Land South Of Sandhill

Drainage Strategy

Job Number: 1518

Date	Version	Notes/Amendments
August 2024	1	Issued for Information

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Acronyms	
AOD	Above Ordnance Datum
CIRIA	Construction Industry Research and Information Association
EA	Environment Agency
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
SuDS	Sustainable Drainage Systems

Executive Summary

Flume Consulting Engineers have been commissioned to develop a Foul and Surface Water Drainage Strategy for a proposed development at Land South of Sandhill, Hermitage, Thatcham. The development site is situated in Flood Zone 1, indicating a low risk of flooding, and is accessible via existing local roads. The proposal involves the change of use of land into a Traveller site with five pitches, each accommodating a mobile home and touring caravan.

Surface Water Drainage Strategy

The drainage strategy focuses on implementing Sustainable Drainage Systems (SuDS) to manage surface water and prevent increased run-off. A permeable pavement system is proposed to facilitate surface water infiltration, thus maintaining the natural drainage patterns and supporting groundwater recharge.

Foul Water Drainage Strategy

Due to site constraints, the strategy recommends using a cesspool for foul water drainage. This solution aligns with the Building Regulations Part H hierarchy and is suitable for the site's intermittent usage. Cesspools were selected over other options because there are no nearby public or private sewers, and septic tanks or treatment plants are not viable due to local and national regulations and specific site conditions.

Maintenance and Management

The proposed drainage systems, including the permeable pavements and cesspool, are designed to be fully maintainable according to regulatory standards. A comprehensive management plan outlines routine maintenance, inspections, and waste removal protocols to ensure long-term operational effectiveness.

The drainage strategy for the proposed development meets all relevant national and local policies, ensuring that both foul and surface water management solutions are effective and sustainable. The incorporation of SuDS and adherence to regulatory requirements ensures minimal impact on the environment while safeguarding the development and its users against flood risks.

Introduction

Flume Consulting Engineers have been appointed to undertake a Foul and Surface Water Drainage Strategy for the proposed development at Land South Of Sandhill, Hampstead Norreys Road, Hermitage, Thatcham RG18 9XU.

This report has been carried out in accordance with the National Planning Policy Framework (NPPF) and the Planning Practice Guidance 'Flood Risk and Coastal Change' (PPG). This report also incorporates advice and guidance from the Environment Agency (EA), Building Regulations Part H and CIRIA documents.

Site Description and Location

The site, located near Hermitage in West Berkshire (postcode RG18 9XU, OS grid reference SU 51080 74141), is set in a rural area characterised by open countryside, agricultural fields, and woodland. It features gently undulating terrain and is accessible via local roads, namely the E30 and the Hampstead Norreys Road linking the site with Hermitage to the south, with nearby connections to Thatcham and Newbury. While rural, it is relatively close to amenities in Hermitage, Cold Ash and Thatcham.

There are no watercourses in the vicinity of the site, with the River Pang approximately 2km east of the site.

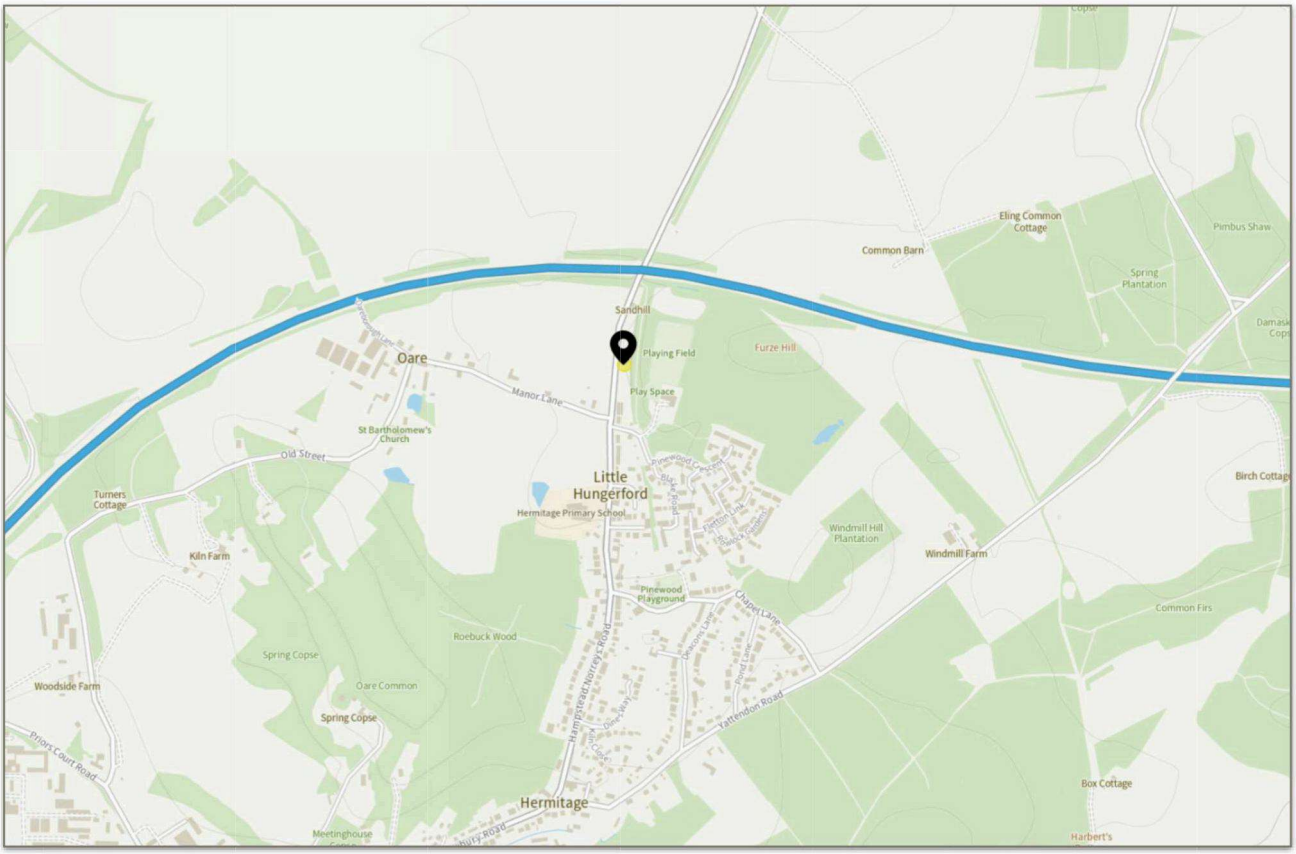

FIGURE 1. SITE LOCATION

Development Proposal

The developed proposals involve a change of use of land to create a 5 pitch Traveler site comprising the siting of 5 mobile homes and 5 touring caravans.

The proposed site will be accessed via the existing permitted access. Pedestrian access will be maintained and remain unchanged from the existing case.

