO SERVE NOTICE UNDER LAND DRAINAGE ACT 1991

PROPOSED 3m EASEMENT FROM TOP
OF BANK OF EXISTING DITCH.
NEW PLOT FENCES TO TERMINATE
PRIOR TO EASEMENT STRIP
NOTE:
ALL REAR GARDEN FENCES WHICH
BACK ON EASEMENT TO BE
CONSTRUCTED WITH REMOVAL
PANELS, FOR FUTURE PROVISION OF
"MAJOR" MAINTENANCE WORKS
AS/IF REQUIRED

MAINTAINED DITCH PROFILE CIRCA 150-200mm
LOWER THAN EXISTING SURVEYED LEVEL.
FALLING FROM 9.30m (INLET) TO 9.19m (OUTLET).
DITCH TO BE LONGITUDINALLY REPROFILED TO
INLET & OUTLET LEVELS.
DITCH GRADIENT TO BE 1 in 845

EASTERN OFFSITE CULVERT/DITCH TO BE
REGRADED AS NECESSARY TO ENSURE
FULL WORKING ORDER TO THE
SATISFACTION OF THE ARUN DISTRICT
COUNCIL ENGINEERS
MAINTENANCE SCHEDULE TO BE AGREED

PROPOSED 3m EASEMENT FROM TOP
OF BANK OF EXISTING DITCH.
NOTE: PERMEABLE PARKING PROPOSED
TO BE RETAINED IN CURRENT LOCATION
WITH A DEED OF EASEMENT TO BE
INCLUDED TO ALLOW MANAGEMENT
COMPANY TO CROSS AREA TO ALLOW
FOR FUTURE MAINTENANCE WORKS.

REINFORCED GRASS ACCESS
FOR THE MAINTENANCE OF
THE SURFACE WATER
PUMPING STATION &
DOWNSTREAM DEFENDER

SEE PDAS LTD. PROJECT
REFERENCE PR10291 REV B
DATED 04.07.17 FOR DETAILS
OF ADAPTABLE FOUL WATER
PUMPING STATION.

BAGWORK HEADWALL OUTFALL TO
WATERCOURSE AS WSCC STANDARD
DETAIL S278/38/23. TO BE CONFIRMED &
ORDINARY WATERCOURSE CONSENT.

ALLOWANCE TO BE MADE FOR SUITABLE
EROSION CONTROL AS WSCC STANDARD
DETAIL S278/38/23 OPPOSITE THE
SURFACE WATER PUMPED OUTFALL

SEE PDAS LTD. PACK Q10621b
DATED 28.06.17 FOR DETAILS OF
SURFACE WATER PUMPING
STATION
SURFACE WATER PUMP WITH
PEAK PUMP FLOWS
RESTRICTED TO GREENFIELD
RUN OFF RATE OF 6.17/s

MINIMUM TOP OF BANK LEVEL 10.00m AOD
TO PROVIDE A MINIMUM OF 300mm
FREEBOARD ABOVE INVERT OF INLET TO
DITCH AND TO PREVENT UNRESTRICTED
SOUTHERN BOUNDARY DITCH FLOWS FROM
ENTERING THE EASTERN OUTFALL DITCH

CONSTRUCTION ISSUE
SUBJECT TO ADOPTING AUTHORITY APPROVAL

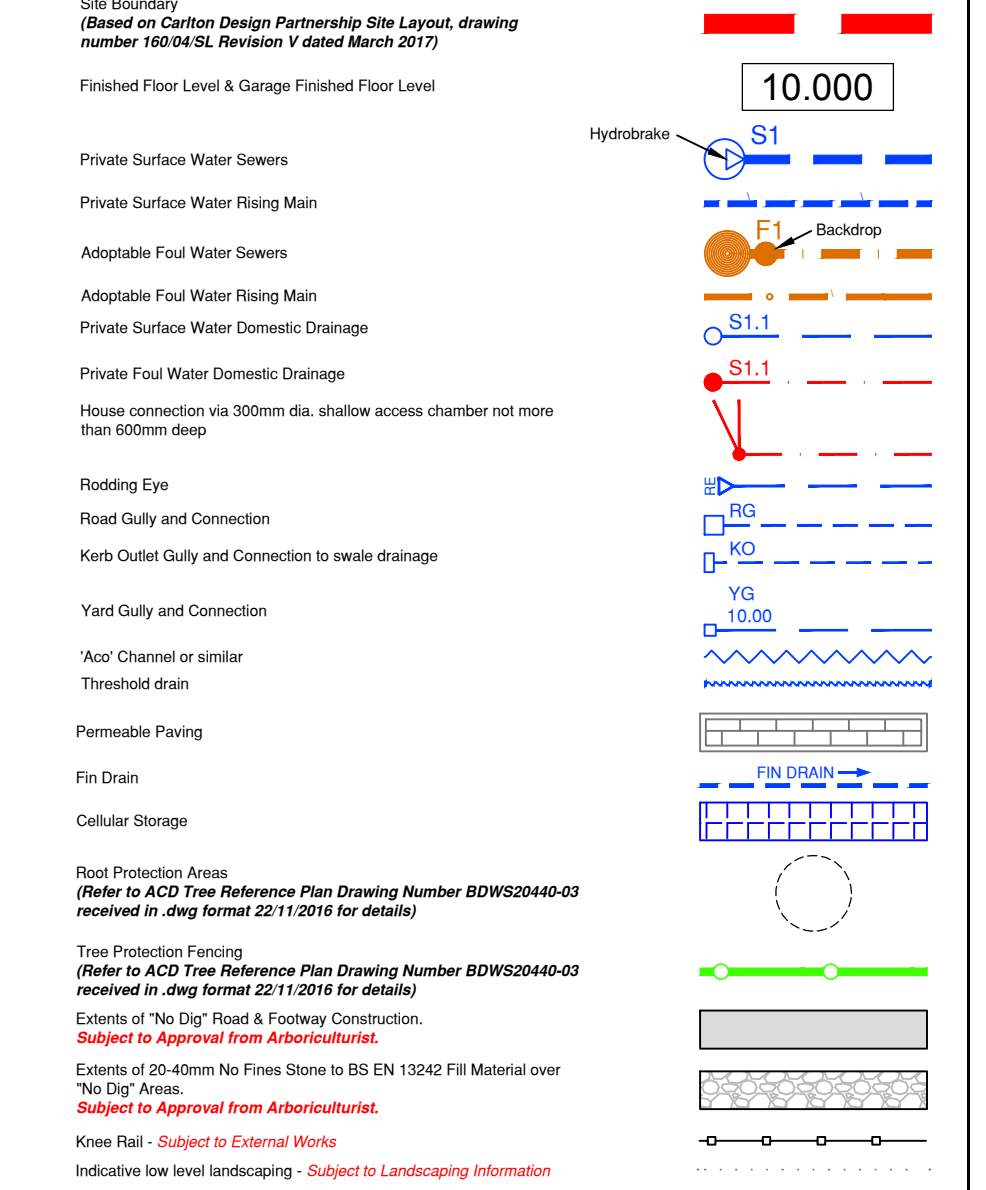
BAGWORK HEADWALLS TO BE CONSTRUCTED WITH
300mm DIA. OUTFALL PIPE TO CONNECT TO MH S5 &
S34. OUTFALL PIPE FROM SOUTHERN BOUNDARY
DITCH TO BE FITTED WITH NON RETURN VALVE TO
PREVENT DEVELOPMENT FLOWS FROM
SURCHARGING TO SOUTHERN BOUNDARY DITCH
HEADWALLS TO INCORPORATE A 150mm THICK
CONCRETE FACE & APRON TO ENABLE A CRANKED
GRILLE (by Athlon or similar approved) TO BE FIXED.

HYDRO-INTERNATIONAL
DOWNSTREAM DEFENDER.

