

HiPAF[®]

High performance aerated filter packaged wastewater treatment plants



Adaptable wastewater treatment



HiPAF Range

The HiPAF range from WCS Environmental Engineering is a decentralised wastewater treatment plant for sites where mains drainage is unavailable.

Serving up to 2,000 population equivalent (PE) our wastewater treatment systems are adapted to meet your specific needs, backed by dedicated technical support throughout the whole project

Our high level of expertise means that we offer all of our customers, from individual homeowners to large water companies, commercial and industrial clients, robust wastewater treatment process solutions that are environmentally compliant..

Design parameters with tertiary treatment	Final effluent quality
Biochemical oxygen demand (BOD 5)	10 mg/L
Total suspended solids (TSS)	10mg/L
Ammoniacal Nitrogen (NH 4-N)	2mg/l
Higher standards are achievable	

Meeting the precise needs of clients

We collaborate with clients, identifying ways to improve efficiency and profitability:

- Upfront consultation to understand the specific needs of the project
 - Dedicated technical support throughout the whole life of the project
 - Meeting Environment Agency standards even at Sites of Special Scientific Interest (SSSI)
 - Work with the client to deliver cost-efficient treatment for the whole life of the plant
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Flexible options:

- Hire equipment to keep sites operational and within consent
- Standard and customised solutions based on site-specific need
- Site refurbishment option can further reduce cost and site waste
- Scalable solutions to accommodate growing populations
- Above and below ground systems. Below ground option ideal for sites which do not want to impede on the landscape

Compliant:

- UK Building Regulations
- Environment Agency guidelines
- British Water's Code of Practice - Flows & Loads
- Compact HPC plant designed and manufactured to BS EN 12566-3
- Midi and modular plants designed in accordance with BS EN 12255 -1/15 and manufactured using BS 4994 as a guide
- CE marked where applicable
- Glass reinforced plastic (GRP) is UV stabilised. Manages seasonal variations in occupancy levels
- The unique design of the flow balancing in the primary tank means it can cope with variable flows and loads making it ideal for caravan sites and other seasonal sites

Ease of installation:

- Compact site footprint minimises excavation
- Modular design (larger plants) overcome site access and footprint restrictions
- Off-site build reduces time on site and health and safety risk

Low maintenance & long term reliability:

- Minimum of 25 years design life
- Energy efficiency
 - Patented process (biozone) treats wastewater with greater efficiency – reducing energy and footprint size
 - Energy-saving timer – pulses air from the blower(s) into the process
- GSM telemetry available for remote monitoring of the plant
- No electrical or moving parts within the tank
- No need to drain tanks to remove the media during maintenance
- Easier tankering - primary sludge and humus are stored together
- Midi and modular plant - large, gas strut assisted lids to give full access for maintenance

Three-stage system for safer processing

Stage

1



Primary settlement

- Incoming wastewater enters the primary settlement stage where organic and inorganic matter settles
- The sludge is held in this section until it requires de-sludging
- A unique forward-feed arrangement uses an airlift to deposit wastewater into the biological treatment stage (biozone), which keeps peak flows from entering the system and prevents hydraulic surges



Stage

2



Biological treatment

- Settled liquor enters the biological section either by displacement or via the airlift
- High-voidage plastic media, contained between two floors within the biozone, encourages the growth of bacteria and other organisms which treat the wastewater
- Air required for the treatment process is delivered by air-blowers housed in a weatherproof kiosk
- The air also helps to scour the media bed, preventing the filter from blocking
- A series of diffusers installed beneath the media bed ensure an even distribution of air



