2. A Landscape Capacity Assessment –

2.4 The response submitted on behalf of the applicant in March, 2016 set out the position of the development within the site, landscape and surrounding area. It is unclear why further assessment beyond this is required/justified with respect to the site, the development and related impacts. The nature/scale of the development along with the array of information already provided would appear to provide sufficient information in order to allow landscape impact(s) to be assessed. As outlined previously the further information submitted in March 2016 (including the photographic record in Appendix 4) was guided by discussion between Dr Wesley Edmund on behalf of Denovan Village Limited and Mr Philip Harris of Falkirk Council. This photographic record (in addition to the planning application drawings and site sections) details the level changes from south to north (rising from Denovan Road) and the general visual containment of the site provided by the topography/woodland when viewed from surrounding public areas (including Denovan Road). The positioning of the reception building at the south-east corner of the site, in light of the surrounding topography and road alignment (Denovan Road), renders this, the largest structure proposed within the site, visible only from the immediately surrounding area and therefore with very limited impact on the appearance of the local landscape.

2.5 The chalets are proposed at levels well above the adjacent Denovan Road. They are however set against the rising landform and within a woodland setting (which would be enhanced over time) and therefore are considered to have relatively local impacts on the landscape individually and collectively.

2.6 The other feature of note is the proposed car park. Again, for the reasons already rehearsed, this will have limited landscape impact. The camping pods are movable structures which will be set in the woodland rather than appearing prominent within it.

2.7 The development will have a localised impact from Denovan Road. Being set within the rising landform and established (to be enhanced) woodland such visual impact is considered to be within acceptable limits especially when factoring in the landscape improvements being proposed as part of the development and the overall declining appearance of the woodland resource at present.

3. Facility Management Arrangements -

2.8 The applicant is committed to the successful and safe operation of the holiday park. The operation is set out/to be operated in a manner in order to be a good neighbour whilst ensuring that it also operates in a beneficial manner for the local area/economy. The suggested management arrangements and rules/responsibilities of guests are set out within the attached "*Denovan Village Rules and Courtesies*". In the

event that this requires some amendment/alteration then the applicant is fully prepared to address this in conjunction with Falkirk Council.

4. Internal Roads -

2.9 The internal road network has been proposed in a manner to protect the existing trees to be retained within the site while providing access to the various facilities being provided. It is accepted that fully detailed design will be required prior to the internal roads being constructed and that construction methods and related protection/mitigation will be required. The road location is shown on the layout plan, with the cross sections also providing additional detail. It would appear entirely appropriate to secure the final details of the road construction by way of a suspensive planning condition on the grant of planning permission. In effect a condition requiring that "*Prior to the commencement of works on site, full details of the internal road construction, including necessary tree protection measures, should be submitted to and agreed in writing by Falkirk Council*" would be entirely appropriate and proportionate to the matter being addressed. The applicant is committed to the retention of the woodland environment as a key part of the holiday village and will work with Falkirk Council to retain and enhance the woodland and its contribution to the site and surroundings (including a range of new planting).

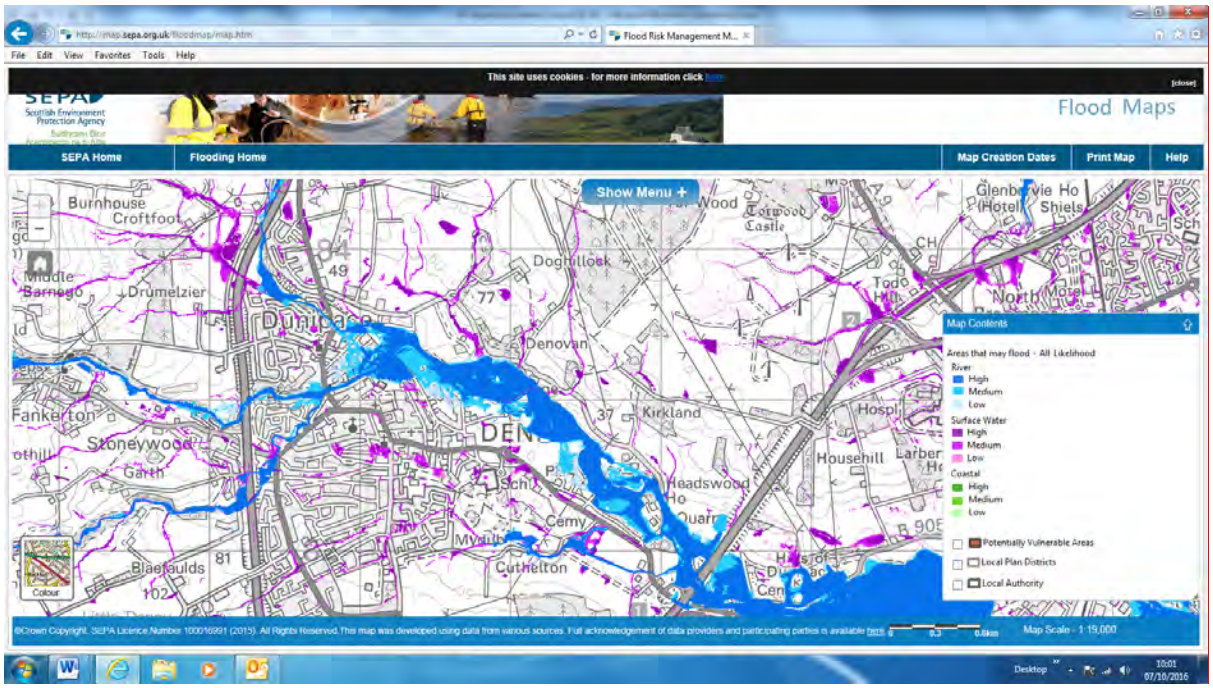
2.10 There are options for the internal roads to be constructed, at least in part, above existing ground levels (with root protection in place as required) and for the use of permeable materials rather than more dense asphalt finishes. To conclude, it is considered that Falkirk Council can exercise appropriate control over the formation/construction of the site's internal road network by way of a suspensive planning condition.

5. A Drainage and Flooding Statement -

2.10 Site drainage information details are provided by the letter from Cleartek Services dated 30th September, 2016 and related attachments. This addresses both foul and surface water drainage.

2.11 With respect to potential flood risk, it is noted that the development site does not fall within an area impacted by flooding as detailed on the SEPA flood map (screen grab below) AND the requirement for the surface water drainage system (SUDs) to attenuate flows to pre-development levels will also prevent any related impacts from the development on the downstream area. There is no basis to consider that the site will be impacted by flooding or that the development would impact on flooding elsewhere in the catchment.

Extract from SEPA Flood Map



6. A Further Tree report

2.12 As indicated, the final details for the internal road network remain to be agreed. The intent is to protect the retained trees. Some additional tree removals have occurred since the planning application was originally submitted due to condition and safety concerns. Other trees have been damaged and removed/plan to be removed. The relevant details are as follows: -

- 371 split and was seriously damaged during storm weather in November 2015
- 390 was dead and rotten in the centre and dangerous - felled in August 2016
- 377 was damaged by high winds November, 2015 felled and removed
- 376 is in very poor condition - canker and upper branches starting to rot and fall off identified in original tree report
- 374 is leaning into road and roots are pushing wall over, action will be taken to make safe once the tree can be re-inspected after leaf fall.

2.13 There are no plans to remove any other trees and, it should be remembered, a range of new planting is being proposed as part of the development along with related woodland management which will secure the long term future of this presently declining woodland.

7. Bat Survey –

2.14 Detailed survey carried out by a suitably qualified ecologist and no impacts on bats noted – report attached.

3.0 CONCLUSIONS

3.1 The applicant has provided a wide range of supporting information for the proposed development previously and as part of this submission. Transportation, protected species, ecology, natural and built heritage, and drainage/flood matters are all addressed. The retention of the woodland resource and the provision of site infrastructure can also be fully addressed in order to protect and enhance the site while making full and appropriate use of the area. The visual impact on the landscape arising from the development will be limited and mitigated by new planting and woodland maintenance measures. There will be a need for agreement on some further details but these can be adequately addressed by the use of appropriate planning conditions.

3.2 The investment to deliver this development is not insignificant and represents further private investment in the local tourism industry (and in the local economy), an outcome supported at local and national planning levels. In addition to the visitor and economic benefits, there would be substantial investment in maintaining the woodland resource (which is presently deteriorating) and therefore the ecological and amenity value of the site would also be enhanced over time. The daily operation of the site has also been designed/addressed in order to co-exist with other uses in the local area.

3.3 In essence, this is a form of development that should be supported through the planning process due to the benefits arising and the related ability of the proposals to mitigate any potentially negative impacts (as demonstrated in the applicant's submissions). The applicant is keen to progress this beneficial development in conjunction with Falkirk Council and remains committed to the productive future use of the planning application site.

