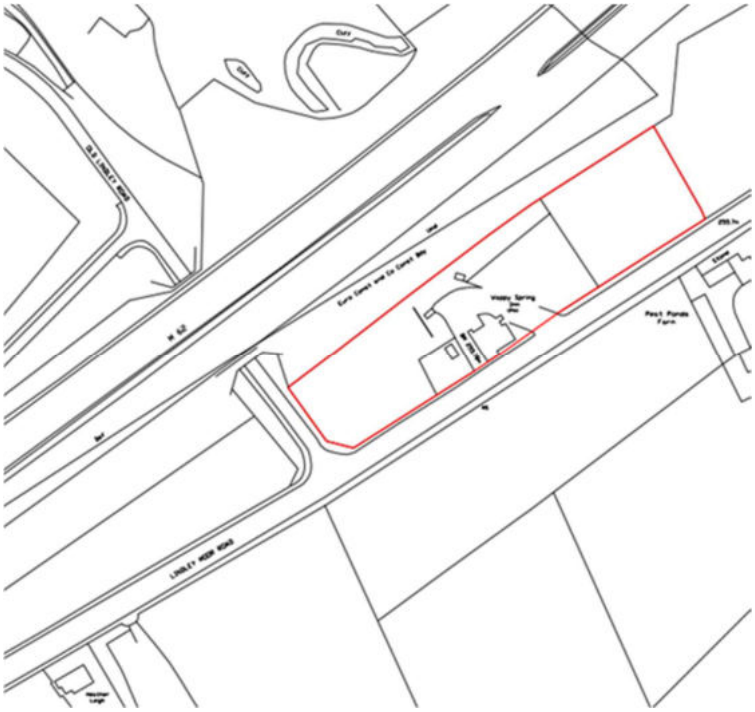
WAPPY SPRINGS, LINDLEY MOOR ROAD

DRAINAGE STRATEGY AND CALCULATIONS



CLIENT:	Frank Marshall Estates Ltd
ARCHITECT:	KPP Architects
SITE ADDRESS:	Wappy Springs Inn, Lindley Moor Road Huddersfield HD3 3TD
REFERENCE (REV):	20392-DCE-XX-XX-T-C-003-P04
DATE:	12/01/2026

AUTHOR:	J. Allchin	DATE:	12/01/2026
CHECKER:	P. Dixon	DATE:	12/01/2026

CONTENTS

REVISION	DATE	AUTHOR	CHECKER	COMMENTS
P01	17/10/2025	J. Allchin	P. Dixon	Preliminary Issue
P02	22/10/2025	J. Allchin	P. Dixon	Updated design to suit client comments
P03	29/10/2025	A. Bertram	J. Allchin	Updated design to suit client comments
P04	12/01/2026	J. Allchin	P. Dixon	Updated to suit LLFA comments

EXISTING SITE

The site is located on the north side of Lindley Moor Road in Huddersfield.

The existing site comprises the existing Wappy Springs Inn public house, with an associated parking, as well as areas of grazing/paddocks.

There is an existing culverted watercourse that passes through the site. There are no plans to divert or alter the watercourse as part of the proposals.

PROPOSED DEVELOPMENT

The proposed works include the construction of 14 industrial/commercial units, with associated delivery yards, parking and landscaping. The site will be served off Lindley Moor Road via an improved access junction.

The development was granted full planning permission in July 2025 (reference 2024/62/92553/W). As part of the planning application, a drainage strategy and flood risk assessment was produced by Holloway Jennings Consulting Engineers, report reference 7270-HJCE-ZZ-XX-RP-3000.v3 dated 28/08/2024. This surmised that surface water would discharge to the culverted watercourse running through the site at a restricted runoff rate of 3.5l/s, and that foul water would be treated on site before also discharging into the culverted watercourse.

The drainage design adheres to these parameters and has been updated to accompany the application to discharge conditions 7 and 9 of the planning permission.

SURFACE WATER DRAINAGE STRATEGY

The proposals match the details approved at planning, with runoff restricted to 3.5l/s to the culverted watercourse running through the site.

An attenuation tank is proposed to contain the 1:100+45% climate change critical storm event within the drainage system. The 45% climate change allowance is the Aire and Calder Management Catchment peak rainfall upper end allowance to the 2070s epoch.

The proposed attenuation tank is an SDS Geolight 400 tank, which has a perforated pipe surrounded by granular fill and a non-woven geotextile running along the base of the tank. This prevents silt reaching the geocellular crates. The perforated pipe can be rodded and jetted from the upstream and/or downstream manhole, hence enabling easy maintenance of the tank and preventing silt buildup.

The hydraulic calculations appended to this report demonstrate that there is no surcharging of the system in the 1:2 year critical storm event (other than at the flow control manhole), no surface water flooding in the 1:30, 1:30+40% or 1:100 critical storm events, and minor surface water flooding (less than $1m^3$) in the 1:100+45% critical storm event, which will be contained within landscaped areas, in line with local and national policies.

Furthermore, the hydraulic calculations show that the runoff rate is restricted to 3.5l/s in every modelled scenario.

A class 1 bypass separator is proposed, in line with the Pollution Prevention Guidance for Businesses, to prevent contaminated surface water from entering the watercourse. The proposed model of separator is the 330C1/ESR which has been selected in accordance with the Building Regulations Part H for the contributing area. The separator will be fitted with an automatic warning device or high level alarm in accordance with the Building Regulations Part H. Roof runoff will not pass through the bypass separator.

FOUL WATER DRAINAGE STRATEGY

In line with the details approved at planning permission stage, it is proposed to treat foul water on site and then discharge this to the culverted watercourse, due to the lack of foul water facilities within close proximity to the development.

Foul water will be collected from the proposed units and pass through the treatment plant before discharging to the watercourse.

An assessment of the expected foul water flows, using British Waters Flows and Loads 4, has been undertaken, assuming a total number of employees of 70 for the 14 units, please see the below table.

		Flow (litres /day)		BOD (grams /day)		NH_3 (grams /day)	
Source of Waste	**No**	**Per Person**	**Total**	**Per Person**	**Total**	**Per Person**	**Total**
Office / Factory without canteen	70	50	3500	25	1750	5	350
Total			**3500**		**1750**		**350**
Population Equivalent			**24**		**30**		**44**

The above table shows that a treatment plant with a Population Equivalent of at least 44 will be required in order to provide the required level of treatment for the proposed foul water facilities.

A permit should not be required to discharge treated foul water to the watercourse as the design meets all of the general binding rules for small sewage discharges to a surface water at the design stage, as detailed below.

- The volume of discharge is estimated to be less than 5 cubic metres (5,000l) a day,
- Only domestic discharge sewage will discharge to the surface water body (no trade effluent),
- The sewage will not cause pollution,
- The proposals will use a small sewage treatment plant,
- The works are not within a tidal area,
- The proposed sewage treatment plant will meet BS EN 12566 standards,
- There is not a public foul sewer within proximity of the site,
- The site is not within 500m of a SSSI, a special protection area, a special area of conservation, a Ramsar wetland site, a designated bathing water, a protected shellfish water nor a freshwater pearl mussel population,
- The site is not within 200m of an aquatic local nature reserve,
- The site is not within 50m of a chalk river or aquatic local wildlife site,
- The surface water will have flow throughout the year.

TEMPORARY, CONSTRUCTION PHASE AND LAND DRAINAGE STRATEGY

A separate document has been prepared to detail the temporary drainage strategy during the construction phase. Please refer to the latest version of the report 20392-DCE-XX-XX-T-C-002.

MAINTENANCE OF DRAINAGE SYSTEMS

The private systems will be managed by the owner of the site. The system has been designed so that the drainage system is fully accessible and maintainable with flooding easily visible if it occurs. The maintenance schedule for the individual elements of the scheme is as per manufacturer's recommendations and as follows.

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

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

Attenuation Tank	
Operation	**Frequency**
Inspect and identify any areas that are not operating correctly, if required, take remedial actions	Monthly for 3 months, then six monthly
Remove sediment from pipework by jetting.	Annually or as required
Inspect/check all inlets, outlets, and overflow pipes to ensure that they are in good condition and operating as designed.	Annually and after large storms with remedials as required.
Excavate and replace the tank, including any backfill material, geomembrane, geotextile, inlets, outlet and vents.	Every 25 years or as required.

Hydrocarbon Interceptor/ Bypass Separator	
Operation	**Frequency**
Remove litter and debris and inspect for sediment, oil and grease accumulation	Six Monthly, or as required by the Manufacturer.
Change the Filter Media	As recommended by the Manufacturer
Remove sediment, oil, grease and floatables	As necessary – indicated by system inspection and monitoring system, or immediately following a fuel spill.
Replace malfunctioning parts or structures	As required
Inspect for evidence of poor operation	Six monthly
Inspect filter media and establish appropriate replacement frequencies	Six monthly or as required by the Manufacturer.
Inspect sediment accumulation rates and establish appropriate removal frequencies.	Monthly for first half year of operation, then every six months, or as required by the Manufacturer.
Note – All Hydrocarbon Interceptors should be maintained and monitored under a Service Plan which is compatible with the Manufacturer's warranty and suited to the plant used.	

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

The maintenance of the drainage network and SuDS features are to be linked with the wider site maintenance.

A log of all maintenance activities is to be kept and made available to the local planning authority (LPA) and / or the Lead Local Flood Authority (LLFA) on request.

NORTH

DO NOT SCALE

DESIGNERS HAZARD IDENTIFICATION

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

ABNORMAL HAZARD REFERENCE

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. THIS DRAWING IS TO BE REPRODUCED IN COLOUR.
3. IF ANY DISCREPANCIES ARE FOUND IN THIS DRAWING, PLEASE REPORT TO DUDLEYS CONSULTING ENGINEERS.
4. THIS DRAWING HAS BEEN ORIENTATED TO OS BRITISH NATIONAL GRID (EPSG:27700 OSGB36). EXISTING SURVEY STATIONS ARE SHOWN ON THE TOPOGRAPHICAL SURVEY.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT ARCHITECTS' AND ENGINEERS' DRAWINGS AND THE FOLLOWING SPECIFICATIONS:
   5.1. ENGSPEC 06 - ROAD, PAVING AND CAR PARKING AREAS
   5.2. ENGSPEC 17 - DRAINAGE WORK
   5.3. ENGSPEC 24 - SPECIFICATION FOR HIGHWAY DRAINAGE
6. THIS DRAWING IS BASED ON THE FOLLOWING INFORMATION:
   6.1. P20-01094-MET-EXT-XX-TOP-M2-G-001 - TOPOGRAPHICAL SURVEY BY MET GEO
   6.2. ENVIRONMENTAL DATED OCT 2020. 3002 - SITE LAYOUT PLAN BY KPP DATED SEP 2025.
7. ALL WORK TO BE UNDERTAKEN IN ACCORDANCE WITH THE CURRENT EDITION OF THE BUILDING REGULATIONS, SEWERAGE SECTOR CODES OF PRACTICE, AND THE RELEVANT LOCAL HIGHWAY AUTHORITY STANDARDS.
8. THE POSITIONS OF EXISTING UTILITIES SHOWN ON THIS DRAWING HAVE BEEN BASED ON INFORMATION EXTRACTED FROM RECORDS OBTAINED FROM UTILITY PROVIDERS. THESE MUST BE REGARDED AS APPROXIMATE ONLY. THE ACCURACY OR COMPLETENESS OF THE INFORMATION OR THE LOCATION OF SUCH APPARATUS IS NOT GUARANTEED AND NO WARRANTY IS GIVEN OR IMPLIED REGARDING THE POSITION, DEPTH, SIZE OR GRADIENT THEREOF. THE CONTRACTOR MUST MAKE THEIR OWN ENQUIRIES OF THE UTILITY PROVIDERS AND PUBLIC AUTHORITIES AND SATISFY THEMSELVES AS TO THE EXACT POSITION, DEPTH, SIZE AND GRADIENT OF SERVICES. IN THE INTEREST OF SAFETY, THE APPROXIMATE POSITION OF UNDERGROUND CABLES SHOULD BE OBTAINED BY USE OF ELECTRONIC CABLE LOCATORS AND THIS POSITION CONFIRMED BY CAREFUL TRIAL-HOLING USING HAND-DUG METHODS.
9. BEFORE UNDERTAKING ANY DRAINAGE WORKS, THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING THE LOCATION AND DEPTH OF THE FINAL CONNECTION POINT(S). ANY DISCREPANCIES MUST BE NOTIFIED TO DUDLEYS CONSULTING ENGINEERS IMMEDIATELY TO ALLOW SUFFICIENT TIME FOR ANY NECESSARY DESIGN CHANGES. COMMENCING NEW DRAINAGE WORKS WITHOUT FIRST ESTABLISHING THE CONNECTION IS ENTIRELY AT THE CONTRACTOR'S OWN RISK AND MAY RESULT IN ABORTIVE WORK IF THE POSITION OR DEPTH OF THE CONNECTION POINT(S) DIFFERS TO WHAT IS DETAILED ON THIS DRAWING.

KEY

- PROPOSED PRIVATE SURFACE WATER SEWER
- PROPOSED PRIVATE SURFACE WATER MANHOLE
- PROPOSED PRIVATE SURFACE WATER PPIC
- PROPOSED PRIVATE SURFACE WATER ATTENUATION TANK
- PROPOSED SURFACE WATER SEPARATOR (TYPE AS SPECIFIED)
- RWP — PROPOSED SURFACE WATER RAIN WATER PIPE
- PROPOSED PRIVATE FOUL WATER SEWER
- PROPOSED PRIVATE FOUL WATER MANHOLE
- PROPOSED PRIVATE FOUL WATER PPIC
- WPC — PROPOSED PRIVATE WASTE POINT CONNECTION
- PROPOSED FOUL WATER TREATMENT PLANT
- PROPOSED DRAINAGE CHANNEL
- SB — PROPOSED SURFACE WATER DRAINAGE CHANNEL SILT BOX
- AP — PROPOSED SURFACE WATER DRAINAGE CHANNEL ACCESS POINT
- EXISTING CULVERTED WATERCOURSE
- EXISTING MANHOLE
- SITE BOUNDARY

DATE	REVISION DESCRIPTION	BY	CHK.	REV.
12.01.26	UPDATED IL'S AT TANK AND NEARBY MANHOLES, UPDATED NOTES	JA	PD	P04
29.10.25	UPDATED TO SUIT CLIENT COMMENTS	AJB	JA	P03
22.10.25	UPDATED TO SUIT CLIENT COMMENTS	JA	PD	P02
17.10.25	PRELIMINARY ISSUE	AJB	JA	P01

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PROJECT
WAPPY SPRINGS
HUDDERSFIELD

