

MANAGEMENT & MAINTENANCE PLAN

Proposed development at PROPOSED DEVELOPMENT AT LAND ADJACENT TO THE TOWN HOUSE, BEGUILDY, KNIGHTON, POWYS, LD7 1YG

1 Introduction

This document sets out the principles for the long-term management and maintenance of the surface water Sustainable Drainage Systems (SuDS) and the foul drainage to be constructed at **PROPOSED DEVELOPMENT AT LAND ADJACENT TO THE TOWN HOUSE, BEGUILDY, KNIGHTON, POWYS, LD7 1YG**

1.1 The purpose of this document is to set out the basis of the development SuDS Maintenance Plan and to ensure that the adopting management company and prospective homeowners are entrusted with a robust inspection and maintenance programme, ensuring the optimum operation of the surface water drainage network and the foul drainage is continually maintained for the lifetime of the development and to prevent the increased risk of flooding both on and offsite in accordance with the National Planning Policy Framework (NPPF).

1.2 The activities listed in this document are generic to the relative SuDS types and represent the minimum maintenance and inspection requirements. However, additional tasks or varied maintenance frequency may be instructed by the asset owners as required. Specific maintenance needs of the SuDS elements should be monitored and the foul drainage, and maintenance schedules adjusted to suit requirements.

1.3 All those responsible for maintenance and the contractors employed to carry out maintenance should follow relevant Health and Safety legislation (Health and Safety at Work Regulations, 1999) for all activities listed within this report including lone working, if relevant) and risk assessments should be undertaken where legislation requires.

1.4 Any contractors employed by the Management Company or Homeowners shall carry out periodic maintenance of all such SuDS in accordance with the schedules listed in this report. Inspection checks shall be carried out by a qualified and competent person, at the minimum intervals listed within the schedules and the appropriate work carried out.

2 SuDS Layout & Design

2.1 The storm water drainage strategy for the proposed development utilises SuDS features to intercept and convey all pluvial surface water runoff. The design of the system aims to direct all surface water to dedicated infiltration structures.

2.2 The proposed storm water system consists of the following SuDS components:

- Catch-pits
- Soakaways - Perforated Concrete manhole rings with 150mm pea gravel bed and surround this is to be maintained by the homeowners.

3 MANAGEMENT & MAINTENANCE

The Table below sets out required maintenance actions and the recommended frequency:

TABLE1 – MAINTENANCE PLAN FOR SOAKAWAYS TO BE MAINTAINED BY HOMEOWNERS

Ref:	Maintenance Item	Required Action	Frequency
01	External Gullies	To be monitored and cleaned with a gully sucker when required.	Inspection Quarterly and before/after extreme storm events
02	Manholes and Inspection Chambers	To be inspected for debris and integrity of chambers and covers. Any man-entry into manholes should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed.	Annually
03	Soil Vent Pipes	Rodding points provided to clear blockages via rodding.	As and when needed
04	Rainwater pipe	Clearance of leaves/ debris from guttering	As and when needed
05	Rodding Eyes	To be inspected for debris and cleaned as required.	Quarterly

We can confirm that the responsibility to maintain the drainage system and any overland flow routes will remain with the homeowners & will remain with them during the design lifetime. **As shown in drawing J02189-A1-001**

