SURFACE AND FOUL WATER DRAINAGE SCHEME

for

Mr ASHLEY ROSTRON

ERECTION OF A REPLACEMENT SINGLE RESIDENTIAL DWELLING

at

THE HAWTHORNS

WEST BRADFORD ROAD, WADDINGTON, BB7 3JE

NOVEMBER 2024

REFORD

Consulting Engineers Limited

Hindley Fallows, Midgery Lane, Fulwood, Preston, PR2 9SX

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Company number: 09620365 VAT Reg. 215 5638 12

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1. INTRODUCTION

1.1 This surface water drainage scheme has been produced on behalf of Mr Ashley Rostron to discharge Condition 22 of the planning approval from Ribble Valley Borough Council (Reference 3/2024/0668) for the construction of a replacement single residential dwelling at The Hawthorns, West Bradford Road, Waddington, BB7 3JE. A location plan is included within Appendix A.

1.2 Condition 22 states the following:

No development shall commence until a detailed, final surface water sustainable drainage strategy for the site has been submitted to and approved in writing by the Local Planning Authority.

The detailed surface water sustainable drainage strategy shall be based upon the sustainable drainage and principles and requirements set out in the National Planning Policy Framework, Planning Practice Guidance and Defra Technical Standards for Sustainable Drainage Systems. No surface water shall be allowed to discharge to the public foul sewer(s), directly or indirectly.

The details of the drainage strategy to be submitted for approval should include, as a minimum:

- *Details of whether the site is greenfield or previously developed in terms of drainage*
- *Assessment of the hierarchy of drainage options*
- *Details of the contributing area*
- *Restricted discharge rate*
- *On-site surface water storage*
- *Allowances for climate change and urban creep*
- *Above ground, multifunctional SuDS components*
- *Arrangements for management and maintenance*

The sustainable drainage strategy shall be implemented in accordance with the approved details.

1.3 This surface water drainage scheme is to discharge Condition 22 of the planning approval. It describes the existing site conditions and proposed development. It assesses the potential impact of proposals on existing drainage and includes a proposed scheme for the provision of new drainage to serve the proposed development.

1.4 The disposal of foul water from the site will also be addressed.

2. BASE INFORMATION

Existing site

2.1 The application site lies on the eastern side of West Bradford Road and sits amongst a small cluster of residential dwellings on the eastern outskirts of Waddington with the wider area comprising a mixture of woodland, agricultural land and open countryside.

2.2 The site comprises a link-detached property which is to be demolished in order for the replacement dwelling to be constructed. Access is from West Bradford Road and provides off street parking.

2.3 The site is of an area approx. 0.66ha.

Site geology

2.4 The online Soilscapes Viewer has identified the site lying in a region characterised by slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage.

2.5 Based on the local geology, infiltration of surface water runoff into the ground will not be possible on this site.

Understanding of existing drainage local to the site

2.6 United Utilities has confirmed that there are no public sewers local to the area. The nearest public sewer is a public foul sewer that lies approx. 400m to the west of the site along West Bradford Road. The sewer records are included within Appendix B.

2.7 The Coplow Brook lies approx. 100m to the west of the where it passes under West Bradford Road in culvert. The brook flows to the south to discharge into the River Ribble approx. 800m to the southwest from West Bradford Road.

2.8 A surface water drain lies within West Bradford Road and it is believed that it flows to the west to discharge into Coplow Brook.

2.9 Surface water from the existing dwelling is collected by an onsite surface water drainage system and a discharge is made into the surface water drain.

2.10 Foul water from the existing dwelling is collected by an onsite foul water drainage system and a discharged into a septic tank that lies within an adjacent field. Foul water from all the local dwellings along West Braford Road is dealt with in a similar fashion.

Proposed development

2.11 The development is for the erection of a single replacement residential dwelling following the demolition of the existing dwelling, a detached annex building and the creation of two parking bays at the front of the replacement dwelling.

3. PROPOSED DRAINAGE SCHEME

Surface water drainage

3.1 In accordance with the National Standards for Sustainable Drainage, the surface water drainage scheme should incorporate the use of Sustainable Drainage (SUDS) where possible. The approach promotes the use infiltration features in the first instance. If drainage cannot be achieved solely through infiltration due to site conditions or contamination risks, the preferred options are (in order of preference):

(i) a controlled discharge to a local waterbody or watercourse, or

(ii) a controlled discharge into the public sewer network (depending on availability and capacity).

3.2 The rate and volume of discharge should strive to provide betterment and be restricted to the pre-development values as far as practicable.

3.3 The online Soilscapes Viewer has identified the site lying in a region characterised by slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage. Based on the local geology, infiltration of surface water runoff into the ground will not be possible on this site.

3.4 Surface water from the existing dwelling is collected by an onsite surface water drainage system and a discharge is made into the surface water drain that lies within West Bradford Road, and in line with common practice, it is proposed the surface water discharge from the proposed development should mimic those from the existing site.

