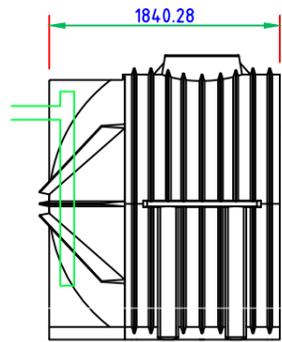
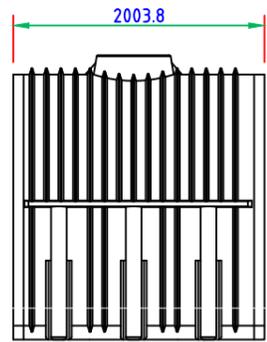


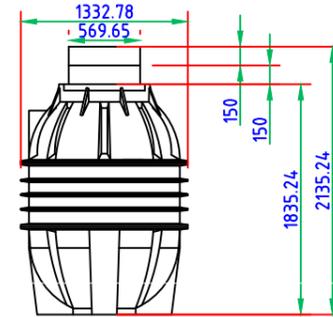
Typical Domed End End View



Modular 4750 Litres Domed End Piece

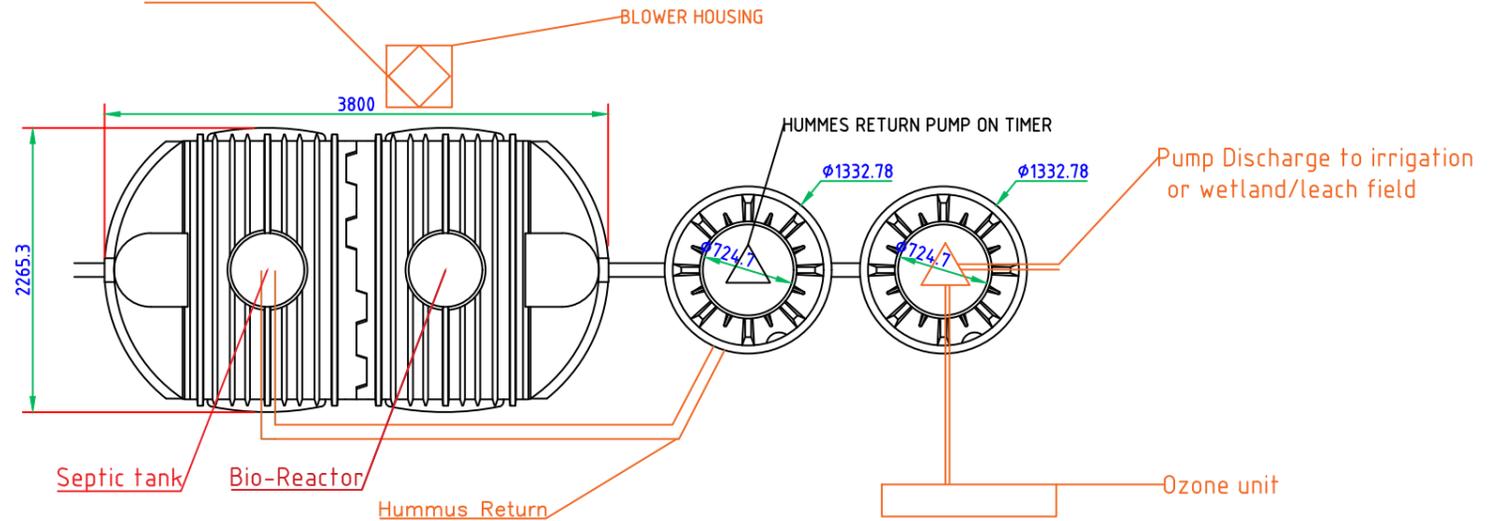


Modular 6000 Litres Intermediate Tank Section



HP 200 Aerator

BLOWER HOUSING



Septic tank

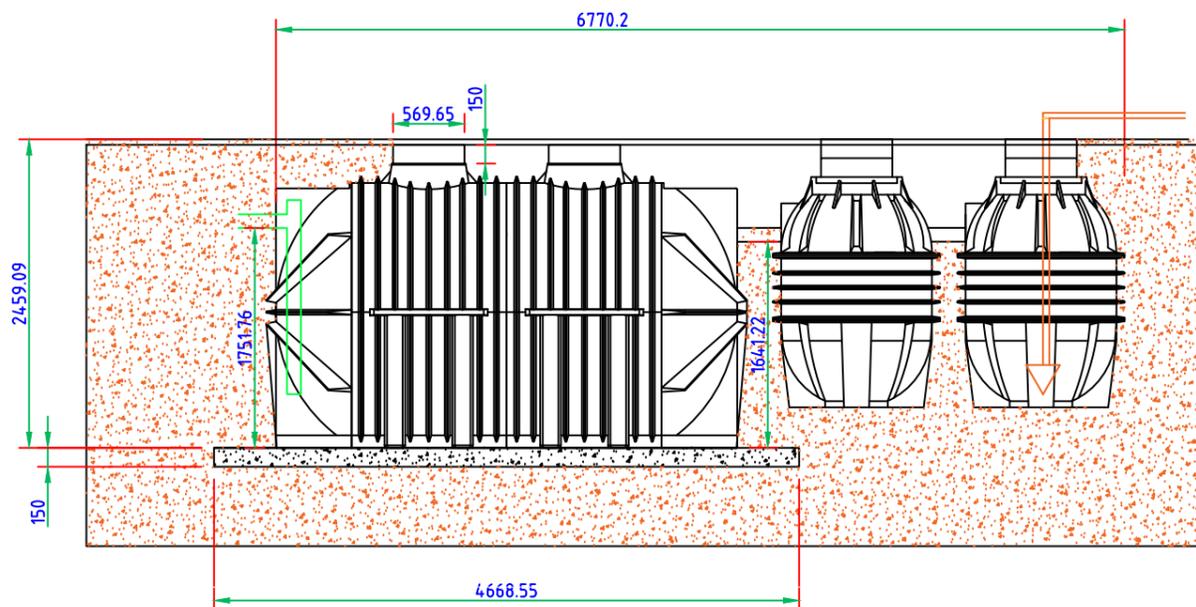
Bio-Reactor

Humus Return

HUMMES RETURN PUMP ON TIMER

Pump Discharge to irrigation or wetland/leach field

Ozone unit



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 **Calcamite** Sanitary Services Pty Ltd

DESCRIPTION : Bio-Mite Bm25 Ozone Below Ground

Drawn By: Brandon Havenga | DWG No: CAL/BM/BM25

DATE : 06 / 10 / 2016 | REV-1

## Bio-Mite Waste Water Treatment Plants

### SUMMARY: HOW DOES THE BIOMITE WASTE WATER TREATMENT PLANT WORK?

- The overall objective of the **Bio-Mite Waste Water Treatment Plant** is to provide a Waste Water Treatment System that is capable of coping with a wide range of probable Waste Water conditions while complying with the overall performance requirements which is to meet or exceed the General Standard of the Department of Water Affairs and Forestry (DWAf).
- The Bio-mite Process cleans domestic waste water in three basic steps:
  1. Anaerobic Digestion,
  2. Aerobic Digestion and
  3. Disinfection.
- The **Anaerobic section** reduces the BOD loading of the waste stream by about 40% and provides a suitable buffer/ retention time for complete treatment. Here we utilize SABS approved multi chambered Septic tanks.
- The **Aerobic section** further reduced the BOD loading and reduces Nutrients (mainly Nitrates and Nitrites from the waste stream.
- Lastly the **Disinfection** process kills any remaining Pathogens in the Waste Stream to provide a clarified effluent ready for any non-potable reuse options such as irrigation, car washing and dust control.
- The Bio-Mite plant can be configured for above or below ground installation.

