5. Summary

Groundwater levels across the Central Plains area vary on a range of spatial and temporal scale. Monitoring wells close to surface water bodies (e.g. alpine rivers, Te Waihora/Lake Ellesmere and the coastal margin) tend to exhibit appreciable short term variability (in response to stage height variations in hydraulically connected surface waters) but typically show limited seasonal or long-term variations. In contrast, hydrographs from wells across the central section of the Central Plains generally exhibit appreciable variability in response to seasonal and long-term variations in rainfall and associated land surface recharge. The magnitude of water level variations in these areas increases from less than five metres in lowland areas to as much as 35 metres on the upper plains. While the effects of abstraction are observed to have resulted in increased seasonal variability in many areas, for a majority of the Central Plains longer-term trends in groundwater levels track corresponding variations in land surface recharge.

Analysis of Environment Canterbury groundwater level records shows a relatively consistent long-term variation across the Central Plains area. Particularly in inland areas, lowest recorded groundwater levels since monitoring commenced in the early-1950's are observed during a dry period in the early 1970's, with higher groundwater levels observed during the latter half of the same decode following a sequence of 'wet' years. From the early 1980's groundwater levels exhibited a relatively consistent decline through to 2005 (this decline exacerbated by increased seasonal drawdown resulting from groundwater abstraction in later years). However, over recent years groundwater levels have steadily increased in response to a period of above normal winter recharge, with levels in 2013 (particularly in lowland areas) approaching or in some cases exceeding those observed during the late 1970's.

Development of the CPWL scheme will result in significant mounding of groundwater levels in the area directly underlying the command area due to a combination of increased irrigation (using water transferred from the alpine rivers) and the substitution of existing groundwater takes with abstraction from CPWL reticulation). Due to the deep water table in this area the projected mounding is unlikely to result in any direct adverse effects and may provide benefits to existing groundwater users (in terms of increased reliability and/or decreased pumping lift).

Downgradient of the CPWL scheme groundwater levels are predicted to rise in lowland areas due to the increased throughflow occurring within the groundwater system, although the absolute magnitude and occurrence of such changes is poorly constrained. While the magnitude of resulting increases are likely to be relatively minor, due to the existing shallow water table in lowland areas this area will be sensitive to relatively small changes in groundwater levels, particularly in terms of land drainage and the functioning of existing wastewater and stormwater discharges to ground. These effects may be particularly significant during periods of naturally high groundwater levels (such as winter 2013).

Due to uncertainty regarding the location, timing and magnitude of groundwater level increases in lowland areas, management of adverse effects associated with groundwater mounding may require additional monitoring and characterisation of services potentially affected by such changes. However, recognition of environmental benefits in terms of lowland stream flows associated with potential groundwater mounding resulting from the CPWL scheme through the CWMS Selwyn Waihora ZIP may require development of a management approach which provides the anticipated environmental benefits

while minimising adverse effects on the operation of existing water, wastewater, stormwater and land drainage infrastructure.

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