Queensland Government

TREATMENT PLANT APPROVAL 20/2021

Plumbing and Drainage Act 2018

Approval

1. The **BioSeptic Performa 2020 (10EP/1500L)** ("the system") described in the Specifications and Drawings in the attached Schedule and manufactured by **BioSeptic Pty Ltd** ("the manufacturer") (ABN 95 056 461 226) has been assessed in accordance with the Queensland Plumbing and Wastewater Code (QPW Code) dated 26 March 2019.

2. Approval is granted for the advanced secondary quality wastewater treatment system, subject to compliance by the manufacturer with the requirements of the *Plumbing and Drainage Regulation 2018*, and the conditions of approval detailed below.

3. This approval, the conditions of approval and the Schedule comprise the entire Treatment Plant Approval document.

4. Any modification by the manufacturer to the design, drawings or specifications scheduled to this approval must be approved by the Chief Executive.

Conditions of approval

5. The manufacture, installation, operation, service and maintenance of the systems must be in conformity with the conditions of this Treatment Plant Approval.

6. The system when tested by a certification accreditation body in accordance with AS1546.3:2017 was found to comply with the advanced secondary 10EP/1500L level without nutrient reduction effluent criteria and must continue to meet the following requirements:

TABLE 2.1 (AS1546.3:2017)

EFFLUENT COMPLIANCE CRITERIA FOR AN STS WITH NO NUTRIENT REDUCTION FACILITIES

Parameter	Secondary effluent		Advanced secondary effluent	
	90% of samples	Maximum	90% of samples	Maximum
BOD_5	≤20 mg/L	30 mg/L	≤10 mg/L	20 mg/L
TSS	≤30 mg/L	45 mg/L	≤10 mg/L	20 mg/L
*E. coli**	≤10 cfu/100 mL	30 cfu/100 mL	≤10 cfu/100 mL	30 cfu/100 mL
FAC	Minimum 0.5 mg/L†	N/A	Minimum 0.5 mg/L†	N/A
Turbidity	N/A	N/A	N/A	5 NTU

* Where disinfection is required.

† Minimum level, not 90% of samples.

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Delegated Authority
Department of Energy & Public Works

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7. Each system must be serviced in accordance with the accreditation certificate by Global Certification Pty Ltd on 09 July 2020, and details supplied in the owner's operation and maintenance manual.

8. Each system must be supplied with —

   (a) a copy of this Treatment Plant Approval document;
   (b) details of the system;
   (c) instructions for authorised persons for its installation;
   (d) a copy of the owner's manual to be given to the owner at the time of installation; and
   (e) detailed instructions for authorised service personal for its operation and maintenance.

9. At each anniversary of the Treatment Plant Approval date, the supplier must submit to the Chief Executive a list of all systems installed in Queensland during the previous 12 months. Where the Chief Executive is notified of any system failures the Chief Executive may randomly select a number of installed systems for audit. The Chief Executive will notify the supplier's nominated NATA accredited laboratory which systems are to be audited for BOD^5 and TSS. The sampling and testing of the selected systems, if required, is to be done at the supplier's expense. The following results must be reported to the Chief Executive;

   (a) Address of premises;
   (b) Date inspected and sampled;
   (c) Sample identification number;
   (d) BOD^5 for influent and effluent; and
   (e) TSS for influent and effluent.

10. The Chief Executive may, by written notice, cancel this approval if the manufacturer/supplier fails —

    (a) to comply with one or more of the conditions of approval; or
    (b) within 30 days, to remedy a breach, for which a written notice been given by the Chief Executive.

11. This approval may only be assigned with the prior written consent of the Chief Executive.

12. This approval expires on 15 April 2026 unless cancelled earlier in accordance with paragraph 10 above.

Treatment Plant Approval
Approved by: Stacey McInnes
Delegated Authority
Department of Energy & Public Works

Queensland Government

Stacey McInnes
A/Director
Plumbing, Drainage and Special Projects
Building Legislation and Policy
Date approved: 16 April 2021

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ABN 61 331 950 314

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TREATMENT PLANT APPROVAL No. 20/2021
Plumbing and Drainage Act 2018

SCHEDULE

Attachment 1

Drawings and Specifications for the

BioSeptic Performa 2020

Treatment Plant Approval
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PRODUCT CERTIFICATE OF REGISTRATION

