## Appendix B: Expert advice from Ecotoxicologist

1. The T4 Project Environmental Assessment Report produced by Douglas Partners and EMGA Mitchell McLennan state that the soils, surface water and groundwater of the T4 location are contaminated with a range of metals, BTEX, PAHs, cyanide, anions and physico-chemistry at selected sites. These levels often exceed respective guidelines (e.g. NSW EPA Health based criteria for industrial/commercial landuse; the ANZECC Water Quality Guidelines for slightly to moderately disturbed sites).

2. The T4 location was previously used to dispose of industrial waste and dredged material, so it is not unexpected that there are a large number of exceedances.

3. There are areas of potential acid sulfate soils around the T4 location with potential for reduced pH and high metal levels. This may be tempered by the buffering capacity of saline waters.

4. There is limited mangrove and saltmarsh vegetation remaining at the T4 location. Threatened migratory bird species and the green and golden bell frog either reside or temporarily use the site. There are nearby national parks and Ramsar wetlands of regional, national and international importance.

5. There are two aquifers on the site separated by a clay aquitard:

    a. the Fill Aquifer, consisting of waste and dredged material, has sub-horizontal flow to surface drainage features as well as vertical percolation through the aquitard to the estuarine aquifer;

    b. the Estuarine Aquifer, consisting predominantly of sand, has sub-horizontal flow to the Hunter River (North and South Arm) and neighbouring wetlands.

    c. The groundwater sampling indicates high concentrations of selected contaminants in the Estuarine Aquifer at or higher than that found in the Fill Aquifer. Some of these still exceed ANZECC water quality guidelines. This is in part is due to movement from the Fill Aquifer through the aquitard and demonstrates the likelihood of movement during and post development.

## HIGHLIGHTED ISSUES

6. Areas of concern relate to the potential movement of contaminated groundwater from the Fill Aquifer through the aquitard into the Estuarine Aquifer and then into the

neighbouring wetlands or Hunter River system. The existing and historic groundwater concentrations are already elevated in the Estuarine Aquifer. The aquitard is thin or more permeable in certain areas (e.g. around the Delta EMD site and Easement Pond) this will create greater movement into the underlying aquifer. Similarly, it is also acknowledged that the aquitard may not be present in some places around the T4 site. These along with associated 'squeezing' of the soil profile from fill material or infrastructure placement could increase leaching and groundwater flows to the estuarine aquifer, hence increasing contaminant transport offsite.

7. Penetration of the clay aquitard during the construction phase has been acknowledged. These include possibilities during dump station, installation of piles, stone columns, wick drains or dynamic replacement. These would result in the increased mobility of contaminants into the estuarine aquifer and then offsite. Mitigation measures are in place to remedy the situation if this occurs. The time to implement these is an important factor that has not been discussed.

8. Surface waters commonly exceeded water quality guideline levels for existing ponds on the T4 site and for wetlands, ponds and the Hunter River offsite. This indicates that the Kooragang Island/Lower Hunter River area is heavily contaminated from decades of industrial use. The T4 site currently has a part in adding to this and future surface water runoff is acknowledged to have similar concentrations. The cumulative impacts of these discharges on the Kooragang wetlands and lower Hunter River system needs to be considered.

9. During operations on average 24% of runoff waters will be released offsite once every 95 days. During wet years this frequency will potentially drop to once every 36 days with exceeds of 550ML/year. Further capture or treatment options need to be considered.

10. The use of the ANZECC/ARMCANZ water quality guidelines 95% trigger values in all relevant reports is indeed a conservative approach and could be viewed as over protective for the environment. This precautionary approach is however appropriate given the potential environmental harm associated with the concentrations and types of the contaminants of concern.

## ASSESSMENT OF REMEDIATION OPTIONS AND PLAN

11. My expertise does not adequately allow a complete assessment of the remediation techniques described for the T4 project. However on *prima facie* evidence the management and remediation measures for the most part would mitigate some potential for impacts associated with the contaminants.

12. The current measures in place at reducing impacts are not adequate at minimizing the future contaminants associated with the T4 development. The proposed measures are therefore better than the do nothing option and the implementation of the precautionary principles is commended in the case of the lead dust and asbestos contaminants.

13. The selected mitigation measures would appear to reduce or contain the horizontal flows or cap the contaminated groundwater and soils. The underlying principle of most of these techniques is the confining nature of the aquitard. The concerns are that the aquitard is of variable depth across the site and so there would be potential for escape of significant amounts of contaminants in areas where the aquitard is non-existent or shallow. Aquitard depth needs to be more fully considered in this development

14. The pond storage and surface water re-use measures are designed for average rainfall conditions. For above average rainfall conditions or under varied climate scenarios excess water will flow off the site carrying potential contaminants. The latter, at least, should be considered more intently.

15. The long term site management plan and the groundwater and surface water monitoring plan are not currently available and so a true evaluation of these aspects cannot be determined.

16. Consideration of the cumulative impacts associated with offsite movement of contaminants needs to be assessed. The claim that the region is already contaminated does not justify the release of more contaminants into the system.