

PORANGAHAU AND TE PAERAHI WASTEWATER TREATMENT OPTIONS THAT CAN BE CONSIDERED

Treatment options that can be considered for wastewater treatment and disposal for Porangahau and Te Paerahi.

1. Oxidation ponds – one or more.
2. Multiple pond systems.
3. Oxidation ponds containing:
 - Baffles
 - Aerators
 - logenyx process
 - Chemical dosing for phosphorus
 - Floating wetlands
4. Oxidation ponds followed by:
 - Wetlands
 - Rock filters
 - Filters and clarifiers
 - Ultra violet disinfection
 - Ozone disinfection
5. Treatment followed by irrigation to land:
 1. To a forest.
 2. To grow grass and other crops.
6. Treatment followed by rapid infiltration.
7. Package plants including rotating biological contactors, sequencing batch reactor, extended aeration.
8. Activated sludge plants.
9. Membrane technology.
10. Worm farms.
11. Combined treatment at one site.
12. Growing algae for energy production.

TREATMENT OPTION	COMMENTS
Oxidation ponds	
Multiple pond systems	
Oxidation ponds and baffles	
Oxidation ponds and aerators	
Oxidation ponds and logenyx process	
Oxidation ponds and dosing for phosphorus	
Oxidation ponds and floating wetlands	
Oxidation ponds followed by wetlands	
Oxidation ponds followed by rock filters	
Oxidation ponds followed by filters & clarifiers	
Oxidation ponds followed by UV disinfection	
Oxidation ponds followed by ozone disinfection	
Treatment plus irrigation to forest	
Treatment plus irrigation to crops	
Treatment plus rapid infiltration	
Package plant	
Activated sludge plant	
Membrane technology	
Worm farm	
Combined treatment at one site	
Algae for energy production	

OXIDATION PONDS

The treatment quality in oxidation ponds is initially related to the volume and area of the pond. The goal is to provide a long retention time in the pond for the wastewater to receive the most treatment from the natural microbes and algae that digests the wastewater. A retention time of 15 days is a minimum, with up to 50 days being ideal.

If the incoming wastewater is extraordinarily strong (usually from industrial sources), or the oxidation pond has become too small because of extra volumes of wastewater (usually due to growth of the town), additions can be made to the pond to improve treatment.

1. Baffles are curtains in the water that divide up the oxidation pond. Baffles direct the flow of wastewater in the oxidation pond and therefore the maximum retention time can be achieved. Baffles also divide the pond into separate cells. In each cell different treatment processes can take place, due to the different stages the treatment process is at, or by the addition of aeration.
2. Aerators can be installed on the oxidation pond. Aerators are any device which mixes extra oxygen into the wastewater. Increasing the amount of oxygen in the wastewater improves the food supply to the microbes and hence improves the treatment quality. Aerators can be installed on an oxidation pond generally, or can be specifically installed in a cell. In a cell they provide more concentrated treatment, so the combination of baffles and aerators improves the quality of treatment.

3. Extra ponds can be built. These increase the retention time and each pond usually performs a different treatment process – initial treatment, maturation, and polishing.

Oxidation ponds usually discharge the treated effluent into adjacent drains or streams, but other disposal options are possible.

TREATMENT AFTER OXIDATION PONDS

A number of treatment processes can be added after the oxidation pond.

1. Constructed wetlands allow treated wastewater from the oxidation pond to flow around specifically planted wetland plants. The plants take up some of the nutrients in the wastewater, and allow settling of some of the suspended solids.
2. Rock filters can improve the quality of the wastewater.
3. Phosphorus can be removed from the wastewater by adding chemicals which bind with the phosphorus. A filter is then needed to filter out the phosphorus which is then disposed of to landfill.
4. Filters and clarifiers can be added to filter out suspended solids and hence improve the quality of effluent.
5. Ultraviolet or ozone disinfection can be added to kill all pathogens in the treated wastewater.

ALTERNATIVE TREATMENT OPTIONS

Other treatment options that do not use oxidation ponds include:

1. Package treatment plants are specifically designed for each site and can address particular types of effluent. Some package plants are rotating biological contactors, sequencing batch reactor, extended aeration. Package plants are usually mechanically based and use pumps and blowers to inject oxygen into the wastewater.
2. Activated sludge plants are larger versions of packaged plants that use large tanks and pumps, blowers and mixers to achieve consistently high quality wastewater.
3. Membranes. Membranes are generally any filter materials that have very small holes. The wastewater flows through the holes but all solids are held back. High quality water can be produced and the sludge produced needs to be disposed of.

LAND BASED TREATMENT AND DISPOSAL

Wastewater can be treated and/or disposed of to land. Usually some pre treatment of the wastewater is required, such as oxidation pond treatment, filtration and/or ultraviolet treatment. Options include:

1. Irrigation into a forest. The treated effluent provides nutrients and water for tree growing.
2. Irrigation to land. The treated effluent can be sprayed on to grass for increased growth, or for hay or silage production. Other crops can also be grown and harvested.
3. Rapid infiltration. With the right ground conditions, treated effluent can be “flooded” into the ground. The ground provides some further treatment and the wastewater eventually ends up as part of the groundwater or of the river. River shingles are the best ground conditions for rapid infiltration.

NEW TECHNOLOGIES

New technologies are being introduced. Some of these are:

1. Floating wetlands. A floating wetland is a large raft or rafts upon which wetland plants grow with their roots in the wastewater of the oxidation pond. It is a hydroponic system. The roots take up nutrients and provide large surface areas for microbes to live on and hence increase the microbe population and the treatment effectiveness. Council installed a floating wetland on the Otane oxidation pond in June 2010.
2. Worm treatment. Wastewater can be irrigated on to large sawdust beds which are filled with worms. The worms digest the wastewater and clean it up so that treated wastewater is discharged out of the sawdust beds.
3. Algal production. Algal growth on oxidation ponds can be prolific, and research on using the algae for fuel is advanced. The treated effluent still has to be disposed of.
4. Multiple pond systems. NIWA has developed a system with 4 ponds, each with a specific function in the treatment process. This system produces high quality effluent, but uses a large land area.
5. E-net. The application of small electrical currents can improve the treatment process. This system is being trialled on the Takapau oxidation pond starting in May 2010.

COMBINED SYSTEMS

Piping the wastewater from Te Paerahi to Porangahau to be treated at one site.