3.5 It is therefore intended that surface water runoff from the developed site will be restricted to 2.0 l/s allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 50% on stored volumes to discharge into an existing manhole that lies within the development site and then into the surface water drain that lies within West Bradford Road. The additional 50% is to allow for climate change and has been included in the surface water volume.

3.6 The proposed surface water drainage for the development will take runoff only from the roofs of the dwelling and the annex, which have a total area of 210m^2 that includes a 10% allowance for urban creep.

3.7 The access and parking bays at the front of the proposed dwelling is to comprise a permeable finish allowing surface water runoff to pass into the construction matrix or to run off at its edges where it will either infiltrate into the upper soil layers, evaporate or be taken up by the vegetation, thus dealing with the surface water at source. It has been determined that in order to cater for the 100 year critical rain storm plus 50% added for climate change, the depth of the sub-base under the access and parking bays comprising open graded crushed rock shall be a minimum thickness of 330mm.

3.8 Similarly, surface water from the paths around the proposed dwelling will runoff to channel drains or to adjacent areas of gravel filter strips or planted beds where it will be allowed to infiltrate into the upper strata and will be either taken up by plants or evaporated thus also dealing with the surface water at source.

3.9 A surface water drainage design has been carried out for the proposed single residential dwelling for all events up to the 100 year critical rain storm plus 50% for climate change on stored volumes. Attenuation is provided within the proposed surface water system of pipes and manholes. The surface water drainage design is included within Appendix C.

Foul water drainage

3.10 United Utilities has confirmed that there are no public sewers local to the area. The nearest public sewer is a public foul sewer that lies approx. 400m to the west of the site along West Bradford Road.

3.11 Foul water from the existing dwelling is collected by an onsite foul water drainage system and a discharged into a septic tank that lies within an adjacent field. Foul water from all the local dwellings along West Braford Road is dealt with in a similar fashion.

3.12 The proposal is for a replacement dwelling and as such the existing septic tank is to be checked to ensure that the system meets the general binding rules. If not, and if it is

not possible for the system to be upgraded to meet the general binding rules, then a sewage treatment plant is to be installed within the site to treat the foul discharges and the effluent discharged into the drain that lies within West Bradford Road.

3.13 A typical sewage treatment plant is the Marsh Ensign sewage treatment plant that has been sized for a population of eight and is to be located a minimum 7m from the proposed habitable areas of the dwelling. Details of a typical sewage treatment plant can be found within Appendix D. The size of the plant is to be confirmed prior to ordering.

Sustainable Drainage Management and Maintenance Plan

3.14 The drainage within the developed site will remain private, being the responsibility of the owner(s) of the dwelling.

3.15 The table below lists the various drainage features, along with the maintenance regime that should be followed.

BUILDING DRAINAGE	
Regular maintenance	**Frequency**
Visually inspect gutters to ensure they are kept clear of leaves, debris etc. Lift covers of drainage to inspect chambers for debris and build-up of silts. Manhole covers are securely in place.	Annually. No triggers other than maintenance to be taken on regular schedule.
Occasional tasks	**Frequency**
Remove leaves and debris from gutters. Remove debris from inspection chambers to ensure outlets are kept clear of debris to ensure adequate drainage.	As required. Indicator of problem / trigger for maintenance when surcharging or flooding of drains occurs or gutters and chambers full of debris and leaves etc.
Remedial work	**Frequency**
Should drains be heavily blocked or damaged contact a drainage maintenance company for unblocking / repair works.	As required. Indicator of problem / trigger for maintenance when drainage not functioning and unblocking pipes and chambers etc. not effective.

4. SUMMARY AND CONCLUSIONS

4.1 This surface water drainage scheme has been produced on behalf of Mr Ashley Rostron to discharge Condition 22 of the planning approval from Ribble Valley Borough Council (Reference 3/2024/0668) for the construction of a replacement single residential dwelling at The Hawthorns, West Bradford Road, Waddington, BB7 3JE. The disposal of foul water from the site has also been addressed.

4.2 Infiltration of surface water back into the ground is not feasible on this site.

4.3 Surface water runoff from the developed site will be restricted to 2.0 l/s allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 50% on stored volumes to discharge into an existing manhole that lies within the development site and then into the surface water drain that lies within West Bradford Road.

4.4 The existing septic tank is to be checked to ensure that the system meets the general binding rules. If not, and if it is not possible for the system to be upgraded to meet the general binding rules, then a sewage treatment plant is to be installed within the site to treat the foul discharges and the effluent discharged into the drain that lies within West Bradford Road.

