



Government of South Australia

Primary Industries and Resources SA

**ASSESSMENT REPORT
MINERAL LEASE APPLICATION
MINERAL CLAIM 3567 (ANGAS ZINC PROJECT)**

**Minister for Mineral Resources Development
SOUTH AUSTRALIA**

24 July 2006

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1 INTRODUCTION

1.1 GENERAL

This Assessment Report assesses the social, environmental and economic impact of the application by Terramin Australia Limited (Terramin) for a Mineral Lease to mine the mineral resource known as the Angas Zinc Deposit, located 40 km southeast of Adelaide near the town of Strathalbyn. Location maps are shown in Appendix 11.4.

Terramin has announced a resource figure of 3.04 million tonnes of ore at a grade of 8.7% zinc, 3.1% lead, 33 g/t silver, 0.5 g/t gold and 0.3% copper for the Angas deposit. An underground mining method is proposed, to produce at a rate of 400 000 tonnes per annum, which would yield an estimated net operating cash flow of at least \$20 million per year over a 5–7 year mine life. Total royalty payable may be of the order of \$9 million, and 70 direct jobs and up to 280 indirect jobs may be created.

While this report is intended to be a "stand alone" document, the detailed information on which it is based is contained within the October 2005 Draft Mining and Rehabilitation Program (MARP), public comments on the MARP, and the proponent's responses to these comments in the MARP Response Document/Supplement prepared in February 2006. It also relies on information, comments and advice provided by appropriate South Australian Government agencies and from an independent international expert consultant.

1.2 MINING PROPOSAL ASSESSMENT PROCESS

This Mineral Lease application has been assessed under the *Mining Act 1971*. Some mining lease applications may be deemed to be "major developments" and are assessed under the *Development Act* process, rather than the *Mining Act* process. In this case the proposal was not deemed to be of such significance that the *Development Act* process should be followed. However, in the case of the more major mining proposals under the *Mining Act* (such as the Angas proposal), some modification to increase the transparency of the standard process is undertaken to reflect the wider public interest in such proposals.

In summary, the following steps are to be completed before a Mining Lease may be offered:

1. Guidelines are issued to the potential applicant, detailing the required information to be supplied with the application as a "mining proposal" document. *This information was supplied to Terramin in June 2005.*
2. Applicant lodges application and mining proposal documents with PIRSA. *Terramin formally applied for a Mining Lease on 13 October 2005.*
3. Application documentation is made available for public comment for at least two weeks. *In this case, six weeks was deemed an appropriate consultation period. This commenced on 10 November 2005 and closed on 23 December 2005.*

4. Comments are formally sought from affected landowners, the local council and relevant government agencies. *These were requested on the 3rd and 4th November 2005 and received in January 2006.*
5. PIRSA summarises comments received from the public and government agencies, which is made publicly available. *Summaries of comments received were progressively made available to Terramin from 13 January 2006 to 9 March 2006. A summary was made publicly available on PIRSA's website on 19 May 2006.*
6. Applicant is formally requested to respond to issues raised in the consultation. This response document is made publicly available. *Terramin was formally requested to respond to the issues raised in the consultation on 9 March 2006. Terramin formally responded on 28 March 2006, and its response was made publicly available on PIRSA's website on 19 May 2006.*
7. PIRSA prepares an assessment report on the mining lease application, based on the original documentation supplied with the application, submissions received during consultation, the response document received from the applicant, and any internal advice obtained by PIRSA. The report is made publicly available. *This report completes this step.*

The following steps are yet to be completed:

1. The internal PIRSA Tenement Review Committee reviews the assessment report and either endorses the report or requests changes.
2. The Executive Director, PIRSA Division of Minerals and Energy Resources (MER) then either endorses or rejects the recommendations of the assessment report.
3. The Development Assessment Commission reviews the assessment report and provides advice to the Minister for Mineral Resources Development on whether the lease should be granted or rejected and, if granted, what conditions should be placed on the lease. The Minister for Urban Development and Planning then provides this advice to the Minister for Mineral Resources Development.
4. The Minister for Mineral Resources Development makes a decision to grant or reject the lease with conditions.
5. The Minister for the River Murray is consulted by the Minister for Mineral Resources Development and either concurs with the Minister for Mineral Resources Development decision or, if not, the matter is referred to the Governor via Cabinet for resolution.
6. Lease is granted by the Minister for Mineral Resources Development with conditions or formally rejected.
7. The final MARP is submitted by the applicant.

8. PIRSA assesses the MARP and an appropriate level of bond.
9. The Chief Inspector of Mines formally approves the MARP and sets an appropriate amount of bond, or requests changes to the MARP by the applicant.
10. Once the bond is paid, and waivers of exemption under S. 9(3) of the Mining Act and appropriate EPA licences are obtained, mining may commence.

2 BACKGROUND

2.1 APPLICATION FOR MINING LEASE

Terramin Australia Limited (ACN 67 062 576 238) of 28 Greenhill Road Wayville SA 5034 has applied for a Mineral Lease (ML) over the area of Mineral Claim 3567 to mine and concentrate ores of zinc (8.7%), lead (3.1%), silver (33 g/t), gold (0.5 g/t) and copper (0.3%) from an area known as the Angas Zinc Project. The zinc ore concentrate will be transported by B-Double trucks (up to 6 per day) via Callington and the Princes Highway to Port Adelaide wharf storage sheds for export to smelters. Lead concentrates, including silver ore concentrates with gold traces, will be transported directly to Port Pirie smelters at the rate of approximately one B-Double load per day.

The claim covers 87.97 hectares, located ~40 km southeast of Adelaide and 1.7 km northeast of the Strathalbyn township boundary. The claim is located on freehold and perpetual leasehold land located in Sections 825, 826, 827, 828, 829, 830 and Allot 51 of FP14493, Allot 6 of FP32738, Allot 6 of DP28694, Allot 7 of DP28694, Allot 8 of DP28694, Allot 9 of DP28694 and Road Reserves, Swamp Road, Callington Road and an unnamed Government Road (south of the Callington Road), in the Hundred of Strathalbyn.

All concentration of the ore will be carried out on the mineral claim area, which will involve crushing, grinding, and lead and zinc flotation.



2.2 THE PROPONENT – TERRAMIN AUSTRALIA LIMITED

Terramin Australia Ltd (TZN) is a small Adelaide-based ASX-listed zinc explorer with a total market capitalisation of ~\$100 million. Terramin's key assets in South Australia include the Angas Prospect (the subject of this lease application) and the Menninnie Dam Prospect (also lead-zinc), along with other exploration acreage, and a potential project in Algeria.

Sempra Metals and Concentrates Corporation has signed a life-of-mine off take agreement to purchase all concentrate production from the Angas Mine, and will participate in ongoing evaluation, development and investment needed to bring the mine into production next year.

3 THE EXISTING ENVIRONMENT

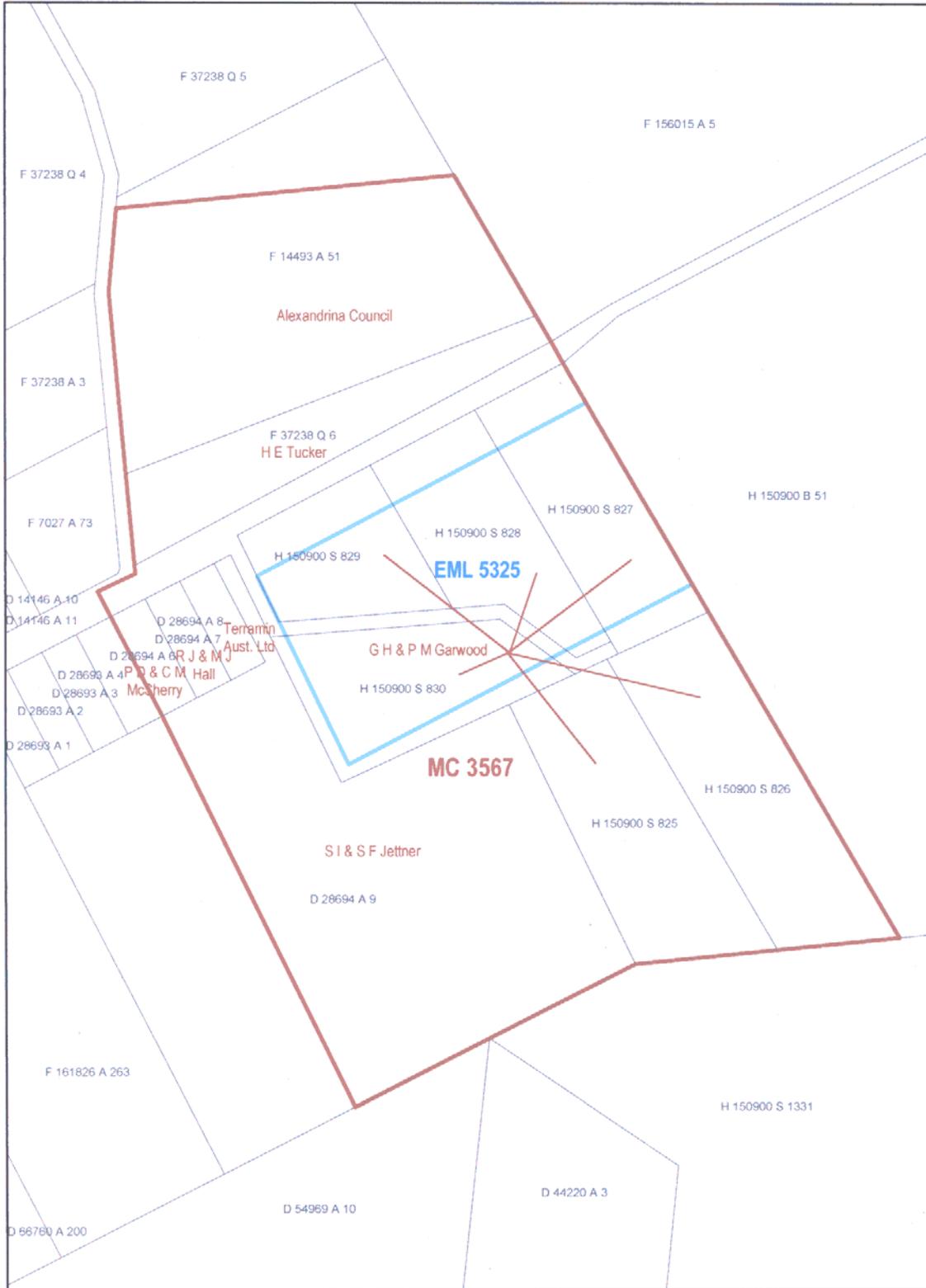
3.1 LAND USE

The claim area has been or is being used for a variety of agricultural, mining, and waste disposal activities.

To the north of the Callington Road, Alexandrina Council operates sewage effluent ponds to treat sewage from Strathalbyn. To the south, Garwood operates a rubble and sand quarry, and to the west a registered solid waste landfill is currently being operated. The remainder of the claim area is used as either large rural residential blocks, or cropping and grazing land. A piggery, until recently operated on the site.

Alexandrina Council	Utilities; water, sewage disposal; sewage treatment.
Alexandrina Council	Road reserves, main road and unused road reserve to access re-subdivided land.
H.E. Tucker	Primary production; agriculture; cereals, grazing and stock watering.
G.H. & P.M. Garwood	This land was converted to freehold title in May 2006. Mining and quarrying; non-metals; crushed stone with secondary industry is primary production and is viable in itself or with other land owned and used by the same owner.
Terramin Australia Ltd	Residential; rural living area; rural residential house.
R.J. & M.J. Hall	Residential; rural living area; rural residential house.
P.D. & C.M. McSherry	Residential; rural living area; rural residential house.
S.I. & S.F. Jettner	Primary production; agriculture; cereals, grazing and stock watering.

All properties covered by Mineral Claim 3567 are either in the name of the Alexandrina Council or freehold land (see ownership plan below).



MC 3567
Hd. Strathalbyn
Terramin Aust. Ltd



Aerial photograph of the proposed mineral lease application.

The existing landfill site is located over a portion of EML5325 as shown in the attached plan.



3.2 CLIMATE

The Strathalbyn region experiences a Mediterranean climate, with warm summers and cool winters. The town has an annual average rainfall of 493 mm, most of which (~40%) falls in winter; this is based on records collected for the period 1862–2005. The average evaporation rate is 1610 mm per year.

Proximity to the coast has a significant influence over the average yearly temperature; the ocean smooths out the variation in temperature over the year so that summer is cooler and winter is warmer than areas not influenced by the ocean.

During winter, average daily maximum temperatures vary between 15 and 16°C on the plains to the east of Strathalbyn. In summer, average maximum temperatures at Strathalbyn vary between 26 and 27°C. Average daily minimum temperatures in the winter vary from 6 to 7°C. In summer, average minimum temperatures vary between 12 and 14°C. Frosts are most common during winter in low-lying areas.

3.3 AIR QUALITY AND NOISE

Terramin engaged Bassett Acoustics to characterise the existing ambient noise levels for the site, based on two locations on the claim area, with noise measurements taken at 15 minute intervals over a one-week period (28/8/05 to 2/9/05). Ambient noise levels vary depending on the time of day and prevailing weather conditions. Average noise levels are 50 dB(A) through the day and 30–40 dB(A) at night. The main existing source of noise is heavy vehicle traffic, particularly at night. The existing quarry would also be expected to contribute to the ambient noise levels of the site.

Terramin is currently conducting baseline studies of existing dust and odour levels, although a proposal to undertake a study of existing dust levels was made in the mining proposal document. Existing dust levels were to be monitored at 10 sites in and near the claim area. It is expected that odour levels would be very low, but some ambient dust could be expected, given the proximity to cultivated land and the existing quarry. Soil sampling near the site has demonstrated existing soil contamination with elevated levels of arsenic, copper, lead, manganese and/or zinc (see section 3.13 below). Dust may potentially contain elevated levels of metals given that the orebody is exposed at the surface to the north of the lease application area.

3.4 GEOHAZARDS

As the proposal includes underground mining, it is necessary to understand the physical (i.e. “geotechnical”) parameters of not only the orebody but also the rocks surrounding the orebody (and importantly the crown pillar — the rock overlying the underground voids) as there is potentially a hazard to both those working in the mine, and to the public and infrastructure that may be located above the underground workings.

Limited geotechnical drilling has been conducted on the site to obtain core from which it is possible to determine the degree to which the rock is fractured, reveal any active groundwater aquifers, and determine the rock strength. Preliminary geological data

indicate that the weathered zone of the orebody near the surface (approximately the first 40–45 m) has relatively poor rock strength, as do the younger sedimentary cover rocks that overlie the orebody in limited areas. Further drilling is being conducted to determine the extent of groundwater influx and fracturing, and obtain more information on rock quality which will be used to determine the final mine design.

The proposed mine is located in an area of low seismic risk, with few historical earthquakes, mostly of less than magnitude 3.

3.5 HOUSING AND URBAN INFRASTRUCTURE

Current land use on the mineral claim area includes grazing, cropping, hard refuse landfill, wastewater treatment (the Strathalbyn town effluent ponds) and quarrying. Other land uses in the vicinity of the mineral claim include residential and an industrial waste depot.

Callington Road, a major arterial road from Strathalbyn and the region, runs through the mineral claim in a northeast–southwest direction and is located immediately to the north of a ridge that divides the mining lease into northern and southern sections. This ridge is similar to those to the south and east of the mineral claim, and features a calcrete capping that has formed a flat planar surface with steep drop-offs to the gently sloping land below. The limestone capping has been breached by excavation of both the current quarry and the hard refuse landfill.

The Strathalbyn effluent pond reserve is located north of the Callington Road in the northern section of the mineral claim. The area covered by the effluent lagoons is ~7.5 ha. The other prominent feature is the quarry south of Callington Road, covering an area of ~4.5 ha, which is operated by Garwood Earthmovers and Contractors Pty Ltd. It has been indicated that this operation will cease while the Angas Zinc Mine is in operation.

The urban area of Strathalbyn is located within 1 km of the claim area. There are 10 houses within 400 m west of the mineral claim area, with the closest house being ~150 m from the claim boundary. All of these properties will require a waiver of exemption to be obtained by Terramin to enable mining to proceed.

A further 16 houses and a school are present within 1000 m of the claim boundary.

3.6 TOPOGRAPHY AND LANDSCAPE

The topography of the mineral claim and surrounding area comprises a ridge (the central ridge) extending across the claim in an approximate east–west direction to the south of Callington Road. This ridge reaches an elevation of ~85 m AHD and divides the claim into northern and southern catchments. South of the ridge, elevation decreases across the claim to a height of ~60 m AHD in a broad, flat area used for grazing and cropping. Further south and east (and outside the claim area), the land surface rises again to another bench of calcrete with an elevation of ~90 m, and eventually 110 m at the eastern boundary of the southern catchment.

In the northern catchment, near the effluent ponds, elevations decline to ~70 m. North of the effluent ponds, elevations once again increase to ~90 m AHD at the northern boundary of the claim. Much of the land is gently sloping at grades of between 2 and 6%, although further east in the catchment, but outside the claim area, slopes increase to ~10%.

Two notable "valleys" occur in the southern catchment, one in an easterly direction from the claim and the second in a southwesterly direction; both are partly within the mineral claim land. The southwest valley is the steeper of the two identified by the survey data, and has an average slope of 2%, compared to the easterly valley which has an average slope of 1.5%.

Both valleys drain into the southwestern corner of the mineral claim, whilst a ridge extends along the southern boundary of the catchment. The steepest slope occurs in the southern catchment and has a value of ~20%. This slope is restricted to a small area directly south of the claim, along the southern catchment boundary.

3.7 WATER COURSES AND DRAINAGE

The Angas River, located ~900 m from the mineral claim, helps to meet the water requirements of Strathalbyn's population of 8500 people. It flows from the hills across the plains to Lake Alexandrina, which is a significant freshwater source in this part of the Fleurieu catchment area. Dams are common in the area due to the land use being mainly agricultural. Water is used for stock, domestic purposes and irrigation.

The claim is located within the River Murray protection area and, because of this, application for the mining lease needs to be referred to the Minister for the River Murray. In the past, water use in excess of the aquifer replenishment rate has led to increased salinity in the area and decreasing water levels.