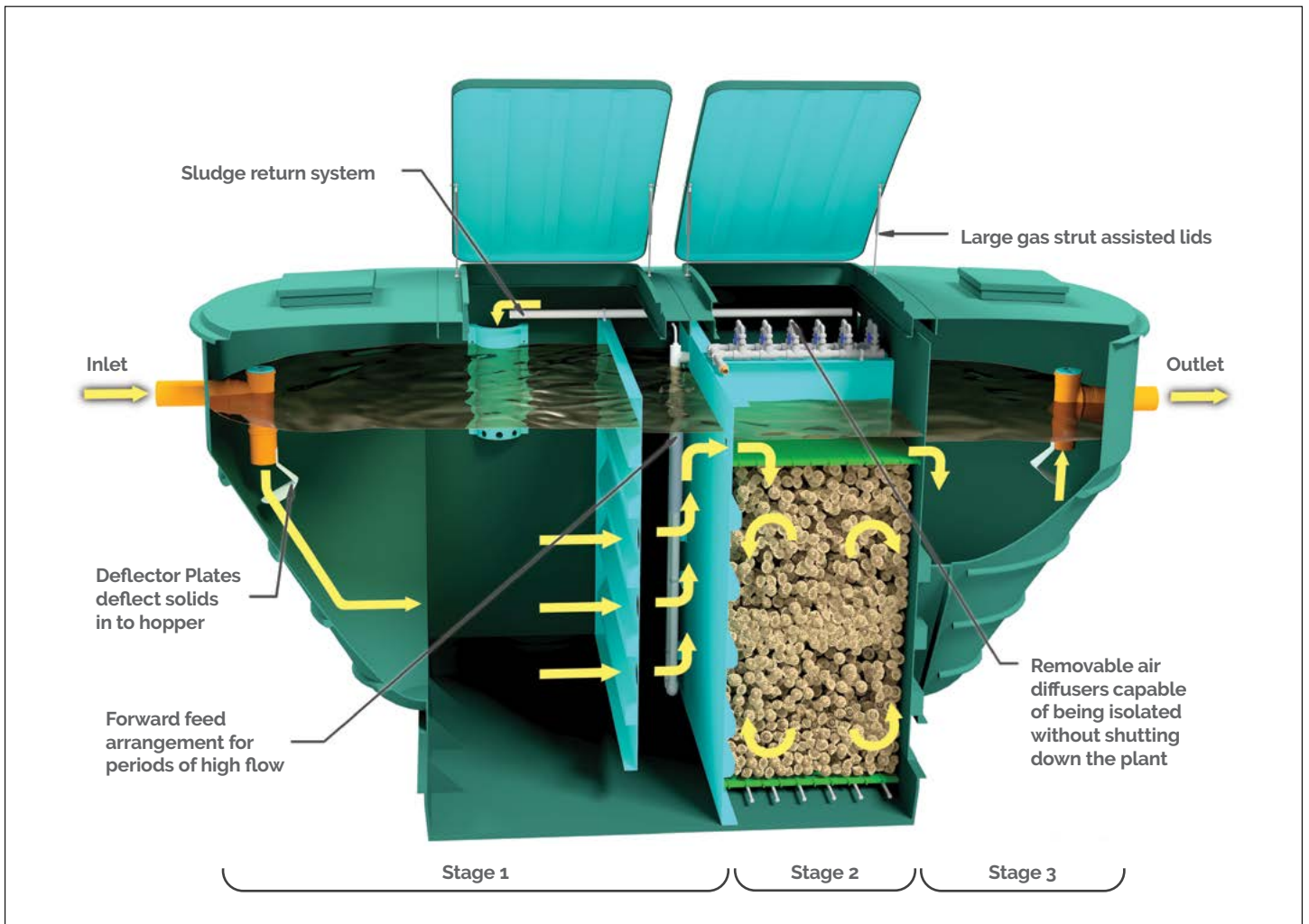
Stage

3



Final settlement

- The treated wastewater (final effluent) enters the final settlement section
- Dead biomass (humus sludge) from the process settles out
- An airlift automatically transfers settled humus sludge back to the primary settlement section for co-settlement
- The final effluent is discharged through gravity displacement to either a watercourse or a sub-surface irrigation field



HiPAF midi packaged sewage treatment plant illustration (above)

Internal Access

The internal sections of the plant can be accessed from the large, gas strut assisted lids. Air is introduced to the unit by a series of air diffusers. Each diffuser is capable of being isolated and removed individually without the need to shut down the plant or affect air supply to the rest of the unit. The complete absence of mechanical and electrical components within the hostile environment provides safe and clean working conditions on site.