TABLE 2– MAINTENANCE PLAN FOR FOUL DRAINAGE TO BE MAINTAINED BY KIDSON HOMES

Ref:	Maintenance Item	Required Action	Frequency
06	Foul drain (Pipe coloured red), Manholes and Sample Chamber (F27) Drawing no J02189-A1-009 Location ref SO 19516 79801	To be inspected for debris and integrity of chambers and covers. Any man-entry into manholes should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed.	Annually
07	Marsh Industries Ensign 6PE treatment plant point B Drawing no J02189-A1-009 (Location ref SO 19430 79809)	To be inspected for debris and integrity of chambers and covers. Any man-entry into manholes should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed.	Annually
08	Marsh Industries Ensign 6PE treatment plant point C Drawing no J02189-A1-009 (Location ref SO 19436 79821)	To be inspected for debris and integrity of chambers and covers. Any man-entry into manholes should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed.	Annually
09	Marsh Industries Ensign 6PE treatment plant point D Drawing no J02189-A1-009 (Location ref SO 19438 79825)	To be inspected for debris and integrity of chambers and covers. Any man-entry into manholes should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed.	Annually
10	Marsh Industries Ensign 6PE treatment plant point E Drawing no J02189-A1-009 (Location ref SO 19471 79823)	To be inspected for debris and integrity of chambers and covers. Any man-entry into manholes should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed.	Annually

Ref:	Maintenance Item	Required Action	Frequency
11	Marsh Industries Ensign 6PE treatment plant point F Drawing no J02189-A1-009 (Location ref SO 19481 79798)	To be inspected for debris and integrity of chambers and covers. Any man-entry into manholes should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed.	Annually
12	Marsh Industries Ensign 6PE treatment plant point G Drawing no J02189-A1-009 (Location ref SO 19492 79792)	To be inspected for debris and integrity of chambers and covers. Any man-entry into manholes should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed.	Annually
13	Marsh Industries Ensign 6PE treatment plant point H Drawing no J02189-A1-009 (Location ref SO 19499 7989)	To be inspected for debris and integrity of chambers and covers. Any man-entry into manholes should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed.	Annually
14	Marsh Industries Ensign 6PE treatment plant point I Drawing no J02189-A1-009 (Location ref SO 19510 79780)	To be inspected for debris and integrity of chambers and covers. Any man-entry into manholes should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed.	Annually
15	Marsh Industries Ensign 6PE treatment plant point J Drawing no J02189-A1-009 (Location ref SO 19527 79787)	To be inspected for debris and integrity of chambers and covers. Any man-entry into manholes should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed.	Annually

If any blockages or problems occur homeowners are to contact:

**Bruce Kidson of Kidson Homes Registered Office Marston House 5 Elmdon Lane,
Marston Green, Solihull, West Midlands, B37 7DL**

Company name & registration number Kidson Homes Ltd 11418423

We can confirm that the responsibility to maintain the **RED LINED FOUL DRAINAGE (as shown in Drawing J02189-A1-009)** and any overland flow routes will remain with **KIDSON HOMES** and will remain with them during the design lifetime.

Measures to include:

Ensure appropriate PPE is worn at all times including the use of safety goggles, ear defenders and other relevant equipment when using high pressure jetting. An appropriate contractor may be required to carry out any jetting works.

- Erect barriers where appropriate and provide adequate lighting.
- No operations to be carried out alone.

APPENDIX 1

Marsh Industries Ensign 6PE Manual

THE 3P's

Caring for your sewage treatment plant, septic tank or pump station



Sewage treatment plants, septic tanks and pump stations are designed only to deal with the 3P's - pee, poo and toilet paper.

Inappropriate materials flushed into the drainage system can cause unnecessary blockages, severe damage to the components within your system and environmental pollution, resulting in costly repairs and clean up operations.

DO NOT FLUSH ANY OF THE FOLLOWING ITEMS

SOLIDS

- ✗ Bandages
- ✗ Baby wipes
- ✗ Cigarette butts
- ✗ Contact lenses
- ✗ Contraception
- ✗ Cotton buds
- ✗ Cotton wool
- ✗ Dental floss
- ✗ Dish cloths
- ✗ Food
- ✗ Incontinence pads
- ✗ Jay cloths
- ✗ Kitchen roll
- ✗ Razors
- ✗ Sanitary items
- ✗ Tights
- ✗ Wet wipes

LIQUIDS

- ✗ Engine oils
- ✗ Chemicals (household or garden)
- ✗ Grease
- ✗ Kitchen fats
- ✗ Paints