FIGURE 2. PROPOSED SITE PLAN

Flood Risk

The EA's indicative floodplain map shows that the site is located in Flood Zone 1 (Low risk). Land within flood zone 1 has a low probability of flooding from rivers and the sea, and is assessed as having annual probability of river flooding less than 0.1% (Figure 3).

Developments in this flood zone do not have any restrictions, provided they do not increase the risk of flooding elsewhere.

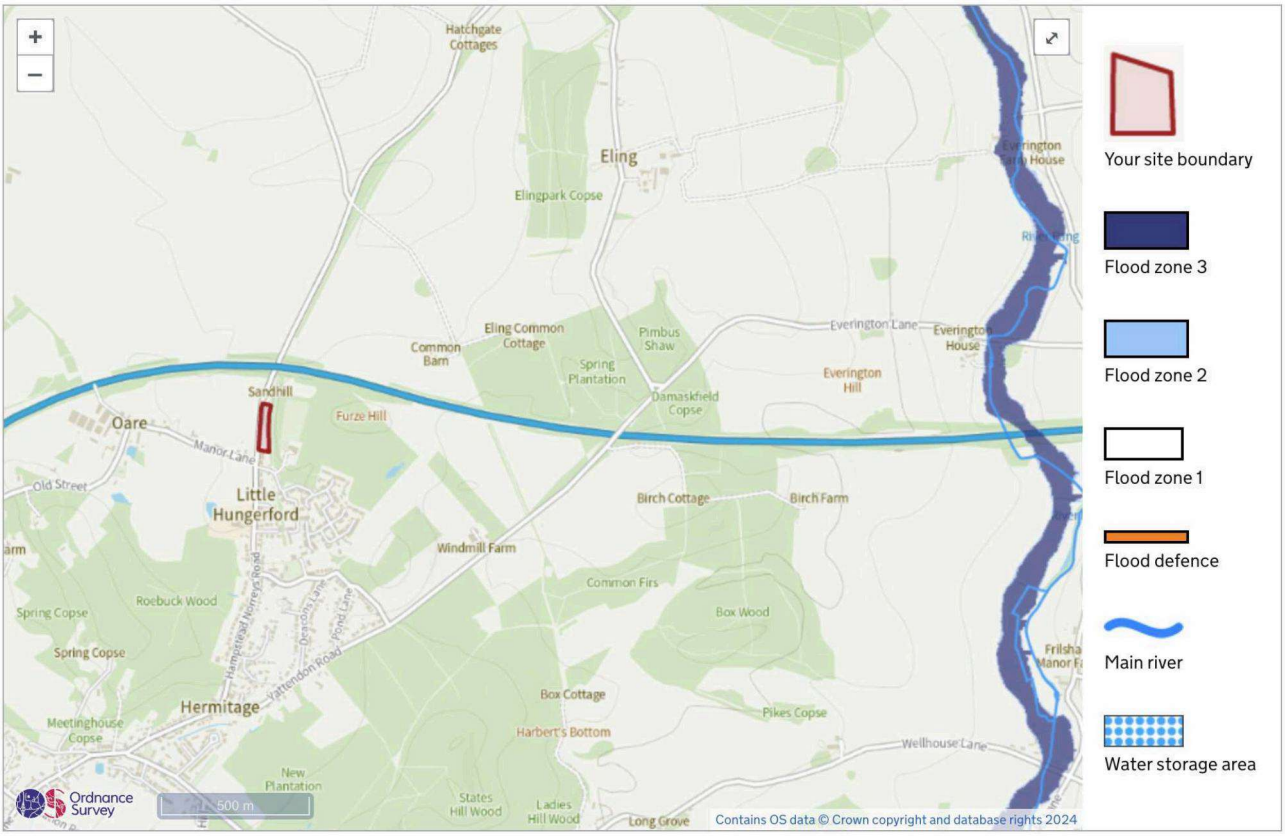

FIGURE 3. ENVIRONMENT AGENCY FLOOD RISK FROM RIVERS OR SEA MAP (GOV.UK, 2024)

Drainage Scheme

To effectively manage the impact of urbanisation on watercourse flows, the introduction of Sustainable Drainage Systems (SuDS) is recommended. These systems are designed to emulate natural drainage patterns as closely as possible at the source, which helps to mitigate the impact of development on surface water flows. Additionally, they are important in safeguarding and enhancing water quality and in facilitating the recharge of groundwater reserves.

Accordingly, the construction of an unlined permeable pavement system is proposed. This system will ensure that surface water will infiltrate into the surrounding soil and will ensure there is no increase in surface water run-off rates as a result of the proposed development.

A cesspool is chosen as the most suitable foul drainage solution for the site due to its constraints. This option aligns with the existing strategy for the site and meets the requirements of the foul drainage hierarchy and in accordance with the EA's General Binding Rules.

The drainage strategy is shown in Figure 4 and in Appendix A. Further information will be provided to support the drainage strategy in the forthcoming chapters.