NOTES

1. F/W & SW foul drainage is to be constructed in accordance with the Building Regulations & BS8301 & the WRC Guide Sewers for Adoption 6th Edition & Interim Addendum.
 2. Drains are to be constructed using factory jointed vitrified clay pipes to BS EN 205-1991 "Super Strength" specification (i.e. Hownorth Superflow or similar) or uPVC drainage pipework to BS4640 & BS4641, bedded & backfilled in accordance with manufacturers instructions.
 3. Location of sewers & lateral drains to be in accordance with the WRC Guide Sewers for Adoption 6th Edition & Interim Addendum and specific requirements of Southern Water.
 4. Backfilling of drain trenches adjacent to dwelling or other structure to be in accordance with BS8301 Fig. 9.
 5. Access fittings & inspection chambers as table below:
- | TYPE | DEPTH RANGE | DESCRIPTION |
|------|----------------|---|
| 1 | 0.6m to 0.9m | Access chamber (RCP) in areas adjacent to existing manholes |
| 2 | 0.9m to 1.2m | Access chamber (RCP) in areas adjacent to existing manholes |
| 3 | 1.2m to 1.5m | Access chamber (RCP) in areas adjacent to existing manholes |
| 4 | 1.5m to 1.8m | Access chamber (RCP) in areas adjacent to existing manholes |
| 5 | 1.8m to 2.1m | Access chamber (RCP) in areas adjacent to existing manholes |
| 6 | 2.1m to 2.4m | Access chamber (RCP) in areas adjacent to existing manholes |
| 7 | 2.4m to 2.7m | Access chamber (RCP) in areas adjacent to existing manholes |
| 8 | 2.7m to 3.0m | Access chamber (RCP) in areas adjacent to existing manholes |
| 9 | 3.0m to 3.3m | Access chamber (RCP) in areas adjacent to existing manholes |
| 10 | 3.3m to 3.6m | Access chamber (RCP) in areas adjacent to existing manholes |
| 11 | 3.6m to 3.9m | Access chamber (RCP) in areas adjacent to existing manholes |
| 12 | 3.9m to 4.2m | Access chamber (RCP) in areas adjacent to existing manholes |
| 13 | 4.2m to 4.5m | Access chamber (RCP) in areas adjacent to existing manholes |
| 14 | 4.5m to 4.8m | Access chamber (RCP) in areas adjacent to existing manholes |
| 15 | 4.8m to 5.1m | Access chamber (RCP) in areas adjacent to existing manholes |
| 16 | 5.1m to 5.4m | Access chamber (RCP) in areas adjacent to existing manholes |
| 17 | 5.4m to 5.7m | Access chamber (RCP) in areas adjacent to existing manholes |
| 18 | 5.7m to 6.0m | Access chamber (RCP) in areas adjacent to existing manholes |
| 19 | 6.0m to 6.3m | Access chamber (RCP) in areas adjacent to existing manholes |
| 20 | 6.3m to 6.6m | Access chamber (RCP) in areas adjacent to existing manholes |
| 21 | 6.6m to 6.9m | Access chamber (RCP) in areas adjacent to existing manholes |
| 22 | 6.9m to 7.2m | Access chamber (RCP) in areas adjacent to existing manholes |
| 23 | 7.2m to 7.5m | Access chamber (RCP) in areas adjacent to existing manholes |
| 24 | 7.5m to 7.8m | Access chamber (RCP) in areas adjacent to existing manholes |
| 25 | 7.8m to 8.1m | Access chamber (RCP) in areas adjacent to existing manholes |
| 26 | 8.1m to 8.4m | Access chamber (RCP) in areas adjacent to existing manholes |
| 27 | 8.4m to 8.7m | Access chamber (RCP) in areas adjacent to existing manholes |
| 28 | 8.7m to 9.0m | Access chamber (RCP) in areas adjacent to existing manholes |
| 29 | 9.0m to 9.3m | Access chamber (RCP) in areas adjacent to existing manholes |
| 30 | 9.3m to 9.6m | Access chamber (RCP) in areas adjacent to existing manholes |
| 31 | 9.6m to 9.9m | Access chamber (RCP) in areas adjacent to existing manholes |
| 32 | 9.9m to 10.2m | Access chamber (RCP) in areas adjacent to existing manholes |
| 33 | 10.2m to 10.5m | Access chamber (RCP) in areas adjacent to existing manholes |
| 34 | 10.5m to 10.8m | Access chamber (RCP) in areas adjacent to existing manholes |
| 35 | 10.8m to 11.1m | Access chamber (RCP) in areas adjacent to existing manholes |
| 36 | 11.1m to 11.4m | Access chamber (RCP) in areas adjacent to existing manholes |
| 37 | 11.4m to 11.7m | Access chamber (RCP) in areas adjacent to existing manholes |
| 38 | 11.7m to 12.0m | Access chamber (RCP) in areas adjacent to existing manholes |
| 39 | 12.0m to 12.3m | Access chamber (RCP) in areas adjacent to existing manholes |
| 40 | 12.3m to 12.6m | Access chamber (RCP) in areas adjacent to existing manholes |
| 41 | 12.6m to 12.9m | Access chamber (RCP) in areas adjacent to existing manholes |
| 42 | 12.9m to 13.2m | Access chamber (RCP) in areas adjacent to existing manholes |
| 43 | 13.2m to 13.5m | Access chamber (RCP) in areas adjacent to existing manholes |
| 44 | 13.5m to 13.8m | Access chamber (RCP) in areas adjacent to existing manholes |
| 45 | 13.8m to 14.1m | Access chamber (RCP) in areas adjacent to existing manholes |
| 46 | 14.1m to 14.4m | Access chamber (RCP) in areas adjacent to existing manholes |
| 47 | 14.4m to 14.7m | Access chamber (RCP) in areas adjacent to existing manholes |
| 48 | 14.7m to 15.0m | Access chamber (RCP) in areas adjacent to existing manholes |
| 49 | 15.0m to 15.3m | Access chamber (RCP) in areas adjacent to existing manholes |
| 50 | 15.3m to 15.6m | Access chamber (RCP) in areas adjacent to existing manholes |
| 51 | 15.6m to 15.9m | Access chamber (RCP) in areas adjacent to existing manholes |
| 52 | 15.9m to 16.2m | Access chamber (RCP) in areas adjacent to existing manholes |
| 53 | 16.2m to 16.5m | Access chamber (RCP) in areas adjacent to existing manholes |
| 54 | 16.5m to 16.8m | Access chamber (RCP) in areas adjacent to existing manholes |
| 55 | 16.8m to 17.1m | Access chamber (RCP) in areas adjacent to existing manholes |
| 56 | 17.1m to 17.4m | Access chamber (RCP) in areas adjacent to existing manholes |
| 57 | 17.4m to 17.7m | Access chamber (RCP) in areas adjacent to existing manholes |
| 58 | 17.7m to 18.0m | Access chamber (RCP) in areas adjacent to existing manholes |
| 59 | 18.0m to 18.3m | Access chamber (RCP) in areas adjacent to existing manholes |
| 60 | 18.3m to 18.6m | Access chamber (RCP) in areas adjacent to existing manholes |
| 61 | 18.6m to 18.9m | Access chamber (RCP) in areas adjacent to existing manholes |
| 62 | 18.9m to 19.2m | Access chamber (RCP) in areas adjacent to existing manholes |
| 63 | 19.2m to 19.5m | Access chamber (RCP) in areas adjacent to existing manholes |
| 64 | 19.5m to 19.8m | Access chamber (RCP) in areas adjacent to existing manholes |
| 65 | 19.8m to 20.1m | Access chamber (RCP) in areas adjacent to existing manholes |
| 66 | 20.1m to 20.4m | Access chamber (RCP) in areas adjacent to existing manholes |
| 67 | 20.4m to 20.7m | Access chamber (RCP) in areas adjacent to existing manholes |
| 68 | 20.7m to 21.0m | Access chamber (RCP) in areas adjacent to existing manholes |
| 69 | 21.0m to 21.3m | Access chamber (RCP) in areas adjacent to existing manholes |
| 70 | 21.3m to 21.6m | Access chamber (RCP) in areas adjacent to existing manholes |
| 71 | 21.6m to 21.9m | Access chamber (RCP) in areas adjacent to existing manholes |
| 72 | 21.9m to 22.2m | Access chamber (RCP) in areas adjacent to existing manholes |
| 73 | 22.2m to 22.5m | Access chamber (RCP) in areas adjacent to existing manholes |
| 74 | 22.5m to 22.8m | Access chamber (RCP) in areas adjacent to existing manholes |
| 75 | 22.8m to 23.1m | Access chamber (RCP) in areas adjacent to existing manholes |
6. As an alternative to the construction of domestic drainage chambers deeper than 1.0m, the "Dema Non-entry Inspection Chamber", 500mm dia, polypropylene chamber to a maximum depth of 3.0m may be used subject to the approval of the local building inspector or similar or uPVC drainage pipework to BS4640 & BS4641, bedded & backfilled in accordance with manufacturers instructions.
 7. Cover levels indicated on the Drainage Schedules are nominal & may be adjusted to suit finished ground levels as necessary.
 8. Generally inspection chamber covers should be Grade D400 in trafficked areas Grade B125 in parking areas and occasional traffic and A15 in pedestrian only areas.
 9. Rainwater downpipes to be connected direct to drain using an appropriate adaptor & removable section of downpipe to permit rodding access.
 10. The positions of SVPs, sub stacks, WC outlets, Back inlet gullies etc. & rainwater downpipes are to be accurately located from the house type working drawings.
 11. Generally FW drains are to be laid to falls of 1 in 40. SW drains are to be laid to falls of 1 in 60, both in 100mm diameter pipes. SW pipes are to be 150mm diameter when serving 2 dwellings or more. FW pipes are to be 150mm diameter when serving 10 dwellings or more unless stated otherwise, or where a schedule is provided.
 12. Gullies situated in areas accessible to wheeled vehicles to be of suitable construction for trafficked areas.
 13. Where land drain is identified on the Architect's details, connect into nearest SW system.
 14. This drawing should be read in conjunction with the Architect's and Structural Engineer's design drawings and specification.
 15. Site layout based on Cartton Design Partnership Site Layout, drawing number 100042156, Revision 1, dated November 2016.
 16. Topographic Survey as per Site Survey, drawing number 30WZ001A, dated February 2016.
 17. Architectural Blocks based on Cartton Design Partnership Site Layout, drawing number 100042156, Revision 1, dated November 2016.
 18. This drawing should be read in conjunction with Foul Water Sewer Longitudinal Sections (BSO/E4462/211 & 212), Surface Water Longitudinal Sections (BSO/E4462/221 & 222), S104 Adopted Layout (BSO/E4462/401), FW & SW Manhole Schedules & S104 Construction Details (BSO/E4462/411 to 414), other Domestic Drainage Layouts, Domestic Drainage Construction Details (BSO/E4462/421 & 422), Surface Water Attenuation Details (BSO/E4462/431, 434, 437 & 471) and Control Chamber Construction Details (BSO/E4462/451 & 452).
 19. Where buildings are less than 1.0m from domestic drainage, backfilling to be accommodated with internal benching.
 20. ANY VARIANCE OR DISCREPANCY MUST BE REPORTED BACK TO RCP ENGINEERING BEFORE WORK BEGINS.

KEY



CDM NOTES

1. EXISTING SERVICES: Depth of existing services must be determined prior to works commencing. The contractor is responsible for establishing underground services in accordance with ISE Guidance note HS (G) 47. Any services which would be within the proposed construction layers must be lowered to below the sub-base.

SCALE BAR 1:200 at A1

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C3	08.06.17	Rising main adjacent plot 64 relocated	SLW	KJ	TS
C2	07.06.17	SW & FW pumping station design notes revised	SLW	KJ	TS
C1	27.07.17	MH S22 to S28 gradient revised. Annotation revised.	VI	SLW	TS
		Issued for Construction.			
F	12.07.17	Finished levels around pumping station, ponds, ditches & attenuation tanks updated. Catchpits renumbered.			
		Outfall ditch clarification notes added			
		Pipe sizes increased around attenuation & ponds	SLW	IDC	TS
E	02.06.17	Additional clarification notes to surface water outfall drainage.	SLW	KJ	TS
		Reinforced grass access to surface water pumping station			
		Knee rail & indicative landscaping shown to Pond 2			
Rev.	Date	Details		By	Chkd/Appd

Client:-

DAVID WILSON HOMES
WHERE QUALITY LIVES

Site:- **Hook Lane Westergate West Sussex**

Drawing Title:- **DOMESTIC DRAINAGE LAYOUT**

SHEET 4 OF 4

Date:	January 2017	Scales:	1:200 at A1
Drawn:	AC	Checked:	TRS
Approved:	TRS		

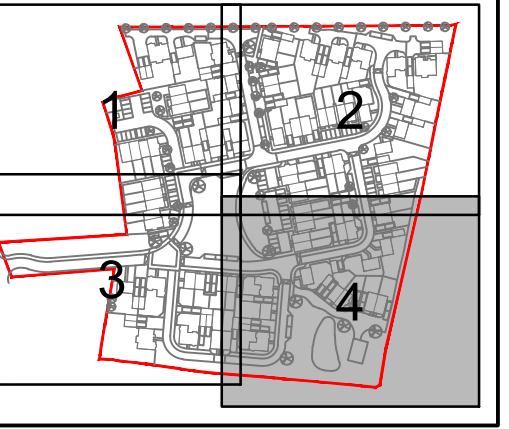
Drawing No. **BSO/E4462/454 C3**

FOR CONSTRUCTION

Rogers Cory Partnership
Civil, Structural and Architectural Consultants

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COLL HOUSE
1:200 KEYPLAN

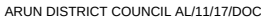


All works within tree root protection areas
must be in accordance with the
arboricultural method statement and
subject to approval by the arboriculturalist.

APPENDIX (2)

SURFACE WATER CALCULATIONS

BSO/E4462/16108



Rogers Cory Ptn Ltd		Page 1
The Old School Old School Road Hook RG27 9NJ	Hook Lane Westergate West Sussex	
Date 15/08/2017 11:29 File 4462-SW2 - 15.08.17.MDX	Designed by SLW Checked by TS	
Micro Drainage		Network 2017.1.2

Time Area Diagram for 4462-SW2.SWS

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.379	4-8	0.917	8-12	0.121

Total Area Contributing (ha) = 1.417

Total Pipe Volume (m³) = 40.519

Rogers Cory Ptn Ltd		Page 2
The Old School Old School Road Hook RG27 9NJ	Hook Lane Westergate West Sussex	
Date 15/08/2017 11:29 File 4462-SW2 - 15.08.17.MDX	Designed by SLW Checked by TS	
Micro Drainage	Network 2017.1.2	

Existing Network Details for 4462-SW2.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	62.242	0.417	149.3	0.129	5.00	0.0	0.600	o	225	Pipe/Conduit
1.001	9.519	0.259	36.7	0.119	0.00	0.0	0.600	o	225	Pipe/Conduit
2.000	5.152	0.118	43.7	0.012	5.00	0.0	0.600	o	150	Pipe/Conduit
2.001	19.712	0.384	51.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
3.000	10.972	0.115	95.4	0.040	5.00	0.0	0.600	o	150	Pipe/Conduit
3.001	24.027	0.202	118.7	0.064	0.00	0.0	0.600	o	150	Pipe/Conduit
2.002	46.170	0.156	296.1	0.070	0.00	0.0	0.600	o	225	Pipe/Conduit
4.000	23.063	0.675	34.2	0.061	5.00	0.0	0.600	o	150	Pipe/Conduit
1.002	54.451	0.175	310.7	0.089	0.00	0.0	0.600	o	375	Pipe/Conduit
5.000	28.633	0.412	69.5	0.086	5.00	0.0	0.600	o	150	Pipe/Conduit
5.001	18.791	0.303	62.1	0.059	0.00	0.0	0.600	o	150	Pipe/Conduit
6.000	20.155	0.100	201.6	0.000	5.00	0.0	0.600	o	300	Pipe/Conduit
6.001	7.415	0.037	200.4	0.000	5.00	0.0	0.600	o	300	Pipe/Conduit
5.002	7.018	0.100	70.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
7.000	6.500	0.690	9.4	0.150	5.00	0.0	0.600	o	225	Pipe/Conduit
7.001	17.122	0.098	174.7	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
7.002	18.355	0.062	296.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit

Network Results Table

PN	US/IL (m)	I.Area (ha)	Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	9.102	0.129	0.0	1.07	42.5
1.001	8.685	0.248	0.0	2.17	86.1
2.000	9.159	0.012	0.0	1.53	27.0
2.001	9.041	0.012	0.0	1.41	24.9
3.000	8.974	0.040	0.0	1.03	18.2
3.001	8.859	0.104	0.0	0.92	16.3
2.002	8.582	0.186	0.0	0.75	30.0
4.000	9.226	0.061	0.0	1.73	30.5
1.002	8.276	0.584	0.0	1.02	112.9
5.000	9.138	0.086	0.0	1.21	21.3
5.001	8.726	0.145	0.0	1.28	22.6
6.000	6.987	0.000	0.0	1.10	78.0
6.001	6.887	0.000	0.0	1.11	78.2
5.002	6.850	0.145	0.0	1.88	132.8
7.000	9.500	0.150	0.0	4.29	170.5
7.001	8.810	0.150	0.0	0.99	39.2
7.002	8.712	0.150	0.0	0.75	30.0

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Existing Network Details for 4462-SW2.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
7.003	14.494	0.049	296.5	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit
7.004	14.976	0.051	296.5	0.022	0.00	0.0	0.600	o	225	Pipe/Conduit
7.005	48.501	0.114	427.1	0.059	0.00	0.0	0.600	o	225	Pipe/Conduit
7.006	5.949	0.014	427.1	0.036	0.00	0.0	0.600	o	225	Pipe/Conduit
7.007	4.402	0.010	427.1	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit
7.008	37.370	0.087	427.1	0.058	0.00	0.0	0.600	o	300	Pipe/Conduit
1.003	14.331	0.029	500.0	0.035	0.00	0.0	0.600	o	450	Pipe/Conduit
1.004	31.931	0.064	500.0	0.065	0.00	0.0	0.600	o	450	Pipe/Conduit
8.000	9.581	0.093	103.0	0.024	5.00	0.0	0.600	o	150	Pipe/Conduit
8.001	10.256	0.059	174.8	0.048	0.00	0.0	0.600	o	150	Pipe/Conduit
8.002	42.619	0.144	296.9	0.045	0.00	0.0	0.600	o	225	Pipe/Conduit
8.003	7.645	0.026	296.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
8.004	6.882	0.239	28.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
1.005	32.855	0.066	497.8	0.023	0.00	0.0	0.600	o	450	Pipe/Conduit
9.000	7.317	0.100	73.2	0.000	5.00	0.0	0.600	o	300	Pipe/Conduit
9.001	4.070	0.858	4.7	0.000	5.00	0.0	0.600	o	300	Pipe/Conduit
1.006	7.738	0.039	198.4	0.073	0.00	0.0	0.600	o	300	Pipe/Conduit
1.007	8.726	0.044	198.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
1.008	4.000	-3.041	-1.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	US/IL (m)	I.Area (ha)	Base Flow (l/s)	Vel (m/s)	Cap (l/s)
7.003	8.650	0.184	0.0	0.75	30.0
7.004	8.601	0.206	0.0	0.75	30.0
7.005	8.551	0.265	0.0	0.63	24.9
7.006	8.437	0.301	0.0	0.63	24.9
7.007	8.423	0.317	0.0	0.63	24.9
7.008	8.338	0.375	0.0	0.75	53.3
1.003	6.675	1.139	0.0	0.90	143.5
1.004	6.647	1.204	0.0	0.90	143.5
8.000	8.793	0.024	0.0	0.99	17.5
8.001	8.700	0.072	0.0	0.76	13.4
8.002	8.566	0.117	0.0	0.75	30.0
8.003	8.423	0.117	0.0	0.75	30.0
8.004	8.397	0.117	0.0	2.45	97.4
1.005	6.508	1.344	0.0	0.90	143.8
9.000	7.400	0.000	0.0	1.84	130.1
9.001	7.300	0.000	0.0	7.27	513.5
1.006	6.442	1.417	0.0	1.11	78.6
1.007	6.403	1.417	0.0	1.11	78.7
1.008	6.359	1.417	0.0	0.00	0.0

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Free Flowing Outfall Details for 4462-SW2.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008	1	9.700	9.400	0.000	0	0

Simulation Criteria for 4462-SW2.SWS

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	3	Number of Time/Area Diagrams	0
		Number of Storage Structures	5
		Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.350		

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Online Controls for 4462-SW2.SWS

Hydro-Brake® Optimum Manhole: 8, DS/PN: 1.003, Volume (m³): 13.2

Unit Reference	MD-SHE-0131-1000-2000-1000
Design Head (m)	2.000
Design Flow (l/s)	10.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	131
Invert Level (m)	6.675
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	10.0	Kick-Flo®	1.167	7.8
Flush-Flo™	0.569	9.8	Mean Flow over Head Range	-	8.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.7	0.800	9.6	2.000	10.0	4.000	13.9	7.000	18.1
0.200	8.3	1.000	9.0	2.200	10.5	4.500	14.7	7.500	18.7
0.300	9.2	1.200	7.9	2.400	10.9	5.000	15.4	8.000	19.3
0.400	9.6	1.400	8.5	2.600	11.3	5.500	16.2	8.500	19.9
0.500	9.8	1.600	9.0	3.000	12.1	6.000	16.8	9.000	20.5
0.600	9.8	1.800	9.5	3.500	13.0	6.500	17.5	9.500	21.0

Hydro-Brake® Optimum Manhole: 5, DS/PN: 1.006, Volume (m³): 11.4

Unit Reference	MD-SHE-0147-1080-1280-1080
Design Head (m)	1.280
Design Flow (l/s)	10.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	147
Invert Level (m)	6.442
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.280	10.8	Kick-Flo®	0.822	8.8
Flush-Flo™	0.378	10.8	Mean Flow over Head Range	-	9.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	0.200	10.1	0.300	10.7	0.400	10.8	0.500	10.7

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Hydro-Brake® Optimum Manhole: 5, DS/PN: 1.006, Volume (m³): 11.4

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.600	10.4	1.600	12.0	2.600	15.1	5.000	20.6	7.500	25.1
0.800	9.1	1.800	12.7	3.000	16.2	5.500	21.6	8.000	25.9
1.000	9.6	2.000	13.3	3.500	17.4	6.000	22.5	8.500	26.6
1.200	10.5	2.200	13.9	4.000	18.5	6.500	23.4	9.000	27.4
1.400	11.3	2.400	14.5	4.500	19.6	7.000	24.3	9.500	28.1

Depth/Flow Relationship Manhole: 3, DS/PN: 1.008, Volume (m³): 6.1

Invert Level (m) 6.359

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.1700	0.700	6.1700	1.300	6.1700	1.900	6.1700	2.500	6.1700
0.200	6.1700	0.800	6.1700	1.400	6.1700	2.000	6.1700	2.600	6.1700
0.300	6.1700	0.900	6.1700	1.500	6.1700	2.100	6.1700	2.700	6.1700
0.400	6.1700	1.000	6.1700	1.600	6.1700	2.200	6.1700	2.800	6.1700
0.500	6.1700	1.100	6.1700	1.700	6.1700	2.300	6.1700	2.900	6.1700
0.600	6.1700	1.200	6.1700	1.800	6.1700	2.400	6.1700	3.000	6.1700

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Storage Structures for 4462-SW2.SWS

Cellular Storage Manhole: CP6, DS/PN: 6.000

Invert Level (m) 7.163 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

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	480.0	952.0	3.600	0.0	1050.8	7.200	0.0	1050.8
0.400	480.0	1001.4	4.000	0.0	1050.8	7.600	0.0	1050.8
0.800	480.0	1050.7	4.400	0.0	1050.8	8.000	0.0	1050.8
1.200	480.0	1050.8	4.800	0.0	1050.8	8.400	0.0	1050.8
1.201	0.0	1050.8	5.200	0.0	1050.8	8.800	0.0	1050.8
2.000	0.0	1050.8	5.600	0.0	1050.8	9.200	0.0	1050.8
2.001	0.0	1050.8	6.000	0.0	1050.8	9.600	0.0	1050.8
2.800	0.0	1050.8	6.400	0.0	1050.8	10.000	0.0	1050.8
3.200	0.0	1050.8	6.800	0.0	1050.8			

Tank or Pond Manhole: 35, DS/PN: 6.001

Invert Level (m) 8.462

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	173.0	1.000	398.0	1.300	1465.0	1.301	0.0

Tank or Pond Manhole: HW, DS/PN: 7.000

Invert Level (m) 9.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	114.0	0.500	311.0

Cellular Storage Manhole: CP5, DS/PN: 9.000

Invert Level (m) 7.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	252.0	0.0	0.800	252.0	0.0
0.400	252.0	0.0	0.801	0.0	0.0

Tank or Pond Manhole: 34, DS/PN: 9.001

Invert Level (m) 9.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	216.0	0.750	355.0	0.751	0.0

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Summary of Critical Results by Maximum Level (Rank 1) for 4462-SW2.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 100
Climate Change (%) 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	11	15 Winter	100	+30%	100/15 Summer	100/15 Summer			10.529	1.202
1.001	10	15 Winter	100	+30%	100/15 Summer	100/15 Summer			10.117	1.207
2.000	14	15 Winter	100	+30%	100/15 Summer				10.140	0.831
2.001	13	15 Winter	100	+30%	100/15 Summer				10.128	0.937
3.000	16	15 Winter	100	+30%	100/15 Summer	100/15 Summer			10.274	1.150
3.001	15	30 Winter	100	+30%	100/15 Summer	100/15 Summer			10.168	1.159
2.002	12	15 Winter	100	+30%	100/15 Summer	100/15 Summer			10.101	1.295
4.000	28	15 Winter	100	+30%	100/15 Summer				10.489	1.113
1.002	9	15 Winter	100	+30%	100/15 Summer				10.029	1.378
5.000	19	15 Winter	100	+30%	100/15 Summer	100/15 Summer			10.491	1.203
5.001	18	15 Winter	100	+30%	100/15 Summer	100/15 Summer			10.077	1.201
6.000	CP6	1440 Winter	100	+30%	100/15 Summer				9.548	2.261
6.001	35	1440 Winter	100	+30%	100/15 Summer				9.548	2.361
5.002	17	1440 Winter	100	+30%	100/15 Summer				9.628	2.478
7.000	HW	30 Winter	100	+30%	100/15 Winter				9.764	0.039
7.001	27	15 Winter	100	+30%	100/15 Summer				9.824	0.789
7.002	26	15 Winter	100	+30%	100/15 Summer				9.980	1.043
7.003	25	15 Winter	100	+30%	100/15 Summer				10.149	1.274
7.004	24	15 Winter	100	+30%	100/15 Summer				10.230	1.404
7.005	23	15 Winter	100	+30%	100/15 Summer				10.255	1.480
7.006	22	15 Winter	100	+30%	100/15 Summer				10.133	1.471
7.007	21	15 Winter	100	+30%	100/15 Summer				10.048	1.400
7.008	20	15 Winter	100	+30%	100/15 Summer				9.939	1.301
1.003	8	15 Winter	100	+30%	100/15 Summer	100/15 Winter			9.762	2.637
1.004	7	1440 Winter	100	+30%	100/15 Summer				9.506	2.409
8.000	33	15 Winter	100	+30%	100/15 Summer				9.655	0.712
8.001	32	15 Winter	100	+30%	100/15 Summer				9.613	0.763
8.002	31	1440 Winter	100	+30%	100/15 Summer				9.504	0.713
8.003	30	1440 Winter	100	+30%	100/15 Summer				9.504	0.856
8.004	29	1440 Winter	100	+30%	100/240 Winter				9.504	0.882
1.005	6	1440 Winter	100	+30%	100/15 Summer				9.504	2.546

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Summary of Critical Results by Maximum Level (Rank 1) for 4462-SW2.SWS