The Angas mineral deposit claim area can be considered to occur partly within two sub-catchments of the Angas River.

The "northern" catchment covers portions of the Callington Road, northern flanks of the ridge in the centre of the claim area, portions of the current quarry operation, land to the north of the existing quarry (which is located on the ridge), and includes the Strathalbyn township wastewater lagoons. The proposed mine portal and parts of the processing facility will be located in this catchment. The "northern" catchment extends to the east of the claim area for ~2.5 km and to the north for ~4 km. It is shown on topographic maps as including two drainage lines (ephemeral watercourses) falling approximately north to south that drain into the swamp at the eastern end of the effluent ponds and then joining the watercourse from the Burnside Park catchment immediately west of the ponds. The Burnside Park catchment watercourse (occurring outside the claim area) is a tributary to the Angas River, and joins that watercourse ~4 km southeast of the Strathalbyn Post Office (straight line distance). The total area of the northern catchment is ~730 ha, most of which lies outside the mining lease to the north and east. The extensive River Red Gum and Lignum wetland to the north of the Callington Road is artificial, and is sustained by overflow from the effluent ponds.

The "southern" catchment includes the catchment for the proposed tailings storage facility, the southern flank of the ridge in the centre of the claim area, and large tracts of grazing and cropping land to the south of the central ridge.

The southern and eastern parts of this catchment lie outside the existing EML, and extend eastward and southward from the claim by ~2.5 and 1.3 km, respectively. The southern catchment does not include any clearly defined watercourses (permanent or ephemeral), and surface runoff from the "southern" catchment discharges to the southwest, via a broad flat area, directly into the same creek detailed for the northern catchment (see above), and hence also to the Angas River. The total area of this catchment is ~310 ha.

The proposed mine portal is to be located within the existing quarry, which is located on the central ridge that separates the northern and southern catchments. As it is located on the catchment boundaries (topographically high ground), it is likely to receive runoff from within the quarry only, which covers an area of ~4.56 ha.

3.8 GROUNDWATER

Programs of testing the local hydrogeology are still ongoing, but it would appear that at least two aquifer zones are present. Parts of the claim area (mostly the ridge to the south of the Callington Road where the existing quarry is located) are underlain by Quaternary and weathered Tertiary materials forming a shallow, possibly seasonal aquifer up to 26 m thick, which sits on relatively impermeable basement rocks (but potentially a fractured aquifer) of the Kanmantoo Group. Groundwater in the Tertiary aquifers may or may not be in hydraulic continuity with groundwater in the fractured basement.

Regional data on the shallow Quaternary–Tertiary aquifer indicate a salinity range of 3000–7000 mg/L. Drilling within the application area indicates that the groundwater level varies from near surface to 25 m depth. Groundwater flow is generally in a southerly direction. There are a number of registered bores within 1 km of the claim boundaries, located in areas of residential, commercial, recreational and primary production land uses. There are no registered bores within the claim area.

Recent deep drilling in the lease area indicates that the basement aquifer may extend to considerable depth, and this raises the possibility that multiple aquifers may be present in the basement.

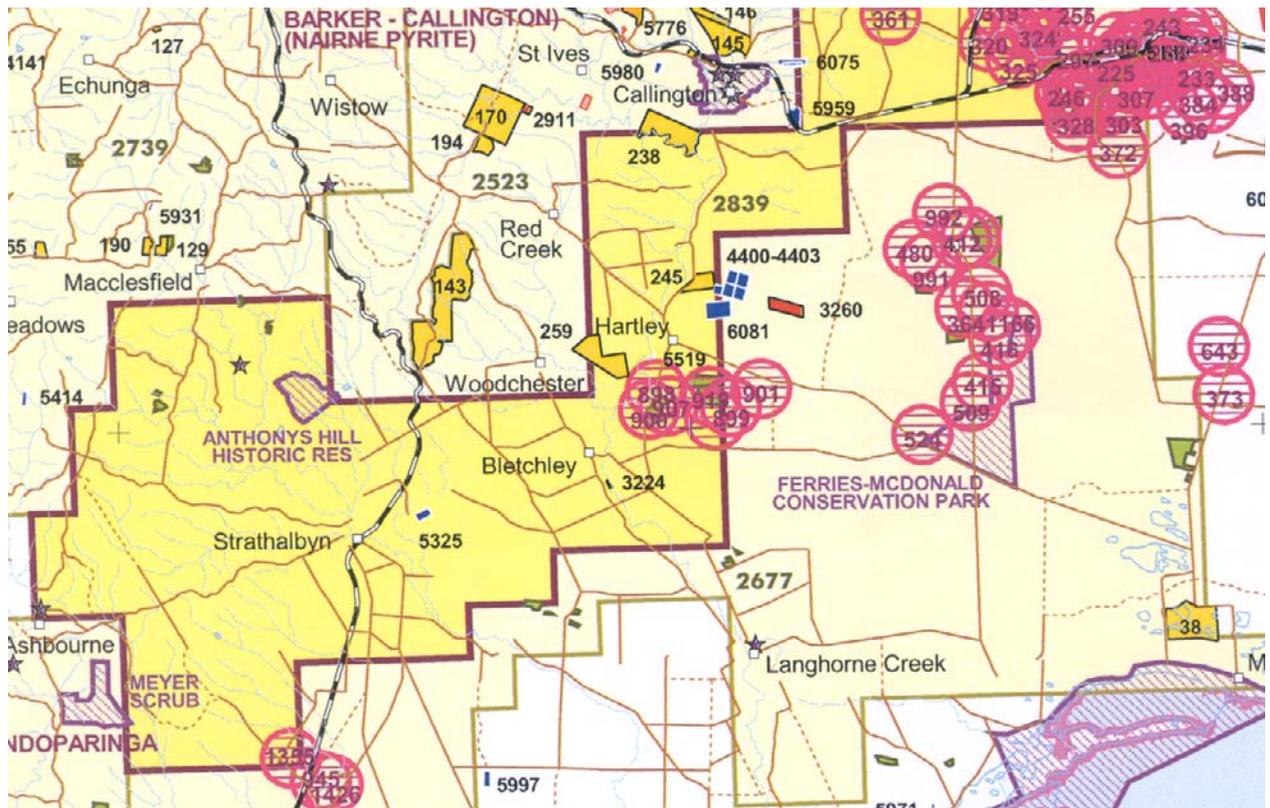
3.9 FLORA AND FAUNA

In general, the site is cleared of native vegetation, with the exception of some remnant red gums and *Lignum* in wetland areas, and *Melaleuca lanceolata* and native grasses in the cropping areas. Trees generally are restricted in distribution, being near to or along the roads and boundary fences, in the vicinity of the effluent ponds, and around houses and sheds. Part of the site has been revegetated over the past 10–20 years with local

native species. All of these areas provide some habitat for native birds, reptiles, bats, insects and small mammals.

Some of the remnant native vegetation is classified as rare or uncommon:

Muehlenbeckia florulenta, regionally RARE (these are located in the artificial wetland near the effluent ponds, and *Lomandra effusa*, regionally RARE (located as roadside vegetation) and *Melaleuca lanceolata*, regionally UNCOMMON (located as scattered trees in the quarry area and in the paddock to the south). *M.lanceolata* is the only species potentially affected by the proposed mine development.



Plan showing the environmental sensitivity areas and mining tenements of the Strathalbyn district; EML 5325 in blue is the location of Garwood's existing quarry. Note that the existing wetland adjacent to the Council effluent ponds is not shown as being a sensitive area.

The numbers on the plan refer to tenement numbers, and the circles indicate known endangered native vegetation species.

3.10 SOIL

The SA Soils Map (DWLBC Land and Soil Information) indicates that soils of the Strathalbyn area and in the vicinity of the site consist of the following:

- sandy loam over poorly structured brown clay (lagoon area, northern sector)
- shallow calcareous loam on calcrete (central sector)
- loam over clay on rock (western portion of southern sector)
- deep, hard, gradational sandy loam (southwestern part of the southern sector and near Callington Road), and
- loam over red clay (central and eastern part of southern sector).

The test pit and borehole logging investigations in general confirm the presence of these soil types.. In the northern sector (effluent pond area), the general profile observed was sandy loam over clay over basement. To the northwest of the effluent treatment ponds, clayey loam over basement to the north, and clay over basement to the south. In the central sector, calcareous soils occur over calcrete, and sandy loams occur on the hill slopes where calcrete is not present.

In the southern sector, soils were generally clayey loam and sandy clay loam. At the localities investigated, soil depth varied between 0.05 and 0.5 m. Organic matter in the A-horizon was generally sparse in the southern and central sectors, but plant roots and other organic matter were common to abundant in the northern sector.

3.11 SOCIO-ECONOMIC

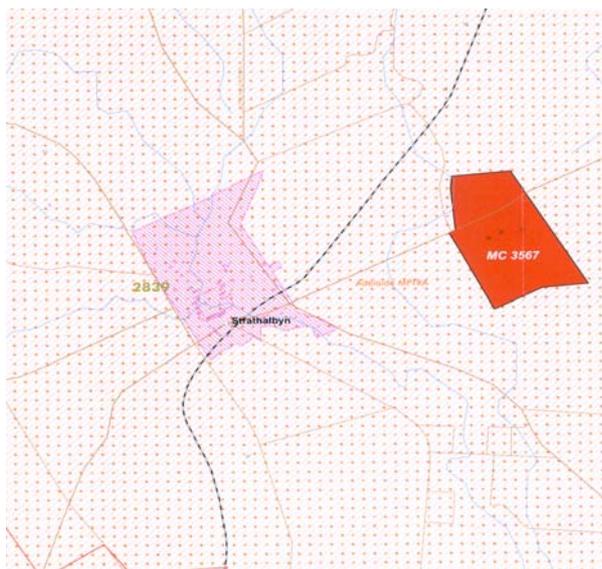
The claim area is located in the northern Fleurieu Peninsula, and the local economy is rural based, with viticulture and grain the main agricultural activities. Some manufacturing is based in Strathalbyn. Tourism (antiques retail, heritage, eco, art and craft, and food and wine) is an important part of the economy for Strathalbyn and the wider region. Strathalbyn is a fast growing town with a current population of 5275, but is expected to grow to ~17 000 over the next decade. It is attractive to urban residents of Adelaide who are seeking a more rural lifestyle, and the town has a high proportion of well-educated residents.

The claim area is located in the Grazing Zone and Landscape Zone of the present Alexandrina Council Development Plan; however, there are a number of schools, private residences, recreational facilities and commercial premises within close proximity of the claim area.

3.12 HERITAGE

No sites of European cultural heritage are known to exist in the claim area.

The Department of Aboriginal Affairs and Reconciliation has been consulted and have advised that there are no registered Aboriginal sites in the area. A heritage survey by the local Ngarrindgeri Heritage Committee has not been conducted. Aboriginal sites of significance may exist in the claim area, although given the high level of existing disturbance of the site, it is unlikely that the proposed mine would cause disturbance to Aboriginal sites.



The shaded area over Strathalbyn shows the extent of the area under the National Estate Register in relation to the mineral claim location.

3.13 EXISTING SITE CONTAMINATION AND DISTURBANCE

Tonkin Consulting has undertaken soil sampling of the mineral claim area and the surrounding areas of the proposed mine site to determine baseline contamination issues. The area contains elevated levels of metal contaminants due to the presence of the orebody at the surface.

This investigation found the following with regard to soils and sediments sampled at 53 locations in the vicinity of the proposed mine site:

- A number of soil sampling locations distributed across the sampled area were found to be contaminated with respect to arsenic (as determined by comparison to NEPM Standard Residential Health Investigation Levels and NEPM Interim Urban Ecological Investigation Levels), showing weak to moderate correlation with the surface expression or outcrop of the orebody. Some of this contamination may also relate to sheep-dipping activities.
- Some soil sampling locations in close proximity to the orebody were found to be contaminated with respect to copper, lead, manganese and/or zinc, showing strong correlation with the surface expression of the orebody.

Arsenic, copper, lead, manganese and/or zinc were reported in elevated concentrations at 23 sampling points, and exceeded the specified NEPM guidelines in a number of samples and all, with the exception of arsenic, appear to be closely connected to the position of the orebody. The high arsenic levels were distributed relatively widely, and do not appear to show as strong a correlation to the position of the ore body.

Terramin also engaged Australian Water Environments to research the historical contamination of the site. The proposed construction site for the processing plant is presently used as a quarry, and is significantly disturbed and modified compared to the original landscape. The area to the south has been used as an unofficial dump, with

considerable rubbish, including car bodies, located on the surface. To the east, a registered landfill site exists, which is used for solid fill, non-polluting building and demolition waste only. To the north, the Alexandrina Council operates sewage effluent ponds that are known to contain high levels of human pathogens and nutrients. A piggery was also previously operated on the site, which may have resulted in further site contamination.

4 THE PROPOSED MINING DEVELOPMENT

4.1 OVERVIEW

Terramin estimates that the deposit contains 2.2 million tonnes of reserves, with a potential resource of 3.04 million tonnes grading 8.7% Zinc, 3.1% lead, 33 g/t silver, 0.5 g/t gold and 0.3% copper.

Conventional underground mining and processing techniques are proposed for the Angas Project. Access to the orebody is proposed via a 4.6 m wide by 5 m high decline from a portal in the wall of the existing limestone and sand quarry. This will provide entry to the main part of the resource located 500 m underground to the north (below Strathalbyn's effluent evaporation ponds).

The decline will provide access to various levels from which the orebody will be drilled, blasted and loaded onto trucks for transport to the surface.

After the initial mining phase, the "stopes" created by the removal of ore will be backfilled and stabilised with tailings and waste rock with or without cement, thereby minimising surface disposal of tailings and waste material. Not all waste material will be able to be disposed in mining voids, as the crushed material is of a greater volume (approximately 20%) than the uncrushed rock. Some non-acidic-producing waste rock may be used to build the tailings dam and other infrastructure on the surface.

After being placed in a stockpile on the surface, the "run-of-mine" ore will be crushed to less than 12 mm in diameter and transferred to a secondary ore storage bin. The secondary ore will then be fed into a grinding mill to liberate the zinc and lead minerals from the waste minerals.

In the next processing stage, the ground ore will undergo a process known as "flotation", in which air is pumped into the slurry. The zinc and silver-lead particles attach to the rising air bubbles and are recovered at the surface using reagents that allow the valuable materials to be separated from the waste minerals, thus producing zinc and lead "concentrates".

The resulting concentrates will then be dried and stored in closed sheds awaiting road transport.

The waste minerals from the flotation phase known as "tailings" will either be pumped into a secure permanent storage facility from which water is recovered and recycled back into the operation, or used for backfilling underground stopes and voids.

The zinc concentrate produced from the Angas Mine will be transported in covered B-double trucks to Port Adelaide for export to overseas markets. Covered trucks will transport the silver–lead concentrate to Port Pirie for storage and smelting.

4.2 PROJECT SCHEDULE AND MINE LIFE

The mine is expected to have a life of 5–7 years. Terramin plans to commence the decline to the underground mine and plant construction in the second half of 2006. Commercial production would commence approximately six months later, with the first year's production being ~240 000 tonnes of ore. From 2008 to 2011, production is expected to be ~400 000 tonnes per year, tailing off towards mine closure. Providing no further ore reserves are defined in this time, the mine will be closed and the site rehabilitated in 2011–12.

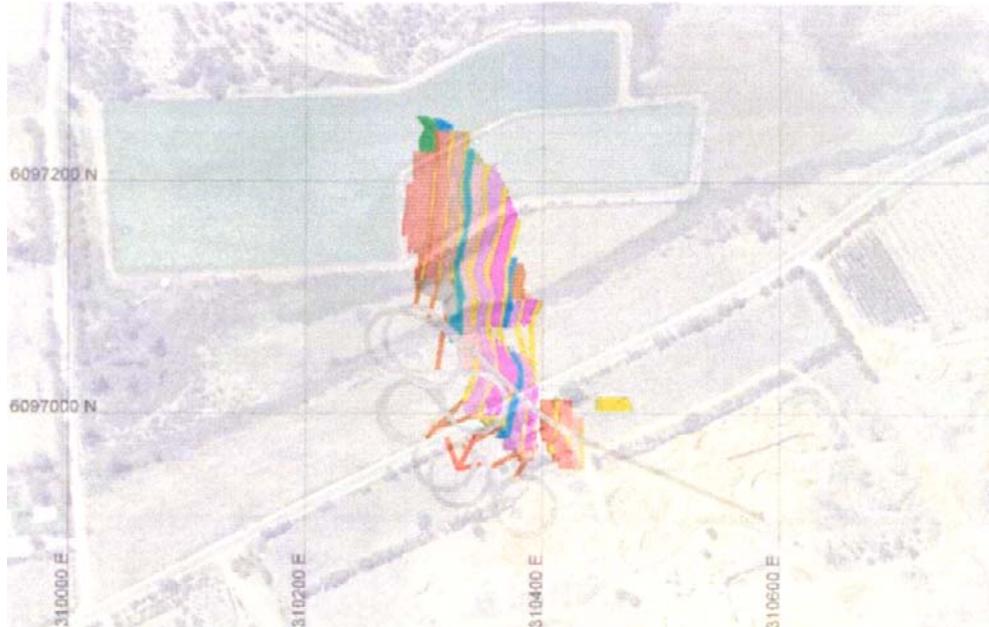
4.3 DEVELOPMENT COMPONENTS

4.3.1 Underground development

The proposed mine decline development is planned to go under a major transport road (Strathalbyn to Callington Road), and stoping is planned under the council effluent evaporation ponds.

It is proposed to construct the portal within the existing extractive quarry from which the 4.6 m wide by 5.0 m high decline will be developed to accommodate mine haul trucks. The decline will provide access to the orebodies for stoping, supplying fresh air, as well as being the main route for ore haulage.

The planned location of the ventilation shaft has been determined by the existing surface infrastructure to minimise the visual impact and for noise reduction. It is, however, expected that in winter there will be some water vapour clouds seen in the exhaust from the ventilation shaft. The diameter of the shaft is planned to be 3 m; the surface collar will be fenced off, a vegetation screen planted and additional mechanical screening installed to reduce the noise and visual impact. The completed vent raiser system will be fitted with escape ladders, a dewatering rising main, fill pipe, and cable and service trays for compressed air, fresh water, power, communications and firing systems.