Internal air diffusers (left)



Large gas strut lids (right)

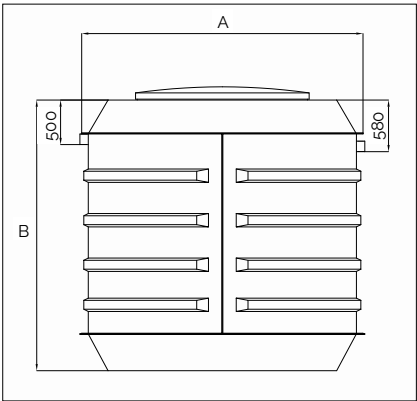
Technical Specification

Please use the tables below as an indicative guide to selecting the right packaged treatment plant for your site.
For technical advice or more information on the range please contact us or a qualified contractor.

HiPAF compact system 1 to 60 PE

Model PE	Standard Consent*	A Diameter (m)	B Height (m)	Inlet Invert (mm)	Outlet Invert (mm)
10	20:30:20	2.32	2.64	500	580
20	20:30:20	2.32	2.80	500	580
30	20:30:20	2.61	2.70	500	580
40	20:30:20	2.86	2.70	500	580
50	20:30:20	3.20	3.00	500	580
60	20:30:20	3.20	3.20	500	580

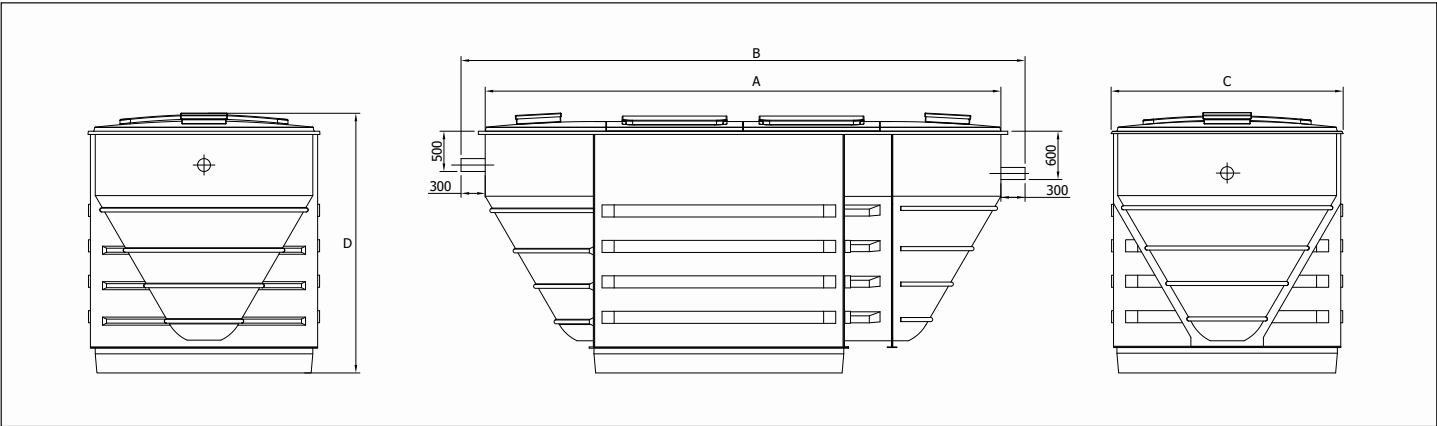
*Typical consent standards shown, tighter consent standards available to meet all requirements specified by the EA



HiPAF midi system 60 up to 300 PE

Model PE	Standard Consent**	A Length (m)	B Length w/pipes (m)	C Width (m)	D Height (m)	Inlet Invert (mm)	Outlet Invert (mm)	Weight (Tonne)
70	20:30:20	4.30	4.90	2.88	3.20	500	600	1.60
90	20:30:20	4.80	5.40	2.88	3.20	500	600	1.90
110	20:30:20	5.20	5.80	2.88	3.20	500	600	2.25
130	20:30:20	5.80	6.40	2.88	3.20	500	600	2.50
150	20:30:20	6.40	7.00	2.88	3.20	500	600	2.90
175	20:30:20	7.00	7.60	2.88	3.20	500	600	3.40
200	20:30:20	7.60	8.20	2.88	3.20	500	600	3.90

** Typical consent standards shown – tighter consent standards available to meet all requirements specified by the EA. For options above 200PE please contact us.



The tables are an indicative guide only. All applications are specified to comply with the British Water Code of Practice for Flows and Loads. Further technical information can be found on our website.