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	11	2.047	0.99		40.7	FLOOD	4
1.001	10	7.269	1.26		89.8	FLOOD	5
2.000	14	0.000	0.24		5.1	SURCHARGED	
2.001	13	0.000	0.35		8.2	FLOOD RISK	
3.000	16	0.436	0.99		16.1	FLOOD	4
3.001	15	8.989	2.15		33.2	FLOOD	6
2.002	12	2.378	1.51		43.3	FLOOD	4
4.000	28	0.000	0.82		23.8	FLOOD RISK	
1.002	9	0.000	1.41		148.3	FLOOD RISK	
5.000	19	3.479	1.39		28.3	FLOOD	5
5.001	18	1.402	1.85		39.3	FLOOD	4
6.000	CP6	0.000	0.00		0.0	FLOOD RISK	
6.001	35	0.000	0.14		8.1	FLOOD RISK	
5.002	17	0.000	0.07		5.4	FLOOD RISK	
7.000	HW	0.000	0.34		39.6	SURCHARGED	
7.001	27	0.000	1.12		39.0	SURCHARGED	
7.002	26	0.000	1.45		39.2	FLOOD RISK	
7.003	25	0.000	1.50		39.4	FLOOD RISK	
7.004	24	0.000	1.51		39.7	SURCHARGED	
7.005	23	0.000	1.67		39.7	SURCHARGED	
7.006	22	0.000	1.85		41.9	FLOOD RISK	
7.007	21	0.000	1.86		45.8	FLOOD RISK	
7.008	20	0.000	1.26		62.1	FLOOD RISK	
1.003	8	0.501	0.12		9.8	FLOOD	3
1.004	7	0.000	0.06		7.4	SURCHARGED	
8.000	33	0.000	0.79		12.2	SURCHARGED	
8.001	32	0.000	2.63		31.4	SURCHARGED	
8.002	31	0.000	0.11		3.3	SURCHARGED	
8.003	30	0.000	0.14		3.3	SURCHARGED	
8.004	29	0.000	0.05		3.3	SURCHARGED	
1.005	6	0.000	0.09		11.2	SURCHARGED	

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Micro Drainage		Network 2017.1.2

Summary of Critical Results by Maximum Level (Rank 1) for 4462-SW2.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
9.000	CP5	1440 Winter	100	+30%	100/15 Summer				9.503	1.803
9.001	34	1440 Winter	100	+30%	100/15 Summer				9.503	1.903
1.006	5	1440 Winter	100	+30%	100/15 Summer				9.503	2.761
1.007	4	1440 Winter	100	+30%	100/15 Summer				9.455	2.752
1.008	3	1440 Winter	100	+30%	100/15 Summer				9.454	2.945

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
9.000	CP5	0.000	0.00		0.0	FLOOD RISK	
9.001	34	0.000	0.00		0.5	FLOOD RISK	
1.006	5	0.000	0.06		3.5	SURCHARGED	
1.007	4	0.000	0.04		2.4	FLOOD RISK	
1.008	3	0.000	0.25		2.4	FLOOD RISK	

APPENDIX (3)

PUMP SUPPLIER – MAINTENANCE SCHEDULE

BSO/E4462/16108

Technical Summary

Liquid Handled	Surface Water
Number of Pumps	2
Control Philosophy	Duty / Standby
Capacity per Pump (L/sec)	6.17
Head Generated (m)	4.50
Pump Manufacturer	Sulzer
Pump Type	AS0630D
Impeller Type / Reference	Vortex / 160mm
Solids Handling (mm)	60
Hazardous Area Rating of Pump	Non-Exp
Motor Rating (kW)	1.3
Speed (rpm)	1330
Electric Supply	230/400V 50Hz, 3 Phase
Full Load Current (Amps)	3.6
Method of Starting	Direct On Line
Length of Cables	20
Level Controls	Float switches
Wet Well Diameter (mm)	1500
Wet Well Depth (m)	4 plus 300mm brick neck by others
Station Pipes and Valves (mm)	65
Station Final Discharge Pipe (mm)	2.5"- 90mm OD MDPE Adaptor
Pump Station Pipe Material	UPVC Grey pipe to BS/EN1452 & BS4346
Rising Main (By Others)	90mm OD PE100 Black MDPE SDR17 (78.7mm Bore)
Access Covers (Supply Only)	Rating: Pedestrian Load GMS
Inlet Connection	1 x 160mm Osma type Socket

Basic Price

Supply and delivery to site of a GRP package pump station as above data and enclosed specification in inclusive of a single electronic Operating and Maintenance manual prepared to our standard format.	£8,878.00
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Additional Items

Single site attendance to complete mechanical and electrical installation works plus a return visit to commission the system once the Electricity Board has fitted their meter.	£626.00
The additional cost to supply explosion-proof pump motors complete with intrinsically safe level controls.	£473.00

Terms and Conditions

Despatch/Completion:	3-4 weeks for GRP chamber 6-8 weeks notice for M&E installation plus commission
Carriage:	Paid (All off-loading to hard standing, site handling and craneage by others)
Validity:	60 days
VAT:	Extra at rate current when invoicing
Conditions:	As PDAS Ltd Terms and Conditions of Sale, copy attached. Prices are strictly nett, no discounts or retentions included.

Specification for Dual Pump Package Pump Station and Accessories

CHAMBER: Vertical, cylindrical GRP watertight pump chamber with sewer inlet connection(s) of size(s) and location(s) to suit requirements, formed benching, moulded cable duct and delivery pipe projections, duckfoot bend and guiderail bolted connections, cable and chain suspensions hooks & access cover with frame (moulded on or separate as required), within which would be contained:-

PUMP: Single stage fully submersible pump of cast iron construction directly connected to watertight IP68 submersible motor having thermistor or thermostat over temperature protection, (certain small frames excepted) and suitable length of multi core VRI PCP sheathed flexible cable. Oil buffer chamber with opposing seals incorporated between pump and motor.

DUCKFOOT: Cast iron duckfoot bend (or pedestal with elbow) incorporating guiderail socket and self locating boltless pump quick release coupling fixed to base of tank.

GUIDERAIL: Galvanised mild steel rail located at neck of tank and extending to duckfoot socket complete with necessary bracket. (Certain manufacturers utilise guidewires and these will be used where applicable.)

CHAIN: Mild steel galvanised lifting chain, attached to pump and of length to reach and be hooked at neck of tank.

REFLUX VALVE: Fullway pattern delivery non-return valve.

SLUICE VALVE: Fullway pattern isolating sluice valve with non rising spindle and hand wheel.

PIPES: From duckfoot through to defined point/level outside the tank, incorporating the above valves. All fitting connections appropriate to materials employed.

LEVEL CONTROLS: Encapsulated float switches with suspension cables and bracket for automatic sump emptying level controls (and high level if specified).

SEPARATELY: For above ground mounting:

PANEL: Dual pump 415v control panel in an IP54 mild steel dust and damp protected enclosure.

- Door interlocked isolator
- Motor fuses
- DOL Contactor starters
- Hand/Off/Auto selector switches
- Supply on indication
- Individual pump run and trip lamps
- High-level alarm buzzer
- 3 x VFC (Common Pump Fail & HLA) – for building into BMS system by others

KIOSK: Green mild steel, plinth mounted, weatherproof, lockable enclosure in stove enamelled textured finish, containing the above control panel, isolator, heater and thermostat. The unit would be fitted with an external Xenon beacon to indicate high level. Dimensions 1500mm(h) X 1000mm(w) X 400mm(d). A minimum 600mm x 450mm clear space would be provided for the mounting of Electricity Board equipment and a suitably rated switch fuse together with 25mm² cable tails would be provided to enable connection to the Electricity Board supply by others.

Method Statement

Planned Preventative Maintenance Contract

Routine/Major Servicing (Submersible Pumps)

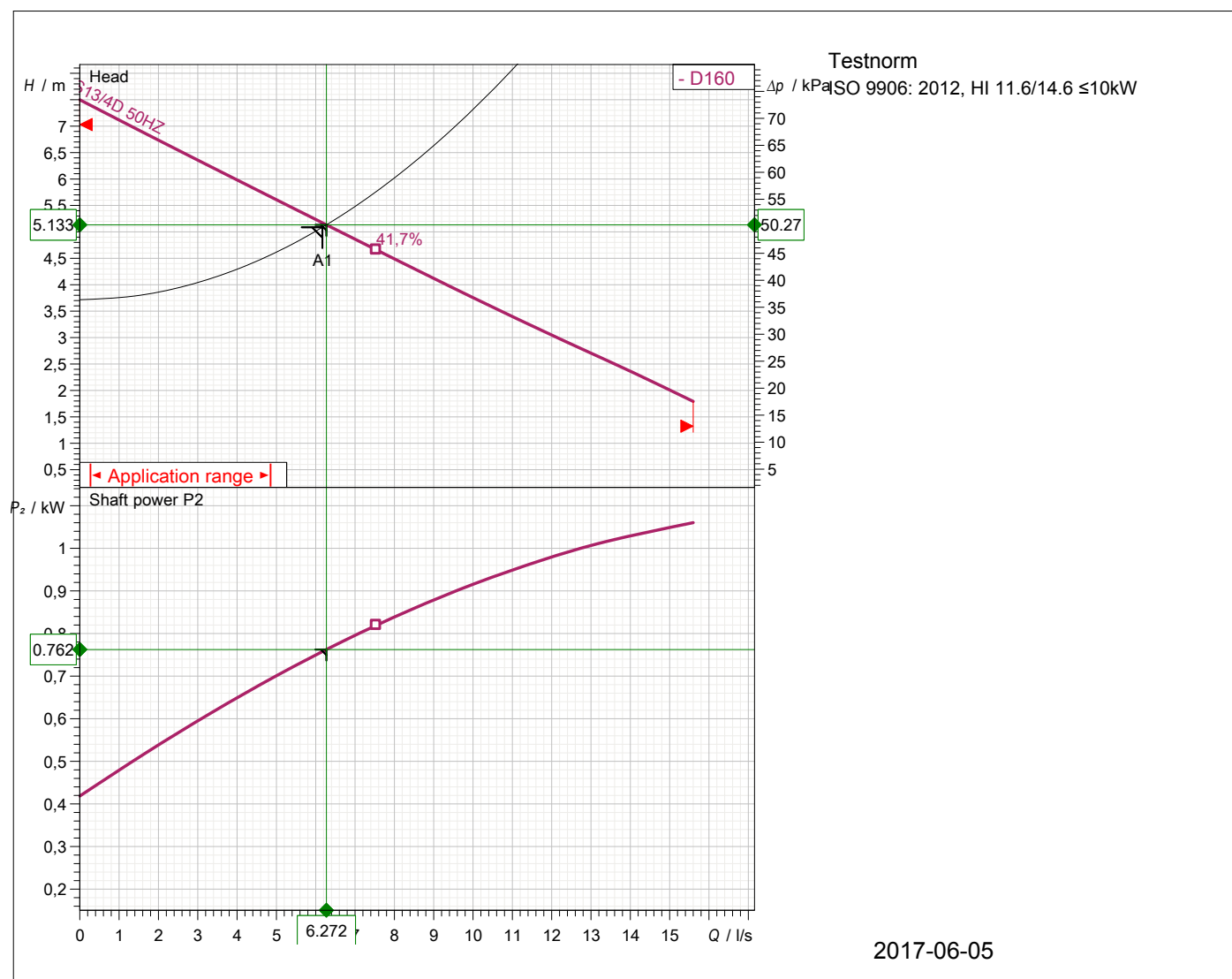
Routine Service

- Report to customer on arrival to site ensuring compliance with site access and Health and Safety requirements.
- Carry out Risk Assessment of site before starting work.
- Ensure that any equipment data that is not present on Service Report Sheet are documented, to enable client records to be updated.
- On arrival at the pumping station, observe the status of all panel indicators, recording on service record sheet any failures found.
- Megger pump windings. If pump readings are below 1 megohm contact relevant Service Coordinator for previous history and agreed action.
- Check motor current and enter details on service record sheet. Compare readings with FLC detailed on motor and the overload settings.
- If telemetry is installed, simulate alarm and liaise with the Service Department to confirm an active communication link and that the alarm signal has been received.
- Test pump operation on hand or manual control and investigate any malfunction.
- Check and ensure all terminals within the control panel are tight and that the heater is working.
- Ensure Float Switches are clean, that there is free movement and that they are untangled. Inspect float and pump suspension cables for stress failure in flexing zone. Check automatic operation by tilting float switches manually, including function of high level alarm.
- Clean off any fat build-up around the guiderails and other components affecting the level controls.
- Check junction box is adequately sealed and that cable glands are secure. If low insulation readings found, carry out further checks to investigate cause.
- Operate and lubricate gate valve(s) and check correct operation of non-return valve(s).
- Check earth bonding status including sump/kiosk and integrity of incoming electrical supply.
- Ensure control panel enclosure is tidy and clean. Oil locks and hinges. Remove all cleaning materials and rubbish. Check cable duct is adequately sealed and reseal if necessary.
- Recheck that power is switched on and system set to automatic operation.
- Leave the site tidy and secure.