TOILET TIPS

- Bin everything other than the 3P's: Pee, Paper and Poo
- Place a bin near all the toilets in your home
- Keep odour and leak-proof bags nearby, eg, nappy sacks or sanitary disposal bags
- Share this information and encourage your toilet users to follow this guide

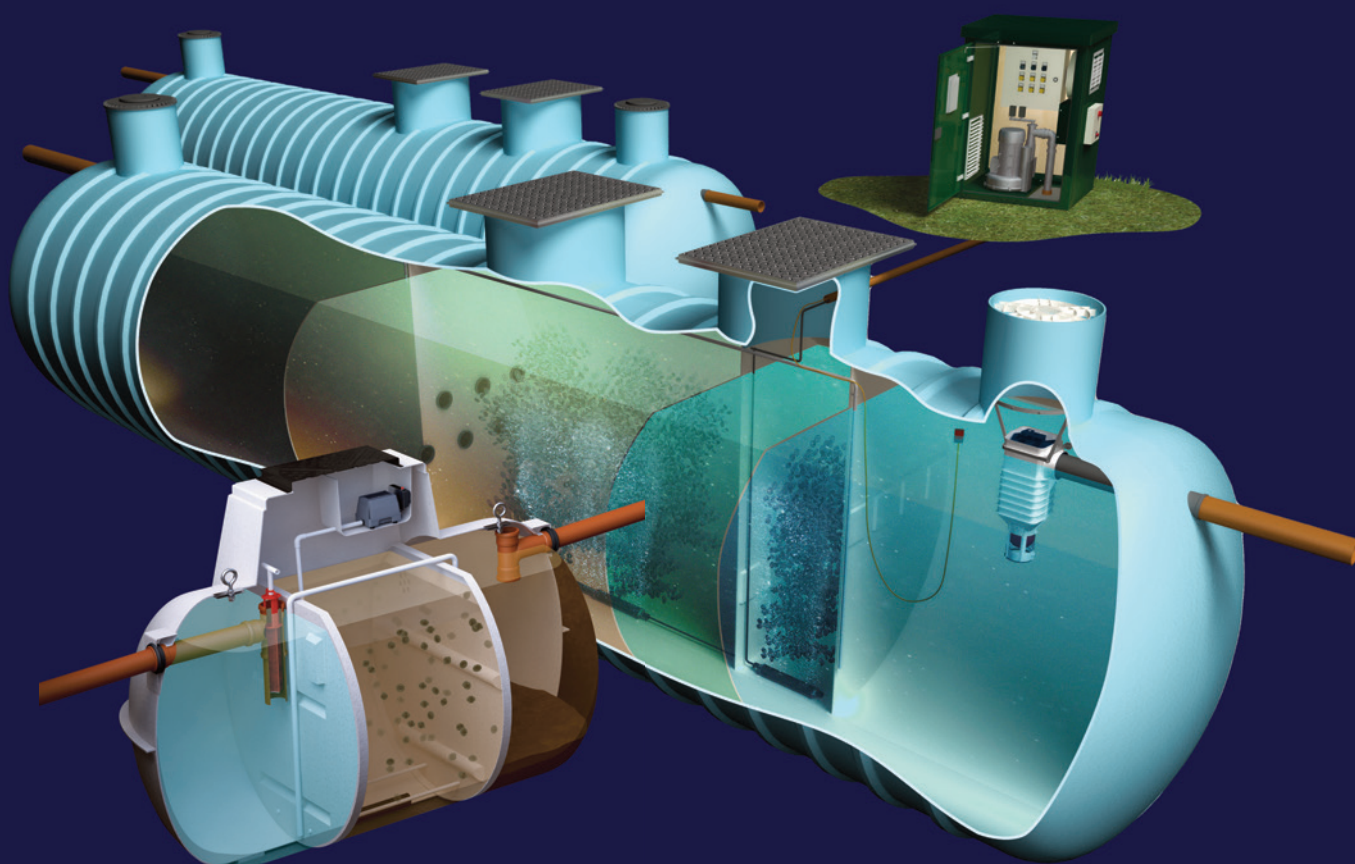


Please contact us if you have any questions or, for more information, visit <https://environmentagency.blog.gov.uk/2015/08/28/love-your-loo/>

sales@marshindustries.co.uk | www.marshindustries.co.uk

Package sewage treatment plants

Installation and operation manual



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

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

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

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

COVID-19 NOTICE

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

When returning to or reopening your place of business, please follow the instructions below to enable a smooth start-up and to minimise the risk of pollution when restarting your sewage treatment plant.