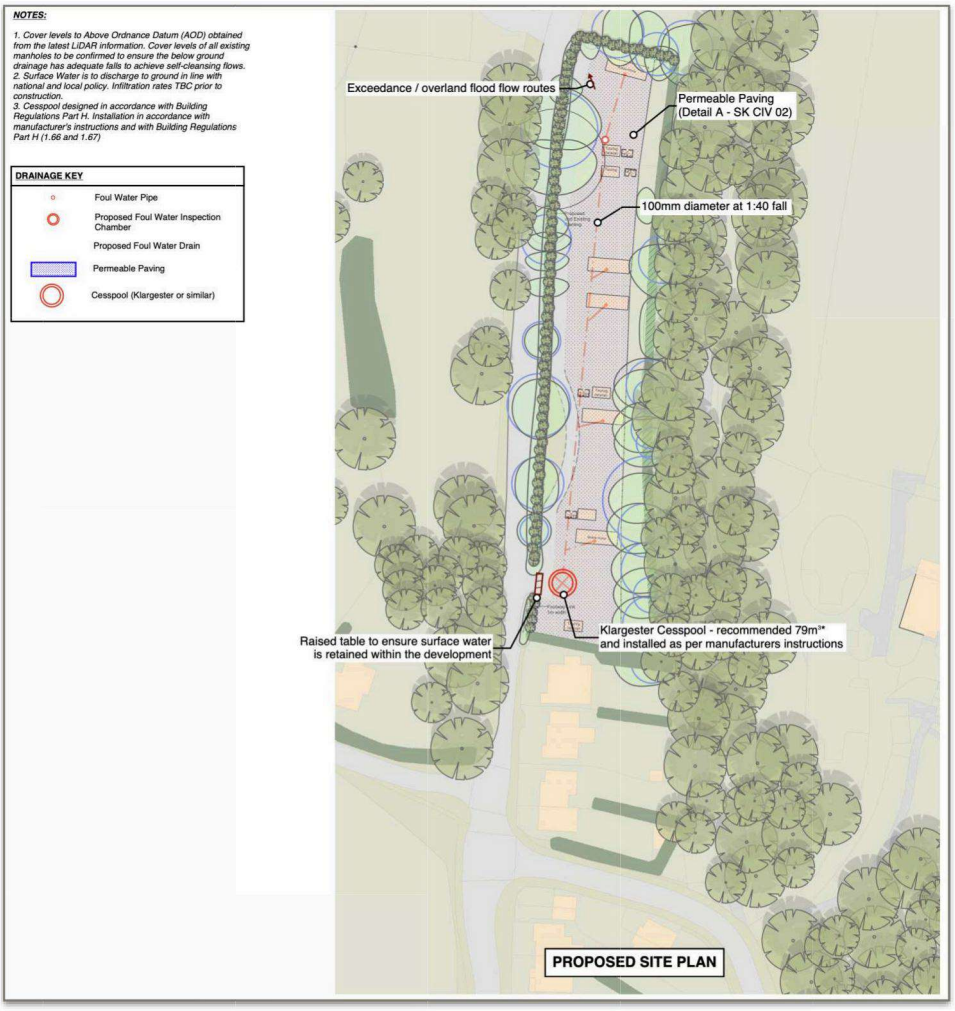

FIGURE 4. DRAINAGE STRATEGY

Surface Water Run-Off Assessment

According to Planning Practice Guidance (PPG), *"generally the aim should be discharge surface runoff as high up the following hierarchy of drainage options as reasonably practicable: 1. Into the ground (infiltration) 2. To a surface water body; 3. To a surface water sewer, highway drain or another drainage system; 4. To a combined sewer",* whilst ensuring that surface water run-off is managed as close to its source as possible.

Infiltration

Based on the infiltration rates obtained in the report, the site is suitable for permeable paving that allows water to infiltrate into the underlying ground. This approach ensures there is no increased surface water runoff from the site, even when accounting for the 1 in 100 year event plus a 40% allowance for climate change. The soil conditions, as indicated by the infiltration testing, have a moderately good capacity for water absorption, making permeable paving an effective solution to manage surface water runoff. The design will ensure that all surface water runoff is infiltrated into the underlying ground, thereby complying with both the SuDS hierarchy and local planning requirements.

Infiltration through permeable paving is considered to be a practical solution to reduce surface water run-off rates and volumes. Infiltration through Permeable Pavements (2D plane only) can also be utilised closer to structures. Permeable Pavements serving themselves behave in a similar way to soft landscaping and can be placed directly against the edge of structures.

The investigation by Jaxx Engineering indicates that the soil has moderately good capacity for infiltration.

JAXX ENGINEERING CONSULTANCY	Infiltration Rate Testing - BIA BRE 365	JAXX ENGINEERING CONSULTANCY

Project Name : Land South of Sandhill, Thatcham

Job No : JEC3544 Performed By : CK

Date : 21/08/24 Checked By : GW

BRE TP1 - B				BRE TP2 - B				BRE TP3 - B			
Test Dimensions		H_0 =		Test Dimensions		H_0 =		Test Dimensions		H_0 =	
1.0m (w) x 1.0m (l) x 2.0m (d)		1.00		1.0m (w) x 1.0m (l) x 2.0m (d)		2.00		1.0m (w) x 1.0m (l) x 2.0m (d)		2.00	
Depth to Water (m)	Time (mins)	H	H/H_0	Depth to Water (m)	Time (mins)	H	H/H_0	Depth to Water (m)	Time (mins)	H	H/H_0
0.000	0	2.00	1.00	0.000	0	2.00	1.00	0.000	0	2.00	1.00
0.040	1	1.96	0.98	0.050	1	1.95	0.98	0.030	1	1.97	0.99
0.080	2	1.92	0.96	0.080	2	1.92	0.96	0.070	2	1.93	0.97
0.120	3	1.88	0.94	0.130	3	1.87	0.94	0.110	3	1.89	0.95
0.150	4	1.85	0.93	0.150	4	1.85	0.93	0.140	4	1.86	0.93
0.170	5	1.83	0.92	0.180	5	1.82	0.91	0.180	5	1.82	0.91
0.190	6	1.81	0.91	0.190	6	1.81	0.91	0.190	6	1.81	0.91
0.200	7	1.80	0.90	0.210	7	1.79	0.90	0.200	7	1.80	0.90
0.210	8	1.79	0.90	0.215	8	1.79	0.89	0.210	8	1.79	0.90
0.220	9	1.78	0.89	0.220	9	1.78	0.89	0.230	9	1.77	0.89
0.230	10	1.77	0.89	0.230	10	1.77	0.89	0.240	10	1.76	0.88
0.240	15	1.76	0.88	0.260	15	1.74	0.87	0.250	15	1.75	0.88
0.270	20	1.73	0.87	0.270	20	1.73	0.87	0.270	20	1.73	0.87
0.290	25	1.71	0.86	0.280	25	1.72	0.86	0.290	25	1.71	0.86
0.330	30	1.67	0.84	0.340	30	1.66	0.83	0.320	30	1.68	0.84
0.390	35	1.61	0.81	0.390	35	1.61	0.81	0.390	35	1.61	0.81
0.440	40	1.56	0.78	0.470	40	1.53	0.77	0.440	40	1.56	0.78
0.500	60	1.50	0.75	0.520	60	1.48	0.74	0.490	60	1.51	0.76
0.600	90	1.40	0.70	0.600	90	1.40	0.70	0.600	90	1.40	0.70
0.720	120	1.28	0.64	0.720	120	1.28	0.64	0.770	120	1.23	0.62
0.830	180	1.17	0.59	0.850	180	1.15	0.58	0.890	180	1.11	0.56
1.100	240	0.90	0.45	1.090	240	0.91	0.46	1.100	240	0.90	0.45
1.160	300	0.84	0.42	1.140	300	0.86	0.43	1.220	300	0.78	0.39
1.390	360	0.61	0.31	1.380	360	0.62	0.31	1.380	360	0.62	0.31
1.600	420	0.40	0.20	1.570	420	0.43	0.22	1.560	420	0.44	0.22
1.880	480	0.12	0.06	1.880	480	0.12	0.06	1.850	480	0.15	0.08
2.000	600	0.00	0.00	2.000	600	0.00	0.00	2.000	600	0.00	0.00
Volume of Excavation (m^3) =		2.00		Volume of Excavation (m^3) =		2.00		Volume of Excavation (m^3) =		2.00	
Storage volume between 75-25% 'Vp' (m^3) =		1.00	300	Storage volume between 75-25% 'Vp' (m^3) =		1.00		Storage volume between 75-25% 'Vp' (m^3) =		1.00	
Time for water to fall from 75-25% 'tp' (min) =		165		Time for water to fall from 75-25% 'tp' (min) =		150		Time for water to fall from 75-25% 'tp' (min) =		155	
50% Internal Surface Area (as50) =		5.00	33	50% Internal Surface Area (as50) =		5.00	30	50% Internal Surface Area (as50) =		5.00	
Soil infiltration rate 'f' (m/s) =		1.65E-05	Vp = 33s/mm	Soil infiltration rate 'f' (m/s) =		9.18E-04	Vp = 30s/mm	Soil infiltration rate 'f' (m/s) =		9.53E-04	Vp = 31s/mm

FIGURE 5. GROUND INVESTIGATION - INFILTRATION TESTS TO BRE 365

For the structural design of the permeable pavements, the calculations are based on a minimum infiltration rate of $1x10^{-7}$ m/s to determine the necessary thickness for the paving, ensuring a cautious and conservative approach. The design proposes a sub-base thickness of 350mm, which is above the minimum requirement, ensuring adequate self-attenuation of the water runoff.

