The Southland Economic Project

URBAN AND INDUSTRY

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Context

Around 3.3% of the 1.2 million hectares of developed land in Southland is used for urban activities, such as residential and commerical areas, transport networks and industry which create discharges of wastewater and stormwater.

A relatively large proportion of people in Southland live rurally (twice the national average) and many towns are service centres for their local area. As a result, 'town and country' are highly reliant on each other.

Invercargill city and 24 Southland towns have municipal wastewater schemes, most of which have been developed since the 1960s. These schemes provide essential services and are a sizeable investment for local communities, making it possible for people to live and work together.

From Matāura Bridge looking north to the remains of the Matāura Falls

The Southland Economic Project

The Southland Economic Project was established to develop ways of understanding the economic impacts of setting catchment limits for water quality in Southland. The project is a joint undertaking between the agencies shown below.

In addition, other organisations are involved in components of the project, including the three local councils (Gore District Council, Invercargill City Council, and Southland District Council), Deer Industry New Zealand, Southland Branch – New Zealand Deer Farmers' Association, Foundation for Arable Research, and Horticulture New Zealand.

Research focus – wastewater schemes

The aim of this research was to develop information on the finanical costs of further managing contaminants in discharges of treated wastewater from municpial schemes. The schemes consist of two main components: the reticulation infratstructure (ie pipes, pits and pumps) and the wastewater treatement system. While a scheme's reticulation infrastrucure is relevant, the research was specially about step changes in wastewater treatment.

Methods

Eight towns across the region were selected as case studies (Te Anau, Ohai, Nightcaps, Winton, Gore, Mataura, Bluff and Invercargill). The towns cover as wide a range of different situations as possible and represent over 70% of people living in the region.

The case study towns were used to assess the current performance of municipal wastewater treatment systems in terms of the waste in their discharges; and the effectiveness of modelled scenarios to further improve their discharges and the financial costs of these scenarios. Reticulation infrastructure were not included.

Results are reported on a 30 year forecast 'per household' basis to take account of the different sizes of the towns. This measure should not be interpreted as a cost to ratepayers.

Ohai biological trickling filter with tributary of Orauea Stream between pine trees

Key findings

There are marked differences between the case study towns, particular in wastewater scheme size, treatment technologies and the relative contributions of domestic, commercial and industrial waste streams. However, on a per household basis the quality of treated wastewater discharged was broadly similar.

Location is important and has influenced settlement, existing infrastructure, biophysical conditions and receiving environment.

The capacity to further remove contaminants depends on the contaminant in question and the existing system (including its waste streams and size).

Winton Main Street with water tower in background

Further treatment of a specific contaminant tends to be lower cost than for several contaminants. The higher cost scenarios usually involved sophisticated technology (mechanical plants) that can bring increased risk of failure.

The land-based scenarios were relatively effective for most contaminants but can be challenging in many locations and at certain times of year.

Further reduction of phosphorus and *E.coli* is simpler to do and lower cost compared to nitrogen.

Much of the variation in costs between case studies was due to environmental conditions (climate, soils and groundwater) and the nature of the existing treatment system.

Invercargill case study

Excerpts from the Invercargill case study are used below to illustrate some of the research. Figure 1 shows the effectiveness of the existing treatment system. More specifically, it identifies contaminant levels in both the wastewater inflow and the discharge for: suspended solids, biochemical oxygen demand, nitrogen, phosphorus and *E. coli*.

