CONTENTS

17. GROUNDWATER

This Chapter provides a response to the issues raised in relation to the groundwater impact assessment for the Traveston Crossing Dam EIS.

Eight submissions were received which raised issues related to groundwater. The main issues raised were in relation to the adequacy of baseline data and the impact on groundwater flows downstream of the inundation area. Discussion of these issues is presented in this Chapter.

17.1 Baseline Conditions

17.1.1 Inadequate Field Data

Several submissions raised issues regarding the lack of long term monitoring of the behaviour of the groundwater systems in the Project area and that the extent of groundwater movement in basement rock aquifers (i.e. seepage) elsewhere in the inundation area had not been investigated. Submitters suggested that there are significant faults and fractures in many areas.

As a way of explanation to these issues, the basement rock (Amamoor Beds) is of extremely low hydraulic conductivity (is virtually impermeable) as reported in Section 6.2.2.2 of the EIS. Therefore, the groundwater aquifer hosted by this geological environment can only be a fractured rock aquifer wherein groundwater is contained in joints, fractures or other defects. By comparison to the total volume of the rock unit the capacity of this fractured rock aquifer is very small. Moreover, these water bearing joints and other apertures in the bedrock become smaller with depth and eventually close completely forming a watertight base to the aquifer. In this environment groundwater cannot leak out of the system. Also, if groundwater does flow in the fractured system it must flow downslope and will eventually find a level at which it will report to the alluvium downstream. Thus, the capacity for water movement through the fractured rock aquifer is unlikely to be affected by the water held within the reservoir and groundwater will not flow around the dam wall in this aquifer.

As detailed in Section 6.2.2.4 of the EIS, the great majority of groundwater in the Mary River catchment area is held in the alluvium above the bedrock. In the inundation area, the bedrock and the alluvium will quickly become saturated after which minimal or no loss could be expected to groundwater.

17.1.2 Seasonal Variability

A submission proposed that more monitoring is required upstream and downstream to assess seasonal and long term groundwater flows.

Section 6.2.1.1 of the EIS describes the groundwater system in the Mary Valley catchment based on a range of drill hole information derived from several investigations in the area over a number of years. The assessment undertaken for the EIS shows, as expected, that there is variation in the watertable levels according to seasons of the year and according to the amount of rainfall in any year. However, the assessment also shows that when the aquifer contains water to a level that equals or exceeds the level of water in the surface stream the groundwater emerges into the surface stream (the volume so released to the surface is termed the baseflow as noted in Section 6.2.2.9 of the EIS). Section 6.2.2.9 of the EIS concludes that the Project will have little impact on the groundwater system downstream of the dam wall and that the aquifer in the inundation area will quickly become saturated and subsequently will not vary substantially. As a result, there is no identifiable benefit to water management in the catchment or outcomes in undertaking groundwater monitoring data to assess seasonal and long term groundwater flows.

17.1.3 Salinity

One submission suggested that salinity and the interconnectivity of stream flow and groundwater have not been taken into account during modelling.

The interconnectivity of groundwater and stream flow have been considered directly in identifying the base flow (i.e. the volume of water moving from the groundwater aquifer to the surface stream over the length of the stream) and the level the base flow contributes to the surface stream flows. The risk of the Project heightening salinity levels in soil or water anywhere in the Mary River catchment is addressed in Section 12.3 of the Supplementary Report, which found such risks to be low.

17.1.4 Water Quality Indicators

Water quality indicators in groundwater samples show nitrogen and phosphorus levels above Queensland Water Quality guidelines and sulphate above National Health and Medical Research Council (NHMRC) levels in some samples. Manganese was not assessed. One submission suggested that these risks need to be quantified and impacts detailed.

The levels for a number of organic and inorganic components of the groundwater were found to exceed water quality guidelines. However, similar levels, exceeding the Queensland Water Quality Guidelines were recorded for water taken directly from the surface streams of the drainage basin (see Section 6.3.4 of the EIS). This is not surprising because, as is explained in the groundwater Section 6.2.2.7 of the EIS, there is significant mixing of groundwater and surface stream water with water movement between the two systems dependent on stream gradients and topography. The net effect is that a significant volume of water having passed through the groundwater aquifer flows naturally into surface streams including the Mary River but at certain points along the course of the river surface water is recharging the groundwater aquifer, although to a lesser extent.