TITLE
DRAINAGE STRATEGY
SHEET 1 OF 2

SCALE	PAPER	STAGE	STATUS
1:125	A0	PRELIMINARY	

DRAWING NO. 20392-DCE-XX-XX-D-C-100 REV. P04

SW-001
CL 255.029m
IL 254.500m - 150Ø OUT
SUMP 0.000m
DP 0.529m

SW-002
CL 254.914m
IL 254.030m - 150Ø IN
IL 254.030m - 150Ø OUT
SUMP 0.000m
DP 0.884m

SW-003
CL 255.212m
IL 254.070m - 150Ø OUT
SUMP 0.000m
DP 1.142m

SW-004
CL 255.210m
IL 253.600m - 150Ø IN
IL 253.600m - 150Ø IN
IL 253.525m - 225Ø OUT
SUMP 0.000m
DP 1.685m

SW-006
CL 254.909m
IL 253.500m - 150Ø IN
IL 253.425m - 225Ø OUT
SUMP 0.000m
DP 1.484m

SW-007
CL 255.211m
IL 253.280m - 225Ø IN
IL 253.280m - 225Ø IN
IL 253.280m - 225Ø OUT
SUMP 0.000m
DP 1.931m

SW-009
CL 255.211m
IL 253.250m - 150Ø IN
IL 253.175m - 225Ø IN
IL 253.175m - 225Ø OUT
SUMP 0.000m
DP 2.036m

SW-011
CL 255.075m
IL 253.655m - 300Ø OUT
SUMP 0.300m
DP 1.720m

SW-012
CL 255.075m
IL 253.605m - 300Ø IN
IL 253.605m - 300Ø OUT
SUMP 0.300m
DP 1.770m

SW-013
CL 255.075m
IL 253.555m - 300Ø IN
IL 253.555m - 300Ø OUT
SUMP 0.300m
DP 1.820m

SW-014
CL 255.075m
IL 253.490m - 300Ø IN
IL 253.490m - 300Ø OUT
SUMP 0.300m
DP 1.885m

SW-015
CL 255.087m
IL 253.440m - 300Ø IN
IL 253.440m - 300Ø OUT
SUMP 0.300m
DP 1.947m

SW-016
CL 255.099m
IL 253.390m - 300Ø IN
IL 253.315m - 375Ø OUT
SUMP 0.300m
DP 2.084m

SW-017
CL 255.100m
IL 253.280m - 375Ø IN
IL 253.280m - 375Ø OUT
SUMP 0.300m
DP 2.120m

SW-018
CL 255.100m
IL 253.245m - 375Ø IN
IL 253.245m - 375Ø OUT
SUMP 0.300m
DP 2.155m

SW-019
CL 255.100m
IL 253.210m - 375Ø IN
IL 253.210m - 375Ø OUT
SUMP 0.300m
DP 2.190m

SW-010
CL 255.308m
IL 252.375m - 225Ø IN
IL 252.300m - 300Ø OUT
SUMP 0.300m
DP 3.308m

FW-001
CL 255.182m
IL 253.830m - 150Ø OUT
DP 1.352m

FW-002
CL 255.182m
IL 253.625m - 150Ø IN
IL 253.625m - 150Ø OUT
DP 1.557m

FW-003
CL 255.182m
IL 253.440m - 150Ø IN
IL 253.440m - 150Ø OUT
DP 1.742m

FW-004
CL 255.181m
IL 253.345m - 150Ø IN
IL 253.435m - 150Ø OUT
DP 1.836m

FW-005
CL 255.187m
IL 252.925m - 150Ø IN
IL 252.925m - 150Ø OUT
DP 2.262m

FW-006
CL 255.188m
IL 252.775m - 150Ø IN
IL 252.775m - 150Ø OUT
DP 2.413m

FW-007
CL 255.188m
IL 252.625m - 150Ø IN
IL 252.625m - 150Ø OUT
DP 2.563m

WAPPY SPRINGS INN

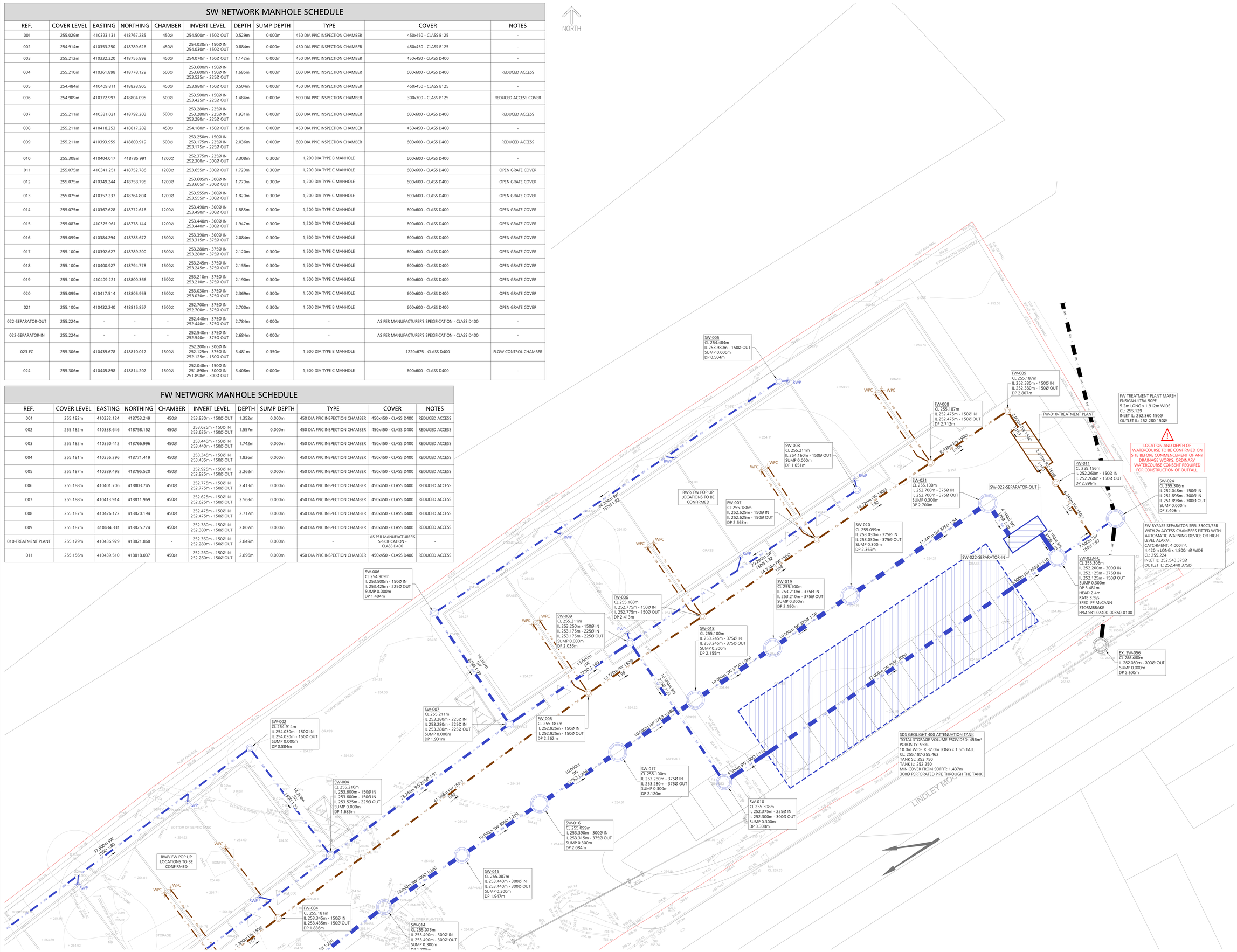
LINDLEY MOOR ROAD

SW NETWORK MANHOLE SCHEDULE

REF.	COVER LEVEL	EASTING	NORTHING	CHAMBER	INVERT LEVEL	DEPTH	SUMP DEPTH	TYPE	COVER	NOTES
001	255.029m	410323.131	418767.285	450ø	254.500m - 150Ø OUT	0.529m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS B125	-
002	254.914m	410353.250	418789.626	450ø	254.030m - 150Ø IN 254.030m - 150Ø OUT	0.884m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS B125	-
003	255.212m	410332.320	418755.899	450ø	254.070m - 150Ø OUT	1.142m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	-
004	255.210m	410361.898	418778.129	600ø	253.600m - 150Ø IN 253.600m - 150Ø IN 253.525m - 225Ø OUT	1.685m	0.000m	600 DIA PPIC INSPECTION CHAMBER	600x600 - CLASS D400	REDUCED ACCESS
005	254.484m	410409.811	418828.905	450ø	253.980m - 150Ø OUT	0.504m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS B125	-
006	254.909m	410372.997	418804.095	600ø	253.500m - 150Ø IN 253.425m - 225Ø OUT	1.484m	0.000m	600 DIA PPIC INSPECTION CHAMBER	300x300 - CLASS B125	REDUCED ACCESS COVER
007	255.211m	410381.021	418792.203	600ø	253.280m - 225Ø IN 253.280m - 225Ø IN 253.280m - 225Ø OUT	1.931m	0.000m	600 DIA PPIC INSPECTION CHAMBER	600x600 - CLASS D400	REDUCED ACCESS
008	255.211m	410418.253	418817.282	450ø	254.160m - 150Ø OUT	1.051m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	-
009	255.211m	410393.959	418800.919	600ø	253.250m - 150Ø IN 253.175m - 225Ø IN 253.175m - 225Ø OUT	2.036m	0.000m	600 DIA PPIC INSPECTION CHAMBER	600x600 - CLASS D400	REDUCED ACCESS
010	255.308m	410404.017	418785.991	1200ø	252.375m - 225Ø IN 252.300m - 300Ø OUT	3.308m	0.300m	1,200 DIA TYPE B MANHOLE	600x600 - CLASS D400	-
011	255.075m	410341.251	418752.786	1200ø	253.655m - 300Ø OUT	1.720m	0.300m	1,200 DIA TYPE C MANHOLE	600x600 - CLASS D400	OPEN GRATE COVER
012	255.075m	410349.244	418758.795	1200ø	253.605m - 300Ø IN 253.605m - 300Ø OUT	1.770m	0.300m	1,200 DIA TYPE C MANHOLE	600x600 - CLASS D400	OPEN GRATE COVER
013	255.075m	410357.237	418764.804	1200ø	253.555m - 300Ø IN 253.555m - 300Ø OUT	1.820m	0.300m	1,200 DIA TYPE C MANHOLE	600x600 - CLASS D400	OPEN GRATE COVER
014	255.075m	410367.628	418772.616	1200ø	253.490m - 300Ø IN 253.490m - 300Ø OUT	1.885m	0.300m	1,200 DIA TYPE C MANHOLE	600x600 - CLASS D400	OPEN GRATE COVER
015	255.087m	410375.961	418778.144	1200ø	253.440m - 300Ø IN 253.440m - 300Ø OUT	1.947m	0.300m	1,200 DIA TYPE C MANHOLE	600x600 - CLASS D400	OPEN GRATE COVER
016	255.099m	410384.294	418783.672	1500ø	253.390m - 300Ø IN 253.315m - 375Ø OUT	2.084m	0.300m	1,500 DIA TYPE C MANHOLE	600x600 - CLASS D400	OPEN GRATE COVER
017	255.100m	410392.627	418789.200	1500ø	253.280m - 375Ø IN 253.280m - 375Ø OUT	2.120m	0.300m	1,500 DIA TYPE C MANHOLE	600x600 - CLASS D400	OPEN GRATE COVER
018	255.100m	410400.927	418794.778	1500ø	253.245m - 375Ø IN 253.245m - 375Ø OUT	2.155m	0.300m	1,500 DIA TYPE C MANHOLE	600x600 - CLASS D400	OPEN GRATE COVER
019	255.100m	410409.221	418800.366	1500ø	253.210m - 375Ø IN 253.210m - 375Ø OUT	2.190m	0.300m	1,500 DIA TYPE C MANHOLE	600x600 - CLASS D400	OPEN GRATE COVER
020	255.099m	410417.514	418805.953	1500ø	253.030m - 375Ø IN 253.030m - 375Ø OUT	2.369m	0.300m	1,500 DIA TYPE C MANHOLE	600x600 - CLASS D400	OPEN GRATE COVER
021	255.100m	410432.240	418815.857	1500ø	252.700m - 375Ø IN 252.700m - 375Ø OUT	2.700m	0.300m	1,500 DIA TYPE B MANHOLE	600x600 - CLASS D400	OPEN GRATE COVER
022-SEPARATOR-OUT	255.224m	-	-	-	252.440m - 375Ø IN 252.440m - 375Ø OUT	2.784m	0.000m	-	AS PER MANUFACTURERS SPECIFICATION - CLASS D400	-
022-SEPARATOR-IN	255.224m	-	-	-	252.540m - 375Ø IN 252.540m - 375Ø OUT	2.684m	0.000m	-	AS PER MANUFACTURERS SPECIFICATION - CLASS D400	-
023-FC	255.306m	410439.678	418810.017	1500ø	252.200m - 300Ø IN 252.125m - 375Ø IN 252.125m - 150Ø OUT	3.481m	0.350m	1,500 DIA TYPE B MANHOLE	1220x675 - CLASS D400	FLOW CONTROL CHAMBER
024	255.306m	410445.898	418814.207	1500ø	252.048m - 150Ø IN 251.898m - 300Ø IN 251.898m - 300Ø OUT	3.408m	0.000m	1,500 DIA TYPE C MANHOLE	600x600 - CLASS D400	-

FW NETWORK MANHOLE SCHEDULE

REF.	COVER LEVEL	EASTING	NORTHING	CHAMBER	INVERT LEVEL	DEPTH	SUMP DEPTH	TYPE	COVER	NOTES
001	255.182m	410332.124	418753.249	450Ø	253.830m - 150Ø OUT	1.352m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	REDUCED ACCESS
002	255.182m	410338.646	418758.152	450Ø	253.625m - 150Ø IN 253.625m - 150Ø OUT	1.557m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	REDUCED ACCESS
003	255.182m	410350.412	418766.996	450Ø	253.440m - 150Ø IN 253.440m - 150Ø OUT	1.742m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	REDUCED ACCESS
004	255.181m	410356.296	418771.419	450Ø	253.345m - 150Ø IN 253.435m - 150Ø OUT	1.836m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	REDUCED ACCESS
005	255.187m	410389.498	418795.520	450Ø	252.925m - 150Ø IN 252.925m - 150Ø OUT	2.262m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	REDUCED ACCESS
006	255.188m	410401.706	418803.745	450Ø	252.775m - 150Ø IN 252.775m - 150Ø OUT	2.413m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	REDUCED ACCESS
007	255.188m	410413.914	418811.969	450Ø	252.625m - 150Ø IN 252.625m - 150Ø OUT	2.563m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	REDUCED ACCESS
008	255.187m	410426.122	418820.194	450Ø	252.475m - 150Ø IN 252.475m - 150Ø OUT	2.712m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	REDUCED ACCESS
009	255.187m	410434.331	418825.724	450Ø	252.380m - 150Ø IN 252.380m - 150Ø OUT	2.807m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	REDUCED ACCESS
010-TREATMENT PLANT	255.129m	410436.929	418821.868	-	252.360m - 150Ø IN 252.280m - 150Ø OUT	2.849m	0.000m	-	AS PER MANUFACTURERS SPECIFICATION - CLASS D400	-
011	255.156m	410439.510	418818.037	450Ø	252.260m - 150Ø IN 252.260m - 150Ø OUT	2.896m	0.000m	450 DIA PPIC INSPECTION CHAMBER	450x450 - CLASS D400	REDUCED ACCESS



DO NOT SCALE

DESIGNERS HAZARD IDENTIFICATION

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

ABNORMAL HAZARD REFERENCE

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. THIS DRAWING IS TO BE REPRODUCED IN COLOUR.
3. IF ANY DISCREPANCIES ARE FOUND IN THIS DRAWING, PLEASE REPORT TO DUDLEYS CONSULTING ENGINEERS.
4. THIS DRAWING HAS BEEN ORIENTATED TO OS BRITISH NATIONAL GRID (EPSG:27700 OSGB36). EXISTING SURVEY STATIONS ARE SHOWN ON THE TOPOGRAPHICAL SURVEY.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT ARCHITECTS' AND ENGINEERS' DRAWINGS AND THE FOLLOWING SPECIFICATIONS:
   5.1. ENGSPEC 06 - ROAD, PAVING AND CAR PARKING AREAS
   5.2. ENGSPEC 17 - DRAINAGE WORK
   5.3. ENGSPEC 24 - SPECIFICATION FOR HIGHWAY DRAINAGE
6. THIS DRAWING IS BASED ON THE FOLLOWING INFORMATION:
   6.1. P20-01094-MET-EXT-XX-TOP-M2-G-001 - TOPOGRAPHICAL SURVEY BY MET GEO
   6.2. ENVIRONMENTAL DATED OCT 2020. 3002 - SITE LAYOUT PLAN BY KPP DATED SEP 2025.
7. ALL WORK TO BE UNDERTAKEN IN ACCORDANCE WITH THE CURRENT EDITION OF THE BUILDING REGULATIONS, SEWERAGE SECTOR CODES OF PRACTICE, AND THE RELEVANT LOCAL HIGHWAY AUTHORITY STANDARDS.
8. THE POSITIONS OF EXISTING UTILITIES SHOWN ON THIS DRAWING HAVE BEEN BASED ON INFORMATION EXTRACTED FROM RECORDS OBTAINED FROM UTILITY PROVIDERS. THESE MUST BE REGARDED AS APPROXIMATE ONLY. THE ACCURACY OR COMPLETENESS OF THE INFORMATION OR THE LOCATION OF SUCH APPARATUS IS NOT GUARANTEED AND NO WARRANTY IS GIVEN OR IMPLIED REGARDING THE POSITION, DEPTH, SIZE OR GRADIENT THEREOF. THE CONTRACTOR MUST MAKE THEIR OWN ENQUIRIES OF THE UTILITY PROVIDERS AND PUBLIC AUTHORITIES AND SATISFY THEMSELVES AS TO THE EXACT POSITION, DEPTH, SIZE AND GRADIENT OF SERVICES. IN THE INTEREST OF SAFETY, THE APPROXIMATE POSITION OF UNDERGROUND CABLES SHOULD BE OBTAINED BY USE OF ELECTRONIC CABLE LOCATORS AND THIS POSITION CONFIRMED BY CAREFUL TRIAL-HOLING USING HAND-DUG METHODS.
9. BEFORE UNDERTAKING ANY DRAINAGE WORKS, THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING THE LOCATION AND DEPTH OF THE FINAL CONNECTION POINT(S). ANY DISCREPANCIES MUST BE NOTIFIED TO DUDLEYS CONSULTING ENGINEERS IMMEDIATELY TO ALLOW SUFFICIENT TIME FOR ANY NECESSARY DESIGN CHANGES. COMMENCING NEW DRAINAGE WORKS WITHOUT FIRST ESTABLISHING THE CONNECTION IS ENTIRELY AT THE CONTRACTOR'S OWN RISK AND MAY RESULT IN ABORTIVE WORK IF THE POSITION OR DEPTH OF THE CONNECTION POINT(S) DIFFERS TO WHAT IS DETAILED ON THIS DRAWING.

