

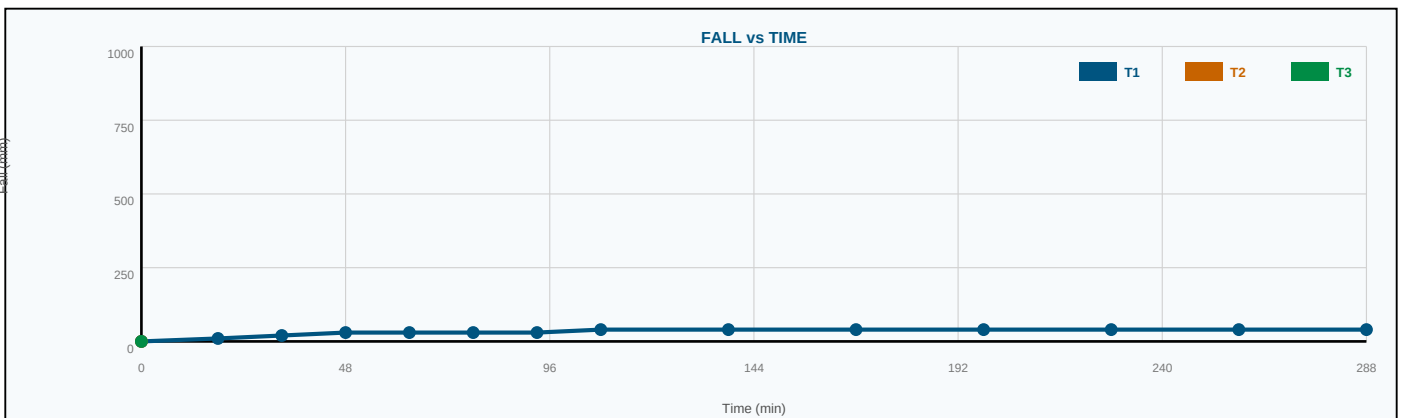
BRE 365 SOAKAWAY INFILTRATION TEST RECORD

TRIAL PIT B

TEST HOLE DIMENSIONS					
Depth of water at 100%	Depth (m)	Width (m)	Length (m)	Base Area (m²)	Vp75-25% (m³)
1.0	1.5	0.3	1.0	0.30	0.150

TEST 1		TEST 2		TEST 3	
Time (min)	Fall (mm)	Time (min)	Fall (mm)	Time (min)	Fall (mm)
0.00	0	0.00	0	0.00	0
18.00	10				
33.00	20				
48.00	30				
63.00	30				
78.00	30				
93.00	30				
108.00	40				
138.00	40				
168.00	40				
198.00	40				
228.00	40				
258.00	40				
288.00	40				
75% - 25% (min)	-	75% - 25% (min)	-	75% - 25% (min)	-
f (m/s)	-	f (m/s)	-	f (m/s)	-
f (m/hr)	-	f (m/hr)	-	f (m/hr)	-

NOTES:



WORST CASE SOIL INFILTRATION RATES		
f =	-	m/s
f =	-	m/hr

Site Photos

Site Photo 1



Trial Pit A – Pit A Photo



CONCLUSIONS — INFILTRATION TEST RESULTS SUMMARY

Project: PT1791 | Site: The Old Piggery, Fryern Road, Storrington, West Sussex, RH20 4BJ | Date: 25/06/2026

Trial Pit	Test Type	Depth (m)	Width (m)	Length (m)	Base Area (m²)	Worst-Case f (m/s)	Worst-Case f (m/hr)
A	BRE 365	1.60	0.30	1.00	0.300	-	-
B	BRE 365	1.50	0.30	1.00	0.300	-	-

CONCLUSION / RECOMMENDATIONS
Testing carried out in line with BRE365. Poor infiltration recorded, further testing abandoned.

Full satellite location plan with pit co-ordinates shown on Page 2.

Appendix D – Greenfield Runoff Rate Calculations (UKSuDS)

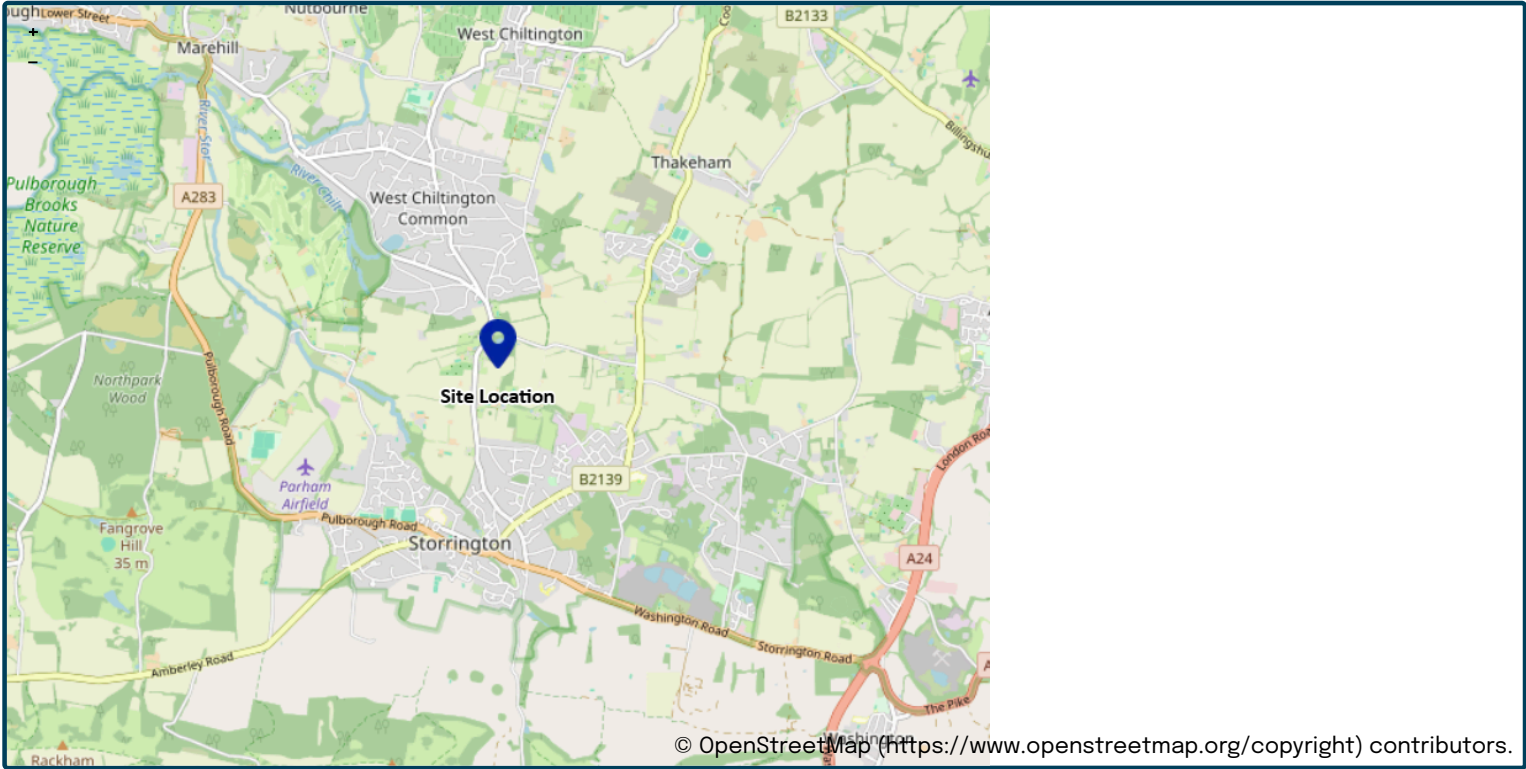
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	23/07/2026
Calculated by	Antony Riozzi
Reference	Old Piggery
Model version	2.2.3

Location

Site name	
Site location	



Site easting (British National Grid)	508942
Site northing (British National Grid)	115610

Site details

Total site area (ha)	0.0432	ha
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Greenfield runoff

Method

Method	IH124
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IH124

	<u>My value</u>		<u>Map value</u>
SAAR (mm)	890	mm	890
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		1
SPR	0.47		
QBar (IH124) (l/s)	0.3	l/s	

Growth curve factors

	<u>My value</u>		<u>Map value</u>
Hydrological region	7		7
1 year growth factor	0.85		
2 year growth factor	0.88		
10 year growth factor	1.62		
30 year growth factor	2.3		
100 year growth factor	3.19		
200 year growth factor	3.74		

Results

Method	IH124	
Flow rate 1 year (l/s)	0.2	l/s
Flow rate 2 year (l/s)	0.2	l/s
Flow rate 10 years (l/s)	0.4	l/s
Flow rate 30 years (l/s)	0.6	l/s
Flow rate 100 years (l/s)	0.9	l/s
Flow rate 200 years (l/s)	1.0	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at [uksuds.com](https://www.uksuds.com/) (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix E – Surface Water Storage Volume Calculations (Causeway Flow+)

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Depth/Area 1	0.043	30.675	7.032	57.598	0.730

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	0.0		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	45	0	0

Node Depth/Area 1 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.730	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	1.1		
Invert Level (m)	29.945	Diameter (m)	0.024		