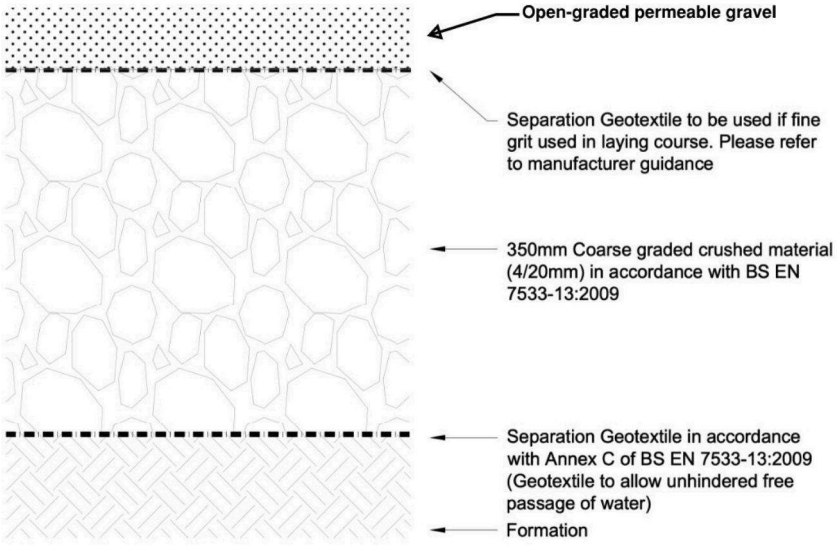

FIGURE 6. PERMEABLE PAVING DETAIL

Infiltration rate = 1×10^{-7}m/s

		1 in 10	1 in 30	1 in 100	1 in 100 + 20%	1 in 100 + 30%
M5-60	**r**	**10**	**3.33**	**1**	**0.5**	**0.25**
20	0.4	90	120	160	210	225
	0.3	100	140	190	240	270
	0.2	135	180	250	310	370
17	0.4	70	100	140	180	190
	0.3	80	110	160	210	225
	0.2	105	150	210	270	305
14	0.4					
	0.3	60	90	130	170	180
	0.2	75	110	160	220	245

FIGURE 7. MINIMUM PAVING THICKNESSES REQUIRED - HYDRAULIC CAPACITY (INTERPAVE, 2018)

Foul Water Drainage

In compliance with Building Regulations Approved Document H, foul water drainage must be designed as follows:

'An adequate system of drainage shall be provided to carry foul water from appliances within the building to one of the following, listed in the order of priority:

a) a public sewer; or, where that is not reasonably practicable,

b) a private sewer communicating with a public sewer; or, where that is not reasonably practicable,

c) either a septic tank which has an appropriate form of secondary treatment or another wastewater treatment system (packaged treatment plant); or, where that is not reasonably practicable,

***d) a cesspool**.'*

In compliance with Building Regulations Approved Document H, foul water drainage must follow a specific hierarchy based on site constraints:

a. Public Sewer: Connecting to a public sewer is the preferred option, but no public sewers are nearby.

b. Private Sewer Communicating with a Public Sewer: There are no private sewers in or near the development site.

c. Septic Tank or Wastewater Treatment System:

• Septic Tanks discharging to a watercourse: Not allowed as per the General Binding Rules, because septic tanks provide minimal treatment and discharge to a watercourse without further treatment is unsafe.

• Septic Tanks discharging to ground (drainage field): Not feasible due to the required minimum distances from watercourses, buildings, boundaries, and roads.

• Packaged Treatment Plant discharging to a watercourse: Not feasible due to the site's intermittent usage patterns, which do not sustain the necessary biological processes for effective treatment.

• Packaged Treatment Plant discharging to ground (drainage field): Also not feasible due to the same restrictions as septic tanks regarding minimum distances and proximity to infiltration systems.

Given these constraints, the recommended solution is to use cesspools, which aligns with the existing approved foul drainage approach for the site.

d) a cesspool ✓

A cesspool offers a reliable solution, particularly for locations without access to mains drainage or where treated effluent discharge is not permissible due to unfavourable ground conditions. This is especially relevant in cases of infrequent or seasonal use, such as holiday homes or traveller sites, which can hinder the effective operation of a foul water treatment plant. Cesspools function as storage facilities, requiring periodic emptying by a tanker. Installing a high-level alarm is recommended to promptly alert residents of the need to empty the tank. For a single dwelling 18180 litres (4000 gallons) is the minimum allowable capacity. This capacity is suitable for two residents, which provides approximately 45 days of storage. This

size should be increased by 6800 litres (6.8m^3) for each additional user (estimated minimum 6). Based on the number of users, the estimated required storage capacity is 79m^3 for this site. Any adjustment to this figure should be discussed with building control and in leasing with the site users to ensure proper and consistent maintenance in line with the recommendations from the manufacturer and in accordance with the management and maintenance schedule.

Management and Maintenance Schedule

The drainage design will be designed to be fully maintainable in accordance with building regulations and the recommendations of CIRIA C753 – SuDS Manual.

Consistent with the General Binding Rules, a maintenance plan for the Cesspool is established to ensure that it operates effectively.

The maintenance measures which should be implemented for the foul water and surface water systems are provided below.

Permeable Paving

Maintenance Schedule	Required Action	Typical Frequency
Monitoring/Inspections	Initial Inspection.	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth - if required take remedial action.	Annually (and after severe storms)
Regular Maintenance	Rubbish and litter removal	As required
	Brushing and vacuuming - standard cosmetic sweep across surface	Once a year after Autumn leaf fall
Remedial Actions	Remedial work to any depressions or rutting considered detrimental to the structural performance.	As required
	Rehabilitation of surface with remedial sweeping	Every 10-15 years or as required.

Foul Water Cesspool

1. Waste Removal by Certified Specialists:

- Engage certified waste management specialists or reputable companies experienced in cesspool waste removal.
- Ensure compliance with waste disposal regulations and environmentally responsible practices.

2. Regular Scheduled Waste Removal:

- Establish a routine waste removal schedule based on recommended intervals and the cesspool's capacity.
- Coordinate with the waste management specialists to adhere to the schedule and maintain an efficient waste removal process.