Global Certification Pty Ltd

Number 576

Product Performance Testing

AS 1546.3:2017

Advanced Secondary 1500 L/day or 10EP Level

Issued to

BioSeptic Pty Ltd

67 Smeaton Grange Road, Smeaton Grange NSW 2567

Certification Date: - 1 July 2020 Expiry Date: - 30 June 2025

Product Certified:

Model	Disinfection	Average Results over the Test Period	Servicing Frequency	Discharge	Manufactured and assembled
BioSeptic Performa 2020	**Yes**	**TSS 5.8mg/l BOD_5 1.9mg/l Turbidity 14.5NTU E coli <1 CFU/100ml**	**3 Monthly Service 4.3 yearly sedimentation pump out or as required**	**Pumped via disinfection/pump chamber with chlorine dispenser**	**Manufactured and Assembled at: 49C Smeaton Grange Road Smeaton Grange, NSW 2567**
The system took 1 week to meet the advanced secondary standard. It is serviced 3 monthly.					

NACE CODES: 3700

This Certificate of Conformance to the Product Certificate Scheme for "Domestic Wastewater Treatment Units (Septic Tanks) and Rainwater Tanks" remains the property of Global Certification Pty. Ltd. and is granted subject to the terms and conditions of the Contract Application, in respect of the Product certified on this page and the attached schedule to the Certification of Conformance, bearing the same number as this certificate.

Date of Issue: 9th July 2020

Bruce Smith Director

www.jas-anz.com.au/register

Signed for and on behalf of Global Certification Pty Ltd
PO Box 195, Morayfield QLD 4506

Treatment Plant Approval
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Department of Energy & Public Works
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THE OPERATION AND PERFORMANCE OF THE BIOSEPTIC PERFORMA 2020 Sewage Treatment System

This is an edited and updated excerpt from a paper presented at On-Site 01 at Armidale, New South Wales, September 2001. The full peer reviewed paper can be obtained from BioSeptic Pty Ltd. The numbering follows section 2 of Schedule 5 of the Plumbing and Drainage Regulation 2019.

2 (a) The Purpose and Process overview of the BioSeptic Performa 2020

The BioSeptic Performa 2020 is an Advanced Secondary Sewage Treatment System contained in two concrete tanks. It treats all the wastewater from a domestic house by an aeration process to reduce pollutants in the water. The treated water is disinfected by chlorine before disposal through surface or subsurface irrigation. The vegetation in the disposal area completes the water cycle by transpiring the water to the atmosphere and utilising the residual nutrients for vegetative growth.

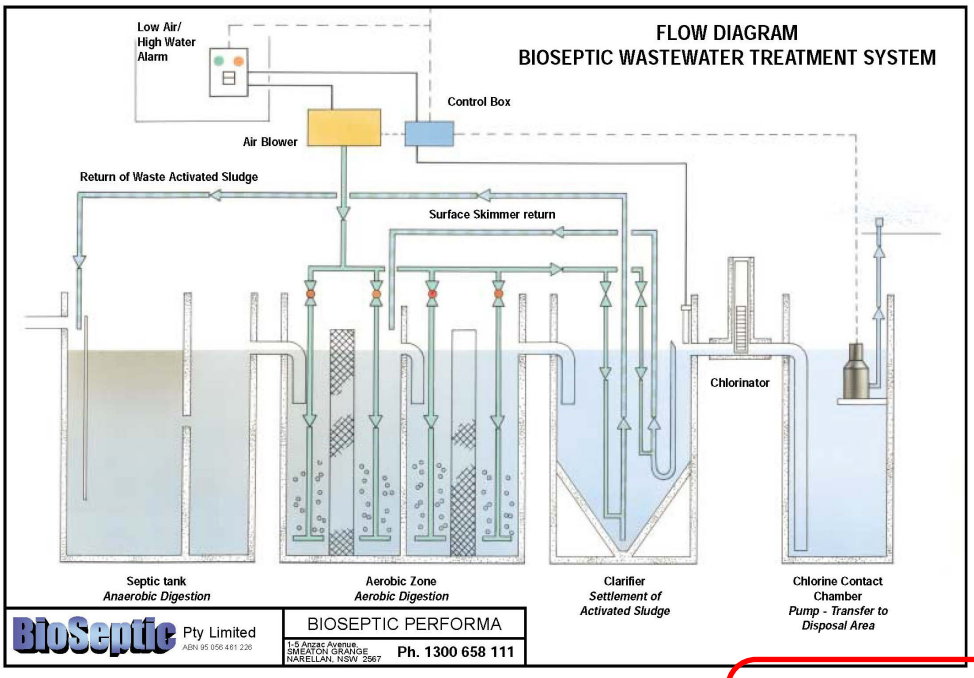
The Performa was tested by Global Certification Pty Ltd to the Advanced Secondary treatment level of AS1546.3:2.17 between May 2019 and January 2020 at the Jimboomba Sewage Treatment Plant.

