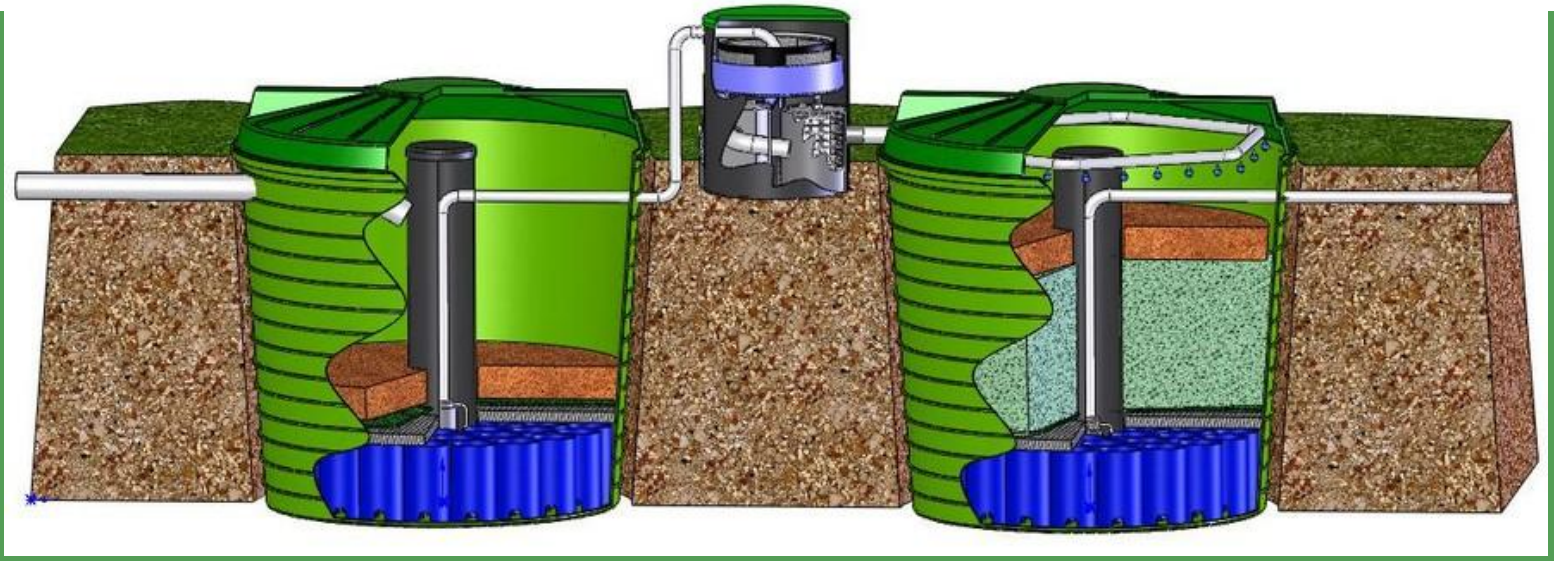
WORMSMART PLUS TECHNICAL SPECIFICATIONS



ECO-FRIENDLY
CHEMICAL-FREE

LOW ONGOING COSTS
ROBUST & RELIABLE

HOW IT WORKS

The Wormsmart Plus is a package wastewater treatment plant comprising a vermi-compost plant followed by a sediment filter and then a single pass trickling filter. It is an eco-friendly option for the treatment of onsite wastewater and comprises four stages:

1

Wastewater enters the system

All greywater and blackwater from the property is plumbed into the tank through one 100mm standard PVC plumbing pipe. There's no need to separate them (unlike some other vermiculture systems).

2

Nature does its work

The worms then break down all of the waste and turn it into an organic humus. As the aerobic bacteria feed on this humus, they further cleanse and treat the wastewater as it filters through the tank.