KEY

12.01.26	UPDATED IL'S AT TANK AND NEARBY MANHOLES, UPDATED NOTES	JA	PD	P04
29.10.25	UPDATED TO SUIT CLIENT COMMENTS	AJB	JA	P03
22.10.25	UPDATED TO SUIT CLIENT COMMENTS	JA	PD	P02
17.10.25	PRELIMINARY ISSUE	AJB	JA	P01
DATE	REVISION DESCRIPTION	BY	CHK.	REV.

DUDLEYS CONSULTING ENGINEERS
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35 Town Street
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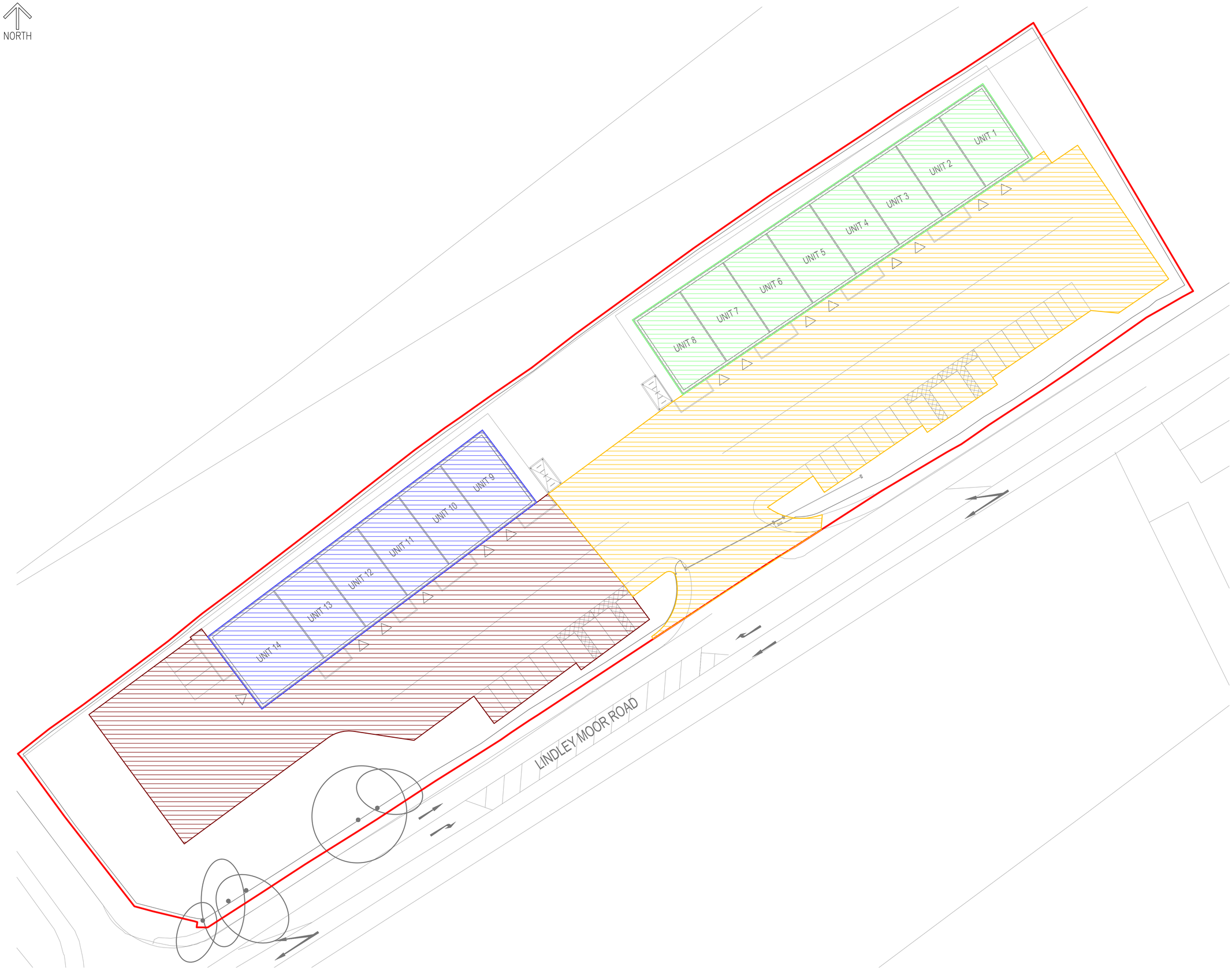
PROJECT
WAPPY SPRINGS
HUDDERSFIELDS

TITLE
DRAINAGE STRATEGY
SHEET 2 OF 2

SCALE	PAPER	STAGE	STATUS
1:125	A0	PRELIMINARY	

DRAWING NO. 20392-DCE-XX-XX-D-C-101 REV. P04

NORTH



DO NOT SCALE

DESIGNERS HAZARD IDENTIFICATION

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ABNORMAL HAZARD REFERENCE

NOTES

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5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT ARCHITECTS' AND ENGINEERS' DRAWINGS AND THE FOLLOWING SPECIFICATIONS:
   5.1. ENGSPEC 06 - ROAD, PAVING AND CAR PARKING AREAS
   5.2. ENGSPEC 17 - DRAINAGE WORK
   5.3. ENGSPEC 24 - SPECIFICATION FOR HIGHWAY DRAINAGE
6. THIS DRAWING IS BASED ON THE FOLLOWING INFORMATION:
   6.1. P20-01094-MET-EXT-XX-TOP-M2-G-001-1- TOPOGRAPHICAL SURVEY BY MET GEO ENVIRONMENTAL DATED OCTOBER 2022.
   6.2. 2002 REV D PROPOSED SITE PLAN BY KPP ARCHITECTS DATED FEBRUARY 2025.
7. ALL WORK TO BE UNDERTAKEN IN ACCORDANCE WITH THE CURRENT EDITION OF THE BUILDING REGULATIONS, SEWERAGE SECTOR CODES OF PRACTICE, AND THE RELEVANT LOCAL HIGHWAY AUTHORITY STANDARDS.
8. BEFORE UNDERTAKING ANY DRAINAGE WORKS, THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING THE LOCATION AND DEPTH OF THE FINAL CONNECTION POINT(S). ANY DISCREPANCIES MUST BE NOTIFIED TO DUDLEYS CONSULTING ENGINEERS IMMEDIATELY TO ALLOW SUFFICIENT TIME FOR ANY NECESSARY DESIGN CHANGES. COMMENCING NEW DRAINAGE WORKS WITHOUT FIRST ESTABLISHING THE CONNECTION IS ENTIRELY AT THE CONTRACTOR'S OWN RISK AND MAY RESULT IN ABORTIVE WORK IF THE POSITION OR DEPTH OF THE CONNECTION POINT(S) DIFFERS TO WHAT IS DETAILED ON THIS DRAWING.

KEY

- PROPOSED IMPERMEABLE AREA: 2066m²
- PROPOSED IMPERMEABLE AREA:1362m²
- PROPOSED IMPERMEABLE AREA: 764m²
- PROPOSED IMPERMEABLE AREA: 621m²

TOTAL IMPERMEABLE AREA: 4813m²

DATE	REVISION DESCRIPTION	BY	CHK.	REV.
22.10.25	UPDATED IMPERMEABLE AREAS	JA	PD	P02
17.10.25	PRELIMINARY ISSUE	AJB	JA	P01

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PROJECT
WAPPY SPRINGS
HUDDERSFIELD, HD3 3TD

TITLE
PROPOSED IMPERMEABLE AREA PLAN

SCALE	PAPER	STAGE	STATUS
1:250	A1	PRELIMINARY	

DRAWING NO. 20392-DCE-XX-XX-D-C-103
REV. P02

NORTH

FFL 255.225m

FFL 255.225m

UNIT 1
UNIT 2
UNIT 3
UNIT 4
UNIT 5
UNIT 6
UNIT 7
UNIT 8
UNIT 9
UNIT 10
UNIT 11
UNIT 12
UNIT 13
UNIT 14

LINDLEY MOOR ROAD

WAPPY SPRINGS INN

PROPOSED LEVELS TO TIE INTO TOP OF GABION WALL AT THIS LOCATION, AT A LEVEL OF 255.000mAOD

CROWN TO BE CREATED AT THE HIGHWAY BOUNDARY SO THAT LEVELS FALL FROM THE BACK OF THE ADOPTED HIGHWAY INTO THE SITE.

SLIGHT INCURSION INTO TREE ROOT PROTECTION AREA. LEVELS IN THIS AREA WILL BE RAISED BY A MAX OF 200mm. AREA EQUATES TO 0.67% OF TOTAL TREE RPA.

DO NOT SCALE

DESIGNERS HAZARD IDENTIFICATION

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ABNORMAL HAZARD REFERENCE

NOTES

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5. THIS DRAWING IS BASED ON THE FOLLOWING INFORMATION:
   5.1. P20-01094-MET-EXT-XX-TOP-M2-G-001 - TOPOGRAPHICAL SURVEY BY MET GEO ENVIRONMENTAL DATED OCT 2020.
   5.2. 3002 - SITE LAYOUT PLAN BY KPP DATED SEP 2025.
6. ALL WORK TO BE UNDERTAKEN IN ACCORDANCE WITH THE CURRENT EDITION OF THE BUILDING REGULATIONS, SEWERAGE SECTOR CODES OF PRACTICE, AND THE RELEVANT LOCAL HIGHWAY AUTHORITY STANDARDS.

KEY

- OB 0.00m — PROPOSED OVERBUILD
- PROPOSED CHANNEL DRAIN
- EX. LEVEL 0.000m — EXISTING SPOT LEVEL
- 0.000m — PROPOSED SPOT LEVEL
- 0.125 — DENOTES MAJOR CONTOURS
- 0.025 — DENOTES MINOR CONTOURS
- 1:X — PROPOSED GRADIENT
- SITE BOUNDARY
- ROOT PROTECTION AREA

29.10.25	FFL AMENDED TO SHOW 255.225. PROPOSED LOW POINT FOR MANHOLE DRAINAGE GULLY COVERS ADJUSTED FOR NORTHERN UNITS.	AJB	JA	P03
21.10.25	RAISED FFL'S AND ASSOCIATED YARD LEVELS, ADDED TREE RPA AND AMENDED TIE-IN LEVELS AT EASTERN BOUNDARY TO TOP OF GABION WALL	JA	PD	P02
17.10.25	PRELIMINARY ISSUE	AJB	JA	P01
DATE	REVISION DESCRIPTION	BY	CHK.	REV.

DUDLEYS CONSULTING ENGINEERS
Tithe House
35 Town Street
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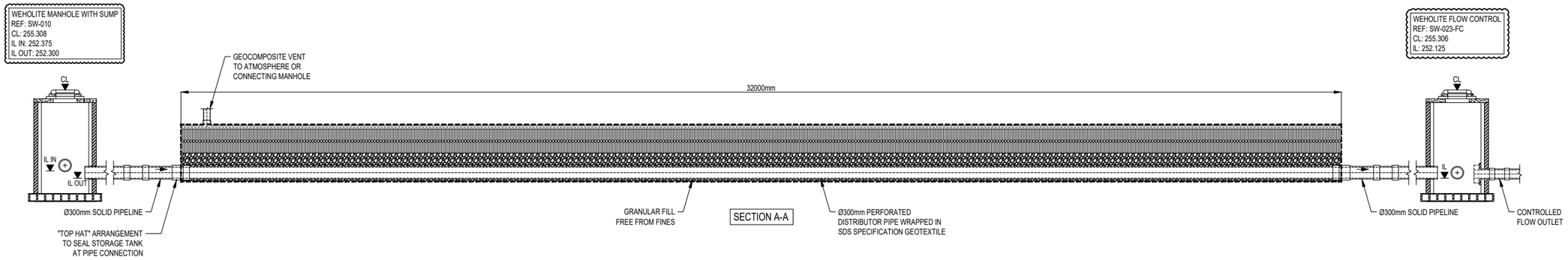
PROJECT
WAPPY SPRINGS
HUDDERSFIELD, HD3 3TD

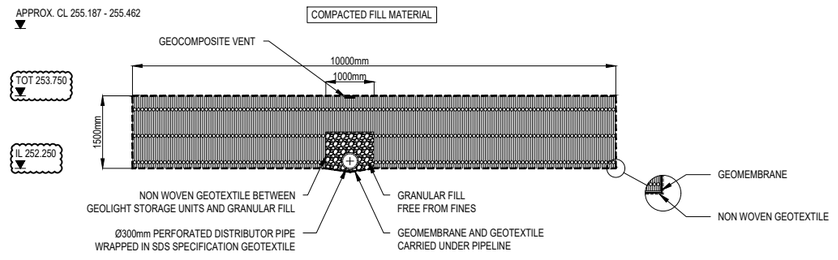
TITLE
EXTERNAL LEVELS

SCALE	PAPER	STAGE	STATUS
1:250	A1	PRELIMINARY	

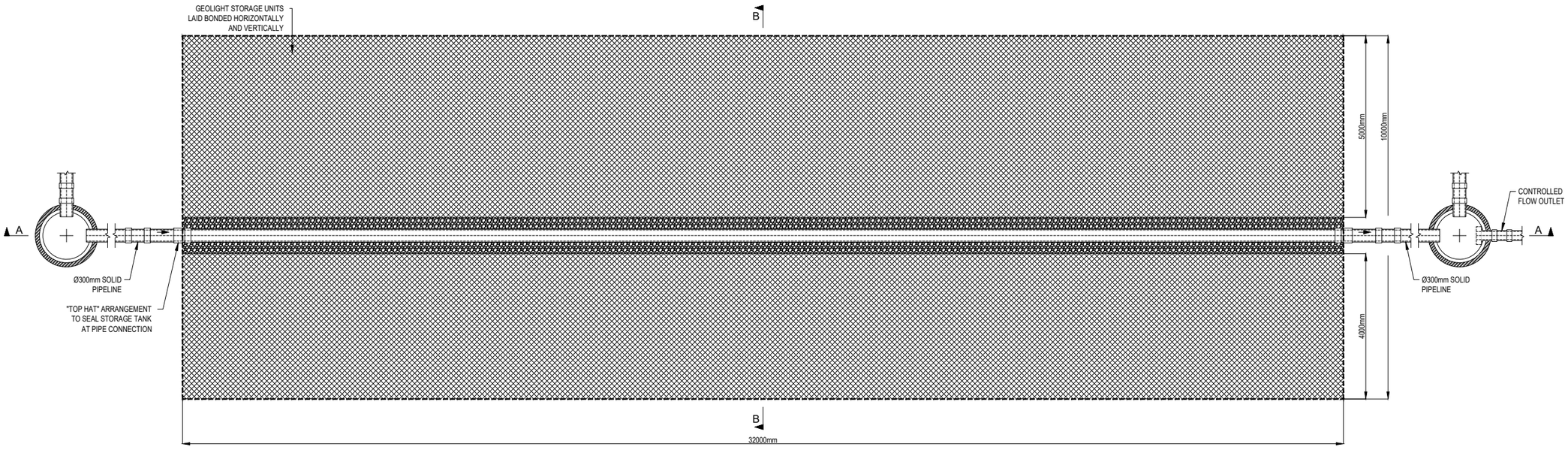
DRAWING NO. 20392-DCE-XX-XX-D-C-155 REV. P03



SECTION A-A



SECTION B-B



Notes:

This Drawing is to be read in conjunction with all relevant Architect's Engineer's and specialists' drawings and specifications.

Do not scale from this drawing in either paper or digital form. Use written dimensions only.

SDS to leave solid stub only, exiting tank for connection by others.

All external Manholes, Access Points, Junctions & Pipe are shown for guidance only and not part of the SDS program unless otherwise agreed.

