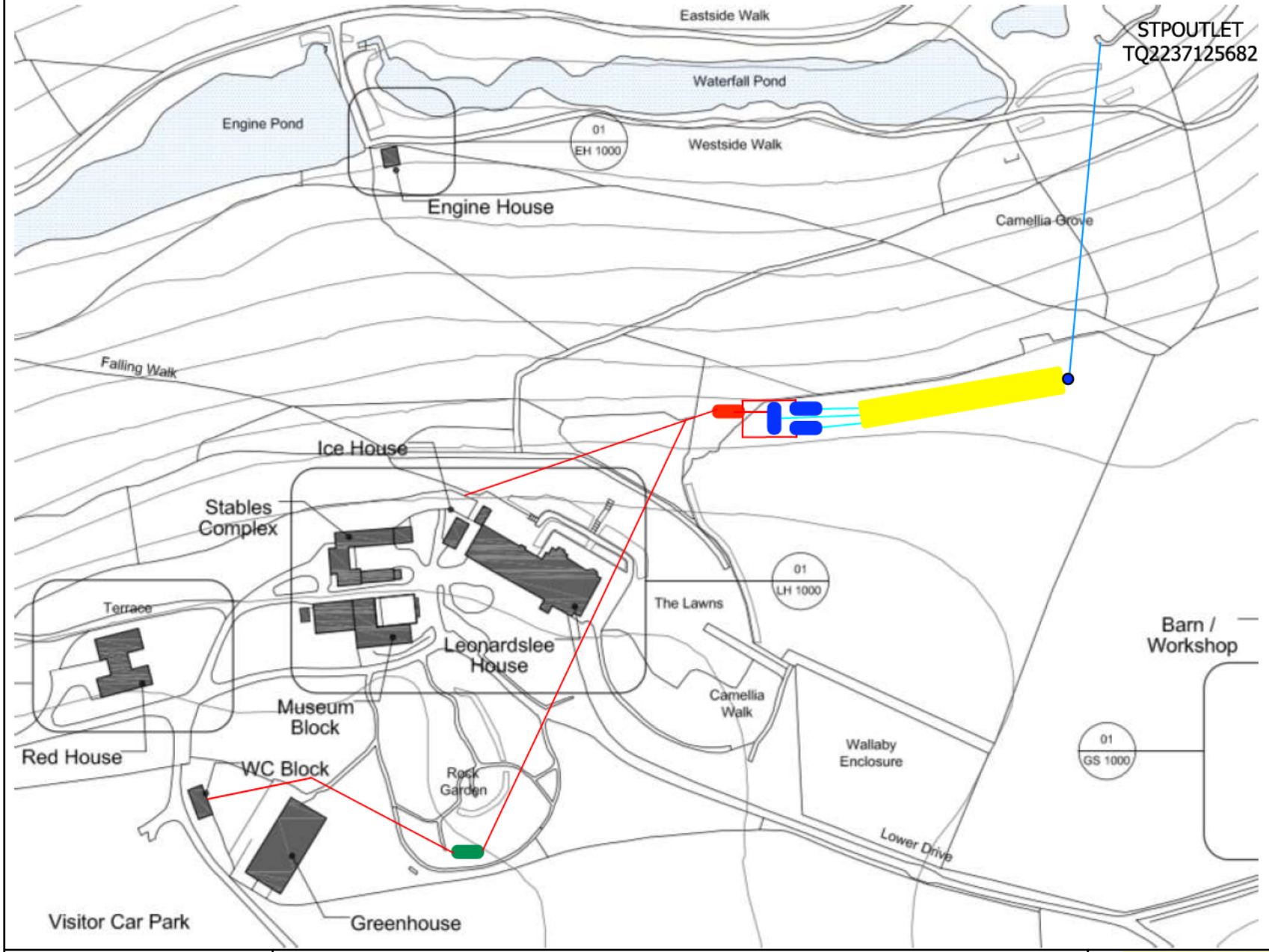

Site Layout Diagram (NTS) **Plan1 - Leonardslee Gardens**

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Review of Engine House STP

Dirk Daude Wastewater Consultancy Services t: +44 (0) 7903 296772 e: dirk@dirkdaude.com

Project and Client Details			
Project Name:	Engine House STP, Leonardslee Lakes & Gardens	Project Ref.:	PC1121-02
Client:	Leonardslee Lakes & Gardens	Date:	18 April 2024

Project Details:

Review of influent loadings and assistance with sizing a new sewage treatment plant (STP) for the Engine House at Leonardslee Lakes & Gardens

General Introduction and Overview

Leonardslee Lakes & Gardens (LLG) are planning to add a single WC and extend the outdoor seating area of the Engine House Café located down in the valley of the gardens. At the moment, there is no existing foul drainage on the valley and the nearest drains are approx. 150m away near the main house and visitor toilets.

The aim of this report is to assess potential influent loadings from the Café/Toilet, assist in sizing a suitable small package sewage treatment plant and check if the overall proposal would comply with EA General Binding Rules for Small Sewage Discharges (EA GBR).

Influent Design Loadings

The following design loadings are calculated based on the information provided by the client and using British Water Code of Practice, Flow and Loads 4, 2013 (BW F&L, see appendix A). Note, conversions to population equivalent (pe) references are based on 150 l/d, 60 gBOD/d and 8 gNH_4-N/d.

A new single WC will be installed next to the cafe to serve both visitors and staff. In addition, the new deck extension will increase the outdoor seating area to accommodate approx. 10x tables and 40x seats. The café will be attended by part-time staff during garden opening hours.

Due to the limitation of only a single WC, the following maximum number of users are assumed:

Application	No.	Hydraulic Load [l/d]		Organic Load [$gBOD_5$/d]		Ammonia Load [gNH_3/d]	
		per Head	Total	per Head	Total	per Head	Total
Café users (simple café food & drinks)	80	12	960	12	960	2.5	200
Additional toilet users	40	10	400	12	480	2.5	100
Staff (part-time)	4	45	180	25	100	3	12
Summary Loadings:			**1,540** l/d		**1,540** $gBOD_5$/d		**312** gNH_3/d
			10 pe		**26** pe		**39** pe
					1,000 mg/l		**203** mg/l

Notes:

1) The above maximum number of users is restricted due to the fact that the café site only has a single WC available to all guests and staff.
2) The café will only serve kiosk-style food/cakes & drinks (coffee/tea) and does not have any cooking facilities.

Treatment and Discharge Options for the Engine House Cafe

In theory, there are four treatment/discharge options available for the toilet facility at the Engine House Café. However, due to the location of the café at the bottom of the valley, the established gardens/trees surrounding the café and the close proximity to the lake, the feasibility of some of these four options is severely limited.

1) ***Pumping Station (PS)*** – pumping raw sewage to the main sewage treatment plant at the top of the hill is NOT a viable option due to the location of the café at the bottom of the hill. Any PS would need to overcome nearly 50m of height difference, thus requiring large macerating type pumps. In addition, any rising main would have to be laid through the existing and long established gardens/trees to reach the main sewage treatment plant at the top of the hill.

2) ***Cesspool*** – a cesspool/holding tank would require frequent emptying, which again is NOT a viable option due to the steep slopes and restricted vehicle access to the Engine House Café. In addition, cesspools are the least favourable options when it comes to "off-mains" treatment options by the EA, and would also be the most expensive option to operate due to the frequent tankering visits.

3) ***Septic Tank & Drainage Field*** – although a septic tank and drainage field would be a theoretical option due to the low anticipated flow rates of less than 2m3 per day (thereby conforming to EA GBR), the close proximity of the lake would NOT allow a drainage field within the area near the Engine House Café. Furthermore, the established gardens/trees surrounding the area of the café do NOT allow a viable area for a suitable drainage field nearby. Finally, the anticipated high effluent Ammonia levels discharging from the septic tank into a drainage field would provide a high risk to the nearby plant and/or aquatic life.

4) ***Sewage Treatment Plant (STP)*** – as a result of these constraints, a small STP which then discharges fully treated final effluent into the nearby lake provides the only viable discharge option for the Engine House Café.

Sizing and Selection Notes for new STP

Due to the close proximity to the established gardens and surrounding trees, the best location for the STP is the deck extension/outside seating area of the café. As such, a compromise must be found to allow access for the operation and maintenance of the plant on the one hand, and "hiding" the STP from the café guest on the other hand. The latter includes keeping noise and odour nuisance to an absolute minimum, which can be achieved by taking particular attention to the location and type of the air blower, and installing an extraction fan into the soil vent pipe.

In addition, any new STP must have been tested in accordance with BS EN 12566-3 in order to comply with the EA General Binding Rules for small sewage discharges (EA GBR).

As a result, the general specification for a new STP for the Engine House is as follows:

a) ***Sizing*** – the STP has to have a minimum treatment capacity of **40pe** in order to meet the calculated design loadings.

b) ***Certification*** – the STP has to be certified/tested to BS EN 12566-3.

c) ***Type*** – due to the access limitations and direct discharge into the lake, the STP should use a "fixed-film" biological treatment process. This includes all STPs that use some form of media for the biological microorganism to grow upon. The preferable option would be a SAF type (submerged aerated filter) STP.

d) ***Installation*** – with the STP located underneath the seating area of the café, the underground tank must be suitable for a complete below ground installation (incl. any access covers) and should be as shallow as possible.

The above limits the number of suitable STPs for the Engine House Café, and in particular excludes the selection of a Klargester BioDisc (RBC type plant) due to the large access lid.

However, there are a small number of manufacturers that do offer STPs which meet the above specification, including (but not limited to):

1) PremierTech – Rewatec SAF40 N20 (Ø1.8m x 5.9m long; note, the overall depth will be approx. 2.1m due to access turrets)

2) Marsh Industries – Ensign 40 (Ø1.9m x 5.2m long; note, the overall depth will be approx. 2.2m due to access turrets)

3) Matrix – CLF6 (2.1m wide x 2.2m deep x 5.1m long)

Based on past experience and overall plant features, I recommend the Rewatec SAF40 N20 for this application.

Report provided by

(Dr Dirk Daude)

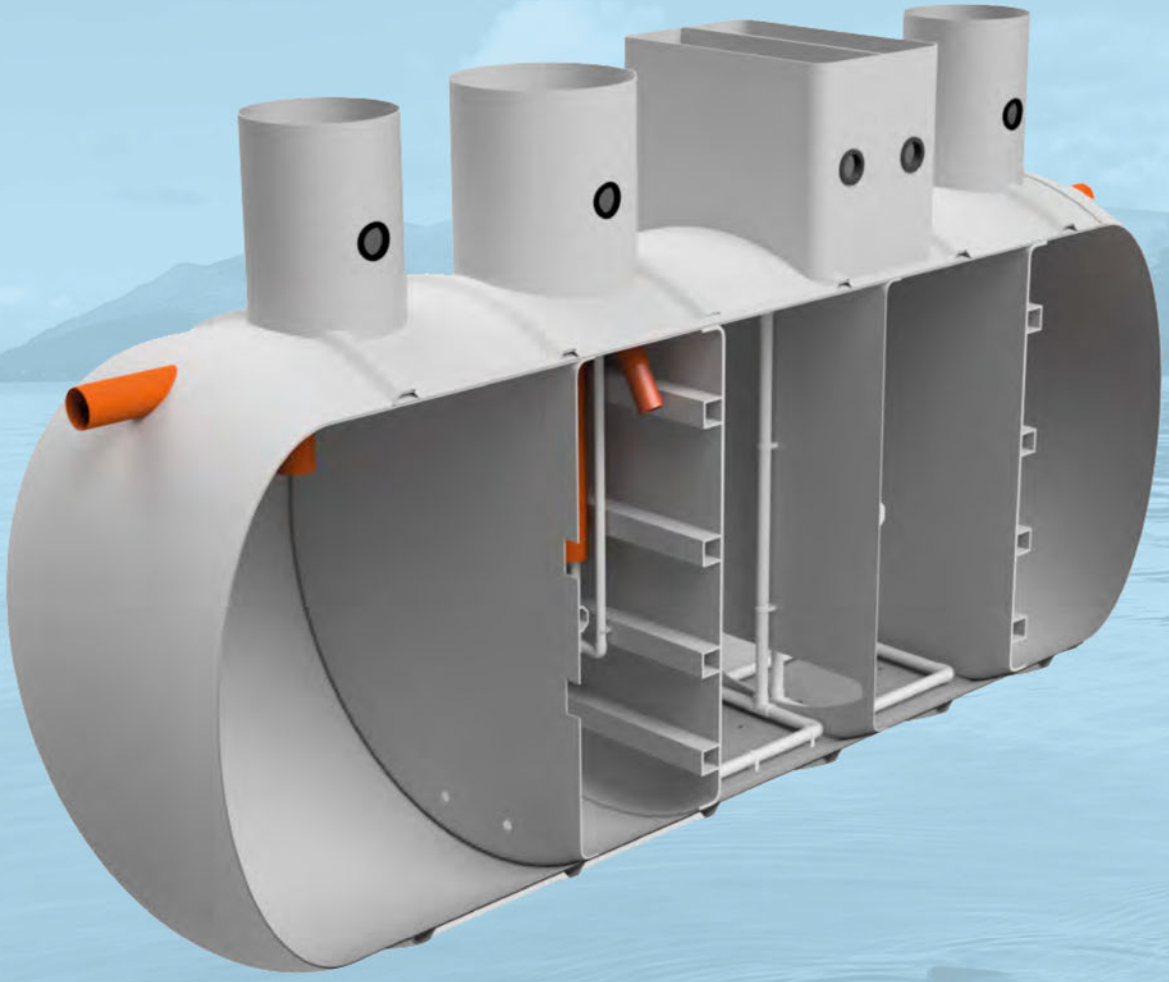
Appendix A – STP Information from Manufacturers