DOCUMENTS

- Transport Statement and appendices
- Revised site layout
- Denovan Village Rules and Courtesies
- Drainage Statement and appendices
- Bat Survey

BRITISH WATER
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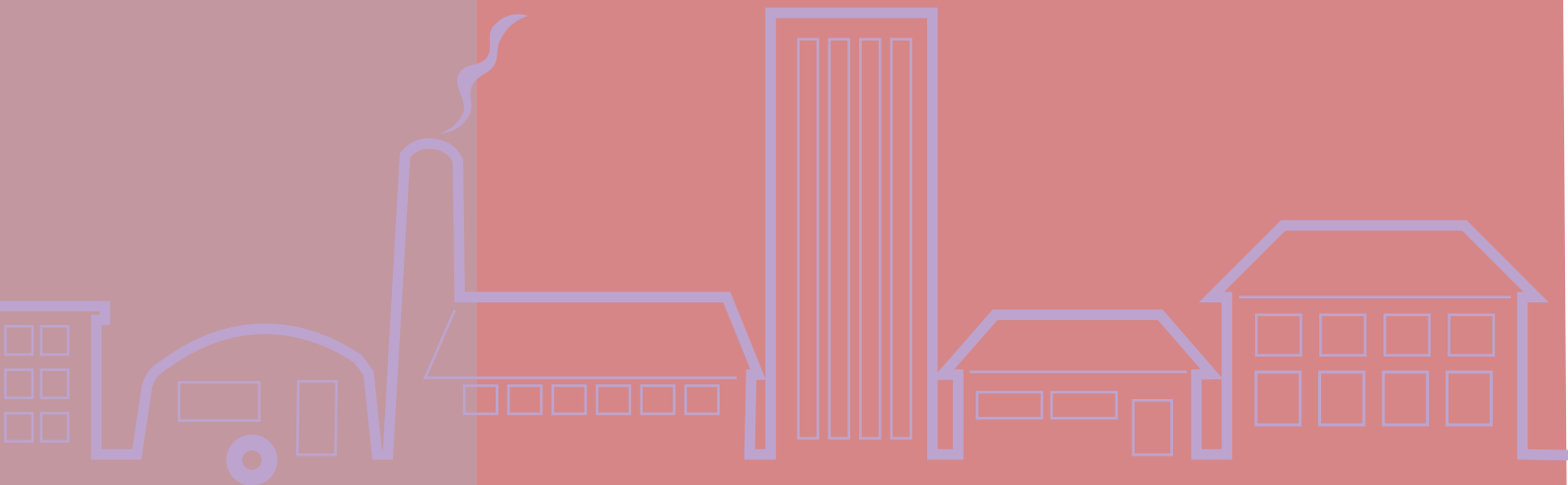
Code of Practice

Flows and Loads – 4

Sizing Criteria, Treatment Capacity for Sewage Treatment Systems



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BW COP: 18.11/13

ISBN 978-1-903481-10-3

BRITISH WATER
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Code of Practice

Flows and Loads – Sizing Criteria, Treatment Capacity for Sewage Treatment Systems

This code of practice was prepared by the British Water Package Sewage Treatment Plant Focus Group comprising manufacturers, suppliers and service companies of all types of small wastewater treatment systems.

The Environment Agency, the Northern Ireland Environment Agency and the Scottish Environment Protection Agency support the use of this code of practice, but the Agencies do not specifically endorse any particular manufacturer's product.

This code of practice provides a table of loadings which allows the total daily sewage load from properties to be calculated and it is recommended that all designers should use this table when sizing and designing non-mains sewage treatment systems. The flows and loads values given represent current best knowledge within the UK but may change with time in line with per capita water use.

Where proposed alternative usage rates or methods of sizing might be more appropriate for a particular application this should be supported by the collection of data or additional site specific evidence to validate the proposal. Professional judgment is required and may be used to compare alternatives especially when assessing sewage strengths and treatability.

Guidance is provided to assist the user to identify the various sources of sewage, to consider the nature of the sewage to be treated and to make users aware of issues which may affect treatability and system performance. Each manufacturer is aware of the capabilities of their own systems with respect to different situations.

The table of loadings may be used to design all sizes of sewage treatment systems serving up to 1000 population.

Use of this code of practice by all UK manufacturers and system designers will:

- help to clearly define site activity and sewage sources
- promote a consistent approach to collecting accurate and complete loading information
- provide consistent information about problem effluents and treatability, and
- promote the design and installation of appropriate treatment systems and so reduce the problem of undersized systems causing environmental contamination.

The loadings in this code of practice are more comprehensive than in previously published guidance, they are generally higher and include values for ammonia.

1 Scope

The purpose of this code of practice is to provide an appropriate table of loadings (volumes and loads) to allow the total daily load entering a treatment system to be calculated.

2 Regulations

Early contact with the Regulator to discuss the proposed discharge of sewage effluent is advisable.

- Planning requirements, eg *DETR Circular 3/99, site survey, etc.*
- Building regulations, eg part H *DTLR England & Wales, part M Scotland, Water (Northern Ireland) Order 1999 and Northern Ireland building regulations.*
- A Permit, Authorisation or Consent to discharge will be required from the environmental regulators (the Agencies).
- Planning permission (Local Authority Planning Guidance).

3 Definitions of terms

- **Population (P)** – number of people the system will serve.
- **Biochemical oxygen demand (BOD_5)** – Mass concentration of dissolved oxygen consumed under specified conditions (5 days at 20° C with nitrification inhibition) by the biological oxidation of organic and/or inorganic matter in water.
- **Ammonia expressed as mg/l N** – Ammonia is NH_3, Ammonium is NH_4OH. In wastewater we frequently refer to and use the word/symbol, ammonia/NH_3. The term ammonia usually includes ammonium as well.

4 Selection considerations – all applications

- Values and conditions required by any regulatory permit or consent.
- Loading figures for each specified load are given for Flow, BOD and NH_3.
- The user/purchaser of the system must declare **ALL ACTIVITIES** to enable all loads entering the treatment system to be identified and evaluated. The user/purchaser should be made aware that there is a risk of poor performance from the equipment if loads are understated. The accuracy of the declared loads is of paramount importance.
- Guidance points given under each category suggest questions to enable the specifier to recognise variable or unusual loads, particular to that site, to improve correct system selection and design.
- Total daily loadings are calculated based on the anticipated final maximum capacity of the site. New sites initially may have a reduced business level but the system suggested should reflect the full business potential, e.g. a system suggested for a hotel or caravan site or any other application, with an average 80% occupancy rate should be designed to handle 100% occupancy. The equipment selected by the specifier should reflect the maximum potential of the site. Where a specifier is instructed to use lower occupancy rates, this should be recorded. Flow balancing should be considered where appropriate
- Excess disinfectants, chemicals, etc can affect the biological processes as can specific toxic substances from site activities e.g. photographic chemicals, weed killers, motor oils. It is assumed that these substances are excluded from the wastes to be treated.
- Some water treatment equipment effluents eg softeners, chlorinated backwashes may not be acceptable; system designers should specifically accept or exclude their use. Many treatment system designs will accept regenerants into their units, however this must be checked and agreed.
- Water saving devices affect sewage strength, the impact of their installation should be identified.
- Laundries affect sewage strength and treatability; their proportion should be identified.
- Surface/storm water is not permitted as part of the wastewater stream and must be excluded.
- It is assumed, unless stated, that waste disposal units (WDU) are not in use.
- Undersizing of equipment is to be avoided as it is always better to have a plant slightly oversized, rather than on the limit or undersized.

The owner of the treatment system holds the permit, consent or authorisation to discharge and should be aware that he is responsible for the effluent quality discharged. Thus all sources of discharge into the system must be declared. It is an offence if the effluent fails to comply with the regulators requirements.