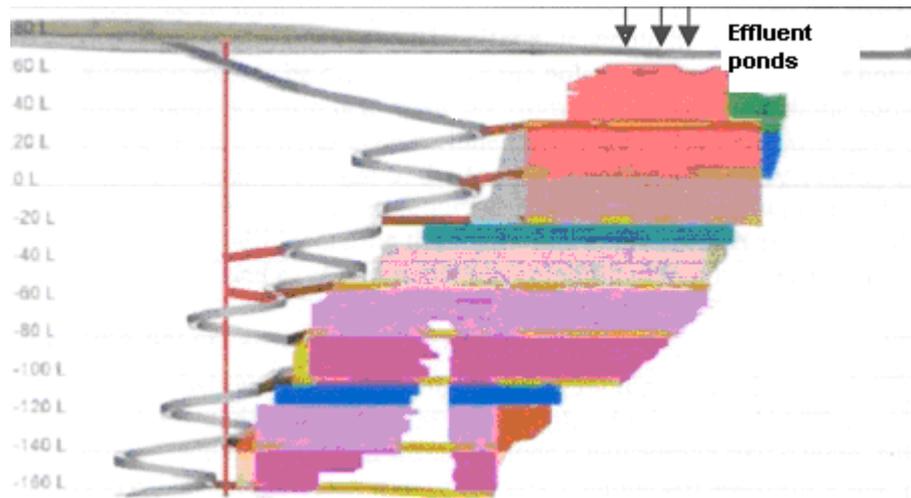
Plan view of the proposed mine development; the various colours show the different stoping levels; the grey circles indicate the drive as it descends down for access to the ore. The red lines indicate the ventilation shafts.

Stopes will be accessed from levels at 20 m vertical intervals developed off the decline. Access is from the south of the orebody and is planned to be in marginal ore where practical. Terramin proposes to develop the various cut-off grades applicable to the various mining methods, and ore access development in future work, prior to mining. Where the ore is less than 4.5 m in width, narrow access and ore drives will be mined down to a width of 3.0 m using twin boom development drills. Orebodies wider than 4.5 m will be accessed by standard drives, which will be 4.5 m high by 4.5 m wide. An airleg miner or single boom jumbo could mine orebodies less than 3.0 m wide.

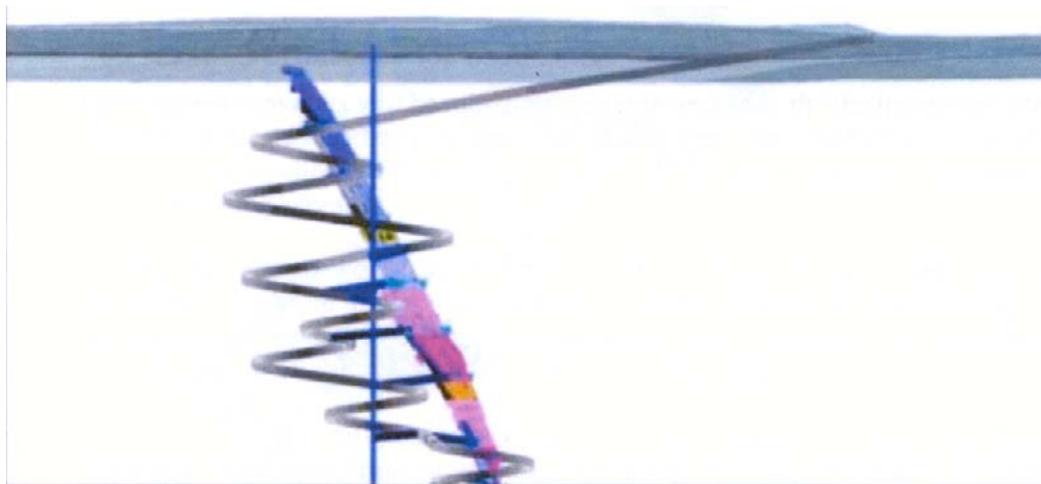
Stopes will be filled using tailings and waste rock with or without cement. Stope backs and hanging walls will be cable bolted as required from detailed stope designs and geotechnical investigation.

Two to three stopes are planned to make up a mining block, with a 10 m floor pillar left between each block.

Initially the fill will be waste rock from development (i.e. decline and drive development) followed by tailings later in the mine life.



Longitudinal view of the proposed mine development. The various colours show the different stoping levels; the grey line indicates the drive as it descends down for access to the ore. The red lines indicate the ventilation shafts; brown lines indicate the drives for access to the ore.



Cross-section view of the proposed mine development (looking north). The various colours show the different stoping levels; the grey line indicates the drive as it descends down for access to the ore. The blue lines indicate the ventilation shafts; brown lines indicate the drives for access to the ore.

4.3.2 Stockpiles

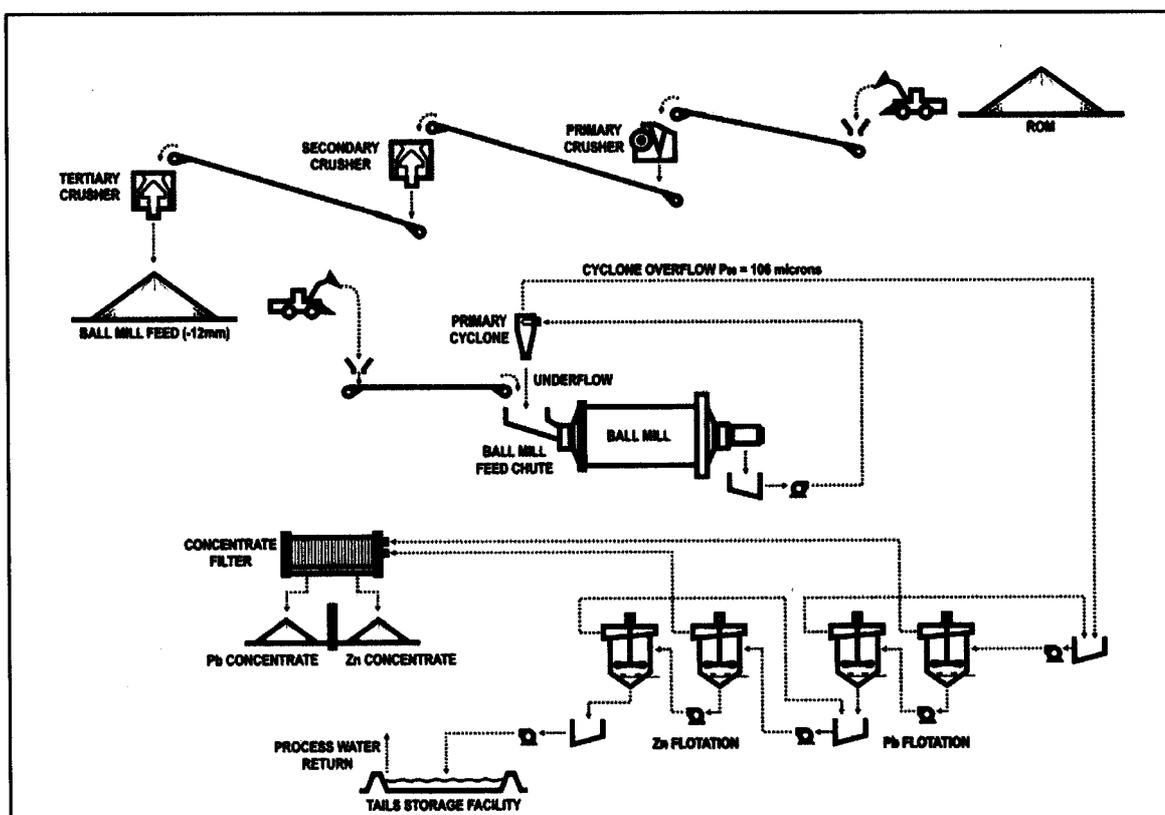
Run-of-mine (ROM) ore will be delivered by trucks to the ROM pad of 10 000 tonne capacity, from which ore will be fed into the crusher feed bin by front end loader. The crusher equipment proposed consists of a grizzly screen to scalp oversized rocks and tramp materials, a jaw crusher, a secondary cone crusher and a tertiary cone crusher. The crushing plant will deliver minus 12 mm ore directly into the ball mill feed bin or onto a ball mill feed stockpile (5000 tonne capacity) to be later fed into the feed bin when the crushing plant is not operating. The base of the crusher feed stockpile will be constructed of compacted hardstand mine waste material with a compacted clay sublayer. All water run off will be collected and fed into the processing circuit.

4.3.3 Processing plant and crusher

The proposed processing plant and crusher will be located within the area of the existing extractive pit. Terramin has not provided details of components or construction (e.g. extent to which the various components will be covered or banded), nor has the company provided details of the hours of operation (although it is expected that at least the processing plant will operate 24 hours per day).

Chemicals to be used in the processing will include sodium ethol xanthate, zinc sulphate, copper sulphate and lime. Cyanide was originally considered but will now not be used.

The ball mill capacity will be 165 tonnes per hour.



4.3.4 Tailings management

Geochemical assessment data from tests on tailings samples from the Angas Project demonstrate that the tailings composition is unusual in terms of its high net acid-producing potential. Oxidation of the Angas orebody has been demonstrated to be an extremely rapid process, and the potential for acid mine drainage generation and release of heavy metals will necessitate appropriate handling and storage of tailings. As noted above, it is expected that most waste rock and tailings can be returned to underground voids as mining progresses, but due to the 20% bulking of crushed versus uncrushed rock, and production timing issues, some tailings may need to be stored permanently on the surface.

The original proposal in the November 2005 document submitted by Terramin was that tailings would be wet type containing 60% water, and would be disposed of in a clay-lined tailings storage facility (TSF). Subsequent to public consultation, Terramin revised this design to include the construction of a HDPE (plastic)-lined tailings storage facility and the use of "thickened" tailings (<30% moisture) rather than the original proposal for water-based tailings. The advantage of the thickened tailings will be easier disposal underground, better recycling of water, and lower risks of acid mine drainage from the TSF. PIRSA estimates that ~1.7 million tonnes of tailings may be produced, based on an estimate of 2.2 million tonnes of ore reserves.

4.3.5 Electricity and water supply infrastructure

Approximately 28 kWh/t are required in total for the proposed mine. The power supply will have to be upgraded at a cost of ~\$2.5 million, which will include a new substation and running a new line from the existing 66 kV transmission line located in the near vicinity. ETSA Utilities has indicated that it plans to upgrade this existing transmission line in the near future, and is of the opinion that the existing capacity of the grid appears to be sufficient for the proposed mining operation.

The original mine proposal required ~440 ML of water per year for its operations, to be sourced from SA Water via upgraded existing infrastructure. Following public consultation, Terramin has committed to an alternative processing method that will recycle water sourced from natural stormwater collection on the site plus water recovered during mine dewatering. No significant water is expected to be required from the SA Water supply infrastructure.

4.3.6 Transport

Terramin investigated a number of methods of ore transport. One of the most obvious was the potential for use of the existing railway. This option was considered inappropriate because of the amount of rehandling required. To move an equivalent amount of ore, there would be approximately five handling steps (process – truck – railcar – truck – final destination) for the rail option, compared to three if road transport was used. The risk of losses (and hence dust impacts) obviously increases proportionately with handling levels. Given the high capital cost of constructing and operating transfer stations, and the potential for wider environmental nuisance to be generated, this option is not considered viable.

5 CONSULTATION

5.1 PROCESS

It is considered best practice (MCMR, 2005) that the primary responsibility for consultation and engaging the community rests with the applicant, and PIRSA recommends that this be undertaken prior to submitting the lease application.

Terramin commenced a process of consultation with stakeholders on the mine proposal in mid-2005.

The company made presentations to government agencies, the Alexandrina Council, Residents for the Future of Strathalbyn, Chamber of Commerce, Langhorne Creek Wine Industry Council, and the South Central Area Consultation Committee. Community and media information kits and newsletters were distributed, and a public open day was held at the Angas site. In general, the consultation process conducted by the company focused on providing information to the community on the mining proposal so that issues of concern could be identified.

After formal submission of the lease application, PIRSA then followed the prescribed consultation process required under Section 35A of the Mining Act. A public notice seeking written submissions on the proposal was placed in The Advertiser on 10 November 2005 with a closing date for submissions of 23 December 2005. Copies of the lease application documentation were supplied directly to relevant government departments, the Alexandrina Council, affected landowners, and a number of other people who had notified PIRSA of their interest in commenting on the project, with a due date of 23 December.

A public meeting was held in the Strathalbyn Town Hall on 13 December 2005, organised by the Alexandrina Council.

The Alexandrina Council and a significant number of members of the public wrote to the Minister in November and December 2005 requesting that the consultation period of six weeks was insufficient, and that it be extended until the end of March 2006. The Minister advised that the consultation period for public submissions would remain unchanged and close on 23 December 2005 to allow the assessment process to move forward in early 2006.

Written submissions were received within the six week consultation period from the Alexandrina Council and relevant South Australian government agencies and authorities (EPA, DWLBC (River Murray), Murray-Darling Basin Natural Resource Management Board, Planning SA, Transport SA, Department of Health, Department of Aboriginal Affairs and Reconciliation, Department of Environment and Heritage, Office of the Technical Regulator). Individual submissions were also received from 95 members of the public. A summary of the issues raised in the submissions is presented in Appendix 11.1.

The Commonwealth did not make a submission in line with its responsibilities under the EPBC Act, although Terramin did not make formal application to the Commonwealth.

Strathalbyn Community Consultative Committee

The Minister for Mineral Resources Development announced his intentions to form the Strathalbyn Community Consultative Committee in February 2006.

The Terms of Reference (TOR) are attached in Appendix 11.3. The committee has an advisory role and will provide the opportunity for comprehensive exchange and sharing of information and issues on the mining proposal. The committee is not vested with

statutory decision-making responsibilities, but has been established to provide advice to Terramin and the government on community issues and on the resolving of such concerns.

PIRSA has appointed the Hon. Dean Brown, former Premier of South Australia, as the initial independent chair of this committee.

The Minister selected the following 12 volunteer residents or representatives:

Mr Ben Brazzalotto	Mr David Bruer	Mr Barry Davis
Mr Mike Farrier	Ms Susan Jettner	Dr Fred Carrangis
Ms Kirstie Murphy	Mr Adrian Pederick MP	Mrs Roz Twartz
Mr Ian Woods	Ms Anne Woolford	Ms Julia Currie

A representative of Terramin and PIRSA will be present at all meetings. Representatives from other government agencies will be invited to attend on an as-needs basis.

5.2 SUMMARY OF ISSUES RAISED

The main issues identified in the submissions from government agencies and authorities, the Alexandrina Council and in public submissions were:

- doubts that potential tailings leakage and contamination of the wider environment could be managed, especially in the long term
- damage to buildings from blasting
- post-mining ground stability
- rehabilitation and landscape management plan
- noise levels, dust and odour emissions
- lead exposure to the community
- night lighting spillage
- threats to native fauna in the general area
- water supplies and impact on town water
- effective ground and surface water management, ensuring security of supply to existing groundwater users and prevention of pollution of groundwater and surface watercourses
- development, planning and overall amenity, including impacts on the economic and social viability of Strathalbyn
- transport and proposed road usage, road loadings, road safety and amenity (noise, vibration)
- proposed adjacent and nearby development proposals
- electricity power needs and grid connection issues
- a need for more consultation with the local community.

A summary of the issues and details of concerns received during the public consultation period was prepared and forwarded to Terramin for a response. These documents are included as Appendices 11.1 and 11.2.

6 ASSESSMENT OF IMPACTS

6.1 GROUND AND SURFACE WATER

6.1.1 Risk assessment

Terramin has identified 22 potential risk events associated with ground and surface water impacts, but most are considered low risk. Some of these risks identified by Terramin are difficult to link to ground or surface water impacts.

The most significant risks identified (in addition to the risk associated with acid drainage and leachate from the ore stockpiles and tailings and waste disposal facility discussed under section 6.7 below) are:

- potential loss of underground water supplies for other users due to mine dewatering
- potential for contamination from chemical spills into groundwater and watercourses, with potential to affect natural ecosystems and users of groundwater
- Disposal of mine water if contaminated with effluent pond water seepage or other pollution, with the potential to affect human and fauna health.

6.1.2 Outcomes to be achieved

Given the risks identified, it is considered appropriate and practical that the mine operator ensures that there is no adverse impact to the supply of water to existing users and water-dependent ecosystems.

6.1.3 Achievability of outcome

The documentation supplied by Terramin lacks sufficient detail to determine if the control measures to be put in place will be sufficient to achieve the above outcome. However, comparisons with other mining projects indicates that these issues can be successfully controlled through appropriate containment (bundling), monitoring and emergency response processes (including provision of alternative water supplies to users if required) and therefore this outcome is likely to be achieved if the mine proposal were to proceed. Disposal of any contaminated mine water will not be permitted or required to be disposed underground, and that not recovered and recycled in the processing circuit will be disposed in the TSF.

6.1.4 Recommended regulatory response

If the lease is granted, the MARP document should be revised to demonstrate that all risks have been adequately identified and appropriately managed. A review of the 22 risks identified should be undertaken to clarify their potential impacts on ground and surface water.

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease and post-mine closure, ensure that there is no adverse impact to the supply of water to existing users and water-dependent ecosystems."

Achievement of this outcome will be demonstrated by specifying in the MARP groundwater monitoring bore locations, with contaminants to be measured that reflect potential contaminants identified in the risk assessment. Water pressure should also be monitored. The frequency of the monitoring should be at least annual, with data to be supplied to PIRSA and DWLBC for expert review. Particular emphasis will be placed on reporting on groundwater ingress zones encountered during mining operations to determine the extent to which these zones may be in communication with shallower aquifers, and to give early warning of potential communication with the overlying effluent ponds.

In regards to surface water monitoring, soil and water monitoring for contaminants should only be required if a spill occurs outside a bunded area designed to contain the spill.