Refer to the Engineering drawings and specification sheet for further details of all components.

2(b) Model name

BioSeptic	Performa 2020 STS
Capacity	1500L/day
Treatment level	Advanced Secondary Treatment

2(c) Flow diagram



2(d) Treatment Process

Septic Tank

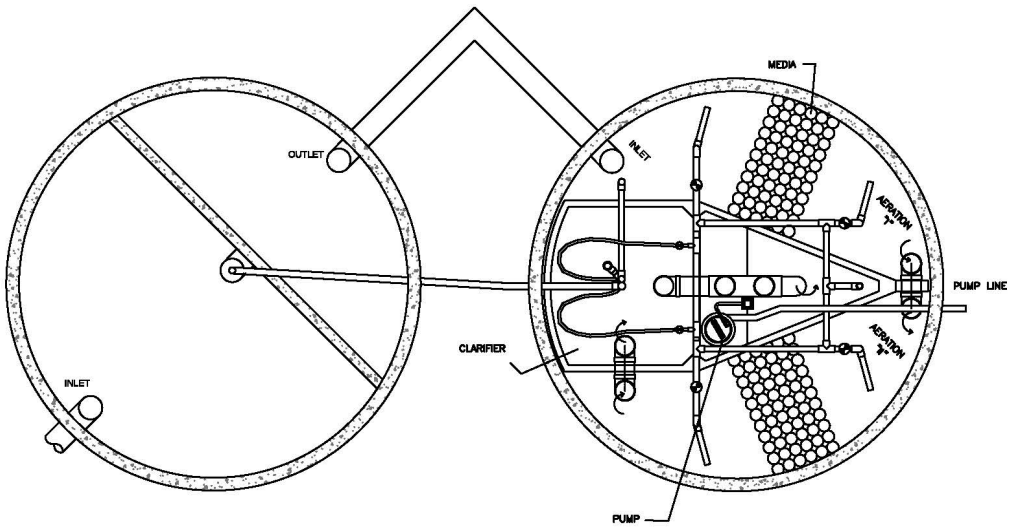
The Performa receives all the wastewater from the house toilets, bathrooms, laundry and kitchen. The Performa's primary tank is a 3575 L baffled septic tank to ensure good primary settling. A concrete baffle creates a 2:1 division in the tank. The baffle makes the tank into a giant grease trap and prevents the overflow of scum from the tank. The wastewater (influent) from the house flows into the septic tank through an inlet square junction. The square junction is a vertical pipe that directs the influent down to the middle depth of the tank, preventing splashing that will disturb the surface crust. There is a second vertical square junction in the baffle that prevents floating solids transferring into the second septic chamber.

The heavier fraction of the wastewater sinks to the bottom of the tank and the lighter fraction of oils and fats, floats to the surface to form an airtight scum to reduce the transfer of atmospheric air into the water. An anaerobic condition develops in which anaerobic bacteria commence the degradation of the organic matter that settles out of the influent. Anaerobic bacteria are slow acting bacteria that in the absence of free oxygen digest the complex organic compounds into simple soluble compounds that are used by the bacteria for energy and food. The process can be described in simple terms as:

Organic matter + anaerobic microorganisms → anaerobic microorganisms + water + carbon dioxide + methane + nitrogen & phosphorous compounds

The settled sludge forms a layer in the bottom of the two chambers. The floating scum is retained on the inlet side of the baffle. A stainless steel outlet filter fitted in the outlet square junction traps floating solid particles and prevents their overflow into the aeration chambers.