(continued on page 4)

Table of Loadings for Sewage Treatment Systems

Per person / activity / day (unless otherwise specified)	FLOW (Litres)	BOD (Grams)	Ammonia as N (Grams)
DOMESTIC DWELLINGS			
Standard residential	150	60	8
Mobile home type caravans with full services	150	60	8
INDUSTRIAL			
Office / Factory without canteen	50	25	5
Office / Factory with canteen	100	38	5
Open industrial site, e.g. construction, quarry, without canteen	60	25	5
*Full-time Day Staff	90	38	5
*Part-time Staff (4 hr shift)	45	25	3
SCHOOLS			
Non-residential with canteen cooking on site	90	38	5
Non-residential without a canteen	50	25	5
Boarding school (i) residents	175	60	8
(ii) day staff (inc. mid-day meal)	90	38	5
HOTELS, PUBS & CLUBS			
Hotel Guests (Prestige hotels)	300	105	12
Hotel Guests (3^H & 4^H hotels)	250	94	10
Guests (Bedroom only – no meals)	80	50	6
Residential Training/Conference Guest (inclusive all meals)	350	150	15
Non residential Conference Guest	60	25	2.5
Drinkers	12	15	5
Holiday camp chalet resident	227	94	10
Resident Staff	180	75	10
Restaurants - Full Meals - luxury catering	30	38	4
- pre-prepared catering	25	30	2.5
- Snack Bars & bar meals	15	19	2.5
- Function Rooms including buffets	15	19	2.5
- Fast Food i.e. (roadside restaurants)	12	12	2.5
- Fast Food Meal (burger chain and similar)	12	15	4
Students (Accommodation only)	100	60	8
AMENITY SITES			
Toilet Blocks (per use)	10	12	2.5
Toilet (WC) (per use)	10	12	2.5
Toilet (Urinal) (per use)	5	12	2.5
Toilet Blocks in long stay car parks/lorry parks (per use)	10	19	4
Shower (per use)	40	19	2
Golf Club	20	19	5
Local community sports club, e.g. squash, rugby & football	40	25	6
Swimming (where a separate pool exists without an associated sports centre)	10	12	2.5
Health Club/Sports Centre	50	19	4
Tent sites	75	44	8
Caravan Sites - (i) Touring not serviced	100	44	8
(ii) Static not serviced	100	44	8
(iii) Static fully serviced	150	60	8
HOSPITALS & RESIDENTIAL CARE HOMES			
Residential old people / nursing	350	110	13
Small hospitals	450	140	Assess
Large hospitals	Assess individually		

*Staff figures also apply to other applications

- *After installation, if the system is overloaded, due to activities that were not previously identified by the owner/ purchaser of the system, then the manufacturer may not be able to assist with meeting the legal obligations of the permit provided by the regulator. The regulator has the right to review permits and change them if necessary.*
- *All sewage treatment system should be maintained according to the manufacturer's instructions by a certified engineer trained in accordance with the British Water Maintenance and Service Code of Practice.*

5 Domestic housing

- A treatment system for a single house with **up to and including 3 bedrooms** shall be designed for a minimum population (P) of 5 people.
- The size of a treatment system for a single house with more than 3 bedrooms shall be designed by **adding 1 P** for **each additional bedroom** to the **minimum single house value of 5 P,** eg:
  - house with 3 bedrooms = **minimum 5 P system**
  - house with 4 bedrooms = **minimum 6 P system (5+1)**
  - house with 6 bedrooms = **minimum 8 P system (5+3).**
- For groups of small 1 and 2 bedroom houses or flats
  - flat with 1 bedroom = **allow 3 P**
  - flat with 2 bedrooms = **allow 4 P**
- A treatment system serving a group of houses shall be designed by adding together the P values for each house calculated independently, eg:
  - for a group of two houses (3 and 4 bedrooms, respectively) the system shall be for a minimum of 11 P (5+6)
- **If the calculated total P for a group of houses exceeds 12 P then some reduction may be made** to allow for the balancing effects on daily flow of a group of houses (round UP not down)
  - **Where the total is 13-25 P** multiply the total by 0.9 to give an adjusted P value, e.g. if there are four four-bedroom houses the total P will be 24 P (4 x 6) and the adjusted P will be 22 P (24 x 0.9 = 21.6)
  - **Where the total is 26-50 P** multiply the total by 0.8 to give an adjusted P value, e.g. if there are four three-bedroom houses and three four-bedroom houses the total P will be 38 P (4 x 5 and 3 x 6) and the adjusted P will be 31 P (38 x 0.8 = 30.4)
- Where there are larger groups of houses, the P should be estimated using both the expected total load and the flow, considering both peak and total flow
- These are minimum recommended population (P) loads, they should not be modified downwards, upward modification may be necessary because of particular characteristics of each property or groups of properties.
- The above assessments of population (P) should be used for both existing and new properties

- *Larger luxurious houses tend to have greater loads and increased water consumption with variability.*
- *Holiday homes tend to have higher occupancies, with perhaps, lounges also acting as bedrooms. Holiday lets and second homes may be used intermittently*
- *Check for unusual water uses such as spa baths, home brewing or home photo processing.*
- *Waste disposal units increase biological load.*
- *Laundry chemicals and toxic substances will affect the performance. (See below) It is assumed that laundry is not brought in, i.e. Team strips.*

6 Commercial Premises

- Identify **ALL** the sources of waste.
- Identify final maximum site usage/business expectations.
- The individual values provided for each function within the table assume that 100% of every application and load is quantified. **DO NOT** reduce values based on reduced expectations.
- All catering applications require the installation of adequately sized grease separators, removal or retention systems up-stream of the biological treatment equipment.

7 Catering premises

- Establish maximum (and minimum) daily load based on a 24 hour cycle.
- Check period of operation.
- Identify dates of maximum loads, e.g. Mothering Sunday, Easter, Bank holidays, Fridays etc.
- Identify load peaks, usually at lunch or evening.

- *Flow balancing may provide an appropriate solution.*
- *Where WDU and potato peelers are to be used calculate/document the load.*
- *Identify the nature(s) of the catering in order to select the correct loading, eg*

Bar snacks	- ploughmans, sandwiches, basket meals, etc.
Pre-prepared catering	- frozen and chilled meals (not prepared on site).
Home cooked meals	- fresh soups, fresh vegetables, casseroles, etc.
Luxury catering	- fully prepared on site with cream sauces, home made desserts.
Takeaways	- Indian, Chinese, fish and chips, etc.
Fast food	- roadside restaurants, burger chains, etc.
Function room catering	- Establish "normal" style, may be sandwiches, or full buffet, home cooked meals, conference, wedding banquets, etc.

- *The biological unit must be protected from grease and fats. Modern cooking uses light oils, which may not separate. The collection and containment of all forms of grease prior to the biological equipment is vital. Operate any grease system in full accordance with the manufacturer's instructions.*
- *Individual kitchen practices affect loads, i.e. leftovers on plates may be scraped into bins, or wet rinsed into system, the former to be encouraged, the latter should be discouraged or factored into the treatment plant design.*
- *Premises serving beers may produce toxic caustic effluents due to the hygiene and cleaning regimes.*
- *The proportion of wastes from some sources can produce an effluent, which is difficult to treat, e.g. some Drive Through Fast Food establishments can have an effluent with a low organic content.*

8 Hotels & Residential Centres

- Establish "style and type" of hotel e.g. Prestige (5^{M}), Bedroom only accommodation, Conference Centres, Resort Hotels with Sports and Spas, Treatment Centres, etc.
- Calculate total loading based on occupancy of at least 2 people per room.

- *Some hotels regularly have 4 occupants per room.*

- Consider and add other hotel activities and waste functions.

The volume/BOD figures are based on an expectation that guests have an evening meal, drink and breakfast and that good kitchen practices are in place.

- Add all other loads, considering non-resident uses, ie Lunches, Functions, Visiting Drinkers, Diners, etc.
- Consider periodicity of loads.
- Ensure residential and training centre loadings reflect the complete meal plan, i.e. allow for lunch and afternoon tea, sports, etc.
- Special Events. Check provision of temporary facilities, e.g. summer marquees and allow for appropriate loading.
- Consider any loads from outside catering.

9 Laundries

- Excepting domestic premises, it is assumed that all laundry functions are additional.
- For each premises, identify which laundry items are done in house or sent off site.
- Calculate the laundry load on the basis of the number of machines and the period of use.
- Sites with laundries must fit and maintain lint filters.

The chemical load (detergents) inhibits biological treatment, the laundry waste percentage of the normal maximum Flow usually needs to be less than 30% of the total load.

Where the laundry percentage >30%, manufacturers select equipment on a different basis.

As a guide, where the hydraulic load from laundries is between 1-10%, system size increases by 10%, 11-20% increases by 20%, 21-30% increases by 30%.

Excess/surplus detergents (above the recommended quantities) can affect the biological process.

Discharge quality may be improved if operators use low/zero phosphate detergents.

10 Toilet Blocks

- Figures can also be assessed according to the sanitary equipment and control system installed.

Automatically flushed urinals use 10 litres per hour; a single flush should not use more than 1.5 litres.

Consider ladies and gents toilet facilities separately.

11 Sports Clubs

- Calculate loadings on 100% usage for the sporting facility. The figure provided includes showering and toilet use by the sports person.
- Consider also the non-sporting uses, i.e. spectators' toilet use.
- Add drinkers, social members and staff.
- Add values for catering facilities.
- Check normal and exceptional catering provisions.
- A swimming pool with no associated sports centre may be calculated using the number of swimmers, assume a toilet use per person, and by adding values for showers and spectators. Check duration of visits and modify for extended use.

Consider separate treatment or disposal of backwash waters from ancillary equipment, such as types of filtration and disinfectant removal in swimming pools.

12 Golf Clubs

- The values within the data table allow for light snacks and toilet use.
- Calculate additional allowances for showers.
- Add values for other catering facilities (if other than light snacks).

