CONCLUSIONS AND RECOMMENDATIONS

Geomorphology and soils information is presented together with maps to assist with the interpretation of local and regional hydrology, and to provide physical information for incorporation in management schemes. Hydrological information on local groundwater and deep leads has been collated and interpreted so that an appreciation of groundwater conditions, particularly in the salt threatened Timor West area, is gained. It is possible to advance some theories about the causes and mechanisms of rising saline water tables at Timor West and make suggestions towards reducing the threat of widespread salting.

The vast size of the Emu Creek catchment, wide distribution of recharge ares and high runoff onto alluvial plains suggests that the contribution of local intake to groundwater conditions in the Emu Creek/Bet Bet valley could be significant. Recharge to groundwater is expected to be high through the exposed metamorphic ridge of Mt Hooghly and the Black Ranges. Significant intake is also possible through the alluvial cover of the central valley due to the grey and reddish clay units (Figs. 4 and 5) which have moderate infiltration rates.

Drilling conducted in June of 1984 revealed a shallow lead between 15 and 18 metres deep discharging to the salted area of Timor West. Proximity to the Ordovician fractured bedrock aquifer which outcrops in Emu Creek and underlies much of the Timor West area at depths less than twenty metres, is also expected to contribute to the saline groundwater problem.

Results from a bore hole (BH 3, Fig. 8) tapping the Bet Bet deep lead south of Timor West show water levels in the lead bore to be similar to levels in the shallow piezometers. This implies interconnection between deep lead groundwater and shallow water tables, suggesting that the deep led water has filled the entire valley. Pumping conducted in September 1984 provide chemical data showing led water to possess a high dissolved oxygen content (>4 mg/L). This indicates that recharge to the lead is by water passing quite rapidly through permeable stream beds or rock exposure, rather than through soil cover which would act to reduce or remove oxygen from percolating rainwater. Further pumping is planned for 1985.

To more accurately determine the effect of each potential groundwater source on local water tables (whether it be local intake, deep lead discharge or as expected a combination of factors), further drilling is required. A bore intersecting the main lead downstream from Timor West would allow comparison of lead water pressures above and below the salt affected area. An extension of the shallow piezometer system both west and east of the present group would permit wider monitoring of the problem. The existence of a ground water “bottle-neck” at “Green Hill” could be examined in this way.

Based on current information several management options are available to attempt to reduce the salting threat at Timor West. Planting of trees along the high recharge ridge country of Mt Hooghly and the Black Ranges would reduce recharge to bedrock aquifers. Limited drainage and deep rooted crop species could be introduced on selected slopes – particularly on the eastern slopes of the Black Ranges to reduce runoff and use water which would otherwise drain onto the moderate recharge alluvial plains. Efficient drainage of Burkinshaw Swamp (partially achieved) and flood control of Green Hill Creek would also reduce intake through the alluvial soils.

The size of the catchment draining into Emu Creek precludes a comprehensive remedy. It would be impractical and uneconomic to consider wholesale modification of the landscape by land management. Remedial strategy can only be piecemeal with attention given to critical areas and/or land made available by co-operative landholders. General improvements in crop techniques designed to reduce recharge is the most feasible option and should be encouraged amongst participating landholders. Reduction of fallowing, changing the frequency and area of cropping together with the introduction of deep rooted species on the alluvial cropland would be positive measures.

To reduce the influence of deep lead discharge in the area, and engineering solution involving lead pumping is worth examining, especially where the discharged water would be suitable for irrigation. At Timor the lead water quality would satisfy irrigation requirements with salinity falling between 1 500 and 3 000 ppm. Mining records from the last century indicate that water levels could be lowered

significantly for considerable lengths of time by large scale pumping operations. The cost effectiveness of such a project would need to be assessed.

In summary, the combination of factors contributing to groundwater conditions at Timor West are complex and there is scope for further study. The salted sites which occur throughout the study area on lower slopes can be treated individually with some confidence. Limited tree planting schemes and introduction of deep rooted pastures on high recharge areas would present feasible management options.

For the Bet Bet/Emu Creek cropland, a combination of cropping modification and a lead pumping trial should be examined as immediate remedial measures, bearing in mind that the effectiveness of land management in reducing salinity is long term (5-10 years).