Figure 1: The BioSeptic Performa 2020.



Treatment tank.

An air blower pumps 80 litres of air per minute into the two discrete aeration chambers to increase the dissolved oxygen concentration. Aerobic bacteria use the oxygen to oxidise the complex compounds in the organic matter into simple compounds that are used as energy and food for their survival. The aerobic process does not generate the noxious gases such as methane that are produced in the anaerobic process. The reduction of the organic matter is also known as Biochemical Oxygen Demand (BOD_5) reduction. The process can be described in simple terms as:

Organic matter + aerobic microorganisms $\rightarrow$ aerobic microorganisms + water + carbon dioxide + nitrates & phosphorous compounds

It can be seen in Figure 1 that the media is placed transversely to the flow path so that the water must pass through the media for treatment by the biomass. The media divides each aeration chamber into two sections with each section containing an air diffuser to provide good oxygen transfer to the water.

The Performa 2020 achieved BOD_5 reduction of 99.44%.

Clarifier.

After the aeration process has reduced the organic load the water overflows into the clarifier. All aeration processes create a biomass known as activated sludge and this needs to be removed from the discharge water. The Performa has a 0.5m2 rectangular clarifier with a cone at the base to concentrate the settled sludge to a central pick-up point. The large surface area ensures that the activated sludge has sufficient settling time to allow a clarified liquor to overflow into the disinfection stage.

An airlift returns all of the settled activated sludge from the bottom of the clarifier hopper to the septic tank. This is waste activated sludge and the anaerobic processes of the septic tank degrades it. The skimmer removes any floating biomass plus a portion of the clarifier influent water containing the activated sludge and recycles it to the inlet of the first aeration chamber.

The Performa 2020 achieved a Total Suspended Solids (TSS) reduction of 98.16%.

Disinfection process

The final part of the process is to disinfect the water to kill pathogens. The Performa uses chlorine in the form of 200gm tablets of sodium trichloroisocynuric acid. To test the efficiency of the disinfection process the water is sampled and tested for the presence of Escherichia coli (E. coli) as an indicator pathogen. These are bacteria present in the lower intestines of warm bloodied animals. E.coli are always present in sewage and if they are reduced or not detected, it is an indication that other pathogens that are susceptible to chlorine have been removed or reduced.

The Performa 2020 has a 300 L chlorine contact chamber to ensure that there is sufficient contact time.

The Performa 2020 achieved an E.coli reduction of 99.99%.

2(e) Component Specification

Design capacity Design flow	 1500L/day
Septic tank Concrete septic tank with concrete baffle to AS/NZS1546.1:2008 Operation	3575L 2:1 division Reduces BOD_5 & SS by settling solids Anaerobic digestion of solids and scum
Aeration chambers Air blower Dissolved oxygen Operation	Two discrete chambers of 1250L each Four submerged air diffusers 80L/minute >2.0g/m^3 Average during test – 3.82g/m^3 Reduction of complex compounds in the waste to simple compounds for bacterial digestion
Bacterial support media Operation	120m^2 of submerged polyethylene tubular media Substrate for bacteria
Clarifier Operation	Capacity - 500L Surface area - 0.5m^2 Equipped with surface skimmer and waste sludge return Settles SS and recycles and wastes MLSS to maintain CRT
Chlorinator Operation	Erosion tablet type 200gm tablets of Sodium Trichlorocynuric acid. Adds chlorine to stream.
Chlorine contact chamber Operation	Capacity - 300L Provides > 30 minutes of residence time to ensure pathogen kill
Pump chamber Pump	Capacity/pump cycle - 100L Submersible type 20m head
Surcharge provision	Capacity – 1000L prior to overflow into chlorine contact chamber

2(f) Component materials

Tanks and internal chamber	Concrete
Bacterial support media	Polyethylene
Air and water pipes	uPVC
Air blower	Cast aluminium with copper wiring
Water pump	Cast iron, stainless steel with copper wiring
Control box	PVC
Control box and blower cover box	Composite resin