13 Hospitals

- The nature of the facility affects the design values. Some nursing homes have very high hydraulic loads as a result of the use of bedpans and their sanitation. Consider any disinfection equipment installed.
- With drugs and hygiene requirements of hospitals adjust the equipment size to compensate for treatability factors.

Disposal of unused/waste medicines is not permitted via the treatment facility.

14 Caravan Sites

- Establish nature of communal blocks, i.e. toilet, shower usage, laundry, etc.
- Where laundry equipment is installed, count the number of machines on site and period of use. Where possible, identify specific commercial machine details for volume and wash cycle duration.

Hydraulic loads of 100 litres per hour for 12 hours are not unusual.

- Loading figures quoted assume that wastes from chemical toilets do not enter the system as they must not be allowed to enter into the treatment plant.

A cesspool may be installed to receive chemical toilet waste for separate disposal.

15 Installation

The following may affect which equipment is offered.

- The site.
- Location of treatment plant within the site.
- Invert depth of installation (where possible, locate to permit gravity flow into and out of the system).
- Pumping equipment.
- Installation requirements.

Refer to manufacturer's specifications and installation manual.

- Access for maintenance and servicing.

Refer to manufacturer's specifications and maintenance instructions.

- The need for a sample chamber.
- Discharge point.
- Soil percolation area or other tertiary treatment.

16 Documentation

Records of the loads used to select and recommend the type and size of treatment systems should be maintained by the specifier and the customer. A typical example follows.

Treatment system enquiry sizing sheet

Our Ref. 123456 **Date** 10th August 2003 **Site** ABC Hotel 3* Hotel **Client** New Architects & Consultants

SOURCE OF WASTE				FLOW LITRE / DAY		BOD GRAMS / DAY		NH_3	
Description	No of rooms	Occupancy	No	Per Head	TOTAL	Per Head	TOTAL	Per Head	TOTAL
Rooms	80	2	160	250	40000	94	15040	10	1600
Bar drinkers			120	12	1440	15	1800	5	600
Non resident luxury meals			150	30	4500	38	5700	4	600
Staff, full-time day staff			30	90	2700	38	1140	5	150
Staff, part-time			20	45	900	25	500	3	60
Laundry – all sent off site Domestic washing machine for tea towels only				800					
Total load(s)					**50340**		**24180**		**3010**
Effluent quality requested					**20 mg/l BOD**		**30 mg/l SS**		**20 mg/l NH_3 N**

Suggested type of plant: XYZ. **Invert:** 1.0m. **Power:** 3-phase. **Surface water:** all to be excluded from foul sewer. **Consent to discharge:** to be obtained from the Regulator. **Waste Disposal Units:** assumed that none are fitted.
Grease trap: required size "125".

Notes

Swimming pool – present, used for guests only, all backwash wastes to be excluded. No function rooms or catering

Further information and guidance can be obtained from the British Water website – **www.britishwater.co.uk**

First edition published 2004; revised 2005, amended 2008, revised 2009, revised 2013

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Wesley Edmunds

Our Reference: BQ598
Date: Friday, 30 September 2016

Dear Sir,

Treatment system for installing at Denovan Village

I refer to our discussions and site meetings and now follow with my detailed description supporting attached three Drawings.
Drawing 1 shows plan of site with location of Septic tank and pipework arrangement.
Other points to note are:-

1. Raw sewage inlet from top cluster of chalets and Wardens office is via a route which completely avoids all tree root circles. A Pump chamber will be installed at Reception/ Toilet block which will avoid tree root circle with pumped pipe coming up fence and around tree root circles to join one of the drop manholes on the way down the hill, (other drop manholes have been excluded for clarity.
2. Pipework to Septic Tank will have a fall of between 1 in 40 to 1 in 80, and manholes will be fitted to suit gradient of ground leaving at chamber base set at 1m deep and joining next drop manhole at 300mm deep down the hill side.
3. The effluent and soakaway along with rainwater pipework with have a fall of 1 in 200 or steeper to suit site conditions.
4. All pipes will be bedded in 20mm Pea Gravel and after testing will be covered then backfilled to surface, chambers will be bedded in concrete along with the Septic tank which will be surrounded in concrete.
5. All distances for Road, Stream, Buildings are within Building Standard Standards
6. The porosity test is based on results from test carried out last year.
7.

Drawing 2 Drop Manhole drawing shows the intent described in (2) above
Drawing 3 Soakaway details.

I have also included calculations for size of Septic Tank and Soakaway sizing along with British water sizing details which we have tried to follow to the letter of the law.

I trust I have interpreted your requirements correctly and remain.

Yours faithfully,

Brian McCleary

Brian McCleary MD

ECONOMIC
EFFICIENT
SUSTAINABLE
SEWAGE TREATMENT ›

MARSH

www.marshindustries.co.uk

MARSH INDUSTRIES

Based in Northamptonshire, England, Marsh Industries is a leading manufacturer of sewage treatment plant and off-mains drainage products for both UK and overseas markets.

Marsh supplies sewage treatment plants and off-mains drainage products for domestic, commercial and industrial applications as well as design and technical support. The company has one of the largest merchant distributor networks available in Europe.

Brand names include Ensign and Ultra Polylok wastewater treatment plants and Marsh Holland pump chambers. Marsh Industries is the sole distributor of Polylok tertiary filters in the UK.

TANK DESIGN

Construction Products Regulations (CPR) state that it is mandatory for manufacturers to apply CE marking to any of their products covered by a harmonised European Standard. Building Regulations have also adopted CE marking as the primary route to show 'Fitness for Purpose' in the UK.

With this in mind Marsh products are fully type-tested and certified in accordance with BSEN12050 (pump chambers) and BSEN12566 (septic tanks and sewage treatment plants) to ensure compliance with environmental permitting programmes and relevant Building Regulations.

MATERIALS AND MANUFACTURING

Marsh Industries uses the highest quality parts and materials to ensure complete assurance in every aspect of build quality.

Tanks and chambers are typically made from the following materials:

Virgin unfilled resin (no 'fillers' such as chalk)
Provides consistent wall thickness to ensure superior structural strength and durability. This also enables the tank to be significantly lighter for on-site handling/positioning and better suited to withstand greater hydrostatic pressures when in use.

ISO gel-coat / flo-coat
Protecting the fibres in the laminates reduces UV degradation whilst improving water and chemical resistance. This inherent integrity allows Marsh to offer an unrivalled 50 year design life, backed by a 25 year structural guarantee.

CE QM D Certification ISO9001 Registered BRITISH WATER BMF Builders Merchants Federation SBWWi MADE IN BRITAIN

SEWAGE TREATMENT
WHAT ARE YOUR OPTIONS?

Choosing the right sewage treatment and disposal method for your site is essential to ensure effective long-term performance, protection of public health and the environment, and compliance with relevant legislation.

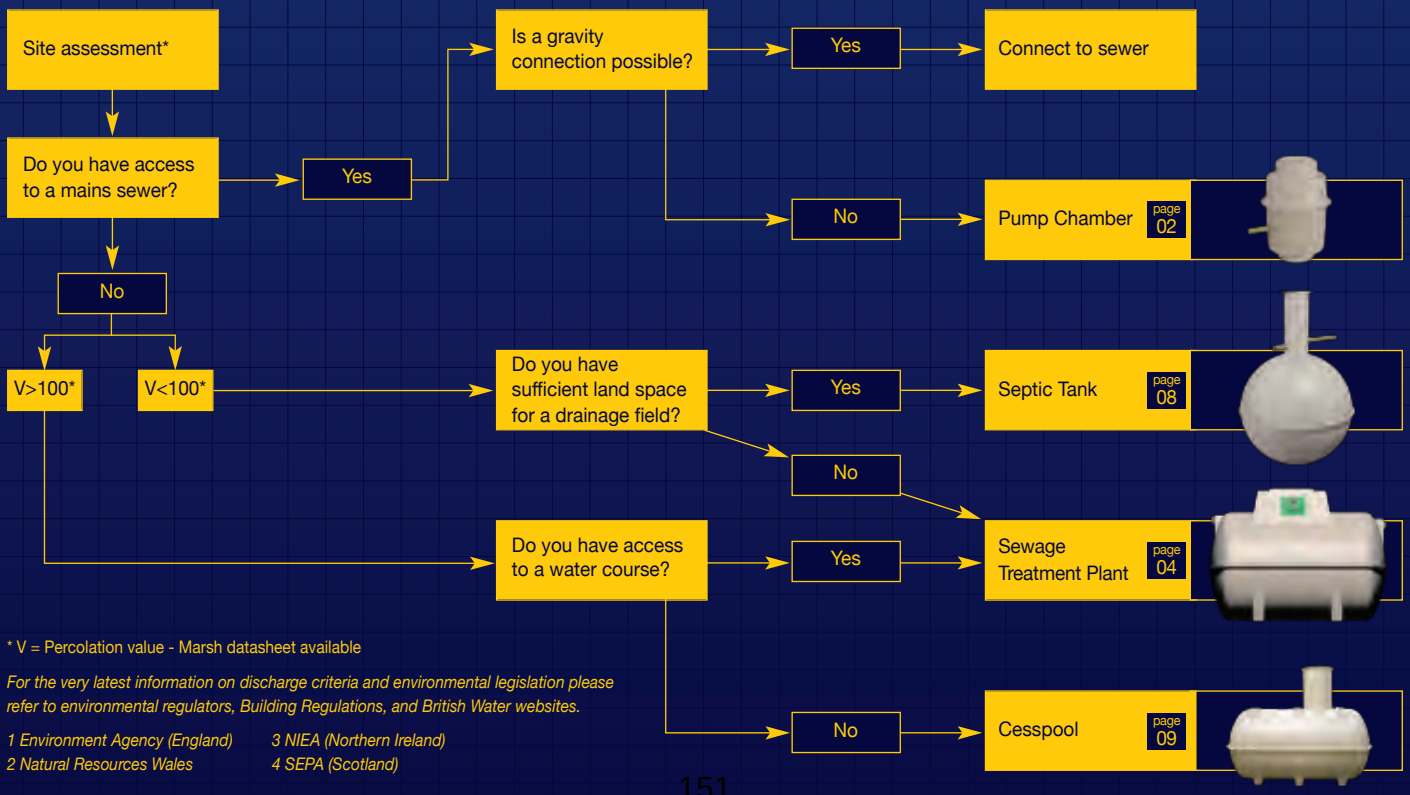
Sewage treatment and disposal can be provided by either public (foul) sewer or by a private sewage system. Use of a private system is only usually acceptable where connection to the public sewer is not possible, and as such should be discussed with your local Planning Authority at an early stage.

