

John Cocks Limited

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Abbe Hutchins
PathNZ

Dear Abbe

Preliminary Wastewater Design Concept

Introduction

This letter provides a summary of the site investigation, a preliminary assessment of wastewater flows, and a design concept of a suggested wastewater treatment and land application system.

The purpose is to convey a preliminary understanding of the site suitability for land application of treated wastewater, the scale of the wastewater system components, regulatory requirements, and design considerations and potential issues.

Site Investigation

The site was inspected by Bryan Hutchins and John Cocks on Saturday, 30 September 2017. Five test pits were dug at locations along the moraine mound, as illustrated in Attachment A. Within the beech forest, soils were silts becoming stony at about 600mm depth. Typically, the top 150mm was humus with dense roots.

The site and soils are considered favourable for the land application of treated wastewater.

Design Flows

Design flows have been determined based on information in the Path Concept Design report by Cheshire Architects dated February 2017, the Australian New Zealand Standard 1547 for Onsite domestic wastewater management (the Standard), and other sources.

The design occupancy is 40 guests and 6 staff.

Wastewater generating facilities have been taken as: toilets, hand basins, showers, and kitchens. It is understood that laundry facilities will not be provided as laundry will be taken off site. It is assumed that standard water using fixtures will be used.

Unit flow and sludge generation factors have been taken from the Standard for hotels/ motels.

The estimated flows at full occupancy are:

- average daily flow 7,900 litres / day
- peak daily flow 19,700 litres / day (on a peak weekly basis).

Wastewater Treatment

Given the favourable soils encountered, treatment of wastewater by septic tank is considered adequate technically.

Septic tank options include:

- a single above ground septic tank located at the forest edge, with minimum capacity 20,000 litres
- a below ground septic tank serving each of the five pods, with minimum capacity of 5,000 litres.

If the main block includes a kitchen and other water using / wastewater generating facilities, the latter option would need modification.

These capacities are based on 3 years scum and sludge storage (the recommended minimum), and 100% occupancy over the year. Tanks would be lightweight and plastic, and accessible for helicopter assisted pump out. Possibly, pump-out could occur using tanks mounted on trailers pulled by quadbikes.

A single tank would require a drain from each pod to a pumping station. The pumping station would pump the raw wastewater to the septic tank. Emergency storage would be required at the pumping station in case of malfunction.

With multiple tanks, each tank would drain to a pumping station, which may be a dedicated pumping station for each pod or a single pumping station, depending on the land application solution and other factors.

Land Application

Land application options considered are:

- subsurface drip irrigation
- soil soakage beds.

Subsurface drip irrigation would involve laying approximately 2 km or more of drip lines in the forest, which is equivalent to 5 runs of pipe between the river in the west and TP 5 in the east as shown on the photo in Attachment A. The irrigation rate at peak occupancy at average daily flow would be 4mm/day. Drip lines could be laid by a small machine that cuts a narrow trench approximately 100 -200mm deep. It is assumed that freezing would not occur to this depth but this assumption needs verification.

Soil soakage beds would occupy in the order of 800 m² of tussock land down slope of the pod locations. Locating soil soakage beds in the forest is considered not appropriate. Soakage beds would require substantial earthworks. Beds could be landscaped and planted to create a natural appearance.

Regulatory Requirements.

Regulatory requirements for the wastewater system include a concession licence, resource consent for the discharge of wastewater to land, and a building consent.

Also, the water supply would need a resource consent for taking water from the river and will need to meet provisions of the Health Act 1956 including Health (Drinking Water) Amendment Act 2007.

System Design Considerations and Possible Issues

Increasingly regional councils are encouraging secondary treatment of wastewater, particularly for commercial premises. With favourable soils, septic tank effluent will be treated to a standard equal to or

greater than a secondary treatment system within a few hundred millimetres depth of soil in a land application area. This is not necessarily recognised by regional councils.

Secondary treatment would create significant operational demands in terms of power and operator skills and time, and risks of malfunction.

The removal and disposal of solids separated from raw wastewater is a significant operational and financial burden. Long septic tank / sludge storage residence time can reduce quantities. Avoiding kitchen sink wastewater disposal units reduces quantities.

The Standard states that drip irrigation should be used only with secondary treated wastewater. The Department of Conservation has several wastewater systems that use drip irrigation with septic tank effluent, with one operating successfully for over 13 years. Overseas design guides provide for the drip irrigation of septic tank effluent.

The wastewater discharge should be monitored in terms of quantity and composition. The wastewater treatment system should be designed to enable expansion if monitoring demonstrates that design flows and loads are being exceeded.

Water using fixtures vary hugely in their consumption of water. Selection of lower flow fixtures will reduce wastewater flows.

Kitchen waste disposal units result in more water being used and wastewater of higher strength. These should be avoided.

Grease traps are used commonly with commercial kitchens. They need regular cleaning. A septic tank located close to a kitchen discharge can avoid the need for a grease trap.

Care is needed with the types of consumables used when using an onsite wastewater system. Consumables include cleaners and detergents. Any form of grease / oil / fat solvents whether chemical or enzyme should be avoided.

Information on freezing depth should be sought.

With reference to the Path Concept Design report, clarification of the activities planned for the 'public' and B.o.H buildings is sought.

Raw wastewater can contain materials that clog or jam pumps e.g. disposable wipes. Draining raw wastewater to a septic tank before pumping ensures pumps are not exposed to such materials and enables higher efficiency pumps to be used. A single above ground septic tank would require long drains from the pods to a pumping station. Digging such drains may be problematic. Keeping options open until further investigation is recommended.

Summary

The site appears well suited for the land application of treated wastewater including wastewater treated by septic tank.

At the design concept stage there is opportunity to design out or reduce operational requirements, and to develop a lower risk system.

Obtaining a resource consent for the discharge of treated wastewater to land based on septic tank and soil treatment may prove challenging. Early discussions with Environment Southland may establish a mutual understanding of an acceptable solution.

The system design concept can be developed after your consideration of this preliminary information and further direction.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'J. Cocks', is positioned below the closing text.

John Cocks

Attachment A



Aerial Photo of Site