Node Depth/Area 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	29.945	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	520	Depth (m)	0.600
Safety Factor	2.0	Width (m)	9.215	Inf Depth (m)	
Porosity	0.30	Length (m)	21.907		

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	Depth/Area 1	256	30.092	0.147	2.4	8.2581	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
360 minute summer	Depth/Area 1	Orifice	0.4	13.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	Depth/Area 1	212	30.260	0.315	6.5	18.3928	0.0000	OK

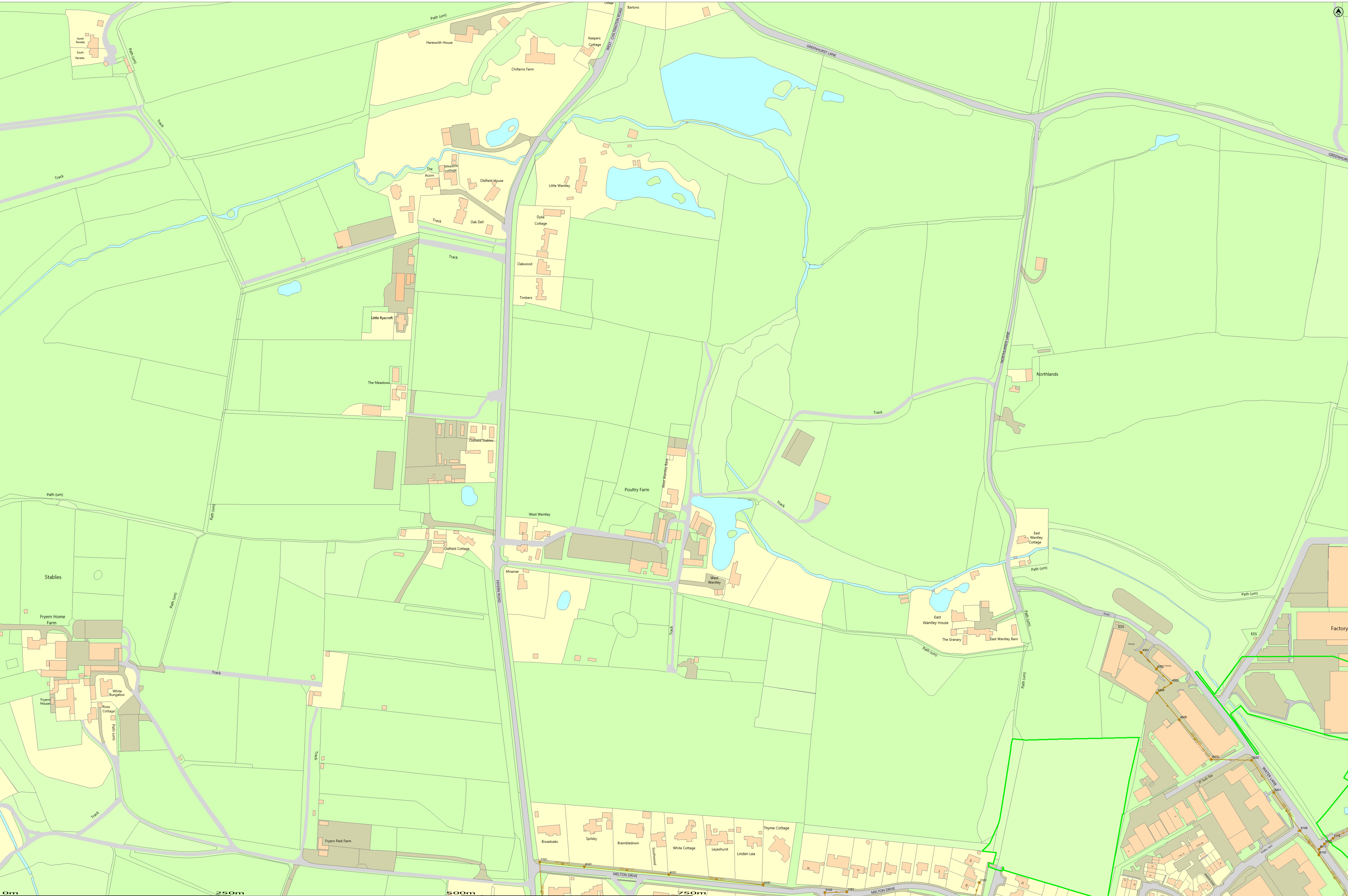
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute summer	Depth/Area 1	Orifice	0.7	24.5

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	Depth/Area 1	240	30.539	0.594	11.6	35.3193	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute summer	Depth/Area 1	Orifice	0.9	43.9

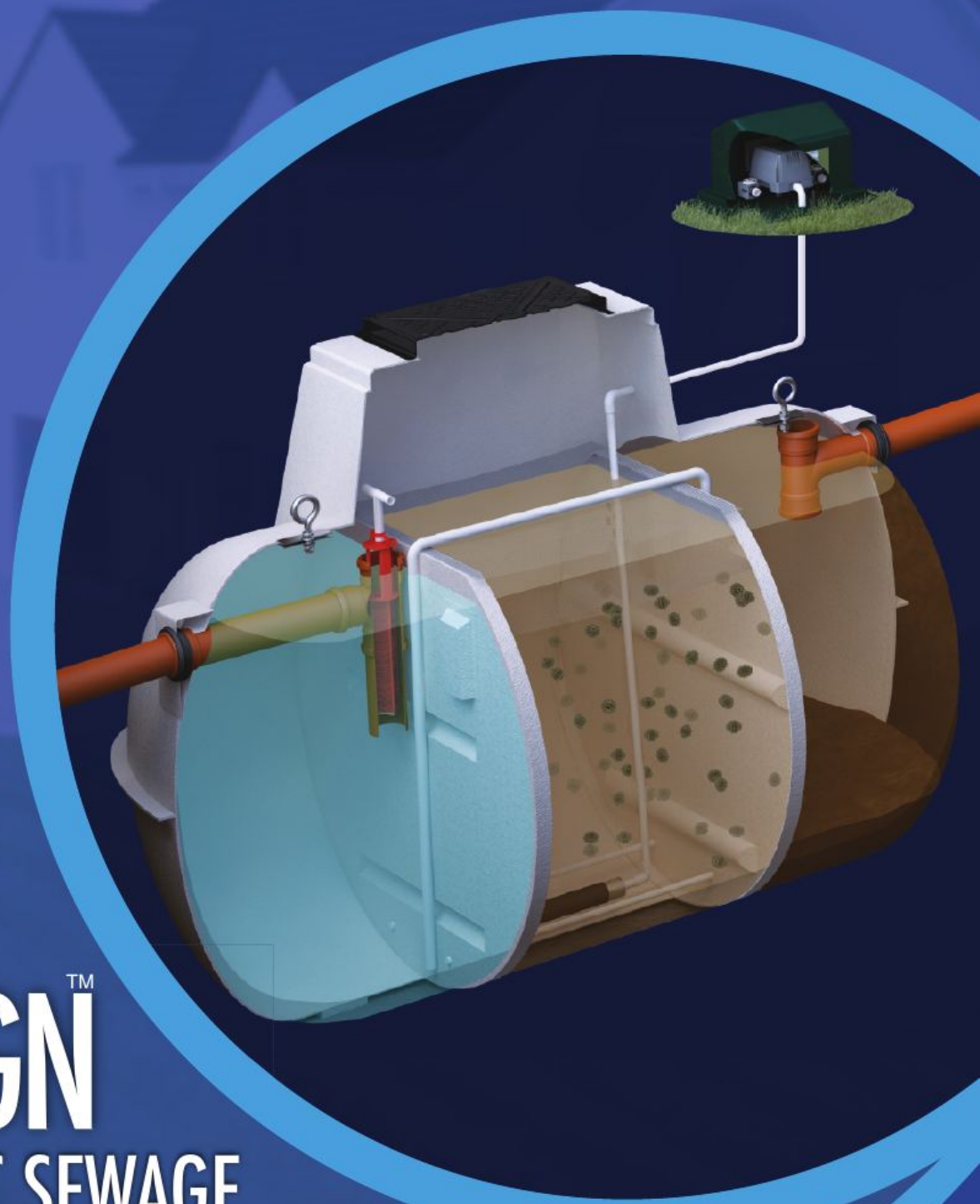
Appendix F – Southern Water Wastewater Asset Plan



0m 250m 500m 750m
Scale: 1:1250
Map Centre: 50804.119609
Data updated: 17/04/26
Our Ref: 2117793-1
Waterwise Plan A2
Powered by right

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2024 Ordnance Survey Licence AC000080122. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.
WARNING: BAC pipes are constructed of Bonded Asbestos Cement.
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Appendix G – Package Sewage Treatment Plant Specification



ENSIGNTM

DOMESTIC SEWAGE TREATMENT PLANTS

4-50PE



mp **40 YEARS**
1979 - 2019
McVeigh Parker
Farming and Fencing Specialists

TANK FEATURES



ENSIGN:ULTRA



SHALLOW ENSIGN:ULTRA

1

Inlet with 'Forsheda seal'

Forsheda seal provides flexibility in the joint for easier installation.
Optional risers to increase invert depth are available.

