

Demonstrating Treatment of Landfill Leachate Using BioHaven® Technology

Project Location: McLean's Pit Landfill, Town of Greymouth, South Island, New Zealand

Landfill leachate is being successfully treated with BioHaven floating treatment wetlands (FTWs) in New Zealand. Although only 50% of the recommended volume of BioHavens was installed, the results enabled the city to reach its effluent goals without further investment.

Overview

Landfill leachate is a problematic water stream to treat in New Zealand and worldwide. Greymouth is a town of approximately 3,000 people on the South Island. The town identified a need for improved treatment of its municipal landfill leachate, which is a dilute stream because of the area's extremely high annual rainfall (3.5 m or 140 in).

Because of limited funding, lagoon improvements were intended to be implemented in three stages. In Stage 1 (results are described below), FII licensee Waterclean Technologies constructed and installed 288 m² (3100 ft²) of BioHavens to cover approximately 20% of the lagoon surface in half of the lagoons. In Stage 2, another 288 m² (3100 ft²) will be constructed in the other half of the lagoons. In Stage 3, media for biofilm attachment will be added to the primary treatment lagoon that precedes the other lagoons, along with improved aeration, for enhanced nitrification (ammonia removal). The wetland plants used are *Carex virgata* and *Cyperus ustulatus*.

Results

Removal of TSS and color pigment has been exceptional, as shown in the results table and first photo. The FTWs are also significantly removing total nitrogen and BOD. Operational data and detailed water quality data are still being collected and analyzed; however, the most recent data indicate that TSS removal has been improved by 89% when compared to pre-launch samples.

Conclusion

Phase 1 of the project (50% of the recommended BioHaven volume) delivered sufficient improvement to bring the site back into compliance. BioHavens improved removal of total suspended solids (TSS), biochemical oxygen demand (BOD) and total nitrogen by 89%, 46% and 40% compared to pre-FTW conditions.



Influent (left) vs. effluent (right)



Mature FTWs in December 2009 (summer in New Zealand)



Extensive root system for nutrient uptake

Installation Data

Location	Greymouth, South Island, New Zealand
Parameters Studied	TSS, Total Nitrogen, BOD
System Type	Lagoon
FTW Size	A total of 288 m ² (3,100 ft ²); each of three ponds contains eight modules with 12 m ² of surface area
Water Source	Landfill leachate
Installation Date	November 2009
Flow Rate	Variable, with highest flows in the winter (rainy season)
Water Body Depth	0.6 m (2 ft)
Water Body Area	Each pond is 40 m x 12 m (131 ft x 39 ft). There are six ponds, with BioHavens in three of them.

Results

Parameters	BioHaven Removal Rate (lb/yr/ft ³)	Improvement Compared to Pre-FTW
TSS	0.2	89%
Total Nitrogen	2.4	40%
BOD	0.8	46%