Major Service

- On a major service, all the previous tasks are to be undertaken in addition to raising each pump in turn.
- Check oil and replace if contaminated.
- Check for impeller wear or damage and confirm correct rotation.
- Inspect for excessive noise/vibration and report all findings.

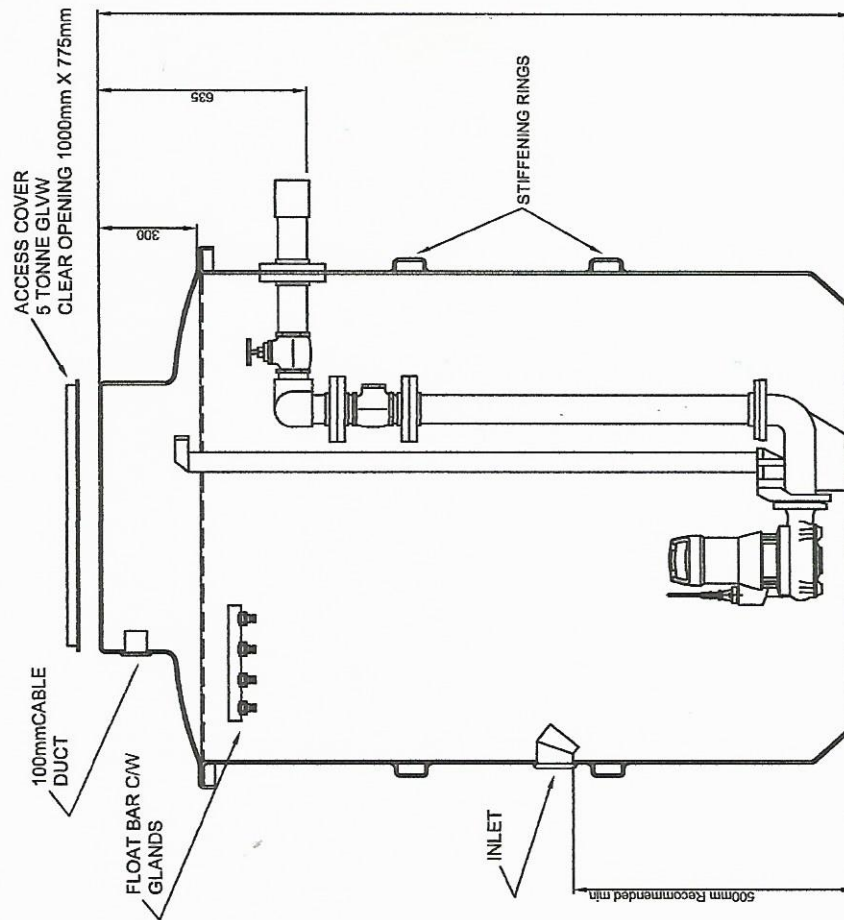
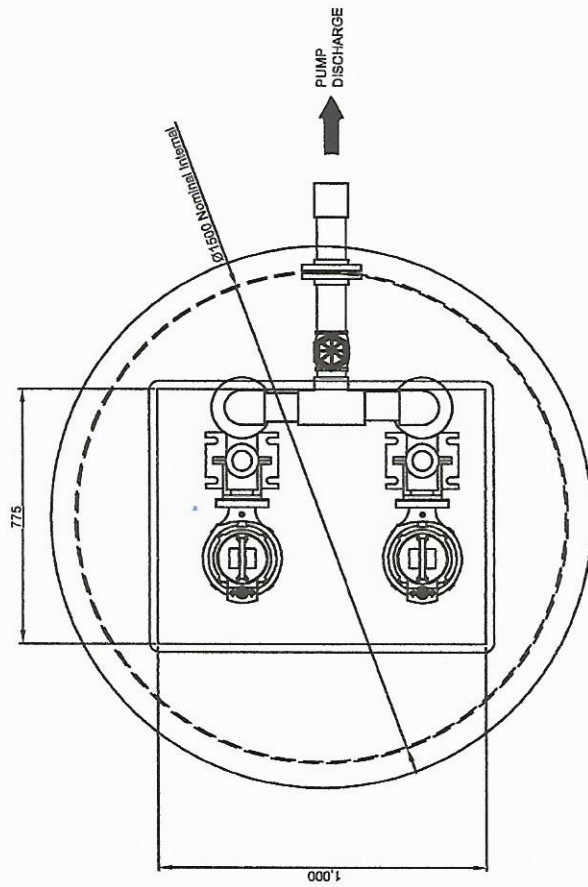
AS 0630 D 50 HZ



Operating data specification			
Flow	6,27 l/s	Head	5,13 m
Efficiency	41,2 %	Shaft power	0,762 kW
NPSH		Fluid	Water
Temperature	20 °C	Nature of system	Single head pump
No. of pumps	1		
Pump data			
Type	AS 0630 D 50 HZ	Make	SULZER
Series	AS	Impeller	Vortex impeller
N° of vanes	6	Impeller size	160 mm
Free passage	60 mm	Suction flange	
Discharge flange	DN65	Type of installation	Wet-well stationary
Moment of inertia			
Motor data			
Rated voltage	400 V	Frequency	50 Hz
Rated power P2	1,3 kW	Nominal Speed	1330 1/min
Number of poles	4	Efficiency	67,2 %
Power factor	0,77	Rated current	3,6 A
Starting current	11,1 A	Rated torque	9,34 Nm
Starting torque	20 Nm	Degree of protection	IP 68
Insulation class	F	No. starts per hour	15

Sulzer reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

Spaix® 4, Version 4.3.4 - 2017/03/02 (Build 576)
Data version Mar-2017



Title:

1500

Date: 20.01.2016

Drawn by: PW

All Dimensions in mm

Do Not Scale

PDAS Ltd
Pump Design and Services Ltd

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GRP PUMP CHAMBER INSTALLATION GUIDELINES

HEALTH & SAFETY AT WORK 1974

As with all site work the dangers of working with water and electricity pose severe threats to health if obvious and fundamental precautions are not taken. Therefore if you are in any doubt to any of the following, please do not hesitate to contact us.

All site work should be undertaken by qualified personnel only.

Lifting & Storage

Great care should be taken when lifting & handling the chambers and suitable equipment should be used at all times. The nature of the design means the centre of gravity of the chamber is likely to be offset. The chambers are best lifted by crane using webbing lifting straps (under no circumstances should chains or other unsuitable equipment be used unless lifting eyes are provided). Any storage site should be free of any object which may cause damage to the chamber and the chamber should be secured to prevent any rolling.

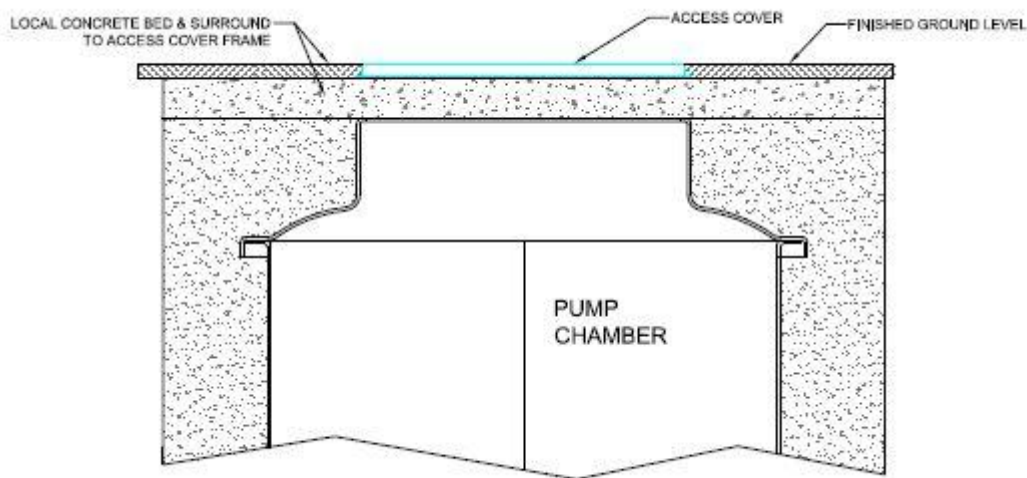
Pre-Installation Inspection

Before installation an inspection of the chamber must be carried out to ensure no damage has occurred since delivery and to check all inlet and outlet connections are correct. **Any changes or repairs cannot be made once installation has begun.**

Tank Installation

- Select a suitable location for the tank. This will be normally at ground level lower than the properties being drained and allow for the falls in site drainage.
- Check that no other structure or special access is required over the selected spot. Provision can always be made, if necessary, to place the tank on a roadway, provided that protective backfill is placed around it and a suitable heavy-duty manhole cover is used over the opening.
- Check that no underground cable, pipe or service duct, lies underneath.
- Excavate the minimum opening in the ground to receive the pumpwell and pipework to be used. If a machine is used to remove the spoil, the sides of the excavation should be battened for stability and a sump left in one corner for dewatering purposes.
- The depth of excavation needs to be at most 500mm deeper than the overall tank depth. If it is dug by hand, the sides will require shoring up for safety, to prevent earth slippage.
- A dewatering pump **MUST** be used to remove any ground water present & provide a dry excavation until the concrete backfill is set.
- Some clean hardcore should be placed and consolidated in the base of the excavation. Usually this will need to be about 200mm thick, but in good ground, should be a minimum of 50mm.
- In order to be protected from any external force the chamber should be completely surrounded by concrete. The concrete surrounding the chamber should be of suitable thickness, usually a minimum of 150mm, and quality to protect the chamber from all external pressure. Whether this is ground pressure, ground water pressure, trafficked areas or any other force which may cause damage or de-formation to the chamber. Therefore we recommend a qualified civil/structural engineer is consulted to specify the correct concrete backfill suitable for your specific site requirements.
- Pour the appropriate amount of concrete on top of the hardcore and then lower the chamber onto the damp concrete allowing the base flange, if fitted, to settle in, ensuring that the inlet and outlet pipes are correctly aligned.

- Fill the chamber with clean water to depth of approx 500mm and recheck levels. **Do not overfill as the chamber is not designed to hold water when not supported.**
- Carefully commence pouring of the concrete backfill in **small stages** evenly around the chamber ensuring there are no voids which may allow ground water to penetrate. **Vibrating pokers should be used with care to avoid damage to the chamber.** Continue filling the chamber with clean water whilst evenly backfilling, ensuring the water level is no more than 300mm above the level of the concrete backfill. Connect up the site pipework to the inlet and outlet of the pump well and continue to backfill.
- **Under no circumstances should concrete be poured directly onto the chamber. Attempting to pour too much concrete at once will result in the chamber “floating” or particularly above the half way point damage to the chamber due to excessive weight on the chamber body for which the manufacturers will not be responsible.**
- Finish off the surface of the concrete at the required level, depending on the final ground cover required i.e. topsoil, tarmac, gravel etc (see below).



**PLEASE ALLOW THE CONCRETE BACKFILL
TO SET BEFORE PUMPING THE WATER
FROM THE PUMP CHAMBER.**

IMPORTANT NOTES

THE CONCRETE BACKFILL IS DESIGNED TO PROTECT THE CHAMBER FROM EXTERNAL GROUND & WATER PRESSURE. THEREFORE IT SHOULD BE WATERTIGHT. WE CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE OR DE-FORMATION OF THE CHAMBER OR PIPEWORK CAUSED BY EXTERNAL GROUND OR WATER PRESSURE OR GROUND MOVEMENT DURING OR AFTER INSTALLATION.

ADDITIONAL NOTES

A cable duct is required with **no sharp bends**, minimum size 110mm.

It is most important that once the tank is in situ with all the inlet connections made, the drainage system should be flushed out, **and all sand, debris etc. removed from the chamber.**

If vehicular traffic will be passing over the chamber, it is **ESSENTIAL** that the cover slab is constructed so that there is **NO DIRECT LOAD** on the chamber. Also an access cover with the correct specified **S.M.W.L.** must be used.

By beginning installation of the unit the installer is deemed to have read and complied with the above. Failure to do so will invalidate your warranty. If you have any questions please remember we are only a telephone call away.

PDAS Ltd Terms and Conditions for Sale and Installation of Goods

1 INTERPRETATION

1.1 In these conditions, the definitions set out below shall apply.

Buyer: the firm or company who purchases the Goods from the Company.

Company: PDAS Ltd (Pump Design and Services Ltd).

Contract: any contract between the Company and the Buyer for the sale and purchase and, if applicable, installation of the Goods incorporating these conditions.