4

Advanced compressor with alarm

Near silent compressor ensures minimal running, maintenance and servicing costs. Integral alarm detects low pressure in air line.

5

Compressor housing (External or internal options)

The compressor can be housed internally or externally with no difference in cost. *External recommended to increase compressor life, and supplied as standard on 4PE, shallow and pumped outlet versions.*

6

RCD / Electrical connection

The RCD box provides easier installation and provides a higher degree of safety.

7

PVC pressure pipe / diffuser(s)

Provides a protective conduit for the air diffuser line. Can be easily removed for maintenance and cleaning.

8

Bio-media

High specification bio-media (310m³ per m²) and membrane diffusers ensure even circulation to eliminate 'dead spots'. The bio-media is contained by a stainless steel securing mesh to ensure no migration during handling or potential flooding.

9

Stainless steel mesh

Retains media in aeration chamber during transportation and handling, and in the event of flooding.

11

32mm sludge return

Larger diameter sludge return prevents the possibility of blockages and improves system circulation. Provides higher effluent quality whilst balancing flow over a 24 hour period or periods of intermittent use.

12

Unique Polylok tertiary filter (Ensign:Ultra unit only)

The Polylok tertiary filter reduces suspended solids and BOD by a further 40% helping to extend drainage field life.

13

Outlet with 'Forsheda seal'

Forsheda seal provides flexibility in the joint for easier installation.
Optional pumped outlets are available.

14

Impermeable lid

Heavy duty lid/frame improves strength and durability whilst blending into the surrounding environment.

SPECIFICATIONS

Ensign:Ultra								Shallow Ensign:Ultra							
Model	Length	Width	Height	Inlet		Outlet		Model	Length	Width	Height	Inlet		Outlet	
(Pop)		+/-100mm		Invert	Ø	Invert	Ø	(Pop)		+/-100mm		Invert	Ø	Invert	Ø
4	1600	1332	1575	540	110	600	110	6	2860	1912	1600	500	110	575	110
6	2602	1650	1935	550	110	625	110	8	2860	1912	1600	500	110	575	110
8	2602	1650	1935	550	110	625	110	10	2860	1912	1600	500	110	575	110
10	2602	1650	1935	550	110	625	110	12	2860	1912	1600	500	110	575	110
12	2860	1912	2139	550	110	625	110	16	3400	1912	1600	500	110	575	110
16	2860	1912	2284	720	110	800	110	20	4200	1912	1600	500	160	575	160
20	3650	1912	2284	720	160	800	160	25	4200	1912	1600	500	160	575	160
25	3650	1912	2284	770	160	850	160	30	5200	1912	1600	500	160	575	160
30	4200	1912	2284	770	160	850	160	35	5200	1912	1600	500	160	575	160
35	4200	1912	2284	770	160	850	160								
40	5200	1912	2284	770	160	850	160								
45	5200	1912	2284	770	160	850	160								
50	5200	1912	2284	770	160	850	160								

Notes:

- > Larger population sewage treatment plants may be supplied as multiple tank configurations. For precise tank sizes and configurations, please contact Marsh Industries
- > All dimensions in mm

TANK FEATURES



ENSIGN:STANDARD

SHALLOW ENSIGN:STANDARD

1

Inlet with 'Forsheda seal'

Forsheda seal provides flexibility in the joint for easier installation.
Optional risers to increase invert depth are available.

4

Compressor with alarm

Low-energy compressor provides minimal running, maintenance and servicing costs. Integral alarm detects low pressure in air line.

5

Compressor housing (External or internal options)

The compressor can be housed internally or externally with no difference in cost. *External recommended to increase compressor life, and supplied as standard on 4PE, shallow and pumped outlet versions.*

6

Plug / socket connection

Standard electrical connection

7

PVC pressure pipe for diffuser(s)

Provides a protective conduit for the air diffuser line. Can be easily removed for maintenance and cleaning.

8

Bio-media

High specification bio-media (310m³ per m²) and membrane diffusers ensure even circulation to eliminate 'dead spots'. The bio-media is contained by a stainless steel securing mesh to ensure no migration during handling or potential flooding.

9

Stainless steel mesh

Retains media in aeration chamber during transportation and handling, and in the event of flooding.

11

32mm sludge return

Larger diameter sludge return prevents the possibility of blockages and improves system circulation. Provides higher effluent quality whilst balancing flow over a 24 hour period or periods of intermittent use.

12

Polylok tertiary filter NOT supplied on Ensign:Standard range

13

Outlet with 'Forsheda seal'

Forsheda seal provides flexibility in the joint for easier installation.
Optional pumped outlets are available.

14

Standard lid

Marsh lid protects inner components whilst blending into the surrounding environment.

SPECIFICATIONS

Ensign:Standard

Shallow Ensign:Standard

Model	Length	Width	Height	Inlet		Outlet		Model	Length	Width	Height	Inlet		Outlet	
(Pop)		+/-100mm		Invert	Ø	Invert	Ø	(Pop)		+/-100mm		Invert	Ø	Invert	Ø
4	1600	1332	1575	540	110	600	110	6	2860	1912	1600	500	110	575	110
6	2602	1650	1935	550	110	625	110	8	2860	1912	1600	500	110	575	110
8	2602	1650	1935	550	110	625	110	10	2860	1912	1600	500	110	575	110
10	2602	1650	1935	550	110	625	110	12	2860	1912	1600	500	110	575	110
12	2860	1912	2139	550	110	625	110	16	3400	1912	1600	500	110	575	110
16	2860	1912	2284	720	110	800	110	20	4200	1912	1600	500	160	575	160
20	3650	1912	2284	720	160	800	160	25	4200	1912	1600	500	160	575	160
25	3650	1912	2284	770	160	850	160	30	5200	1912	1600	500	160	575	160
30	4200	1912	2284	770	160	850	160	35	5200	1912	1600	500	160	575	160
35	4200	1912	2284	770	160	850	160								
40	5200	1912	2284	770	160	850	160								
45	5200	1912	2284	770	160	850	160								
50	5200	1912	2284	770	160	850	160								



PACKAGE SEWAGE TREATMENT PLANTS

Package Sewage Treatment Plant's (or PSTP's) are often a suitable option where groundwater in the surrounding environment is vulnerable, drainage field percolation values are restrictive, or direct discharge to a drainage field/watercourse or surface water sewer is the preferred discharge method.

HOW DO THEY WORK?

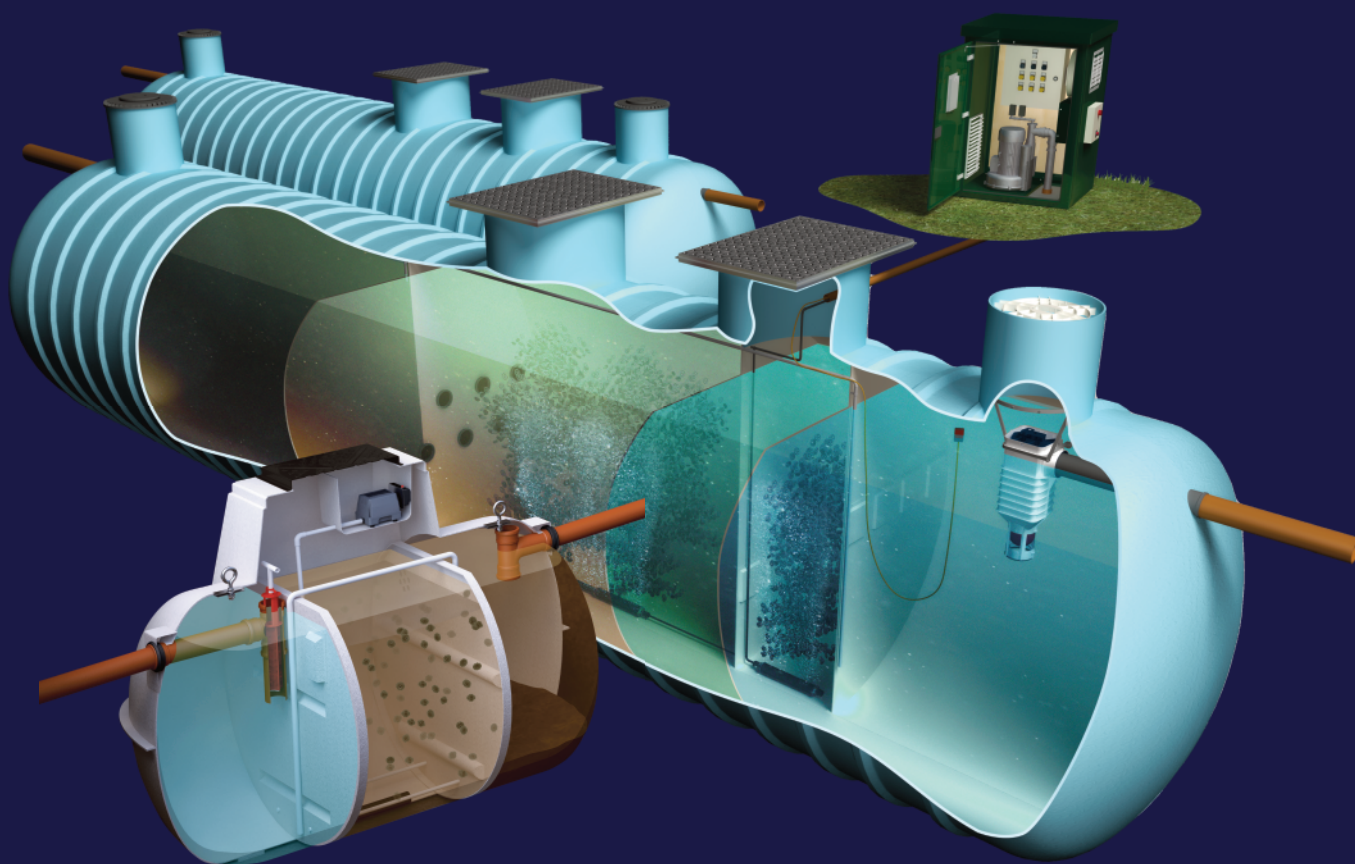
In addition to anaerobic digestion taking place in the primary settlement chamber **1** the Ensign:Ultra unit allows the clarified water to pass into a second 'aeration' chamber **2** where it is treated to remove the dissolved constituents. Here aerobic bacteria, supported by diffused air and mobile media, ensures full treatment is achieved before the treated effluent and 'sloughed off' bacteria flows to a final settlement chamber **3**. The final effluent is then discharged to the drainage field or watercourse via a Polylok filter.