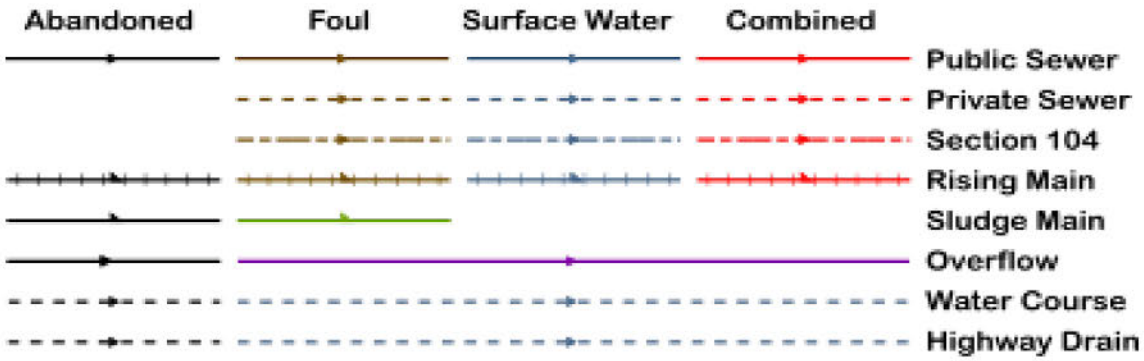
APPENDIX A

LOCATION PLAN

APPENDIX B

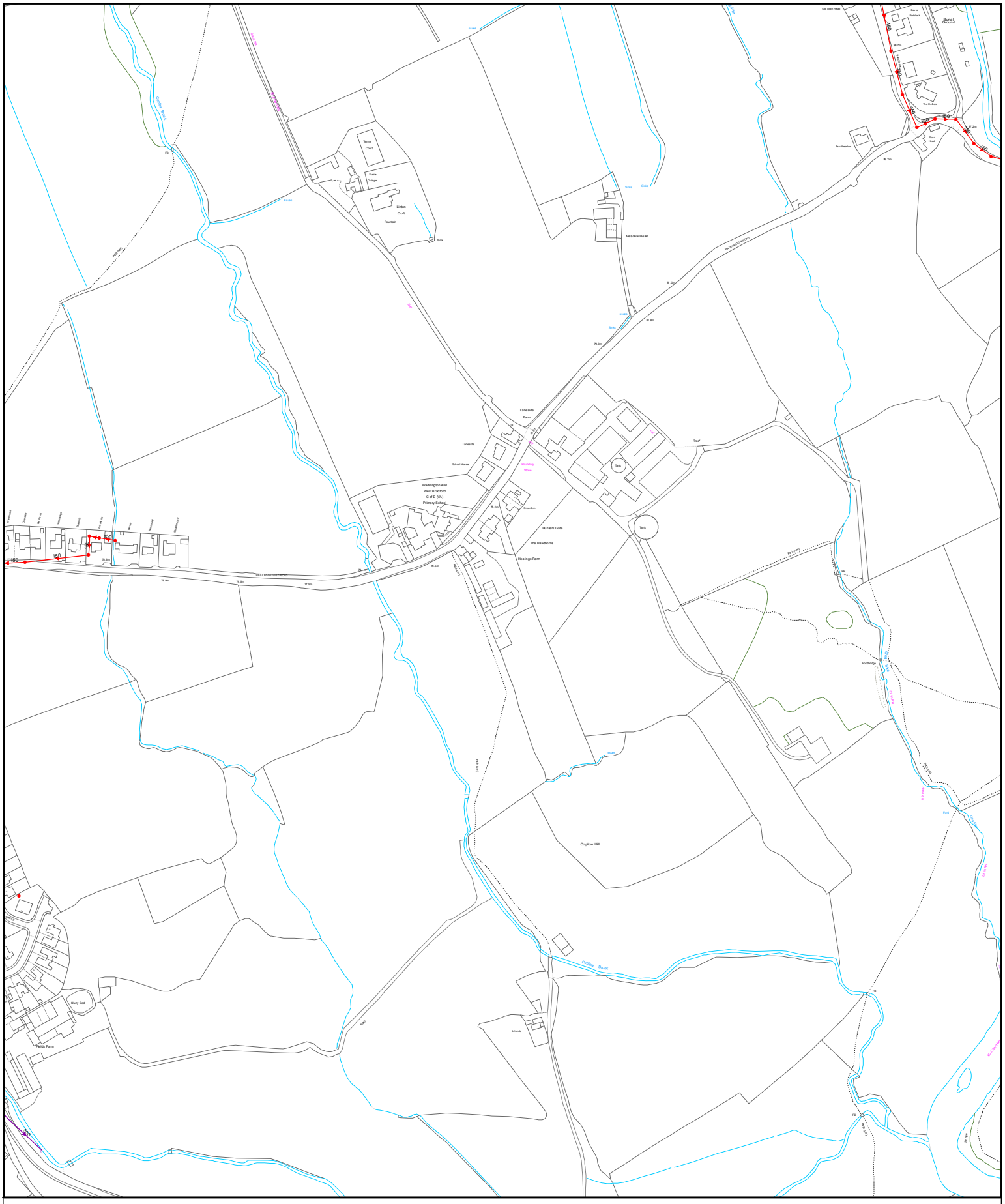
United Utilities
Water for the North West

Wastewater Symbology



All point assets follow the standard colour convention: red – combined, brown - foul, blue – surface water, purple - overflow

- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- CA Catchpit
- VC Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- CK Control Kiosk
- DNM Network Monitoring Point
- Change of Characteristic



Date: 12/11/2024

Printed By:
Property Searches

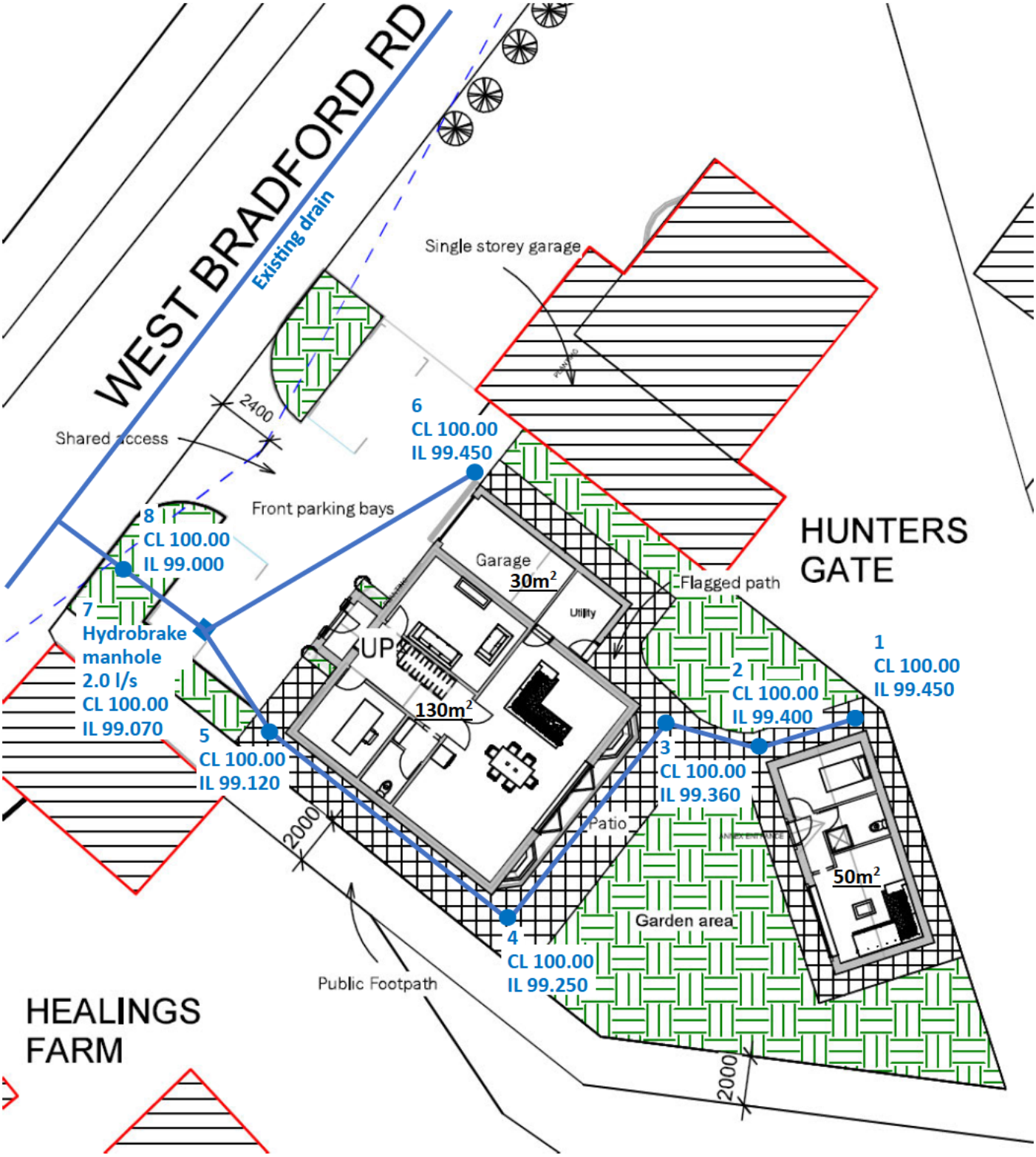
Extract from Map of Public Sewers

the hawthorns

United Utilities
Water for the North West

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities Water PLC will not accept any liability for any damage caused by the actual positions being different from those shown.

APPENDIX C



PROPOSED SURFACE WATER DRAINAGE LAYOUT

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	75.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	2.000
Ratio-R	0.250	Preferred Cover Depth (m)	0.450
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
1	0.005	5.00	100.000	100	0.550
2			100.000	450	0.600
3	0.004	5.00	100.000	450	0.640
4	0.003	5.00	100.000	450	0.750
5	0.003	5.00	100.000	450	0.880
6	0.006	5.00	100.000	100	0.550
7			100.000	1200	0.930
8			100.000	1200	1.000