3

The water is filtered further

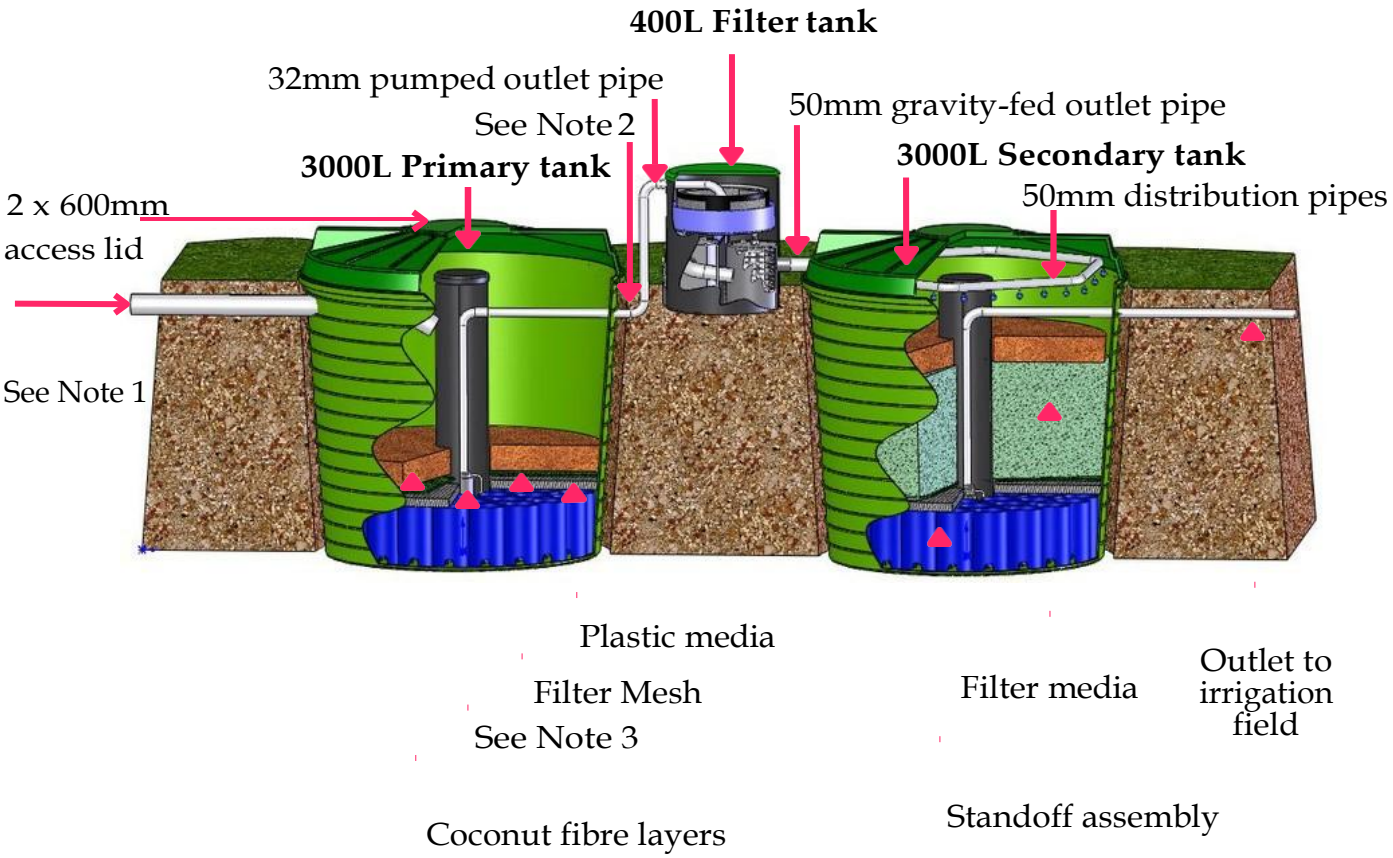
From the bottom of the first tank, a small efficient pump lifts the water to a sediment filter basket (which is easily accessible for maintenance in a 400L chamber). In situations where there is enough fall/gravity on the site, one or even both of the pumps specified may not be needed. From here it is dosed evenly across a single-pass, trickling filter in the second 3000L tank. This filter facilitates the removal of organic matter from the wastewater.

4

Water is recycled

Another sump pump sends the water to the pressure-compensating drip irrigation discharge area. The efficient pumps use very little power, though again, if there is enough fall/gravity on the property the sump pump will not be necessary. Instead a dosing flout can be used to pressurise the pressure-compensating drip line. The water that leaves the system is relatively colourless and odourless, and is nutrient-rich. The irrigation field can be buried out of sight, or mounted on the surface if more practical (e.g. in the bush amongst tree roots).

SCHEMATIC DIAGRAM



Note 1: 100mm inlet pipe. Standard plumbing (blackwater & greywater combined)

Note 2: Safety overflow combined with worm return pipe to primary tank. Disconnectable for service & maintenance

Note 3: Pump wells, fitted with submersible pumps & float switches. Designed to activate at 470L intervals and consumes no power when idle.