3. Alarm-Triggered Waste Removal:

- Install an alarm system connected to the cesspool to provide timely notifications when waste levels approach a critical point.
- Train personnel to respond promptly to alarm alerts, initiating waste removal as necessary to prevent overflows and system complications.

4. Coordination and Communication:

- Maintain open communication with waste management specialists to ensure timely and coordinated waste removal activities.
- Foster a proactive relationship to promptly address any issues or concerns related to the cesspool's functionality and waste management.

5. Documentation and Compliance:

- Maintain comprehensive records of waste removal activities, including dates, quantities removed, and disposal locations.
- Ensure compliance with local regulations and guidelines regarding waste management, reporting, and documentation.

6. Periodic Cesspool Inspection:

- Conduct regular inspections of the cesspool and associated systems to identify potential issues early on.
- Document inspection findings and implement necessary maintenance and repairs to ensure the longevity and effectiveness of the foul drainage system.

Conclusions

The below ground drainage system has been designed in accordance with Building Regulations Part H, and the surface water drainage is designed to accommodate the 1 in 100 year return period plus a 40% allowance for climate change, ensuing that site users remain safe at all times, whilst ensuring there is no impact on third-party flood risk.

The proposed site will incorporate SuDS features in the form of permeable paving which will infiltrate any surface water to the underlying ground, in line with West Berkshire Council advice. Permeable Pavements are placed highly in the SuDS Hierarchy, and will ensure that water quality, water quantity, amenity and biodiversity are all promoted in the SuDS design.

Due to the constraints on site, the existing approved scheme discharges foul water drainage on site into a cesspool. This is in line with the foul drainage hierarchy noted in Building Regulations Part H, and national and local policies.

Note:

This report has been prepared for the purposes of submitting to the local planning authority for review in relation to the associated drainage strategy for the proposed development, and uses the most up-to-date information available to us at the time. It should not be relied upon by anyone else or used for any other purpose. This report is confidential to our Client; it should only be shown to others with their permission. We retain copyright of this report which should only be reproduced with our permission.

	Prepared By	Checked By	Approved for issue
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Signature	TQ	MST	TQ
Date	30 August 2024	30 August 2024	30 August 2024

flume

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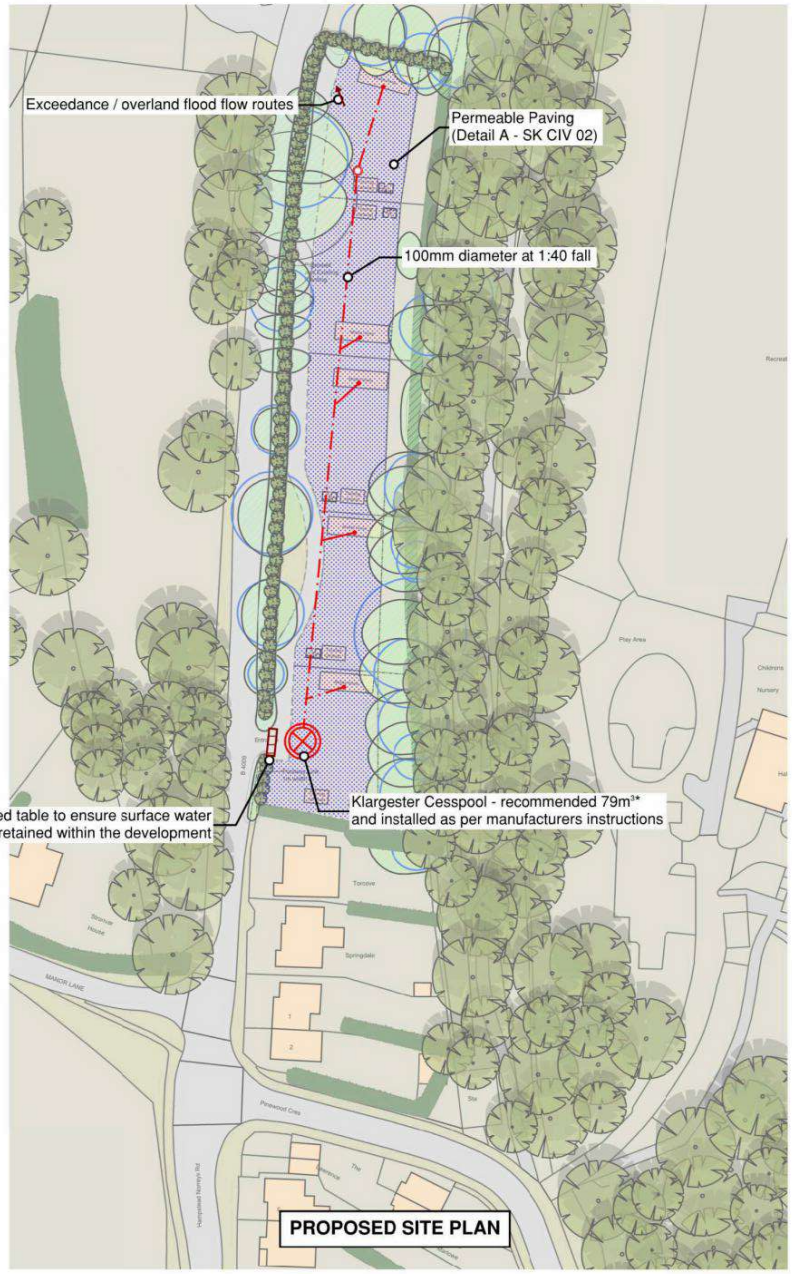
Job	Land South of Sandhill - SuDS & Foul Drainage Scheme				

NOTES:

1. Cover levels to Above Ordnance Datum (AOD) obtained from the latest LiDAR information. Cover levels of all existing manholes to be confirmed to ensure the below ground drainage has adequate falls to achieve self-cleansing flows.
2. Surface Water is to discharge to ground in line with national and local policy. Infiltration rates TBC prior to construction.
3. Cesspool designed in accordance with Building Regulations Part H. Installation in accordance with manufacturer's instructions and with Building Regulations Part H (1.66 and 1.67)

DRAINAGE KEY

	Foul Water Pipe
	Proposed Foul Water Inspection Chamber
	Proposed Foul Water Drain
	Permeable Paving
	Cesspool (Klargester or similar)



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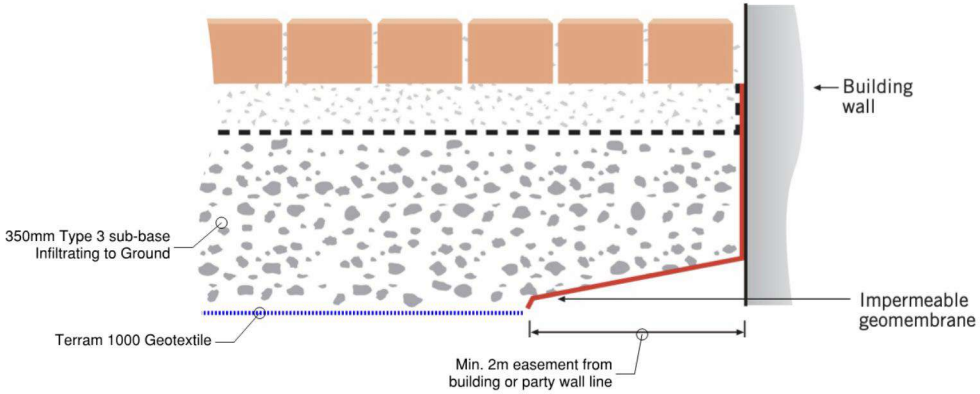