Before sewage effluent can be discharged to 'controlled waters' it must receive at least primary and secondary treatment:

- For a discharge to ground the micro-organisms in the soil provide the secondary treatment
- For a discharge to a water course the sewage treatment must be provided by a Package Sewage Treatment Plant (PSTP) or equivalent.

SYSTEM SELECTION

Hierarchy of off-mains discharge routes as laid out by the environmental regulators and British Water



* V = Percolation value - Marsh datasheet available

For the very latest information on discharge criteria and environmental legislation please refer to environmental regulators, Building Regulations, and British Water websites.

1 Environment Agency (England)
2 Natural Resources Wales
3 NIEA (Northern Ireland)
4 SEPA (Scotland)

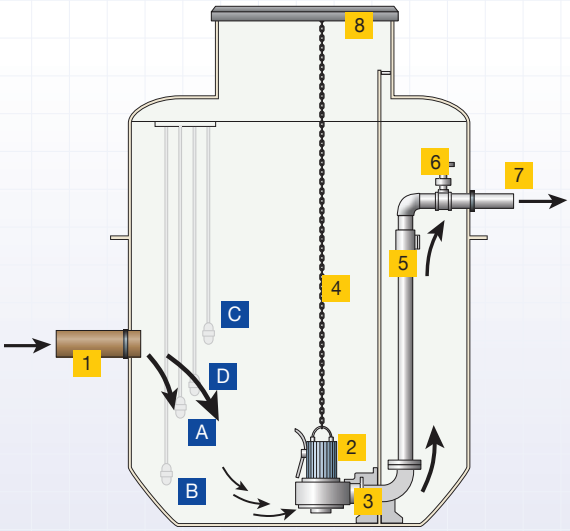
PUMP CHAMBERS

FOR PUMPING SEWAGE AND WATER TO MAINS

When discharge to mains is required, but to do so by gravity is impractical, a pump chamber system will be needed. Although available as floor-mounted units for indoor applications such as basements, the vast majority are installed outdoors at levels to suit on-site conditions and topography.

The Marsh range incorporates systems for pumping surface water or domestic sewage to mains, septic/PSTP effluent to drainage fields/watercourses, and bespoke systems for larger domestic and industrial applications.

- Where foul water drainage from a domestic property is to be pumped to the mains the effluent receiving chamber should be sized to contain 24-hour inflow to allow for disruption in service, the minimum daily discharge being taken as 150 litres per person per day.
- For other building types the capacity of the receiving chamber should be based on the calculated daily demand of the water intake for the building, or when only a proportion of the foul sewage is to be pumped then the capacity should be based pro-rata.
- If the sewer is to be 'adopted' by a local water authority, please contact Marsh Industries as Sewers for Adoption (SFA) specification and additional local authority related criteria may apply.



HOW DOES IT WORK?

Each pump chamber contains a number of float switches linked to a control panel that automatically controls flow and levels.

In a **single pump chamber** there are three float switches:
Float A: Actuates the pump cycle until level drops to low level
Float B: Low level float stops the pump
Float C: High level alarm – positioned above the pump actuator float (min 100mm)

For **twin pump chamber** operation there is an additional float switch (Float D) – usually positioned 150mm above first actuator (A) – which actuates the second pump in periods of higher flow.

After each cycle the pumps alternate to extend pump life and are designed to run for a minimum of 60 seconds with no more than 15 starts per hour.

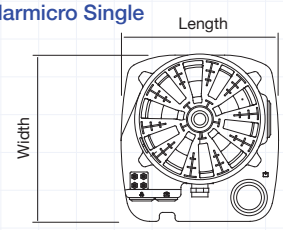
KEY

1 Inlet
2 Submersible pump
3 Pump guide rails/pedestal
4 Pump retrieval chains
5 Non-return valve
6 Isolation valve
7 Outlet
8 Access cover

PUMP CHAMBER BENEFITS

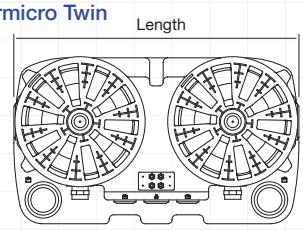
- Designed to BSEN12050 for structural strength and water-tightness and to BSEN752 to comply with hydrostatic and electrical requirements
- Smooth internal walls and integral pump well improves pump efficiency and eliminates 'dead spots' which can lead to odours and septicity
- Pre-assembled pipework for fully automatic operation (pump/control equipment separate).
- Heavy duty (industrial) 'peardrop' floats and Lowara (Xylem) pumps throughout ensure robust, reliable design and maximum efficiency of pump with minimal clogging or wear
- Unique 'keying-in' lip to assist anchoring into concrete surround
- High level alarm as standard
- Variable invert depths and orientations to suit individual site conditions

Marmicro Single

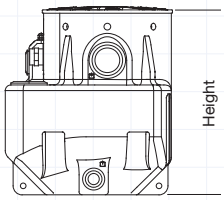


Plan view

Marmicro Twin



Plan view



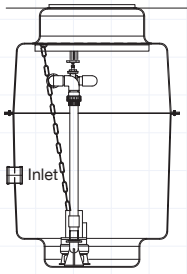
Typical side elevation

MARMICRO SPECIFICATIONS

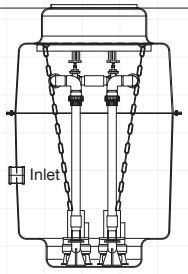
For small flows from a single dwelling

Model	Length	Width	Height	Inlet		Outlet		Total storage
				Invert	Ø	Invert	Ø	Litres
Marmicro Single	700	740	840	350	110	250	50	270
Marmicro Twin	1270	740	840	350	110	250	50	550

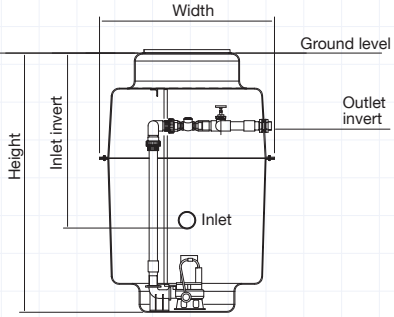
All dimensions in mm



Single pump system



Twin pump system



Typical section

All pump chambers are available for dirty water (DW) or sewage (SW), in single pump (SP) and twin pump (TP) configurations.