Firstly, make sure the area is secure and cordoned off to prevent people or animals on site from falling into the sewage treatment plant. Where possible a qualified British Water accredited engineer should be employed to carry out these procedures. This process should be undertaken by two people while observing HM Government Social Distancing (Covid-19). PPE must be worn and handwashing/sanitizing must be carried out.

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

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

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

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

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

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

1 Pre-installation checklist

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

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

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

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

2 Site location (For guidance only)

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

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

3 Tank installation

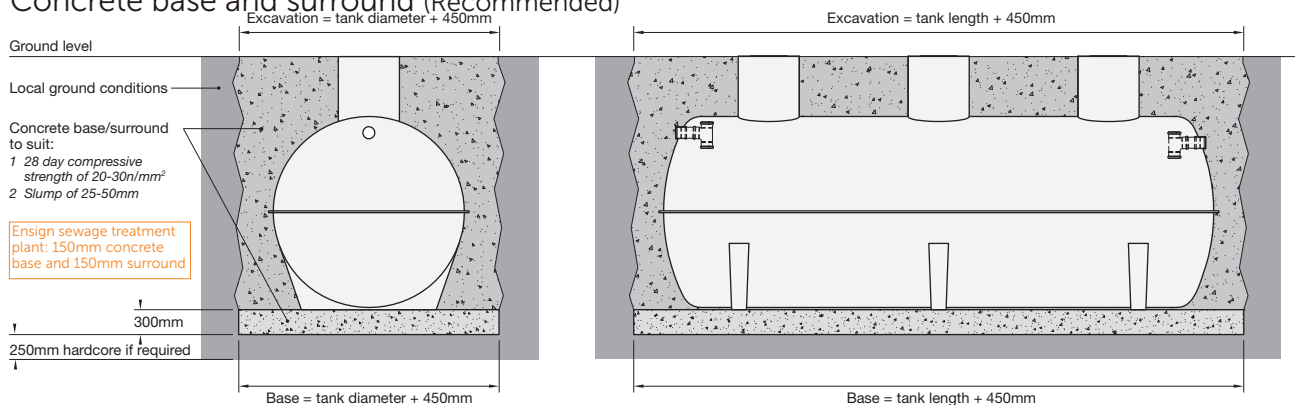
Site inspection

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

Movement of the sewage treatment plant

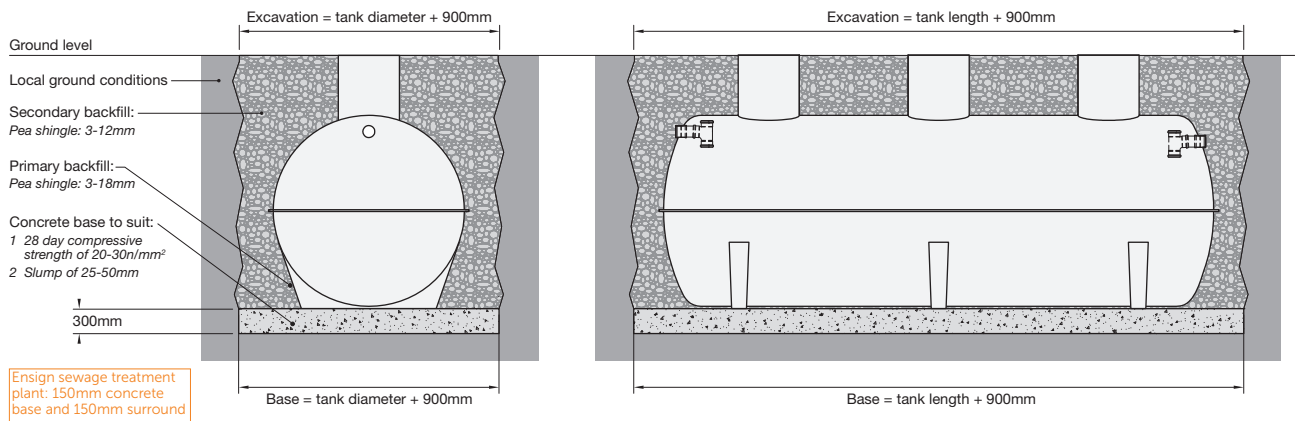
- The weight of the tank is not evenly distributed along its length, so time needs to be taken to ensure the straps are distributed to prevent movement or slippage.
- Use only web straps to lift the tank - do not allow chains, cables or wire ropes to make contact with the tank.
Note: Lifting eyes (rated to 350kgs) used during the manufacture of Ensign units can be used for on-site handling - For steadying purposes only. Not to be used for lifting the tank.
- A lifting beam is to be used for tanks over 8m long.
- The tank must be fully lifted off the ground for clear movement – do not drag the tank along the ground.
- The unit needs to be chocked to prevent movement or rolling when sitting on the ground.

Concrete base and surround (Recommended)



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

Granular surround (For free draining sites)



Primary backfill