PREMIER TECH

Energy efficient wastewater treatment plants

REWATEC®

Submerged Aerated Filter (SAF)



Marked to CE standard EN 12566-3

UK CA

Highly efficient wastewater treatment

The Premier Tech range of Rewatec SAF sewage treatment plants, combine energy efficiency with an exceptionally high final effluent quality. Uniquely engineered to cater for a population range of 25 to 600 people equivalent (PE) (larger options are available in bespoke setups), the Rewatec SAF fully meets UK environmental discharge standards and is the perfect solution for both small and large scale projects where access to the main drainage system is unavailable, or if wastewater pre-treatment is required.

The Rewatec SAF range is designed, manufactured and tested in accordance with EN12566-3 for plants below 50PE, EN12255 for plants above 50PE and the British Water Code of Practice for Flows and Loads. It comprises of a primary settlement tank, a biozone-aeration chamber and a final settlement tank, with a range of customisable options in between to meet specific requirements. Flow through all the treatment stages occurs via gravity, integral airlifts or via pumps.

By using biological treatment within the SAF, strict effluent standards and consent from a range of on-site applications can be achieved. This includes a final effluent quality of 20mg/L BOD, 30 mg/L SS and up to 5 mg/L NH4-N. It can also achieve up to 62% TN removal and up to 50% TP removal. For applications where additional nitrogen (TN) and/or phosphorus (TP) removal is required, a Rewatec Denitrifying Submerged Aerated Filter (DSAF) can be provided. Dosing options are also available to improve both TN and TP removal.

ENERGY OPTIMISATION

An optional probe can be installed to regulate the air supply in the biozone chamber based upon the incoming wastewater loading. If the occupancy is reduced, the probe will detect the oxygen surplus and the blower will automatically adjust to reduce the air supply.

This provides major benefits in terms of maximising energy efficiency, reducing cost and improving the overall carbon footprint of the plant.

Depending on the site's specific effluent requirements and population requirements, Premier Tech can offer*:

- Single tanks: 25 – 300 PE
- Two tank modular systems: 350 – 500 PE
- Three tank modular systems: 600 PE
- Multi-stream tanks: bespoke designs to meet particular application parameters and larger PE requirements

*all based on N20 effluent discharge consent.

How does the Rewatec SAF work?

Step 1 – In typical installations, wastewater first flows into the primary settlement tank. The purpose of this tank is simple; to balance the flow when subjected to variation and to separate solids from liquids (and store such matter until it is removed via periodic desludging).

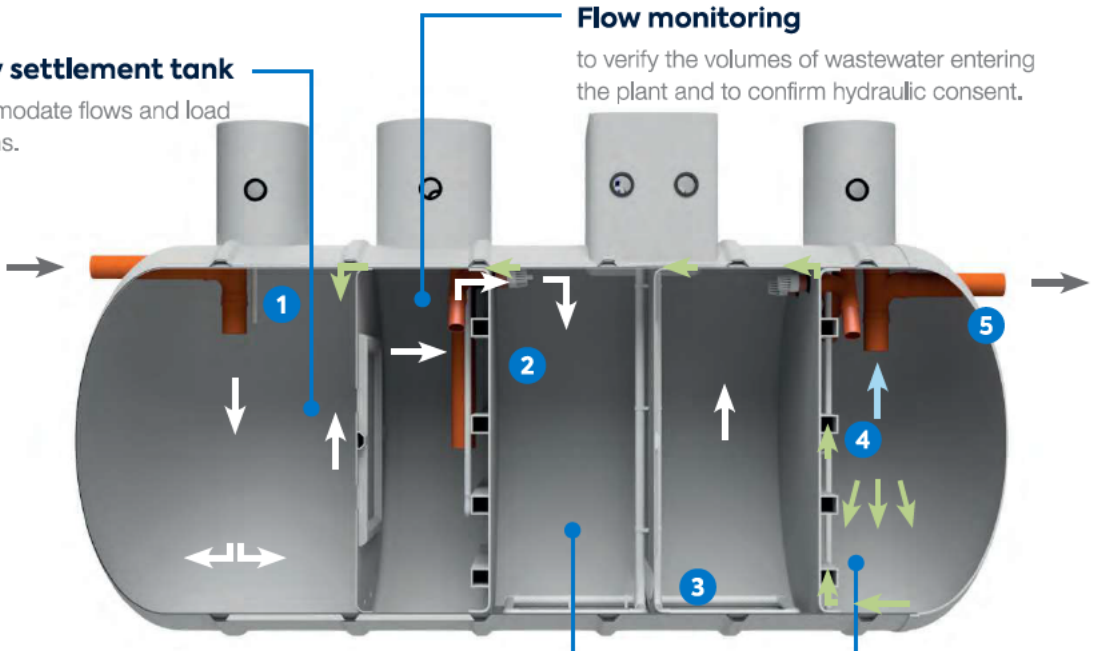
Step 2 – Wastewater flow passes from the primary settlement tank to the biozone chamber. The biozone is designed with two course bubble aeration arrangements to prevent blockages from floating biomass and to increase the efficiency of oxygen being supplied to the chamber. Above each of these legs, plastic bio-media - each shaped with a large surface area to encourage biomass growth, treats the wastewater and minimises the size of the reactor.

Step 3 – A blower, housed in an external kiosk, delivers air to the bottom of the biozone to provide oxygen for the biomass, further stimulating growth to support the oxidation process. The air stream promotes the efficient mixing of wastewater effluent with the bio-media present in the tank.

Step 4 – After treatment, wastewater flows into the final settlement tank. Settled sludge (dead biomass) accumulates at the bottom of the tank before being redirected to the primary settling area via re-circulation (enabling partial nutrients (TN, TP) removal).

Step 5 – The treated wastewater (final effluent) is subsequently discharged from the SAF via the outlet pipe. This can either be via gravity displacement or via an external pump station, depending on the water table and site requirements.

DSAF – The Rewatec DSAF incorporates the same working principles as the Rewatec SAF however it also incorporates pumps in both the primary and final settlement tank. This is to regulate the circulation of the nutrients transformed in the process and to ensure contact between nutrients and microorganisms. At the end of the process, nutrients are converted to inert gases (N_2) or inert solids (Phosphorus-based) and leave the plant as emissions or as sludge.



Rewatec SAF kiosks

All Rewatec SAF sewage treatment plants are delivered with a robust kiosk to house the aeration blowers, timer valves and the electrical control panel.

The control panel can be adapted to accommodate a range of mechanical and electrical devices (such as a final effluent pump station, dosing units, flowmeters, sensors etc.) as well as the standard requirements for commissioning and running the plant.

Each kiosk is fitted with an alarm beacon as standard however it can also be customised to incorporate features such as a variable speed blower (for plants over 50PE) to increase efficiency, reduce costs and lower the carbon footprint of the plant, acoustic lining and GSM and/or BMS communication for remove plant monitoring. Other innovative elements provided as standard include thermostatic cut off controls and a monitored aeration filter to extend the life of the blower.

Typical applications

Whilst also catering for projects that require 24/7 operation, such as residential developments, our range of Rewatec SAF sewage treatment plants can also be engineered to operate efficiently for applications that have seasonal fluctuations. This includes:

- Caravan parks and camping sites
- Hotels
- Restaurants and cafes
- Schools
- Office buildings
- Leisure facilities
- Care homes
- Industrial sites

Benefits of the Rewatec SAF

COMPACT AND DISCREET

- Minimal visual impact on site
- Bespoke kiosk to house electronic equipment
- Silent and odourless operation

UNRIVALLED PERFORMANCE

- Manage organic and hydraulic load variants
- Reduce carbon footprint
- Bespoke solutions to meet effluent requirements

BUILT TO LAST

- Highly efficient blowers and aeration legs
- Reliable filter design
- Durable GRP shells

SMART INVESTMENT

- Excellent performance to cost ratio
- Adaptable to manage seasonal fluctuations
- Reduce energy bills

Options and accessories

Options	Accessories
Optional probe to increase energy efficiency	Access shafts for deeper inverts
Kiosks (GRP, Acoustic lagging)	Heavy duty / drive-able covers
Sampling chamber	
UV disinfection	
Final effluent pump station	
Single or three phase electrical supply	
Dosing (for additional TP or TN removal)	
Flowmeter (weir or magnetic)	
Duty/standby blower	
Effluent polishing filter (membrane or sand) – large applications	
Effluent polishing filter (Ecoflo wastewater treatment system)	
Variable speed blower	

Rewatec SAF specifications

SINGLE TANK SYSTEM

	Primary settlement/ Biozone/Humus tank			Max load per day		
Product code	**Tank Diameter (m)**	**Overall Length (m)**	**Dry weather flow (DWF) (m^3/day)**	**BOD (kg/day)**	**NH_3 (kg/day)**	**Desludging Interval**
Rewatec SAF 25 N20	1.8	4.1	3.8	1.5	0.2	120
Rewatec SAF 30 N20	1.8	4.6	4.5	1.8	0.24	120
Rewatec SAF 35 N20	1.8	5.2	5.3	2.1	0.28	120
Rewatec SAF 40 N20	1.8	5.9	6	2.4	0.32	120
Rewatec SAF 50 N20	1.8	7.3	7.5	3	0.4	120
Rewatec SAF 60 N20	2.5	4.1	9	3.6	0.48	90
Rewatec SAF 60 N10	2.5	4.5	9	3.6	0.48	90
Rewatec SAF 60 N05	2.5	5.3	9	3.6	0.48	90
Rewatec SAF 75 N20	2.5	4.5	11.3	4.5	0.6	90
Rewatec SAF 75 N10	2.5	5.5	11.3	4.5	0.6	90
Rewatec SAF 75 N05	2.5	6	11.3	4.5	0.6	90
Rewatec SAF 100 N20	2.5	6	15	6	0.8	90
Rewatec SAF 100 N10	2.5	7.2	15	6	0.8	90
Rewatec SAF 100 N05	2.5	7.8	15	6	0.8	90
Rewatec SAF 125 N20	2.5	7.2	18.8	7.5	1	90
Rewatec SAF 125 N10	2.5	9	18.8	7.5	1	90
Rewatec SAF 125 N05	2.5	9.6	18.8	7.5	1	90
Rewatec SAF 150 N20	2.5	9	22.5	9	1.2	90
Rewatec SAF 150 N10	2.5	10.6	22.5	9	1.2	90
Rewatec SAF 150 N05	2.5	11.5	22.5	9	1.2	90
Rewatec SAF 200 N20	2.5	10.6	30	12	1.6	90
Rewatec SAF 200 N10	2.5	12.7	30	12	1.6	90
Rewatec SAF 200 N05	3	14.2	30	12	1.6	90
Rewatec SAF 250 N20	2.5	12.7	37.5	15	2	90
Rewatec SAF 300 N20	3	11.4	45	18	2.4	90

TRAINING FOR PROFESSIONALS

At Premier Tech we provide a full range of training programmes to fully meet the requirements of our professional partners. If you require product functionality guidance on the Rewatec SAF or DSAF, or a more detailed training course for installations, we can provide a solution to meet your needs.