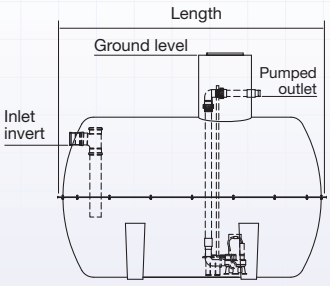
Pump chambers are usually bespoke. The dimensions given on this page are for guidance only

VERTICAL SPECIFICATIONS

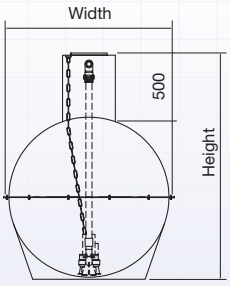
For housing projects and small commercial developments

Model	Diameter	Height	Inlet		Outlet		Storage below	Total storage
			Invert	Ø	Invert	Ø	invert	Litres
Mini	600	1100	500	110	300	63	120	234
Midi	600	1500	500	110	300	63	280	421
Maxi	600	2000	500	110	300	63	421	561
CPS1	1100	1100	500	110	300	63	470	867
CPS2	1100	1500	700	110	300	63	780	1183
CPS3	1100	2200	900	110	300	63	1025	1735
CPS4	1100	2600	900	110	300	63	1340	2050
CPS5	1700	2100	900	110	300	63	2440	3700
CPS6	1700	3400	900	110	300	63	4000	6000

All dimensions in mm



Typical side elevation



View on outlet end

HORIZONTAL SPECIFICATIONS

For larger housing projects, and commercial/industrial developments

Model	Length	Width	Height	Inlet		Outlet		Total storage
				Invert	Ø	Invert	Ø	Litres
AT2800	3000	1250	1750	800	110	300	63	2800
AT3800	4000	1250	1750	800	110	300	63	3800
AT4500	2650	1600	2100	800	110	300	63	4500
AT6000	2950	1900	2400	800	160	300	63	6000
AT8000	3640	1900	2400	800	160	300	63	8000
AT10000	4200	1900	2400	800	160	300	63	10000
AT12000	5200	1900	2400	800	160	300	63	12000
AT14000	5840	1900	2400	800	160	300	63	14000
AT16000	6700	1900	2400	800	160	300	63	16000
AT18000	7500	1900	2400	800	160	300	63	18000
AT20000	8100	1900	2400	800	160	300	63	20000

All dimensions in mm

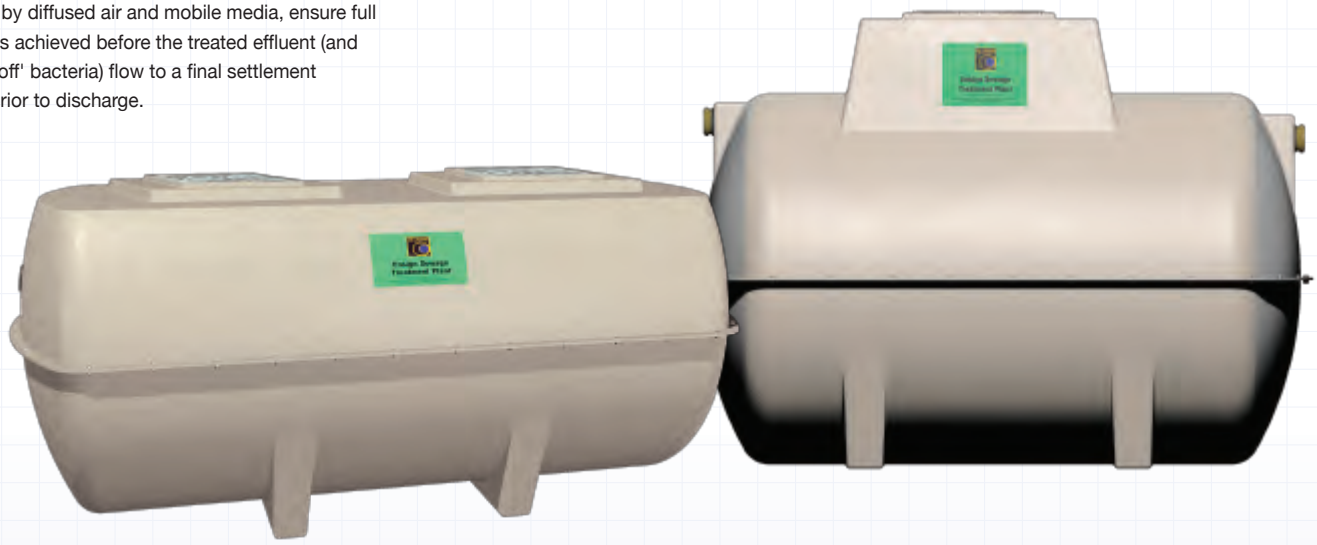
ENSIGN PACKAGE SEWAGE TREATMENT PLANT

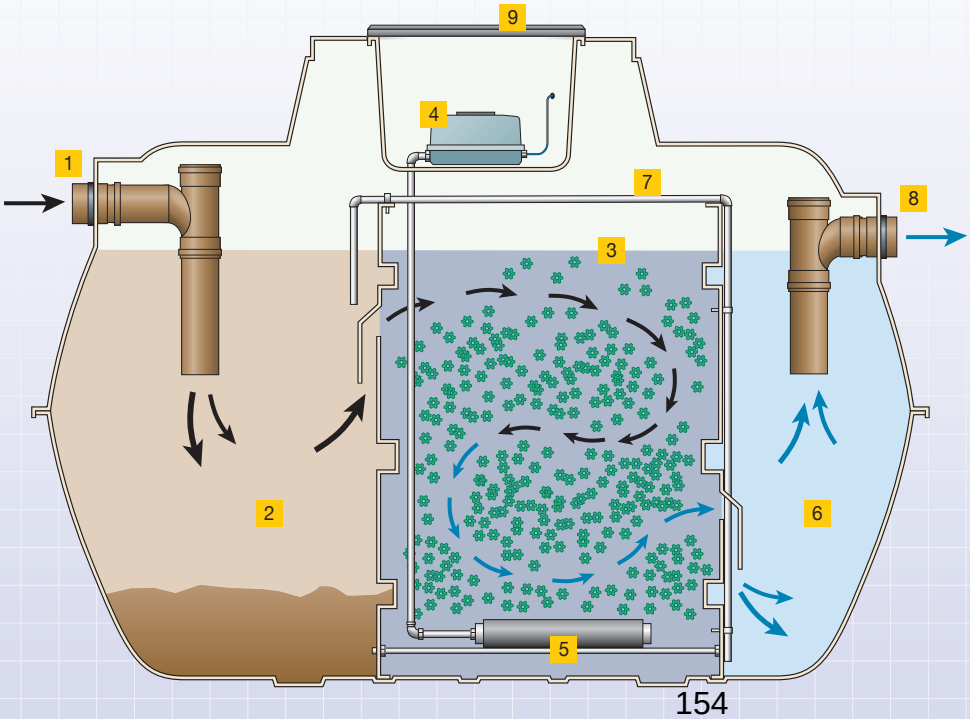
INTENSIVE BIOLOGICAL PROCESSING FOR OFF-MAINS WASTEWATER

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 watercourse or surface water sewer is the prefered discharge method.

In addition to the anaerobic digestion taking place in the primary settlement tank (as septic tanks) the Ensign unit allows the clarified water to pass into a second 'aeration' chamber where it is treated to remove the dissolved constituents. Here aerobic bacteria, supported by diffused air and mobile media, ensure full treatment is achieved before the treated effluent (and 'sloughed off' bacteria) flow to a final settlement chamber prior to discharge.

- 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





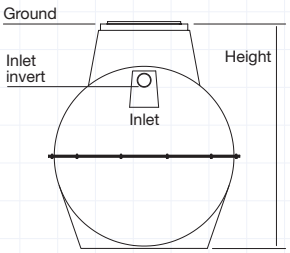
KEY

1 Inlet
2 Primary chamber
3 Aeration chamber
4 Compressor (external on shallow and pumped units)
5 Diffuser
6 Final (or 'humus') chamber
7 Recirculation to primary chamber
8 Outlet
9 Manway access

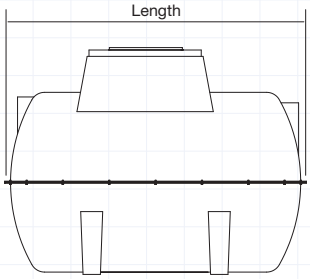
ENSIGN BENEFITS

> Tested to BSEN12566:3 and CE-marked to ensure compliance with latest environmental and Building Regulations requirements
> Class-leading effluent quality of **11.5:19.2:8.4 (BOD:SS:NH^4)** ensures discharges well within national consent standards
> Three chamber system correctly sized for separation and retention of solids improves final effluent quality
> Standard or shallow options enable suitability for all site conditions (including driveways - subject to plinth/surround to prevent superimposed loadings)
> Shallow option ideal for groundworks involving bedrock or high water table as the low profile allows for safe, cost effective installation
> Low energy compressors ensure minimal running, maintenance and servicing costs. Integral alarm detects low pressure in air line
> High specification bio-media (310m^3 per m^2) and membrane diffusers ensure even circulation to eliminate 'dead spots'
> Internal recirculation (from final to primary chamber) continues treatment process to provide higher effluent quality whilst balancing flow over 24 hour period or periods of intermittent use
> Integral lifting eyes for improved on-site handling
> Unique 'keying-in' lip to assist anchoring into granular or concrete surround
> Optional extras include patented Polylok filter to further reduce suspended solids and extend life of drainage field; extensions for deep installations; pumped outlets for sites with adverse levels; and many more