6.2 EROSION

6.2.1 Risk assessment

Terramin has identified two potential risk events associated with erosion, and both are considered low risk. The main risk identified is the potential exacerbation of existing erosion on disturbed areas, leading to sediment movement off site. Given the disturbed nature of the existing site, this risk is considered very low. The second risk relates to soil stockpiles which, if not appropriately managed, may be at risk of water or wind erosion. This risk is also dealt with under section 6.3 below. No public comments were raised on this issue.

6.2.2 Outcomes to be achieved

Given the already highly disturbed nature of the site, it is considered desirable and practical that the mine operator, in designing and operating the mine, stabilises current disturbed areas, prevents sediment from leaving the site, and prevents loss of soil stockpiles.

6.2.3 Achievability of outcome

The documentation supplied by Terramin indicates that site management strategies such as stormwater control, revegetation of currently cleared areas and the infrastructure construction will all improve the current erosion issues on the site and therefore this outcome is likely to be achieved if the mine proposal was to proceed.

6.2.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease and post-mine closure, stabilise current disturbed areas and prevent sediment from leaving the site."

Achievement of this outcome will be demonstrated by specifying in the MARP photo monitoring points of the problem areas of the current site, and these will show that erosion issues are being addressed.

Demonstration that no sediment will leave the site will be addressed under section 6.5 below.

The MARP should document the problem areas with the existing site, and describe how these will be addressed in the proposed development.

6.3 TOPSOIL

6.3.1 Risk assessment

Terramin has identified 12 potential risk events associated with soil, and all (other than tailings related impacts) are considered low risk. The main risk identified (in addition to the risk associated with acid drainage and leachate from the ore stockpiles and tailings and waste disposal facility discussed under section 6.7 below) is the potential contamination of soil in place and stored in stockpiles due to windblown and water-borne transport around the site of chemicals, crushed ore and ore residues. The site is already highly disturbed (including a waste disposal facility), and may have contaminated soil due to natural erosion of the orebody, hence the risk to soil may be considered low. The risk of erosion of the stockpiles is addressed in section 6.2 above. It is not considered that there is a credible risk of native seed sterilisation in the soil stockpiles due to the cleared nature of the land.

6.3.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in designing and operating the mine, ensures that where uncontaminated soil occurs, it is protected from further contamination or loss to facilitate rehabilitation and a suitable post-mine closure land use.

6.3.3 Achievability of outcome

The documentation supplied by Terramin lacks sufficient detail to determine if appropriate control measures will be put in place to achieve the above outcome. While there has been a commitment to the separation and storage of soil, it is assumed that measures to control water contamination and dust will also be suitable controls for top soil contamination and erosion, and therefore this objective is achievable. The existing state of the soil contamination on the site has been well described in Appendix D of the Mining and Rehabilitation Proposal submitted by Terramin.

6.3.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

" The lessee must, in constructing and operating the lease and post-mine closure, ensure that soil quality and quantity is protected."

Achievement of this outcome will be demonstrated by regular testing of soil stockpiles to demonstrate that there is no accumulation of contamination, testing of in-place soil to demonstrate no further contamination of soils, and photo monitoring of stockpiles to demonstrate no loss of soil due to erosion.

The MARP should document the depth that top and sub-soil will be collected and retained.

6.4 VEGETATION CLEARANCE

6.4.1 Risk assessment

Terramin has identified three potential risk events associated with native vegetation clearance, and all are considered low risk. Due to previous land-use disturbance, the site is essentially clear of native vegetation, and most infrastructures will be located in areas already cleared. The main risk identified is the almost certain clearance of two Tea trees (*Melaleuca ?sp.*), but given the sparse vegetation left on the site, this will have very minimal impact on the biodiversity of the region. There is some risk that saline vapours from the vent rise may affect nearby vegetation. Some species of conservation significance may occur within the lease area, and further work is required to ensure that these areas are clearly identified.

6.4.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in designing and operating the mine, avoids clearance of native vegetation where possible, and if unavoidable, offset plantings of native vegetation found in the area should be provided to increase the biodiversity.

6.4.3 Achievability of outcome

Given that the site is already largely cleared, it is practical to avoid further clearance due to the construction of infrastructure. The documentation supplied by Terramin does not identify in detail the vegetation to be cleared for infrastructure or where the two Tea trees are that will be cleared, and hence it is not possible to assess if the clearance of these is avoidable. It is clear that the proposed development will include new plantings of vegetated bunding, which will adequately offset the clearance of a small amount of vegetation. Ventilation rises will be sealed through aquifers to avoid saline vapours. It is concluded that this outcome is likely to be achieved if the mine proposal was to proceed.

6.4.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease and post-mine closure, ensure that there is no permanent loss of biodiversity through the clearance of native vegetation."

Achievement of this outcome will be demonstrated by photo monitoring of the site before and after construction, and during operation to demonstrate no damage to, or clearance of, native vegetation.

It will be a requirement that the lessee operates the site in a manner that minimises the spread of weeds and plant pathogens (including phytophthora).

The MARP should be revised to document in some detail the location of flora species of conservation significance, and assess the risk of saline vapours from the vent rise damaging vegetation.

6.5 SILT AND STORMWATER CONTROL

6.5.1 Risk assessment

Terramin has identified 16 potential risk events associated with silt and stormwater control. Some of these are similar to risks identified under sections 6.1 and 6.3 above, and others relate to the TSF, which are considered under section 6.7 below. The main risks are damage to facilities (leading to spillage of chemicals) caused by excessive rainfall and/or flooding, and silt runoff from the site affecting surface watercourses.

6.5.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in designing and operating the mine, ensures that no stormwater contaminated as a result of mining operations is to leave the lease area or result in contamination of soil at closure within the lease area.

6.5.3 Achievability of outcome

The documentation supplied by Terramin lacks sufficient detail to determine if all stormwater will be captured and disposed of on site, or if some will be discharged into natural water courses. The documentation also lacks detail on historic flood levels for the site, and the design standards for the stormwater diversion systems. However, it is anticipated that with good design, stormwater on the site can be adequately controlled and therefore this outcome is likely to be achieved if the mine proposal was to proceed.

6.5.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease and post-mine closure, ensure that no stormwater contaminated as a result of mining operations is to leave the lease area or result in contamination of soil at closure within the lease area."

Achievement of this outcome will be demonstrated by taking water samples during storm events at discharge points which will be analysed to demonstrate compliance with current EPA water quality policy, or to be no higher than current background levels. The criteria listed in the draft documentation supplied by Terramin appears to be in error, and relates to groundwater monitoring, and will require revision in the final MARP. Surface-water monitoring sites and data will be required to be supplied to DWLBC and PIRSA on an annual basis.

The MARP should be revised to document in some detail how data on the current quality of surface water leaving site will be acquired, the historic and 100-year flood levels for the site, details of the stormwater control infrastructure (including how this relates to site risks and the maximum size storm event that it will be designed to cope with), and where discharges into natural water courses will occur.

6.6 WASTE DISPOSAL AND HAZARDOUS SUBSTANCES

6.6.1 Risk assessment

Terramin has identified four potential risk events associated with waste disposal and hazardous substances, most of which relate to issues discussed in sections 6.1, 6.3 and 6.11. The main risks are failure to contain an accidental chemical or fuel spill leading to pollution of water, air or soil, or inappropriate disposal or temporary storage onsite of waste products. The site already has considerable rubbish on the surface, and an industrial waste disposal facility onsite.

6.6.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in operating the mine, ensures that no contamination or pollution (either on or off site) is caused by waste products and hazardous materials (where unavoidable, no permanent pollution or contamination occurs), and that the existing rubbish on site is cleared.

6.6.3 Achievability of outcome

The documentation supplied by Terramin (draft MARP Appendix S) demonstrates that appropriate emergency response procedures will be implemented in the event of an accidental chemical or fuel spill. It is industry best practice that all facilities will be designed to minimise the risk of such spills occurring. The existing on-site industrial waste disposal facility will be capped and closed, and the existing adjacent industrial waste disposal facility will be used to dispose of waste as appropriate. It is assumed that waste not able to be disposed of at this facility will

be stored temporarily onsite (using appropriate control measures such as bunding) before being transported to an appropriate EPA licensed facility. Terramin has committed to clearing the site of existing rubbish prior to commencing mining. It is concluded that this outcome is likely to be achieved if the mine proposal was to proceed.

6.6.4 Recommended Regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease and post-mine closure, ensure that no contamination or pollution is caused by waste products and hazardous materials used in the mine operations."

Achievement of this outcome will be demonstrated by maintaining a register of waste disposal, demonstrating that waste has been disposed of at an appropriate waste disposal facility off site or, if onsite, that the waste is stable and non-polluting and in accordance with EPA requirements. Photo monitoring of the site before and after construction will demonstrate that existing rubbish on site has been removed.

The MARP should be revised to document the waste management and recycling plan for the site, including more detail on hazardous chemicals and fuel to be used and their management strategies. The area of the existing licensed landfill site should be clearly marked on maps of the site.

6.7 ACID MINE DRAINAGE AND TAILINGS MANAGEMENT

6.7.1 Risk assessment

Acid mine drainage (AMD) is the natural generation of acids occurring with the addition of water and air to sulphide-mineral-rich rocks. The acids produced can cause significant heavy metal pollution of soil, groundwater and surface waters, and adversely and permanently affect the ecology of sensitive ecosystems downstream from the source. Terramin has identified two potential risk events associated with the potential for AMD occurring as a result of mine operations, including disposal of tailings underground and on the surface. Terramin has rated these as "low".

Following further information on the composition of the tailings provided by Terramin, independent expert advice commissioned by PIRSA has provided a significantly differing view of the risk of AMD at this mine and concluded that the tailings composition at the Angas Project is unusual in terms of its high net acid-producing potential, and that there is significant risk of AMD contamination if the ore materials are not carefully managed. Oxidisation of the Angas Project orebody has been demonstrated to be an extremely rapid process and will commence as soon as the ore is exposed underground. The independent expert has identified that other possible sources of AMD including the waste rock stockpile and ROM pad, mine dewatering, and transport and handling of the ore will be considerably greater than from the TSF. The overall conclusion is that there is a high risk of

AMD at this site, and that careful design and management will be required to manage the long-term risk to the environment to an acceptable level.

There are also significant risks and issues associated with mine closure relating to the ongoing management of tailings; these are discussed under section 6.18 below.

6.7.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in operating the mine and indefinitely after mine closure, ensures that no contamination of natural water drainage systems, groundwater, land and soil occurs either on or off site results from permanent disposal or temporary storage of mine ore or waste material.

6.7.3 Achievability of outcome

There is considerable public and government agency concern over the achievability of this outcome in the long term for this site.

Most tailings could be disposed of in underground voids left after mining, which is considered the best option to minimise contamination of the wider environment, but not all tailings may be able to be disposed of this way, and some may be required to be disposed of on the surface. Terramin has not given a firm commitment to underground disposal of tailings in its proposal document, but does state "[the need for] a fill plant will be reviewed after the next reserve [estimate] is complete."

PIRSA engaged an independent, internationally recognised expert on tailings disposal (Professor Richard Jewell of Metago Environmental Engineers (Australia) Pty Ltd) to provide advice on whether or not the tailings storage facility design submitted in the lease application documentation would achieve the above outcome. His conclusion is that the above outcome is achievable on this site for surface disposal, given appropriate design of the TSF, but that the present design would not achieve this. Prof. Jewell has developed a guideline for the management of the tailings on this site (Appendix 11.5) that reflects best practice in design, construction, management and closure of TSFs in Australia. This guideline has also been endorsed by the EPA as satisfying its requirements for tailings management in regards licences required under the Environment Protection Act. PIRSA understands that Terramin is considering alternative locations and designs for the TSF, some of which may be outside the current lease application area, and the company has publicly committed to a "no discharge" policy consistent with the above outcome. It is therefore concluded that this outcome is achievable on this site.

6.7.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease and indefinitely post-mine closure, ensure that there is no contamination of natural water drainage

systems, streams and rivers, groundwater, land and soil either on or off site, during operation and indefinitely post-closure, caused by mine ore or waste material."

As the best option for disposal of tailings is as backfill underground, it is considered appropriate that, as far as technically feasible, the tailings will be disposed of underground.

It will be a mandatory requirement that the TSF be designed, constructed, operated and decommissioned in accordance with the Guidelines for the Management of Tailings at the Proposed Angas Zinc Project, as approved by PIRSA and the EPA (Appendix 11.5), and that further work is required to determine the 100-year flood level for the site. PIRSA will expect that the final location selected for the site will be at least 100 m from the maximum 1 in 100 year flood level. Other temporary ore and waste stockpiles will be required to be suitably contained and bunded to prevent escape of contaminants (prior to permanent underground or TSF storage), as it will not be possible to prevent the formation of acid in these stockpiles.

A comprehensive monitoring plan will be required, both during operation and post-closure, of the TSF and other areas of potential AMD.

To provide assurance that the design and construction of the TSF has been appropriately carried out, the lessee will be required to engage an independent, suitably qualified expert to audit the final design and oversee the construction of the TSF.

6.8 TRAFFIC

6.8.1 Risk assessment

Terramin has identified five potential risk events associated with mine traffic, which have been rated as either low or medium risk. The main risks are noise, dust, fumes, weed and pest issues, public safety, and damage to public roads. The Callington Road is already subject to a considerable number of heavy vehicle movements and it is not anticipated that the mining proposal will add significantly to this.

Dragout (dust and mud from traffic movements on the bitumen road), as well as potentially causing a nuisance to the public and affecting road safety, should also be avoided due to the potential for lead dust to be spread beyond the mine site (see section 6.11 below).

6.8.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in operating the mine, ensures that no impacts offsite are caused by accidents, noise, dust and dragout by traffic from or to the mine site.

6.8.3 Achievability of outcome

Although there was considerable concern by the local residents about increased traffic due to the mine, the documentation supplied by Terramin in support of its application, and the subsequent information provided in response to the public consultation process, indicates that the increase in traffic due to the mine will be relatively small and the impacts can be reasonably managed. Specific measures to be implemented to achieve the above outcome will include:

- monitoring of road condition for dragout and near misses or accidents
- all concentrate trucks will be covered and wheels will be washed down before leaving the site
- the Callington Road – mine road intersection will be upgraded to Transport SA specifications to ensure safety of other road users
- truck movements will be restricted to reasonable hours to minimise noise impacts
- heavy vehicles will not pass through Strathalbyn.

6.8.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease, ensure that there are no impacts offsite caused by accidents, noise, dust and dragout by traffic from or to mine site."

Achievement of this outcome will be demonstrated by regular monitoring of the road surface condition near the mine entrance for evidence of dragout, a register of traffic accidents, complaints from the public and near misses will be kept, and each incident investigated.

The following specific conditions relating to traffic are recommended for the lease, if granted:

- no heavy vehicles to be taken along Strathalbyn town roads unless approved by the Chief Inspector of Mines
- heavy vehicle movements offsite be limited to hours as approved by the Chief Inspector of Mines
- all concentrate trucks will be covered to prevent dust impacts
- wheel washdown of all vehicles leaving site will be undertaken to prevent dragout and weed propagation
- the Callington Road – mine road intersection be upgraded and maintained to Transport SA specifications
- the Callington Road condition be monitored for dragout impacts
- all accidents and near misses are to be investigated and reported to PIRSA.

6.9 NOISE

6.9.1 Risk assessment

Terramin has identified two potential risk events associated with noise generated by operations on the site (excluding traffic and blasting), including noise generated by construction activities and by plant machinery (crusher, mill, conveyors, ore processing, ventilation systems, water pumps, and material handling). Terramin engaged Bassetts Acoustics to model the potential noise impacts from the proposed mine for both day and night time. This model predicts that some noise impacts will occur to residences up to 1.6 km from the plant site, primarily to the northwest and east of the site.

6.9.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in operating the mine, ensures that there are no public nuisance impacts from noise emanating from the operating site.

6.9.3 Achievability of outcome

There was considerable concern by the local residents about noise impacts, particularly over night-time noise levels and doubts that noise could be controlled to reasonable limits. Terramin has indicated that a range of noise control measures will be implemented including design of equipment, location of equipment to utilise natural or artificial shielding (e.g. earth bunding) and restrictions on hours of use of some equipment to daytime only (e.g. the crusher). It is clear that further modelling of noise will be required once the design of the plant infrastructure is finalised, however, comparisons with other mining projects indicate that these issues can be successfully controlled through appropriate measures as noted above, and this outcome is therefore likely to be achieved if the mine proposal was to proceed.

6.9.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease, ensure that there are no public nuisance impacts from noise emanating from the operating site."

Noise levels are also an issue addressed by the Environment Protection Act, and the noise policy under that Act sets acceptable noise limits.

Achievement of this outcome will be demonstrated by continuous monitoring of noise, at locations outside the lease area and agreed with residents, to demonstrate that the appropriate EPA noise limits are being complied with. These limits are currently 40 dB at night and 47 dB during daytime.

The EPA will also monitor this aspect of the operation, and is able to enforce compliance through its licence requirements.

The MARP should also include an updated noise model for the site to reflect the final design of the plant.

6.10 BLASTING

6.10.1 Risk assessment

Terramin has identified two potential risk events associated with blasting: airblast (low frequency noise) and ground vibration. As the operations will be predominantly underground, airblast will only be an issue during the initial stages of construction of the decline, however vibration effects will be felt throughout the life of the mine. In the proposal document, Terramin indicates that some modelling of blast effects has been undertaken, but this was not presented in the document. The greatest perceived risks by the public are damage to buildings due to blasting, and potential nuisance and disturbance to sleep from blasting vibration.

6.10.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in operating the mine, ensures that there are no public nuisance impacts or damage to infrastructure from airblast and vibration caused by blasting.