COMMISSIONING AND SERVICING

Premier Tech offer commissioning and routine or emergency servicing on all Rewatec SAF sewage treatment plants.

MAINTENANCE

Routine maintenance of the Rewatec SAF is recommended to help preserve the lifespan of the product. If the tanks are well maintained, the lifecycle of the product can exceed 50 years (i.e. the same as the GRP material).

WARRANTY

For over 50 years, we have proudly developed sustainable and long-lasting products that make a real difference for our customers, our professional partners, and above all, our planet.

25 YEAR WARRANTY

Our experience in the industry allows us to give you a complete 25-year warranty for our Rewatec SAF and DSAF sewage treatment plants and a 12-month warranty for our kiosks.

Above ground installation

People and Technologies making a difference

Premier Tech brings to life products that help feed, protect, and improve our world.

- **founded in 1923**
- **family business**
- **70 team members in the UK**
- **4,700 team members worldwide**
- **47 factories in 27 countries**

We develop and manufacture solutions for wastewater treatment, rainwater management and liquid storage.

Together, we continuously innovate to create sustainable solutions that are accessible to all.

PREMIER TECH

BRITISH WATER · Constructionline Associate Member · MAKE uk Member · CPD MEMBER The CPD Certification Service · bsi FM 555591 EMS 688764

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ENSIGN®

Package sewage treatment plants

MARSH

Intensive biological processing for off-mains wastewater

Overview

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

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

Class leading performance

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

Unrivalled choice

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

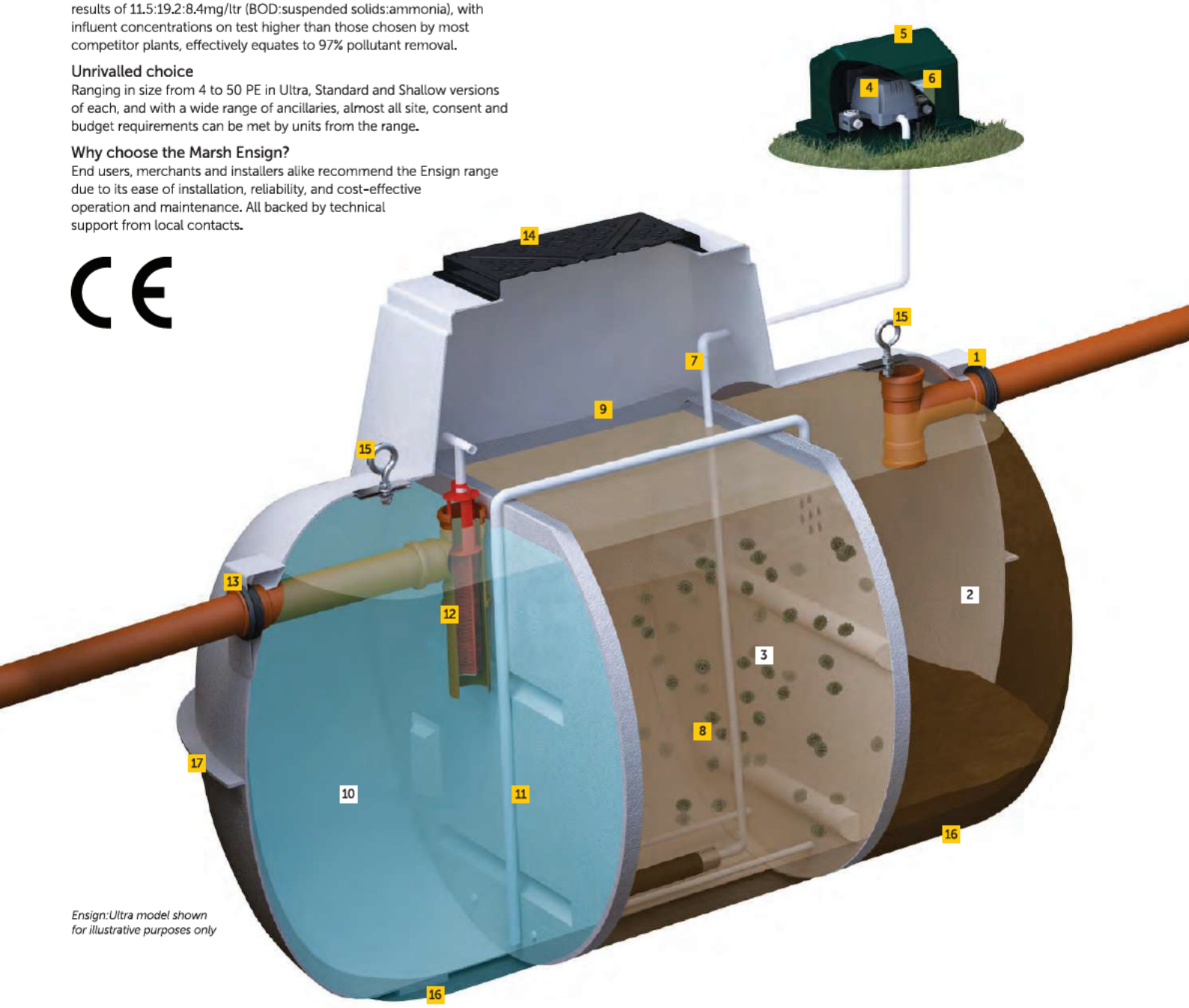
Why choose the Marsh Ensign?

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

CE

Operating principle

In addition to anaerobic digestion taking place in the primary settlement chamber [2] the Ensign:Ultra unit allows the clarified water to pass into a second 'aeration' chamber [3] where it is treated to remove the dissolved constituents. Here aerobic bacteria, supported by diffused air and mobile media, ensures full treatment is achieved before the treated effluent and 'sloughed off' bacteria flows to a final settlement chamber [10]. The final effluent is then discharged to the drainage field or watercourse via a Polylok filter.



Ensign:Ultra model shown for illustrative purposes only

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

Benefits

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

2 **Primary settlement chamber**

3 **Aeration chamber**

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

5 **Compressor housing - internal or external options available**
The compressor can be housed internally or externally with no difference in cost.
External recommended to increase compressor life, and supplied as standard on 4PE, shallow and pumped outlet versions.

6 **RCD/Electrical connection (Ensign:Ultra units only)**
The RCD box provides easier installation and proveds a higher degree of safety. (Regular plug/socket connection on Ensign:Standard models).

7 **PVC pressure pipe/diffuser(s)**
Provides a protective conduit for the air diffuser line. Can be easily removed for maintenance and cleaning.

8 **Bio-media**
High specification bio-media (310m³ per m²) and membrane diffusers ensure even circulation to eliminate 'dead spots'. The bio-media is contained by a stainless steel securing mesh to ensure no migration during handling or potential flooding.

9 **Stainless steel mesh (Ensign:Ultra units only)**
Retains media in aeration chamber during transportation and handling, and in the event of flooding.

10 **Final settlement chamber**

11 **32mm sludge return**
Larger diameter sludge return prevents the possibility of blockages and improves system circulation. Provides higher effluent quality whilst balancing flow over a 24 hour period or periods of intermittent use.

12 **Unique Polylok tertiary filter (Ensign:Ultra units only)**
The Polylok tertiary filter reduces suspended solids and BOD by a further 40% helping to extend drainage field life.

13 **Outlet with 'Forsheda seal'**
Forsheda seal provides flexibility in the joint for easier installation.
Optional pumped outlets are available.

14 **Impermeable lid (Ensign:Ultra units only)**
Heavy duty lid/frame improves strength and durability whilst blending into the surrounding environment. (Regular lid on Ensign:Standard models).

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

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

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

Guidance notes

Package Sewage Treatment Plant's (or PSTP's) are often a suitable option where groundwater in the surrounding environment is vulnerable, drainage field percolation values are restrictive, or direct discharge to a water course or surface water sewer is the prefered discharge method.

- *PSTP's should be sized using the latest version of British Water Flows & Loads which provides detailed information on sewage production figures and sizing calculations*
- *Regulatory authorities for the control of pollution in the UK normally require treatment plants conforming to BSEN12566:3 to be demonstrated as capable of producing a minimum effluent discharge quality of 20:30:20 (Biochemical Oxygen Demand;Suspended Solids: Ammoniacal Nitrogen in mg/ltr), although in certain areas more stringent site-specific qualities may be required*
- *No surface water should enter the system as this can reduce the system's capacity and cause solids to be flushed out which may prematurely block drainage field or cause pollution*
- *As with septic tanks sludge should be removed annually or in line with manufacturers instructions*

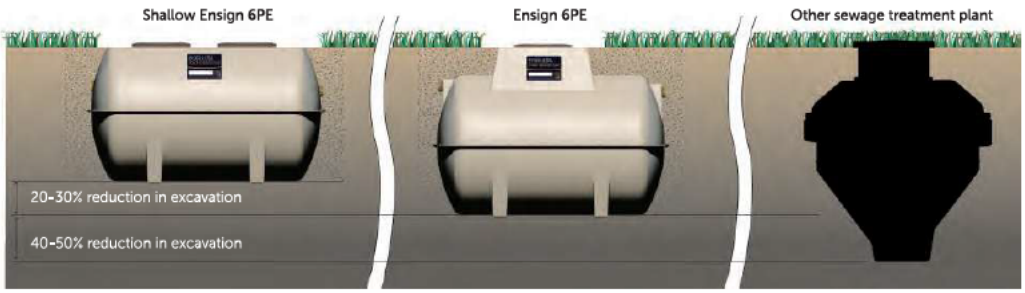
Many domestic sewage treatment plants offered by "internet resellers" claim to hold EN12566-3 compliance. This does not necessarily mean compliance with the UK National Forward, May 2007.

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

Shallow units

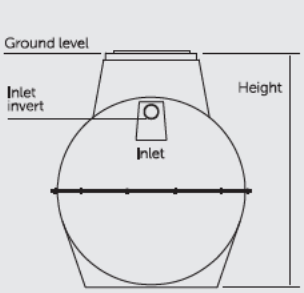
Common sewage treatment plants on the market often exceed 2.3m high. Marsh Industries offer a range of shallow plants from 4-35PE that are only 1.6m in height, meaning installation is not only possible*, but easier and safer too.

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

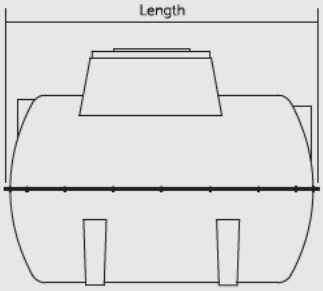


Specifications

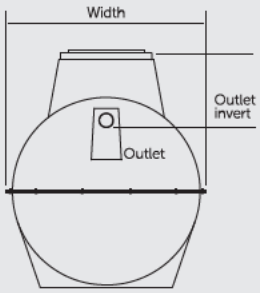
Ensign:Ultra and Ensign:Standard



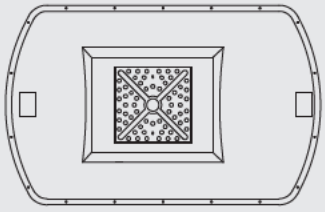
View on inlet end



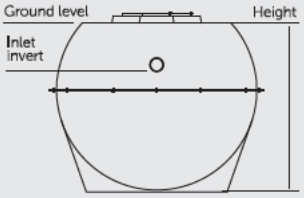
Typical side elevation



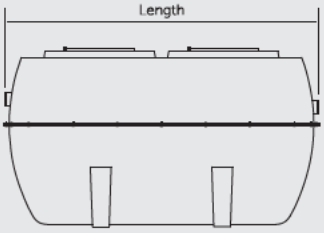
View on outlet end


Typical plan view

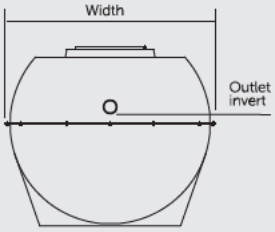
Shallow Ensign:Ultra and Shallow Ensign:Standard