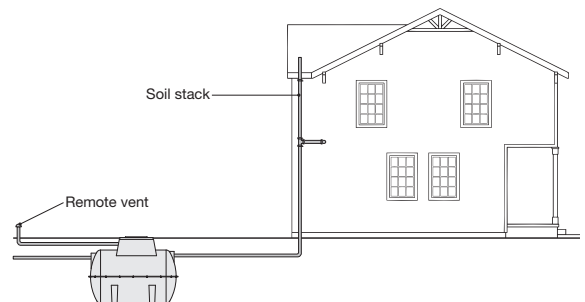
- Primary granular backfill is pea shingle between 3-18mm in size. It should be washed, have no sharp edges and contain no boulders. In winter, check to ensure there are no clumps of ice in the materials as this can create voids causing long term damage.
- Tanks must be installed with primary backfill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

Secondary backfill

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

Ventilation

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



4 Electrical guidelines

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



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

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

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

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

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

Alarm options

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

5 Service checklist and maintenance

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

General

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

Compressor

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

Media (Within aeration chamber)

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

Polylok Filter (Tertiary filtration)

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

High level alarm

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

Structural

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

Electrical

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

6 Drainage fields

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

For any such proposal you should:

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

Drainage fields

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

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

Trial hole and percolation test method (See figure 1)

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

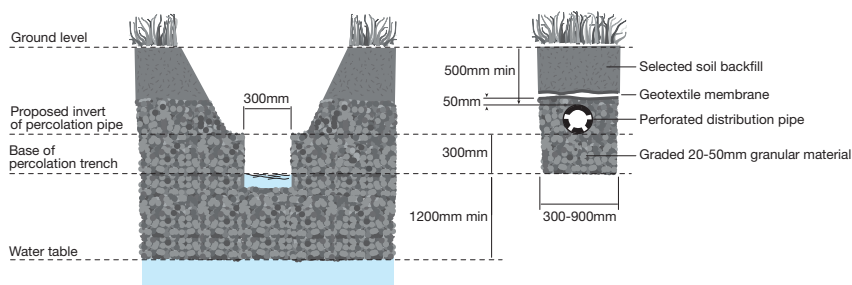


Figure 1 - Percolation/water table test

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

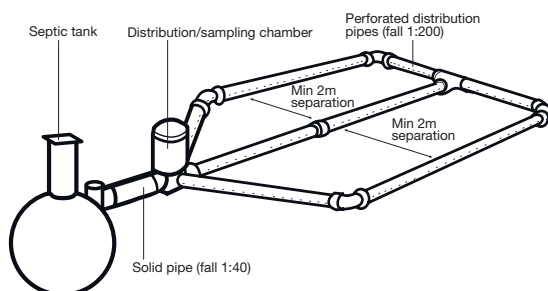


Figure 2 - Typical drainage field construction

Drainage field construction (See figures 1 and 2)