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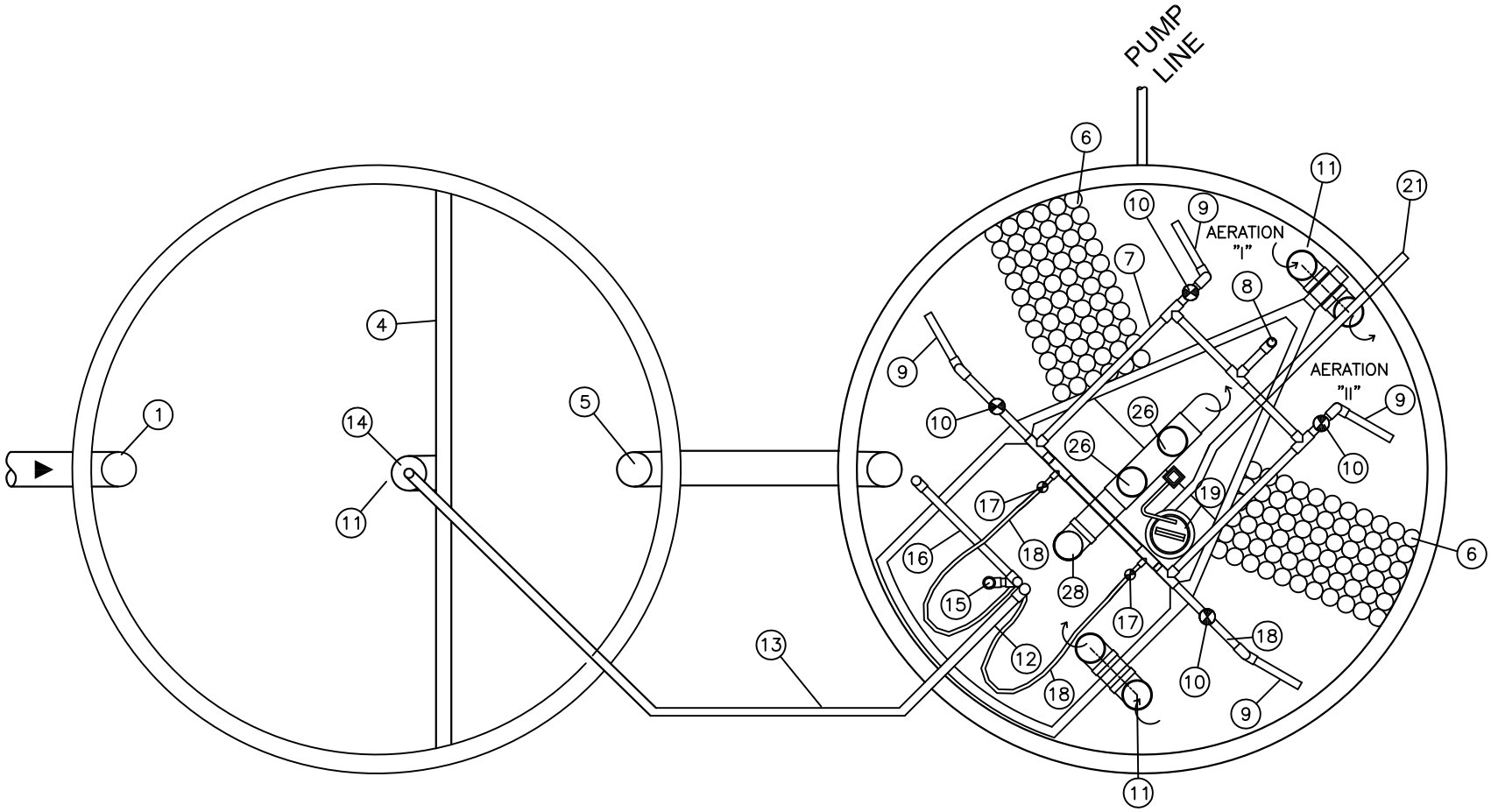
BIOSEPTIC – PERFORMA 2020



PLAN

(SCALE 1:15)

CHAMBER CAPACITIES

	Capacity
Septic Tank	3575 litres
Aeration 1	1250 litres
Aeration 2	1250 litres
Clarifier	503 litres
Chlorine Contact Chamber	307 litres
Pump Chamber	103 litres
Surcharge Volume	1050 litres

