



Environmental Baseline Assessment of freshwater resources, and characteristics of soils, surrounding proposed rapid infiltration site, Lake Rotoiti



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Introduction

- To help protect and restore Lake Rotoiti existing septic tanks are proposed to be replaced with a reticulated sewage system.
- Domestic wastewater, treated by proposed vermiculture and low-pressure grinder will then be pumped to Maori land owned by local iwi.
- The effluent will be further treated using a bardenpho and membrane bioreactor system before being discharged to land through rapid infiltration.

Objectives

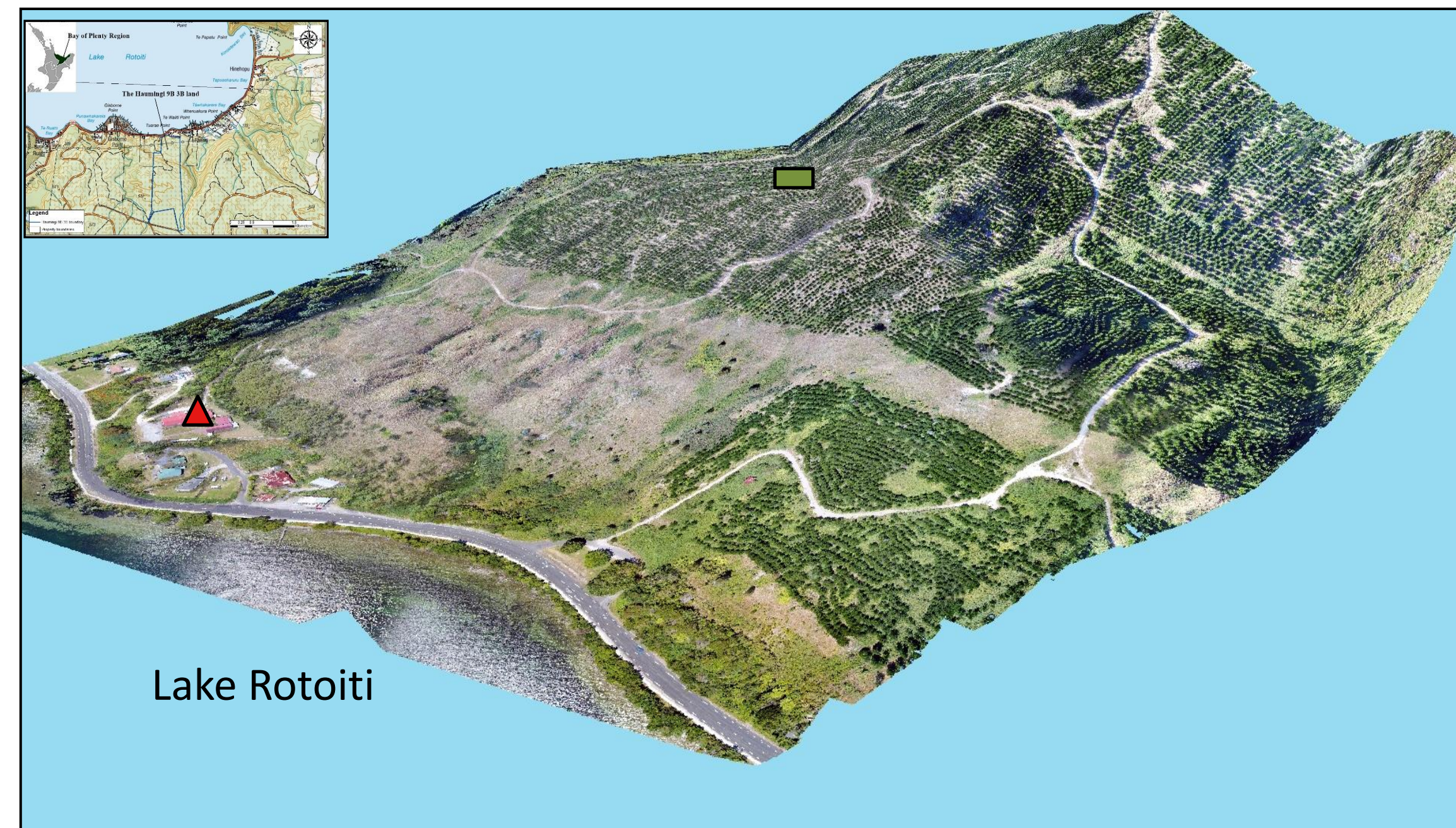
- Provide an independent baseline assessment of springs and lake water surrounding the proposed rapid infiltration site against which future changes could be assessed.
- Conduct a detailed geomorphic and landscape evaluation.
- Conduct detailed soil characterization and interpretation relating to potential for productive land use and wastewater reuse.

Freshwater

- Water was sampled from five puna (springs) on the margin of Lake Rotoiti, and from ambient lake water.
- The spring and lake water sampled were all of excellent quality meeting guidelines for swimming, ecological standards, and even New Zealand drinking water standards.
- The springs had a higher nutrient content compared to the surrounding lake water; indicative of possible contamination from septic tanks.



On site water analysis and sample collection



▲ Taurua Marae
 Proposed Sewage treatment plant site
 Topographic map displaying location of the study site. (Base map and property boundary: LINZ Data Service, Undated)

Characterisation of Soils



Topographic Analysis (Drone)

- A DJI Phantom 4 Pro Drone and soil analyses with field and laboratory tests were undertaken to understand the topography, potential, and characteristics of soil at the site.
- Soils are formed on scoria deposits of the Tarawera eruption (10/06/1886) which overlie the graded deposits of pumice from Kaharoa Tephra (1314 ± 12 AD) that rests on Rotokawau Tephra (3710 ± 100 AD). The soils were classified as Typic Orthic Pumice Soils belonging to the Rotoiti Series.