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

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

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

7 Desludging

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

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

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

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

Desludging procedure

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

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

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

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

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

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

Please note:

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

Further safety precautions

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

8 Warranty information

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

Marsh Industries

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

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

- *Sewage treatment plants 4-500+ PE*
- *Pump stations 234-20,000+ litres*
- *Septic tanks and cesspools 2800-20,000+ litres*
- *Septic conversion units 4-60+ PE*
- *Grease traps 234-20,000+ litres*
- *Trash/debris barriers*
- *Agri-silage tanks up to 100,000 litres*
- *Stormwater attenuation up to 130,000 litres*
- *Rainwater harvesting systems 1500-20,000+ litres*
- *Oil separators, wash-down separators and silt traps*

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

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

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APPENDIX 2

Foul Drainage drawing J02189-A1-009



JNM
CIVIL ENGINEERING DESIGN CONSULTANTS

2. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
3. ALL PRIVATE DRAINAGE WORKS ARE TO COMPLY WITH THE REQUIREMENTS OF BS 752 BUILDING DRAINAGE AND BUILDING REGULATIONS 2010 APPROVED DOCUMENT H 2002 EDITION, ALL ADAPTABLE DRAINAGE TO COMPLY WITH THE REQUIREMENTS OF BS EN 12057 WATER AND SEWERS FOR ADOPTION (8th EDITION), INCLUDING THE RELEVANT PROVISIONS OF THE COMBINED ADDENDUM.
4. ALL MATERIALS, UNLESS SPECIFIED OTHERWISE, SHALL COMPLY WITH THE RELEVANT BRITISH STANDARD. SOURCES OF SUPPLY ARE TO BE AGREED WITH THE EMPLOYER'S REPRESENTATIVE/ENGINEER IN ADVANCE OF THE WORKS.
5. ANY DISCREPANCIES IN THE DETAILS SHOWN TO BE REPORTED TO THE EMPLOYER'S REPRESENTATIVE/ENGINEER PRIOR TO CONSTRUCTION.
6. ALL EXISTING SERVICES TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY DRAINAGE WORKS WHERE NECESSARY PROTECTION OR DIVERSIONS TO BE UNDERTAKEN TO AVOID CONFLICT WITH THE PROPOSED WORKS.
7. TYPICAL PIPE BEDDING TO DRAINAGE WHERE DEPTH TO SOFTENING OF SUBGRADE IS 100mm OR GREATER AND 1200mm IN ADAPTABLE HIGHWAYS AND 800mm IN OTHER TRAFFICKED AREAS IS TO BE CLASS S1 (E 10-14mm) COMPACTED GRADUALLY COMPATIBLE MATERIAL, FREE FROM RUBBISH AND ORGANIC MATTER, FROZEN SOIL, CLAY LUMPS AND LARGE STONES, TO BE COMPACTED IN LAYERS NOT EXCEEDING 150mm THICK.
8. A FLEXIBLE JOINT SHALL BE PROVIDED AS CLOSE AS IS PRACTICABLE TO THE POINT OF ENTRY TO THE TUNNEL TO WHICH A PIPE IS BUILT, COMPATIBLE WITH THE SATISFACTORY COMPLETION AND SUBSEQUENT MOVEMENT OF THE JOINT. THE NEXT PIPE (ROCKER PIPE) AWAY FROM THE STRUCTURE SHALL AS BE SHOWN IN THE TABLE BELOW.