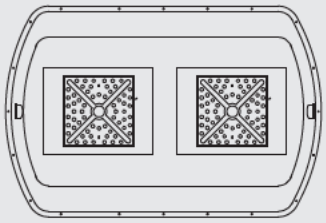
View on inlet end



Typical side elevation



View on outlet end


Typical plan view

Ensign:Ultra and Ensign:Standard

Model	Length	Width	Height	Inlet		Outlet	
(Pop)	+/-50mm	+/-50mm	+/-50mm	Invert	Ø	Invert	Ø
4	1600	1332	1575	540	110	600	110
6	2602	1650	1935	550	110	625	110
8	2602	1650	1935	550	110	625	110
10	2602	1650	1935	550	110	625	110
12	2860	1912	2139	550	110	625	110
16	2860	1912	2284	720	110	800	110
20	3650	1912	2284	720	160	800	160
25	3650	1912	2284	770	160	850	160
30	4200	1912	2284	770	160	850	160
35	4200	1912	2284	770	160	850	160
40	5200	1912	2284	770	160	850	160
45	5200	1912	2284	770	160	850	160
50	5200	1912	2284	770	160	850	160

Shallow Ensign:Ultra and Shallow Ensign:Standard

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

Notes:

> *Larger population sewage treatment plants may be supplied as multiple tank configurations.*
> *For precise tank sizes and configurations, please contact Marsh Industries*
> *All dimensions in mm*

01933 654582 | sales@marshindustries.co.uk | www.marshindustries.co.uk

Institute for Wastewater Technology

PERFORMANCE RESULTS

C & L Fabrication Limited
Unit D3, Hortonwood 10, Telford,
Shropshire, TF1 7ES, Great Britain

EN 12566-3 Annex B
"Small wastewater treatment systems for up to 50 PT"

Small wastewater treatment systems MATRIX CLF
Submerged aerated filter bed

Nominal organic daily load	0.34	kg/d
Nominal hydraulic daily load	1.20	m³/d
Material	PP	
Treatment efficiency (nominal sequences)	COD	91.4 %
	BOD_5	96.2 %
	SS	95.5 %
	NH_4-N*	83.3 %
Electrical consumption	1.4	kWh/d

** determined for temperatures ≥ 12°C in the bioreactor.*

Performance tested by:
PIA - Prüfinstitut für Abwassertechnik GmbH
(PIA GmbH)
Hergenrather Weg 30
D-52074 Aachen

Certified according to ISO 9001:2000

Notified Body number: 1739

This document replaces neither the declaration of conformity nor the CE marking.

[redacted]

Centre d'Études et
de Recherches
de l'Industrie du Béton

BP 30059
28231 ÉPERNON CEDEX
FRANCE

Industrial Quality Dept
(Fax: +33 (0)2 37 32 63 46 - Email: essais-dqi@cerib.com)

Notified body No. 1164
CAL
Quotation No.7794

Test date: from 16/07 to 11/09/09
Manager: S. POUDEVIGNE
Executed by: LM

Type of tests:

Initial type tests on a range of small wastewater treatment plants in compliance with Standard EN 12566-3 (July 2005) and its amendment A1 (January 2009) "Small wastewater treatment systems for up to 50 PTE – Part 3: Packaged and/or site assembled domestic wastewater treatment plants":
- Watertightness (water test),
- Treatment efficiency,
- Structural behaviour ("Pit Test").

Description of samples:

A range of ***MATRIX CLF*** polyethylene small wastewater treatment plants, comprising 7 plants with a nominal daily hydraulic flow of 1,2 – 2,4 – 3,6 – 5,0 – 6,0 – 8,0 – 10,0 m^3/d.

Receipt of samples:

On 16/07/09 for the tests carried out on the CERIB test platforms.

Remarks:

The plants were manufactured and delivered by the applicant.
The applicant was responsible for the sampling and grouping of products in the same range.

With respect to CE marking of small wastewater treatment plants, this document constitutes the Initial Type Tests (ITT) report for the range of products of the above brand name.

TEST REPORT

Carried out at Epernon, 18/12/09

At the request of: ***CL Fabrication Limited***
Unit D3
Hortonwood 10
Telford
SHROPSHIRE TF1 7ES

UNITED KINGDOM

Test report reference: 09 DQI 619

For all additional information, please contact S.POUDEVIGNE - Tel. 02.37.18.48.27

CONDITIONS GÉNÉRALES DE VENTE

1. CONDITIONS GÉNÉRALES APPLICABLES À L'ENSEMBLE DES PRESTATIONS

1.1 Devis

À la suite de sa demande, le CERIB établit un devis et l'adresse au client en deux exemplaires. Les travaux peuvent commencer après réception d'un de ces exemplaires dûment accepté par le client. Le devis est valable trois mois. Dans le cas où les travaux débutent plus de six mois après l'établissement du devis, il est appliqué une révision de prix selon la formule suivante :

$$Rm = Ro\ (0{,}10 + 0{,}90\ Im / Io)$$

Rm : *nouveau montant du devis à la date de début des travaux*
Ro : *montant initial du devis*
Im : *valeur de l'index ingénierie à la date de début des travaux*
Io : *valeur de l'index ingénierie au mois précédant l'établissement du devis.*

Dans le cas où la probabilité d'un dépassement important du devis se révèle au cours des travaux, le CERIB interrompt ceux-ci et en informe le client qui dispose d'un délai de deux semaines pour accepter le devis complémentaire ou confirmer l'interruption. Dans ce dernier cas, les travaux déjà effectués sont facturés.

1.2 Acompte

Le versement d'un acompte est exigible à la commande.

1.3 Règlement des factures - Pénalités

Le paiement, net d'escompte, est exigible à 30 jours de la date de la facture.

Tout retard de paiement donnera lieu, après une mise en demeure effectuée par le CERIB, à la perception de pénalités dont le montant sera déterminé par application à la somme impayée d'un taux égal à deux fois le taux légal en vigueur, à compter de la date de paiement initialement convenue.

1.4 Aides

Dans le cas où une aide est sollicitée par le client pour financer une opération menée par le CERIB, la responsabilité du CERIB ne pourrait être engagée en cas de non-aboutissement de cette démarche.

1.5 Réclamations

Les réclamations doivent être formulées dans le délai de trois semaines après la réception du rapport final par lettre recommandée avec accusé de réception adressée au Directeur Général du CERIB.

1.6 Secret professionnel

Les membres du personnel du CERIB sont statutairement tenus à l'observation du secret professionnel. Il leur est interdit, sous peine de sanctions professionnelles et de poursuites pénales, de communiquer à toute autre personne que le demandeur tout renseignement concernant l'éxécution et les résultats des travaux réalisés à sa demande, ou toute information dont ils peuvent avoir connaissance à l'occasion de ces travaux.

1.7 Responsabilités

1.7.1

Le CERIB n'est responsable que des dommages qui sont la conséquence directe d'un manquement à ses obligations. En ce cas, ou pour toute autre raison d'ailleurs, il ne pourra être tenu responsable que des seuls dommages directs subis par le client et ce, tous chefs de préjudice confondus, dans la limite maximum du prix dû par le client au titre de sa commande, à moins que ce montant puisse être porté à une valeur supérieure du fait des garanties d'assurances visées à l'article 1.7.3 ci-après, ou qui ont pu être spécifiquement souscrites par le CERIB à la demande du client et pour son compte.

En tout état de cause, le CERIB ne saurait être tenu responsable de quelconques dommages subis par le client lors de l'application ou de l'utilisation de résultats issus des prestations, sauf à établir une faute lourde de sa part. Le client garantit le CERIB et ses éventuels sous-traitants contre toutes les réclamations de tiers en raison de dommages subis par eux qui découleraient de l'application ou de l'utilisation des résultats des prestations du CERIB par le client ou par un tiers auquel le client aurait transmis les dits résultats, sauf dol ou faute lourde de la part du CERIB.

Le CERIB n'accepte aucune responsabilité pour des dommages qui découleraient des défauts des biens remis par le client ou de la non-communication d'informations quant aux risques particuliers auxquels ceux-ci, en raison de leur conception ou de leur nature (notamment s'ils sont fragiles), se trouveraient exposés ou qu'ils feraient courir à la sécurité des personnes et des biens.

En tout état de cause, le client assumera l'entière responsabilité de tous dommages causés au CERIB ou à son personnel du fait de la fourniture d'une information insuffisante ou erronée.

1.7.2 Force majeure

En cas de force majeure ou d'événements assimilables tels que guerres, grèves, troubles politiques, incendies, séismes, inondations, épidémies, accidents dans les installations, bris de machine, interruptions ou perturbations dans les transports et les communications, retards dans les approvisionnements, chômage total ou partiel affectant le CERIB lui-même ou ses fournisseurs, la seule responsabilité du CERIB sera d'informer alors en temps opportun le client des difficultés d'exploitation résultant de telles circonstances.

1.7.3 Dommages aux biens confiés et assurances

Le CERIB décline toute responsabilité pour tous dommages survenant aux biens confiés à ses soins pendant les prestations proprement dites, et ce, tant dans ses propres établissements qu'en dehors de ceux-ci lorsque ces dommages sont une conséquence directe des prestations prévues à la commande.

Sous réserve de ce qui précède, le CERIB assume la responsabilité pouvant lui incomber en cas de dommages survenant aux biens confiés, à la suite d'erreur, de négligence ou de faute quelconque commise dans le déroulement des prestations, dans la limite de la somme de 152 450 € TTC.

1.7.4 Dommages corporels

À moins qu'il n'en soit convenu autrement, les dommages corporels de toute nature causés aux personnels du client, du CERIB et de ses fournisseurs directs à l'occasion de l'exécution des prestations resteront à la charge de leurs employeurs respectifs.

Ces dispositions sont limitées aux relations entre les Parties et ne portent pas atteinte aux droits et actions dont pourraient légalement se prévaloir les victimes des accidents ou leurs ayants droit, ou les organismes de la Sécurité Sociale.

1.8 Prévention des risques

Lorsque la prestation comporte une intervention sur des matériels ou dans des locaux présentant des risques potentiels pour les personnels du client, de ses partenaires ou du CERIB, le client devra obligatoirement en informer le CERIB lors de sa demande de prestations. Cette information ne saurait pour autant décharger le client de sa responsabilité en cas de sinistres intervenus malgré les précautions prises par le CERIB au regard des risques déclarés.

Chaque fois qu'il sera nécessaire, le client établira, en concertation avec le CERIB et avant le début de l'intervention, un plan spécifique de prévention des risques.

1.9 Sous-traitance

Sauf convention contraire expresse, le CERIB est autorisé, sous sa responsabilité, à recourir aux services de tiers pour exécuter la commande du client.

1.10 Résultats des prestations

Les prestations du CERIB donnent lieu à la remise au client d'un document (rapport, note de calculs...) établi en deux exemplaires (un seul exemplaire s'il s'agit d'un certificat d'étalonnage).

Ce document ne peut, sans l'accord du CERIB, être utilisé par le client à d'autres fins ou dans d'autres conditions que celles prévues. Il ne peut être communiqué ou reproduit que dans son intégralité, ou sous forme d'un résumé préalablement approuvé par le CERIB.

Inversement, le CERIB ne peut le communiquer ou le reproduire à l'usage de tiers qu'avec l'accord du client. Il est toutefois autorisé à diffuser, sous forme anonyme, la synthèse des résultats de ses travaux.

1.11 Résiliation

Si le client ayant manqué aux obligations mises à sa charge ne remédie pas à ce manquement dans un délai de quatre semaines après notification d'une mise en demeure par le CERIB, ce dernier pourra, sans préjudice de toute autre action, mettre immédiatement fin à ses propres engagements contractuels.

1.12 Litiges

Tout différend relatif à la validité, l'interprétation ou l'exécution des commandes auxquelles s'appliquent les présentes Conditions Générales, et qui n'aurait pu se résoudre amiablement, sera de la compétence exclusive des tribunaux dans le ressort desquels est situé le siège social du CERIB.

1.13 Droit applicable

Sauf convention contraire expresse, ces commandes sont exclusivement régies par le droit français.

2. CONDITIONS GÉNÉRALES COMPLÉMENTAIRES APPLICABLES AUX ESSAIS ET AUX ÉTALONNAGES

2.1 Définition des essais et des étalonnages

Les essais et les étalonnages non définis par un texte normatif doivent faire l'objet d'un programme précis. Ce programme doit être établi avec la participation des responsables des services du CERIB qui seront chargés de son exécution. Tous les documents nécessaires à l'exécution de la prestation devront être joints à la demande ou fournis à la requête du CERIB (notices, schémas, plans, circonstances détaillées des incidents éventuels, conditions d'utilisation...).