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	5.000	0.600	99.450	99.400	0.050	100.0	100	5.11	54.7
1.001	2	3	4.000	0.600	99.400	99.360	0.040	100.0	100	5.20	54.4
1.002	3	4	11.000	0.600	99.360	99.250	0.110	100.0	100	5.43	53.5
1.003	4	5	13.000	0.600	99.250	99.120	0.130	100.0	100	5.72	52.5
1.004	5	7	5.000	0.600	99.120	99.070	0.050	100.0	100	5.82	52.2
2.000	6	7	14.000	0.600	99.450	99.070	0.380	36.8	100	5.18	54.4
1.005	7	8	4.000	0.600	99.070	99.000	0.070	57.1	100	5.89	51.9

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.769	6.0	0.7	0.450	0.500	0.005	0.0	24	0.521
1.001	0.769	6.0	0.7	0.500	0.540	0.005	0.0	24	0.521
1.002	0.769	6.0	1.3	0.540	0.650	0.009	0.0	32	0.613
1.003	0.769	6.0	1.7	0.650	0.780	0.012	0.0	36	0.660
1.004	0.769	6.0	2.1	0.780	0.830	0.015	0.0	41	0.702
2.000	1.274	10.0	0.9	0.450	0.830	0.006	0.0	20	0.778
1.005	1.021	8.0	3.0	0.830	0.900	0.021	0.0	42	0.941

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	100.000	0.550	100				
				0	1.000	99.450	100
2	100.000	0.600	450	1	1.000	99.400	100
							
				0	1.001	99.400	100

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
3	100.000	0.640	450	1	1.001	99.360	100
				0	1.002	99.360	100
4	100.000	0.750	450	1	1.002	99.250	100
				0	1.003	99.250	100
5	100.000	0.880	450	1	1.003	99.120	100
				0	1.004	99.120	100
6	100.000	0.550	100	0	2.000	99.450	100
7	100.000	0.930	1200	1	2.000	99.070	100
				2	1.004	99.070	100
				0	1.005	99.070	100
8	100.000	1.000	1200	1	1.005	99.000	100

Simulation Settings

Rainfall Methodology	FSR	Summer CV	0.750	Drain Down Time (mins)	240
FSR Region	England and Wales	Winter CV	0.840	Additional Storage (m³/ha)	20.0
M5-60 (mm)	20.000	Analysis Speed	Normal	Check Discharge Rate(s)	x
Ratio-R	0.250	Skip Steady State	x	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	0	0	0
30	0	0	0	100	50	0	0

Node 7 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	99.070	Product Number	CTL-SHE-0069-2000-0900-2000
Design Depth (m)	0.900	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Results for 1 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
15 minute winter	1	10	99.472	0.022	0.6	0.0042	0.0000	OK
30 minute summer	2	18	99.422	0.022	0.6	0.0034	0.0000	OK
15 minute winter	3	11	99.389	0.029	1.1	0.0082	0.0000	OK
15 minute winter	4	11	99.283	0.033	1.5	0.0079	0.0000	OK
15 minute winter	5	13	99.186	0.066	1.7	0.0151	0.0000	OK
15 minute winter	6	11	99.468	0.018	0.7	0.0041	0.0000	OK
15 minute winter	7	13	99.185	0.115	2.3	0.1296	0.0000	SURCHARGED
15 minute summer	8	1	99.000	0.000	1.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	0.6	0.487	0.099	0.0063	
30 minute summer	2	1.001	3	0.6	0.398	0.097	0.0059	
15 minute winter	3	1.002	4	1.1	0.530	0.181	0.0227	
15 minute winter	4	1.003	5	1.4	0.575	0.236	0.0485	
15 minute winter	5	1.004	7	1.6	0.340	0.263	0.0333	
15 minute winter	6	2.000	7	0.7	0.564	0.070	0.0611	
15 minute winter	7	Hydro-Brake®	8	1.8				1.1

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
15 minute winter	1	10	99.485	0.035	1.5	0.0067	0.0000	OK
30 minute winter	2	24	99.485	0.085	1.2	0.0136	0.0000	OK
30 minute winter	3	24	99.485	0.125	2.2	0.0355	0.0000	SURCHARGED
30 minute winter	4	24	99.482	0.232	2.9	0.0554	0.0000	SURCHARGED
30 minute winter	5	24	99.476	0.356	3.2	0.0809	0.0000	SURCHARGED
15 minute winter	6	10	99.479	0.029	1.8	0.0065	0.0000	OK
30 minute winter	7	24	99.473	0.403	3.3	0.4557	0.0000	SURCHARGED
15 minute summer	8	1	99.000	0.000	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	1.5	0.598	0.244	0.0164	
30 minute winter	2	1.001	3	1.3	0.462	0.209	0.0299	
30 minute winter	3	1.002	4	2.2	0.607	0.364	0.0861	
30 minute winter	4	1.003	5	2.5	0.551	0.406	0.1017	
30 minute winter	5	1.004	7	2.0	0.312	0.324	0.0391	
15 minute winter	6	2.000	7	1.8	0.592	0.178	0.0677	
30 minute winter	7	Hydro-Brake®	8	2.0				4.0