## DETAILED: HOW DOES THE BIOMITE WASTE WATER TREATMENT PLANT WORK?

The **Bio-Mite** has been engineered to treat domestic and industrial waste water to a level that conforms to the National Standards as required by DWAF. The process is purely the biological breakdown of organic solids entering the treatment plant. The Bio-Mite process incorporates the advantages of fixed film technologies and combines with them the fine bubble diffused aeration techniques, to get a highly efficient biological treatment unit. It has as its main components, the bio media and fine bubble diffused aeration grid. With the higher surface area of bio media ( $150\text{m}^2/\text{m}^3$ ), higher organic loading rates are enabled, thus reducing the overall size required of the aeration tank. This leads to a considerable reduction in civil and fabrication costs. The Bio-Mite process incorporates the advantages of fixed film technologies and combines with them the fine bubble diffused aeration techniques, to get a highly efficient biological treatment unit. It has as its main components, the bio media and fine bubble diffused aeration grid. With the higher surface area of bio media ( $150\text{m}^2/\text{m}^3$ ), higher organic loading rates are enabled, thus reducing the overall size required of the aeration tank. This leads to a considerable reduction in civil and fabrication costs.

The system configuration enables better oxygen transfer efficiency with plug flow conditions. Submerged fixed film growth in SAFF reactors sustain good microbial growth even in adverse conditions and also handles shock loads very well. Sludge production is low; no sludge re-circulations is required and mean cell residence time is enhanced. Air requirement is based only on the organic load and mixing requirements are not called for, as this system is primarily an attached growth system. The media is a randomly packed polypropylene filter media and has wide application in biological treatment systems. The reactors are up-flow or down-flow fixed film type, based on either anaerobic or aerobic treatment processes.

The media provides optimum effective surface area for biological growth. The three dimensional liquid distribution due to unique dimensional design, increases hydraulic retention time and ensures excellent gas-liquid distribution within packed bed reactors, thus enhancing the treatment efficiency.

### **The Biological Breakdown Process**

- **Primary treatment** is done in the SABS approved septic tanks/anaerobic reactors. The liquid capacity of these septic tanks is determined by the number of users connected to a septic tank. The anaerobic treatment process occurs in enclosed

tanks to prevent access to oxygen. It is not necessary to resettle the effluent on domestic waste water treatment plants to an anaerobic reactor. In the anaerobic reactor solids are intercepted and biologically broken down by anaerobic microorganisms that are in contact with the waste water. We keep the anaerobic microorganisms (biomass) in our anaerobic treatment process in suspension. This process requires at least twenty-four hours but should be retained for at least forty-eight hours. The longer retention time translates into a higher quality effluent with significant Biological Oxygen Demand (**BOD**) reduction occurring before it flows into the biological reactor for secondary treatment.

- **Secondary treatment** is done in the Aerobic Biological Reactor. In the process, air (oxygen) is pumped into the reactor to mix and supply air to the waste water. The design for the secondary treatment process allows us to circulate the waste water between an aerobic zone and an anoxic zone to facilitate the de-nitrification process. Providing immobilized media for microorganisms to attach and grow on, is known as a fixed film process. Fixed film that has specifically been designed for waste water treatment is incorporated into the aerobic zone. This fixed film provides a surface area of approximately  $150\text{m}^2/\text{m}^3$  waste water. The microorganisms metabolize the organic material into carbon dioxide and other end products and new biomass. The putrescibility and soluble oxygen demand is reduced to a small amount. The two major advantages of this fixed film technology are that diluted waste water can be treated and the bacterial colony will not be flushed out should the system be hydraulically overloaded.
- The **Tertiary treatment** process is a disinfectant/sterilizing process. We subject the treated waste water from the secondary treatment process to chlorination on the domestic treatment plants and ozonising on the bigger and custom built plants. This as a precaution against pathogens that may have passed on from the second stage. For this to be effective a contact period of at least thirty minutes should exist for pathogen destruction. We achieve this with a pumping chamber that has a storage capacity of 200 litres before the submersible pump pumps out the contents for reuse in the garden or on the lawn – not for growing vegetables.

It should be noted that nature is very effective in treating waste water that, once applied to the topsoil, aerobic bacteria in the root zone of plants will consume any remaining organic nutrients in the waste water. Waste water applied to the topsoil is also in contact with the powerful sterilization capabilities of UV rays present in sunlight.