2.2 Réception des échantillons et des matériels

Les échantillons ou matériels doivent être déposés ou expédiés, franco de tous droits, à l'attention du Département du CERIB chargé de l'exécution du travail. Le CERIB ne peut en aucun cas être considéré comme responsable des pertes ou détériorations survenues aux échantillons ou matériels pendant les transports, ni des détériorations en cours d'essai ou d'étalonnage. Pour toute réexpédition, les frais de transport et d'emballage sont facturés en sus. En l'absence de valeur déclarée précisée sur la commande, les équipements ne seront pas assurés et aucun dédommagement ne sera pris en charge par le CERIB.

2.3 Exécution

Le rôle des laboratoires consiste essentiellement à effectuer des observations et des mesures, à en relever les résultats et à en fournir le procès-verbal. Toute mise au point ou modification des produits, échantillons ou matériels doit, en principe, être exécutée par le client.

Lorsque le matériel de mesure ou d'essai du CERIB est installé dans les locaux ou sur le site du client, celui-ci est réputé en avoir la garde et sa responsabilité est engagée en cas de destruction ou de détérioration.

Le client peut assister aux essais ou mesures. Il ne doit alors en aucun cas intervenir dans leur exécution. Il est tenu de se conformer aux règles de sécurité et de secret professionnel auxquelles le personnel du CERIB est lui-même astreint.

Le CERIB s'engage à mettre en œuvre, à la demande du client, les moyens matériels permettant d'effectuer les travaux réalisés dans les locaux du CERIB à l'abri des regards de toute personne étrangère à ces travaux.

2.4 Retrait des échantillons soumis à essai

Sauf accord particulier, le reliquat des échantillons soumis à essai n'est pas conservé après essai. Le CERIB est en droit de détruire les échantillons ou ce qu'il en reste.

3. CONDITIONS GÉNÉRALES COMPLÉMENTAIRES APPLICABLES AUX DIAGNOSTICS, ACTIONS APRÈS DIAGNOSTIC ET AUDITS

3.1 Participation de l'entreprise

La bonne fin dépend de la collaboration apportée par l'entreprise selon les conditions annexées au devis. En cas de non-respect de celles-ci, le CERIB se réserve le droit d'interrompre l'opération et de facturer les travaux déjà effectués.

3.2 Mise à disposition éventuelle de matériel

Lorsque le diagnostic comporte l'installation ou la mise à disposition de matériel dans l'entreprise, le maintien de ses qualités est à la charge de l'industriel.

4. CONDITIONS GÉNÉRALES COMPLÉMENTAIRES APPLICABLES AUX CONSULTATIONS TECHNOLOGIQUES

4.1 Domaine couvert par la consultation

L'expert délégué par le CERIB établit un constat de la situation et formule un avis. Cet avis résulte essentiellement des connaissances acquises par l'expert. Il est également fonction des informations mises à sa disposition. En conséquence, la responsabilité de l'expert ou du CERIB ne saurait se substituer à celle de l'entreprise dans la suite donnée à la consultation.

5. CONDITIONS GÉNÉRALES COMPLÉMENTAIRES APPLICABLES AUX NOTES DE CALCUL

5.1 Bases de calcul

Les hypothèses de calcul : valeur et mode d'application des charges, nature et caractéristiques des matériaux ou des produits..., devront être précisées au préalable par le client, en liaison avec le responsable concerné au CERIB. Sans information précise, les calculs seront effectués en prenant en compte les hypothèses les plus défavorables.

6. CONDITIONS GÉNÉRALES COMPLÉMENTAIRES APPLICABLES AUX EXPERTISES

6.1 Domaine couvert par l'expertise

L'expert du CERIB analyse le problème posé notamment à partir des informations communiquées par le client et lui remet un rapport d'expertise. La teneur de ce rapport est intimement liée à la qualité et à l'exactitude des éléments mis à la disposition de l'expert. En conséquence, la responsabilité du CERIB ne saurait se substituer à celle du client dans la suite à donner formulée par l'expert.

1 SAMPLE

This report identifies the physical and mechanical performance of the treatment plants in the ***MATRIX CLF*** range, manufactured by CL Fabrication at SHROPSHIRE (UNITED KINGDOM), in compliance with EN 12566-3 (July 2005) and its amendment A1 (January 2009) "Small wastewater treatment systems for up to 50 PTE – Part 3: Packaged and/or site assembled domestic wastewater treatment plants".

Summary definition of the range according to EN 12566-3: *"group of products in which, for the purpose of evaluation, the selected property or properties is/are similar for all products within the group".*

Manufacturer's declared characteristics for the *MATRIX CLF* range of small wastewater treatment plants:

- ***shape:*** CLF1 – 2 – 3: vertical cylindrical and CLF4 – 5 – 6 – 7: rectangular,
- ***equipment:*** 1st chamber: primary settlement,
  2nd chamber: bioreactor – treatment process: submerged aerated filter bed,
  3rd chamber: final settlement,
- ***material:*** polyethylene,
- ***end use conditions:*** - with and without groundwater (dry and wet ground conditions),
  - maximum authorised depth of backfill: 65 cm.

Design rules declared by the manufacturer to guarantee a minimum level of performance (hydraulic efficiency and structural behaviour) for all products in the range:

Plant reference	Pop. Equiv.	Nominal daily hydraulic flow Q_N	Nominal daily organic load (in BOD_5)	Test performed	Correlation rules
MATRIX CLF1	6 PE	1,2 m^3/d	0,36 kg/d	Treatment efficiency	The test is performed on the smallest product of the range. Except the dimensions of the units, the manufacturing specification is identical for all units in the range. See ITT report No. PIA2008-093B49.
MATRIX CLF7	50 PE	10,0 m^3/d	3,00 kg/d	Structural behaviour	The test is performed on the largest product of the range. The tested product presents the biggest length and width of the products of the range, with equivalent reinforcements and same high of backfill load.

Plant reference	Pop. Equiv.	Nominal daily hydraulic flow Q_N	Nominal daily organic load (in BOD_5)	Standard overall dimensions	Nominal Diameter of inlet/outlet connections (*ND*)
MATRIX CLF1	6 PE	1,2 m^3/d	0,36 kg/d	Diameter: 150 cm Height: 210 cm (integrated extension shaft 60 cm high includes)	DN: 110 mm
MATRIX CLF2	12 PE	2,4 m^3/d	0,72 kg/d	Diameter: 190 cm Height: 210 cm (integrated extension shaft 60 cm high includes)	DN: 110 mm
MATRIX CLF3	18 PE	3,6 m^3/d	1,08 kg/d	Diameter: 250 cm Height: 210 cm (integrated extension shaft 60 cm high includes)	DN: 110 mm
MATRIX CLF4	25 PE	5,0 m^3/d	1,50 kg/d	Length: 471 cm Height: 217,4 cm (integrated extension shaft 65 cm high includes) Width: 150 cm	DN: 160 mm
MATRIX CLF5	30 PE	6,0 m^3/d	1,80 kg/d	Length: 401 cm Height: 217,4 cm (integrated extension shaft 65 cm high includes) Width: 212,4 cm	DN: 160 mm
MATRIX CLF6	40 PE	8,0 m^3/d	2,40 kg/d	Length: 506 cm Height: 217,4 cm (integrated extension shaft 65 cm high includes) Width: 212,4 cm	DN: 160 mm
MATRIX CLF7	50 PE	10,0 m^3/d	3,00 kg/d	Length: 561 cm Height: 217,4 cm (integrated extension shaft 65 cm high includes) [1)] Width: 212,4 cm	DN: 160 mm

[1)] The tested plant for Pit Test presents an integrated extension shaft 90 cm high, to take into account the pedestrian loads of 17 cm high.

2 SUMMARY OF TEST RESULTS

Compliance (as applicable) of the test results is established according to the requirements of EN 12566-3 (Appendix A of this document).

The entries shown in bold are those that may be displayed in commercial documents for CE-marked products.

Plant reference	**Test date**	**Test site(s)**	**Nominal daily hydraulic flow Q_N**	**Nominal daily organic load (in BOD_5)**	**WATERTIGHTNESS (WATER TEST)** Visual inspection	**TREATMENT EFFICIENCY** Efficiencies during nominal load sequences (for 20 results)	**STRUCTURAL BEHAVIOUR (PIT TEST)** Visual inspection Watertightness/ Deformations
MATRIX CLF1	from 10/12/07 to 31/08/08	PIA AACHEN (Germany)	**1,2 m³/d**	**0,36 kg/d**	No loss of watertightness **ITT report n° PIA 2008-093B49** **compliant**	**Average performance:** **BOD_5: 96,2%** **COD: 91,4%** **SS: 95,5%** obtained with average **daily organic loads** at inlet **(in BOD_5) : 0,34 kg/d** Average concentrations at outlet : BOD_5 : 11 mg/l COD: 56 mg/l SS : 16 mg/l **ITT report n° PIA 2008-093B49**	

MATRIX CLF7 AH-953-MS-01-50PE-P	from 10/07/09 to 11/09/09	CERIB EPERNON (France)	**10,0 m^3/d**	**3,00 kg/d**			Test in dry ground conditions. Maximum authorised depth of backfill: 65 cm. Variation in capacity over 3 weeks: - 2,6% in relation to volume after being buried for 24 hours. No deformation at connections Test in wet ground conditions. Maximum authorised depth of backfill: 65 cm. Variation in capacity over 3 weeks after the test in dry ground conditions: - 3,0% in relation to volume after being buried for 24 hours. No loss of watertightness No deformation at connections **compliant**

3 DETAILS OF TEST PROCEDURES AND RESULTS

3.1 Watertightness test

The test is carried out on one representative plant in the range, in compliance with annex A.2 of EN 12566-3.
See ITT Report n° PIA 2008-093B49.

3.2 Treatment efficiency test

The test is carried out on one of the plants in the range, according to annex B of EN 12566-3.

3.3 Structural behaviour test (Pit Test)

The test is carried out on one of the small wastewater treatment plants in the range, in compliance with annex C of NF EN 2566-3.

The Pit Test is a structural test. It assesses the mechanical properties of a plant subjected to earth pressure to its lateral walls, to backfill and pedestrian loads to the top, as well as to possible ground water pressure.

It involves placing the plant in a test pit and burying it with gravel. If testing performance in wet ground conditions, the pit is then filled with water to simulate the presence of ground water.

The assessment of the plant's mechanical characteristics is based upon variation in its volume, its watertightness, as well as any deterioration occurring during the test.

3.3.1 Description of loads

The loads imposed on the plant are evenly distributed on the walls, exerted by 4-8 mm rounded gravel only (dry ground conditions), or by 4-8 mm rounded gravel immersed in water (wet ground conditions).

- **Lateral loads**

The Pit Test simulates the horizontal pressure exerted on the lateral walls of the plant, combining the following forces *(figure 1)*:

- those resulting from the pressure of 4-8 mm rounded gravel, which simulates earth pressure
- those resulting from water pressure (only in wet ground conditions), which represents groundwater pressure.

The angle α defines the influence zone within which the material is involved in the exertion of a lateral force on the plant wall. It is a function of the angle of internal friction ϕ of the material.

For 4-8 mm gravel, ϕ is taken to equal 36°. Thus: $\alpha = \frac{\pi}{4} + \frac{\phi}{2} = 63°$.

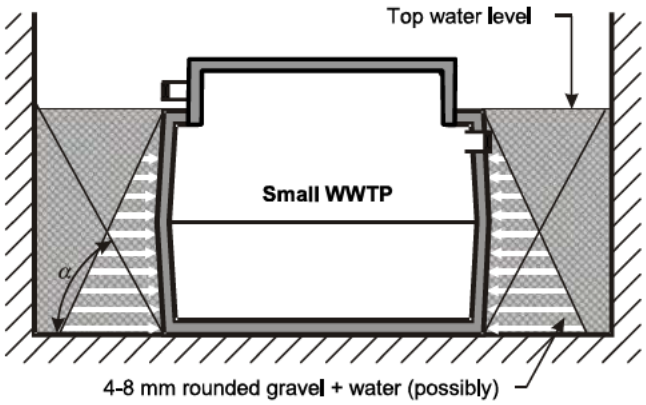


Figure 1. Action of horizontal loads exerted by the gravel on the plant

- **Vertical loads (weight loads)**

The Pit Test takes into account the vertical pressure, adding a layer of 4-8 mm rounded gravel, evenly distributed on top of the plant (*figure 2*). The layer of gravel combines:

- The maximum height of backfill allowed, according to the manufacturer.
- The pedestrian loads on the plant in operation. The load applied is 2.5 kN/m². The filling depth due to pedestrian loads only is 17 cm.