Notes:

- > PSTP's should be sized using the latest version of British Water Flows & Loads which provides detailed information on sewage production figures and sizing calculations
- > Regulatory authorities for the control of pollution in the UK normally require treatment plants conforming to BSEN12566:3 to be demonstrated as capable of producing a minimum effluent discharge quality of 20:30:20 (Biochemical Oxygen Demand; Suspended Solids; Ammoniacal Nitrogen in mg/ltr), although in certain areas more stringent site-specific qualities may be required
- > No surface water should enter the system as this can reduce the system's capacity and cause solids to be flushed out which may prematurely block drainage field or cause pollution
- > As with septic tanks sludge should be removed annually or in line with manufacturers instructions

Package sewage treatment plants

Installation and operation manual



	page
1 Pre-installation checklist _____	1
2 Site location _____	2
3 Tank installation _____	2
4 Electrical guidelines _____	5
5 Service checklist and maintenance _____	5
6 Drainage fields _____	6
7 Desludging _____	8
8 Warranty information _____	9

Based in Northamptonshire and with extended facilities in Bridgwater, Somerset, Marsh Industries is a leading manufacturer of sewage treatment plant, off-mains drainage products and rainwater harvesting systems for both UK and overseas markets.

Marsh supplies sewage treatment plant and off-mains drainage products for domestic, commercial and industrial applications as well as offering engineering design and technical support.

With one of the largest merchant distributor networks available in Europe, clients ask for Marsh products and services because they know the company delivers from a solid foundation of knowledge, customer support, product quality and proven performance.

Architects, specifiers and installers within the construction sectors seek alliances and partnership with Marsh because its core products and services bring further added value to their own brands.

Start up information for sewage treatment plants after prolonged periods of inactivity

When returning to or reopening your place of business, please follow the instructions below to enable a smooth start-up and to minimise the risk of pollution when restarting your sewage treatment plant. This guidance can be applied to seasonal locations such as holiday parks, or to businesses that have faced an enforced period of inactivity such as site refurbishment.

Firstly, make sure the area is secure and cordoned off to prevent people or animals on site from falling into the sewage treatment plant.

Where possible a qualified British Water accredited engineer should be employed to carry out these procedures. PPE must be worn and handwashing/sanitising must be carried out.

When first opening the tank chambers please ensure the area is well ventilated and engineers are wearing protective face masks. Sewer gases can accumulate in sewage treatment plants, particularly Hydrogen Sulphide, which can be very dangerous even at low levels. (Sewer gas is a complex mixture of toxic and nontoxic gases produced by the decomposition of organic household or industrial components of sewage).

- ✓ When your treatment plant is turned on, make sure the compressor/air blower is operational.
- ✓ Inspect the air filters on the top of the compressor and remove any debris impeding the flow of air.
- ✓ Check whether air is reaching the treatment zone of your sewage treatment plant. This can be done by checking for a mild jacuzzi effect in the middle chamber of the plant.
- ✓ Make sure the media (golf ball sized pieces of plastic) are freely circulating in the aeration chamber within the treatment plant. These must not be accumulating at one side of the chamber or the other.
- ✓ Ensure that the treatment plant is vented locally and that air is allowed unhindered access to the plant with no air admittance valves located on the vent.
- ✓ Be aware that when restarting your plant after prolonged periods of inactivity, smell and odour may be generated in the initial weeks while the biomass - 'good bacteria' - starts to grow again on the media (Activated carbon vents are available for purchase from Marsh Industries if this is an issue).
- ✓ Existing recirculation pipes from the final chamber to the primary chamber assist and speed up the sewage treatment process, however a temporary submersible pump with a flow of less than 10 litres a minute can be fitted into the final humus chamber to further enhance the process. The pump must be 1m below the waterline and should discharge to the primary chamber with the hose being under the waterline to minimise the agitation of solids. The pump can be operated for 20mins in every hour for 6 hours per day for the first 4 days of start up. After this period, the pump should be removed, cleaned and stored.

If you have concerns about restarting your sewage treatment plant, please contact the Marsh HQ on 01933 654582.

Note: Marsh Industries accepts no liability for any damage or loss, including consequential loss caused by the failure of any drainage equipment or any failure caused by gross solids or fats entering the sewage treatment plant.

It is the responsibility of the installer/contractor to undertake installation of the sewage treatment plant as per the manufacturer instructions.

Marsh Industries believe that the information printed in this manual is accurate, and published for information only. No warrants, express or implied, are contained therein, nor does any legal liability attach to Marsh Industries for any reason whatsoever. The company's policy is one of continuous product improvement and we reserve the right to make alterations to our range and specification without prior notice.

1 Pre-installation checklist

Prior to installation please check or take note of the following:

- ✓ Ensure that the information contained in this manual is adhered to at all times.
- ✓ When the sewage treatment plant arrives on site it is recommended to fully inspect for damage (ie, fractures to the shell or ribs, delamination, scratches or abrasions deeper than 1.5mm, stress cracks or star crazing). If any damage is seen or suspected please notify Marsh Industries immediately as problems cannot be rectified easily after installation.
- ✓ It is the responsibility of the installer/contractor to undertake installation of the sewage treatment plant as per Marsh Industries' instructions.
- ✓ All electrical work must be undertaken by fully qualified personnel under the guidance of The Health & Safety at Work Act.
- ✓ Ensure the plant is properly ventilated.
- ✓ The end-user of the plant is responsible for the operation and maintenance of the system and its discharge either direct to a watercourse or through a percolation area.
- ✓ It is important that the product is operated under the conditions for which it is designed. Any variation in these conditions could prevent the unit from performing to its full potential and the effluent discharge may not meet required standards.
- ✓ Maintain the system in accordance with this handbook.
- ✓ Any service contract offered by Marsh is mechanical only and does not include desludging (emptying of the system). The end-user must desludge the system in accordance with the guidelines provided in this handbook.
- ✓ Drainage fields, drains and desludging of the plant remains the responsibility of the end-user. Any damage to the installation due to the influx of surface water or the backing up of drainage fields or drains is not covered by service agreements.
- ✓ Contact Marsh Industries if you have any technical queries regarding the installation, maintenance or servicing of the system.

To maintain optimum system performance the end-user must be aware of certain precautions, including the following:

- ✗ Do not open the plant cover without firstly isolating the mains power.
- ✗ Do not alter in any way, any part of the system or internal parts supplied with the system.
- ✗ The design loading of the plant should not be exceeded.
- ✗ High volume discharges such as those from swimming pools and Jacuzzi's must never enter the system.
- ✗ Surface water must not enter the system.
- ✗ Heavy duty toilet paper, sanitary towels or incontinence pads must not enter the sewage treatment plant. This could cause severe blockages and can adversely affect organic biomass growth.
- ✗ If the plant is installed in a care home or medical facility, spent medication must not enter the sewage treatment plant as this can adversely affect organic biomass growth.
- ✗ Do not allow large quantities of chemicals to enter the system including:
 - *Water softener regenerate*
 - *Disinfectants or high concentrate bleaches*
 - *Strong acids and alkalis*
 - *Oil or grease*
 - *Pesticides*
 - *Photographic chemicals*

2 Site location (For guidance only)

Minimum distances for locating sewage treatment plant is set out below. These are minimum distances only – the unit should be located as far away as is practically possible. However, when locating the plant, consideration should be given to allow adequate access for a desludging tanker.

	Any dwelling	Watercourse or stream	Spring or well	Lake/moat	Site boundary	Road	Slope, break or cuts
Plant	7m	10m	50m	50m	3m	4m	4m
Percolation area	15m	10m	50m	50m	3m	4m	4m

3 Tank installation

Site inspection

- Ensure site location ground is flat, even and free from rocks.
- If the plant is to be installed in a high traffic area, a qualified civil engineer should design a separate load bearing slab and reinforced base of hard core with metal grid support and concrete.