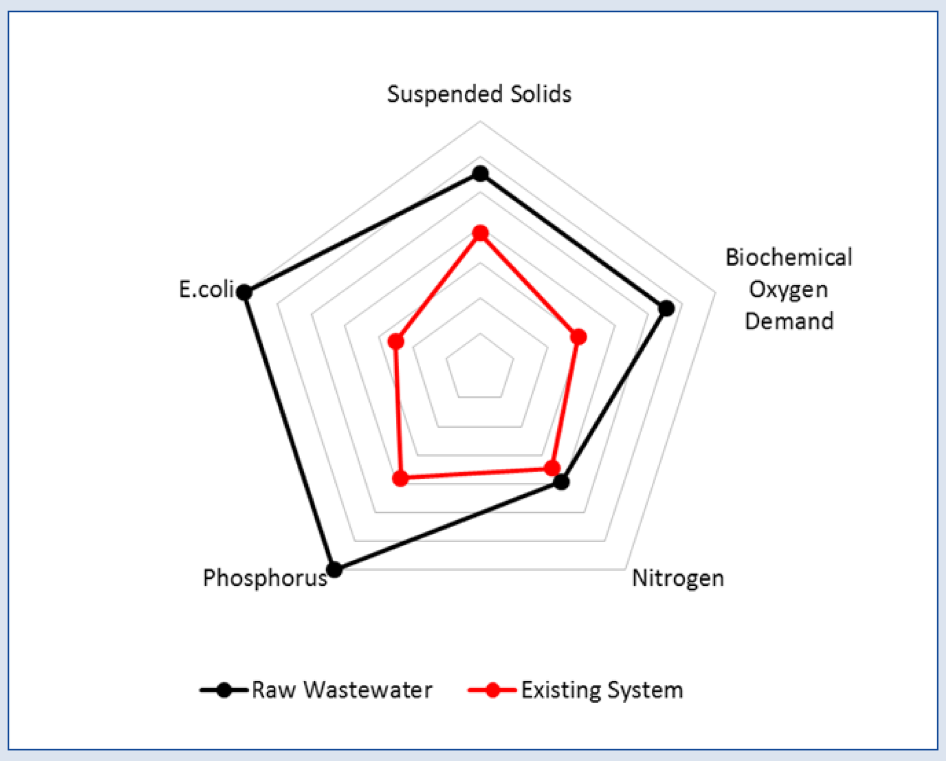

Figure 1: Example of outputs from Invercargil city case study.

Table 1 gives the total cost and cost per household of the whole scheme (i.e. the reticulated infrastructure and treatment system) for additional or new treatment scenarios. Figure 2 shows the effectiveness of these treatment scenarios for further removing total nitrogen. Similar outputs to this Invercargill case study were produced for the other seven case study towns. In both Table 1 and Figure 2, discharges to water scenarios are highlighted in blue and discharges to land are highlighted in green.

Table 1: Invercargill wastewater scheme - scenarios

SCENARIO	TOTAL 30 YEAR COST	ADDITIONAL ANNUAL COST PER HOUSEHOLD
Existing scheme	**$223million**	**$356**
1. Phosphorus reduction	$241million	+$29
2. Pathogen reduction	$242million	+$31
3. Rapid infiltration	$282million	+$94
4. Nutrient reduction	$288million	+$103
5. Nutrient and solids reduction	$295million	+$115
6. Slow infiltration	$354million	+$209
7. Enhanced treatment	$355million	+$210

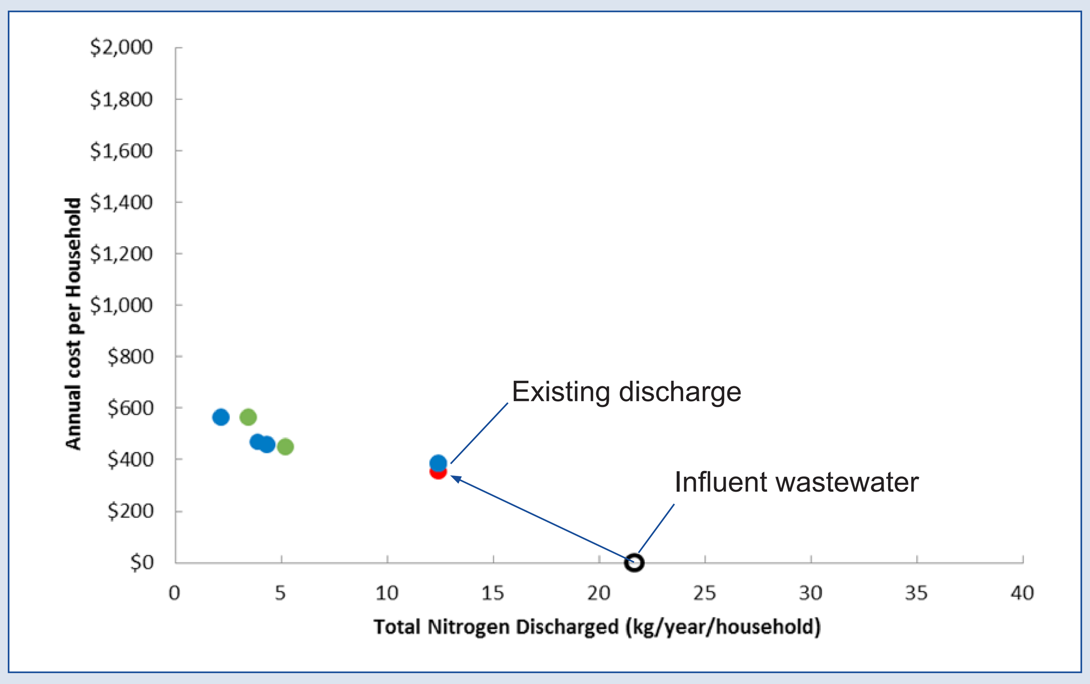

Figure 2: Relationship between annual cost per household and total nitrogen discharged for different treatment options. Blue circles = discharge to water treatment scenario. Green circles = discharge to land treatment scenario (see scenarios 3. and 6. in Table 1)

More information

For more information see www.es.govt.nz or contact Emma Moran at emma.moran@es.govt.nz