Soil Sampling

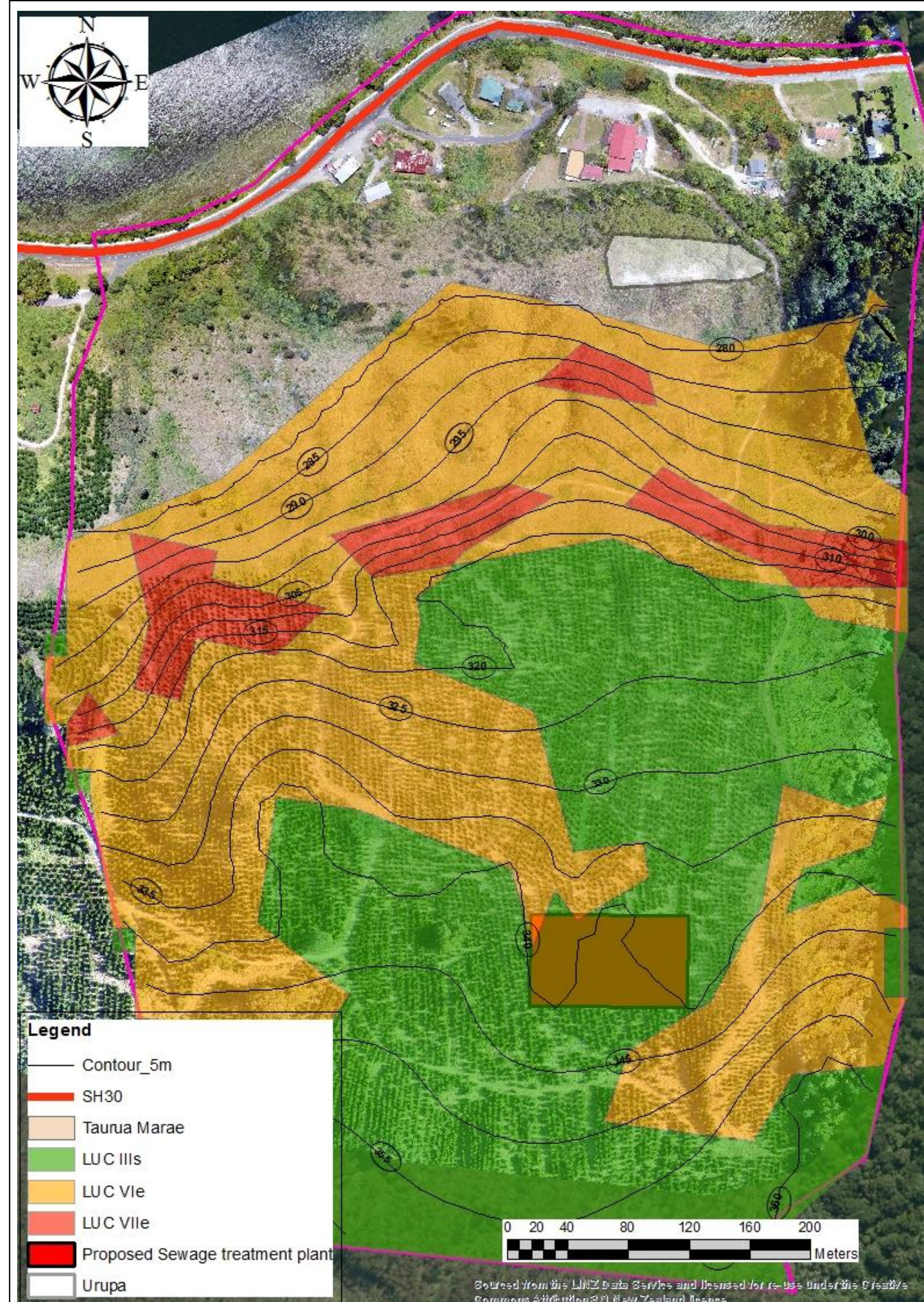
- The soil horizons generally comprised gravelly sand, with low dry bulk density, high root penetration, low water retention and low concentration of nutrients.
- The 2bBw horizon, a paleosol formed from Rotokawau tephra, has a higher moisture content and cation exchange capacity than the Bw and Cu horizons.



Typical soil profile at study site

Site limitations and productive potential

- The soils were generally sandy in nature with minimal clay thus prone to severe wind, sheet, and rill erosion with the potential for gully erosion if left exposed during heavy rainfall.
- There is potential to cultivate crops other than pine forestry if the site is irrigated with treated wastewater.



LUC class of land surrounding the proposed treatment plant

- The steeper slopes 1.9 hectare space (LUC class VII/e) can be utilised for permanent vegetation such as native forest, pine forest, or for Manuka cultivation. The rolling slopes (14.4 hectares, LUC class VI/e) can be used for harvestable permanent crops such as harakeke, energy crops for e.g. coppiced poplar, willow or eucalyptus.
- The undulating areas (13.7 hectares, LUC class III/s) can either be used for all the options above or other high value small scale crops e.g. flower production.
- The undulating areas could potentially be used for an exclusive accommodation tourist venture as the location has attractive views and can be incorporated with cultural experience.

Conclusions

- The spring waters are of the highest quality, meeting ecological, swimming, & drinking water standards.
- The spring samples had higher nutrient concentrations than the adjacent lake water samples, possibly from seepage from septic tanks.
- Soils were relatively uniform across the area and were classified according to NZ soil classification as Typic Orthic Pumice Soils.
- There is potential for improving soil productivity for crop cultivation other than pine forestry if the site is effluent irrigated.