Water chemistry, particularly for elements such as phosphorus, nitrogen or manganese, will not be altered by the Project. As noted in Section 6.2.2.7 of the EIS the ability for phosphorus to move in water is dependent on the availability of particles (i.e. turbidity) to which the phosphorus may attach. Of potential sources of phosphorus, the most likely one in the Mary River is runoff from existing farming activities in the area. The conclusion in the EIS is that the high nutrient levels within the Mary River catchment is typical of a catchment dominated by rural activities. It should also be noted, water for urban consumption will be treated to a drinking water standard prior to distribution to the water supply networks of SEQ.

17.2 Construction Impacts

17.2.1 Drainage

One submission suggested that the downstream release of groundwater pumped from boreholes appropriately placed to dewater the excavations for the dam wall construction poses a risk in that elevated levels of phosphorus, mercury, organic nitrogen and unknown concentrations of manganese were found in the groundwater.

The potential for reduced downstream flows during dam construction is addressed in Section 6.3.7.4 of the EIS. The EIS has shown that a considerable baseflow of 3,927 ML per annum contributes to the river flow each year in the existing natural system. The dewatering activities during construction will take groundwater from the alluvium at one place upstream of the proposed dam and replenish into the stream further downstream. The volume of water being transferred during this activity is small relative to the baseflow, resulting in little or no effect on water chemistry characteristics downstream of the dam construction works. As noted in Section 17.1.4, there is significant natural mixing of groundwater and surface stream water with water movement between the two systems already as a result of stream gradients and topography.

17.3 Operational Impacts

17.3.1 Groundwater Flows

One submission raised the concern that no assessment had been made as to the effect of stopping groundwater flow at the dam wall. Several submissions raised the specific concern about the requirement for a grout curtain in the area of the dam wall to control groundwater flows and that the grout wall will have a deleterious effect on groundwater resources of the Mary River drainage basin.

Post construction, the Project is considered unlikely to affect the groundwater regime because the most significant recharge mechanism is rainfall, which comprises about 70% of the recharge, as estimated in Section 6.2.2.9 of the EIS. Moreover, the reservoir would store from an area of a 1/3 of the Mary River Basin and associated drainage system, meaning that rainfall within the other 2/3 of the catchment will continue to recharge groundwater within tributary alluvial aquifers, which feed the central alluvial aquifer of the Mary River, as well as the central aquifer itself.

Assessment of the Mary River catchment has shown that a large proportion of groundwater comes to the surface and contributes to the stream flow due to relative levels along the stream. Table 6.51 in the EIS indicates the water balance estimated for the inundation area showing the volume of water that enters the system from rainwater or from migration in the alluvium to the area of inundation. Due to the topography providing a moderate downstream slope to the main river channel, a large proportion of the water that enters the groundwater system is released back to the surface stream with the net effect that only about one eighth (or 170ML) of the groundwater that reaches the inundation area from upstream passes downstream through the dam site within the groundwater aquifer. The dominance of rainfall as a recharge agent means that the dam will have virtually no impact on the downstream groundwater regime and no effect on existing users of that groundwater.

Water released from the dam on a regular basis will also recharge groundwater resources as it passes along the stream valley if water levels in the aquifer are lower than the natural balance level within the stream.

The dam will have no net effect on the overall groundwater system of the catchment area because it will not introduce or remove water from the groundwater system. Some minor changes in the immediate vicinity of the dam wall may occur but these have been modelled and found to be potentially very low. The EIS thus concludes that impacts of the dam on downstream groundwater levels are expected to be minimal.

17.3.2 Monitoring

It was suggested by a submission that more monitoring would be required upstream and downstream to assess seasonal and long term groundwater flows.

Because the level of use of groundwater is quite low, as detailed in Section 6.2.1 of the EIS, the need to monitor the groundwater levels is not apparent. The water balance model calculations detailed in the EIS provide a comprehensive assessment of the groundwater flow and possible impact of the dam on the groundwater regime in the inundation area. The possible effects of the Project on the downstream groundwater aquifers, and the value of additional monitoring to assess seasonal and long term groundwater flows are addressed in the response immediately above in 17.3.1 of this report.