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BIOSEPTIC PTY LTD
67 SMEATON GRANGE ROAD
SMEATON GRANGE NSW 2567

Gary Murphy B.E. (CIVIL) M.I.E. AUST. SIGNED

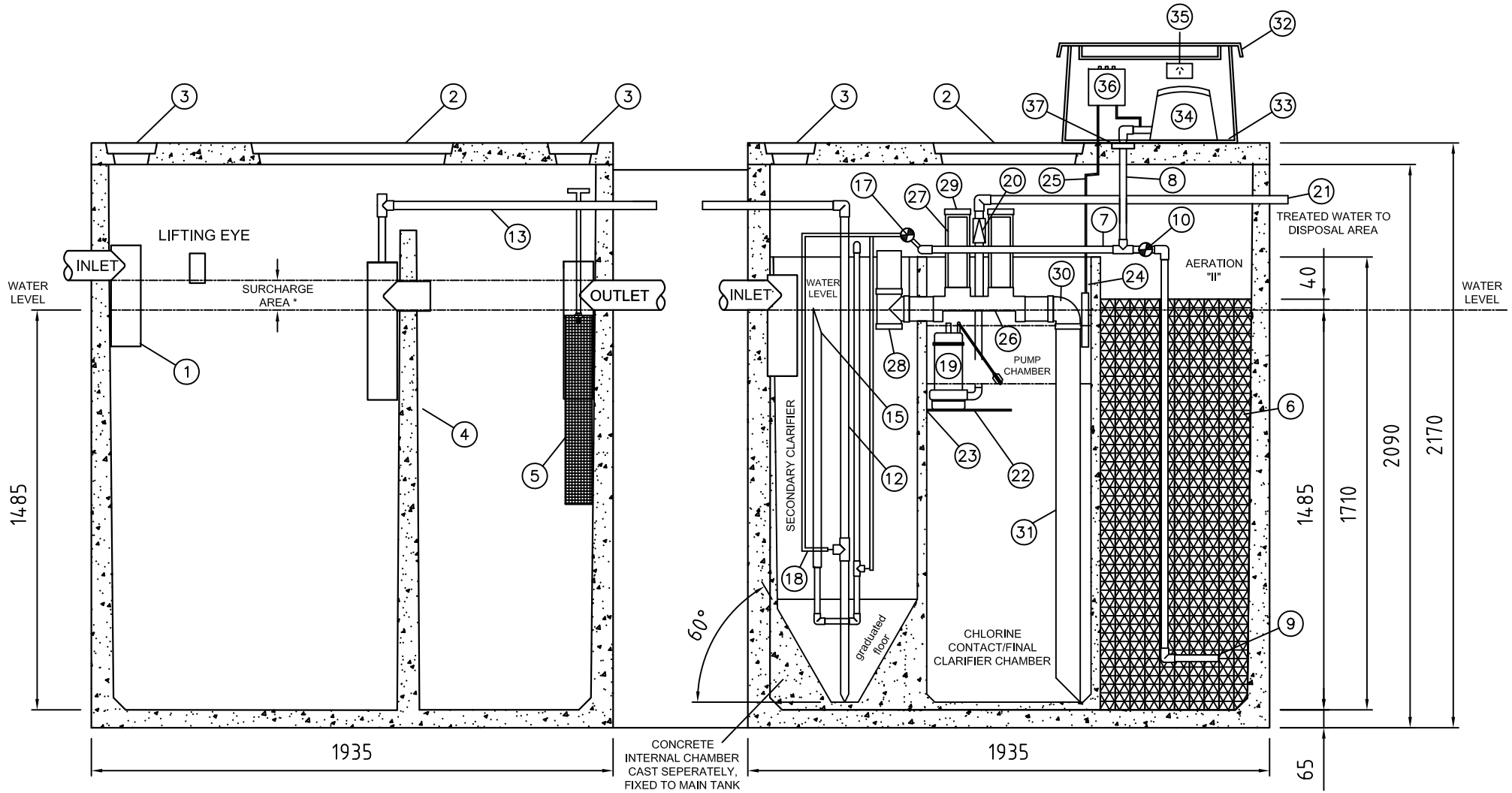
BIOSEPTIC PERFORMA

SHEET 1 OF 2 SHEETS

UPDATE	DRAWN O.R.	DATE 17/12/18
SCALES 1:15	DRAWN G.F.M.	DATE 16/03/00

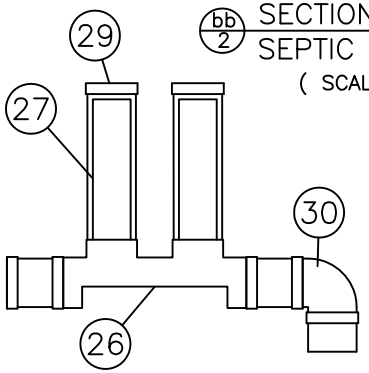
BP–2006–TANK

CAD FILE: BP–2020–TANK–ACR



bb/2 SECTIONAL ELEVATION
SEPTIC TANK (PRIMARY CLARIFIER)
(SCALE 1:15)

aa/1 SECTIONAL ELEVATION
TREATMENT TANK
(SCALE 1:15)



DETAIL CHLORINATOR
(SCALE 1:10)

* SURCHARGE AREA – INCLUDES BOTH SEPTIC AND TREATMENT TANK COMPARTMENTS EXCLUDING PUMP CHAMBER.

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SHEET 2 OF 2 SHEETS

UPDATE	DRAWN O.R.	DATE 17/12/18
SCALES 1:15	DRAWN G.F.M.	DATE 16/03/00

BP–2020–TANK

BIOSEPTIC PERFORMA AWTS 2020

No	Description	Position	Quantity	Material	Specification
1	Inlet square	P S	1	PVC	100mm per manufacturer's spec.
2	Access cover	S	2	Composite resin	610mm diameter
3	Inspection opening	S	3	Concrete	150mm min diameter
4	Integral Baffle	P S	1	Concrete	Reinforced concrete
5	Outlet square with filter	S	1	Stainless steel	700 x 96 dia with 5mm holes
6	Bacterial support media	P S	120m2	PVC	Surface area > 200m2/m3
7	Air manifold	P S	1	PVC	20mm pressure pipe Sche 40
8	Air inlet	P S	1	PVC	20mm pressure pipe Sche 40
9	Air diffuser	P S	4	PE	20mm diameter
10	Ball valve	P S	2	PVC	20mm
