

Addendum - Mangawhai WWTP - Irrigation Field Assessment.

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This memo is to be read as an addendum to the WSP memo dated 11-02-19 by Anne-Maree Jolly. The purpose of this memo is to:

- 1 Provide an approximate capital cost and annual power costs for irrigating effluent to the 2.4 Ha identified as feasible.
- 2 To clarify the challenges and difficulties associated with irrigating to steep slopes.

COST ESTIMATE OF IRRIGATING EFFLUENT TO 2.4 HA.

- The approximate capital cost is: \$24,000 to \$48,000
- The approximate cost of power is: \$ 700 to \$1,100 per annum.

This is based on the following assumptions:

- Given the remoteness and the relative steepness of the slopes we think the system is likely to be a fixed sprinkler system where sprinklers are controlled in reasonably small groups.
- The length from the storage pond.
- The high static (700 kPa approximate) and dynamic pressure (600 kPa) required to operate the system.
- The cost of supplying and installing such a system based on industry experience is around \$10,000 and \$20,000 per Ha.
- Operational hours per day of 12 hours per day and cost of power of between \$0.12 and \$0.18 per kW-hr.

The cost of labour and equipment has not been included.

THE CHALLENGES AND DIFFICULTIES ASSOCIATED WITH IRRIGATING TO STEEP SLOPES.

As a slope gets steeper the following challenges become apparent:

- The risk of water flowing across the surface rather than being absorbed increases as slope increases. To combat this risk:
 - The type of irrigation system becomes more specialised (sub-surface dripline and individually controlled fixed sprinklers). The capital cost to supply and install these systems can be greater than \$20,000/ Ha. The biggest unknown here is the uncertainty around the installation costs
 - The design application rate reduces relative to what can be applied to a flat area by up to 50% or more. This in effect increases the amount of area needed and therefore the cost per m³ of effluent to dispose of.

- The effort required to install the system is markedly increased. This both increases the cost and health and safety risks.
- The effort required to operate and maintain the system is markedly increased. This both increases the annual costs and health and safety risks.
- Having a complex system that is difficult to repair could put at risk the ability to discharge effluent in a timely manner.
- To ensure the system is working effectively a more sophisticated monitoring system will be required to measure and record soil moisture, flow and pressure throughout the system.

SUMMARY:

In theory, it is possible to irrigate effluent to steep areas. However before embarking on further detailed analysis it would be prudent to:

- Clearly understand the overall water balance of the system and therefore understand how much land and storage is required and understand which one is critical.
- Identify if the current system could be improved.
- Identify if there is other land is available that can be more effectively irrigated with effluent.
- Investigate and undertake an options report to evaluate the best solution moving forward.