REFERENCE DRAWINGS:

Drawing Number	Revision	Drawing Title	Date
20392-DCE-XX-XX-D-C-101	P04	DRAINAGE STRATEGY SHEET 2 OF 2	05.01.26

Rev	Comments	Date	DRW	CHK
A	LEVELS UPDATE	09.01.25		
	ISSUED FOR APPROVAL		CG	RJ
-	ISSUED FOR APPROVAL	23.12.25		
			CG	SP

SDS INFRASTRUCTURE
Clearwater House
Castlemills
Biddisham
Somerset
BS26 2RE
+44 (0)1934 751303
sdsinfrastructure.com

Project: WAPPY SPRINGS HUDDERSFIELD

Client: DUDLEYS CONSULTING ENGINEERS

Title: ATTENUATION TANK 1 DETAIL

Scale: NTS | Date: 23.12.25

SDS Drawing No: E265725_01 | Rev: A

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	x
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	1.000	Connection Type	Level Soffits		
Time of Entry (mins)	4.00	Minimum Backdrop Height (m)	0.750		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
001	0.031	4.00	255.029	450	410323.131	418767.285	0.529	254.500
002			254.914	450	410353.250	418789.626	0.884	254.030
003	0.031	4.00	255.212	450	410332.320	418755.899	1.142	254.070
004			255.210	600	410361.898	418778.129	1.685	253.525
005	0.038	4.00	254.484	450	410409.811	418828.905	0.504	253.980
006			254.909	600	410372.997	418804.095	1.484	253.425
007			255.211	600	410381.021	418792.203	1.931	253.280
008	0.038	4.00	255.211	450	410418.253	418817.282	1.051	254.160
009			255.211	600	410393.959	418800.919	2.036	253.175
010			255.308	1200	410404.017	418785.991	3.008	252.300
TANK			255.307	1200	410421.847	418798.004	3.057	252.250
011	0.043	4.00	255.075	1200	410341.251	418752.786	1.420	253.655
012	0.094	4.00	255.075	1200	410349.244	418758.795	1.470	253.605
013			255.075	1200	410357.237	418764.804	1.520	253.555
014			255.075	1200	410367.628	418772.616	1.585	253.490
015			255.087	1200	410375.961	418778.144	1.647	253.440
016	0.067	4.00	255.099	1500	410384.294	418783.672	1.784	253.315
017			255.100	1500	410392.627	418789.200	1.820	253.280
018			255.100	1500	410400.927	418794.778	1.855	253.245
019	0.087	4.00	255.100	1500	410409.221	418800.366	1.890	253.210
020			255.099	1500	410417.514	418805.953	2.069	253.030
021	0.053	4.00	255.100	1500	410432.240	418815.857	2.400	252.700
022-SEPARATOR-IN			255.224	600	410435.019	418811.700	2.684	252.540
022-SEPARATOR-OUT			255.224	600	410437.443	418813.334	2.784	252.440

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
023-FC			255.306	1500	410439.678	418810.017	3.181	252.125
024			255.306	1500	410445.898	418814.207	3.258	252.048

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)
PN 3.001	001	002	37.500	0.600	254.500	254.030	0.470	79.8	150	4.55	50.0
PN 3.002	002	004	14.386	0.600	254.030	253.600	0.430	33.5	150	4.69	50.0
PN 2.001	003	004	37.000	0.600	254.070	253.600	0.470	78.7	150	4.54	50.0
PN 1.003	004	007	23.744	0.600	253.525	253.280	0.245	96.9	225	4.99	50.0
PN 3.005	005	006	44.394	0.600	253.980	253.500	0.480	92.5	150	4.71	50.0
PN 3.006	006	007	14.347	0.600	253.425	253.280	0.145	98.9	225	4.89	50.0
PN 3.007	007	009	15.600	0.600	253.280	253.175	0.105	148.6	225	5.23	50.0
PN 3.008	008	009	29.290	0.600	254.160	253.250	0.910	32.2	150	4.27	50.0
PN 3.009	009	010	18.000	0.600	253.175	252.375	0.800	22.5	225	5.34	50.0
PN 3.010 IN	010	TANK	21.500	0.600	252.300	252.250	0.050	430.0	300	5.82	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
PN 3.001	1.126	19.9	5.6	0.379	0.734	0.031	0.0
PN 3.002	1.746	30.9	5.6	0.734	1.460	0.031	0.0
PN 2.001	1.134	20.0	5.6	0.992	1.460	0.031	0.0
PN 1.003	1.328	52.8	11.2	1.460	1.706	0.062	0.0
PN 3.005	1.045	18.5	6.9	0.354	1.259	0.038	0.0
PN 3.006	1.314	52.3	6.9	1.259	1.706	0.038	0.0
PN 3.007	1.070	42.6	18.1	1.706	1.811	0.100	0.0
PN 3.008	1.780	31.5	6.9	0.901	1.811	0.038	0.0
PN 3.009	2.770	110.1	25.0	1.811	2.708	0.139	0.0
PN 3.010 IN	0.752	53.1	25.0	2.708	2.757	0.139	0.0

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)
PN 3.010 OUT	TANK	023-FC	21.500	0.600	252.250	252.200	0.050	430.0	300	6.29	50.0
PN 3.011	011	012	10.000	0.600	253.655	253.605	0.050	200.0	300	4.15	50.0
PN 3.012	012	013	10.000	0.600	253.605	253.555	0.050	200.0	300	4.30	50.0
PN 3.013	013	014	13.000	0.600	253.555	253.490	0.065	200.0	300	4.50	50.0
PN 3.014	014	015	10.000	0.600	253.490	253.440	0.050	200.0	300	4.65	50.0
PN 3.015	015	016	10.000	0.600	253.440	253.390	0.050	200.0	300	4.80	50.0
PN 3.016	016	017	10.000	0.600	253.315	253.280	0.035	285.7	375	4.95	50.0
PN 3.017	017	018	10.000	0.600	253.280	253.245	0.035	285.7	375	5.11	50.0
PN 3.018	018	019	10.000	0.600	253.245	253.210	0.035	285.7	375	5.27	50.0
PN 3.019	019	020	10.000	0.600	253.210	253.030	0.180	55.6	375	5.33	50.0
PN 3.020	020	021	17.747	0.600	253.030	252.700	0.330	53.8	375	5.45	50.0
PN 3.021	021	022-SEPARATOR-IN	4.100	0.600	252.700	252.540	0.160	25.6	375	5.47	50.0
PN 062	022-SEPARATOR-IN	022-SEPARATOR-OUT	2.924	0.600	252.540	252.440	0.100	29.2	375	5.49	50.0
PN 3.022	022-SEPARATOR-OUT	023-FC	3.100	0.600	252.440	252.125	0.315	9.8	375	5.50	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
PN 3.010 OUT	0.752	53.1	25.0	2.757	2.806	0.139	0.0
PN 3.011	1.108	78.3	7.7	1.120	1.170	0.043	0.0
PN 3.012	1.108	78.3	24.6	1.170	1.220	0.136	0.0
PN 3.013	1.108	78.3	24.6	1.220	1.285	0.136	0.0
PN 3.014	1.108	78.3	24.6	1.285	1.347	0.136	0.0
PN 3.015	1.108	78.3	24.6	1.347	1.409	0.136	0.0
PN 3.016	1.067	117.8	36.8	1.409	1.445	0.203	0.0
PN 3.017	1.067	117.8	36.8	1.445	1.480	0.203	0.0
PN 3.018	1.067	117.8	36.8	1.480	1.515	0.203	0.0
PN 3.019	2.435	268.9	52.4	1.515	1.694	0.290	0.0
PN 3.020	2.475	273.4	52.4	1.694	2.025	0.290	0.0
PN 3.021	3.591	396.6	61.9	2.025	2.309	0.343	0.0
PN 062	3.361	371.2	61.9	2.309	2.409	0.343	0.0
PN 3.022	5.803	640.9	61.9	2.409	2.806	0.343	0.0

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)
PN 3.023	023-FC	024	7.500	0.600	252.125	252.048	0.077	97.4	150	6.42	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
PN 3.023	1.018	18.0	87.0	3.031	3.108	0.481	0.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
PN 3.001	37.500	79.8	150	Circular	255.029	254.500	0.379	254.914	254.030	0.734
PN 3.002	14.386	33.5	150	Circular	254.914	254.030	0.734	255.210	253.600	1.460
PN 2.001	37.000	78.7	150	Circular	255.212	254.070	0.992	255.210	253.600	1.460
PN 1.003	23.744	96.9	225	Circular	255.210	253.525	1.460	255.211	253.280	1.706
PN 3.005	44.394	92.5	150	Circular	254.484	253.980	0.354	254.909	253.500	1.259
PN 3.006	14.347	98.9	225	Circular	254.909	253.425	1.259	255.211	253.280	1.706
PN 3.007	15.600	148.6	225	Circular	255.211	253.280	1.706	255.211	253.175	1.811
PN 3.008	29.290	32.2	150	Circular	255.211	254.160	0.901	255.211	253.250	1.811
PN 3.009	18.000	22.5	225	Circular	255.211	253.175	1.811	255.308	252.375	2.708

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
PN 3.001	001	450	Manhole	Adoptable	002	450	Manhole	Adoptable
PN 3.002	002	450	Manhole	Adoptable	004	600	Manhole	Adoptable
PN 2.001	003	450	Manhole	Adoptable	004	600	Manhole	Adoptable
PN 1.003	004	600	Manhole	Adoptable	007	600	Manhole	Adoptable
PN 3.005	005	450	Manhole	Adoptable	006	600	Manhole	Adoptable
PN 3.006	006	600	Manhole	Adoptable	007	600	Manhole	Adoptable
PN 3.007	007	600	Manhole	Adoptable	009	600	Manhole	Adoptable
PN 3.008	008	450	Manhole	Adoptable	009	600	Manhole	Adoptable
PN 3.009	009	600	Manhole	Adoptable	010	1200	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
PN 3.010 IN	21.500	430.0	300	Circular	255.308	252.300	2.708	255.307	252.250	2.757
PN 3.010 OUT	21.500	430.0	300	Circular	255.307	252.250	2.757	255.306	252.200	2.806
PN 3.011	10.000	200.0	300	Circular	255.075	253.655	1.120	255.075	253.605	1.170
PN 3.012	10.000	200.0	300	Circular	255.075	253.605	1.170	255.075	253.555	1.220
PN 3.013	13.000	200.0	300	Circular	255.075	253.555	1.220	255.075	253.490	1.285
PN 3.014	10.000	200.0	300	Circular	255.075	253.490	1.285	255.087	253.440	1.347
PN 3.015	10.000	200.0	300	Circular	255.087	253.440	1.347	255.099	253.390	1.409
PN 3.016	10.000	285.7	375	Circular	255.099	253.315	1.409	255.100	253.280	1.445
PN 3.017	10.000	285.7	375	Circular	255.100	253.280	1.445	255.100	253.245	1.480
PN 3.018	10.000	285.7	375	Circular	255.100	253.245	1.480	255.100	253.210	1.515
PN 3.019	10.000	55.6	375	Circular	255.100	253.210	1.515	255.099	253.030	1.694
PN 3.020	17.747	53.8	375	Circular	255.099	253.030	1.694	255.100	252.700	2.025
PN 3.021	4.100	25.6	375	Circular	255.100	252.700	2.025	255.224	252.540	2.309
PN 062	2.924	29.2	375	Circular	255.224	252.540	2.309	255.224	252.440	2.409
PN 3.022	3.100	9.8	375	Circular	255.224	252.440	2.409	255.306	252.125	2.806

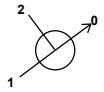
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
PN 3.010 IN	010	1200	Manhole	Adoptable	TANK	1200	Junction	
PN 3.010 OUT	TANK	1200	Junction		023-FC	1500	Manhole	Adoptable
PN 3.011	011	1200	Manhole	Adoptable	012	1200	Manhole	Adoptable
PN 3.012	012	1200	Manhole	Adoptable	013	1200	Manhole	Adoptable
PN 3.013	013	1200	Manhole	Adoptable	014	1200	Manhole	Adoptable
PN 3.014	014	1200	Manhole	Adoptable	015	1200	Manhole	Adoptable
PN 3.015	015	1200	Manhole	Adoptable	016	1500	Manhole	Adoptable
PN 3.016	016	1500	Manhole	Adoptable	017	1500	Manhole	Adoptable
PN 3.017	017	1500	Manhole	Adoptable	018	1500	Manhole	Adoptable
PN 3.018	018	1500	Manhole	Adoptable	019	1500	Manhole	Adoptable
PN 3.019	019	1500	Manhole	Adoptable	020	1500	Manhole	Adoptable
PN 3.020	020	1500	Manhole	Adoptable	021	1500	Manhole	Adoptable
PN 3.021	021	1500	Manhole	Adoptable	022-SEPARATOR-IN	600	Manhole	Adoptable
PN 062	022-SEPARATOR-IN	600	Manhole	Adoptable	022-SEPARATOR-OUT	600	Manhole	Adoptable
PN 3.022	022-SEPARATOR-OUT	600	Manhole	Adoptable	023-FC	1500	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
PN 3.023	7.500	97.4	150	Circular	255.306	252.125	3.031	255.306	252.048	3.108

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
PN 3.023	023-FC	1500	Manhole	Adoptable	024	1500	Manhole	Adoptable

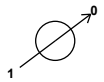
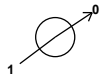
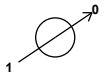
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
001	410323.131	418767.285	255.029	0.529	450				
						0	PN 3.001	254.500	150
002	410353.250	418789.626	254.914	0.884	450	1	PN 3.001	254.030	150
									
						0	PN 3.002	254.030	150
003	410332.320	418755.899	255.212	1.142	450				
						0	PN 2.001	254.070	150
004	410361.898	418778.129	255.210	1.685	600	1	PN 2.001	253.600	150
						2	PN 3.002	253.600	150
									
						0	PN 1.003	253.525	225
005	410409.811	418828.905	254.484	0.504	450				
						0	PN 3.005	253.980	150

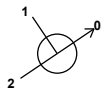
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
006	410372.997	418804.095	254.909	1.484	600	1	PN 3.005	253.500	150
						0	PN 3.006	253.425	225
007	410381.021	418792.203	255.211	1.931	600	1	PN 3.006	253.280	225
						2	PN 1.003	253.280	225
						0	PN 3.007	253.280	225
008	410418.253	418817.282	255.211	1.051	450	0	PN 3.008	254.160	150
009	410393.959	418800.919	255.211	2.036	600	1	PN 3.008	253.250	150
						2	PN 3.007	253.175	225
						0	PN 3.009	253.175	225
010	410404.017	418785.991	255.308	3.008	1200	1	PN 3.009	252.375	225
						0	PN 3.010 IN	252.300	300
TANK	410421.847	418798.004	255.307	3.057	1200	1	PN 3.010 IN	252.250	300
						0	PN 3.010 OUT	252.250	300
011	410341.251	418752.786	255.075	1.420	1200	0	PN 3.011	253.655	300
012	410349.244	418758.795	255.075	1.470	1200	1	PN 3.011	253.605	300
						0	PN 3.012	253.605	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
013	410357.237	418764.804	255.075	1.520	1200	1	PN 3.012	253.555	300
									
						0	PN 3.013	253.555	300
014	410367.628	418772.616	255.075	1.585	1200	1	PN 3.013	253.490	300
									
						0	PN 3.014	253.490	300
015	410375.961	418778.144	255.087	1.647	1200	1	PN 3.014	253.440	300
									
						0	PN 3.015	253.440	300
016	410384.294	418783.672	255.099	1.784	1500	1	PN 3.015	253.390	300
									
						0	PN 3.016	253.315	375
017	410392.627	418789.200	255.100	1.820	1500	1	PN 3.016	253.280	375
									
						0	PN 3.017	253.280	375
018	410400.927	418794.778	255.100	1.855	1500	1	PN 3.017	253.245	375
									
						0	PN 3.018	253.245	375
019	410409.221	418800.366	255.100	1.890	1500	1	PN 3.018	253.210	375
									
						0	PN 3.019	253.210	375
020	410417.514	418805.953	255.099	2.069	1500	1	PN 3.019	253.030	375
									
						0	PN 3.020	253.030	375

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
021	410432.240	418815.857	255.100	2.400	1500	1	PN 3.020	252.700	375
									
						0	PN 3.021	252.700	375
022-SEPARATOR-IN	410435.019	418811.700	255.224	2.684	600	 1	PN 3.021	252.540	375
						0	PN 062	252.540	375
022-SEPARATOR-OUT	410437.443	418813.334	255.224	2.784	600	1	PN 062	252.440	375
									
						0	PN 3.022	252.440	375
023-FC	410439.678	418810.017	255.306	3.181	1500	 1	PN 3.022	252.125	375
						2	PN 3.010 OUT	252.200	300
						0	PN 3.023	252.125	150
024	410445.898	418814.207	255.306	3.258	1500	1	PN 3.023	252.048	150
									

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	600	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

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	45	0	0
30	40	0	0				

Node 023-FC Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	PN 3.023	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0073-3500-2400-3500
Invert Level (m)	252.125	Min Outlet Diameter (m)	0.100
Design Depth (m)	2.400	Min Node Diameter (mm)	1200
Design Flow (l/s)	3.5		

Node TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	252.250
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	320.0	0.0	1.500	320.0	0.0	1.501	0.0	0.0