Site: the site address as specified in the quotation provided by the Company to the Buyer.

Delivery Point: the place where delivery of the Goods is to take place under condition 4.

Goods: any goods agreed in the Contract to be supplied to the Buyer by the Company (including any part or parts thereof).

1.2 Any reference to a statute or a provision of a statute includes the same as amended, re-enacted or consolidated at the relevant time.

1.3 The headings are for convenience only and shall not affect interpretation of these conditions.

1.4 References to the singular include the plural and vice versa as the context admits or requires.

2 APPLICATION OF TERMS

2.1 Subject to any variation under condition 2.3 the Contract shall be on these conditions to the exclusion of all other terms and conditions (including any terms or conditions which the Buyer purports to apply under any purchase order, confirmation of order, specification or other document).

2.2 No terms or conditions endorsed on, delivered with or contained in the Buyer's purchase order, confirmation of order, specification or other document shall form part of the Contract simply as a result of such document being referred to in the Contract.

2.3 These conditions apply to all the Company's sales and any variation to these conditions and any representations about the Goods shall have no effect unless expressly agreed in writing and signed by an authorised signatory of the Company. The Buyer acknowledges that it has not relied on any statement, promise or representation made or given by or on behalf of the Company which is not set out in the contract. Nothing in this condition shall exclude or limit the Company's liability for fraudulent misrepresentation.

2.4 Each order or acceptance of a quotation for Goods by the Buyer from the Company shall be deemed to be an offer by the Buyer to buy Goods subject to these conditions.

2.5 No order placed by the Buyer shall be deemed to be accepted by the Company until a written acknowledgement of order is issued by the Company or (if earlier) the Company delivers the Goods to the Buyer.

2.6 The Buyer shall ensure that the terms of its order and any applicable specification are complete and accurate.

2.7 Any quotation is given on the basis that no Contract shall come into existence until the Company despatches an acknowledgement of order to the Buyer. Any quotation is valid for a period of 60 days only from its date, provided that the Company has not previously withdrawn it.

3 DESCRIPTION

3.1 The quantity and description of the Goods shall be as set out in the Company's quotation or acknowledgement of order.

3.2 All samples, drawings (including, but not limited to, any drawing created by the Company's engineer(s)) descriptive matter, specifications and/or advertising issued by the Company and any descriptions or illustrations contained in the Company's catalogues or brochures

are issued or published for the sole purpose of giving an approximate idea of the Goods described in them. They shall not form part of the Contract and this is not a sale by sample.

4 DELIVERY AND INSTALLATION

4.1 Unless otherwise agreed in writing by the Company, delivery of the Goods shall take place when the Company's delivery vehicles arrive at the Site. For the avoidance of doubt, it shall be the Buyer's responsibility to unload the Goods from the Company's delivery vehicles.

4.2 Any dates specified by the Company for delivery of the Goods are intended to be an estimate and time for delivery shall not be made of the essence by notice. If no dates are so specified, delivery shall be within a reasonable time.

4.3 Subject to the other provisions of these conditions the Company shall not be liable for any direct, indirect or consequential loss (all three of which terms include, without limitation, pure economic loss, loss of profits, loss of business, depletion of goodwill and similar loss), costs, damages, charges or expenses caused directly or indirectly by any delay in the delivery or, if applicable, delay in the installation of the Goods (even if caused by the Company's negligence), nor shall any delay entitle the Buyer to terminate or rescind the Contract unless such delay exceeds 180 days.

4.4 If for any reason the Buyer fails to accept delivery of any of the Goods when they are delivered, or the Company is unable to deliver the Goods on time because the Buyer has not provided appropriate instructions, documents, licences or authorisations:

a) risk in the Goods shall pass to the Buyer (including for loss or damage caused by the Company's negligence);

b) the Goods shall be deemed to have been delivered and the Company's invoice shall be raised for payment as if delivery had actually taken place;

c) the Company may store the Goods at its sole discretion until delivery (entirely at the Buyer's risk) whereupon the Buyer shall be liable for all related costs and expenses (including, without limitation, storage and insurance) save that the Company may, at its sole discretion at any time, cease to provide such storage facilities; and

d) insured storage will only be arranged on written request from the Buyer and, in any event, will be provided at a cost of £50 per week.

4.5 The Company may deliver the Goods by separate instalments. Each separate instalment shall be invoiced and paid for in accordance with the provisions of the Contract.

4.6 Each instalment shall be a separate contract and no cancellation or termination of any one contract relating to an instalment shall entitle the Buyer to repudiate or cancel any other contract or instalment.

4.7 Where the Company has agreed to install the Goods then subject to satisfaction of the Buyer's obligations set out in these conditions in relation to delivery and installation, the Company shall install the Goods at the Buyer's premises with reasonable skill and care.

4.8 The Company shall separately make available to the Buyer its requirements for site readiness for installation of the Goods.

4.9 The Buyer shall be responsible for making the Site ready for installation which shall include, without limitation, ensuring that chambers are constructed with the cover slabs in position or the tank buried; ensuring that chambers are dry and free from rubble; kiosk plinth, to ensure that cable duct and other associated works have already been constructed; and to ensure that there is reasonable hard road vehicle access or alternatively assistance and/or craneage if it is not possible to park vehicles adjacent to the pump chamber.

4.10 Where the Company has agreed to install the Goods at the Site and the Goods have been delivered but the Site is not ready for installation to be completed, risk in the Goods shall pass to the Buyer who shall be responsible for insuring and storing the Goods and for any loss and/or damage, howsoever caused, to the Goods.

4.11 Save where a separate maintenance agreement has been entered into with the Company (in which case visits to the Site shall be governed in accordance with that separate agreement and/or any related conditions), after delivery and, if appropriate, completion of installation of the Goods, any attendance at the Site and/or investigations or maintenance by the Company in relation to the Goods shall be chargeable to the Buyer at the Company's usual rates.

5 NON-DELIVERY

5.1 The quantity of any consignment of Goods as recorded by the Company upon despatch from the Company's place of business shall be conclusive evidence of the quantity received by the Buyer on delivery unless the Buyer can provide conclusive evidence proving the contrary.

5.2 Any liability of the Company for non-delivery of the Goods shall be limited to replacing the Goods within a reasonable time or issuing a credit note at the pro rata Contract rate against any invoice raised for such Goods.

6 RISK/TITLE

6.1 The Goods are at the risk of the Buyer from the time of delivery.

6.2 Ownership of the Goods shall not pass to the Buyer until the Company has received in full (in cash or cleared funds) all sums due to it in respect of:

a) the Goods; and

b) all other sums which are or which become due to the Company from the Buyer on any account.

6.3 Until ownership of the Goods has passed to the Buyer, the Buyer shall:

a) hold the Goods on a fiduciary basis as the Company's bailee;

b) where the Goods have not been installed, store the Goods (at no cost to the Company) separately from all other goods of the Buyer or any third party in such a way that they remain readily identifiable as the Company's property;

c) not destroy, deface or obscure any identifying mark or packaging on or relating to the Goods; and

d) maintain the Goods in satisfactory condition and keep them insured on the Company's behalf for their full price against all risks to the reasonable satisfaction of the Company. On request the Buyer shall produce the policy of insurance to the Company.

6.4 The Buyer may re-sell the Goods before ownership has passed to it solely on the following conditions:

a) any sale shall be effected in the ordinary course of the Buyer's business at full market value; and

b) any such sale shall be a sale of the Company's property on the Buyer's own behalf and the Buyer shall deal as principal when making such sale.

6.5 The Buyer's right to possession of the Goods shall terminate immediately if:

a) the Buyer convenes a meeting of creditors (whether formal or informal), or enters into liquidation (whether voluntary or compulsory) except a solvent voluntary liquidation for the purpose only of reconstruction or amalgamation, or has a receiver and/or manager, administrator or administrative receiver appointed of its undertaking or any part thereof, or documents are filed with the court for the appointment of an administrator of the Buyer or notice of intention to appoint an administrator is given by the Buyer or its directors or by a qualifying floating charge holder (as defined in paragraph 14 of Schedule B1 to the Insolvency Act 1986), or a resolution is passed or a petition presented to any court for the winding-up of the Buyer or for the granting of an administration order in respect of the Buyer, or any proceedings are commenced relating to the insolvency or possible insolvency of the Buyer; and/or

b) the Buyer suffers or allows any execution, whether legal or equitable, to be levied on its property or obtained against it, or fails to observe or perform any of its obligations under the Contract or any other contract between the Company and the Buyer, or is unable to pay its debts within the meaning of section 123 of the Insolvency Act 1986 or the Buyer ceases to trade; and/or

c) the Buyer encumbers or in any way charges any of the Goods.

6.6 The Company shall be entitled to recover payment for the Goods notwithstanding that ownership of any of the Goods has not passed from the Company.

6.7 The Buyer grants the Company, its agents and employees an irrevocable licence at any time to enter any premises where the Goods are or may be stored in order to inspect them, or, where the Buyer's right to possession has terminated, to recover them.

6.8 Where the Company is unable to determine whether any Goods are the goods in respect of which the Buyer's right to possession has terminated, the Buyer shall be deemed to have sold all goods of the kind sold by the Company to the Buyer in the order in which they were invoiced to the Buyer.

6.9 On termination of the Contract, howsoever caused, the Company's (but not the Buyer's) rights contained in this condition 6 shall remain in effect.

7 PRICE

7.1 Unless otherwise agreed by the Company in writing, the price for the Goods shall be the price set out in the Company's price list published on the date of delivery or deemed delivery.

7.2 The price for the Goods shall be exclusive of any value added tax (if applicable) and all costs or charges in relation to packaging, loading, unloading, carriage and insurance, all of which amounts the Buyer shall pay in addition when it is due to pay for the Goods.

8 PAYMENT

8.1 Subject to condition 8.4, payment of the price for the Goods is due in pounds sterling within 30 days of the date of the invoice.

8.2 Time for payment shall be of the essence.

8.3 No payment shall be deemed to have been received until the Company has received cleared funds.

8.4 All payments payable to the Company under the Contract shall become due immediately on its termination despite any other provision.

8.5 If the Buyer fails to pay the Company any sum due pursuant to the Contract, the Buyer shall be liable to pay interest to the Company on such sum from the due date for payment at the annual rate of 4 % above the base lending rate from time to time of the Bank of England, accruing on a daily basis until payment is made, whether before or after any judgment.

9 CANCELLATION OF ORDER

9.1 The Buyer acknowledges that the Company will begin to incur costs (including, but not limited to, the cost of raising purchase orders with suppliers) following the date of the order acknowledgement letter sent by the Company to the Buyer confirming the order for the Goods (the "Order Acknowledgement Letter"). The Buyer further acknowledges and agrees that a cancellation charge of 20% of the value of the Contract will be incurred if the Contract is cancelled after the date of the Order Acknowledgement Letter but before delivery of the Goods has taken place.

10 NO SET-OFF/RETENTIONS, ETC

The Buyer shall make all payments due under the Contract in full on time without any retention or deduction whether by way of set-off, counterclaim, discount, abatement or otherwise unless the Buyer has a valid court order requiring an amount equal to such deduction to be paid by the Company to the Buyer.

11 QUALITY

11.1 Where the Company is not the manufacturer of the Goods, the Company shall endeavour to transfer to the Buyer the benefit of any warranty or guarantee given to the Company.

11.2 Save for where a separate maintenance contract has been entered into between the Company and the Buyer (in which case the provisions of that contract and/or any relevant conditions shall apply in connection with the maintenance and warranty obligations of the Company), the Company warrants that (subject to the other provisions of these conditions) upon delivery, and for a period of 12 months after delivery or deemed delivery, the Goods shall be of satisfactory quality within the meaning of the Sale of Goods Act 1979 save that, where the Goods have been installed by the Company at the Site, the Buyer shall be liable for any defects caused by treatment of the Goods during any intervening period between delivery and installation.

11.3 The Company shall not be liable for a breach of the warranty in condition 11.2 unless:

a) the Buyer gives written notice of the defect to the Company, and, if the defect is as a result of damage in transit to the carrier, within 7 days of the time when the Buyer discovers or ought to have discovered the defect; and

b) the Company is given a reasonable opportunity, after receiving the notice, of examining such Goods and the Buyer complies with condition 11.