Results for 100 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
30 minute winter	1	26	99.622	0.172	1.6	0.0328	0.0000	SURCHARGED
30 minute winter	2	26	99.622	0.222	1.6	0.0353	0.0000	SURCHARGED
30 minute winter	3	26	99.622	0.262	2.9	0.0744	0.0000	SURCHARGED
30 minute winter	4	26	99.620	0.370	3.5	0.0884	0.0000	SURCHARGED
30 minute winter	5	26	99.616	0.496	3.1	0.1125	0.0000	SURCHARGED
30 minute winter	6	26	99.614	0.164	1.9	0.0371	0.0000	SURCHARGED
30 minute winter	7	26	99.613	0.543	3.6	0.6144	0.0000	SURCHARGED
15 minute summer	8	1	99.000	0.000	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	1	1.000	2	1.6	0.617	0.272	0.0391	
30 minute winter	2	1.001	3	1.6	0.484	0.270	0.0313	
30 minute winter	3	1.002	4	2.6	0.607	0.425	0.0861	
30 minute winter	4	1.003	5	2.4	0.549	0.397	0.1017	
30 minute winter	5	1.004	7	1.9	0.307	0.321	0.0391	
30 minute winter	6	2.000	7	1.9	0.630	0.190	0.1095	
30 minute winter	7	Hydro-Brake®	8	2.0				5.3

Results for 100 year +50% 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
60 minute winter	1	47	99.984	0.534	1.7	0.1014	0.0000	FLOOD RISK
60 minute winter	2	47	99.983	0.583	1.5	0.0927	0.0000	FLOOD RISK
60 minute winter	3	47	99.983	0.623	2.4	0.1769	0.0000	FLOOD RISK
60 minute winter	4	47	99.980	0.730	2.8	0.1746	0.0000	FLOOD RISK
60 minute winter	5	47	99.975	0.855	2.7	0.1941	0.0000	FLOOD RISK
60 minute winter	6	47	99.973	0.523	2.1	0.1181	0.0000	FLOOD RISK
60 minute winter	7	47	99.971	0.901	3.3	1.0193	0.0000	FLOOD RISK
15 minute summer	8	1	99.000	0.000	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	1	1.000	2	1.5	0.579	0.247	0.0391	
60 minute winter	2	1.001	3	1.3	0.455	0.210	0.0313	
60 minute winter	3	1.002	4	2.1	0.590	0.343	0.0861	
60 minute winter	4	1.003	5	2.1	0.515	0.355	0.1017	
60 minute winter	5	1.004	7	1.8	0.318	0.301	0.0391	
60 minute winter	6	2.000	7	1.7	0.630	0.168	0.1095	
60 minute winter	7	Hydro-Brake®	8	2.0				10.6

APPENDIX D

Ensign®
Sewage treatment plants
Intensive biological processing for off-mains wastewater

Overview

The Marsh Ensign is widely regarded as one of the most efficient, reliable and economical sewage treatment plants on the market.

The standard Ensign has been adapted to improve reliability and the Ensign:Ultra now brings unique enhancements to further improve noise level, treatment efficiency and final effluent quality.

Class leading performance
Tested and approved to BSEN12566-3/A1:2009 all Ensign units provide treatment well within national consent requirements. Published test results of 11.5:19.2:8.4mg/ltr (BOD:suspended solids:ammonia), with influent concentrations on test higher than those chosen by most competitor plants, effectively equates to 97% pollutant removal.