11	Transfer square	P	2	PVC	100mm per manufacturer's spec.
12	Sludge return	P S	1	PVC	25mm pressure pipe
13	Sludge return pipe	P S	1	PVC	25mm pressure pipe
14	Sludge return outlet	P S	1	PVC	25mm pressure pipe
15	Skimmer inlet	P S	1	PVC	25mm pressure pipe
16	Skimmer pipe	P	1	PVC	20mm pressure pipe Sche 40
17	Air valve	P S	2	PE	13mm bore
18	Air line	P S	2	PE	13mm low density pipe
19	Water pump	P S	1	CI/SS	>.25Kw
20	Non return valve	S	1	PVC	25mm spring check valve
21	Pump discharge pipe	P S	1	PVC	25m pressure pipe
22	Shelf	S	1	Concrete	>20mm thick
23	Shelf support	S	3	SS	10mm bolt
24	High water sensor	P S	1	PVC	20mm pressure pipe Sche 40
25	High water alarm tube	P S	1	PE	4mm tube
26	Chlorinator	P S	2	PVC	Moulded one piece PVC
27	Chlorine canister	P S	2	PVC	Moulded cap
28	Transfer weir	P S	1	PVC	90mm s/w square junctions
29	Cap	S	2	PVC	90mm stormwater pipe
30	Elbow	S	1	PVC	90mm stormwater pipe
31	Chlorinator outlet pipe	S	1	PVC	90mm stormwater pipe
32	Cover box	S	1	Composite resin	As per BioSeptic drawing Nov 11
33	Base slab	S	1	Concrete	Cast as part of part of lid
34	Air blower	S	1		80 litre/minute
35	Weather proof GPO	S	1	PVC	Complies with AS/NZS 3112
36	Control box	S	1	PVC	BioSeptic design
37	Sealing plate	S	1	PVC	90mm stormwater cap

				Key	
				P	*Denotes shown on plan*
				S	*Denotes shown on section*
				PVC	*Polyvinylchloride*
				PE	*Polyethylene*
				SS	*Stainless steel*
					April 2019 Jimboomba

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