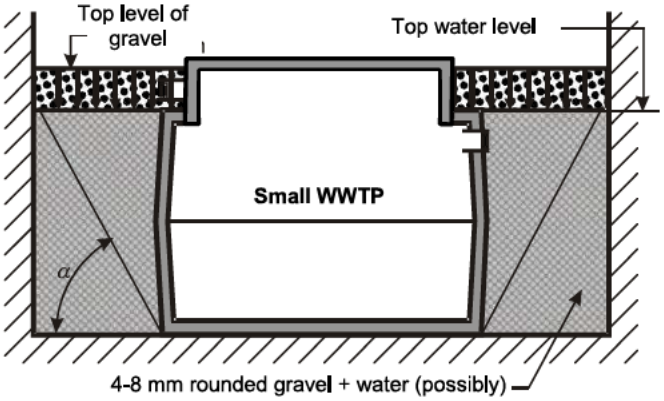


Figure 2. Action of vertical loads exerted by the gravel on the plant

3.3.2 Testing procedure

- **Step 1 (determining the initial dimensions)**

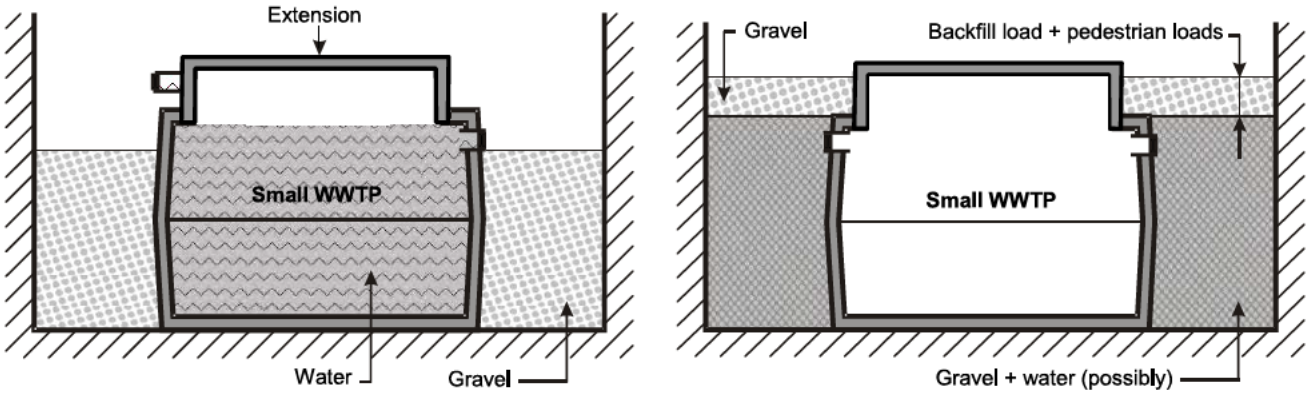
Measuring the internal dimensions of the plant.

- **Step 2 (installing the plant)**

- Installing the plant in the pit on a horizontal bed of gravel. It is fixed at the bottom of the pit by belts, so as to hold the position of the plant to its foot, according to the manufacturer's instructions.
- Sealing the inlet and outlet connections.

- **Steps 3 to 5 (burial and possible submerging of the plant)**

- Filling the pit with gravel up to the level of the pipe connections.
- Simultaneously, filling the plant to the top with water.
- Determination of the volume V_1 (l) of water introduced into the plant.
- Emptying the plant.
- Checking the positions of the inlet and outlet pipe connections.
- Backfilling with gravel up to the top of the plant, then to the depth necessary to take account of the backfill authorised by the manufacturer, as well as pedestrian loads.
- Possible filling of the pit with water to the top level of the plant, if it is tested in wet ground conditions *(figure 3)*.
- For polyethylene plants, refilling the plant with water after it has been buried for 24 hours.
- Determination of the fresh volume $V_{1'}$ (l) of water introduced into the plant.
- Emptying the plant.



Burial of the plant with gravel and simultaneous filling with water

Addition of backfill loads, emptying the plant and possible submersion in water (in wet ground conditions)

Figure 3. Steps 3 to 5 of the Pit Test

- **Step 6 (testing)**

Maintenance of the test conditions for a 24 hour period, three weeks for polyethylene plants.

- **Step 7 (inspection of the plant)**

- Visual inspection of the inside of the plant at the end of the test period.
- If there is no visible sign of leaking, filling the plant to the top with water.
- Determination of the volume V_2 (l) of water introduced into the plant.
- Calculation of variation in volume: $\Delta = V_2 - V_1$, (l) (after 3 weeks).

3.3.3 Expression of results

Any cracking or deformation is observed and recorded.

In wet ground conditions, any loss of water tightness is recorded.

The deformation is given by the variation in volume of the plant Δ.

Table 1 shows the observations made for the plant of the range tested.

3.3.4 Equipment and materials used

- Water flowmeter: ± 1% of reading.
- Test pit.
- Gravel:
  - 4-8 mm,
  - rounded,
  - with a dry bulk density of 1.55 kg/l.

3.3.5 Results

Plant reference	MATRIX CLF 7					
Declared date of manufacture	08/07/09					
Maximum authorised depth of backfill	65 cm					
Condition of use	Not within the water table (dry ground conditions)			Within the water table (wet ground conditions following testing in dry ground conditions)		
Observed characteristic	Visual assessment	Volume	Deformation	Visual assessment	Volume	Deformation
Before test	/	V_{1dry} = 20 970 litres	/	/	V_{1wet} = 20 128 litres	/
After being buried for 24 hours	/	$V_{1'dry}$ = 20 662 litres	- 1,5% (after 24 hours)	/	$V_{1'wet}$ = 20 120 litres	- 0% (after 24 hours)
A the end of the test	No failure No deformation at connections	V_{2dry} = 20 128 litres	Δ_{dry} = $V_{2dry} - V_{1'dry}$ = - 534 litres i.e. – 2,6% of the initial volume (after 3 weeks)	No failure No deformation at connections No loss of watertightness	V_{2wet} = 20 032 litres	Δ_{wet} = $V_{2wet} - V_{1'wet}$ = - 88 litres i.e. – 0,4% of initial volume (after 3 weeks) **Δ_{total} = $V_{2wet} - V_{1'dry}$ = - 630 litres i.e. – 3,0% of initial volume (after 6 weeks)**

Table 1. Results of the structural behaviour test (Pit Test)

This test report only certifies the characteristics of the sample submitted for testing and makes no judgement about the characteristics of similar products. It does not, therefore, constitute product certification under article L 115-27 of the French consumer code and of the law of 3 June 1994. The specifications of the reference standard are given for information.

[redacted] Test M[redacted]

L. MORCET LAMARCHE **S. PO**[redacted]

ANNEX A

Extracts from the specifications of EN 12566-3 + A1 (January 2009)
"Small wastewater treatment systems for up to 50 PTE – Part 3: Packaged and/or site assembled domestic wastewater treatment plants"

Watertightness (Clause 6.4 of the Standard)

The plant shall be watertight up to the height declared by the manufacturer; the minimum declared height shall be to the top of the tank.

Water test

When tested according to A.2, the water loss for plants shall be measured after 30 min.

For concrete plants:

For tanks made of concrete it shall be ≤ 0,1 l/m^2 of the internal wet surface of the external walls.

For polyethylene, steel or GRP plants:

For tanks made from plastics or other material, no leakage shall occur.

Vacuum test

For GRP or steel plants:

When tested according to A.3, the plant shall be deemed watertight when the vacuum pressure selected for the test does not deviate by more than 10 % of the selected pressure

Pneumatic pressure test

The plant is considered to be watertight when:

- tested in the conditions given in A.4.2 a), the pneumatic pressure selected for the test does not deviate by more than 0,5 kPa (0,005 bar) during the related test period; or
- tested in the conditions given in A.4.2 b), the variation of the initial pneumatic pressure (equal to 0,3 bar) is less than 3 kPa (0,03 bar) during 180 s.

Treatment efficiency (Clause 6.3 of the Standard)

Nominal designation (clause 5): The nominal organic daily load expressed in kg of BOD5 (or BOD7) per day and the nominal hydraulic daily flow (Q_N) expressed in cubic metres per day shall be declared.

The plant shall demonstrate compliance with the wastewater treatment efficiency performances and the related operational data declared by the manufacturer.

The manufacturer's declaration shall be expressed in terms of the treatment efficiency ratios on COD, BOD and SS in relation to the tested organic daily load as indicated in B.4.

The mean value of the 20 efficiency ratios obtained during the NOMINAL sequences (with and without power breakdown) shall be calculated for each parameter. The tested organic daily load shall be the mean value of the 20 organic daily loads measured during the NOMINAL sequences. (clause B.4)

Each efficiency ratio is calculated using the following formula:

$$R = \frac{P_i - P_o}{P_i}$$

where:

R is the efficiency ratio for a given parameter (COD, BOD, SS ...);

P_i is the value of the given parameter at the inlet;

P_o is the value of the same given parameter at the outlet.

The ratio declared by the manufacturer shall not be greater than those obtained by the test made according to Annex B. In addition, another way of expression of the efficiency may be used for BOD, COD and suspended solid.

EXAMPLE Minimum and maximum concentrations of the effluent and/or the influent.

Note : The ratios obtained do not automatically mean that the regulatory requirements on effluent qualities in a given country are met. A calculation should be made to indicate the final effluent qualities, which should be compared to the requirements valid in the place of use.

These ratios may not always be obtained when the plant is operating in practice.

In addition, the following parameters shall be declared: nominal organic daily load and nominal hydraulic daily flow. Total power consumption shall be declared, if applicable.

Where required, i.e. by national regulations, parameters described in B.2.4 shall be declared.

Structural behaviour (Clause 6.2 and annex C of the Standard)

The plants shall resist the loads and stresses resulting from handling, installation and use, including desludging and maintenance, for their design life.

Depending on the end use, the following loads for the complete equipped plant shall be considered:

a) backfill load;

b) hydrostatic loads;

c) pedestrian loads.

Pit Test

For concrete or GRP plants:

For plants with tanks made of concrete or GRP, no failure shall occur during the test. In addition, no lack of watertightness shall be recorded.

For polyethylene or steel plants:

- variation of the volume of the plant (expressed in litres) shall be lower than 20 % of the internal volume of the plant;
- movement of inlet, outlet and interconnecting pipe works shall not lead to a loss of watertightness.

Crushing test

For concrete plants –Type A, B and C tests:

The load F corresponding to failure shall be noted and expressed in kN.

For polyethylene plants:

This test method is applicable for use in dry conditions only.

The load corresponding to collapse shall be noted and expressed in kN.

Vacuum test

For GRP plants:

No permanent deformation shall occur following application of a vacuum *P* for one minute.

