4.0 DRAINAGE MANAGEMENT PLAN

Objectives

- *To ensure the retention of turbid water from areas disturbed during excavation, within the exhausted clay pit within each stage.*

- *To modify, where necessary, existing drainage patterns between the site and the Ellen Brook Nature Reserve (approximately 300m north-east of the site), to ensure that drainage waters bypass the tortoise habitat within the reserve.*

- *To monitor drainage water quality which will enable the success of drainage management to be confirmed, or remedial action to be instigated, where necessary.*

4.1 Run-off Management

4.1.1 Basis

In accordance with the ministerial Conditions for this project:

- All drainage waters from the south western side of the Great Northern Highway were required to be diverted from entering any of the fenced tortoise habitat enclosure at the EBNR, within 2 years of the Minister for the Environment's approval.

- All drainage waters generated from the operational areas are to be detained on-site for the life of the mine, to avoid deleterious effects on the tortoise habitat.

4.1.2 Containment

The following management strategies have been and will continue to be implemented to ensure the containment of turbid waters from the operational area on-site:

- The pit created during each excavation campaign (stage 1,2,3...16) are utilised for containment of turbid run-off.

- Run-off from disturbed ground adjacent to the pit is diverted to the pit by strategic formation of the surrounding bunds (and spoon-drains if necessary).

- To avoid the necessity for dewatering of drainage which collects in the operational area, prior to excavation during subsequent campaigns the "drainage" pit created in each stage is left as a discrete cell until eventually rehabilitated. In the case of the stages in the northern half of the site, these cells will eventually be amalgamated to form permanent lakes.

Based on exploratory drilling data and topographical information, it was estimated that the clay deposit extends to a depth of approximately 10 metres below the surface. However, in order to avoid the necessity for dewatering, clay will only be excavated to a depth of approximately 8 metres. However, it is possible that in the process of clay mining a shallow zone of water-bearing sediments may be intersected, in which case water will drain into the pit. Experience with existing clay pits in the locality strongly suggests that large cells of perched groundwater are very much an exception; a factor supported by monitor bore data presented in the CER.

Loss of water occurs from the pits through evaporation over the summer months, and can additionally be used for dust suppression and tree watering if required. As each stage is mined in discrete, self-contained cells, it is not necessary to dewater any pit at the commencement of each excavation season, however pumping of rainwater caught during winter is required in some cases before recommencing extraction of backfilling with overburden.

In the event that dewatering of rainwater from a pit is necessary, or that a lens of groundwater is intersected, Austral Brick will pump low volumes of water as a lateral sheet flow to undisturbed ground for disposal via evaporation within the site, or to a previously excavated stage in the northern half of the site. In any event, water will not be discharged to the surrounding drainage network under any circumstances.

4.1.3 Drainage Diversion

Originally surface drainage waters from the site flowed in a northeast direction, towards and eventually into (at least to some degree) the fenced habitat area of the EBNR. The EPA and CALM were satisfied that the main habitat area in the EBNR could be maintained primarily by direct rainfall, and that the tortoise's survival would benefit by the elimination of the risk of contaminated drainage waters entering the reserve.

With the construction of diversion bunds, clean drainage waters from undisturbed non-operational areas of the site now enter the Apple Street drain, which flows east to a table-drain within the road reserve on the western side of Great Northern Highway. Some clean sheet-flow may also directly enter this drain from the site. This table-drain discharges to the EBNR approximately 800 metres further north from the intersection of Apple Street and Great Northern Highway, on the eastern side of the highway.

4.2 Monitoring and Remedial Action

4.2.1 Monitoring

The objective of monitoring was to ensure the success of turbid run-off containment during the initial years of operation. Monitoring of drainage continued after the drainage diversion was completed. The EPA has acknowledged that this is no longer required, and cleared the Condition in June 2000.

4.2.2 Remedial Action Plan

Remedial action will be dependent on the nature and extent of the identified problem, and may include:

- Repairs to perimeter bunds;
- Diversion of additional run-off into the clay pit for containment;
- Use of hay bales in areas of sheet run-off to reduce water velocities and filter sediment loads;
- Hydro-mulching of disturbed ground to prevent water erosion; and
- Enlargement of the settling/compensation basin.

It should be noted that as 'ground-disturbing' activity will only occur during the drier months of the year, and as most rainfall would be expected to occur when the operation is dormant, turbidity will not be as excessive as one would expect if machinery were operating or stock were on the site. Therefore, with the exception of the excavation area and internal access route, the remainder of drainage from the site is anticipated to be relatively "clean" water.

4.3 Reporting

If remedial action is considered necessary the EPA will be advised at the time.