6.10.3 Achievability of outcome

Although there is considerable concern over the potential for damage to buildings due to vibration damage caused by blasting, in reality these issues are well understood from mining operations undertaken elsewhere. In the publication "Noise, Vibration and Airblast Control" published by Environment Australia, the following explanation of why blasting vibration is often perceived as a threat to buildings is provided:

"Because people are able to "feel" very low levels of vibration (even though they may not be disturbed by the motion), they often over-estimate the risk of damage associated with vibration in buildings. This is particularly true when the source of that vibration is outside the building, and generally not within the occupant's control or when damage may be due to ground subsidence, not current mining operations. On the other hand, sources of much higher levels of vibration (e.g. wind, domestic appliances, people walking on floors, slamming of doors, etc.) are readily accepted due to their day to day familiarity or because they are "within the control" of the occupant. It is primarily these effects which cause the gradual, long-term fatigue-induced deterioration in most structures considered to be normal ageing. Provided the levels of vibration-induced stress from an additional source are well below those of these "normal" stress-inducing events, then the additional source of vibration is unlikely to accelerate the normal ageing process."

The Australian Standard Explosives Code (AS2187.2) notes that for residential buildings, if the peak vibration particle velocity is below 5 mm/s, then damage to buildings is unlikely. If the velocity is above 10 mm/s, the likelihood of damage is increased, but the likelihood of damage is dependent on the individual characteristics of the building. For context, the effect of these vibration levels on a building is about the same as jumping on the floor or slamming a door.

The Australia and New Zealand Environment Council (ANZEC) has considered that the appropriate levels for noise and vibration to meet human comfort levels for daylight hours are:

- the recommended maximum level for airblast is 115 dB linear
- the level of 115 dB linear may be exceeded on up to 5% of the total number of blasts over a period of 12 months; however, the level should not exceed 120 dB linear at any time
- the recommended maximum level for ground vibration is 5 mm/s (peak particle velocity [ppv])
- the ppv level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months; the level should not exceed 10 mm/s at any time.

It is likely that the above noise and vibration limits can be achieved by Terramin in operation of the mine. Terramin has stated that blasting must be undertaken at shift changes, normally 6:30–7:30 am and 6:30–7:30 pm.

6.10.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease, ensure that there are no public nuisance impacts or damage to infrastructure from airblast and vibration caused by blasting."

All blasting will be required to meet the ANZEC criteria at the nearest, non-Terramin owned residence:

- vibration to not exceed 10 mm/s at any time, with no more than 5% of blasts in any one year to be within the range 5–10 mm/s
- airblast to not exceed 120 dB linear at any time, with no more than 5% of blasts in any one year to be within the range 115–120 dB linear.

Achievement of this outcome will be demonstrated by continuous monitoring of airblast noise (only during surface portal and decline construction) and vibration at locations outside the lease area and agreed with residents, to demonstrate that the above ANZEC limits are being complied with.

It is considered appropriate that these monitoring sites be selected in consultation with the Community Consultative Committee, and focus on impacts at non-Terramin owned residences.

The MARP should also include a worst case airblast and vibration model for the site to reflect both the impacts of open air blasting during construction and also underground blasting.

6.11 PUBLIC HEALTH AND NUISANCE (DUST, AIR EMISSIONS, ODOUR)

6.11.1 Risk assessment

Terramin has identified 17 potential risk events that may impact on public health and nuisance, mostly focusing on dust impacts but also odour, air emissions and hazardous substances. All are low or medium impact, and all are considered more of a nuisance rather than a potential impact on public health. A large number of public submissions were received on this issue, with the main risk factors perceived to be:

- lead in dust leading to ingestion by public, especially children
- dust nuisance
- odour nuisance
- accidents with hazardous chemicals (e.g. xanthate, cyanide)
- disturbance to contaminated council effluent ponds.

Despite public perceptions to the contrary, the risk of lead ingestion by the public is considered low. This is due primarily to the fact that no smelting of the ore will take place on site, and hence the lead will remain in the natural, insoluble, sulphide form not easily absorbed by humans or animals. Nonetheless, dust containing lead and other potentially toxic materials needs to be controlled to remain on site. No disturbance is anticipated to the council effluent ponds as Terramin has decided to not use this water in mine, and hence this risk is considered very low.

6.11.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in operating the mine, ensures that there are no public health, loss of amenity and nuisance impacts to local residents from air emissions, dust and odour generated on site as a result of mining operations.

6.11.3 Achievability of outcome

Dust controls for this type of processing operation are well known and effective, and include cladding or enclosure of dust-generating areas, dust extractors fitted to crushers, sealing (or watering) of mine roads, vegetation screens, watering or covering of stockpiles, and vehicle wash down and covering the loads of concentrate trucks leaving the site. Terramin has agreed to develop an odour model, but it is not clear how odours will be controlled if this model indicates significant impacts. The management of hazardous chemicals is well established in industry given that it is an occupational health and safety risk, and can be successfully managed through the use of bunding, appropriate management systems and emergency response procedures. Terramin has also agreed to review the risk from air emissions.

6.11.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

" The lessee must, in constructing and operating the lease and post-mine closure, ensure that there are no public health, loss of amenity and nuisance impacts to local residents from air emissions, dust and odour generated on site as a result of mining operations."

Achievement of this outcome will be demonstrated by specifying in the lease conditions and MARP that dust, lead and odour concentration limits will be as set by the EPA, and monitored using the EPA preferred technology. For dust and lead, it is likely that these limits will be as recommended by the National Environment Protection Measure (NEPM):

Dust: (PM10) <50 micrograms/m³, averaged over one day, no more than five exceedences per year.

Lead: <0.5 micrograms/m³, averaged over one day, no exceedences per year.

Odour: <2 odour units.

Other criteria may need to be included once the air emissions risk has been reviewed.

It is considered appropriate that these monitoring sites be selected in consultation with the Community Consultative Committee, and focus on impacts at non-Terramin owned residences.

The EPA will also monitor this aspect of the operation, and is able to enforce compliance through its licence requirements.

The MARP should also include an odour and air emissions model (developed using the appropriate EPA guidelines), and an updated dust model for the site, to reflect the final design of the processing facility and to demonstrate that the outcome can be achieved. Background levels of dust, odour etc. should be measured (Including lead in rainwater tanks) to establish baseline levels in the MARP.

6.12 FIRE

6.12.1 Risk assessment

Terramin has identified a general potential risk of fire associated with the proposed operation, but that the risk is considered low after control measures are implemented. Potential ignition sources are not listed, but the lack of surrounding vegetation suggests that the risk of an uncontrolled fire escaping from the lease area is low. Two responses to the consultation process noted that there might be a risk of fire due to explosion or concentrations of flammable chemicals.

6.12.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in operating the mine, ensures that there are no unplanned fires onsite, and ensures that control measures are in place to manage potential off-site impacts.

6.12.3 Achievability of outcome

Achievability of this outcome will require focus on two aspects of the operation: the prevention or minimisation of the risk of fire in the design and operation of the surface facilities, and ensuring that appropriate fire control measures are in place to control a fire should it occur. The mining proposal submitted by Terramin does not list the sources of ignition, nor how such sources will be managed. The emergency fire control measures seem to rely on external help from the local CFS at Strathalbyn and Mt Barker. Notwithstanding the lack of detail in the mining proposal, it is not considered likely that the fire risk is unusually high at this location to warrant specialised control measures.

6.12.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease, ensure that there are no unplanned fires onsite, and ensure that control measures are in place to manage potential off-site impacts."

Achievement of this outcome will be demonstrated by specifying in the MARP that any fires that occur be investigated to demonstrate that these were appropriately contained, and could not have been reasonably prevented.

The MARP should include a more comprehensive risk assessment of ignition sources and potentially flammable or toxic chemicals, and the ability of the CFS and any onsite control measures to manage credible fire scenarios. Any fire on the site will be required to be reported to PIRSA immediately.

6.13 PUBLIC SAFETY

6.13.1 Risk assessment

This risk was recognised in the mining proposal document as "vertical openings and site security", and the perceived risks were associated with vertical openings such as the ventilation shafts and decline. There are other risks to the public associated with unauthorised entry to the site, e.g. access to explosives, toxic chemicals, mine traffic, etc. The risk is higher at this site than other mines given the location close to residential areas and children. No public comments were received on this issue.

6.13.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in operating the mine, ensures that there are no public injuries or deaths resulting from unauthorised entry to the mine site.

6.13.3 Achievability of outcome

Achievability of this outcome will almost exclusively focus on site security for the operation, and Terramin has committed to securely fencing the whole site and the vent rise, and employ security patrols. It is believed that these measures will be adequate to achieve the above outcome.

6.13.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease and post-mine closure, ensure that there are no public injuries or deaths resulting from unauthorised entry to the mine site."

Achievement of this outcome will be demonstrated by specifying in the MARP that any detection of unauthorised entry to the site will be fully investigated, and that the entry could not have been reasonably prevented. Any unauthorised entry would be required to be reported immediately to PIRSA.

6.14 GEOTECHNICAL STABILITY

6.14.1 Risk assessment

Given that the mine is an underground operation, the mining process will create significant underground voids, and these may potentially lead to surface instability and collapse. The main risk is associated with the potential collapse of the proposed pillar of rock directly above the highest void in the mine (the "crown pillar"). Its stability is critically dependent on the dimensions and strength of the rock, and the amount of void left underground.

Terramin has identified five potential risk events associated with the potential for underground voids to collapse which have been rated as low or medium. These risks are limited to areas directly overlying underground voids and potentially could lead to damage to the Strathalbyn–Callington Road, injuries or deaths resulting from sudden collapse of the road, damage to the effluent ponds to the north of the road, and injuries or death to underground workers if a collapse resulted in sudden connection to the overlying effluent ponds. PIRSA considers this risk to be the second most important after the tailings disposal risk outlined in section 6.7 above, and believes classification of these risks is of higher significance than stated in the mining proposal document, particularly if the long-term post-mine closure is considered.

6.14.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in operating the mine, ensures that there is no damage to public and private infrastructure, and that there are no injuries or deaths resulting from collapse of underground workings both during mining and after mine closure.

6.14.3 Achievability of outcome

An assessment of achievability of this outcome will require detailed information on the geology and rock characteristics of the crown pillar, and on the extent to which underground voids will be filled with waste material. This information has not been provided as part of the mining proposal, but this issue is a common risk in the mining industry. It is considered that with good technical information and subsequent design, it is likely that the outcome can be achieved. Terramin is currently drilling on the lease to acquire technical information on the characteristics of the rocks that may be left over the underground voids.

6.14.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease and post-mine closure, ensure that there is no damage to third party infrastructure and that there are no injuries or deaths resulting from collapse of underground workings."

Achievement of this outcome will be demonstrated in the MARP. The final design for the underground voids and backfilling strategies will not result in a risk for surface collapse during operation of the mine, and the voids left after mine closure are not of sufficient size to allow propagation of a collapse to the surface at any time in the future. Before approving the MARP, PIRSA will require that the lessee engage an independent, expert consultant to provide advice such that the design proposed will achieve the above outcome.

During operations, any unplanned collapse of underground workings would be required to be reported immediately to PIRSA.

It is also likely that the collapse of any crown pillar will trigger reporting requirements under the *Occupational, Health, Safety & Welfare Act 1986*.

6.15 VISUAL IMPACT

6.15.1 Risk assessment

The present site is not regarded as being particularly attractive, given that it is currently used as a quarry, has a considerable amount of rubbish on the surface, has limited natural vegetation cover, and is partially used as a waste disposal facility. The project proposal would seem to offer considerable scope to improve the visual appearance of the site in the long term (post-mine closure), but some visual impacts may arise during operation as identified by Terramin in its mining proposal document:

- visible dust and air emissions
- visibility of mine infrastructure
- soil, ore and waste rock stockpiles.

Not recognised as a risk by Terramin, but noted in a number of public submissions, is the risk of light spillage at night from the operation.

6.15.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in operating the mine, could minimise the visual impact during the operational phase of the mine, and improve the visual amenity of site in the long-term post-mine closure.

6.15.3 Achievability of outcome

Reducing visual impact of the site during the operational phase of the project is readily achievable through the use of vegetation, screening mounds, natural topography and suitable paint colours for buildings. Dust and air emission issues have been dealt with under section 6.11. Night lighting can be designed to minimise light spillage outside the mine site. Post-closure amenity issues are discussed under section 6.18 below.

6.15.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease, minimise the visual impact, and improve the visual amenity of the mine site in the long-term post-mine closure."

Achievement of this outcome will be demonstrated by specifying in the MARP that photo monitoring at specified sites during the operational phase will show that the visual amenity of the site is improving or no worse than the present situation. The company will need to develop criteria in its MARP document to measure the impact of night lighting on the amenity of residents. All structures will be required to be painted in non-reflective earth tones (Terramin has suggested Eucalyptus green), and vegetation screens, where required, are to be local native species.

It is considered appropriate that the photo monitoring sites be selected in consultation with the Community Consultative Committee.

6.16 FAUNA

6.16.1 Risk assessment

The present site, being degraded and lacking extensive native vegetation cover, is not a significant habitat for native fauna, but is home to a range of feral animals. The existing council-owned effluent ponds and associated swamp area is host to a range of native fauna but, given the high levels of bacteria in the ponds, a significant threat may be posed to the fauna. The mining proposal document does not provide detail on the native fauna present on the site.

Risks to native fauna may arise due to:

- migratory birds ingesting chemicals on the tailings storage facility
- removal of micro-habitats when existing rubbish is removed from site
- chemical spills and leakage into waterways
- infrastructure may act as traps for small native animal species
- new weeds and diseases may be brought into area that may spread to native flora areas outside lease area.

The last three of these were not specifically recognised by Terramin but were raised in public submissions. Most are considered low impact risks, with the most significant risk associated with the TSF through potential leakage into waterways.

6.16.2 Outcomes to be achieved

It is considered appropriate and practical that the mine operator, in operating the mine, ensure that there are no net adverse impacts from site operations on the native fauna in the lease area and in adjacent areas.

6.16.3 Achievability of outcome

The risk of ingestion by migratory birds of the tailings material will be considerably reduced by the adoption of thickened tailings, instead of the liquid slurry tailings originally proposed by Terramin, and by the anticipated non-toxic levels of contaminants in the tailings. The planting of local vegetation on the lease area will mitigate the removal of existing habitats. Infrastructure can be designed to minimise the potential to trap small native animals, or escape mechanisms can be incorporated into the design. Weed and disease management procedures are well understood and can be readily implemented in mine operating processes. The management of leakage from the TSF is discussed under section 6.7.

Bird deterrent systems may be used to ensure that no avian fauna is affected by interaction with open ponds containing chemicals.

6.16.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcome:

"The lessee must, in constructing and operating the lease and post-mine closure, ensure that there are no net negative impacts from site operations on native fauna in the lease area and in adjacent areas."

Achievement of this outcome will be demonstrated by specifying in the MARP that any deaths or injuries to native fauna on the site will be investigated to demonstrate that it is unlikely that the death or injury was the result of mining operations on the site. The risks of weed and disease propagation associated with the operation will need to be investigated, and criteria will need to be developed to monitor weed, pest and diseases on the site. The MARP should include details on the native fauna present on the site (or likely to be attracted to the site) and

demonstrate that the final design of the surface infrastructure will not pose a threat to native fauna.

6.17 SOCIAL AND ECONOMIC

6.17.1 Risk assessment

In the mining proposal provided by Terramin, social and economic issues associated with the proposal were discussed briefly under the "Stakeholders" section. These issues were of significant interest to the Strathalbyn community, and a large number of public submissions were received on various aspects of the potential impacts on the amenity and economy of the local community. The issues raised pose a challenge to both clearly articulate and appropriately manage. Based on the public submissions received, the following risks were identified:

- **Construction and operational workforce**

The permanent workforce during the operational phase of the mine is anticipated to be ~60 people. Terramin has estimated that a further 90 non-mining jobs would be created indirectly elsewhere (some in Strathalbyn) due to the mine (independent economic models suggest up to nine indirect jobs per one mining job may be created by mining; see section 7.2 below). Concerns have been raised that these jobs are only of short duration, perhaps seven years, and that once the mine ceases production these people will face the social and economic impact of unemployment. Concerns were also raised that these employees may be sourced from the local casual employment pool, creating difficulties for existing business to source labour as needed and/or the new employees would be shift workers from out of town, and may have difficulty integrating into the local social life.

- **Property values and population growth**

There was a strong perception that the mine proposal was already reducing the value of residential property in the town, and would continue to do so while the mine was in operation. Recent statistics on median house and land prices show that residential property and the population in Strathalbyn has grown considerably in the last five years, and appears to be unaffected by the mining proposal. Property value statistics from other exclusively mining towns elsewhere in the state show that mining towns, due to the high growth in the local economy and resulting demand for property, usually outperform other rural areas. It is concluded that this issue may in fact be a positive aspect of the proposal for the town in general, but individual landowners near the mine site could suffer from depressed land values, particularly while the mine is in the proposal stage. It is considered that this is a private commercial matter that will be dealt with through negotiation with individual landowners, and disputes may be resolved through the appropriate court.

- **Integration with existing economy and business in the town**

Concerns were raised that the proposed mine was incompatible with the existing clean rural image of the town, and that the mine may impact on the existing tourism, heritage and wine and food-based economy. However, given that the location of the proposed mine is on an existing quarry site, and adjacent to effluent ponds, the proposed mine may not have a significant effect on other aspects of the local economy.

From the 2001 census data (summarised in section 7.2 below), it is difficult to determine the actual extent that tourism currently accounts for regional employment (accommodation, some proportion of cafes and restaurants, some proportion of retail trade, some proportion of agriculture (wine)) and thus for regional economic activity.

Given that the mine has a finite life, careful management of mining activities to minimise the effects on the community's heritage and tourism values should ensure that the existing tourism-based industries are not unduly impacted by the proposed mine.

- **Local emergency services**

Terramin has not undertaken an assessment of the ability of the local emergency services to cope with an accident on site. It is not clear that the local emergency services are sufficient to cope with scenarios unique to the site, and of a much greater consequence than would be considered within the scope of a normal rural community, such as a major fire, major toxic chemical spill or underground rescue. In the mining proposal document, reference is made (Appendix S) to an "external mine rescue service" but it is not clear where this will be sourced.

- **Character and Lifestyle**

A very large number of public submissions referred to the effect the mine proposal would have on the character and lifestyle experienced by the existing residents of the town. Many of these impacts are physical, such as noise, dust etc. and have been discussed above, and cannot be totally eliminated, but can be reduced to levels that will not unduly impact on lifestyle. There remains a concern by the residents that the mine will not result in any positive effects on the local community; however, the mine does provide an opportunity to improve the quality of life in the town. The positive aspects are discussed in section 7 below.