PERMEABLE PAVEMENT DETAIL

FOR KLARGESTER CESSPOOL DETAIL - REFER TO MANUFACTURER'S INFORMATION (APPENDED)

Sealed Cesspool

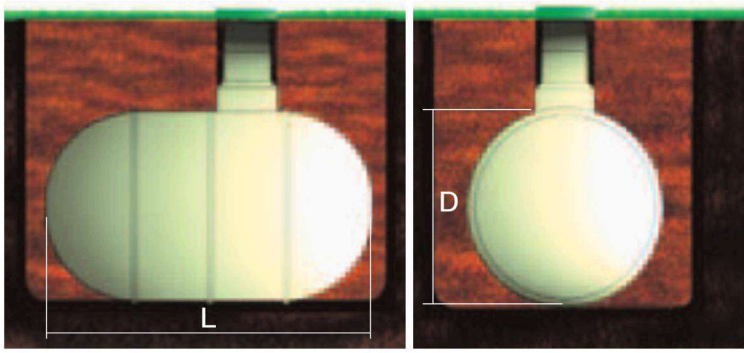
For Effective Containment of Domestic Sewage

klargester.com

Klargester

Sealed Cesspool

For Effective Containment of Domestic Sewage



A Klargester cesspool provides a reliable solution for locations without mains drainage, where the discharge of treated effluent is not permissible due to unsuitable ground conditions, or where infrequent or seasonal use, such as a holiday home, would prevent the successful functioning of a BioDisc® treatment plant, for example.

Quality & Reliability

Klargester cesspools have been successfully installed throughout the world since 1967. They are constructed from non-corrosive materials, designs in accordance with BS 6297: 1983. Klargester is an accredited company under BS EN ISO 9001:2000 quality management systems - a total approach to quality, ensuring this reliable cesspool can be installed with complete peace of mind for years of trouble free operation. All cesspools are covered by Klargester's 12 month warranty.

Factory Tested

Every cesspool is tested to ensure that it is watertight and structurally sound.

Easy Installation & Maintainance

Delivered as a complete unit ready for installation, each cesspool must be installed in a level condition and bedded on, and surrounded with, 225mm thickness of concrete. The cesspool will need to be ballasted internally with water and remain so until the concrete has set. Full installation instructions are provided with each unit, but are also available on request. Cesspools are for storage only and their contents have to be emptied at regular intervals by tanker. A 'high level' alarm is available for monitoring the cesspool for optimum usage.

Lockable Manhole Cover

For added safety, cesspools can be supplied with a lockable manhole cover.

Capacity

For a single dwelling 18180 litres (4000 gallons) is the minimum allowable capacity. This capacity is suitable for two residents only. This size should be increased by 6800 litres (6.8m^3) for each additional user. For non-domestic applications refer to Klargester for advice on the capacity and type of tank required.

Tank Selection

Nominal Litres	Capacity Gallons	Length mm	Approx. Concrete Requirements (m^3)
18,180	4,000	4,320	9.0
22,500	5,000	5,090	11.0
27,000	6,000	6,190	13.0
36,000	8,000	7,740	16.0
45,000	10,000	9,460	19.5
55,000	12,000	11,180	23.0

For inlet depths down to lm. a standard duty tank is acceptable. A heavy duty cylindrical cesspool is available in 18180 litre size suitable for inlet invert depths between 1m - 1.5m. For all other configurations please consult Klargester.

Nationwide Availability

Klargester products can be sourced from your local builders merchant or through local pollution control specialists.

Other Products

Klargester manufactures a wide range of pollution control equipment including:

- BioDisc® Sewage Treatment Plants
- AirFlow Sewage Treatment Plants
- Sigma SuperSeptic
- HillMaster Package Pump Systems
- Pumpstor24 Pumps Systems
- Stormwater Attenuation Systems
- Septic Tanks
- Cesspools
- Grease & Silt Traps
- Oil/Water Separators
- Silage Effluent Tanks
- Reed Beds
- Rainwater Harvesting
- Garden Watering Systems

BioDisc® is a Registered Trademark of Klargester Environmental

Klargester

Cert. No. 870381

BRITISH WATER

Klargester Environmental

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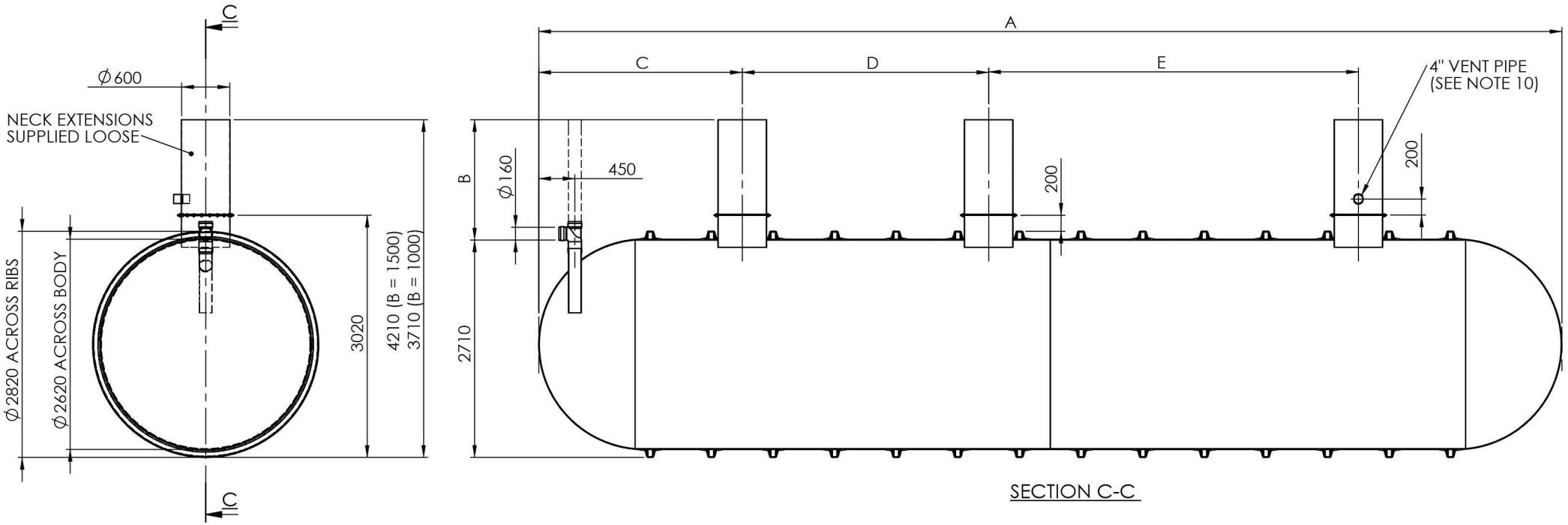