APPENDIX B
Tests on the MATRIX CLF range

Structural behaviour test

Handling of the plant in the test pit

Installation of the plant in the test pit

Anchoring of the plant at the bottom of the test pit

Filling the test pit with gravel and simultaneously filling the plant with water

Backfilling with gravel to include the maximum backfill authorised and the pedestrian loads

Plant under test conditions

Appendix B – British Water Code of Practice, Flow and Loads 4 (2013)

BRITISH WATER
expertise worldwide

SEPA Scottish Environment Protection Agency

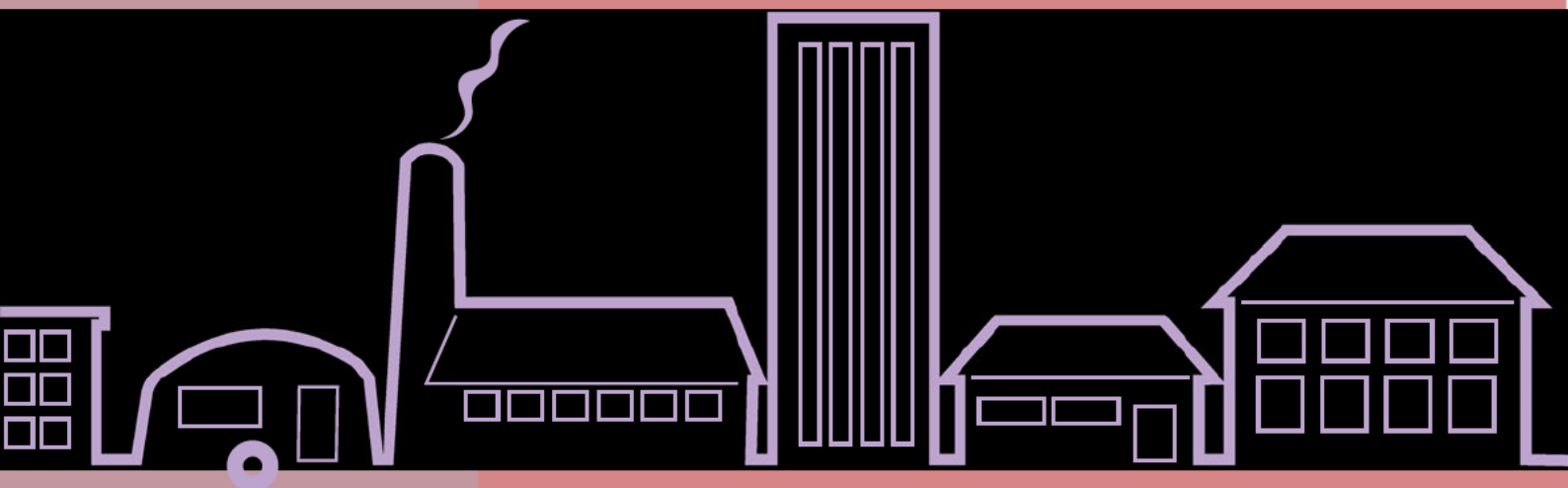
Environment Agency

NIEA Northern Ireland Environment Agency

Code of Practice

Flows and Loads – 4

Sizing Criteria, Treatment Capacity for Sewage Treatment Systems



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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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General Binding Rules Compliance Report

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Site Details			
Site Name:	Engine House STP	Contract/Ref.:	PC1121
Site Address:	Leonardslee Lakes & Gardens, Brighton Rd, Horsham, RH13 6PP	Date:	18 April 2024
Site Contact:	Derran Holden		

General

The Engine House at Leonardslee Lakes & Gardens is a small café located at the bottom of the valley next to the lakes, and is planned to be upgraded to include a single WC. The WC will serve the café guests, staff and other garden guests.

Due to the geographical location and the distance to the main facilities, it is not economical feasible to pump the wastewater from the café WC to the main foul drainage network at the top of the hill. Similarly, installing a cesspool and then transporting the wastewater using a small sludge tanker is neither practical nor economical viable. This leaves the option of treating the wastewater on site and discharging it locally.

Compliance with General Binding Rules for SSDs (see appendix A)

The general binding rules consist of the conditions together with technical requirements specified by the Environment Agency in guidance to operators, compliance with which is part of the conditions. These will apply to anyone who has a septic tank or sewage treatment plant that makes a small sewage discharge, from January 2015. The general binding rules set out the conditions that septic tanks and sewage treatment plants need to meet in order to be used without an environmental permit (Rules #1 to #14). In addition, any new installation that started on or after 1 January 2015 will have to comply with Rules #15 to #21.

The following table list all rules relevant to the proposed sewage treatment system at the above site, i.e. all rules relating to "Discharges to surface water". Rules relating solely to "Discharges to ground" (incl. rules #1, #5, #7 and #18) are not relevant.

Rule	General Binding Rule	Compliance
#2	The discharge must be 5 cubic metres or less per day in volume.	**Yes** – the maximum anticipated discharge from the café WC is 1.54m3 per day using British Water CoP, see appendix B and C).
#3	The sewage must only be domestic.	**Yes** – domestic type waste from a WC only.
#4	The discharge must not cause pollution of surface water or groundwater.	**Yes** – subject to the STP being maintained and operated in accordance with the manufacturer's guidelines.
#6	The sewage must receive treatment from a sewage treatment plant.	**Yes** – sewage will receive treatment from a STP.
#8	For discharges in tidal waters, the discharge outlet must be below the mean spring low water mark.	**Yes** – not applicable as no discharge into tidal waters.
#9	All works and equipment used for the treatment of sewage effluent and its discharge must comply with the relevant design and manufacturing standards ie the British Standard that was in force at the time of the installation, and guidance issued by the appropriate authority on the capacity and installation of the equipment.	**Yes** – subject to the new proposed STP being compliant with BS EN 12566-3.
#10	The system must be installed and operated in accordance with the manufacturer's specification.	**Yes** – subject to the new STP being installed in accordance with manufacturer's specification.
#11	Maintenance must be undertaken by someone who is competent.	**Yes** – subject to the new STP being maintained by a professional service provider.
#12	Waste sludge from the system must be safely disposed of by an authorised person.	**Yes** – subject to the new STP being maintained by a professional service provider who arranges sludge removal by a licensed waste carrier (i.e. tanker).

General Binding Rules Compliance Report

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#13	If a property is sold, the operator must give the new operator a written notice stating that a small sewage discharge is being carried out, and giving a description of the waste water system and its maintenance requirements.	**Yes** – subject to this report and new STP documents being given to the new homeowner/operator.
#14	The operator must ensure the system is appropriately decommissioned where it ceases to be in operation so that there is no risk of pollutants or polluting matter entering groundwater, inland fresh waters or coastal waters.	**Yes** – not relevant at this time as new STP being installed at this time.
#15	New discharges must not be within 30 metres of a public foul sewer.	**Yes** – the nearest public foul sewer is more than 30m away.
#16	For new discharges, the operator must ensure that the necessary planning and building control approvals for the treatment system are in place.	**Yes** – subject to the operator/planning consultant obtaining all required planning and building control approvals for the new STP.
#17	New discharges must not be in or within: 500 metres of a Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar site, biological Site of Special Scientific Interest (SSSI), freshwater pearl mussel population, designated bathing water, or protected shellfish water; 200 metres of an aquatic local nature reserve; 50 metres of a chalk river or aquatic local wildlife site.	**Yes** – there are none of these special conservation areas within 500m, nor an aquatic local nature reserve within 200m, nor a chalk river/aquatic local wildlife site within 50m of the proposed new discharge (see appendix D).
#19	New discharges must be made to a watercourse that normally has flow throughout the year.	**Yes** – the discharge will be made to a watercourse that flows throughout the year.
#20	For new discharges, any partial drainage field must be installed within 10 metres of the bank side of the watercourse.	**Yes** – not applicable as there will be no partial drainage field. The discharge will be made directly to a watercourse.
#21	New discharges must not be made to an enclosed lake or pond.	**Yes** – the discharge will be made to a cascading lake system that has a through flow throughout the year.

In summary, the proposed new STP (subject to conforming to BS EN 12566-3) at the Engine House Cafe will comply with the current EA General Binding Rules for SSDs.

Study undertaken and report written by:

(Dr Dirk Daude)

General Binding Rules Compliance Report

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Appendix A – EA General Binding Rules for SSDs

Department for Environment, Food and Rural Affairs

Reform of the regulatory system to control small sewage discharges from septic tanks and small sewage treatment plants in England

General binding rules for small sewage discharges (SSDs) with effect from January 2015

The following general binding rules apply to all small sewage discharges:

#	Discharges to surface water	Discharges to ground	General binding rule
1		X	The discharge must be 2 cubic metres or less per day in volume.
2	X		The discharge must be 5 cubic metres or less per day in volume.
3	X	X	The sewage must only be domestic.
4	X	X	The discharge must not cause pollution of surface water or groundwater.
5		X	The sewage must receive treatment from a septic tank and infiltration system (drainage field) or a sewage treatment plant and infiltration system.
6	X		The sewage must receive treatment from a sewage treatment plant.
7		X	The discharge must not be within a groundwater Source Protection Zone 1 or within 50 metres from any well, spring or borehole that is used to supply water for domestic or food production purposes.
8	X		For discharges in tidal waters, the discharge outlet must be below the mean spring low water mark.

#	Discharges to surface water	Discharges to ground	General binding rule
9	X	X	All works and equipment used for the treatment of sewage effluent and its discharge must comply with the relevant design and manufacturing standards ie the British Standard that was in force at the time of the installation, and guidance issued by the appropriate authority on the capacity and installation of the equipment.
10	X	X	The system must be installed and operated in accordance with the manufacturer's specification.
11	X	X	Maintenance must be undertaken by someone who is competent.
12	X	X	Waste sludge from the system must be safely disposed of by an authorised person.
13	X	X	If a property is sold, the operator must give the new operator a written notice stating that a small sewage discharge is being carried out, and giving a description of the waste water system and its maintenance requirements.
14	X	X	The operator must ensure the system is appropriately decommissioned where it ceases to be in operation so that there is no risk of pollutants or polluting matter entering groundwater, inland fresh waters or coastal waters.

For a new discharge, which is one that was started on or after 1 January 2015, the following general binding rules also apply:

#	Discharges to surface water	Discharges to ground	General binding rule
15	X	X	New discharges must not be within 30 metres of a public foul sewer.
16	X	X	For new discharges, the operator must ensure that the necessary planning and building control approvals for the treatment system are in place.
17	X		New discharges must not be in or within: 500 metres of a Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar site, biological Site of Special Scientific Interest (SSSI), freshwater pearl mussel population, designated bathing water, or protected shellfish water; 200 metres of an aquatic local nature reserve; 50 metres of a chalk river or aquatic local wildlife site.
18		X	New discharges must not be in, or within 50 metres of, a Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar site, or biological Site of Special Scientific Interest (SSSI), and must not be in an Ancient Woodland.
19	X		New discharges must be made to a watercourse that normally has flow throughout the year.
20	X		For new discharges, any partial drainage field must be installed within 10 metres of the bank side of the watercourse.
21	X		New discharges must not be made to an enclosed lake or pond.

Explanatory Note

General binding rules is a term given to legally binding requirements in regulations that set the minimum standards or conditions which apply. In this case the conditions are set in the **Environmental Permitting (England and Wales)(Amendment)(England) Regulations 2014.**

The general binding rules consist of the conditions together with technical requirements specified by the Environment Agency in guidance to operators, compliance with which is part of the conditions. These will apply to anyone who has a septic tank or sewage treatment plant that makes a small sewage discharge, from January 2015.

The general binding rules set out the conditions that septic tanks and sewage treatment plants need to meet in order to be used without an environmental permit.

Further information on the new approach to how we will regulate small sewage discharges is available on Gov.uk.

January 2015

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Appendix B – British Water Code of Practice (Flow and Loads 4)

BRITISH WATER
expertise worldwide

SEPA Scottish Environment Protection Agency

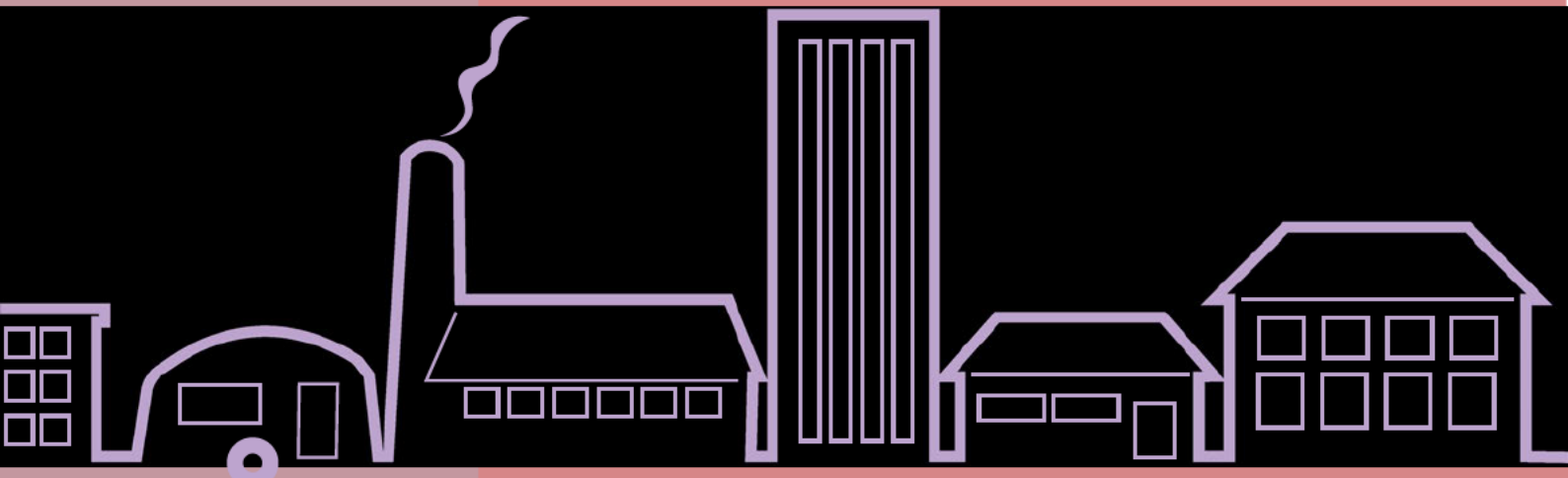
Environment Agency

NIEA Northern Ireland Environment Agency

Code of Practice

Flows and Loads – 4

Sizing Criteria, Treatment Capacity for Sewage Treatment Systems



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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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General Binding Rules Compliance Report

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Appendix C – Flow and Load Calculations

Influent Loadings

Influent design loadings are based on the information provided by the client and using British Water Code of Practice, Flow and Loads 4 (2013).