- **Water supply**

In the original mining proposal, Terramin suggested that the water will be supplied from either the existing council effluent ponds or from SA Water. The option to use the effluent ponds water has been abandoned by Terramin due to the pathogen risks to human health. The proposal has been modified to use thickened tailings, which will result in a high level of water recycling on the site. Terramin now suggests that the majority of water required will be sourced from the mine dewatering process or rainfall captured on site, hence there will be no impact on existing users of water, nor on environmentally sensitive sources such as the River Murray, although no details have been provided to demonstrate that this is viable option.

- **Electricity supply**

No details were provided by Terramin on the capacity of the grid to supply electricity to the mine, but subsequent information received from ETSA indicates that existing electricity users in the town will not be affected.

6.17.2 Outcome to be achieved

It is considered appropriate that the mine operator, in operating the mine, attempts to minimise any net adverse impact on the social amenity and economy of the Strathalbyn community.

6.17.3 Achievability of outcome

Achievability of this outcome will largely depend on the commitment to regular engagement between the representatives of the community, Terramin and the government regulatory agencies. A Community Consultative Committee has already been formed (see section 5.1), and it is hoped that this will provide a suitable forum to not only discuss and address the social and economic impacts of the proposal, but also to investigate ways that the mine may contribute positively to the local character and lifestyle.

A 24 hour complaints hotline may also help to address issues of concern from residents.

6.17.4 Recommended regulatory response

The lease, if granted, should require that the lessee resource, participate with and maintain a Strathalbyn Community Consultative Committee to resolve issues of concern to the local community. The lessee will also be required to establish and maintain a 24 hour hotline to receive and action complaints from residents.

6.18 MINE DECOMMISSIONING, CLOSURE AND REHABILITATION

6.18.1 Risk assessment

Terramin has provided a conceptual closure plan for the site in appendix C of the mining proposal document. This document is significantly deficient in that it does not have a clear post-mine land use for the whole site, and further discussions with relevant stakeholders are required before this can be settled. Without a clear goal for post-mine land use, much of the discussion below is speculative and will require significant further development in the final MARP that is submitted.

The main risks associated with mine closure are the long-term chemical stability of the surface TSF, and the long-term stability of the underground voids left after mining ceases. It is also clear that most stakeholders would prefer if the site at closure was left in a more attractive state than at present.

It is considered appropriate that Terramin assumes responsibility for tailings disposal until such time that it can be demonstrated that the TSF is stable in the long term, and is working to design specifications to protect the surrounding environment from AMD impacts, and will not create a potential legacy issue for future generations. This may be difficult to confirm for quite some time, and will depend on the final tailings design chosen. Provision may also need to be made by Terramin to ensure the ongoing management of the TSF indefinitely into the future, including preventing inappropriate development of the TSF that may damage the integrity of the containment structure. It is likely that over a long period

of time, without maintenance, the front wall of the TSF will erode and revert to more natural slopes. This may therefore restrict development in areas below the front wall of the proposed TSF to the existing rural and grazing land uses, and it would be prudent of the Alexandrina Council to assume responsibility to prevent other types of development (e.g. housing) from occurring in these areas indefinitely into the future.

6.18.2 Outcome to be achieved

It is considered appropriate and practical that the mine operator, upon mine closure, ensures that the site (including the TSF) is left in a stable, non-polluting state and returned to a land use consistent with landowner wishes, practicalities of ensuring the integrity of the TSF, and the Alexandrina Council development plan.

6.18.3 Achievability of outcome

PIRSA's independent expert has confirmed that this outcome is technically achievable, but is critically dependent on the final design of the TSF and the extent to which underground voids are backfilled. These closure outcomes are considered achievable with appropriate design and appropriate post-closure management.

6.18.4 Recommended regulatory response

The lease, if granted, should require that the lessee achieve the following outcomes:

"The lessee must ensure that upon mine closure, all plant and equipment (unless otherwise agreed with the Chief Inspector of Mines) is removed from the site.

The lessee must ensure that the site (including the TSF) is left in a stable, non-polluting state indefinitely post-closure.

The lessee must ensure that upon mine closure, the site is returned to a land use as agreed with the landowner, be consistent with practicalities of ensuring the integrity of the TSF, and consistent with the Alexandrina Council Development Plan."

Achievement of these outcomes will be demonstrated by specifying in the MARP criteria that will be developed after the final post-mine land use is determined.

Criteria relating to the underground workings will focus on an independent verification that the volume of void left in the workings and stopes is such that it is not possible for a piping failure to propagate to the surface.

For the tailings containment structure, an independent verification will be required that the TSF is operating to design specifications (this may require very long-term monitoring).

A caveat on the freehold title will be required to ensure that inappropriate development is not undertaken on the site of the TSF in perpetuity.

A bond equivalent to the full rehabilitation liability and public liability insurance will be required to be lodged and maintained by Terramin at all times. Some financial provision for ongoing monitoring and maintenance of the TSF may also be required.

7 ASSESSMENT OF BENEFITS

7.1 ENVIROMENTAL

The existing site has been subject to a variety of historical land uses that have degraded both the visual amenity and natural habitat of the area. The mining proposal, if it includes a closure plan that will eliminate the present waste disposal and quarrying activities, should significantly improve the visual amenity of the site, and has the potential to reinstate an area of native flora and create new habitats for native fauna.

The present site is not well managed for weeds and feral vermin, and if the site is cleaned up and weed control measures introduced, there is potential to provide a benefit to the adjacent native fauna populations and agricultural landowners in the general area.

7.2 ECONOMIC

Information in the public domain that has been provided by Terramin indicates that the proposed Angas Zinc Mine will produce 319 300 tonnes of zinc concentrate and 122 300 tonnes of lead–copper concentrate over a seven-year mine life. Volatility in metal prices and exchange rates preclude accuracy in estimating revenues from the sales of these products, but it would be reasonable to expect that sales revenues of the order of \$500 million could be expected over the life of the mine with potential royalty payments to the state of \$9 million. This estimate is an order of magnitude only, and would depend on the prevailing price received for the various concentrates at the time of sale, and how much of the ore is produced and sold within the first five years.

The mine will directly create jobs for ~70 people, mostly local, with total annual wages of ~\$5 million and a total annual operating cost of ~\$27 million, which would contribute to the local and state economy. There will be potential for local industries to provide goods and services to the mine.

State level effects.

The South Australian Government has endorsed the *South Australian Strategic Plan* (SASP) and its targets that are designed to lead to the sustainable development of South Australia, balanced between environmental, social and financial objectives.

Economic studies have shown that investment or expenditure in one sector of an economy will affect other sectors of that economy. Using South Australian input–output tables for 1999–2000 prepared for the South Australian Government, it is estimated that the development of this mine would create state-wide benefits of:

Criteria	Direct benefit	State-wide benefit
Employment	70 FTEs	280 FTEs
Income	\$5 million	\$14.81 million
Expenditure (less wages)	\$22 million	\$ 39.8 million

Development of the Angas Mine will help South Australia meet the SASP targets that relate to Jobs, regional population levels and regional unemployment, while mining expenditure will assist in meeting the targets relating to minerals and exploration, economic growth and investment. The sales revenue from mine products will assist in meeting targets relating to exports and economic growth.

The royalties paid to the government will support the state's public finances and help in retaining its AAA credit rating.

Regional and local affects.

Analytical techniques used to estimate state-wide effects of development proposals are generally not suited to estimating local or regional effects. It is therefore difficult to quantitatively estimate the effects of this proposal on the regional or local economy. A more qualitative approach has been used to estimate potential benefits of this proposal.

2001 census data indicate that Strathalbyn was the 23rd largest urban centre in South Australia with a population of 3203 people, but is growing rapidly with an estimated current population of 5275, and it is estimated to grow to 17 000 people within the next decade.

In recent decades, the economy of the Fleurieu region has moved from a reliance on traditional agriculture towards more intensive agricultural activities such as wine, tourism and as a provider of accommodation and recreational services to the Adelaide urban region.

2001 census data for Strathalbyn Statistical Local Area (SLA), which incorporates the township of Strathalbyn and peri-urban close to the township, show that the SLA had a workforce 2230 people. A breakdown of the occupations of this workforce is given below.

Industry	Employment	% of workforce
Agriculture, forestry and fishing	897	40.2
Manufacturing	476	21.4
Retail trade	269	12.1
Property and business services	143	6.4
Wholesale trade	130	5.8
Construction	117	5.3
Accommodation, cafes and restaurants	85	3.8
Transport and storage	54	2.4
Other	59	2.6

Six people from this area were engaged in mining activity.

It is unlikely that all new employment at the mine would be filled from within the region, as many mining activities require specialist skills that are unlikely to be found locally. Establishment of the mine would likely lead to an increase in the regional workforce and would widen the base of economic activity. Given the reliance of the region on agriculture, forestry, fishing and manufacturing for employment, it is unlikely that this employment increase could be considered significant.

Some concern has been expressed by residents of Strathalbyn that house and land prices will be depressed by the presence of the mine close to the town, but evidence from mining-based towns elsewhere suggest that the net contribution into the local economy due to the mine, and the increased demand for residential property due to local employment, will result in real growth in the value of property in the area; these increases may not be reflected in the value of properties close to the mine. Given that the mine will have a finite life and that significant environmental rehabilitation will be undertaken as part of the mine operations, it is reasonable to expect that any decrease in property values would only occur while the mine and associated plant are operational.

7.3 SOCIAL

The community of Strathalbyn has a proud respect for the heritage and historic architecture of the town, and supports significant tourism. Historical mining wealth from the area indicates that there may be an opportunity for Terramin to support restoration of heritage buildings, especially those associated with early mining, to further develop and preserve the character of the town, and to develop new tourist attractions.

Terramin has provided a commitment to direct resources towards the development of local community groups and activities, and this potentially will enhance the social life of the community.

The presence of the mine near the town may require upgrades to utility services such as power and water supply infrastructure, and also emergency services such as hospital and fire services. These upgrades, if required, will provide additional benefits to the wider local community.

8 OTHER ENDORSEMENTS REQUIRED

8.1 PLANNING ACT

This application is made pursuant to the *Mining Act 1971* and is excluded from the definition of “development” pursuant to the *Development Act 1993*. The appropriate authority is the Minister administering the Mining Act. The mining lease application is located on land zoned **Landscape (Strathalbyn District)** in the **Alexandrina Council** development area and within the greater **Outer Metropolitan planning area**.

Development controls, including Mining Objectives 22 and 23, apply to “development” applications within the Alexandrina Council area:

MO 22: *The siting and management of quarrying and similar extractive and associated manufacturing industries so that minimum damage is caused to the landscape.*

The permanent effect of mining operations on the appearance of the landscape and waterfront areas should be considered before operations begin, and the suitability of alternative sites investigated.

After workings are finished, undesirable structures should be removed, quarry faces beautified by landscaping, or the natural cover of the land restored. In some cases the redevelopment of some areas to other uses should be considered.

Mineral deposits in some instances underlie other basic resources such as remnant bushland and scenic areas. Development of mineral deposits in these areas should only proceed following full evaluation of the benefits to the community in retaining bushland or scenery as opposed to the development of the deposits, and the relative abundance of alternative mineral deposits. In particular, mining activities in areas suitable for conservation or recreation parks should take place only in the state or national interest under stringent conditions following precise delineation of the sites.

MO 23: *The continued availability of metallic, industrial, and construction minerals by preventing development likely to inhibit their exploitation.*

Mineral resources in the region should be delineated so that adequate supplies of minerals can be secured in areas where there is no major environmental conflict.

The most suitable sites, consistent with environmental constraints and expected future demand, should be kept free of development likely to inhibit the exploitation of the resource.

Sufficient land should be available to provide resources for continued production and for the establishment of buffer areas between the mineral deposit and adjoining development.

Development controls, including Mining Principles 27 to 32, apply to “development” applications within the Alexandrina Council area:

MP27 *Mining operations should not be undertaken unless environmental impacts can be minimised and no wider ecological damage will result.*

MP28 *Mining operations should only be undertaken if:*

- (a) mining of the resource is in the public interest*
- (b) the proposed location is the best alternative site in regard to minimising pollution and the loss of amenity, or bushland*
- (c) there are a limited number of known reserves of the mineral in the area or elsewhere in the state*
- (d) there are significantly higher costs of extraction and transport of the minerals from alternative sites to principal centres of consumption of the minerals*
- (e) the site is capable of restoration to ensure that the impact on the landscape is minimal.*

MP29 *Mining operations should be conducted in accordance with a development and reclamation program which:*

- (a) ensures that danger and unreasonable damage or nuisance does not arise from the workings or any operations associated with them*
- (b) provides an adequate buffer of land, tree screening or mounding around the site to protect the existing adjoining land users from effects of the operation*
- (c) provides for progressive reclamation of disturbed areas*
- (d) provides for the removal of buildings, plant, equipment, rubbish and litter when operations are complete*
- (e) renders the site safe for future occupiers or users.*

MP30 *An after use appropriate to the site and the locality should be established on the completion of extractive operations and reclamation.*

MP31 *New extractive operations should generally not be opened within zones proposed for urban purposes unless for short-term public works programs or other special purposes.*

MP32 *Borrow pits for road construction should be worked so as to minimise disturbance to the environment. Workings adjoining public roads should be screened by tree planting, and pits restored on completion of operations.*

Mining is a temporary use of the land and the proposed mining operations have been planned in a manner to maximise recovery and minimise nuisance and environmental impact. Mining operations are to be carried out in accordance with an approved MARP approved by the Minister for Mineral Resources Development. On completion of mining activities, the land will be rehabilitated and returned to an agreed after use. The proposed mining operations are compatible with rural activities and are not inconsistent with the objectives and principles for control of “development” applications on the Landscape (Strathalbyn District) Zone within the Alexandrina Council and the greater Outer Metropolitan planning area.

8.2 DEVELOPMENT ACT — Schedule 20

The mineral claim is located within a Schedule 20 “Mineral Production Tenement Area” of the Development Act, and hence this application and assessment needs to be referred for advice to the Minister for Urban Development and Planning, pursuant to section 75 of the Development Act.

Mining applications (Mining Production Tenements) are referred to Planning SA for advice as part of the Mining Act consultation process; however, if an application is located in an area described in the Development Act Regulations (Regulation 84 and Schedule 20), it must be referred to the “Planning Minister” for advice. The Act then requires the Minister to seek advice from the Development Assessment Commission (DAC). The “Extractive Industries Committee”, which is a delegate subcommittee of DAC, usually provides this advice. The report is used by the “Planning Minister” to advise the “Mining Minister” on whether the lease application should be granted and, if so, under what conditions.

Essentially, the committee provides advice to the “Planning Minister” as to whether he should support the granting of a mining lease (or modify the conditions of a lease) or

not. This advice is then provided to the “Mining Minister” before a lease can be offered to an applicant. Such advice is given in the knowledge that the proposal has undergone the necessary consultation and is at the final stage of the mining application process conducted by PIRSA. In instances where the two Ministers disagree, the application is put before Cabinet and a decision made by the Governor. As in this case, the Minister for Mineral Resources Development and the Minister for Urban Development and Planning is the same person (Minister Holloway). Minister Holloway has decided to delegate his role as Minister for Urban Development and Planning to another Cabinet Minister for this decision.

8.3 RIVER MURRAY ACT 2003

The mineral claim is also located within the River Murray Protection Area, and hence this application and assessment needs to be referred for advice to DWLBC for review, on behalf of the Minister for the River Murray.

The *River Murray Act 2003* requires the Minister, in considering an application for a mining lease that will apply within the Murray-Darling Basin, to:

- take into account the objects and objectives for a Healthy River Murray of the River Murray Act; and
- where the application relates to an area within a River Murray Protection Area, to refer the application to the Minister for the River Murray.

The principles of ecologically sustainable development include that proper weight should be given to both long and short-term economic, environmental, social and equity considerations in deciding all matters relating to environmental protection, restoration and enhancement, and to the facilitation of sustainable economic development.

When referred to the Minister for the River Murray and the Ministers cannot agree on the grant or conditions of the grant of the application, the Ministers must refer the matter to the Governor for determination.

8.4 ENVIRONMENT PROTECTION ACT LICENCES

EPA Licences required for the proposed Terramin Angas Zinc Project, which is a Prescribed Activity of Environmental Significance under the Environmental Protection Act, will require the following licences:

- *Mineral Works Licence*: Schedule 1 S(2) (9) the conduct of works at which ores are smelted or reduced to produce metal.
- *Works Approval* S(35) (a) the construction or alteration of a building or structure for use for a prescribed activity of environmental significance; (b) the installation or alteration of any plant or equipment for use for a prescribed activity of environmental significance.

These licences will be required prior to commencing any construction work on site.

8.5 WATER EXTRACTION LICENCE UNDER THE NATURAL RESOURCES MANAGEMENT ACT

The proposed mine is within the "Notice of Prohibition" and prescribed area of the Eastern Mount Lofty Ranges. As the mine will be required to be dewatered as part of normal operations, the lessee will be required to obtain a licence to take water under the Natural Resources Management Act before mine construction begins.

9 CONCLUSION AND RECOMMENDATIONS

9.1 IMPACTS AND BENEFITS OF THE MINING PROPOSAL

It is clear that the mining proposal will deliver significant economic benefits to the state and local community through royalties and direct and indirect employment.

The proposal will potentially also deliver a net environmental benefit once the mine is completed, given the degraded condition of the present site, although there is some risk that the TSF may, in the longer term, not successfully contain the high acid generating material, with the potential to cause long-term pollution to waterways in the area. It is judged on balance that, with good design and management, this risk can be successfully controlled to an acceptably low level.

Determining the net social benefit or detriment is more difficult to judge. It is clear that there is considerable concern among some members of the local community over the proposal, and that the mine will, in regards to noise, odour, dust, ground vibration and traffic, result in some impacts on the local community lifestyle, particularly those living or working close to the proposed mine. Other members of the community are clearly supportive of the project, and believe that the mine may contribute positively to the amenity and lifestyle of Strathalbyn. Social benefits arising from the mine will be critically dependent on the degree of commitment that Terramin makes to engaging with the local community, sponsorship of local community groups, and to assisting the further development and preservation of the heritage of the town. Other benefits may arise through the potential upgrading of water and electricity infrastructure and upgrades to local emergency services.