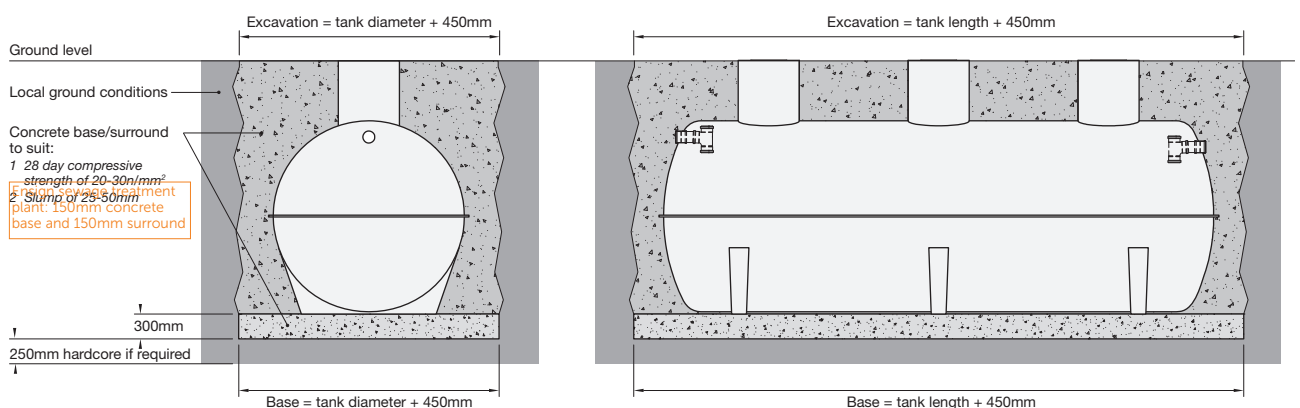
Movement of the sewage treatment plant

- The weight of the tank is not evenly distributed along its length, so time needs to be taken to ensure the straps are distributed to prevent movement or slippage.
- Use only web straps to lift the tank - do not allow chains, cables or wire ropes to make contact with the tank.

Note: Lifting eyes (rated to 350kgs) used during the manufacture of Ensign units can be used for on-site handling - For steadying purposes only. Not to be used for lifting the tank.

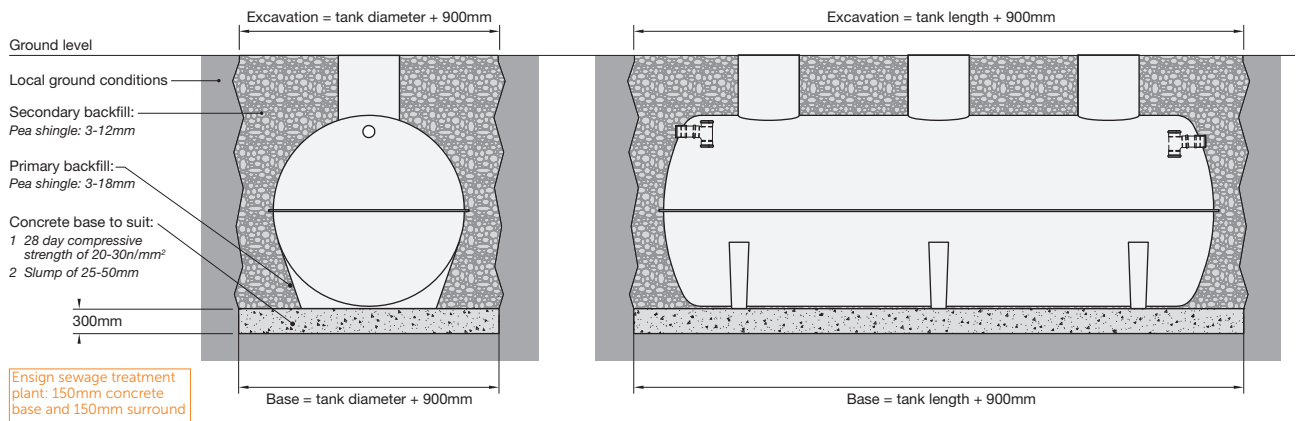
- A lifting beam is to be used for tanks over 8m long.
- The tank must be fully lifted off the ground for clear movement – do not drag the tank along the ground.
- The unit needs to be chocked to prevent movement or rolling when sitting on the ground.

Concrete base and surround (Recommended)



- Essential for wet sites where the water table can rise above the base of the system (Installation in a wet site may be precluded by site considerations in relation to effluent disposal).
- Groundwater must be controlled and prevented during the installation, even when the tank has been strapped or anchored. Failure to do so will damage the shell and invalidate all warranties.
- The excavation must be kept as dry as possible. Excess water should be evacuated using a site pump/sump, hole/suction hose arrangement. Dewatering should be continued for as long as necessary or at least until the concrete base has set.
- Ensure the excavation is safe with sloped surrounds and shuttering to safeguard the installation.
- The grade and thickness of the concrete base should be designed to suit site conditions - a minimum thickness of 300mm (Ensign sewage treatment plant: 150mm concrete base) and for high water table/wet sites a 250mm hardcore sub-base should be laid, compacted and levelled.
- *The choice of concrete is the responsibility of the installer and should be chosen to suit local ground conditions. In normal conditions with non-aggressive soils, a concrete with a 28 day compressive strength of 20 to 30N/mm² with a 25 to 50mm slump – this must adhere to the relevant BS EN standards. If in doubt seek specialist advice prior to installation.*
- *When pouring concrete around the sewage treatment plant, please ensure the maximum pressure of 15kN/m² around the plant is not exceeded. The concrete should never be poured directly on to the tank.*
- *Do not use vibrating poker.*
- Lower the sewage treatment plant onto the concrete base ensuring the tank is level at all laterals.
- Connect up the pipework - the system is plumbed for 160mm UPVC pipe (Ensign sewage treatment plant up to 16pe: 110mm UPVC pipe). A short length of pipe with flexible joints should be used immediately before and after the sewage treatment plant to allow for movement between the tank and the pipe work.
- The excavation should be backfilled with concrete of minimum 225mm pour width to approximately 300mm below the ground level (full surround to top of tank, around turrets and inlet/outlet points).
- In a multiple tank arrangement, there must be a minimum of 500mm distance between the tanks. This 500mm void must be filled with concrete during the pouring.
- Evenly fill each chamber of the tank with clean water to a depth of 700mm. Continually check the pipework levels and connections visually.
- Backfill evenly around the tank with concrete ensuring no voids are present, especially around the bottom of the tank shell and ribs.
- Continue filling the tank chambers with water whilst evenly backfilling and pouring concrete around the tank ensuring that the water level is no more than 300mm above the concrete level.
- For any tank with a lip connection, please ensure that concrete is over the lip before adding water to this point of the tank.
- Ensure all turrets and access covers are sealed to prevent concrete entering the plant. Use framework around the turrets to prevent distortion and damage to the tank.
- **We recommend that normally the depth from ground level to inlet invert of the sewage treatment plant should be no more than 1.5m.** This could change due to groundwater conditions. Deeper inverts with heavier duty shells and ribs are available from Marsh Industries.

Granular surround (For free draining sites)



Primary backfill

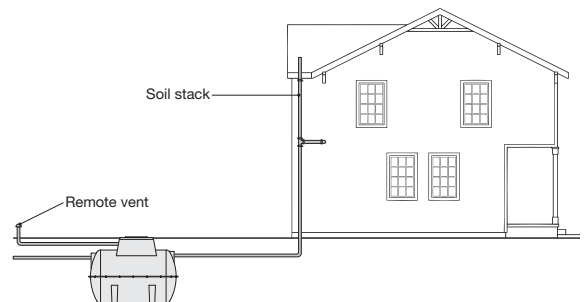
- Primary granular backfill is pea shingle between 3-18mm in size. It should be washed, have no sharp edges and contain no boulders. In winter, check to ensure there are no clumps of ice in the materials as this can create voids causing long term damage.
- Tanks must be installed with primary backfill only within the region immediately surrounding the tanks - the pour width should be 450mm. During the pour, check to make sure that no voids are created and that the pour is evenly distributed.
- The pour should be evenly to the top of the turrets and access points. Care needs to be taken to avoid distortion.

Secondary backfill

- Secondary backfill is pea shingle between 3-12mm or coarse sand. This once again is judged to be clean, free flowing with no voids whilst pouring.
- If crushed stone is used as the secondary backfill, ensure that it is at least 450mm from the tank walls and dome ends.
- Be careful as dug material needs to be carefully selected and sifted to ensure no roots, clay or boulders are present.
- Take care when compacting the backfill material not to distort the turrets or access chambers.

Ventilation

- It is important that a specific air venting point is provided by the installer to allow the system to freely vent and disperse gas, and also ensure air supply to the compressor if this is integral to the tank.
- For all sewage treatment plants it is recommended that a remote vent stack should be installed. This should be connected into the (marked) vent position on the tank using the 110mm grommet supplied, and terminate at a suitable distance and height from any surrounding dwellings to allow dispersal of air from the system. Consideration should be given to the prevailing wind and any local site geography that may inhibit air dispersion or allow any odours to return towards the dwellings.
- Marsh recommend external compressors (in housing supplied) to ensure a constant supply of clean, dry air. If the compressor is supplied integral to the unit (in 'basin' under manway lid) it is recommended to fit a vent local to the tank to improve air supply and quality.
- If in any doubt as to the installation of an appropriate vent, please contact Marsh Industries.



