

**Chapel Farm Estate Redevelopment
Wastewater Treatment and Effluent Disposal Proposal**

229 Toodyay Rd Middle Swan

Overview

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1.0 Introduction

The Taylex secondary treatment unit is a package sewage treatment plant for domestic and commercial applications where mainline sewerage is not available. It provides a safe and viable alternative for treatment of wastewater and produces an effluent that can be reused for irrigation purposes.

2.0 Proposal

Based on the information provided by yourselves I have based the wastewater treatment plant requirement on processing up to 10,000 L/d.

Café/Restaurant license for 330 people including staff. Using Health Department criteria (Public Building Frequent Use) the estimated wastewater load will be $330 \times 30 \text{ L/p} \sim 10,000 \text{ L/d}$.

The Taylex ABS 5000 model ATU is Health Department of WA and Australian Standards secondary treatment system approved to process up to 5,000 L/d. It is a two-tank unit designed for in-line processing of the wastewater.

We would propose installing two systems in parallel, splitting the flows evenly using a diversion pit.

Each tank is 2.5 m in diam. and 2.7 m high and each tank weighs 8 T.

3.0 Plant Description

Sewage effluent from each facility will gravity flow into a diversion pit where the flows will be split evenly to each system. Tank 1 (of each system) is designed for primary effluent settlement. From here the wastewater gravity flows into Tank 2 for aeration processing.

Air is introduced into this tank by means of an air manifold and fine bubble air diffusers located close to the floor of the chamber. In addition, the tank has attached growth media submerged below water depth. The aerated wastewater exits the aeration chamber and gravity flows into chamber 4, which is a clarifier. The clarification chamber allows for secondary settlement where remaining solids settle to the bottom of the tank. The settled sludge, is pumped automatically by means of an air venturi system back to the Primary Tank for re-digestion, this is called the Returned Activated Sludge (RAS).

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The flow from the clarifier then gravity flows into the final chamber and then pumped automatically into an existing pump pit from where it is discharged to the designated irrigation disposal area.

4.0 Effluent Disposal

The client engaged Local Geotechnics to undertake field permeability tests across several areas of the site to assess site suitability (Their report is attached).

Soil profiles and permeability results for FPT 6 and FPT 5 – TH 3 are the least favorable locations. In addition, they are located north of Jane Brook and would require heavy site modification plus special approval to transfer wastewater across Jane Brook.

The area in the vicinity of FPT 4 and FPT 3 - TH 2 are the client's preferable choice of location. There is greater separation from Jane Brook as well as it being elevated and above the flood plain.

The soil profile is described as Gravelly Clay with a hydraulic conductivity in the range 1.0 E -01 to 1.3 E-01 m/d.

We are proposing the use of Flatbed Drains for wastewater disposal and distribution, as the flat profile of the site lends itself to this type of disposal option. In addition, the area can be grassed over to assist in evapotranspiration as well as being aesthetically pleasing.

Using Health Department of WA criteria for wastewater disposal from secondary treatment systems, and based on the soil profile and permeability results, a nominal area of 850 m² (85 m x 10 m) is being proposed. Attached photo shows cleared area.

5.0 Process Description

The design of efficient, economical biological wastewater treatment systems requires an understanding of the biological principles on which they are based.

5.1 Aerobic Biological Process

Successful biological treatment depends on developing and maintaining an appropriate active mixed microbial population in the system. This

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microbial population may be present either as fixed film attached to some form of support media or as a suspended growth system.

The aeration tank of the Taylex ABS is fitted with a fixed submerged media. This media provides additional surface area for the housing of the microbial population in the activated sludge process and thus greatly enhances the degradation of the waste through microbial activity.

Environmental factors that influence biological growth include temperature, pH, mixing intensity and the presence of toxic agents. Temperature may affect growth rate of microorganisms to the extent of doubling the reaction rate for each 10°C increase in temperature. Different organisms predominate at different temperatures however there is little difficulty in Australian conditions to develop a suitable organism population.

The pH for optimum biological should be in the range of 6.5 to 7.5 although growth will occur over the range of pH 4.0 to 9.5. Toxic materials should be avoided where possible.

Any deficiency in nutrient or environmental factors will inhibit biological growth and will lead to loss of process efficiency. Process efficiency should be maximized by maintaining all conditions of operation as constant as possible.

5.2 Clarification

Clarification is the process by which any excess settleable solids contained in the effluent from the aeration tanks is separated from the effluent by setting under gravity. The clarifiers are designed with a large enough surface area to provide sufficient capacity to produce a clear effluent provided the treatment plant is well maintained.

The clarifier base is slightly tapered to provide for the accumulation of settled sludge. The accumulated sludge is pumped intermittently by means of a submersible pump situated on the floor of the tank. The sludge is returned to the primary tank for accumulation and periodic emptying.

5.3 Disinfection (if required)

The system is supplied with a chlorine tablet dosing unit. Treated effluent will overflow from the clarifier and pass through the unit. The tank is sized to ensure there is a minimum of 30 minutes detention time at peak flow for the chlorine to react and remove pathogenic organisms.

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5.4 Pump Out

Post disinfection, the treated wastewater is pumped automatically to the disposal area. Each system will be provided with a duty/stand by transfer pump for emergency purposes to ensure no accidental spillage/overflow from the system into Jane Brook.

Please contact me on 0409 680142 for any further information.

Regards

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