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 summer	001	10	254.546	0.046	3.7	0.0073	0.0000	OK
15 minute summer	002	10	254.066	0.036	3.7	0.0057	0.0000	OK
15 minute summer	003	10	254.115	0.044	3.8	0.0071	0.0000	OK
15 minute summer	004	10	253.581	0.056	7.4	0.0160	0.0000	OK
15 minute summer	005	10	254.031	0.051	4.6	0.0081	0.0000	OK
15 minute summer	006	10	253.469	0.044	4.5	0.0125	0.0000	OK
15 minute summer	007	11	253.365	0.084	11.8	0.0239	0.0000	OK
15 minute summer	008	10	254.199	0.039	4.6	0.0063	0.0000	OK
15 minute summer	009	11	253.235	0.060	15.9	0.0169	0.0000	OK
960 minute summer	010	645	252.480	0.180	3.0	0.2039	0.0000	OK
960 minute summer	TANK	645	252.480	0.230	8.0	70.0028	0.0000	OK
15 minute summer	011	10	253.708	0.053	5.1	0.0604	0.0000	OK
15 minute summer	012	10	253.706	0.101	16.4	0.1143	0.0000	OK
15 minute summer	013	10	253.654	0.099	16.4	0.1122	0.0000	OK
15 minute summer	014	10	253.590	0.100	16.3	0.1131	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	001	PN 3.001	002	3.7	0.955	0.186	0.1461	
15 minute summer	002	PN 3.002	004	3.7	1.159	0.119	0.0456	
15 minute summer	003	PN 2.001	004	3.7	0.866	0.187	0.1601	
15 minute summer	004	PN 1.003	007	7.4	0.699	0.139	0.2515	
15 minute summer	005	PN 3.005	006	4.5	0.859	0.243	0.2317	
15 minute summer	006	PN 3.006	007	4.4	0.481	0.085	0.1359	
15 minute summer	007	PN 3.007	009	11.7	1.069	0.275	0.1720	
15 minute summer	008	PN 3.008	009	4.6	1.263	0.146	0.1066	
15 minute summer	009	PN 3.009	010	16.0	1.941	0.145	0.1482	
960 minute summer	010	PN 3.010 IN	TANK	2.9	0.492	0.055	1.0992	
960 minute summer	TANK	PN 3.010 OUT	023-FC	-5.1	0.345	-0.096	1.3599	
15 minute summer	011	PN 3.011	012	5.1	0.358	0.065	0.1465	
15 minute summer	012	PN 3.012	013	16.4	0.795	0.209	0.2058	
15 minute summer	013	PN 3.013	014	16.3	0.796	0.208	0.2656	
15 minute summer	014	PN 3.014	015	16.1	0.798	0.206	0.2019	

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 summer	015	11	253.538	0.098	16.1	0.1109	0.0000	OK
15 minute summer	016	10	253.440	0.125	23.8	0.2215	0.0000	OK
15 minute summer	017	11	253.403	0.123	23.4	0.2170	0.0000	OK
15 minute summer	018	11	253.361	0.116	23.5	0.2044	0.0000	OK
15 minute summer	019	11	253.306	0.096	32.4	0.1692	0.0000	OK
15 minute summer	020	11	253.121	0.091	32.7	0.1614	0.0000	OK
15 minute summer	021	11	252.793	0.093	38.2	0.1646	0.0000	OK
15 minute summer	022-SEPARATOR-IN	11	252.645	0.105	38.4	0.0296	0.0000	OK
15 minute summer	022-SEPARATOR-OUT	11	252.502	0.062	38.5	0.0175	0.0000	OK
960 minute summer	023-FC	645	252.480	0.355	7.6	0.6277	0.0000	SURCHARGED
720 minute summer	024	465	252.085	0.037	2.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	015	PN 3.015	016	16.1	0.847	0.206	0.1905	
15 minute summer	016	PN 3.016	017	23.4	0.743	0.199	0.3159	
15 minute summer	017	PN 3.017	018	23.5	0.781	0.199	0.3009	
15 minute summer	018	PN 3.018	019	23.7	0.947	0.201	0.2549	
15 minute summer	019	PN 3.019	020	32.7	1.525	0.121	0.2142	
15 minute summer	020	PN 3.020	021	32.9	1.567	0.120	0.3727	
15 minute summer	021	PN 3.021	022-SEPARATOR-IN	38.4	1.660	0.097	0.0950	
15 minute summer	022-SEPARATOR-IN	PN 062	022-SEPARATOR-OUT	38.5	2.125	0.104	0.0539	
15 minute summer	022-SEPARATOR-OUT	PN 3.022	023-FC	38.5	1.310	0.060	0.1689	
960 minute summer	023-FC	PN 3.023	024	2.4	0.692	0.134	0.0261	158.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 96.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	001	10	254.599	0.099	14.1	0.0158	0.0000	OK
15 minute summer	002	10	254.105	0.075	14.1	0.0120	0.0000	OK
15 minute summer	003	10	254.165	0.095	14.1	0.0152	0.0000	OK
15 minute summer	004	10	253.641	0.116	28.2	0.0328	0.0000	OK
15 minute summer	005	10	254.099	0.119	17.4	0.0189	0.0000	OK
15 minute summer	006	10	253.513	0.088	17.1	0.0249	0.0000	OK
15 minute summer	007	10	253.475	0.195	45.2	0.0551	0.0000	OK
15 minute summer	008	10	254.242	0.082	17.4	0.0131	0.0000	OK
15 minute summer	009	10	253.304	0.129	61.8	0.0366	0.0000	OK
1440 minute winter	010	1380	253.023	0.723	3.4	0.8176	0.0000	SURCHARGED
1440 minute winter	TANK	1410	253.018	0.768	13.6	233.5078	0.0000	SURCHARGED
15 minute summer	011	10	253.856	0.201	19.4	0.2272	0.0000	OK
15 minute summer	012	10	253.852	0.247	61.7	0.2794	0.0000	OK
15 minute summer	013	10	253.795	0.240	61.3	0.2713	0.0000	OK
15 minute summer	014	10	253.731	0.240	60.7	0.2720	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	001	PN 3.001	002	14.1	1.329	0.709	0.3975	
15 minute summer	002	PN 3.002	004	14.1	1.651	0.457	0.1229	
15 minute summer	003	PN 2.001	004	14.1	1.213	0.701	0.4288	
15 minute summer	004	PN 1.003	007	28.1	0.969	0.532	0.6780	
15 minute summer	005	PN 3.005	006	17.1	1.173	0.928	0.6494	
15 minute summer	006	PN 3.006	007	17.1	0.655	0.327	0.3651	
15 minute summer	007	PN 3.007	009	44.4	1.482	1.042	0.4693	
15 minute summer	008	PN 3.008	009	17.4	1.794	0.553	0.2841	
15 minute summer	009	PN 3.009	010	61.5	2.621	0.559	0.4225	
1440 minute winter	010	PN 3.010 IN	TANK	3.3	0.461	0.063	1.5140	
1440 minute winter	TANK	PN 3.010 OUT	023-FC	28.1	0.399	0.529	1.5140	
15 minute summer	011	PN 3.011	012	19.1	0.377	0.244	0.5609	
15 minute summer	012	PN 3.012	013	61.3	1.020	0.783	0.6123	
15 minute summer	013	PN 3.013	014	60.7	1.017	0.775	0.7861	
15 minute summer	014	PN 3.014	015	60.0	1.009	0.766	0.5953	

Results for 30 year Critical Storm Duration. Lowest mass balance: 96.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	015	10	253.672	0.232	60.0	0.2626	0.0000	OK
15 minute summer	016	10	253.609	0.294	89.7	0.5187	0.0000	OK
15 minute summer	017	10	253.558	0.278	88.4	0.4917	0.0000	OK
15 minute summer	018	10	253.499	0.254	87.8	0.4493	0.0000	OK
15 minute summer	019	10	253.425	0.215	124.9	0.3796	0.0000	OK
15 minute summer	020	11	253.234	0.204	123.6	0.3601	0.0000	OK
1440 minute summer	021	1170	253.053	0.353	48.4	0.6245	0.0000	OK
720 minute winter	022-SEPARATOR-IN	660	253.246	0.706	93.9	0.1997	0.0000	SURCHARGED
1440 minute summer	022-SEPARATOR-OUT	1410	253.218	0.778	216.8	0.2202	0.0000	SURCHARGED
600 minute summer	023-FC	540	253.093	0.968	79.6	1.7105	0.0000	SURCHARGED
60 minute summer	024	28	252.085	0.037	2.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	015	PN 3.015	016	59.5	1.123	0.760	0.5675	
15 minute summer	016	PN 3.016	017	88.4	0.981	0.751	0.9013	
15 minute summer	017	PN 3.017	018	87.8	1.052	0.746	0.8363	
15 minute summer	018	PN 3.018	019	89.0	1.292	0.756	0.7241	
15 minute summer	019	PN 3.019	020	123.6	1.983	0.460	0.6280	
15 minute summer	020	PN 3.020	021	123.6	1.852	0.452	1.3828	
1440 minute summer	021	PN 3.021	022-SEPARATOR-IN	62.8	1.490	0.158	0.4490	
720 minute winter	022-SEPARATOR-IN	PN 062	022-SEPARATOR-OUT	-93.9	1.581	-0.253	0.3225	
1440 minute summer	022-SEPARATOR-OUT	PN 3.022	023-FC	150.3	1.362	0.234	0.3419	
600 minute summer	023-FC	PN 3.023	024	2.4	0.692	0.134	0.0261	147.2

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 74.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	001	10	254.636	0.136	19.8	0.0216	0.0000	OK
15 minute summer	002	10	254.123	0.093	19.8	0.0148	0.0000	OK
15 minute summer	003	10	254.196	0.126	19.8	0.0201	0.0000	OK
15 minute summer	004	11	253.761	0.236	39.8	0.0669	0.0000	SURCHARGED
15 minute summer	005	11	254.374	0.394	24.3	0.0626	0.0000	FLOOD RISK
15 minute summer	006	11	253.654	0.229	22.4	0.0647	0.0000	SURCHARGED
15 minute summer	007	11	253.620	0.340	58.9	0.0961	0.0000	SURCHARGED
15 minute summer	008	10	254.264	0.104	24.3	0.0165	0.0000	OK
1440 minute winter	009	1350	253.503	0.328	4.8	0.0930	0.0000	SURCHARGED
1440 minute winter	010	1350	253.502	1.202	5.5	1.3592	0.0000	SURCHARGED
1440 minute winter	TANK	1350	253.501	1.250	58.2	380.1466	0.0000	SURCHARGED
15 minute summer	011	10	254.103	0.448	27.1	0.5068	0.0000	SURCHARGED
15 minute summer	012	10	254.094	0.489	85.1	0.5530	0.0000	SURCHARGED
15 minute summer	013	11	254.013	0.458	83.5	0.5181	0.0000	SURCHARGED
15 minute summer	014	11	253.928	0.438	82.0	0.4955	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	001	PN 3.001	002	19.8	1.414	0.994	0.5292	
15 minute summer	002	PN 3.002	004	20.1	1.735	0.652	0.1980	
15 minute summer	003	PN 2.001	004	19.7	1.253	0.984	0.5898	
15 minute summer	004	PN 1.003	007	37.1	0.987	0.702	0.9443	
15 minute summer	005	PN 3.005	006	22.4	1.275	1.214	0.7815	
15 minute summer	006	PN 3.006	007	21.8	0.680	0.417	0.5706	
15 minute summer	007	PN 3.007	009	59.0	1.580	1.387	0.5374	
15 minute summer	008	PN 3.008	009	24.3	1.922	0.772	0.3703	
1440 minute winter	009	PN 3.009	010	5.5	1.091	0.050	0.7159	
1440 minute winter	010	PN 3.010 IN	TANK	5.8	0.496	0.109	1.5140	
1440 minute winter	TANK	PN 3.010 OUT	023-FC	-56.5	-0.803	-1.064	1.5140	
15 minute summer	011	PN 3.011	012	25.5	0.372	0.326	0.7042	
15 minute summer	012	PN 3.012	013	83.5	1.187	1.067	0.7042	
15 minute summer	013	PN 3.013	014	82.0	1.164	1.047	0.9155	
15 minute summer	014	PN 3.014	015	80.6	1.145	1.029	0.7042	

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 74.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	015	11	253.855	0.415	80.6	0.4696	0.0000	SURCHARGED
15 minute summer	016	11	253.781	0.466	122.1	0.8238	0.0000	SURCHARGED
15 minute summer	017	11	253.726	0.446	120.5	0.7880	0.0000	SURCHARGED
15 minute summer	018	11	253.670	0.425	118.5	0.7508	0.0000	SURCHARGED
15 minute summer	019	11	253.614	0.404	170.0	0.7134	0.0000	SURCHARGED
960 minute summer	020	840	253.515	0.485	43.4	0.8568	0.0000	SURCHARGED
600 minute summer	021	585	253.663	0.963	153.1	1.7014	0.0000	SURCHARGED
480 minute winter	022-SEPARATOR-IN	432	253.856	1.316	491.2	0.3724	0.0000	SURCHARGED
480 minute summer	022-SEPARATOR-OUT	600	254.359	1.919	537.8	0.5432	0.0000	SURCHARGED
480 minute winter	023-FC	616	253.615	1.490	188.3	2.6329	0.0000	SURCHARGED
960 minute summer	024	1005	252.087	0.039	2.7	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 summer	015	PN 3.015	016	79.3	1.127	1.013	0.7042	
15 minute summer	016	PN 3.016	017	120.5	1.093	1.023	1.1030	
15 minute summer	017	PN 3.017	018	118.5	1.106	1.006	1.1030	
15 minute summer	018	PN 3.018	019	114.9	1.328	0.975	1.1030	
15 minute summer	019	PN 3.019	020	166.7	2.003	0.620	1.1030	
960 minute summer	020	PN 3.020	021	61.3	1.402	0.224	1.9574	
600 minute summer	021	PN 3.021	022-SEPARATOR-IN	220.0	2.001	0.555	0.4522	
480 minute winter	022-SEPARATOR-IN	PN 062	022-SEPARATOR-OUT	-307.3	-2.786	-0.828	0.3225	
480 minute summer	022-SEPARATOR-OUT	PN 3.022	023-FC	265.9	2.411	0.415	0.3419	
480 minute winter	023-FC	PN 3.023	024	2.6	0.707	0.147	0.0281	153.7

Results for 100 year Critical Storm Duration. Lowest mass balance: 73.15%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	001	10	254.620	0.120	17.9	0.0191	0.0000	OK
15 minute summer	002	10	254.118	0.088	17.9	0.0139	0.0000	OK
15 minute summer	003	10	254.185	0.115	17.9	0.0182	0.0000	OK
15 minute summer	004	11	253.670	0.145	35.7	0.0410	0.0000	OK
15 minute summer	005	10	254.223	0.243	22.0	0.0386	0.0000	FLOOD RISK
15 minute summer	006	11	253.600	0.175	20.5	0.0494	0.0000	OK
15 minute summer	007	11	253.578	0.297	54.6	0.0842	0.0000	SURCHARGED
15 minute summer	008	10	254.256	0.096	22.0	0.0153	0.0000	OK
1440 minute winter	009	1410	253.416	0.240	4.4	0.0680	0.0000	SURCHARGED
1440 minute winter	010	1410	253.414	1.114	4.4	1.2596	0.0000	SURCHARGED
1440 minute winter	TANK	1410	253.413	1.163	52.3	353.4099	0.0000	SURCHARGED
15 minute summer	011	10	253.984	0.329	24.6	0.3724	0.0000	SURCHARGED
15 minute summer	012	10	253.977	0.372	77.3	0.4208	0.0000	SURCHARGED
15 minute summer	013	10	253.899	0.344	75.9	0.3885	0.0000	SURCHARGED
15 minute summer	014	10	253.809	0.319	74.4	0.3603	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	001	PN 3.001	002	17.9	1.377	0.900	0.4837	
15 minute summer	002	PN 3.002	004	17.9	1.742	0.580	0.1478	
15 minute summer	003	PN 2.001	004	17.8	1.261	0.889	0.5225	
15 minute summer	004	PN 1.003	007	34.9	1.009	0.660	0.7925	
15 minute summer	005	PN 3.005	006	20.5	1.205	1.111	0.7518	
15 minute summer	006	PN 3.006	007	20.8	0.670	0.398	0.5226	
15 minute summer	007	PN 3.007	009	54.9	1.494	1.290	0.5208	
15 minute summer	008	PN 3.008	009	22.0	1.887	0.699	0.3415	
1440 minute winter	009	PN 3.009	010	4.4	1.091	0.040	0.7159	
1440 minute winter	010	PN 3.010 IN	TANK	4.3	0.496	0.081	1.5140	
1440 minute winter	TANK	PN 3.010 OUT	023-FC	-52.3	-0.743	-0.985	1.5140	
15 minute summer	011	PN 3.011	012	23.3	0.370	0.297	0.7042	
15 minute summer	012	PN 3.012	013	75.9	1.078	0.969	0.7042	
15 minute summer	013	PN 3.013	014	74.4	1.057	0.950	0.9155	
15 minute summer	014	PN 3.014	015	73.3	1.041	0.936	0.7033	

Results for 100 year Critical Storm Duration. Lowest mass balance: 73.15%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	015	10	253.736	0.296	73.3	0.3348	0.0000	OK
15 minute summer	016	10	253.669	0.354	111.1	0.6259	0.0000	OK
15 minute summer	017	11	253.618	0.338	109.6	0.5979	0.0000	OK
15 minute summer	018	11	253.559	0.314	108.1	0.5550	0.0000	OK
15 minute summer	019	11	253.485	0.275	156.6	0.4855	0.0000	OK
1440 minute winter	020	1410	253.518	0.488	55.8	0.8624	0.0000	SURCHARGED
1440 minute winter	021	1410	253.521	0.821	134.2	1.4514	0.0000	SURCHARGED
960 minute winter	022-SEPARATOR-IN	945	253.972	1.432	291.0	0.4053	0.0000	SURCHARGED
1440 minute summer	022-SEPARATOR-OUT	1530	254.283	1.843	476.7	0.5217	0.0000	SURCHARGED
1440 minute winter	023-FC	1380	253.794	1.669	229.2	2.9488	0.0000	SURCHARGED
1440 minute summer	024	1440	252.087	0.039	2.7	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 summer	015	PN 3.015	016	73.0	1.118	0.932	0.6928	
15 minute summer	016	PN 3.016	017	109.6	1.037	0.931	1.0629	
15 minute summer	017	PN 3.017	018	108.1	1.089	0.918	1.0167	
15 minute summer	018	PN 3.018	019	108.5	1.321	0.921	0.9258	
15 minute summer	019	PN 3.019	020	153.6	1.995	0.571	0.9796	
1440 minute winter	020	PN 3.020	021	72.2	1.201	0.264	1.9574	
1440 minute winter	021	PN 3.021	022-SEPARATOR-IN	207.2	1.879	0.522	0.4522	
960 minute winter	022-SEPARATOR-IN	PN 062	022-SEPARATOR-OUT	531.0	4.815	1.430	0.3225	
1440 minute summer	022-SEPARATOR-OUT	PN 3.022	023-FC	-252.8	-2.293	-0.394	0.3419	
1440 minute winter	023-FC	PN 3.023	024	2.7	0.709	0.148	0.0281	280.5