It is concluded that the mining proposal should proceed, given that on balance the economic, environmental and social benefits outweigh the potential social and environmental impacts.

9.2 LEASE CONDITIONS

Appendix 11.6 provides the recommended conditions for this lease, which reflect the regulatory recommendations identified in sections 6.1 to 6.14 above.

In summary, the lease conditions include:

- conditions requiring public disclosure of the MARP and annual compliance reports
- a requirement to demonstrate management competency
- a requirement to resource and participate in a Community Consultative Committee

- explicitly state the environmental outcomes to be achieved
- specific requirements in regard to the design and monitoring of operations, with particular reference to the TSF.

Other regulatory requirements will be addressed in the final MARP to be submitted — these requirements have in some cases been referenced as lease conditions.

9.3 FINANCIAL SECURITY FOR OBLIGATIONS AND LIABILITIES

The rehabilitation bond is a financial assurance given by the lessee to pay a sum of money if it defaults on its obligations. The bond is generally held in the form of an unconditional bank guarantee and is authorised under Section 62 of the Mining Act.

It is recommended that the lease be granted subject to a condition that the level of bond will be initially set once the MARP is approved, and thereafter will be regularly reviewed to ensure that the bond held by the government is at all times equivalent to the full cost of the rehabilitation liability.

The estimation of the full third party cost for complete rehabilitation will initially be provided by Terramin in its final MARP. Terramin has provided an initial estimate of rehabilitation costs as \$1.3 million, based on the conceptual mine design. The amount of rehabilitation bond will be set when more exact details are known from the revised MARP to be submitted for approval after the lease has been granted. PIRSA will reserve the right to seek independent third party quotes for the cost of rehabilitation to verify the estimate provided by Terramin.

PIRSA will take into account the following in setting and reviewing the bond for this lease:

- the risks to the environment as calculated from the severity of the likely environmental effects and the likelihood that the rehabilitation will not be successfully completed
- changes in the costs of the components of rehabilitation, e.g. hire of machinery for earthworks and increases in the consumer price index
- changes in the need for rehabilitation due to any reason, including increased community standards subject to the criteria of the standards applying when the operations were carried out
- progress or lack of progress in progressive rehabilitation
- whether the mine is in care and maintenance mode for a period and the effect that has on the need to protect the community and on the public interest.

The bond may be used for any purposes relevant to the contents of Section 62 of the Mining Act. The bond will be activated either partially or in full when the Minister is of the view that leaseholder has:

- incurred a civil or statutory liability or liabilities in the course of carrying out mining operations and payment is required to discharge these obligations
- defaulted on its obligations in regards to rehabilitation of the land disturbed by mining operations, which may include progressive rehabilitation as provided for under either the lease and MARP or both.

The bond may be used either partially or in full at the Minister's discretion at any stage of the mine's life and irrespective of the lessee's then financial position.

The bond will be retired when rehabilitation has met all completion criteria and standards set out in the lease conditions and closure plan in the MARP (i.e. that the rehabilitated area is safe, stable, erosion is comparable to the surrounding areas, and that the biological system is sustainable under a range of seasonal conditions representative of that climate). In regards to the TSF, there may be an extended time after mining operations have ceased before it can be demonstrated that the rehabilitation has been successful.

To provide additional security for public liability obligations (e.g. clean up costs from an unplanned containment loss), the lease will also be subject to a condition to require that at least \$50 million public liability insurance be maintained during the currency of the lease. This insurance will be required to include covering the risk of sudden and accidental pollution caused by the mining operation.

9.4 RECOMMENDATIONS

The Tenement Review Committee recommends to the Minister for Mineral Resources Development that:

- an offer of a Mineral Lease be made to Terramin Australia NL to conduct mining operations for the **recovery of metallic mineral ores** over the area of **Mineral Claim 3567**, and
- the Lessee be advised of the need to comply with the following (non-inclusive) list of Acts, Codes and Standards, which may not be directly administered by the Minister for Mineral Resources Development:
 - *Electricity Act 1996 and the Electricity (General) Regulations 1997*
 - *Environment Protection Act 1993*
 - *Occupational Health, Safety and Welfare Act 1986 (SA)*
 - *Natural Resources Management Act 2004*
 - *Native Vegetation Act 1991 (Reprint No.4) and Regulations 2003*
 - *River Murray Act 2003.*
 - *Workers Rehabilitation and Compensation Act 1986*
 - *Aboriginal Heritage Act 1988*
 - *Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia).*

The lease agreement will be subject to the following terms and conditions:

- The term of the lease agreement will be for 10 years; and
- The following First and Second Schedules, as per Appendix 11.6, be attached to the lease.

If you concur with the recommendation please sign below.

John Morton
Program Leader
Mine Technical Services

Hans D Bailiht
Senior Assessments Officer
Mine Technical Services

Date:

Date:

The Tenement Review Committee considered this application (T2538) on 5 July 2006 and supports the abovementioned recommendation.

Signed:
For the TENEMENT REVIEW COMMITTEE

Date:

RECOMMENDATION SUPPORTED

**PAUL HEITHERSAY
EXECUTIVE DIRECTOR,
MINERAL RESOURCES & ENERGY**

**MARK McGEOUGH
A/DIRECTOR MINERAL RESOURCES**

Date:

Date:

10 REFERENCES

- ANCOLD Guidelines on Tailings Dam Design, Construction and Operation.
 A guide to Tailings Dams and Impoundments Design, construction, use and rehabilitation. Bulletin 106
- Watertight Geomembranes for Dams Bulletin 78
- Tailings Dams. Transport Placement and Decantation Bulletin 101
- Monitoring of Tailings Dams Bulletin 104
- Tailing Dams Design of Drainage Bulletin 97
- Tailings Dam and Environment Bulletin 103
- Tailings Dam Safety Guidelines Bulletin 74
- Guidelines on the Safe Design and Operating Standards for Tailings Storage – Department of Minerals and Energy Western Australia. May 1999
- Guidelines on the Development of an Operating Manual for Tailings Storage - Department of Minerals and Energy Western Australia. October 1998
- Environmental Guidelines Management of Tailings Storage Facilities Victorian Minerals & Petroleum Division November 2004.
- Minerals Council of Australia Strategic Framework for Tailings Management.

11 APPENDICES

11.1 SUMMARY OF SUBMISSIONS RECEIVED IN RESPONSE TO PUBLIC CONSULTATION PERIOD

GUIDANCE NOTES

In accordance with Section 35A of the *Mining Act 1971*, a statutory consultation process was undertaken on the lease application made by Terramin on 2 November 2005. A public notice seeking written submissions on the proposal was placed in *The Advertiser* on 10 November 2005 with a closing date for submissions of 23 December 2005. Copies of the lease application documentation were supplied directly to relevant government departments, the Alexandrina Council, affected landowners, and a number of other people who had notified PIRSA of their interest in commenting on the project.

Written submissions were received within the six-week consultation period from the Alexandrina Council and relevant South Australian Government agencies and authorities (EPA, DWLBC (River Murray), Murray-Darling Basin Natural Resource Management Board, Planning SA, Transport SA, Department of Health, Department of Aboriginal Affairs and Reconciliation, Department of Environment and Heritage, Office of the Technical Regulator). Individual submissions were also received from 95 members of the public and non-government organisations (NGOs).

This document summarises the issues raised in all submissions received during the statutory consultation period. Issues have been grouped by the environmental outcomes in the original mining proposal document submitted by Terramin in support of its Angas lease application (these are referenced by the numbering used in that document, and by restating the environmental outcomes used — columns 1 and 2 in this document).

Column 3 indicates the number of public and NGO submissions that referenced the issue summarised in column 5.

Column 4 references the particular issues raised by the Alexandrina Council and relevant South Australian Government agencies and authorities:

Alex Council = Alexandrina Council
Murray-Darling NRMB = Murray-Darling Natural Resources Management Board
DWLBC = Department of Water, Land and Biodiversity Conservation (River Murray)
Health = Department of Health
Planning = Planning SA, PIRSA
DEH = Department for Environment and Heritage
EPA = Environment Protection Agency
Transport = Transport SA, Department of Transport, Energy and Infrastructure
Technical regulator = Office of the Technical Regulator, Department of Transport, Energy and Infrastructure

Some interpretation of the submissions has been made to enable grouping of like issues raised in different submissions.

The names of private individuals and non-government organisations that made submissions have not been disclosed to Terramin nor will they be made available to the public.

The full text of submissions made by the Alexandrina Council and South Australian Government agencies, and a summary of the public submissions, has been forwarded to Terramin for its response to the issues raised. PIRSA has also formed a view of the issues raised in the consultation process, and has developed a number of actions relating to the progression of the lease assessment process, including issues that must be resolved as part of the lease assessment process (e.g. changes to the environmental outcomes to be achieved), and issues that may be deferred to the assessment and approval process for the final mining and rehabilitation program should the lease be granted (e.g. detailed designs of surface infrastructure).

Outcome to be achieved (referenced as per original mining proposal)	Number of public submissions on this issue	Government agency submissions on this issue	Issue raised in submission
17.2 Ground and surface water <i>"Prevent the contamination of surface water and/or ground water and pressure loss to users of ground water"</i>	2 9 10 1	 Alex Council Alex Council Alex Council Murray-Darling NRMB, DWLBC Planning Planning Health	Impact on watercourses from dragout after rain Security of underground water supplies Potential for contamination from chemical spill into ground water and watercourses Potential for contamination by unsealed exploration holes in effluent ponds area Need to consider requirements of the Water Allocation Plan for mine dewatering and apply for water licence Need to ensure integrity of separate aquifers are maintained in mining operations and at closure EPA to confirm suitability of monitoring program Risk associated with mine dewatering if from effluent pond water seepage
17.3	Erosion <i>"Stabilise current disturbed areas and prevent sediment from leaving the site"</i>		No comments received
17.4	Topsoil <i>"Ensure soil quality is protected"</i>	DEH DEH	Need to clarify what depth top and sub soil will be collected and stored Need to monitor soil stockpiles to avoid seed sterilisation
17.5	Vegetation Clearance	DEH	Flora species of conservation significance do occur in lease area — need to survey

	<i>"Avoid loss of biodiversity through clearance of native vegetation. Significant environmental benefit (SEB) will be provided to increase the biodiversity"</i>		DEH DEH EPA	and clarify species present If two Melaleuca trees are removed or any previous revegetation plantings, Significant Environmental Benefit must be paid Need to clarify if any clearance will occur for installing infrastructure (fig 35) Sealing or raise bores through aquifers should be an approval condition
17.6	Silt and storm water control <i>"Prevent contamination of storm water leaving site"</i>	2	Alex Council, Planning Planning, DEH Planning, DEH	No contaminated water to leave site More monitoring details of stormwater runoff from tailings dam Need to demonstrate stormwater diversion around TSF will be sufficient to cope with storm events and how runoff water will be disposed of Need to address stormwater runoff of stockpiles
17.7	Waste disposal and hazardous substances <i>"Prevent contamination and pollution from the management of waste products and spillages"</i>	1	Alex Council DEH	Detail hazardous waste management process to give confidence that risk can be managed Recycling strategies should be documented, including opportunities to recycle waste material currently onsite
17.8	Acid Mine drainage <i>"Prevent contamination of surface water, groundwater, and soils by acid mine drainage"</i>	32 1 2 2 1	Alex Council, Murray-Darling NRMB, DWLBC, Planning, DEH, EPA Alex Council, Planning Planning Alex Council, DWLBC Murray-Darling NRMB, EPA	Doubt leakage or contamination (groundwater and surface water) can be managed (risk rating is high) Risk of embankment failure Potential for seismic failure — must withstand 7 on Richter scale for 1 minute Potential for reactive soils to cause failure Design to be world's best practice — specify design parameters and include monitoring facilities

		12	Planning, DEH	Risk of damage due to flooding underestimated (should be 500 m from 100 ARI flood level of Burnside Creek)
		4		Investigate alternative locations for tailings dump
		2	DWLBC	AMD risk from temp storage of waste rock TSF to be designed to EPA "Guidelines for Solid waste landfills" and managed and de-commissioned in accordance with "Landfill Environmental Management Plan" (LEMP)
17.9	Ventilation <i>"Prevent public nuisance impacts from noise and fumes emanating from the vent fan and prevent adverse impacts on vegetation surrounding the fan"</i>	1	Alex Council	Doubts dust will be controlled Doubts Odours will be controlled
		1	Planning	Need to model gas emissions from exhaust fans and demonstrate noise acceptable
			DEH	Monitoring for noise, soil and air quality should be more frequent than annual
17.10	Traffic <i>"Prevent accidents, dust and the spread of pest/diseases associated with mine traffic"</i>	7		Traffic danger, close to schools etc (impact on cycling)
		14	Health	Noise
		13		Damage to roads
		5	EPA	Dragout
		2	Health	No dust from trucks (cover load — tarpaulin may not be sufficient)
		4	Alex Council	No trucks through town or on town roads, including chemical transport trucks as well as concentrate trucks
		1		Clarify hours of vehicle movements
		1		Could extend 80 km/hr speed limit to mine entrance to increase safety
		1		Changing road access improves safety, but increases noise for residents
		1		Pollution from increased diesel exhaust

		1		Consider use of railway for transport instead of trucks
		1	Alex Council	Prescribe conditions which preclude disconnection of B-double trailers to allow trucks thru town
			Alex Council, Transport	Existing Callington road not suitable for B-doubles- requires widening
			Transport	Entrance on to Callington Rd should have a C junction and deceleration lane
			DEH	Entrance to mine should cater for two-way traffic, and be sealed Where will tyre wash down pad be located and how will contaminated water and dust be disposed of?
			Health	Suggested B-Double traffic be restricted to reasonable hours

17.11	Noise <i>"Prevent public nuisance impacts from noise emanating from the operating site"</i>	2		Noise need to characterise tone, pitch etc operation
		23		Noise limit for night time (40 db) too high — wants no noise at night
		1		Definition of "daytime" is not 7am to 10pm
		1		What days of week will mine operate?
		16		Noise during daytime to be comparable with existing rural noise levels
		18		Doubts that noise can be controlled to stated or acceptable limits
		2		Concern crushing may be 24 hour operation, not just 12 hour operation
		1		Doubts that EPA able to enforce noise limits
		1		Need to consider shift workers, not all are 9 to 5
		2		Ventilation shaft location not known — doubts noise will be acceptable
		1		Suggest 45 dB during the day and 40 dB at night, to account for schools
		1	EPA	Noise limits not clear
		1		Noise at night now form music, mine won't

			Alex Council, Planning Health	be any worse Limit crushing pant to 7am to 7pm Mon– Sat, no crushing Sun and Pub Holidays Noise limits suggested in MARP not appropriate WHO guidelines recommend 50 dB during day, 45 dB at night (some people will still be adversely affected by these levels e.g. shift workers, elderly)
17.12	Blasting <i>"Prevent public nuisance impacts from vibration caused by blasting"</i>	12 1 2	Alex Council	Damage to buildings Need to warn residents of blasting Limit blasting to after 7:30am (or 7am– 7pm) not 24 hour nor 7days a week, no blasting Sundays or Pub Holidays
17.13	Public health nuisance <i>"Prevent public health and nuisance impacts from the ingestion of dust and harmful substances and odour dust associated with mining activities"</i>	24 31 24 1 16 19 4 13 2 3 1 1 1 2	EPA, Health EPA EPA, Health Alex Council Alex Council	Doubts / lack of detail over dust control measures No guarantees there will be no health impacts from chemicals or dust Lead dust in rainwater tanks Health impacts from ventilation of underground workings No Odour off site Suggest EPA standard limit of 2 odour units, Doubt / more detail on how odours from tailings dam can be managed Dust to be contained on site Need for baseline blood and environmental lead level data Impacts on organic vegetable growing Transport and use of toxic chemicals (e.g. Xanthate) Monitoring of dust levels on boundary of operation Monitor CS2 levels — to be below 0.042 ppm (WA PA) Risk of zinc metal or oxide dust ingestion Higher stress levels for residents due to noise, traffic, fear of contaminated

		1		rainwater
		6		Compensate affected landowners with double glazing, aircond, filters for rainwater tanks
		1		No compensation if outcomes not met - no confidence in ability of regulators to enforce requirements
		1		Dust/Lead concentration limit to be NEPM std: lead <0.5 ug/m ³ (no exceedences per yr) and PM10 <50ug/m ³ (5 exceedences per yr)
		1	EPA	Need for odour, hydrogen cyanide modelling
		1	EPA	Need to demonstrate no risk from hydrogen cyanide volatilisation for flotation process
		1		Dust/emissions risk should also assess potential for PM10, CO, SOx, VOCs, Nox and asbestos
		2		Risk is high, extensive monitoring required using modern technology
		1		Need to assess PM2.5 risk and set appropriate standards
		1		If adverse weather conditions, close down operations temp
			Health	More detail on ore composition required
			Health	Baseline monitoring of blood lead levels not required
			Health	Need to ensure lead-bearing dust is not transported offsite by workers
			Health	Baseline dust monitoring required
			Health	Effluent ponds are incorrectly referred to as "grey water ponds", but present risks to public health due to pathogen content
			Health	Appendix P (Blood Lead Management Guidelines) is incomplete requires revision
		2	Planning, EPA	Demonstrate cyanide and daughter products do not pose threat to humans or fauna
		1		No odour outcome
17.14	Fire	1	Alex Council	Risk posed by concentration of flammable

