Proposed Riversdale Wastewater Disposal Areas – Preliminary Hydrogeological Assessment

The proposal spray irrigation areas are located on a dissected coastal terrace at an elevation of about 50-60m amsl. The flat to gently undulating terraces are formed by eroded marine sediments (Q5b), underlain by a much older mudstone ('papa') sequence. The papa occurs at the surface (beneath surficial clayey loess and palaeosol) as slightly higher undulating land to the north of the main west-east gulley containing the existing farm pond. Either superficial modern alluvium (Q1a) or papa occur in the base of most gullys.

The attached aerial photo shows an overlay of the mapped geology (GNS QMap 11 Wairarapa Area, 2002).

Summary of geological units:

Q5b – occurs on the flat coastal terrace/bench beneath the proposed irrigation areas. These are sand and gravel marine deposits with some silt and clay and are probably relatively permeable although vertical groundwater movement will be attenuated due to layering and thin silts. Q5b is overlain or capped by thick loess, palaeosol and tephra (all very low permeability, weathering to clay). The thickness of Q5b is probably in the region of 20-30m.

Kiw – mudstones (papa), generally impermeable.

No information exists relating to local groundwater conditions in the vicinity of the proposed spray irrigation areas. However, the geological characteristics of the area, topography and occurrence of wetland areas provide information for a basic hydrogeological evaluation.

It is likely that the depth to groundwater (water table) beneath the Q5b surface is relatively deep and that discharge occurs from the elevated terrace areas into the adjacent gullys in the form of seeps and minor spring flows (possibly at the contact between the Q5b material and the papa). It is estimated that the water table depth beneath irrigating terrace flats would be significantly greater than 10m, but slightly higher than adjacent gully base levels. Recharge rates by rainfall infiltration through the loess (clay) capping layer are expected to be relatively low, with most rainfall running off through the gully system. The high density of surface water channels/gullys in this area tends to suggest low-permeability conditions with only relatively minor groundwater recharge.

Since the terraces are capped with clays (loess deposits), it is unlikely that there would be a rapid infiltration of irrigation water through this capping layer. Rather, there would tend to be a slow 'leakage', but preferential pathways through the clay capping layer may occur (ie desiccation cracks, plant roots etc). The slow infiltration rate, high adsorption capacity of the clay cover, and large depth to water table would tend to suggest that the potential migration of nutrient rich wastewater to the water table would be small. Furthermore, filtration through wetland vegetation in the gully bases (where this occurs – this could be a mitigation measure, planting suitable species?) would provide a further mechanism to reduce the risk of downstream surface water contamination.

There are no recorded groundwater users either in, or downstream of, the irrigation area (none are registered on the regional council database – although this does not mean that there are definitely none).

Perceived environmental risks of irrigating in the proposed areas would be direct surface runoff during heavy rainfall events (when the infiltration capacity of the soil is reached) into the gullys - especially on sloping ground - with potential contamination of downstream environments; and spray drift due to the prevalence of windy conditions (!). These are clearly risks which could be mitigated through appropriate design of the irrigation system/application rates/timing of irrigation. Other mitigation measures could be the establishment of engineered wetlands in gully bases to attenuate any contaminated runoff/seepage before it flows downstream.