11.4 The Company shall not be liable for a breach of the warranty in condition 11.2 if:

a) the Buyer makes any further use of such Goods after giving such notice; or

b) the defect arises because the Buyer failed to follow the Company's oral or written instructions as to the storage, installation, commissioning, use or maintenance of the Goods or (if there are none) good trade practice; or

c) the Buyer alters or repairs such Goods without the written consent of the Company.

11.5 If the Buyer considers that the Goods do not conform with the warranty in condition 11.2, it may (at its own cost) return the Goods to the Company's premises for inspection, subject to advance notification of its intention to do so.

11.6 Subject to condition 11.3 and condition 11.4 if, in the Company's opinion following the inspection referred to in clause 11.5, any of the Goods do not conform with the warranty in condition 11.2, the Company shall at its option repair or replace such Goods (or the defective part) or refund the price of such Goods at the pro rata Contract rate.

11.7 The Company shall bear the cost of delivering the repaired/replacement Goods/part of the Goods to the Site but it shall be the Buyer's responsibility to unload the Goods/part of the Goods and risk shall pass at the point the Company's delivery vehicles arrive at the Site.

11.8 If the Company complies with condition 11.5 it shall have no further liability for a breach of the warranty in condition 11.2 in respect of such Goods.

11.9 Any Goods replaced shall belong to the Company and any repaired or replacement Goods shall be guaranteed on these terms for the unexpired portion of the Company's supplier's and/or manufacturer's warranty.

12 LIMITATION OF LIABILITY

12.1 Subject to condition 4, condition 5, and condition 11, the following provisions set out the entire financial liability of the Company (including any liability for the acts or omissions of its employees, agents and sub-contractors) to the Buyer in respect of:

a) any breach of these conditions;

b) any use made or resale by the Buyer of any of the Goods, or of any product incorporating any of the Goods; and

c) any representation, statement or tortious act or omission including negligence arising under or in connection with the Contract.

12.2 Subject to condition 11.2, all warranties, conditions and other terms implied by statute or common law (save for the conditions implied by section 12 of the Sale of Goods Act 1979) are, to the fullest extent permitted by law, excluded from the Contract.

12.3 Nothing in these conditions excludes or limits the liability of the Company:

a) for death or personal injury caused by the Company's negligence; or

b) for any matter which it would be illegal for the Company to exclude or attempt to exclude its liability; or

c) for fraud or fraudulent misrepresentation.

12.4 Subject to condition 12.2 and condition 12.3:

a) the Company's total liability in contract, tort (including negligence or breach of statutory duty), misrepresentation, restitution or otherwise, arising in connection with the performance or contemplated performance of the Contract shall be limited to the price payable for the Goods under the Contract; and

b) the Company shall not be liable to the Buyer for any pure economic loss, loss of profit, loss of business, depletion of goodwill or otherwise, in each case whether direct, indirect or consequential, or any claims for consequential compensation whatsoever (howsoever caused) which arise out of or in connection with the Contract.

13 ASSIGNMENT

13.1 The Company may assign the Contract or any part of it to any person, firm or company.

13.2 The Buyer shall not be entitled to assign the Contract or any part of it without the prior written consent of the Company.

14 FORCE MAJEURE

The Company reserves the right to defer the date of delivery or to cancel the Contract or reduce the volume of the Goods ordered by the Buyer (without liability to the Buyer) if it is prevented from or delayed in the carrying on of its business due to circumstances beyond the reasonable control of the Company including, without limitation, acts of God, governmental actions, war or national emergency, acts of terrorism, protests, riot, civil commotion, fire, explosion, flood, epidemic, lock-outs, strikes or other labour disputes (whether or not relating to either party's workforce), or restraints or delays affecting carriers or inability or delay in obtaining supplies of adequate or suitable materials, provided that, if the event in question continues for a continuous period in excess of 180 days, the Buyer shall be entitled to give notice in writing to the Company to terminate the Contract.

15 COMMUNICATIONS

Any formal communications or notices given by either of us under the Contract must be in writing and signed by a director of the Company and delivered by hand, first class post or fax (in the case of fax a transmission/delivery receipt shall be proof of service) and shall be deemed effectively given on the date when in the ordinary course of the means of transmission it would be received by the addressee in normal business hours. No email communication shall have legal effect or be usable as evidence.

16 GENERAL

16.1 Each right or remedy of the Company under the Contract is without prejudice to any other right or remedy of the Company whether under the Contract or not.

16.2 If any provision of the Contract is found by any court, tribunal or administrative body of competent jurisdiction to be wholly or partly illegal, invalid, void, voidable, unenforceable or unreasonable it shall to the extent of such illegality, invalidity, voidness, voidability, unenforceability or unreasonableness be deemed severable and the remaining provisions of the Contract and the remainder of such provision shall continue in full force and effect.

16.3 Failure or delay by the Company in enforcing or partially enforcing any provision of the Contract shall not be construed as a waiver of any of its rights under the Contract.

16.4 Any waiver by the Company of any breach of, or any default under, any provision of the Contract by the Buyer shall not be deemed a waiver of any subsequent breach or default and shall in no way affect the other terms of the Contract.

16.5 The parties to the Contract do not intend that any term of the Contract shall be enforceable by virtue of the Contracts (Rights of Third Parties) Act 1999 by any person that is not a party to it.

16.6 The formation, existence, construction, performance, validity and all aspects of the Contract shall be governed by English law and the parties submit to the exclusive jurisdiction of the English courts.



Unit 9 Lordswood Industrial Estate
 Revenge Road, Lordswood, Chatham
 Kent ME5 8UD

DATE:

SITE:

ENGINEER:

Pump Station Ref:

6 MONTHLY SERVICE SCHEDULE

ACTION	PUMP 1		PUMP 2		PUMP 3	
	Pass	Fail	Pass	Fail	Pass	Fail
Pump Down On Manual						
Check Valve Operation						
Check Pipework For Leaks						
Check Control Panel						
Check Panel Bulbs						
Amp Meter Reading (Panel or Hand Meter)						
Hours Run						
Electricity Meter Reading						
Check Overloads & Fuses						
Check Condition of Motor Cables						
Megga Test Windings						
Condition Guide Rails/						
Check Lifting Chains/ Shackles/Lifting Gear						

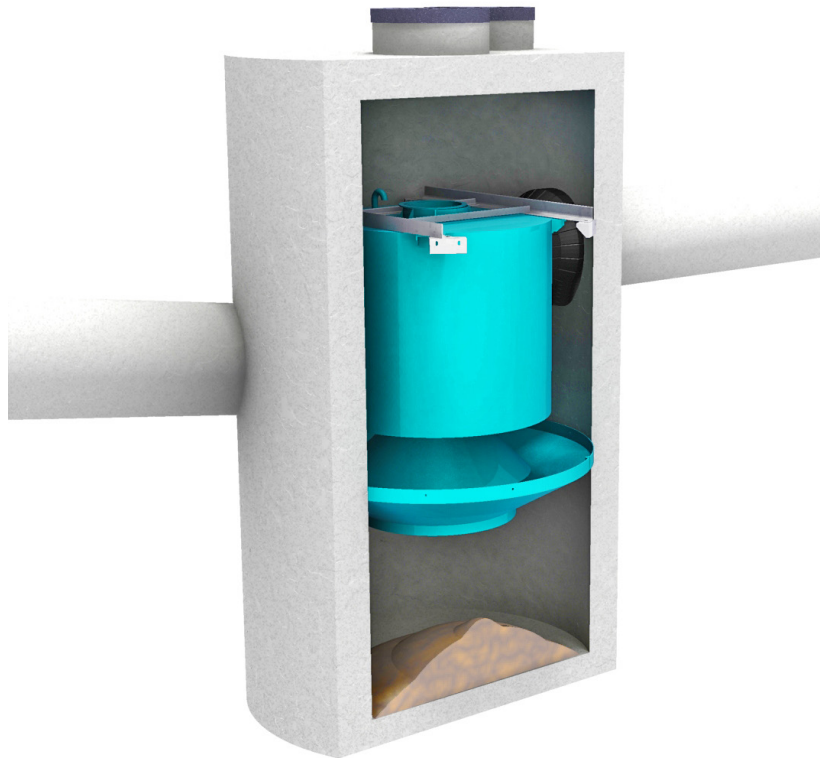
	Checked	Pass	Fail	Status
Clean Floats/Ultrasonic Transducer				
Check Float/Ultrasonic Operation & Sequence				
Check High Level Alarm				
Condition of Wet Well/ Valve Chest				
Condition of Access Covers & Grease as Required				
Clean Wet Well (if water & power available)				
Advise if Tanker/ Jetter Required				
Check Heater & Lights				
Inspect Earthing System				
Condition of Kiosk				
Ensure System Reset and Left In Auto.				

PUMP DESCRIPTION	SERIAL NO.s
1	
2	
3	
4	
Notes:	
Client Signature:	Print:

APPENDIX (4)

DOWNSTREAM DEFENDER – MAINTENANCE MANUAL

BSO/E4462/16108



Operation and Maintenance Manual

Downstream Defender[®]

Vortex Separator for Stormwater Treatment

Turning Water Around ...[®]

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DISCLAIMER: Information and data contained in this manual is exclusively for the purpose of assisting in the operation and maintenance of Hydro International plc's Downstream Defender®. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc have a policy of continuous product development and reserve the right to amend specifications without notice.

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Downstream Defender® by Hydro International

The Downstream Defender® is an advanced Hydrodynamic Vortex Separator designed to provide high removal efficiencies of settleable solids and their associated pollutants, oil, and floatables over a wide range of flow rates.

The Downstream Defender® has unique, flow-modifying internal components developed from extensive full-scale testing, CFD modeling and over thirty years of hydrodynamic separation experience in wastewater, combined sewer and stormwater applications. These internal components distinguish the Downstream Defender® from simple swirl-type devices and conventional oil/grit separators by minimizing turbulence and headlosses, enhancing separation, and preventing washout of previously stored pollutants.

The high removal efficiencies and inherent low headlosses of the Downstream Defender® allow for a small footprint making it a compact and economical solution for the treatment of non-point source pollution.

Benefits of the Downstream Defender®

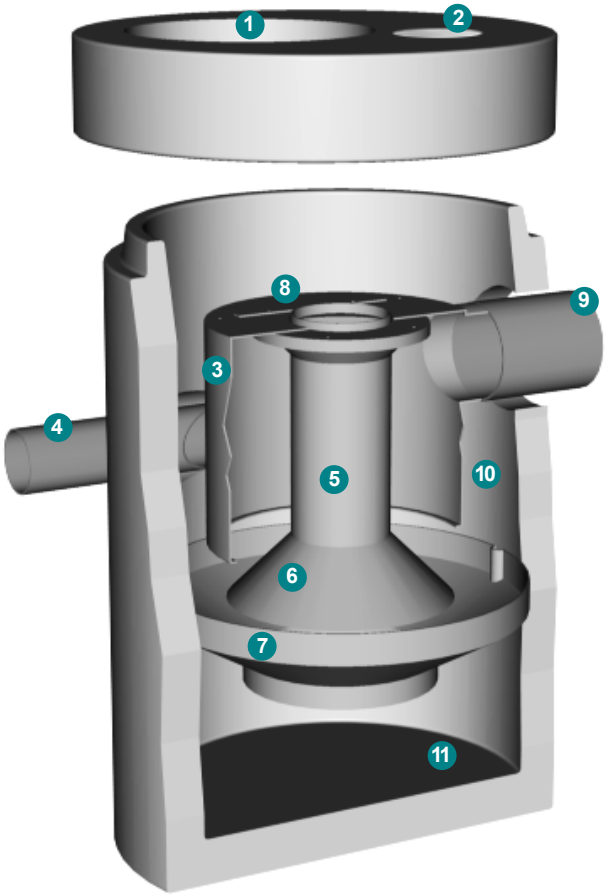
- Removes sediment, floatables, oil and grease
- No pollutant washouts
- Small footprint
- No loss of treatment capacity between clean-outs
- Low headloss
- Efficient over a wide ranges of flows
- Easy to install
- Low maintenance

Applications

- New developments and retrofits
- Utility yards
- Streets and roadways
- Parking lots
- Pre-treatment for filters, infiltration and storage
- Industrial and commercial facilities
- Wetlands protection

Downstream Defender® Components

1. Central Access Port
2. Floatables Access Port (6-ft., 8-ft. and 10-ft. models only)
3. Dip Plate
4. Tangential Inlet
5. Center Shaft
6. Center Cone
7. Benching Skirt
8. Floatables Lid
9. Outlet Pipe
10. Floatables Storage
11. Isolated Sediment Storage Zone



HYDRO MAINTENANCE SERVICES

Hydro International has been engineering stormwater treatment systems for over 30 years. We understand the mechanics of removing pollutants from stormwater and how to keep systems running at an optimal level.