4 Electrical guidelines

- Connection must be performed by a suitably qualified and experienced electrical contractor.
- The electrical requirement of the unit will be either Single Phase or Three Phase. Please check the specification that has been supplied to you about your system.
- The compressor is either linear or side channel and will come with wiring instructions.
- A GRP kiosk or above ground housing may be supplied/required dependent on the size of the plant. Please check your system specification in advance so that you are able to prepare the site for your kiosk.



NOTE: If the plant is not due to be commissioned for at least two weeks it is advisable to remove the compressor.

Standard gravity system with air blower (Conforms to European Standards)

- A 230V, 16amp waterproof plug and socket connector will be supplied with the unit, one for each compressor required. Please check your system specification about the quantity and type of compressor(s). On larger units, connection details can be bespoke, please check prior to installation.

It is the end-user's responsibility for the provision of:

- A single run of 1.5mm (or greater dependent on distance/voltage drop considerations) 3 core SWA cable from the end-user's distribution cabinet to the tank unit socket, or to the pre-wired distribution box fitted inside the GRP kiosk. The cable armour must be properly bonded to the main earth at the premises
- Cable protection via 10amp MCB/RCD or RCBO, rated 230V AC and tripping current 30mA.
- The unit will come with power failure alarm as standard. Other alarms are available, depending on your application, please check the specification supplied to you about your alarm options.
- The air pump/compressors and electric power must never be switched off. It is imperative they run 24 hours a day, every day, to ensure a constant supply of oxygen to the bacteria in the biozone.

Alarm options

Various alarm systems are available to suit different standards and system specifications. Please contact Marsh Industries for full details.

5 Service checklist and maintenance

The plant must be switched off and isolated before checking the electrical components and supply.

General

- Check to ensure the levels in the tank are even across all chambers.
- Regularly check to see if the primary chamber requires desludging (See section 7).

Compressor

- Check to ensure all compressors are working and air hose connections are secure.
- Annually clean the filter on the top of the compressor.
- Annually check the diaphragms and replace if required.
- Check the loss of pressure alarm on compressors.
- If the compressors are housed, either in a kiosk or housing, check to ensure ventilation is adequate.

Media (Within aeration chamber)

- Ensure media is moving around the aeration chamber freely by the diffuser/diffusers.
- Visually check to ensure adequate bio-mass growth on the media surface area.

Polylok Filter (Tertiary filtration)

- If a Polylok Filter is fitted to the plant at the outlet end (normally only on plants over 50PE) carefully lift the filter out of the casket and wash down before returning it back into the casket securely. This should be done normally once a month.
- A high level alarm should be fitted to alert the site owner of when the filter needs cleaning.

High level alarm

- If a high level alarm is fitted, check to ensure the high level alarm float switch is secure and working by lifting of the float switch by approximately 200mm.

Structural

- Check to ensure the baffles are not damaged.
- Check that all manhole cover and frames are secure and all locking nuts are in place.

Electrical

- Check supply current and amps.
- Check wiring condition and IP plugs.

6 Drainage fields

For development proposals in sewered areas it is usually a legal requirement to connect to the public sewer, either by gravity or pumping, as the sewage is conveyed to a municipal sewage treatment works. However, if it can be demonstrated that the proposed sewage disposal system offers a more sustainable solution to the overall water management of the site, then the regulators will consider the installation of a 'private' system.

For any such proposal you should:

- Check with your regulating body to confirm current status with regard to Registration/Consent, quality and volume limits, etc.
- Take account of the requirements of Building Regulations and discuss with the local planning authority at an early stage - well before any planning application is made.

Drainage fields

- If you have access to a suitable area of land, discharge from your septic tank or treatment plant to a properly designed and sized drainage field is the best environmental option as the treated effluent recharges groundwater, nutrients are retained in the soil, and nutrient loads on surface waters are reduced.
- The most common form of drainage field is a subsurface percolation area comprising perforated infiltration pipes laid in shingle filled trenches – normally within 1m of ground level to allow the micro-organisms in the soil to break down the organic matter, and at least 1.2m above the winter water table.
- The drainage field has two principal purposes:
 - To allow percolation of partially treated/treated effluent to ground at a controlled rate.
 - To allow further treatment of partially treated effluent before it reaches the groundwater level.

- Before you can dispose of effluent via a drainage field you first need to assess whether such a route is appropriate, ie, you have a good depth of well-drained, well-aerated soil away from watercourses, wells/boreholes, dwellings, and avoiding sloping sites and areas prone to waterlogging.

Trial hole and percolation test method (See figure 1)

- To calculate the exact area of land required for effective disposal an 'assessment' is required, usually by performing a percolation/water table test as outlined in BS6297 (Code of Practice for the Design and Installation of Drainage Fields for use in Wastewater Treatment) and the latest version of Building Regulations: H2.
- A trial hole should be dug to determine the position of the standing groundwater table a minimum of 1m² in area and 2m deep, or a minimum of 1.5m below the invert of the proposed drainage field pipework.
- The groundwater table should not rise to within 1m of the invert level of the proposed effluent distribution pipes. If the test is carried out in summer, the likely winter groundwater levels should be considered.
- A percolation test should then be carried out to assess the further suitability of the proposed area. A hole 300mm square should be excavated to a depth 300mm below the proposed invert level of the effluent distribution pipe. Where deep drains are necessary the hole should conform to this shape at the bottom, but may be enlarged above the 300mm level to enable safe excavation to be carried out.
- Fill the 300mm square section of the hole to a depth of at least 300mm with water and allow it to seep away overnight.
- Next day, refill the test section with water to a depth of at least 300mm and observe the time, in seconds, for the water to seep away from 75% full to 25% full level (ie, a depth of 150mm). Divide this time by 150. The answer gives the average time in seconds (Vp) required for the water to drop 1mm.
- The test should be carried out at least three times with at least two trial holes and the average figure from the tests should be taken. The test should not be carried out during abnormal weather conditions such as heavy rain, severe frost or drought.

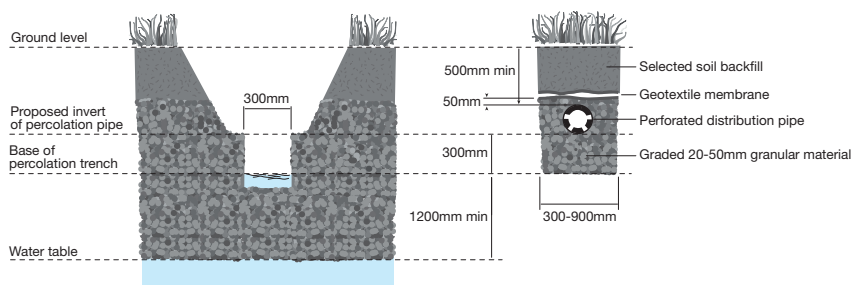


Figure 1 - Percolation/water table test

- Drainage field disposal should only be used when percolation tests indicate average values of Vp of between 12 and 100. This minimum value ensures that untreated effluent cannot percolate too rapidly into groundwater. Where Vp is outside these limits effective treatment is unlikely to take place in a drainage field.

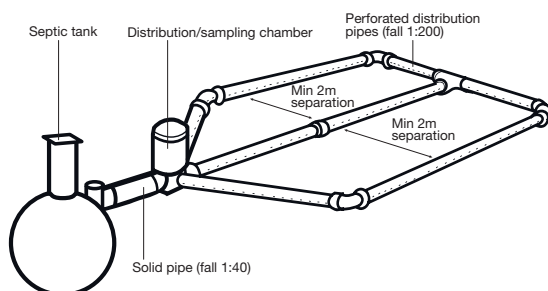


Figure 2 - Typical drainage field construction

Drainage field construction (See figures 1 and 2)

- Drainage fields should be designed and constructed to ensure aerobic contact between the liquid effluent and the subsoil using perforated pipe laid in trenches.
- Pipes should be laid on a 300mm layer of clean shingle or broken stone (graded between 20mm and 50mm) at a minimum depth of 500mm and a uniform gradient not steeper than 1:200.
- Trenches should be filled to a level 50mm above the pipe and covered with a layer of geotextile to prevent the entry of silt. The remainder of the trench can be filled with soil.
- Trenches should be from 300mm to 900mm wide with areas of undisturbed ground 2m wide being maintained between parallel trenches.
- An inspection chamber should be installed between the septic tank and the drainage field.
- Drainage fields should be set out as a continuous loop fed from the inspection chamber.
- To calculate the floor area of the drainage field (A_t in m^2), the following formulas should be used:
 - For septic tanks: $A_t = p \times V_p \times 0.25$
 - For treatment plant: $A_t = p \times V_p \times 0.20$

Where p is the number of persons served by the tank and V_p is the percolation value (secs/mm) obtained.

7 Desludging

The sewage treatment plant will require desludging and maintenance as follows:

- 6PE-35PE – Annually or as required
- 40PE-100PE – Six monthly or as required
- 100PE-300PE – As advised

The desludging of the plant is the responsibility of the site owner. Desludging should be carried out according to the size of the plant and dependent on usage.