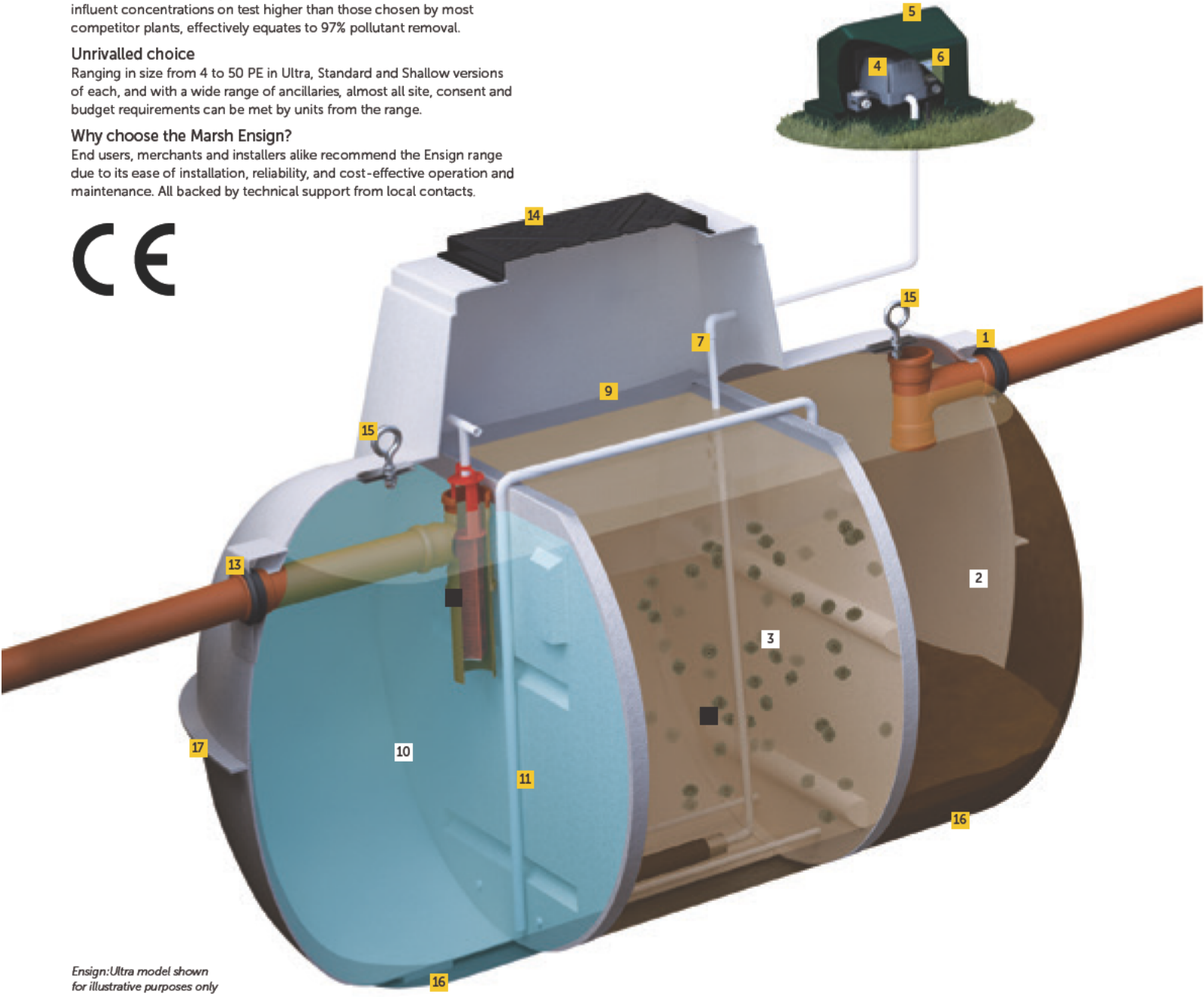
Unrivalled choice
Ranging in size from 4 to 50 PE in Ultra, Standard and Shallow versions of each, and with a wide range of ancillaries, almost all site, consent and budget requirements can be met by units from the range.

Why choose the Marsh Ensign?
End users, merchants and installers alike recommend the Ensign range due to its ease of installation, reliability, and cost-effective operation and maintenance. All backed by technical support from local contacts.

CE

Operating principle

In addition to anaerobic digestion taking place in the primary settlement chamber [2] the Ensign:Ultra unit allows the clarified water to pass into a second 'aeration' chamber [3] 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 [10]. The final effluent is then discharged to the drainage field or watercourse via a Polylok filter.



Ensign:Ultra model shown for illustrative purposes only

Benefits

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

2 Primary settlement chamber

3 Aeration chamber

4 Advanced compressor with alarm (Ensign:Ultra units only)
Near silent compressor ensures minimal running, maintenance and servicing costs. Integral alarm detects low pressure in air line. (Regular Low-energy compressor on Ensign:Standard models).

5 Compressor housing - internal or external options available
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 (Ensign:Ultra units only)
The RCD box provides easier installation and proveds a higher degree of safety. (Regular plug/socket connection on Ensign:Standard models).

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.

10 Final settlement chamber

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 units 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. (Regular lid on Ensign:Standard models).

15 Integral lifting eyes
For safe and secure on-site handling.

16 Stabilising feet
Stabilising feet prevents the tank from rolling and allows safe and steady transportation and installation.

17 Unique 'keying-in' lip
Assists anchoring into granular or concrete surrounds.

Whisspurr
Acoustic Vibration Reduction (AVR) unit
Suitable for all types of diaphragm compressors.
See page 14.

Guidance notes

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 water course or surface water sewer is the prefered discharge method.

- *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*

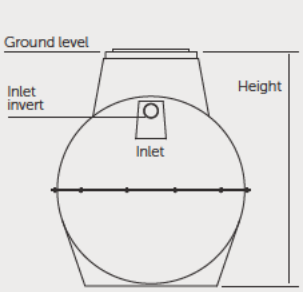
Many domestic sewage treatment plants offered by "internet resellers" claim to hold EN12566-3 compliance. This does not necessarily mean compliance with the UK National Forward, May 2007.

These plants may have been tested in their country of origin but not tested to the same criteria as Marsh Industries, where we strictly adhere to the UK National Forward. Contact contracts@marshindustries.co.uk for more information.