SECTION C-C

Nominal Volume (Litres)	Nominal Volume (Gallons)	Weight (Kg)	Overall Length A	Inlet Invert B = 1.5 Metres	Inlet Invert B = 1.0 Metres	Dimension to neck C	Dimension between necks D	Dimension between necks E
54,000	11,880	2,229	11,222	1,500	1,000	2,538	3,073	3,075
59,000	12,968	2,317	11,991	1,500	1,000	2,538	3,073	3,842
63,000	13,860	2,538	12,760	1,500	1,000	2,538	3,073	4,611
71,000	15,620	2,998	14,295	1,500	1,000	2,538	4,610	4,610
79,000	17,380	3,477	15,833	1,500	1,000	2,538	5,379	5,379

NOTES:-

1. CESSPOOLS AND SILAGE TANKS MUST NOT DISCHARGE IN TO THE ENVIRONMENT AND MUST BE EMPTIED WHEN FULL.
2. THE TANK IS FITTED WITH A 160MM INLET SOCKET. PIPE ADAPTORS CAN BE PROVIDED FOR ANALTERNATIVE SIZE OF 110mm. THESE ARE FITTED EXTERNALLY TO THE TANK.
3. THIS DRAWING IS PROVIDED TO SUPPLY DIMENSIONAL INFORMATION ONLY.
4. THE UNIT MUST BE INSTALLED WITH A CONCRETE SURROUND. PLEASE SEE THE DETAILED INSTALLATION PROCEDURE SUPPLIED WITH EACH UNIT.
5. THE UNIT IS SUPPLIED WITH LOOSE, BOLT ON TANK SHAFTS TO SUIT EITHER 1 OR 1.5 METRE INVERT (SPECIFY WITH ORDER). THEY MUST BE FITTED ON SITE AS PART OF THE INSTALLATION AND CAN BE TRIMMED TO SUIT THE EXACT SIZE OF INVERT.
6. THE UNIT IS PROVIDED WITH 1, 2 OR 3 SHAFTS, DEPENDING ON IT'S VOLUME. TO AID DE-SLUDGING IT IS RECOMMENDED THAT 2 SHAFTS ARE SELECTED FOR TANKS WITH CAPACITES OF 34m3 AND ABOVE. 3 SHAFTS SHOULD BE FITTED TO UNITS OF ABOVE 54m3 (SPECIFY WITH ORDER). ADDITIONAL SHAFTS CAN BE FITTED. UNITS SHOULD NOT BE INSTALLED DEEPER THAN NECESSARY, NOR DEEPER THAN THE INVERT SPECIFIED FOR THE UNIT SUPPLIED.
7. PEDESTRIAN DUTY COVER AND FRAMES TO FIT DIAMETER 600mm NECKS, ARE AVAILABLE FOR PURCHASE.
8. THE WEIGHTS GIVEN ARE FOR HANDLING PURPOSES ONLY AND EXCLUDE THE BOLT ON SHAFTS.
9. THE INLET PIPE SHOULD BE EXTENDED TO GROUND LEVEL. DIAMETER 450mm ACCESS COVERS ARE FOR PURCHASE TO ALLOW FOR RODDING ACCESS.
10. SINGLE NECK TANKS SERVING SINGLE PROPERTIES SHOULD BE VENTED, USING THE SOIL STACK. LARGER TANKS SERVING MULTIPLE PROPERTIES SHOULD HAVE A VENT FITTED TO THE NECK TO ENABLE LOCALISED HIGH LEVEL VENTING.
11. WE RECOMMEND THE PURCHASE AND USE OF A HIGH LEVEL ALARM WITH THESE TANKS.

Material : Various	Tolerance (unless stated) :
Finish :	Thickness : n/a
	Surface Area :