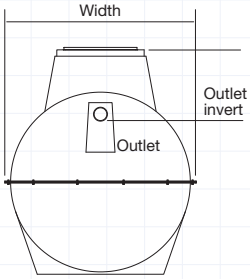
ENSIGN SPECIFICATIONS



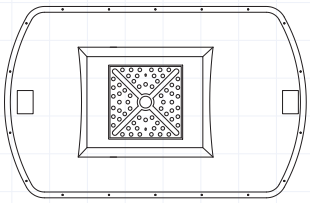
View on inlet end



Typical side elevation



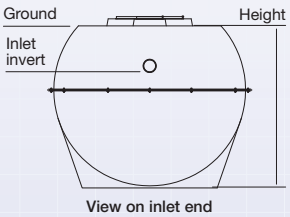
View on outlet end


Typical plan view

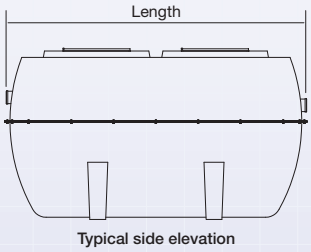
Model	Length	Width	Height	Inlet		Outlet	
				Invert	Ø	Invert	Ø
6	2602	1650	1935	550	110	625	110
10	2602	1650	1935	550	110	625	110
12	2860	1912	2139	550	110	625	110
16	2860	1912	2284	720	110	800	110
20	3650	1912	2284	720	160	800	160
25	3650	1912	2284	770	160	850	160
30	4550	1912	2284	770	160	850	160
35	4550	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

All dimensions in mm

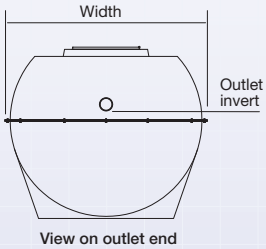
ENSIGN SHALLOW SPECIFICATIONS



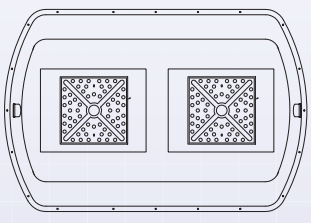
View on inlet end



Typical side elevation



View on outlet end


Typical plan view

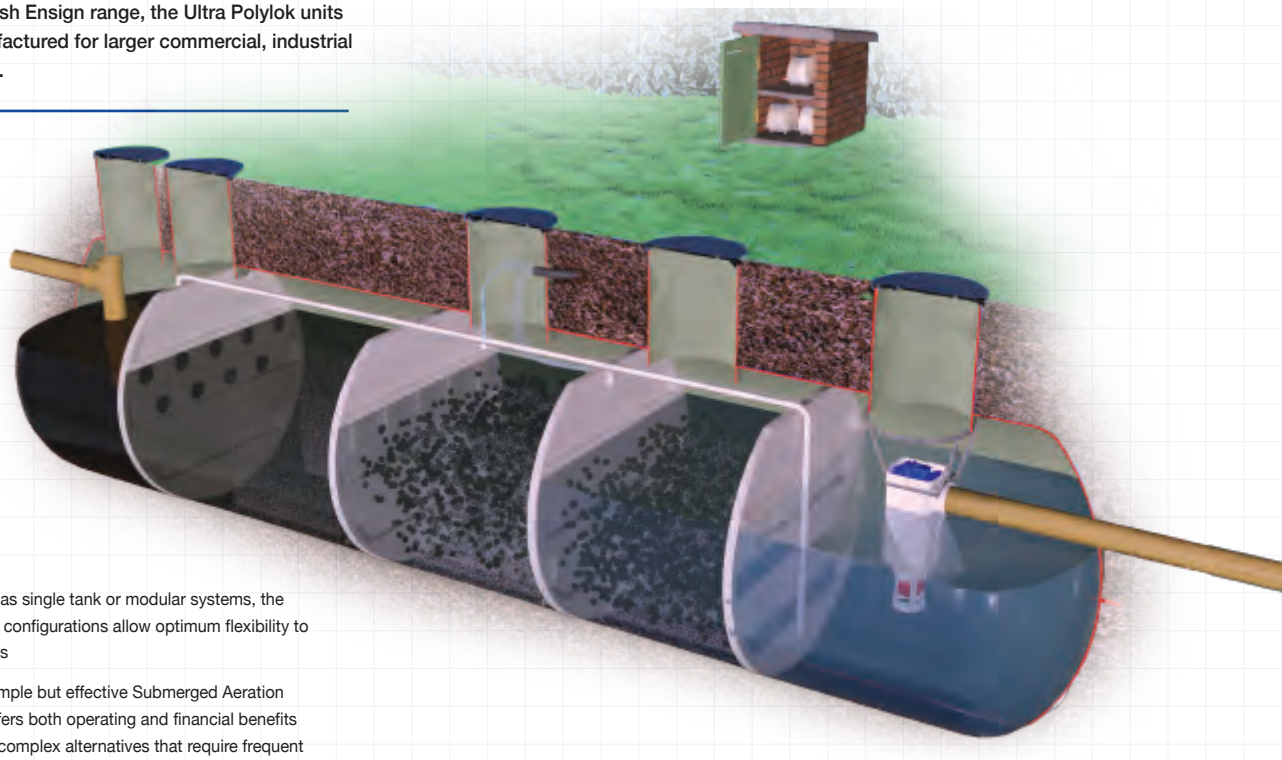
Model	Length	Width	Height	Inlet		Outlet	
				Invert	Ø	Invert	Ø
6	2860	1912	1600	500	110	575	110
10	2860	1912	1600	500	110	575	110
12	2860	1912	1600	500	110	575	110
16	3400	1912	1600	500	110	575	110
20	4550	1912	1600	500	160	575	160
25	4550	1912	1600	500	160	575	160
30	5500	1912	1600	500	160	575	160
35	5500	1912	1600	500	160	575	160

All dimensions in mm

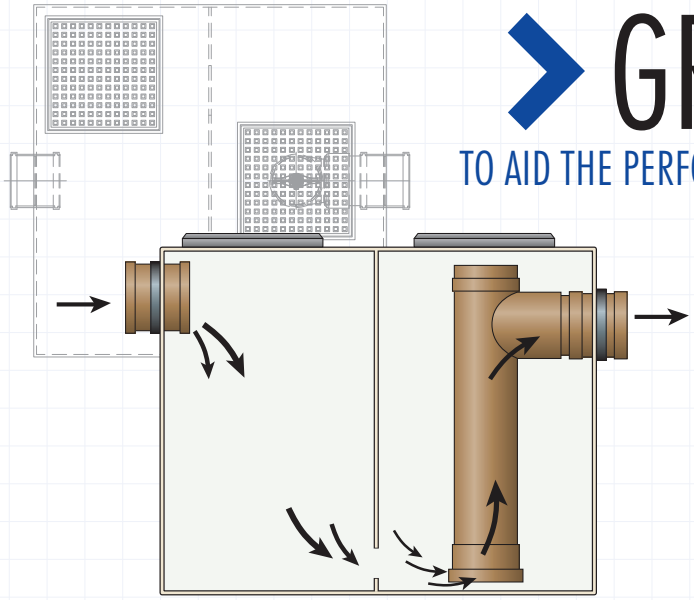
ULTRA POLYLOK ADVANCED SEWAGE TREATMENT PLANT

ADVANCED BIOLOGICAL TREATMENT TO OFF-MAINS WASTEWATER FROM 6-500PE+

An extension of the Marsh Ensign range, the Ultra Polylok units are designed and manufactured for larger commercial, industrial and leisure site projects.



- Designed to BSEN12255 as single tank or modular systems, the differing tank profiles and configurations allow optimum flexibility to suit varying site conditions
- Proven reliability of the simple but effective Submerged Aeration Filtration (SAF) system offers both operating and financial benefits when compared to more complex alternatives that require frequent servicing and maintenance to maintain performance
- All plants are fitted with the patented Polylok tertiary filter to further reduce suspended solids in the final treated effluent



GREASE TRAPS

TO AID THE PERFORMANCE OF SEWAGE TREATMENT PLANTS

Through a system of internal baffles and polylok filters, Marsh grease traps aid the performance of sewage treatment plants by preventing fats, oils and greases from entering the drainage channel.

PHOSLOK

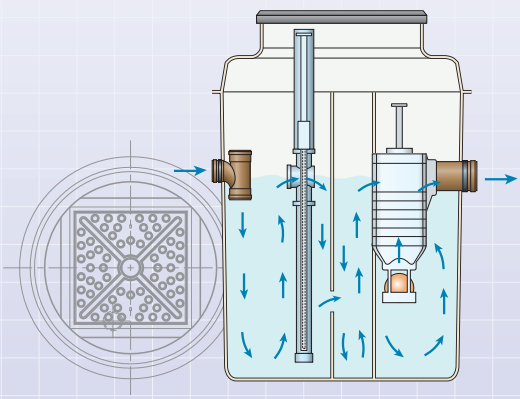
TERTIARY PHOSPHATE TREATMENT

Available for domestic or commercial sites the Marsh Phoslok is single piece plant which adds timed doses of a coagulant to treated effluent to further remove phosphates.