The Engine House Café is served by a single WC.

Application	No.	Hydraulic Load [l/d]		Organic Load [$gBOD_5/d$]		Ammonia Load [gNH_3/d]	
		per Head	Total	per Head	Total	per Head	Total
Café users (simple café food & drinks)	80	12	960	12	960	2.5	200
Additional toilet users	40	10	400	12	480	2.5	100
Staff (part-time)	4	45	180	25	100	3	12
Summary Loadings:			**1,540**	l/d	**1,540**	$gBOD_5/d$	**312**	gNH_3/d
			10	pe	**26**	pe	**39**	pe
					1,000	mg/l	**203**	mg/l

Notes:

1) The above maximum number of users is restricted due to the fact that the café site only has a single WC available to all guests and staff.
2) The café will only serve kiosk-style food/cakes & drinks (coffee/tea) and does not have any cooking facilities.
3) The proposed new STP must be tested and fully compliant with BS EN 12566-3 (up to 50pe).

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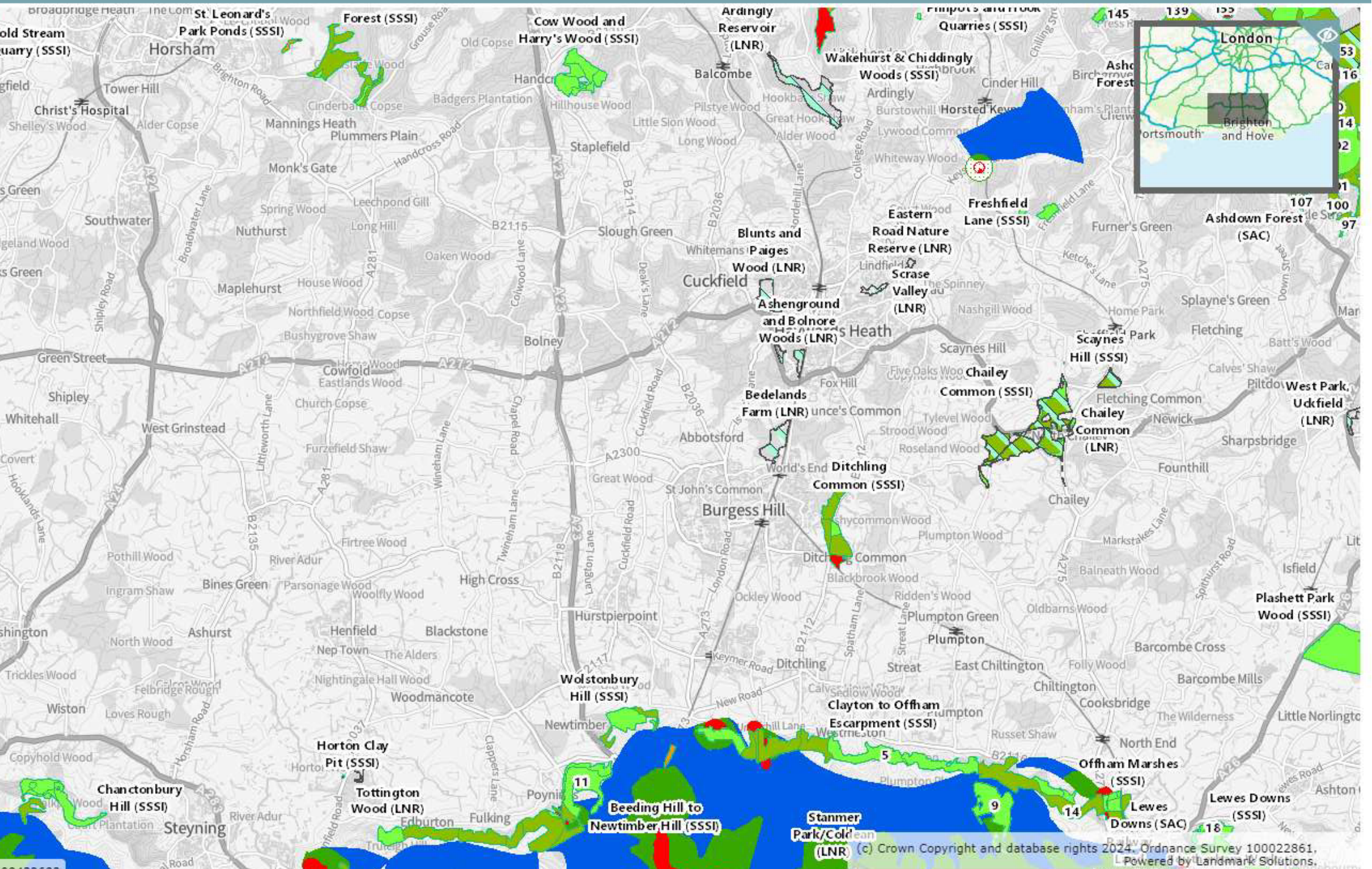
Appendix D – Excerpt from Magic Map showing special conservation areas within the larger region and local area


OSGB36
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St Leonard's Forest (SSSI)
Park Ponds (SSSI)
Horsham
Cow Wood and Harry's Wood (SSSI)
Ardingly Reservoir (LNR)
Balcombe
Wakehurst & Chiddingly Woods (SSSI)
Quarries (SSSI)
Ardingly
Horsted Keynes
Cinder Hill
Tower Hill
Christ's Hospital
Mannings Heath
Plummers Plain
Staplefield
Monk's Gate
Southwater
Nuthurst
Slough Green
Blunts and Paiges Wood (LNR)
Eastern Road Nature Reserve (LNR)
Freshfield Lane (SSSI)
Furner's Green
Ashdown Forest (SAC)
Cuckfield
Scrase Valley (LNR)
Ashenground and Bolnore Woods (LNR)
Maplehurst
Bolney
Splayne's Green
Fletching
Scaynes Hill (SSSI)
Chailey Common (SSSI)
Green Street
Cowfold
Shipley
Whitehall
West Grinstead
Bedelands Farm (LNR)
Fletching Common
Chailey Common (LNR)
Newick
Abbotsford
Ditchling Common (SSSI)
Burgess Hill
Sharpsbridge
Fountain Hill
Chailey
Bines Green
High Cross
Hurstpierpoint
Ditchling Common
Plumpton Green
Plumpton
Isfield
Plashett Park Wood (SSSI)
Ashurst
Henfield
Blackstone
Ditchling
Streat
East Chiltington
Barcombe Cross
Barcombe Mills
Chiltington
Cooksbridge
Wolstonbury Hill (SSSI)
Woodmancote
Clayton to Offham Escarpment (SSSI)
Newtimber
Horton Clay Pit (SSSI)
Tottington Wood (LNR)
Chanctonbury Hill (SSSI)
Steyning
Edburton
Fulking
Beeding Hill to Newtimber Hill (SSSI)
Stanmer Park/Coldean (LNR)
North End
Offham Marshes (SSSI)
Lewes Downs (SAC)
Lewes Downs (SSSI)
London
Brighton and Hove
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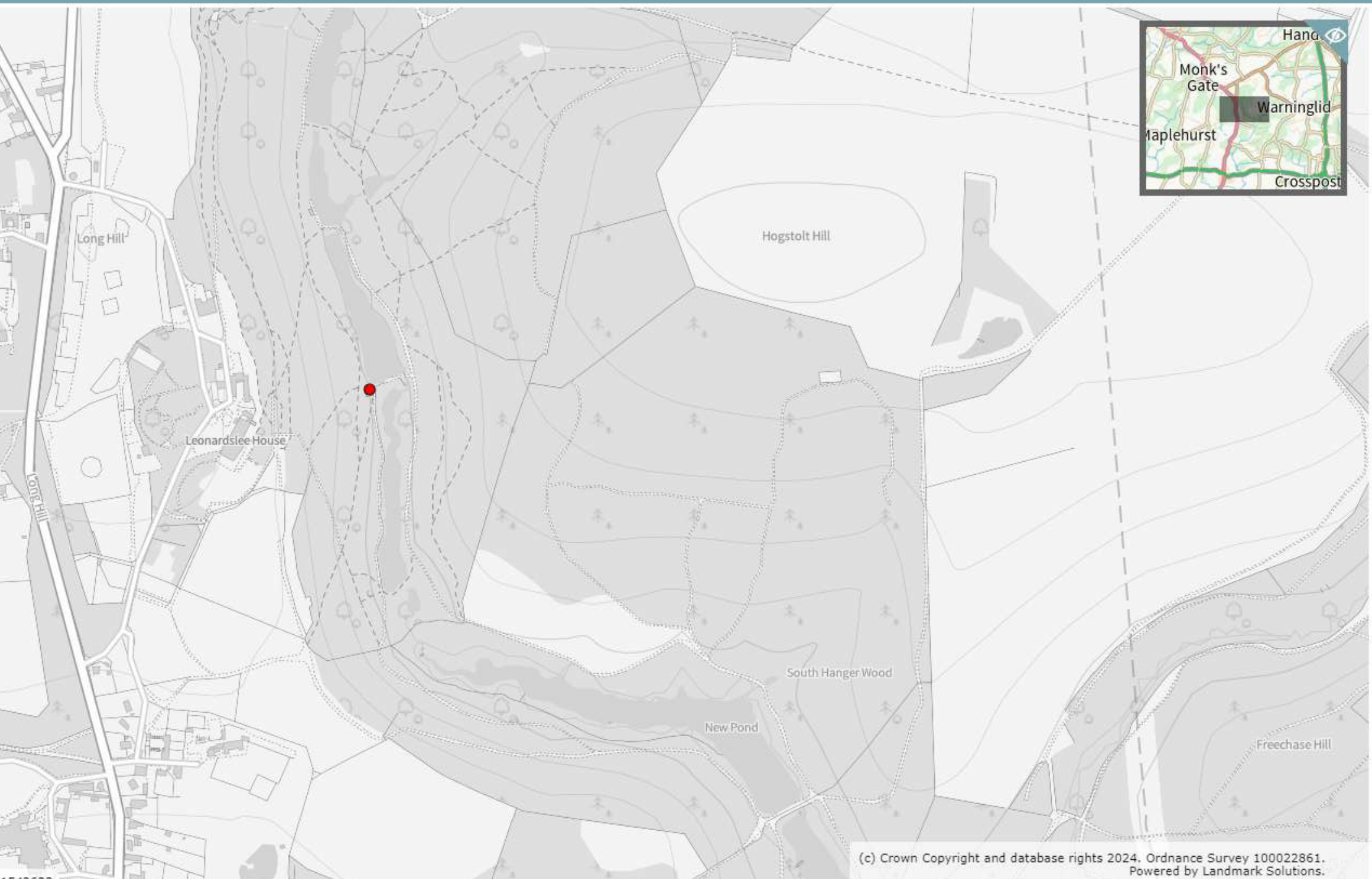
OSGB36
1:5,000
Hand
Monk's Gate
Warninglid
Maplehurst
Crosspost
Long Hill
Hogstolt Hill
Leonardslee House
Long Hill
South Hanger Wood
New Pond
Freechase Hill
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