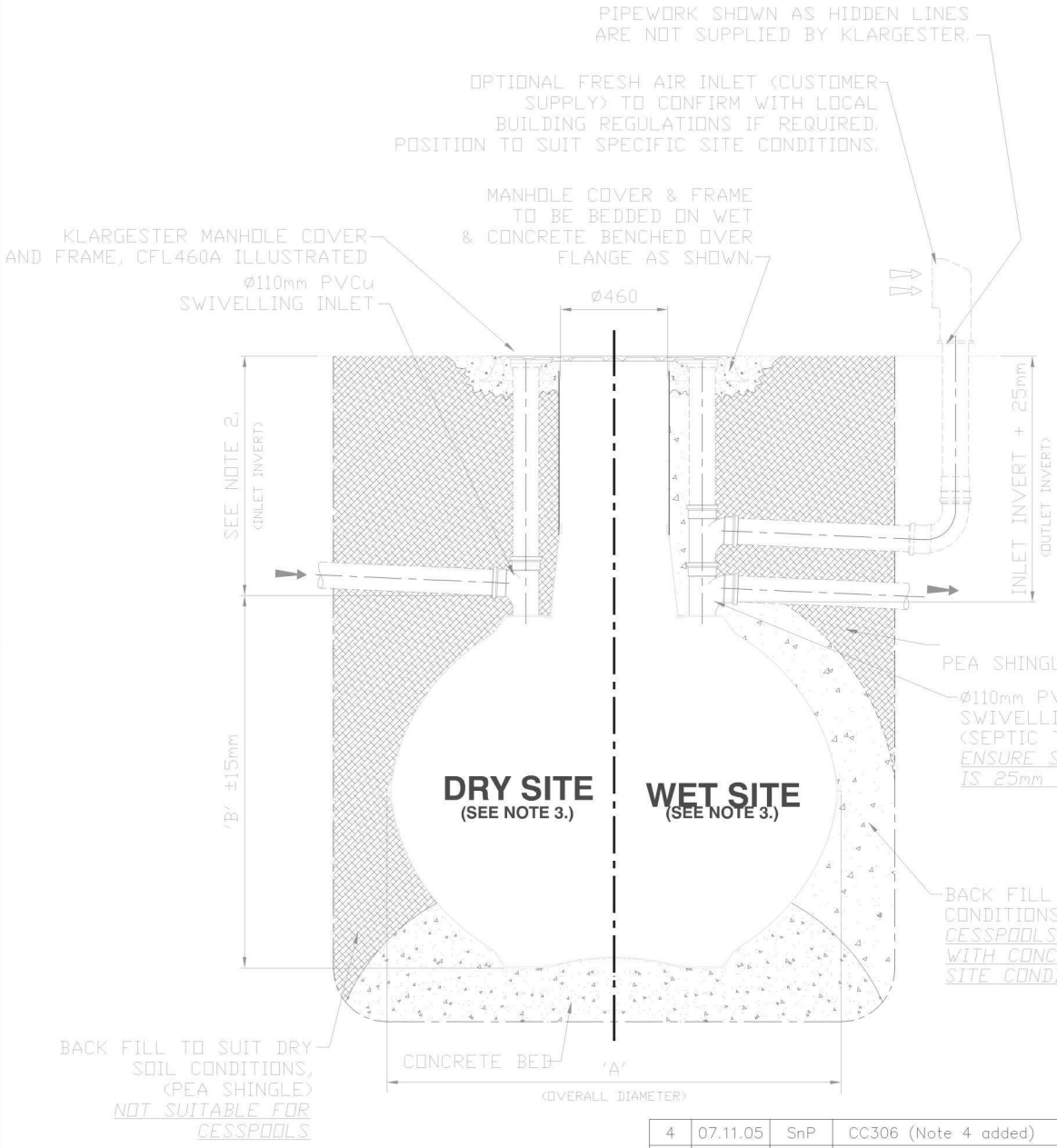
Drawing : DS0963P - Ø2.6 CP - SL

TRIPLE NECK CESSPOOL / SILAGE TANK

All dimensions in mm

Scale: Not to scale

Kingspan Environmental



NOTES:-

1.) STANDARD INLET/OUTLET PIPES ARE PVCu UNDERGROUND DRAINAGE TO BS4660 WITH KLARGESTER SEALS.

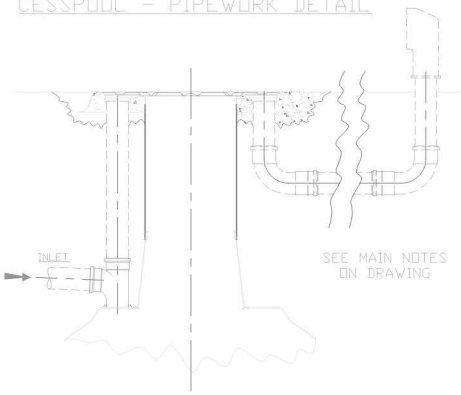
2.) TANKS HAVE AN INLET INVERT DEPTH OF 1.0m. UPON REQUEST TANKS MAY HAVE AN INVERT DEPTH OF 1.5m OR GREATER. REFER TO KLARGESTER DO NOT EXTEND TANK NECK.

3.) THIS DRAWING SHOULD BE USED FOR DIMENSIONAL INFORMATION ONLY. REFER TO INSTALLATION GUIDELINES

4.) THIS DRAWING IS ALSO AVAILABLE ON OUR WEBSITE www.klargester.com

CAPACITY	DIMENSIONS		WEIGHTS	KLARGESTER COVER & FRAME
LITRES	'A' ø	'B'	Kg	
2800	1905	1565	125	CFL460E
3800	2070	1795	180	CFL460E
4600	2080	2035	210	CFL460E

CESSPOOL - PIPEWORK DETAIL



ISSUE	DATE	DRAWN	MODIFICATION
4	07.11.05	SnP	CC306 (Note 4 added)
3	03.08.05	A.L.	NOTES UPDATED
2	07.03.03	A.L.	DRAWING UPDATED
1	23.10.98	J.A.H.	INITIAL ISSUE

THIRD ANGLE PROJECTION

ALL DIMENSIONS ARE IN MILLIMETRES – DO NOT SCALE

Klargester Treatment Systems

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Tel:- 01296 633000
www.klargester.com

TITLE

2800 3800 4600 ALPHA TANKS

SEPTIC / CESSPOOL INSTALLATION DETAIL

SCALE	SHEET SIZE
1:15	A2

DRAWING No.	ISSUE
DS0552	4

Appendix B - Surface Water Hydraulic Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	150.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
Permeable Paving	0.250	5.00	0.500	450	0.500
Outfall	0.000		0.500	450	0.500

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	Permeable Paving	Outfall	3.000	0.600	0.000	0.000	0.000	0.0	100	5.05	54.5

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.000	7.9	36.9	0.400	0.400	0.250	0.0	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)
1.000	3.000	0.0	100	Circular	0.500	0.000	0.400	0.500	0.000	0.400

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	Permeable Paving	450	Manhole	Adoptable	Outfall	450	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Permeable Paving	0.500	0.500	450	0	1.000	0.000	100
Outfall	0.500	0.500	450	1	1.000	0.000	100

Simulation Settings

Rainfall Methodology	FSR	Summer CV	0.750	Drain Down Time (mins)	1440
FSR Region	England and Wales	Winter CV	0.840	Additional Storage (m³/ha)	0.0
M5-60 (mm)	20.000	Analysis Speed	Normal	Check Discharge Rate(s)	x
Ratio-R	0.400	Skip Steady State	x	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	40	0	0

Node Permeable Paving Online Depth/Flow Control

Flap Valve	x	Invert Level (m)	0.000	Design Flow (l/s)	0.2
Replaces Downstream Link	✓	Design Depth (m)	1.000		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	1.000	0.000

Node Permeable Paving Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.03780	Safety Factor	2.0	Invert Level (m)	0.000
Side Inf Coefficient (m/hr)	0.03780	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	2300.0	2300.0	0.350	2300.0	2300.0	0.351	0.0	2300.0

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.000

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 15 minute summer	488.233	138.153	100 year +40% CC 360 minute summer	56.677	14.585
100 year +40% CC 15 minute winter	342.620	138.153	100 year +40% CC 360 minute winter	36.841	14.585
100 year +40% CC 30 minute summer	320.551	90.705	100 year +40% CC 480 minute summer	43.979	11.622
100 year +40% CC 30 minute winter	224.948	90.705	100 year +40% CC 480 minute winter	29.219	11.622
100 year +40% CC 60 minute summer	214.603	56.713	100 year +40% CC 600 minute summer	35.604	9.738
100 year +40% CC 60 minute winter	142.577	56.713	100 year +40% CC 600 minute winter	24.327	9.738
100 year +40% CC 120 minute summer	129.587	34.246	100 year +40% CC 720 minute summer	31.433	8.424
100 year +40% CC 120 minute winter	86.094	34.246	100 year +40% CC 720 minute winter	21.125	8.424
100 year +40% CC 180 minute summer	97.729	25.149	100 year +40% CC 960 minute summer	25.432	6.697
100 year +40% CC 180 minute winter	63.526	25.149	100 year +40% CC 960 minute winter	16.847	6.697
100 year +40% CC 240 minute summer	75.977	20.078	100 year +40% CC 1440 minute summer	18.055	4.839
100 year +40% CC 240 minute winter	50.477	20.078	100 year +40% CC 1440 minute winter	12.134	4.839

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	Permeable Paving	59	0.129	0.129	81.2	89.1520	0.0000	SURCHARGED
15 minute summer	Outfall	1	0.000	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
60 minute winter	Permeable Paving	Depth/Flow	Outfall	0.0	0.0
60 minute winter	Permeable Paving	Infiltration		12.1	