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 77.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	001	10	254.985	0.485	26.0	0.0772	0.0000	FLOOD RISK
15 minute summer	002	11	254.233	0.202	24.9	0.0322	0.0000	SURCHARGED
15 minute summer	003	11	254.633	0.563	26.0	0.0895	0.0000	SURCHARGED
1440 minute summer	004	960	254.003	0.478	4.2	0.1352	0.0000	SURCHARGED
15 minute summer	005	9	254.484	0.504	32.0	0.0801	1.3798	FLOOD
1440 minute summer	006	960	253.984	0.559	11.7	0.1581	0.0000	SURCHARGED
1440 minute summer	007	960	253.997	0.717	13.8	0.2028	0.0000	SURCHARGED
15 minute summer	008	10	254.294	0.134	32.0	0.0213	0.0000	OK
1440 minute summer	009	960	254.001	0.826	12.8	0.2338	0.0000	SURCHARGED
1440 minute summer	010	1020	254.037	1.737	15.8	1.9643	0.0000	SURCHARGED
1440 minute summer	TANK	1020	254.038	1.788	40.7	456.1520	0.0000	SURCHARGED
15 minute summer	011	11	254.803	1.148	35.6	1.2978	0.0000	FLOOD RISK
15 minute summer	012	11	254.791	1.186	107.6	1.3418	0.0000	FLOOD RISK
15 minute summer	013	11	254.675	1.120	101.0	1.2667	0.0000	SURCHARGED
15 minute summer	014	11	254.539	1.049	94.4	1.1868	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	001	PN 3.001	002	24.9	1.440	1.252	0.6602	
15 minute summer	002	PN 3.002	004	23.1	1.703	0.749	0.2533	
15 minute summer	003	PN 2.001	004	22.9	1.304	1.145	0.6514	
1440 minute summer	004	PN 1.003	007	4.2	0.586	0.080	0.9443	
15 minute summer	005	PN 3.005	006	23.8	1.351	1.287	0.7815	
1440 minute summer	006	PN 3.006	007	-11.2	0.409	-0.215	0.5706	
1440 minute summer	007	PN 3.007	009	-13.8	0.928	-0.323	0.6204	
15 minute summer	008	PN 3.008	009	32.0	1.965	1.016	0.5004	
1440 minute summer	009	PN 3.009	010	-12.3	1.028	-0.112	0.7159	
1440 minute summer	010	PN 3.010 IN	TANK	-15.8	0.548	-0.298	1.5140	
1440 minute summer	TANK	PN 3.010 OUT	023-FC	-31.5	-0.447	-0.593	1.5140	
15 minute summer	011	PN 3.011	012	29.3	0.416	0.374	0.7042	
15 minute summer	012	PN 3.012	013	101.0	1.434	1.290	0.7042	
15 minute summer	013	PN 3.013	014	94.4	1.340	1.205	0.9155	
15 minute summer	014	PN 3.014	015	90.8	1.289	1.159	0.7042	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 77.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	015	11	254.428	0.988	90.8	1.1171	0.0000	SURCHARGED
15 minute summer	016	11	254.319	1.004	140.6	1.7743	0.0000	SURCHARGED
15 minute summer	017	11	254.236	0.956	135.0	1.6898	0.0000	SURCHARGED
15 minute summer	018	11	254.156	0.911	131.0	1.6093	0.0000	SURCHARGED
15 minute summer	019	11	254.077	0.867	196.4	1.5323	0.0000	SURCHARGED
1440 minute summer	020	960	253.968	0.938	36.1	1.6580	0.0000	SURCHARGED
1440 minute summer	021	1020	254.063	1.363	315.7	2.4076	0.0000	SURCHARGED
1440 minute summer	022-SEPARATOR-IN	1230	254.519	1.979	394.4	0.5600	0.0000	SURCHARGED
960 minute winter	022-SEPARATOR-OUT	810	254.788	2.348	658.2	0.6644	0.0000	SURCHARGED
960 minute summer	023-FC	1515	254.040	1.915	355.9	3.3841	0.0000	SURCHARGED
1440 minute summer	024	1020	252.090	0.042	3.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	015	PN 3.015	016	89.1	1.265	1.137	0.7042	
15 minute summer	016	PN 3.016	017	135.0	1.224	1.146	1.1030	
15 minute summer	017	PN 3.017	018	131.0	1.187	1.112	1.1030	
15 minute summer	018	PN 3.018	019	135.1	1.245	1.147	1.1030	
15 minute summer	019	PN 3.019	020	186.8	1.994	0.695	1.1030	
1440 minute summer	020	PN 3.020	021	21.7	1.345	0.079	1.9574	
1440 minute summer	021	PN 3.021	022-SEPARATOR-IN	-301.4	-2.733	-0.760	0.4522	
1440 minute summer	022-SEPARATOR-IN	PN 062	022-SEPARATOR-OUT	532.9	4.832	1.436	0.3225	
960 minute winter	022-SEPARATOR-OUT	PN 3.022	023-FC	440.4	3.993	0.687	0.3419	
960 minute summer	023-FC	PN 3.023	024	2.9	0.731	0.163	0.0302	242.4

StormBrake™
Performance Report

fpmccann

wrc approved
PT/398/0217

StormBrake™ Performance Report

fpmccann

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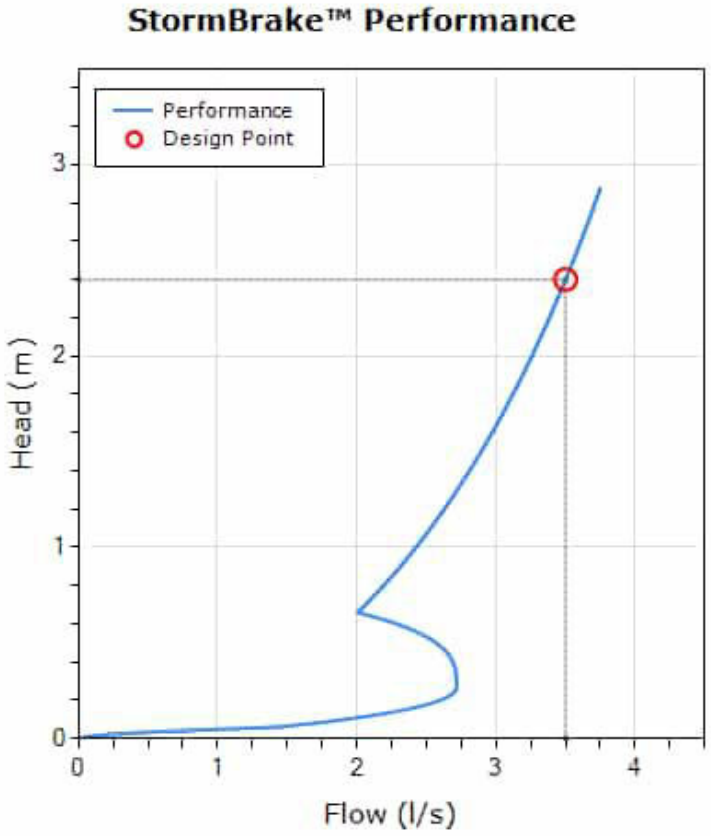
Contractor:	Dudleys Consulting Engineers	Head(m):	2.4
Site:	20392	Flow(l/s):	3.5
Date:	22/10/2025	Chamber Ref:	SW-023
Created By:	Jonathan Allchin	Mounting Style:	LUGS (Default)
Device Ref:	FPM-SB1-02400-00350-0100		



	Head (m)	Flow (l/s)
Design Point	2.40	3.50
Flush Flow	0.27	2.72
Kick Back	0.66	2.01

	Dims (mm)
Min. Chamber Diameter	1200
Min. Outlet Pipe Diameter	150
Min. Sump Depth	230

Head (m)	Flow (l/s)
0	0.00
0.1	1.92
0.2	2.60
0.3	2.72
0.4	2.69
0.5	2.58
0.6	2.30
0.69	2.06
0.79	2.19
0.89	2.31
0.99	2.42
1.09	2.52
1.19	2.62
1.29	2.71
1.39	2.80
1.49	2.88
1.59	2.96
1.69	3.04
1.79	3.11
1.89	3.18
1.98	3.25
2.08	3.31
2.18	3.37
2.28	3.43
2.38	3.49
2.48	3.55
2.58	3.60
2.68	3.65
2.78	3.70
2.88	3.75

The unique performance characteristics of this StormBrake™ are derived from extensive dynamic modelling using parametric experimental testing and computational fluid dynamics.

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StormBrake™ Performance Report

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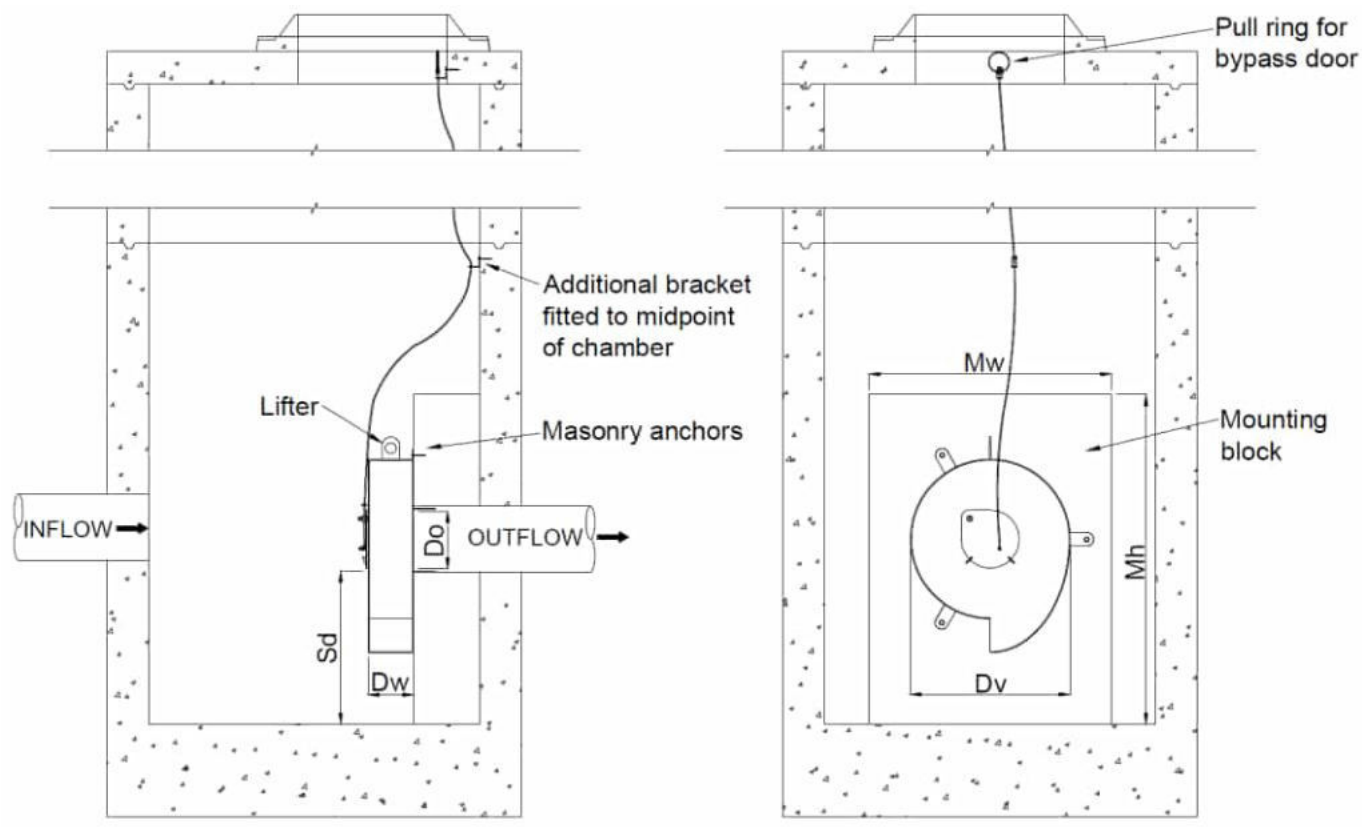
wrc approved PT/398/0217

INSTALLATION INSTRUCTIONS

1. Position the StormBrake™ so that the inlet is at the bottom and the device outlet is in line with the chamber outlet pipe.
2. Mark the locations of the mounting points on the chamber/mounting wall.
3. Using the marked locations, drill holes to the required thickness and depth for the supplied masonry anchors (M10 throughbolts require 11 mm holes). Fit the bolts to the holes.
4. Attach the StormBrake™ to the anchor points, ensuring the neoprene gasket is flush with the chamber wall, and fasten the device by tightening the bolts. This will compress the neoprene gasket to provide a watertight seal between the StormBrake™ and the wall.
5. Fix the stainless steel wire cable from the front bypass door to the underside of the manhole cover, vertically above the device. A secondary bracket is supplied and should be fitted halfway up the chamber to guide the bypass door cable to the top.
6. Adjust the length of the bypass door cable accordingly, so that it reaches the ground level whilst ensuring the bypass door can open if required. Ensure the bypass door is closed for normal operating conditions.



Geometry	Annotation	(mm)
Device Vortex Diameter	Dv	380
Device Width	Dw	84
Device Orifice	Do	76
Sump Depth (outlet Ø150mm)	Sd	230
Mounting Block Width	Mw	620
Mounting Block Height	Mh	660

Dimensions quoted are minimum values based on the geometry of this unique StormBrake™ unit. These ensure the device can be fitted to the flow control chamber without restriction and meet the performance specification.

STORMWATER STORAGE

SDS GEOlight®

Stormwater Management System

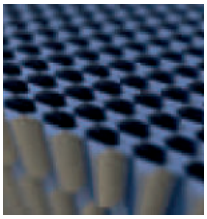
Product Profile

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

The high void rate (>95%), high compressive strength (to 1000KN/m²) and low resistance to water flow makes SDS GEOlight® an ideal material for cost efficient and maintainable underground water storage during storm conditions.

SDS Geolight® Benefits

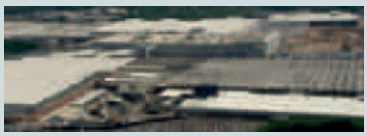
- High compressive strength – can be located under all roads, car parks and amenity area surfaces.
- Reduced excavation costs – the very high void rate (95%) minimises the required volume of earthworks.
- Speed of installation – 1000m³ reservoir, completed in one week.
- Light and easy to handle.
- Excellent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



Applications

Retail

Infrastructure



Industrial

Residential

Commercial

Public Sector

sdsinfrastructure.com

SDS Limited, Clearwater House, Castlemills, Biddisham, Somerset BS26 2RE

T: +44 (0)1934 751303

E: info@sdsinfrastructure.com

	SDS GEOlight® 400	SDS GEOlight® 600	SDS GEOlight® 800
APPLICATIONS			
Stormwater Management			
Attenuation / Infiltration			
Bacterial filter-bed for biological treatment			
Hydrocarbon Separation			
Filtration and Separation Units			
SPECIFICATIONS			
Material	Recycled Rigid PVC		
Colour	Dark grey to black		
Standard length of a block	2000 mm	2000 mm	2000 mm
Standard width of a block	500 mm	500 mm	500 mm
Standard height of a block*	750 mm	750 mm	750 mm
	*Other block sizes available on request		
Void Ratio	> 95%	> 95%	> 95%
Compressive Strength	420 kN/m²	610 kN/m²	800 kN/m²
ADVANTAGES			
Highly cost effective			
Reduced excavation costs			
High void capacity			
Good UV resistance			
Good hydrocarbon resistance			

GEO DS/0125

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Biddisham, Somerset BS26 2RE

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GEOLIGHT maintenance

Once received stormwater reaches the storage reservoir through one or more distribution pipes laid out on the side faces of the Geolight blocks.

These distribution pipes are covered in a trench filled with draining material requiring little compaction, like washed rolled pebbles, free from fines, and 15/25 grading.

A 10 mm mesh geogrid or GEOtextile, laid between the distribution pipe and Geolight, prevents the horizontal Geolight blocks being clogged by the draining materials.