It is the site owner's responsibility to provide access for the vacuum tanker, to desludge the plant. Vehicles should never drive over the system. Keep at least 4 metres away from the covers on the plant.

NOTE: If effluent samples are to be taken they should be taken from the sample chamber or, alternatively, from the discharge pipe. Sampling should only be taken by approved test centres.

Desludging procedure

- Desludging should normally be carried out by a vacuum sludge tanker.
- Licensed tankers are available commercially and the service is also provided by some local authorities.
- The sludge should be disposed of in accordance with local authority instructions or in a manner which will not cause pollution.
- The tank should be desludged before the onset of winter if conditions do not allow a tanker on site.
- The sludge in the primary chamber (s) should not be removed completely, but approximately 75mm should be kept in the bottom of the tank to re-seed the new sludge, which will be formed when the tank is put into use again.

The depth of sludge can be checked using the following technique:

- Use a pole that can touch the bottom of the tank and wrap the bottom 1.4m with a white rag.
- Lower the pole to the bottom of the tank and hold for several minutes to allow the sludge layer to penetrate the rag.
- Remove the pole and note the sludge line, which will be darker than the colouration caused by the liquid waste.

(Typically a dark sludge line approximately 2/3rd from the bottom of the pole means you should desludge).

- The primary chamber must be refilled with fresh water after desludging.
- On every alternative desludge, dead humus/scum should be skimmed from the final settlement tank(s). Ensure the tee pieces in all chambers are clear.

- Care must be taken not to damage the treatment plant with the hose of the vacuum tanker.

Please note:

- The sewage treatment plant should be clearly marked and vacuum tanker should never come closer than the depth of the excavation for the system unless the appropriate precautions have been taken. Never drive over the sewage treatment plant.
- Desludging should never be carried out alone due to potential dangers.
- The access cover should never be left off while the unit is unattended.
- The continued performance of the plant will depend on regular maintenance and cleaning. It is the end-user's responsibility to desludge the unit and keep the vents clear.

Further safety precautions

- Naked flames should not be used in vicinity of the tank due to the danger of explosion.
- Never enter a tank unless a safety line is attached to the person entering the tank and a second person is above ground to help if the entrant is overcome by gasses or foul air. Personnel entering the tank must have suitable breathing equipment and be fully trained in man entry techniques.
- As safety and security is of vital importance in sewage treatment systems, the following aspects are critical:
 - *Protective clothing/gloves/breathing apparatus, should be worn at all times.*
 - *Always remove contaminated clothing and protective equipment after working with sewage treatment Systems.*
 - *Wash hands and face prior to eating, drinking or smoking.*
 - *Adequate first aid boxes should be present.*
 - *When working with machinery/electrical equipment, proximity of water should be noted. All tools and electrical equipment should be kept dry.*
 - *A second person should be present when carrying out non-routine maintenance.*
- Disused or abandoned tanks should be demolished, filled in or sealed so that accidental entry is impossible.

8 Warranty information

Marsh Industries offers an initial 12-month warranty on every plant installed provided that it is installed, commissioned (if required) and maintained in accordance with the manufacturer's instructions and also provided that the unit has not been subject to damage or abuse. This warranty covers all of the GRP components and any other additional installed components against malfunction.

British-made off-mains drainage systems for domestic, commercial, agricultural and leisure sites

Marsh Industries delivers water/wastewater treatment products and solutions to the domestic, commercial and agricultural sectors from its UK manufacturing plants in Kettering and Bridgwater.

The company is recognised as a collaborative and trusted partner to its customers, with a reputation for providing quality products that really do add value:

- *Sewage treatment plants 4-1000+ PE*
- *Pump stations 234-20,000+ litres*
- *Septic tanks and cesspools 2800-20,000+ litres*
- *Septic conversion units 4-60+ PE*
- *Grease traps 234-20,000+ litres*
- *Trash/debris barriers*
- *Agri-silage tanks up to 100,000 litres*
- *Stormwater attenuation up to 130,000 litres*
- *Rainwater harvesting systems 1500-20,000+ litres*
- *Oil separators, wash-down separators and silt traps*

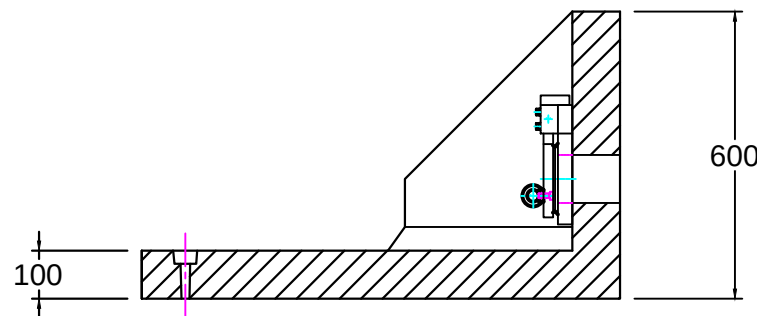
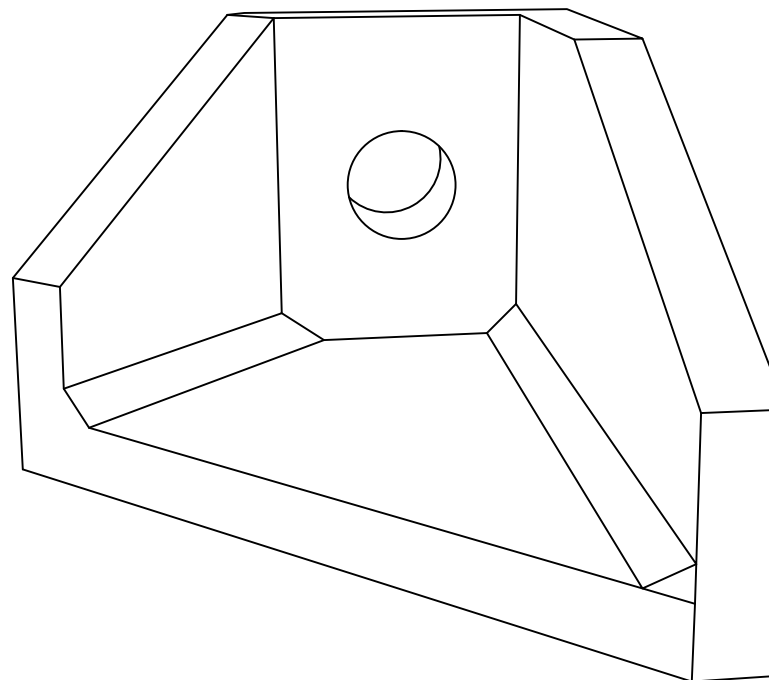
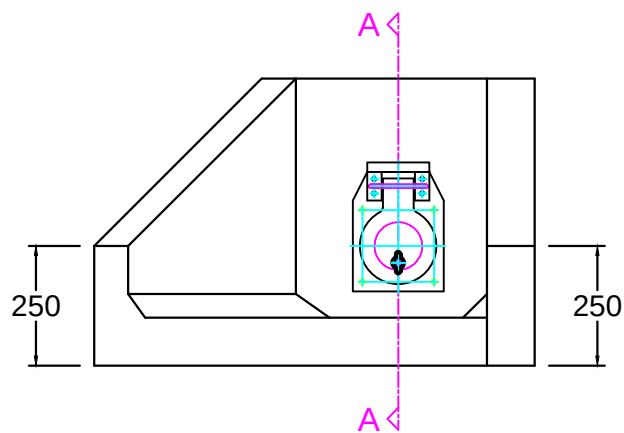
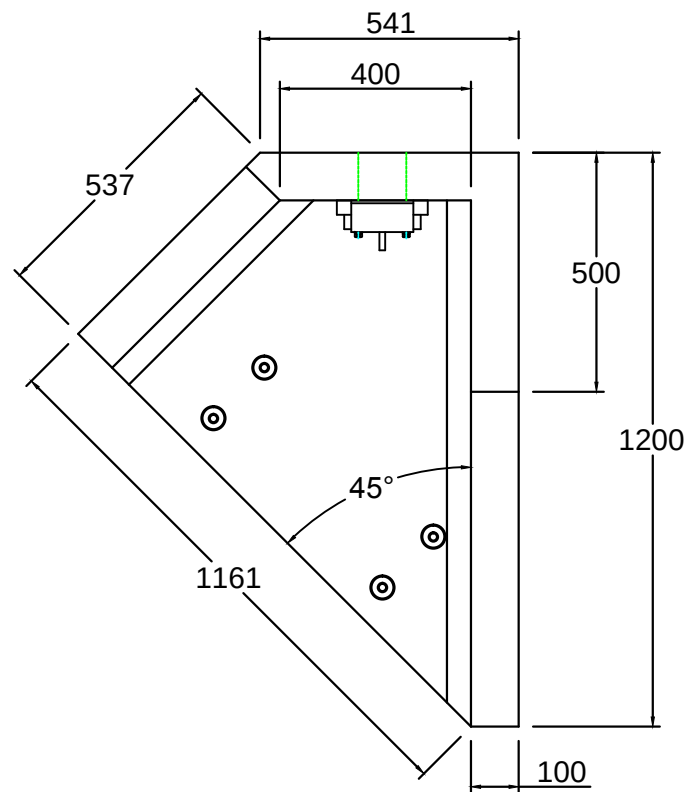
All products are fully type-tested and certified to ensure compliance with relevant environmental permitting programmes and building regulations.