Design parameters

Design Criteria	British Water's Flows and Loads 4	
Peak flow treatment	Generally 3 dry weather flow	
Invert depth	0.5m as standard, other invert depths available up to 1.5m	
Discharge standards		
	Standard	Final effluent quality
	Biochemical oxygen demand (BOD 5)	20mg/L
	Total suspended solids (TSS)	30mg/l
	Ammoniacal Nitrogen (NH 4-N)	20mg
	Standard with tertiary treatment	
	Biochemical oxygen demand (BOD5)	10mg/l
	Total suspended solids (TSS)	10mg/l
	Ammoniacal nitrogen (NH 4-N)	2mg/l
	Higher NH 4-N and BOD 5 removal is achievable. Option of phosphate removal with the use of additional process technologies	

Design options

- Invert depths available up to 1.5m with turret extensions
- Pumped inlet flow control
- Control panels are available to cater for single and three phase electrical supplies
- Alarm beacon for mechanical failure and loss of air pressure
- Duty/duty stand-by and variable speed drive blower(s)
- GSM telemetry for remote monitoring of the plant
- Technologies such as a sand filter or microscreen can improve final effluent quality

Design options

The weatherproof kiosk is acoustically-lined to house the control panel, air distribution manifold and air blower(s) on site. Ten metres of high temperature resistant airline hose is supplied to connect blowers to the treatment plant – extra lengths can be supplied.



Case Studies

Holiday Park treatment tackles seasonal flows

An existing sewage treatment plant located at the foot of the Quantock Hills in Somerset needed replacing. It was important to find a robust and reliable treatment for the static caravans and chalets on-site.

The Environment Agency stipulated the treated effluent quality, which is released into the historic bay of St Audries, should achieve a maximum of 40mg/L biochemical oxygen demand (BOD) and 60mg/L suspended solids (SS).

HiPAF tanks were installed below ground. A two way flow splitter, installed between the HiPAFs and the primary tank separates the effluent into parallel streams, allowing the operators to switch between the two HiPAF systems or to use both at once, subject to load.

As the treatment site was close to a number of static caravans, it was important to create a replacement plant which was low on noise and odour. The Nethercott family, who own the Home Farm Holiday Centre, wanted the installation to take place with as little disruption to the natural environment as possible.

Dibby Nethercott, one of the owners said:

“The new treatment plant fulfils our requirement in that it is quiet when in operation and treats effluent to a high environmental standard.”

Population equivalent: 1000

Consent: 40mg/L BOD⁵ and 60mg/L SS

Design flow rate: 155.4m³/day and 5.4l/sec peak flow



Discreet package treatment installed at English whisky distillery

When it came to choosing a package sewage treatment plant for The Lakes Distillery on the banks of Lake Bassenthwaite, it was important to find a model which could blend into the stunning rural setting and also treat wastewater to the highest environmental standards.

The HiPAF midi was chosen and fitted as the new distillery was taking shape. Treated water from the plant will be discharged into the River Derwent, which is a site of special scientific interest (SSSI), meaning pollutants have to be thoroughly removed from wastewater to meet statutory regulations.

The below ground HiPAF midi can be controlled in such a way to guarantee removal of organic pollutants and total nitrification to meet surface water discharge consents even in SSSI's.

Managing director of The Lakes Distillery Paul Currie said:

“Our distillery is building a reputation as one of the greenest in the world, so it was important for every part of our renovation and building work to be carried out to the highest possible environmental standards.”

The lakes which is at the heart of the Lake District National Park will produce a million bottles of English malt a year and expects to welcome 55,000 visitors annually.

Population equivalent: 177

Consent: 20mg/L BOD⁵; 30mg/L SS; 20mg/L NH₄-N

Design flow rate: 10.2m³/day flow and 0.35 l/sec peak flow



Northumberland National Park visitor centre selects HiPAF package treatment

A prestigious new visitor centre in the heart of Northumberland National Park has benefitted from a specially designed package plant. The Sill National Landscape Discovery Centre, a £14.2m joint project between the National Park and the Youth Hostel Association, has been built with the help of £8m from the Heritage Lottery Fund.

The treated effluent at the site is released into a natural stream while sludge is periodically tankered to an offsite wastewater treatment works. It was very important to supply back-up blowers and to enable the facility to connect a generator in the event of a power failure. The package plant comprises of two modular high performance aerated filter – HiPAF – units, a primary settlement tank to separate solids and a submerged aerated filter (SAF) tank for biological treatment. An extra-large, glass-reinforced plastic control kiosk was also supplied.