The permeability of the supply and distribution pipe located on the periphery of the reservoir is designed to prevent any clogging of the system upstream of the stormwater drain.
This sizing is checked for each supply. It is obtained thanks to design programmes by SDS limited following testing of a size 1 reservoir in which all hydraulic configurations were studied.

These tests also made it possible to check the very good vertical and horizontal permeabilities of Geolight blocks and this general layout is usually accepted.

The choice of one of these layouts or a combination of them is according to:
- the place reserved for the reservoir
- available slopes
- hydraulic parameters (discharge)
- position of stormwater input and output systems.

The ends of feeder drains (distribution pipes) are connected to inspection chambers(manholes), acting as settling tanks and making inspection and maintenance of the whole distribution pipe possible.

For small discharges, stormwater does not penetrate Geolight blocks, but circulates either in an appropriate bypass, or in the distribution pipe drain. This is for draining the first water which will be handled downstream if required.

When the reservoir is drained, water is drained through a distribution pipe possibly the same as the one located at the input which operates in the opposite direction. Drainage discharge is controlled by the downstream system piping.

A ventilation system consisting of a drainage geocomposite is fresh air vented in the inspection pits. It is laid out in the upper part of the distribution pipes and the general space occupied by the reservoir.

We generally recommend that the stormwater tank inspection chambers are checked periodically in conjunction with general maintenance of the underground pipe network.

SPEL ESR Bypass

Treatment System

Overview

The SPEL ESR Bypass Treatment System treats flows up to and including the 1 in 1 year return events (27mm/h) in line with guidence from the CIRIA SuDS Manual (C753).

The SPEL ESR Bypass System is fully certified to meet the CIRIA SuDS Mitigation Index. It has been tested by WRc to the British Water Code of Practice for Manufactured Treatment Devices. This unit is also certified to the British and European Standard BS EN 858 by HR Wallingford.

SPEL's ESR range is a total treatment system removing Hydrocarbons, Total Suspended Solids (TSS) and Metals. It's a highly efficient, single unit, water quality SuDS component.

Product Range

200 Series
(1.2m internal diameter):
Treated Flow Rate: 10-15 l/s
Catchment Area: 1,333m^2 - 2,000m^2

300 Series
(1.8m internal diameter):
Treated Flow Rate: 20-50 l/s
Catchment Area: 2,665m^2 - 6,665m^2

400 Series
(2.6m internal diameter):
Treated Flow Rate: 60-160 l/s
Catchment Area: 8,000m^2 - 21,333m^2

500 Series
(3.5m internal diameter):
Treated Flow Rate: 180-250 l/s
Catchment Area: 24,000m^2 - 33,333m^2

600 Series
(4m internal diameter):
Treated Flow Rate: 300-700 l/s
Catchment Area: 40,000m^2 - 93,333m^2

Applications

The ESR Bypass Treatment System will treat up to the 1 in 1 year storm event for surface water run-off to a Pollution Hazard Index of 'Medium'.

This covers surfaces such as:

Roofs

Private and public car parks

Residential roads and drives

Low and medium use roads

Commercial yards and delivery areas

The ESR Bypass Treatment System can be used as part of a treatment train to achieve a 'High' Mitigation Index. (See other SPEL SuDS treatment systems).

Shell Design

Designed with reference to BS EN 13121. All tank shells carry the SPEL 25 Year Warranty and life expectancy in excess of 50 years.

Shell Specifications

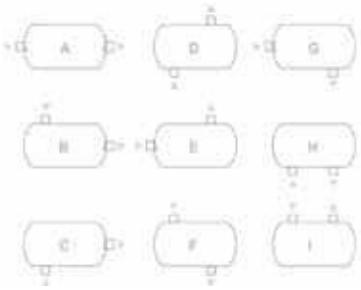
Different tank shell specifications are available dependent upon tank invert levels, ground conditions and ground water levels. (See Section 7)

Inlet/Outlet Connections

160/225/300mm diameter PVCU socket/spigot.

450, 600, 750, 900 and 1200mm diameter GRP spigot available, for connecting to site pipework via Flex-Seal/Band-Seal or similar flexible couplings.

The nine inlet/outlet options below are available to assist with design and installation.



This graphic shows indicative locations only. For accurate location, please contact our technical team.

SPEL ESR Bypass Treatment System

Stormwater Treatment System

The SPEL ESR Bypass Treatment System is fully certified to meet the CIRIA SuDS Mitigation Index. It has been tested by WRc to the British Water Code of Practice for Manufactured Treatment Devices. This unit is also certified to the British and European Standard BS EN 858.

SPEL's ESR range is a total treatment system removing Hydrocarbons, Total Suspended Solids (TSS) and Metals. It's a highly efficient, single unit, water quality SuDS component.

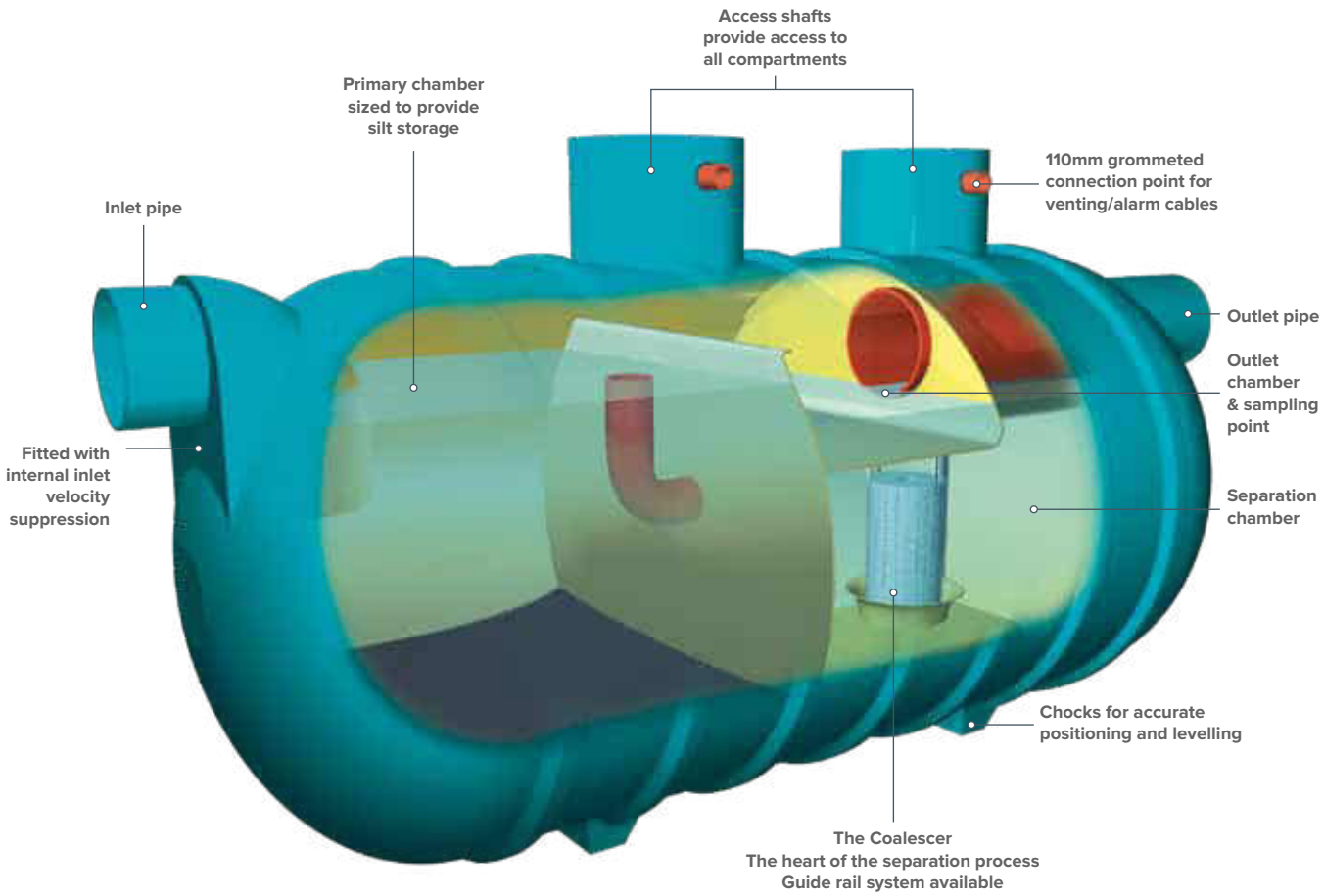
The coalescer inserts are easy to clean and simple to replace but rarely require replacing. The unique 'insert' format ensures that this unit can be extracted complete every time, compared to other systems where 'wrap around' style units allow the foam to slip off, requiring confined space entry to retrieve.

SPEL ESR Bypass Treatment System
Certified Mitigation Index

TSS	0.8
Metals	0.6
Hydrocarbons	0.9*

**H R Wallingford test results to BS EN 858*

The total treatment solution for SuDS



SPEL ESR Bypass Treatment System

Testing and Certification

Research and development is at the heart of what we do at SPEL, our passion as Zero Pollution Ambassadors is to be at the cutting edge of clean surface water technology.

Months of rigorous testing has resulted in the SPEL ESR Range.

Surface Water Treatment Device Performance Declaration

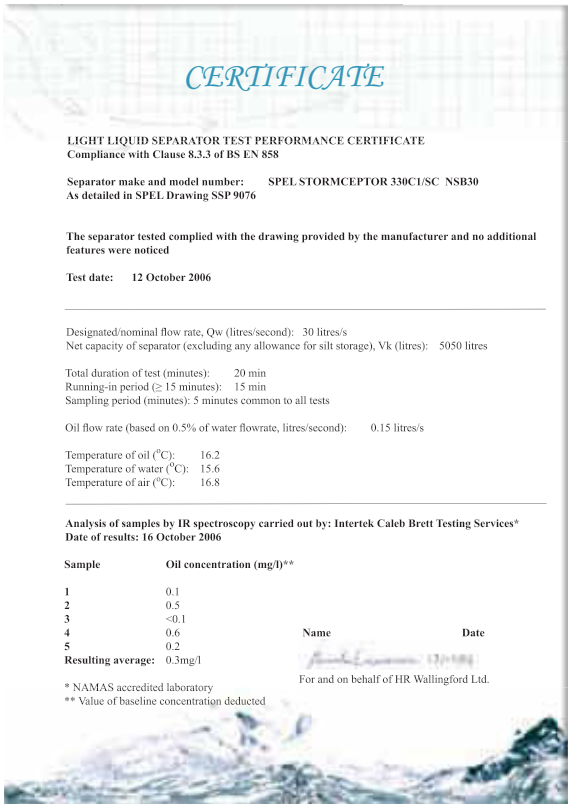
Testing carried out according to British Water Code of Practice

Product Details	Description
Manufacturer	SPEL Products
Treatment Device Name/Model	Stormceptor Type 210 C1/SC
General description	Class 1 By-pass Separator with Silt Capacity
Envisaged application	Treatment of Surface Water Run-off
Pollutant(s) captured	Suspended Solids

Test	Value	Unit
Treatment device capacity	3200	litres
Sediment Storage capacity	1000	litres
Treatment Flow rate	10	l/s
Connected Area	1,333	m²
Pollution retention flow rate	10	l/s

Parameter	Value	Unit
Maximum capacity flow rate	100	l/s
Device head loss (at treatment flowrate)	0.15	m
Device head loss (at maximum capacity treatment flowrate)	-	m
TSS capture and retention efficiency (Milisil W4 test sediment)	**82**	**%**
Zinc capture efficiency (if tested)	Not tested for dissolved metals	%
Zinc retention efficiency (if tested)	Not tested for dissolved metals	%
Copper capture efficiency (if tested)	Not tested for dissolved metals	%
Copper retention efficiency (if tested)	Not tested for dissolved metals	%
Dissolved Metals reduction	0.0	%
Particulate metals reduction*	61.5*	%
Total Metals reduction*	61.5*	%
Total Metals Mitigation Index	0.615*	-

* Extrapolated value in accordance with British Water How to Guide: Applying the CIRIA The SuDS Manual (C753) Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices. Version 7, Section 4.3, (2021- under pre-publication review).



CERTIFICATE

LIGHT LIQUID SEPARATOR TEST PERFORMANCE CERTIFICATE
Compliance with Clause 8.3.3 of BS EN 858

Separator make and model number: SPEL STORMCEPTOR 330C1/SC NSB30
As detailed in SPEL Drawing SSP 9076

The separator tested complied with the drawing provided by the manufacturer and no additional features were noticed

Test date: 12 October 2006

Designated/nominal flow rate, Qw (litres/second): 30 litres/s
Net capacity of separator (excluding any allowance for silt storage), Vk (litres): 5050 litres

Total duration of test (minutes): 20 min
Running-in period (≥ 15 minutes): 15 min
Sampling period (minutes): 5 minutes common to all tests

Oil flow rate (based on 0.5% of water flowrate, litres/second): 0.15 litres/s

Temperature of oil (°C): 16.2
Temperature of water (°C): 15.6
Temperature of air (°C): 16.8

Analysis of samples by IR spectroscopy carried out by: Intertek Caleb Brett Testing Services*
Date of results: 16 October 2006

Sample	Oil concentration (mg/l)**
1	0.1
2	0.5
3	<0.1
4	0.6
5	0.2
Resulting average:	0.3mg/l

Name Date

For and on behalf of HR Wallingford Ltd.

* NAMAS accredited laboratory
** Value of baseline concentration deducted

SPEL's Head of Technical Development alongside the WRc testing officer.

SPEL ESR Bypass Treatment System

Specification Chart

As directed by the SuDS Manual, treatment trains should be sized according to the **connectible area**, see column 5 below.

Model	Series	Treated Flow Rate	Maximum Flow	Connectible/ Catchment area (m^2)*	Oil Storage (litres)	Silt Capacity (litres)	Tank Length (mm)	Internal Diameter (mm)	Inlet Invert (mm)	Base to Inlet (mm)	Base to Outlet (mm)	Optimum in/out pipe diameter** (mm)	Number of Access Shafts A-C*** (dia. mm)			
							L		A	B	C		600	750	900	1200
210C1/ESR	200	10	100	**1,333**	150	1,000	2,920	1,220	550	1,350	1,300	300	-	1	-	-
212C1/ESR	200	12	120	**1,600**	180	1200	3,570	1,220	550	1,350	1,300	300	-	1	-	-
215C1/ESR	200	15	150	**2,000**	225	1,500	4,237	1,220	550	1,350	1,300	300	-	1	-	-
320C1/ESR	300	20	200	**2,665**	300	2,000	3,200	1,800	700	1,450	1,350	450	2	-	-	-
325C1/ESR	300	25	250	**3,333**	375	2,500	3,535	1,800	700	1,450	1,350	450	2	-	-	-
330C1/ESR	300	30	300	**4,000**	450	3,000	4,420	1,800	700	1,450	1,350	450	-	1	1	-
340C1/ESR	300	40	400	**5,333**	600	4,000	5,760	1,800	740	1,410	1,310	450	1	1	-	-
345C1/ESR	300	45	450	**6,000**	675	4,500	6,563	1,800	740	1,410	1,310	450	1	1	-	-
350/C1/ESR	300	50	500	**6,665**	750	5,000	7,060	1,800	740	1,410	1,310	450	1	1	-	-
460C1/ESR	400	60	600	**8,000**	900	6,000	4,400	2,600	950	2,100	2,000	600	-	1	1	-
470C1/ESR	400	70	700	**9,333**	1,050	7,000	5,250	2,600	950	2,100	2,000	600	-	1	1	-
480C1/ESR	400	80	800	**10,665**	1,200	8,000	6,170	2,600	950	2,100	2,000	600	-	1	1	-
4100C1/ESR	400	100	1,000	**13,333**	1,500	10,000	7,400	2,600	1,100	1,950	1,850	750	-	1	1	-
4125C1/ESR	400	125	1,250	**16,665**	1,875	12,500	9,000	2,600	1,100	1,950	1,850	750	-	1	1	-
4150C1/ESR	400	150	1,500	**20,000**	2,250	15,000	9,930	2,600	1,100	1,950	1,850	750	-	-	2	-
4160C1/ESR	400	160	1,600	**21,333**	2,400	16,000	11,830	2,600	1,250	1,950	1,850	750	-	1	2	-
5180C1/ESR	500	180	1,800	**24,000**	2,700	18,000	7,472	3,500	1,185	2,690	2,550	900	-	1	2	-
5200C1/ESR	500	200	2,000	**26,665**	3,000	20,000	8,530	3,500	1,185	2,425	2,325	1,200	1	1	2	-
5250C1/ESR	500	250	2,500	**33,333**	3,750	25,000	10,040	3,500	1,185	2,425	2,325	1,200	2	1	2	-
6300C1/ESR	600	300	3,000	**40,000**	4,500	30,000	10,310	4,000	1,325	2,850	2,675	1,200	1	1	2	-
6350C1/ESR	600	350	3,500	**46,665**	5,250	35,000	11,499	4,000	1,325	2,850	2,675	1,200	-	2	3	-
6400C1/ESR	600	400	4,000	**53,333**	6,000	40,000	12,690	4,000	1,325	2,850	2,675	1,200	-	2	3	-
6500C1/ESR	600	500	5,000	**66,665**	7,500	50,000	15,880	4,000	1,325	2,850	2,675	1,200	-	2	4	-
6600C1/ESR	600	600	6,000	**80,000**	9,000	60,000	18,256	4,000	1,325	2,850	2,675	1,200	2	1	4	-
6700C1/ESR	600	700	7,000	**93,333**	10,500	70,000	22,250	4,000	1,325	2,850	2,675	1,200	-	2	5	-

These connectible/catchment areas are based on the SuDS Manual requirement for bypass devices to treat the 1 in 1 year storm event (27mm).