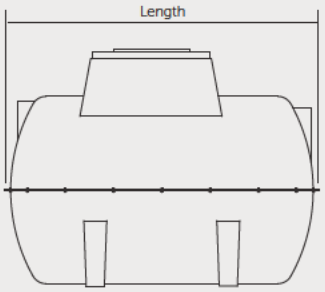
> The Marsh Ensign is widely regarded as one of the most efficient, reliable and economical sewage treatment plants on the market

Specifications

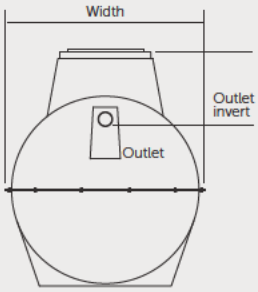
Ensign:Ultra and Ensign:Standard



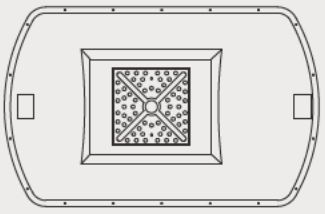
View on inlet end



Typical side elevation



View on outlet end



Typical plan view

Ensign:Ultra and Ensign:Standard

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

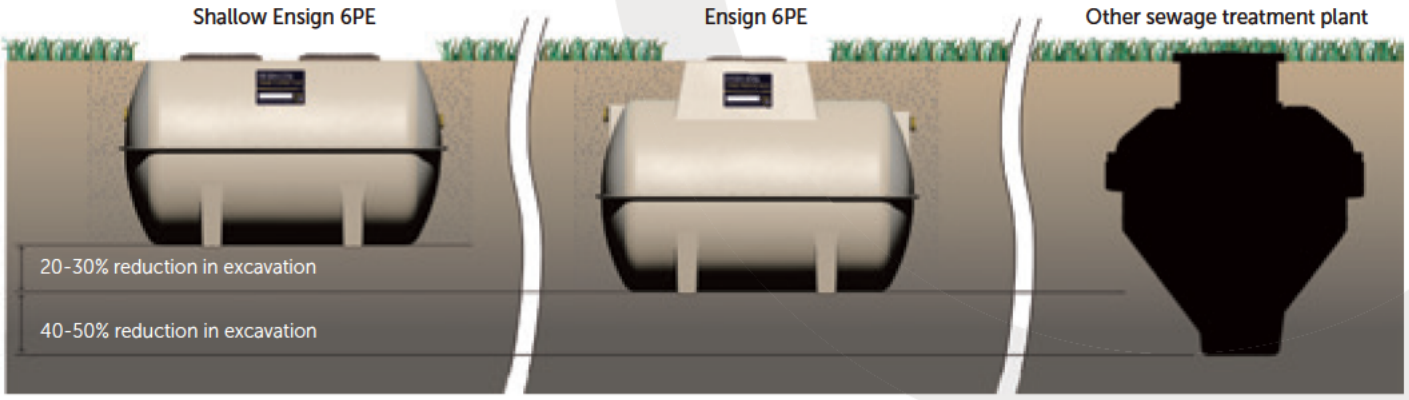
Notes:

- *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*

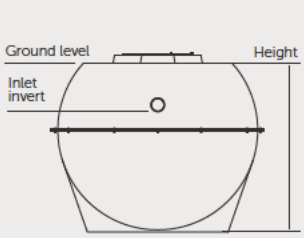
Shallow units

Common sewage treatment plants on the market often exceed 2.3m high. Marsh Industries offer a range of shallow plants from 4-35PE that are only 1.6m in height, meaning installation is not only possible*, but easier and safer too.

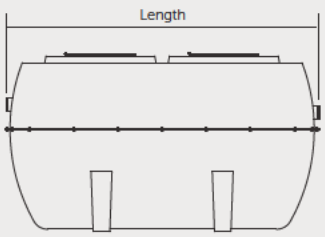
**Shallow Ensign's are often favoured when hard rock site conditions mean deeper alternatives, involving costly and time-consuming excavation.*



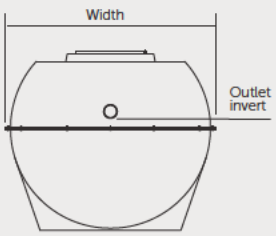
Shallow Ensign:Ultra and Shallow Ensign:Standard



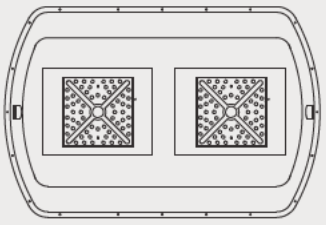
View on inlet end



Typical side elevation



View on outlet end


Typical plan view

Shallow Ensign:Ultra and Shallow Ensign:Standard

Model	Length	Width	Height	Inlet		Outlet	
(Pop)	+/-50mm	+/-50mm	+/-50mm	Invert	Ø	Invert	Ø
6	2860	1912	1600	500	110	575	110
8	2860	1912	1600	500	110	575	110
10	2860	1912	1600	500	110	575	110
12	2860	1912	1600	500	110	575	110
16	3400	1912	1600	500	110	575	110
20	4200	1912	1600	500	160	575	160
25	4200	1912	1600	500	160	575	160
30	5200	1912	1600	500	160	575	160
35	5200	1912	1600	500	160	575	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*