COMPONENT LIST

2 x 3000L Everhard polypropylene tanks
1 x 400L Everhard advanced HDPE polymer sludge tank
Davies Pumps LS Alarm Panel
Davey Submersible Drainage Pump D15VA
Davey Submersible Drainage Pump D23A/B
Microlene UV 151 Disinfection System

SYSTEM COMPONENTS

The plant comprises two 3000L polypropylene tanks and a 400L advanced HDPE polymer sludge tank which is located between the two tanks.

THE FIRST 3000L TANK

comprises the vermicompost unit which holds a 300mm diameter x 3m long coconut fibre log laid in snake fashion over a 0.5mm screen mesh. This fibre log acts as a habitat for the worms - similar in concept to a honeycomb for bees. It provides insulation for the worms in extreme temperatures as they can move in or out of the coconut fibre as required. Likewise, if the system ever gets flooded (eg. if there is a power cut in the area which stops the pump from working), the coconut fibre log floats. This provides a refuge for the worms and significantly reduces the risk of them drowning. A 450mm high plastic support media provides storage for the primary lift pump. The emergency storage of 2540L (including the effluent pump station and media submergence) is also located within the primary tank. The primary lift pump is a Davey D15VA float-controlled vortex pump, 240L/min which lifts vermicompost effluent to the sludge tank.

THE 400L ELEVATED SLUDGE TANK

houses a large 500-micron stainless steel filter basket and is fitted with a high water-level indicator.

THE SECOND 3000L TANK

comprises a layer of coconut fibres with a filter layer below. A pump well, fitted with a submersible Davey D23A/B 0.2kW float-controlled pump (which can be changed if required), is at the bottom of the distribution pipe. The pump is designed to activate at 470L intervals (also adjustable) and consumes no power when idle.
A high-quality LS alarm panel indicates system malfunction both visually and audibly.

EFFLUENT DISPOSAL & IRRIGATION

The irrigation field can be installed within the topsoil layer (between 50mm and 250mm deep) and can be buried out of sight, or mounted on the surface if more practical.

Product	Emitter spacing	Emitter flowrate/hr
Rivulis Hydro PC 16/40 1635060-1	60cm	3.5L
Rivulis Hydro PC 16/40 1616060-1	60cm	1.6L
Rivulis Hydro PC 16/40 1622060-1	60cm	2.2L
Rivulis Hydro PCND 16/40 16235060-1	60cm	2.35L non-draining emitters

Non-draining emitters are used with tertiary treatment options, in conjunction with a Microlene UV151 lamp. This keeps the flow rate below the discharge volume the lamp can treat, which is 37L/min. (Note that the flow rate is higher for emitters which drain between doses, because it isn't restricted by the emitters until the lines are full). In areas where swelling due to heavy frost may damage the non-draining pipes, an alternative is to use draining emitters and a bigger UV lamp that can treat the higher flow rates (e.g. Microlene ESF2500MKII which can treat at 83L/minute).

SYSTEM PERFORMANCE

"The Worm Smart Plus plant performed well throughout the study, with no equipment failures or attendance required. In terms of effluent quality, the plant performed well, with low energy usage, low and stable BOD."

On-site Effluent Treatment National Testing Programme

INDICATOR PARAMETERS

Indicator Parameter	Median	Std Dev	Rating	Rating System				
				A+	A	B	C	D
BOD (mg/L)	8.4	4.5	A	<5	<10	<20	<30	≥ 30
TSS (mg/L)	7.2	3.6	A	<5	<10	<20	<30	≥ 30

SECONDARY TREATMENT

For up to 1800L/day achieves:
BOD ≤ 20 mg/L
TSS ≤ 30 mg/L

TERTIARY TREATMENT

For up to 1000L/day with a Davey UV151 and non-leakage dripper lines achieves:
BOD ≤ 15 mg/L
TSS ≤ 15 mg/L
FC ≤ 200 cfu/100mL

*Not suitable for systems requiring a high level of nitrogen reduction.

WORMSMART NZ

Wormsmart was founded in Australia by Matthew Coddington, who designed the system to be simple and biological. Meanwhile in New Zealand, Wayne Gilinsky had been working for nearly 20 years with various worm-based systems from around the world. When Wayne heard about Wormsmart, he headed over to Australia to check it out and a trans-Tasman partnership began. Many New Zealand homes are built near bodies of water, and this has resulted in regulatory requirements which increasingly require a secondary level of wastewater treatment. Wayne developed the Wormsmart Plus to meet these needs, which has since set industry-leading standards at the OSET trials in Rotorua. Wormsmart NZ is an independent company, however Wayne & Matt continue to work closely together.