***SPEL ESR Bypass Treatment Systems are designed for a maximum flow (NS/NSB) but can be fitted with larger than the recommended maximum connection size IN/OUT or with the addition of adapters providing the maximum flow (NS/NSB) cannot be exceeded or any increase in the operating level in the SPEL Separator to cause the captured pollutants to escape into the vent connections or through access shaft connections. Any overriding of the above criteria could jeopardise performance to the European Standard BS EN 858-1.*

****D-I configurations available upon request.*

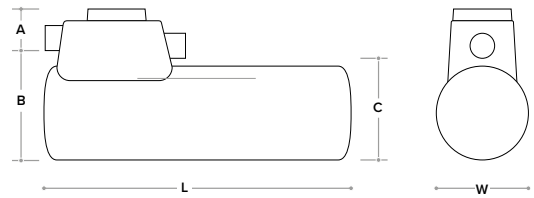
Shell Specification

The 'standard' specification is normally adequate for most installations but Heavy, Extra Heavy, Special, Extra Special, Ultra and Ultra Plus specifications are available depending upon the burial depth and water table level, in winter. The concern is when the system is emptied completely and remains empty for a period of time.

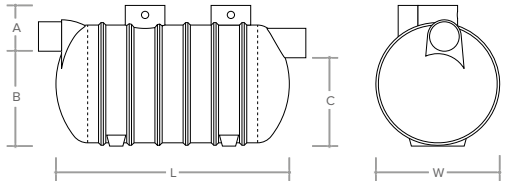
For more information and to see burial depth charts see Section 7.

200 Series ESR – Inside diameter 1200mm, outside diameter 1225mm.
300 Series ESR – Inside diameter 1800mm, outside diameter 1875mm.
400 Series ESR – Inside diameter 2600mm, outside diameter 2700mm.
500 Series ESR – Inside diameter 3500mm, outside diameter 3650mm.
600 Series ESR – Inside diameter 4000mm, outside diameter 4150mm.

200 series



300/400/500 & 600 series



SPEL ESR Bypass Treatment System

Components and Accessories

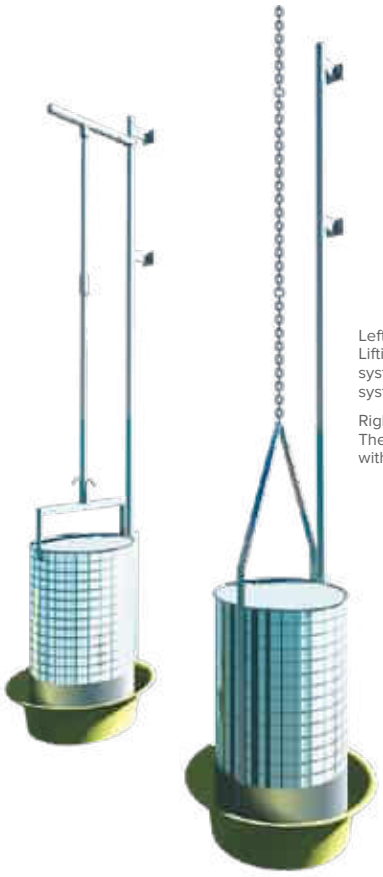
SPEL Coalescer Guide Rail Systems

To facilitate easy insertion of coalescer units, the optional SPEL guide rail system manufactured in stainless steel can be incorporated into SPEL ESR Bypass Treatment Systems.

Brackets fixed to the top and bottom of the coalescer unit simply engage with the stainless steel guide rail which is fixed to the top of the stub access shaft. The coalescer unit is then lowered in the normal way, being guided at the correct angle into the conical base.

Lifting chains are available for the larger coalescer units and where extension shafts are fitted.

Extension guide rails can be incorporated into SPEL extension shafts to suit.



Left:
Lifting, locating and locking system with guide rail system.

Right:
The SPEL coalescer unit with lifting chain.

SPEL Coalescer Lifting, Locating and Locking system (3L)

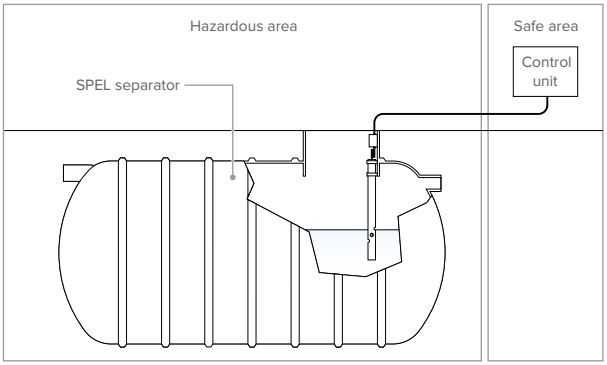
Where SPEL ESR Systems can be subjected to surcharging and/or tidal outfall, then the SPEL 3L system should be included.

The SPEL Lifting, Locating and Locking system is manufactured in stainless steel and replaces the standard coalescer unit handle.

The locating/locking handle ensures the coalescer unit is seated and locked in its correct position.

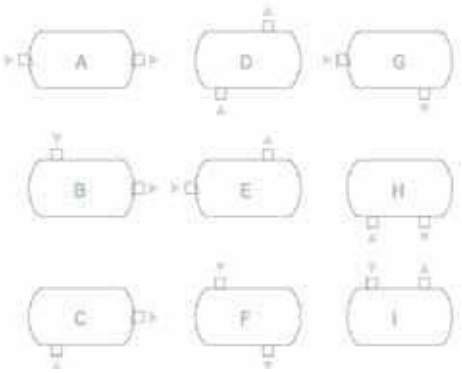
SPEL Automatic Monitoring Alarms

SPEL offer a range of alarms, for full details refer to the SPEL Data Manual Section 8.



SPEL ESR Range Inlet/Outlet Orientation

Dependent upon model and diameter of connections, these nine different orientations are available. However on the larger models it is important to check with our technical department.



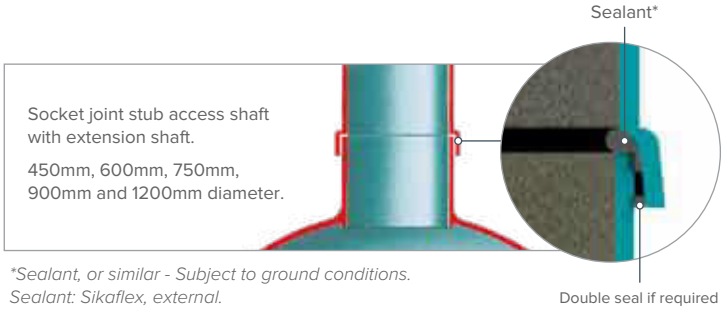
This graphic shows indicative locations only. For accurate location, please contact our technical team.

SPEL ESR Bypass Treatment System

Components and Accessories

SPEL extension access shafts

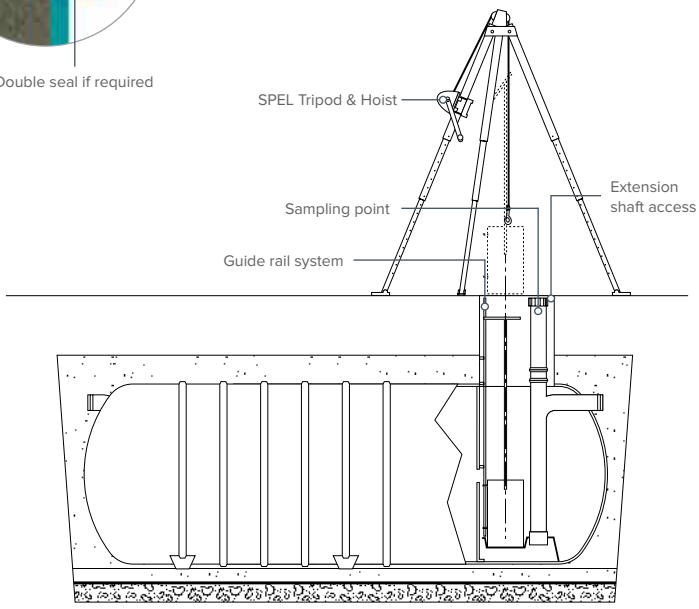
Extension access shafts are available for deep invert applications.



**Sealant, or similar - Subject to ground conditions.*
Sealant: Sikaflex, external.

SPEL tripod and hoist

Where surface water run-off has a high silt content the coalescer units can become filled, making them heavy to lift out. In order to facilitate easy withdrawal of coalescer units the SPEL tripod and hoist is recommended.



A SPEL P400 1CSC undergoing a routine service.

SPEL Products Lancaster Road, Shrewsbury, Shropshire SY1 3NQ (01743) 445 200 | info@spelproducts.co.uk

ENSIGN®

Package sewage treatment plants

MARSH

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.

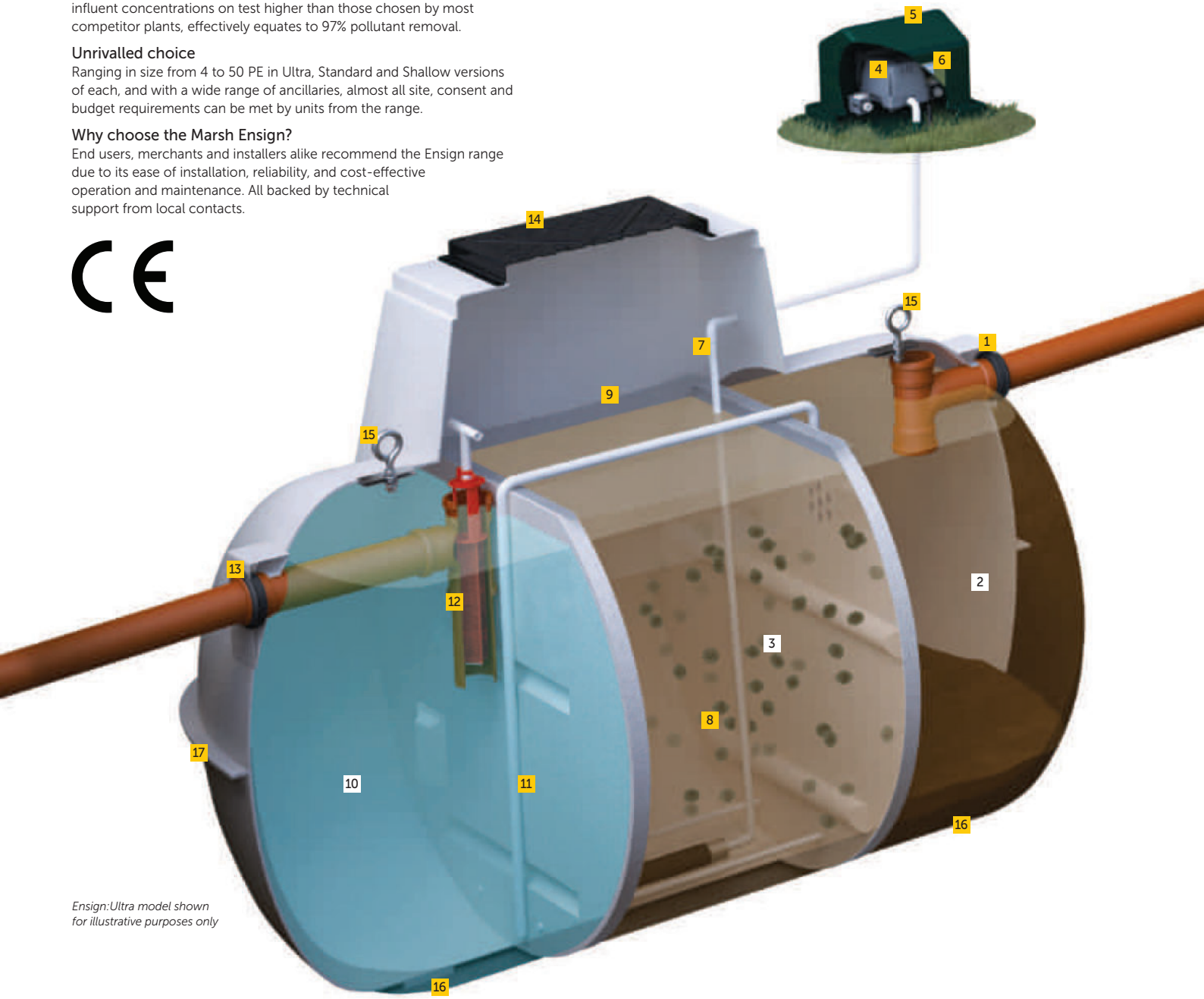
Why choose the Marsh Ensign?

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

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

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 (310m^3 per m^2) 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 (Ensign:Ultra units only)**
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 (Ensign:Ultra units only)**
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.

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*

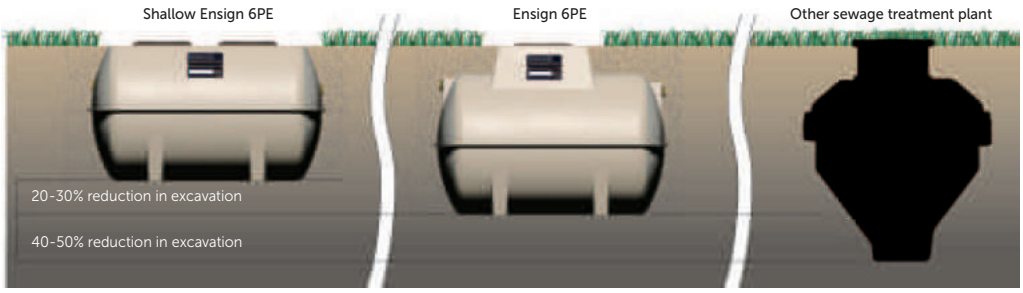
Many domestic sewage treatment plants offered by "internet resellers" claim to hold EN12566-3 compliance. This does not necessarily mean compliance with the UK National Forward, May 2007.

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.

Shallow units

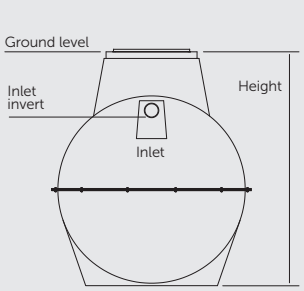
Common sewage treatment plants on the market often exceed 2.3m high. Marsh Industries offer a range of shallow plants from 4-35PE that are only 1.6m in height, meaning installation is not only possible*, but easier and safer too.

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

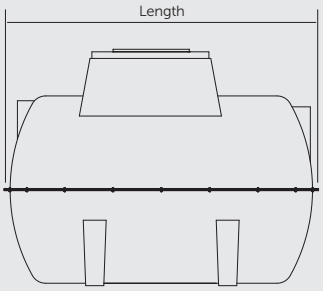


Specifications

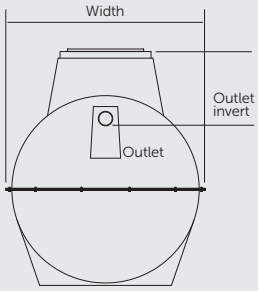
Ensign:Ultra and Ensign:Standard



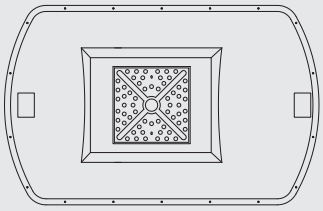
View on inlet end



Typical side elevation

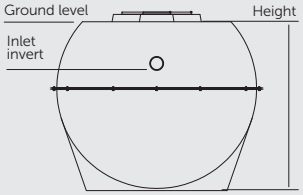


View on outlet end

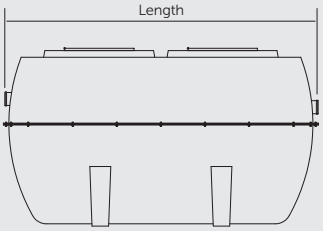


Typical plan view

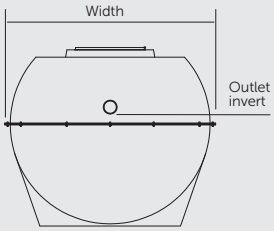
Shallow Ensign:Ultra and Shallow Ensign:Standard



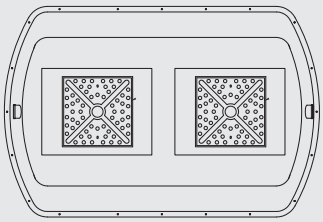
View on inlet end



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

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*

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