NOBODY KNOWS OUR SYSTEMS BETTER THAN WE DO



Avoid Service Negligence

Sanitation services providers not intimately familiar with stormwater treatment systems are at risk of the following:

- Inadvertently breaking parts or failing to clean/replace system components appropriately.
- Charging you for more frequent maintenance because they lacked the tools to service your system properly in the first place.
- Billing you for replacement parts that might have been covered under your Hydro warranty plan
- Charging for maintenance that may not yet have been required.

LEAVE THE DIRTY WORK TO US

Trash, sediment and polluted water is stored inside treatment systems until they are removed by our team with a vactor truck. Sometimes teams must physically enter the system chambers in order to prepare the system for maintenance and install any replacement parts. Services include but are not limited to:

- Solids removal
- Removal of liquid pollutants
- Replacement media installation (when applicable)



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Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

BETTER TOOLS, BETTER RESULTS

Not all vactor trucks are created equal. Appropriate tools and suction power are needed to service stormwater systems appropriately. Companies who don't specialize in stormwater treatment won't have the tools to properly clean systems or install new parts.



SERVICE WARRANTY

Make sure you're not paying for service that is covered under your warranty plan. Only Hydro International's service teams can identify tune-ups that should be on us, not you.

TREATMENT SYSTEMS SERVICED BY HYDRO:

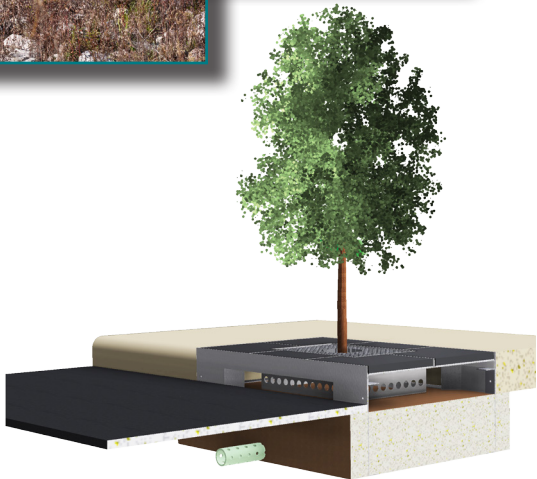
- Stormwater filters
- Stormwater separators
- Baffle boxes
- Biofilters/biorention systems
- Storage structures
- Catch basins
- Stormwater ponds
- Permeable pavement



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Operation

Introduction

The Downstream Defender® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The Downstream Defender® has been designed to allow for easy and safe access for inspection/monitoring and clean-out procedures. Entry into the unit or removal of the internal components is not necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the Downstream Defender® have been designed to protect the oil, floatables and sediment storage volumes so that separator performance is not reduced as pollutants accumulate between clean-outs. Additionally, the Downstream Defender® is designed and installed into the storm drain system so that the vessel remains wet between storm events. Oil and floatables are stored on the water surface in the outer annulus separate from the sediment storage volume in the sump of the unit providing the option for separate oil disposal, and accessories such as adsorbant pads. Since the oil/floatables and sediment storage volumes are isolated from the active separation region, the potential for re-suspension and washout of stored pollutants between clean-outs is minimized.

Wet Sump

The sump of the Downstream Defender® retains a standing water level between storm events. The water in the sump prevents stored sediment from solidifying in the base of the unit. The clean-out procedure becomes more difficult and labor intensive if the system allows fine sediment to dry-out and consolidate. Dried sediment must be manually removed by maintenance crews. This is a labor intensive operation in a hazardous environment.

Blockage Protection

The Downstream Defender® has large clear openings and no internal restrictions or weirs, minimizing the risk of blockage and hydraulic losses. In addition to increasing the system headloss, orifices and internal weirs can increase the risk of blockage within the unit.

Maintenance

Overview

The Downstream Defender® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the Downstream Defender®. The Downstream Defender® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the Downstream Defender® will no longer be able to store removed sediment and oil. Maximum pollutant storage capacities are provided in Table 1.

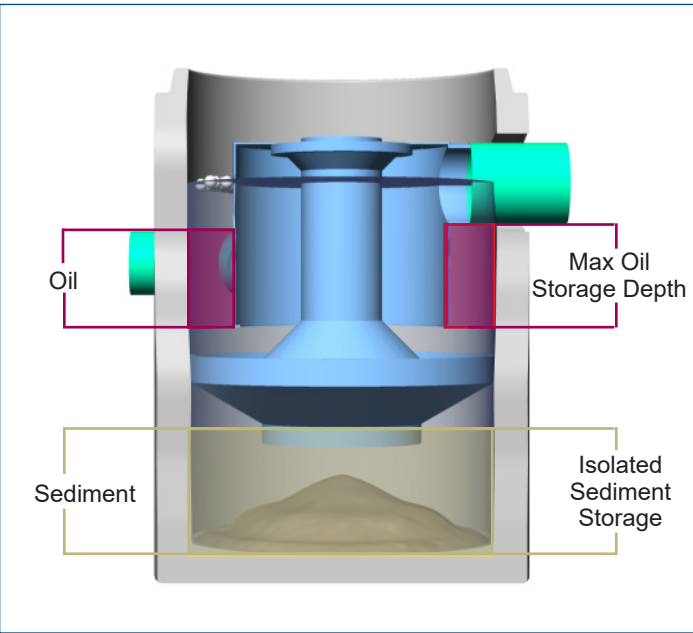


Fig.1 Pollutant storage volumes of the Downswtream Defender®.

Inspection Procedures

Inspection is a simple process that does not involve entry into the Downstream Defender®. Maintenance crews should be familiar with the Downstream Defender® and its components prior to inspection.

Scheduling

- It is important to inspect your Downstream Defender® every six months during the first year of operation to determine your site-specific rate of pollutant accumulation
- Typically, inspection may be conducted during any season of the year
- Sediment removal is not required unless sediment depths exceed 75% of maximum clean-out depths stated in Table 1

Recommended Equipment

- Safety Equipment and Personal Protective Equipment (traffic cones, work gloves, etc.)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net
- Sediment probe (such as a Sludge Judge®)
- Trash bag for removed floatables
- Downstream Defender® Maintenance Log

The Downstream Defender® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole. On the 6-ft, 8-ft and 10-ft units, the floatables access port is above the outlet pipe between the concrete manhole wall and the dip plate. The sediment removal access ports for all Downstream Defender® models are located directly over the hollow center shaft.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the Downstream Defender®, nor do they require the internal components of the Downstream Defender® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Determining Your Maintenance Schedule

The frequency of cleanout is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil/flotables removal, for a 6-ft Downstream Defender® typically takes less than 30 minutes and removes a combined water/oil volume of about 500 gallons.

Table 1. Downstream Defender® Pollutant Storage Capacities and Max. Cleanout Depths.

Unit Diameter	Total Oil Storage	Oil Clean-out Depth	Total Sediment Storage	Sediment Clean-out Depth	Max. Liquid Volume Removed
(feet)	(gallons)	(inches)	(gallons)	(inches)	(gallons)
4	70	<16	141	<18	384
6	216	<23	424	<24	1,239
8	540	<33	939	<30	2,884
10	1,050	<42	1,757	<36	5,546
12	1,770	<49	2,970	<42	9,460

NOTES

1. Refer to Downstream Defender® Clean-out Detail (Fig. 1) for measurement of depths.
2. Oil accumulation is typically less than sediment, however, removal of oil and sediment during the same service is recommended.
3. Remove floatables first, then remove sediment storage volume.
4. Sediment removal is not required unless sediment depths exceed 75% of maximum clean-out depths stated in Table 1.



Fig. 4



Fig. 5



Fig. 6

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the Downstream Defender® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the lids to the manhole (Fig. 4). NOTE: The 4-ft Downstream Defender® will only have one lid.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. See Fig. 7 and 8 for typical inspection views.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the outer annulus of the chamber.
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel (Fig. 5).
6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.



Fig. 7 View over center shaft into sediment storage zone.

7. Securely replace the grate or lid.
8. Take down safety equipment.
9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Cleanout

Floatables cleanout is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig. 6).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose and skimmer pole to be lowered to the base of the sump.

Scheduling

- Floatables and sump cleanout are typically conducted once a year during any season.
- If sediment depths are greater than 75% of maximum clean-out depths stated in Table 1, sediment removal is required.
- Floatables and sump cleanout should occur as soon as possible following a spill in the contributing drainage area.



Fig. 8 View of outer annulus of floatables and oil collection zone.

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (6-inch flexible hose recommended)
- Downstream Defender® Maintenance Log

1. Set up any necessary safety equipment around the access port or grate of the Downstream Defender® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the lids to the manhole (NOTE: The 4-ft Downstream Defender® will only have one lid).
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. Using the Floatables Port for access, remove oil and floatables stored on the surface of the water with the vactor hose or the skimmer net (Fig. 9).
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (Pg. 9).
6. Once all floatables have been removed, drop the vactor hose to the base of the sump via the Central Access Port. Vactor out the sediment and gross debris off the sump floor (Fig. 6).

7. Retract the vactor hose from the vessel.
8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.
9. Securely replace the grate or lid.

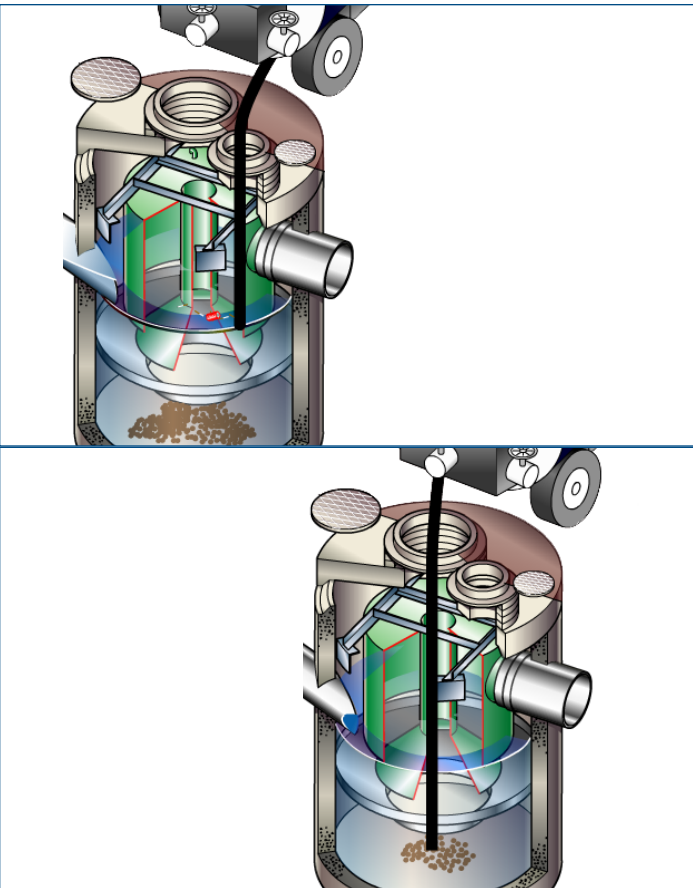


Fig. 9 Floatables and sediment are removed with a vactor hose

Maintenance at a Glance

Activity	Frequency
Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area

NOTE: For most cleanouts it is not necessary to remove the entire volume of liquid in the vessel. Only removing the first few inches of oils/floatables and the sediment storage volume is required.



Downstream Defender® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL (CIRCLE ONE): 4-FT 6-FT 8-FT 10-FT CUSTOM



Downstream Defender® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment * Depth Measured	Volume of Sediment Removed	Site Activity and Comments

*Note: Sediment removal is not required unless sediment depths exceed 75% of maximum clean-out depths stated in Table 1.

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stormwaterinquiry@hydro-int.com

www.hydro-int.com

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APPENDIX (5)

ATHLON GRILLE FOR HEADWALL

BSO/E4462/16108