Stuart Evans, Sill Project Director of Northumberland National Park said:

“The Sill will be much more than a visitor attraction – it will enable us to reconnect with our landscapes and our heritage. It is important that we seek the highest environmental standards in all our construction and operational activity to minimise disruption to the natural beauty of the area.”

Population equivalent: 500

Consent: 20mg/L BOD₅; 30mg/L SS; 10mg/L NH₄-N

Design flow rate: 40m³/day flow and 1.39 L/sec peak flow



Sewage treatment upgrade at remote historic site

A celebrated historic site on an island in the Orkney archipelago needed to upgrade its wastewater treatment plant; ensuring its replacement was able to cope with wildly fluctuating flows and extreme weather conditions. Whether coping with the impact of thousands of visitors during the summer or surviving the vagaries of the Orkney winter, the new compact treatment plant would be serving visitors to the Neolithic treasure for years to come.

A huge increase in the numbers of cruise ship visitors was one of the main reasons that the original HiPAF system needed to be replaced. The previous plant was installed in 1997 when the Visitor Centre was first built and over the sixteen year time period, gave very few problems - which is why its engineers were happy to install a new system to replace it.

The original plant was re-purposed to create an overflow tank by removing the internal equipment. This tank can now be used for storage should effluent pass a certain level in the event of prolonged power failure in extreme winter weather conditions.

Despite the technical challenges, the compact nature of the plant meant it could be transported and installed with minimum disruption to the daily running of the visitor centre.

Population equivalent: 500

Consent: 20mg/L BOD₅; 30mg/L SS; 20mg/L NH₄-N

Design flow rate: 19.4m³/day flow and 0.67L/sec peak flow



Case Studies

Premier treatment for Swansea City's New Training Centre

The success of Premier League football team Swansea City on the pitch has been matched by the remarkable transformation of the club's new Fairwood training centre. Modernisation of the facility, which is leased from the University of Swansea, included building eight full-size pitches, changing facilities, offices, seminar rooms, a canteen and specialist medical and physiotherapy rooms.

Importantly, to accommodate the impressive new buildings and a significant increase in activity at the site, extra sewage treatment processing was also required. In view of the prestigious, public nature of the site, the installation needed to be wholly reliable, and discreet. The existing gravity-fed trickling filter plant, while meeting discharge consents, was too basic to accommodate the new demands. Further, the location of the legacy plant, in a wooded area 150m from the facility, also made it difficult to service and maintain.

The HiPAF midi plant suits a usage of 60-300 people and can easily handle the variable pattern of usage to be expected at a state of the art premier league training facility.

Population equivalent: 300

Consent: 20mg/L BOD₅; 30mg/L SS; 20mg/L NH₄-N

Design flow rate: 11.1m³/day flow and 0.39L/sec peak flow



Yorkshire Water installed HiPAF® in rural village

Yorkshire Water installed a customised sewage treatment plant produced in the scenic, rural village of Appletreewick, in the Yorkshire Dales. The HiPAF modular packaged treatment plant was used to replace the current system. The customised wastewater treatment system is designed to meet site specific requirements for up to 300 population equivalent and adheres to the Yorkshire Water assets standards.

Due to the aesthetics of both the village and the surroundings, minimal visual impact of the product was required. The HiPAF modular is completely below ground, meaning that it does not impede the scenic views of the Yorkshire Dales and requires only a small excavation. A factor that had to be considered was the site's highly variable flow rate increases due to surface water ingress. At the Appletreewick site, the peak flow can reach levels over 20 times that of the dry weather flow. Flow retention within the primary, SAF (biozone) and humus tanks means that the HiPAF modular "Off-site built" plant can cope with variable flows and loads, a key benefit of this particular system.

Population equivalent: 300

Consent: 40mg/L BOD₅ and 60mg/L SS

Design flow rate: 671m³/day flow and 7.76L/sec peak flow



Our Roots

WCS Environmental Engineering is a part of the WCS Group, which has the in-house skills and expertise in place to deliver full turnkey solutions from influent to effluent, with the capability to close the loop with water reuse.

Our clients include the highly regulated wastewater utilities, municipalities, industrial and commercial sectors, as well as domestic homeowners.



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