



Why VRM Treatment Plants

Thanks to an innovative 'low-tech' sewage system, Palm Bay **Hideaway** Resort on Long Island in the Whitsundays is able to reuse 100 percent of its waste water to reduce costs and the environmental impact on one of the most sensitive areas in Australia.

Developed and installed by Australian **biotech** resource company, Vital Resource Management (VRM), the system incorporates a patented micro-biological inoculation process that **keeps the system balanced** and reduces the residual sludge to next-to-nothing.

"Unlike a conventional sewage treatment system, our system has no sludge return. **Time, space and numbers of organisms in the system are managed** to allow all the sludge to be eaten by micro-organisms living within it," says VRM director, Ken Bellamy. "During its three years of operation no tank has been de-sludged or had more than 200mm of sludge at the bottom. Basically, the bugs eat everything."

The system is designed to keep this community of sewage-eating bugs in careful balance. The following is an outline of how it works.

Designing for a Sensitive Site

Long Island is only 120 metres across and entirely surrounded by national park (including the **Great Barrier Reef Marine Park**) so the site requirements were extremely particular. After winning the job (as the result of its clever cost-effective system-VRM was the second cheapest of four serious tenders) and conducting rigorous tests under the supervision of the appropriate environmental authorities, VRM installed small septic tanks outside each of the 23 resort units in preference to a large conventional open-air holding pond. "A conventional aspirated sludge system would have needed all the space the septic tanks take up plus about the same space as the resort's swimming pool," Bellamy says. "Aside from the space restrictions of the site, the smell from the open-air pond would have been prohibitive."





Managing Load Fluctuations

Dealing successfully with load fluctuations is a major challenge for biological treatment systems – in other words, **coping with crowds over a weekend but only a handful of people through the week**. To manage high use (more water), VRM ensured the system was fully-sealed against rainwater ingress which can reduce the concentration level of the food for the micro-organisms. For example, if 200mg per litre is the normal loading of organic material as food for bugs in the water, twice as much water in the system (e.g. from a tropical downpour and leaky pipes) means they only have 100mg/L of material to feed on. This results in significant die-back of organisms in the system. So all tanks and the collection network have o-ring seals and welded HDPE fittings and pipes. All tanks are roto-moulded and sealed and **simple flow balancing processes are incorporated**. To cope with minimal use (less water) or changes in type or pattern of use, VRM installed inoculation units at every initial catchment point (toilets and grease traps) and every secondary transfer point (collection point from several septic tanks). These units **inoculate the system automatically every five seconds** with VRM's microbial formulations. Automatic Units are Manually topped up once a week with a small amount of seed material and bugs grow in the units while waiting to be sent into action.

Inoculation

This is done according to a VRM-patented technique using a formulation of micro-organisms which work symbiotically within the system. The growth of these organisms is encouraged by a group of photosynthetic micro-organisms impregnated in and grown on a unique ceramic material located at the start (toilet cisterns) and the end (bio-filters, treatment plant and in-line strainer on the irrigation lines) of the system. Bellamy explains that it is important to nurture the micro-organisms which feed on the waste and keep other which are harmful to humans (**salmonella and faecal colliforms**) at the minimal levels set by World Health guidelines. To do this, a pro-biotic cleaner is used to induce the 'right' bugs to produce substances (like vinegar and lactic acid) that reduce the growth of the 'wrong' bugs.

Using the Gas

No smell emanates from the system because all tanks, from the 4500 Litre septics (each rated for 10 people) to the above-ground (5.5mx3m) treatment tanks within the plant itself, are all roto-moulded and linked with electro-fused HDPE. Instead, the gas that accumulates in the domed tops of the treatment tanks is first oxidised (with ozone and UV) to **neutralise any smell, then used to aerate the effluent**. This increases the concentration of oxygen in the recycled water which enables it to be stored without going off.





Structural Basis

The septic tanks run to transfer station where the waste undergoes secondary inoculation, then it flows into a common effluent main (a 50mm inside-diameter pipe) that circles around the resort and incubates the bugs. This then connects into six 24, 000 litre holding tanks at the treatment plant (secondary treatment) before being transferred to three 24, 000 litre aeration tanks. The effluent then flows into a bio-filtration zone (where zeolite and the ceramics are located), through an advanced oxidation (a combination of oxygen and UV) stage and into storage tanks – feeding a constant pressurised ring-main of water ready for **reuse in toilet flushing and irrigation**.

More Water for Less

Not only is the recycled water odourless and nutrient rich, it has enabled the resort to drastically reduce its water costs. Before the sewage system was installed, the resort bought water from the mainland for about \$50 -100,000 a year (depending on rainfall). Once the recycled water from the system was used for flushing and irrigation, **much of that cost was eliminated**. The solution is so successful that five out of seven resorts in the Whitsundays now use the VRM probiotic formulations and the owner of Palm Bay Hideaway Resort has become a VRM shareholder.