In addition, the company's state-of-the art computer software, GALA, can generate precise, bespoke commercial sewage treatment plants and pump chamber systems to the finest specification.

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Appendix H – Outfall Headwall Specification



Section AA

DO NOT SCALE DRAWING

NOTES:

- All dimensions in mm
- All measurements ± 1 mm

Specification Information

- Opening in back wall cast to suit outside diameter of the pipework
- Invert level of pipe can be set to your specification

Headwall Installation

Units should be bedded on minimum 150mm thick well compacted Class 6A* selected well graded granular material.

*Manual of contract documents for Highway Works: Volume 1 (MCHW1) specification for Highway Works, Series 600 (Nov.09).

Sit the headwall level or with a slight fall 1:50 from pipe to spill mouth.

Material: Reinforced concrete

Kee Klamp Specification Information

- Galvanised steel kee klamp handrail
- 1100mm high above back wall
- GRP / FRP hand rails also available

100mm HDPE Flap Valve Specification

- The valve plate and the back plate are produced using HDPE/SS
- The hinge pin and ballast weight are produced using SS316 as standard
- The ballast weight can be easily adjusted if required
- The sealing arrangement consists of an EPDM lips seal in the back plate
- The valve plate is also installed on an angle in relation to the back plate to ensure a good seal

Material: HDPE, SS316, EPDM

Opening: $\phi 150$ mm

Max load from bottom invert level (B.I.L): 1.3MWC long period (≈ 50 years)

5MWC short period (≈ 72 hours)

Number of chemical anchors M8: 4 pieces

All dimensions in mm



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DRAWING TITLE:

AH4CA RH Headwall
100mm Flap Valve

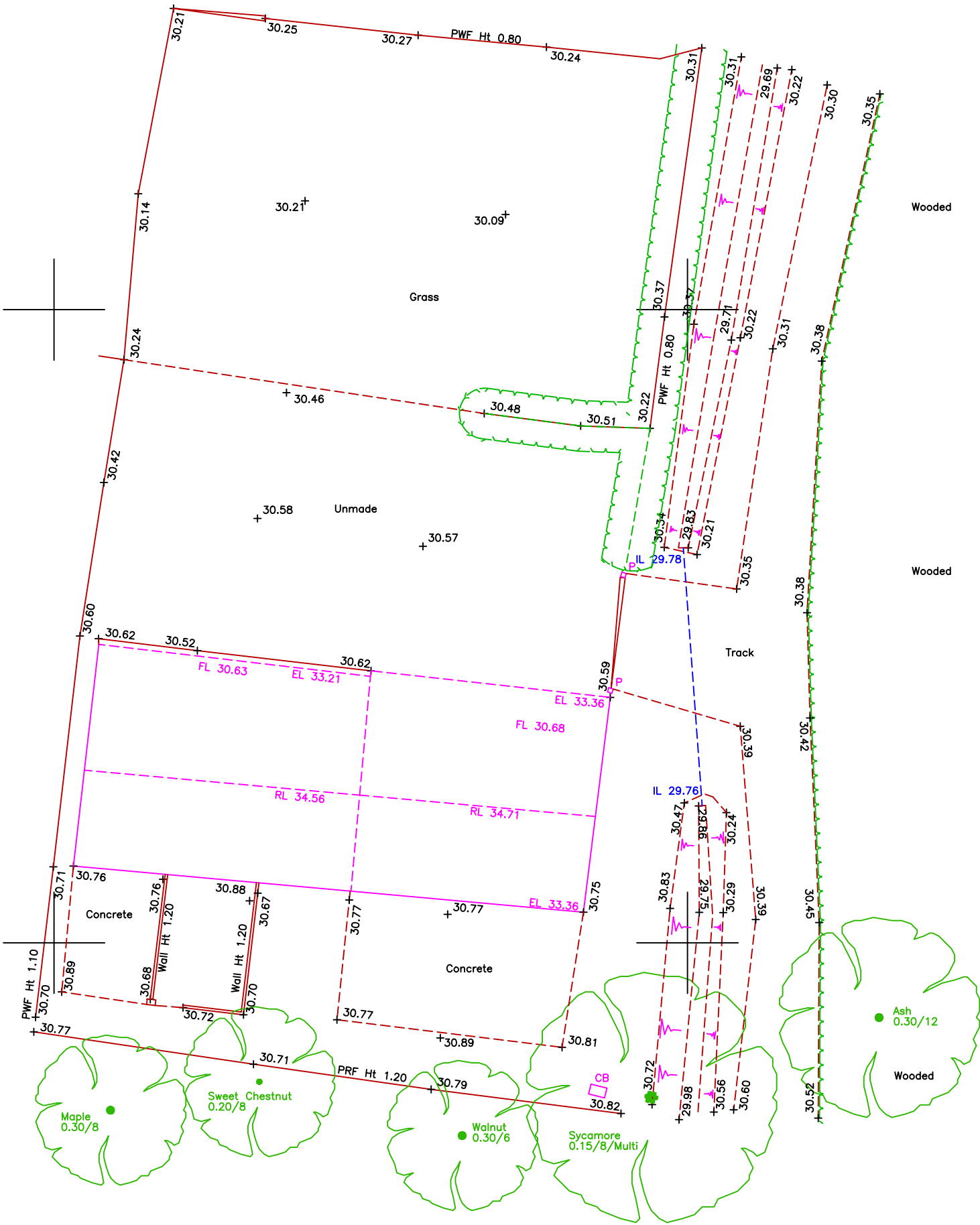
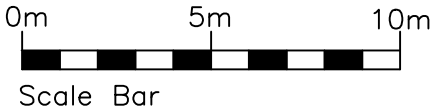
CLIENT:

SCALE:	PAPER:	DATE:
NTS	A4	04 - 08 - 17
SHEET NO:	WEIGHT:	
01 OF 01	375kg	

PRODUCT NAME:
AH4C A RH

DRAWING No:

Appendix I – Topographical Survey (2026-2668-001)



LEGEND

Street Furniture		Covers/Drainage	
ACU	Air Conditioning Unit	AV	Air Valve
BB	Belisha Beacon	CL	Cover Level
BO	Bollard	CH	Coal Hole
BS	Bus Stop	CP	Catch Pit
CB	Control Box	CTV	Cable TV
EP	Electricity Pole	DC	Drainage Channel
FP	Flag Pole	EC	Electric Cover
LB	Litter Bin	FH	Fire Hydrant
LP	Lamp Post	G	Gully
MK	Marker	GV	Gas Valve
PB	Post Box	IC	Inspection Cover
PM	Parking Meter	IL	Invert Level
P	Post	KO	Kerb Outlet
RS	Road Sign	MH	Manhole
RWP	Rain Water Pipe	RE	Rodding Eye
TCB	Telephone Call Box	SC	Stop Cock
THL	Threshold Level	SV	Sluice Valve
TL	Traffic Light	TC	Telecoms Cover
TP	Telegraph Pole	UTL	Unable to Lift
VP	Vent Pipe	WC	Water Cover
		WM	Water Meter
		WO	Wash Out
Walls		Levels	
BW	Brick Wall	DPC	Damp Proof Course
CW	Concrete Wall	EL	Eave
GW	Gabion Wall	FL	Finished Floor
RTW	Retaining Wall	PAR	Parapet
SW	Stone Wall	R	Ridge
TW	Timber Wall	RL	Flat Roof
Fences		RFL	Flat Roof
CBF	Close Board Fence	THL	Threshold
CLF	Chain Link Fence	TWL	Top of Wall
CPF	Chestnut Palling Fence	WCL	Window Cill
CSF	Concrete Slab Fence	WHL	Window Head
IRF	Iron Railing Fence		
LLF	Larch Lap Fence	STN	Survey Station
OBF	Open Board Fence	+ 20.00	Spot Level
PRF	Post and Rail Fence		Gate
PSB	Pedestrian Safety Barrier		Contours
PWF	Post and Wire Fence		Hedge

Trees
All trees canopy spreads and heights are approximate.
Species have been identified to the best of the Surveyors knowledge.
Notation : Diameter of Trunk / Height, Spreads drawn to scale
Trees that have multiple boles will have the number shown.

NOTES

Survey Grid & Datum Levels
Survey Grid
The survey grid is Related to Ordnance Survey grid by GPS Observations.

Survey Datum
The survey datum is related to Ordnance Survey datum by GPS observations.

Drainage
Where drainage invert levels/pipe sizes are shown, data has been recorded from the surface by visual inspection only. Drainage connections to other manholes/gully's are assumed, Where drainage information is critical a full drainage tracing survey should be undertaken.

Base Map Data
Information shown in grey for adjacent properties and boundaries is shown for illustrative purposes only, these features have not been surveyed unless otherwise stated.
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Status
Survey Drawings

Site Address
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Storrington,
Pulborough,
RH20 4BJ.

Drawing Title
Existing Topographical Survey

Scale
1:200 @ A2

Date
02/06/26

Drawn
TJJ

Drawing N°.
2026-2668-001-Survey Plan

Rev
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