Appendix J Final Void Water Quality Model Inputs

Final Void Water Quality Model Inputs

A TDS mass-balance model of the final void was constructed by combining the net loads of TDS of groundwater, rainfall and runoff (ie. flow x TDS), where:

- all inflow rates to the void (groundwater, backfill seepage, rainfall, surface flow contributions) were calculated as net inflows from aquifer inflows and outflows in the groundwater recovery model. The groundwater data consisted of an initial 133 years of variable inflow and outflow data relating to the period when the void is filling. After this time, water levels were predicted in the groundwater model to increase only very slowly (i.e. 2 m water level rise in about 20 years). After this initial period, constant yearly inflow rates were used to reflect the period when the void water level was at equilibrium.
- there were no groundwater or surface water discharges from the void. Water outflow is only via evaporation, which was taken from values used in the final void equilibrium water level model.
- yearly salt loads to the void were calculated for each of the inflows using their flow rates and TDS concentrations:
  - concentrations for groundwater contributions used in these calculations were derived from median (base case scenario) and 80th percentile (worst-case scenario) TDS concentrations from groundwater sampling;
  - waste rock infiltration values were conservatively assumed to be median Permian groundwater concentrations;
  - TDS for surface runoff from rehabilitated areas was conservatively estimated to be 480 mg /L, which was estimated by doubling the highest median TDS from the nearest creeks to the void (Gowrie Creek and Tea Tree Creek); and
  - TDS of rainfall was calculated as 10 mg/L from a published EC value (Suttar, 1990), which lists rainwater EC as 15 μS/cm.

A schematic of the final void mass balance model is provided in **Figure J-1**. The inflow TDS concentrations used in the model are summarised in **Table J-1**.

Prediction of the years taken to achieve the salinity of seawater (36 000 mg/L) was by extrapolation of the slope equation for salinity versus years since cessation of mining and was based on the period following equilibrium.

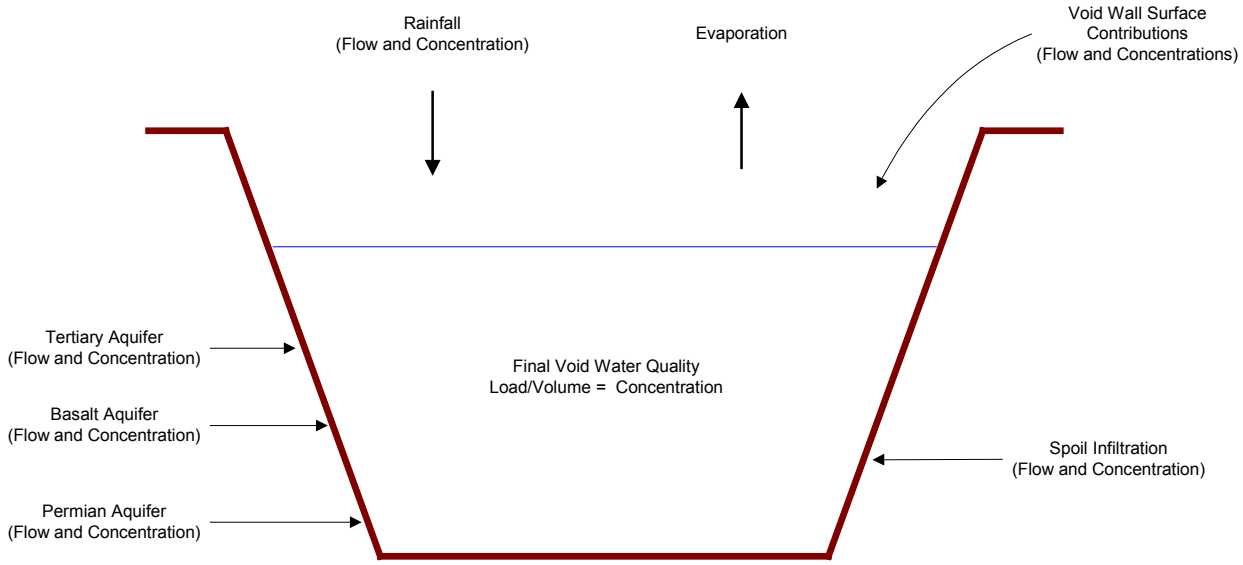

Figure J-1 Schematic of the final void TDS mass balance model.

Table J-1 Inflow TDS concentrations used in the final void water quality model

Parameter	Base-case TDS (mg/L)	Worst-case scenario (mg/L)	Source
Rainfall	10	10	Calculated from EC level of 15μS/cm in Suttar (1990).
Surface runoff of rehabilitated areas	480	480	Double highest median from local creeks.
Basalt inflow	530	640	Ground water quality database.
Tertiary sediments inflow	548	576	Ground water quality database.
Permian inflow	500	713	Ground water quality database.
Waste rock infiltration	500	713	Used Permian groundwater quality data as conservative estimate. Data from groundwater quality database.