0. THIS DRAWING IS PRODUCED FOR PLANNING PURPOSES ONLY.
1. SVP AND RWP LOCATIONS TO BE CONFIRMED PRIOR TO ANY CONSTRUCTION ON SITE
2. HYDRO-BRAKE MANUFACTURER SPEC - MD-SHE-0101-5000-1300-5000

Revised Outfall location	JJM	05.06.24	A
Revision Details	By <i>Check</i>	Date	Suffi

TOWN HOUSE
BEGUILDY
POWYS

Scale at A1 1:500	Detailed		Approved <i>James Mewis</i>
Drawn JJM	Tech Chk RAW	Det Chk	Date 24.05.24

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APPENDIX 3


Engineering layout drawing J02189-A1-001 REV B



JNM
CIVIL ENGINEERING DESIGN CONSULTANTS

2. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
3. ALL PRIVATE DRAINAGE WORKS ARE TO COMPLY WITH THE REQUIREMENTS OF BS 752 BUILDING DRAINAGE AND BUILDING REGULATIONS 2010 APPROVED DOCUMENT H 2002 EDITION, ALL ADAPTABLE DRAINAGE TO COMPLY WITH THE REQUIREMENTS OF BS EN 12057 WATER AND SEWERS FOR ADOPTION (8th EDITION), INCLUDING THE RELEVANT PROVISIONS OF THE COMBINED ADDENDUM.
4. ALL MATERIALS, UNLESS SPECIFIED OTHERWISE, SHALL COMPLY WITH THE RELEVANT BRITISH STANDARD. SOURCES OF SUPPLY ARE TO BE AGREED WITH THE EMPLOYER'S REPRESENTATIVE/ENGINEER IN ADVANCE OF THE WORKS.
5. ANY DISCREPANCIES IN THE DETAILS SHOWN TO BE REPORTED TO THE EMPLOYER'S REPRESENTATIVE/ENGINEER PRIOR TO CONSTRUCTION.
6. ALL EXISTING SERVICES TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY DRAINAGE WORKS WHERE NECESSARY PROTECTION OR DIVERSIONS TO BE UNDERTAKEN TO AVOID CONFLICT WITH THE PROPOSED WORKS.
7. TYPICAL PIPE BEDDING TO DRAINAGE WHERE DEPTH TO SOFTENING OF SUBGRADE IS 100mm OR LESS SHALL BE 100mm AND GREATER THAN 1200mm IN ADAPTABLE HIGHWAYS AND 800mm IN OTHER TRAFFICKED AREAS IS TO BE CLASS S1 (E 10-14mm) COMPACTED GRADUALLY COMPATIBLE MATERIAL, FREE FROM RUBBISH AND ORGANIC MATTER, FROZEN SOIL, CLAY LUMPS AND LARGE STONES, TO BE COMPACTED IN LAYERS NOT EXCEEDING 150mm Thick.
8. A FLEXIBLE JOINT SHALL BE PROVIDED AS CLOSE AS IS PRACTICABLE TO THE POINT OF ENTRY TO THE TUNNEL TO WHICH A PIPE IS BUILT, COMPATIBLE WITH THE SATISFACTORY COMPLETION AND SUBSEQUENT MOVEMENT OF THE JOINT. THE POINT OF THE NEXT PIPE (ROCKER PIPE) AWAY FROM THE STRUCTURE SHALL AS BE SHOWN IN THE TABLE BELOW.

0. THIS DRAWING IS PRODUCED FOR PLANNING PURPOSES ONLY.
1. SVP AND RWP LOCATIONS TO BE CONFIRMED PRIOR TO ANY CONSTRUCTION ON SITE
2. HYDRO-BRAKE MANUFACTURER SPEC - MD-SHE-0101-5000-1300-5000

Foul drainage removed	JJM	27.06.24	B
Foul outfall revised	JJM	23.10.23	A
Revision Details	By  / Check	Date	Suffi

TOWN HOUSE
BEGUILDY
POWYS

Scale at A1 1:200	Detailed		Approved <i>James Mewis</i>
Drawn JJM	Tech Chk RAW	Det Chk	Date 18.11.21

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