Easily installed downstream from a sewage treatment plant, this tertiary treatment option is the best available method to prevent eutrophication in sensitive discharge locations such as protected waters.

ULTRA POLYLOK UV FILTER

ULTRA-VIOLET DISINFECTION



Specifically designed for disinfecting the effluent from residential and commercial aerobic treatment plants by destroying viruses, parasites and pathogenic bacteria.

The Ultra Polylok UV chambers can be installed as part of a Marsh Ultra Polylok sewage treatment plant or as a stand-alone plant to further improve the effluent from an existing sewage treatment plant.

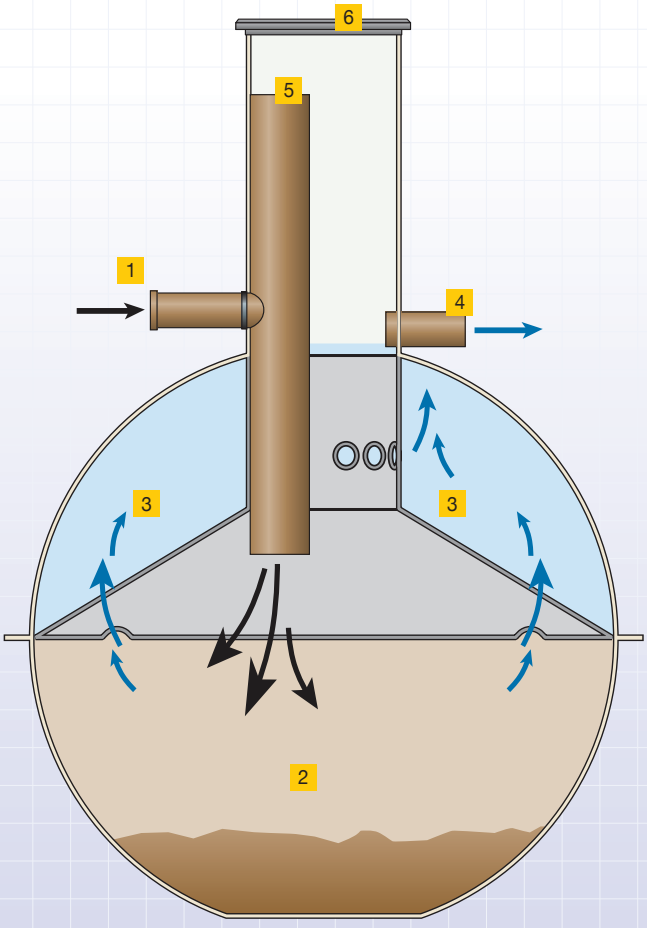
SEPTIC TANKS

FOR BASIC TREATMENT TO OFF-MAINS WASTEWATER

CE

Normally the simplest and most economical means of treating wastewater from small developments, a septic tank is a two or three chamber system which holds sewage to allow solids to settle into sludge at the bottom of the tank. Here it is naturally broken down, by a process known as anaerobic digestion, which provides settlement and some biological treatment but the effluent is not fully treated and must receive additional treatment before discharge to the water environment – the most common method being to spread the effluent to land via an underground drainage field.

- For domestic dwellings the capacity of a septic tank should be a minimum of 2700ltrs for up to 4 users, with the size increased by 150ltrs for each additional user
- Sewage treatment is an ongoing process. For the micro-organisms to stay healthy the system should be desludged regularly to prevent the build-up of sludge and to allow sewage to flow freely through the unit

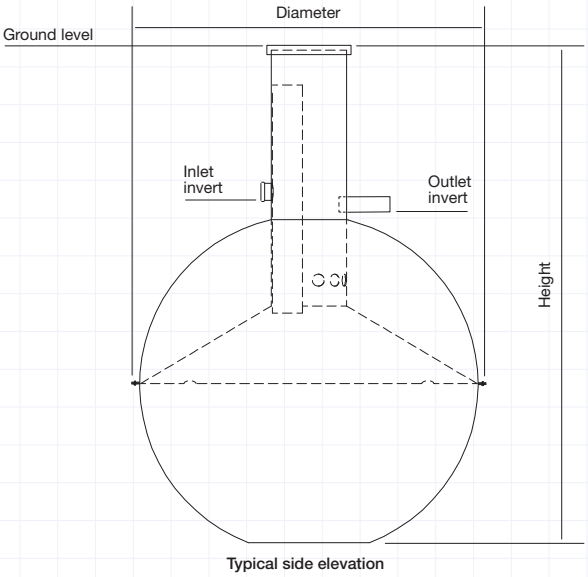


SEPTIC TANK BENEFITS

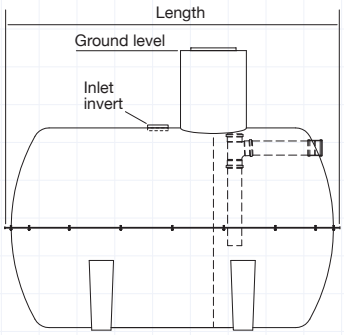
- Tested to BSEN12566:1 and CE-marked to ensure compliance with latest environmental and Building Regulations requirements
- Traditional 'onion-style' tanks for standard installations
- Low profile versions for high water table or hard rock site conditions
- Heavy duty shell as standard to enable installation in all ground conditions
- Integral lifting eyes for improved on-site handling
- Unique 'keying-in' lip to assist anchoring into granular or concrete surround
- Pedestrian cover and frame included as standard
- Additional 'Green Filter' range incorporating patented Polylok filter on outlet to reduce suspended solids, improving effluent quality and prolonging drainage field life

KEY

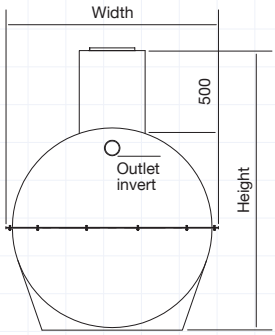
1 Inlet
2 Primary settlement chamber
3 Secondary chamber
4 Outlet
5 Desludge port
6 Access cover



Typical side elevation



Typical side elevation



View on outlet end

STANDARD SEPTIC TANK SPECIFICATIONS

Size	Dia	Height	Inlet		Outlet	
			Invert	Ø	Invert	Ø
2800L	1870	2780	1000	110	1040	110
3800L	2075	3000	1000	110	1040	110
4500L	2196	3100	1000	110	1040	110

All dimensions in mm

HORIZONTAL SEPTIC TANK SPECIFICATIONS

Size	Length	Width	Height	Inlet		Outlet	
				Invert	Ø	Invert	Ø
2800L	3000	1250	1750	500	110	800	110
3800L	4000	1250	1750	500	110	800	110
4500L	2650	1600	2100	500	110	800	110
6000L	2950	1900	2400	500	160	800	160
8000L	3640	1900	2400	500	160	800	160
10000L	4200	1900	2400	500	160	800	160
12000L	5200	1900	2400	500	160	800	160
14000L	5840	1900	2400	500	160	800	160
16000L	6700	1900	2400	500	160	800	160
18000L	7500	1900	2400	500	160	800	160
20000L	8100	1900	2400	500	160	800	160

All dimensions in mm

> CESSPOOLS

FOR BASIC STORAGE AND DISPOSAL OF OFF-MAINS WASTEWATER

A cesspool is a covered, watertight tank used for storing sewage. It has no outlet and relies on road transport for the removal of raw sewage. No treatment is involved.

- For domestic applications cesspools should have a capacity below the level of the invert of at least 18,000ltrs for two users, and should be increased by 6800ltrs for each additional user. Cesspools for commercial premises have no such restrictions
- Installation of a high level alarm is recommended to indicate when it is nearly full
- Whoever empties your cesspool (or septic/PSTP) should be a registrered Waste Carrier and hold a current discharge licence from the local water authority
- Use of cesspool is not permitted in Scotland

CESSPOOL SPECIFICATIONS

Model	Length	Width	Height	Inlet	
				Invert	Ø
AT2800	3000	1250	1750	500	110
AT3800	4000	1250	1750	500	110
AT4500	2650	1600	2100	500	110
AT6000	2950	1900	2400	500	160
AT8000	3640	1900	2400	500	160
AT10000	4200	1900	2400	500	160
AT12000	5200	1900	2400	500	160
AT14000	5840	1900	2400	500	160
AT16000	6700	1900	2400	500	160
AT18000	7500	1900	2400	500	160
AT20000	8100	1900	2400	500	160

All dimensions in mm