	<i>"Prevent fires onsite, and if unavoidable, control to ensure no off site impacts"</i>			or explosive chemicals
17.15	Seismic <i>"Prevent damage to public infrastructure, injuries/deaths and pollution of the environment resulting from seismic induced catastrophic failure of mine infrastructure"</i>	1		Risk of seismic action and reactive soils
17.16	Vertical openings/Site security <i>"Prevent public injuries/deaths resulting from unauthorised entry to the mine site"</i>			No comments received
17.17	Geotechnical stability <i>"Prevent damage to public infrastructure and injuries/deaths resulting from pillar failures both during and after mine closure"</i>	1 1	Transport Planning	Risk of effluent pond collapse due to mining — who will be liable for repair of damage Risk that acid-generating tails will weaken cemented tailings underground Callington–Goolwa Rd integrity must be protected Potential for surface subsidence of TSF if located over ore extraction areas
17.18	Visual impact <i>"Minimise visual impact of site and operations"</i>	11 2 2 1 1 1	Planning Planning	Lighting at night to focussed down, or operations enclosed -so as to not be visible from town Screening of Tailings dam from town - if vegetation to be used, when will this be effective Locate plant in existing quarry, not on exposed sthn hillside, or locate away from town Need to clarify how large and visible the stockpiles will be Visual aspects of large ugly trucks on road Plant visible to local residents - which

			Alex Council Planning DEH	roads will be used to determine if visible or not? Tailings dam not to be increased in height from initial approval Buildings to be painted in earth tones If plantings are used to screen, use local species to increase biodiversity in region
17.19	Fauna <i>"Prevent impact of site operations on native fauna"</i>	11 1 3	Murray- Darling NRMB Murray-Darling NRMB, DWLBC Planning, DEH DEH, EPA DEH DEH DEH	Threats to wildlife in general area and in Tucker's swamp area (especially frogs - sensitive to low level toxins). Swamp is breeding area for vulnerable birds. Need to consider implications of groundwater impacts on wetlands River black fish (protected), Mountain Galaxis, Carp Gudgeon in Angas river and not mentioned in MARP Risks to birds and fauna (especially rare and vulnerable) from cyanide, heavy metal toxins etc in TSF Fauna survey required especially migratory birds One weed species of national significance has been identified on site -weeds need to be managed Need to ensure infrastructure areas are designed to avoid traps for ground dwelling fauna Need to implement phytophthora management
17.20	Stakeholders <i>"Maintain good relationships with local community and minimise other negative impacts on public amenity and values"</i>	18 1 47 22 22 20 2 4	Alex Council, Planning	Will restrict future growth and development of town, impact existing business May cause labour shortage for other business (e.g. vineyards) Impact on quality of life (non specific) Lower property values Impacts on electricity and water supplies SA water and ETSA to confirm infrastructure sufficient Effect on heritage/wine/food tourism Better to mine now rather than later, before town expands Positive impacts on commerce, employment, education, health/hospital

				services, transport in the town
		1		Positive effect on community sponsorship
		1		Will improve ugly site
		1		Vermin control will improve environment for native flora/fauna in area
		1		Mains water supply on Callington Rd will be upgraded
		1		May address environmental impacts of existing effluent ponds
		1		Employment only short term
		6		No certainty new jobs created will attract new residents
		1		Impact on Strath Model aircraft club - what happens to them?
		2		Use of effluent ponds for water source may leave recreation grounds without water
		1		Will the new substation the mine is proposing give benefit to residents (i.e. more secure supply?)
		1		Terramin promised sponsorship to clubs other than sport, but have only sponsored football club
		2		New residents may not contribute to social life in town due to long shift work
		2		Process to inform and deal with landowner access issues not good
		29	Alex Council, DEH	Need for more consultation including formation of consultative committee especially closure issues
		1		Want measurable outcomes (not world's best practice"
		1		Wants severe penalties for not meeting outcomes
		1		Want problems prevented, not punished after they occur
			Planning	Site already degraded due to presence of landfill, quarry and effluent ponds
			Planning	Location of mine in quarry will minimise off site impacts

		2	<p>Planning</p> <p>Technical Regulator</p> <p>Technical Regulator</p>	<p>Management of issues critical to maintain amenity, given close proximity to Strathalbyn</p> <p>Section 7.1 on power supplies missing</p> <p>No evidence that grid capacity is sufficient</p> <p>Emergency services must be supplemented to respond to accident on site</p>
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	Closure	11		Long term liability of tailings dam (may end up with the community to fix and monitor)
	No Outcome	1		Long term residual, liability re health effects
			Planning	Will vegetation grow on tailings dam given contamination
		4		Rehab required beyond working life of mine
		1		Potential to lower value/damage land post rehabilitation
		1		Post mine land use not clear (reopening as waste disposal may not be allowed)
		1	Alex Council	Establish trust fund to compensate for impacts
		1	Planning, DEH	Need to demonstrate TSF will be stable and non polluting,
		2	Planning	3yr post closure monitoring program may not be sufficient, need to model appropriate monitoring period
			Planning DEH	Proposed closure plan complies with Development Plan policies
			DWLBC	LEMP for TSF required to be developed, may require monitoring/bond for up to 25yrs
			DEH	Need to specify what native species will be used in rehab
			DEH	Need to monitor for soil erosion post closure

	Other Issues	7		Potential for further future leases, or operation beyond 7 years, conversion to open cut, establishment of smelter
		3		Greenhouse gas emissions from power usage
		3		Uncertainty over size
		4		Environmental monitoring to be conducted by independent authority
		1		Monitor at High school on Callington rd - could be used as part of curriculum
		1		Risk of pollution if electricity supplies fail
		5		MARP should better characterise proximity to housing, (Burnside area) schools, hospital etc (section 3.3)
		10		Climate data at mine (especially wind directions) may differ from Strathalbyn due to local topographical effects or fails to account for predicted climate change
		2		Risk assessment inadequate - too many are still rated medium after control measures, (especially social impacts), some have not rating due to lack of information, risks should be assessed independently
		1		Increased lead impacts on residents of Port Pirie
		1		More baseline environmental sampling required (not specified)
		1		Contingencies for premature closure or sell off part way through

11.2 RESPONSE BY TERRAMIN TO ISSUES RAISED IN CONSULTATION SUBMISSIONS



TERRAMIN AUSTRALIA limited

Terramin's Response to the Issues Raised Through Community Consultation Process and PIRSA Action Items.

Executive Summary

A fundamental change to the draft MARP (Mining proposal) submitted by Terramin to PIRSA is the ZERO DISCHARGE policy for any potentially contaminated water. This change will be facilitated by significantly redesigning the Tailings Storage Facility and ensuring that all stormwater drainage from any potentially contaminated surface will return to the process circuit.

Terramin now proposes to remove water from the tailings by thickening to a consistency of 70% solids, the water will be returned to the process water circuit via a holding pond, which will be lined with high density polyethylene (HDPE) to prevent seepage. The Tailings Storage Facility will also be fully lined with a HDPE liner and will have more than double the stormwater storage capacity required to hold the equivalent of the worst five day storm event in history (in 1943) if it fell in one day.

Runoff from potentially acid generating stockpiles or exposed surfaces will be collected and pumped to the tailings thickener where the pH will be adjusted and returned to the process stream.

In response to community concern regarding noise, odour, dust, traffic and the proximity to the township, Terramin has incorporated several engineering design changes to address the real or perceived impacts from these issues. The addition of cladding around equipment that may generate noise, addition of dust extractors in the crusher and more sealed surfaces (all road surfaces will now be sealed). The relocation of the mine entrance will increase the level of safety through improved traffic conditions and visibility.

In addition Terramin will monitor environmental dust, noise, odour and water quality throughout mine life and post closure to ensure that all Australian and South Australian Standards will be met. In the event that any standard is not met, despite all the precautions taken, Terramin undertakes to immediately investigate and implement an appropriate remediation program to correct the situation.

The following table presents Terramin's response to the issues raised through the Community Consultation Process on the draft MARP submitted to PIRSA in support of the Mining Lease application. The table follows the Outcome numbering order used in the draft MARP for cross checking purposes.

The response table is designed so that readers can go to the specific issues they are interested in and read Terramin's response to all the issues raised by the respondents and the Action Items requested by PIRSA

Key to Acronyms:

ANCOLD	<i>Australian National Committee on Large Dams</i>
ARI	<i>Annual Return Interval</i>
AWE	<i>Australian Water & Environment</i>
AMD	<i>Acid Mine Drainage</i>
ATC	<i>Australian Tailings Consultants</i>
EGi	<i>Environmental Geochemistry international</i>
MSDS	<i>Material Safety Data Sheet</i>
PM₁₀	<i>Particulate material less than 10 micron diameter</i>
PM_{2.5}	<i>Particulate material less than 2.5 micron diameter</i>

Key to using the Table:

*This Table is divided into **outcomes** presented in the Draft MARP. All the **issues** raised through the community consultation process were summarised by PIRSA and allocated to the appropriate Outcome. Terramin's response and how it intends to address each issue is presented in the column - **Action to be taken by Terramin**.*

*In response to the issues identified through the community consultation process PIRSA prepared a list of actions for Terramin. These actions are shown in the column **Action Requested by PIRSA**. Terramin's response to these requests and how it proposes to address the actions is shown in the column **Terramin's Reply**. Terramin's response to the PIRSA Actions list provides additional information if not already provided in the replies to the Community Consultation Issues.*

Outcome 17.1 is the Angas Mine Environmental Risk Assessment, this outcome is addressed in the specific Outcomes from 17.2 onwards.

Outcome 17.2 - Ground and surface water

“Prevent the contamination of surface water and/or ground water and pressure loss to users of ground water”

Issue	Action to be taken by Terramin
Impact on watercourses from dragout after rain.	A vehicle wash bay will be located approximately 100m from main road entry. All vehicles that come in contact with contaminated soil (on or off site) will have to go through the wash bay prior to leaving the property. Terramin expects this will prevent dragout from leaving the property and will not impact on the watercourses.
Security of underground water supplies.	<p>Initial investigations were presented in the draft MARP in Appendix D (soils) and Appendix M (hydrology). Six new bores are being installed in strategic locations to provide further hydrological information on both shallow and deep aquifers by AWE. New hydrological information will be used to develop a more detailed model of the regional hydrology. The model will be verified through a monitoring program designed to detect water levels and allow time for management to respond to seasonal variations.</p> <p>The hydrological model will be used to test current values for drawdown rate, the extent of the cone of depression and related hydrological values. The improved information regarding permeability combined with the hydrological model will improve our current predictions of the rate of movement and concentration of any metals through the groundwater for environmental control measures.</p> <p>The current mine plan indicates that mining will not intercept water that would affect the regional water table. This will be confirmed by the hydrological model currently being developed by AWE.</p> <p>The main potential source of contaminants to groundwater during the operational phase is leakage through the base or overflow from the Tailings Storage Facility. Terramin has redesigned the Tailings Storage Facility with plastic liners to ensure total containment of contaminants, preventing these reaching surface or groundwater. This will be achieved by installing a thickening plant to thicken the tailings (~70% solid) prior to release and by using a liner at the base and top of the Tailings Storage Facility.</p> <p>The environmental monitoring program has both management and environmental protection components; the management component will ensure that if contamination of groundwater or losses of water pressure occur they will be rapidly detected, contained, remediated and positive action taken to prevent reoccurrence. The environmental component will report to PIRSA, the EPA and stakeholders regarding the effectiveness</p>

	<p>of Terramin's management systems and provide evidence that the water quality criteria are being met.</p> <p>Ground and surface water quality are governed by the Environment Protection (Water Quality) Policy (2003). The appropriate water quality criteria in Schedule 2 of the Policy are for the protection of aquatic ecosystems (fresh water) and agricultural (livestock) use. Water in the mineralised region around the proposed mine may contain elevated metal and organic pollutants, and in its pre-mining state surface and groundwater would not meet the appropriate water quality criteria.</p> <p>Terramin has initiated a baseline monitoring program for winter 2006, subject to Council and property owners' permission to install monitoring bores and sampling stations, which will establish the natural (or background) level of salts and metals in ground and surface water.</p> <p>Terramin expects that the proposed control measures will ensure that all water leaving the site will fall within $\pm 2SD$ of background mean levels, Section 17.21. This measure will allow for natural variability in metal pollutants and ensure that mining operations will meet the Water Quality Policy objectives: Section 2.2 Part 2: Policy objectives</p> <p><i>"The purpose of the Water Quality Policy is to achieve the sustainable management of the waters of the State by protecting and enhancing water quality while allowing economic and social development".</i></p> <p>Whilst there is no plan to discharge water from the property, Terramin will implement a management control measure to ensure that any natural runoff water quality is not compromised. The action level will be set lower than the proposed 2 standard deviations' tolerance to provide sufficient warning of system failure.</p>
Potential for contamination by unsealed exploration holes in effluent ponds area.	Terramin will cap all exploration holes in the area of the effluent ponds. The process is planned to start in week 3 of March.
Need to consider requirements of Water Allocation Plan for mine dewatering and apply for water license.	Terramin has engaged AWE to ensure that the requirements of the Water Allocation Plan are met. AWE is currently preparing submissions to the DWLBC for a water licence.
EPA to confirm suitability of monitoring program.	The general location of sampling points, frequency of sampling and indicators to be measured were addressed in the draft MARP and will be revised with new information from the baseline survey and in consultation with the SA EPA.
Sealing of raise bores through aquifers should be an approval	Terramin will any raise bore holes to prevent any saltwater ingress that could contaminate soil or damage vegetation.

condition.	
Risk associated with mine dewatering from effluent pond water seepage.	A hydrological model for the site is currently being upgraded to investigate the effect of dewatering on regional hydrology and potential seepage from Council Sewage Effluent Ponds. Appropriate engineering solutions will be implemented if mining results in seepage from the Council Sewage Effluent Ponds that contaminates groundwater.
Action Requested by PIRSA	Terramin's reply
Modify outcome to "No adverse impact to the supply of water to existing users and water dependent ecosystems".	Agree. The outcome will be modified in the MARP as requested.
Review risk assessment to include risk of watercourse pollution from dragout.	Agree. A risk assessment of watercourse pollution from dragout will be included in the final MARP.
Criteria to be revised to specify monitoring bore locations and frequency to be at least annual, with data to be supplied to DWLBC.	Agree. Groundwater monitoring criteria will be revised in consultation with PIRSA and stakeholders. Terramin proposes to install 6 new monitoring wells in April and monitor a list of relevant parameters on a quarterly frequency for groundwater and monthly for surface water in the first year. This will be revised in consultation with PIRSA after a review of the first year's data.
Criteria to be revised to describe frequency and location of surface water monitoring and dragout monitoring.	Agree. Surface water monitoring criteria have been revised, additional monitoring sites identified to address potential impacts from dragout, a suite of relevant parameters identified and a monitoring frequency will be based on rain events with minimum monthly monitoring during the first year to extend data base.
Include detail of control measures to be employed (e.g. bunding, sealing raise bores).	Agree. Terramin intends to include appropriate bunding and other measures to prevent runoff or groundwater from being contaminated. More specific information will be available in the final MARP document.

Outcome 17.3 – Erosion	
<i>“Stabilise current disturbed areas and prevent sediment from leaving the site”</i>	
Issue	Action to be taken by Terramin
No comments received.	No issues were raised on the management actions proposed by Terramin in the MARP to remediate and stabilise the currently disturbed areas.
Action Requested by PIRSA	Terramin's reply

No Action Item	PIRSA has not raised additional action items for this proposed outcome.
Outcome 17.4 – Topsoil <i>“Ensure soil quality is protected”</i>	
Issue	Action to be taken by Terramin
Need to clarify what depth top and sub soil will be collected and stored	Soil will be classified as topsoil and subsoil, according to paedology - both will be managed differently. Subsoil will mostly be used for fill while topsoil will be used for revegetation.
Need to monitor soil stockpiles to avoid sterilisation	Terramin intends to stockpile subsoil and topsoil separately within practical and physical constraints. Monitoring of soil stockpiles will take place via regular photos of fixed sites. Seed-bank sterilisation is a potential outcome of topsoil storage. This risk will be managed by ensuring regular turn over of stored topsoils, as well as ensuring the total depth of stored material is less than 3m. However, given the extensively modified floral assemblage in the area, as documented in Appendix J: Flora Assessment, the maintenance of a seed bank may actually produce ongoing weed problems. Maintenance of a viable seed-bank of native vegetation is desirable; maintenance of a weed seed-bank is not. Investigations into the proportion of viable indigenous seeds in the topsoil will drive further management plans and be incorporated into the revegetation scheme.
Action Requested by PIRSA	Terramin’s reply
Review risk assessment to include risk of seed sterilisation of topsoil stockpiles.	Agree. Will include risk assessment in final MARP.
Criteria to be revised to specify monitoring of soil stockpiles.	Agree. The topsoil stockpiles will be monitored to ensure that erosion is under control and soil not sterilised. Seed vigour will not be monitored because Terramin considers any measures to conserve seed in the topsoil from the current pastures will be counter to the weed management program; however propagules of native species (exotic and weed species free) will be sown over rehabilitated surfaces.
Include detail of depth (topsoil and subsoil) and areas of soil to be stockpiled.	Agree. Will include soil storage detail in final MARP
Include details of source of soil for Tailings Storage Facility closure.	Agree. Will include source of soil for Tailings Storage Facility in final MARP
Outcome 17.5 - Vegetation clearance <i>“Avoid loss of biodiversity through clearance of native vegetation. Significant environmental benefit (SEB) will be provided to increase the biodiversity”</i>	

Issue	Action to be taken by Terramin
<p>Flora species of conservation significance do occur in lease area - need to survey and clarify species present</p>	<p>Locations of dry land <i>Melaleuca lanceolata</i> were noted on aerial photographs and in the Flora assessment (MARF Section 17.5 and Appendix J); these trees were identified, photographed and included in the draft MARF.</p> <p>Other significant species identified in the flora assessment were native grasses that were planted in previous revegetation efforts along boundaries and as windbreaks; these were recorded in the vegetation survey by Matt Rose, MARF Section 3.6. These plants are not growing in areas of anticipated construction or mining activity; their continued survival will be enhanced by the planned revegetation efforts for the lease area.</p> <p>Further vegetation surveys are being planned for Spring 2006 to resolve the species of some plants that flower in spring.</p> <p>If trees are evaluated as environmentally significant, they will be protected from mining activities by fencing and signage if warranted. Seeds will be collected and germinated to provide seedlings for the revegetation program and as an insurance against accidental or natural loss of the trees.</p>
<p>If 2 <i>Melaleuca</i> trees are removed or any previous revegetation plantings, SEB must be paid</p>	<p>Vegetation of significant environmental benefit (SEB) will be protected by ensuring that mine and infrastructure planning will recognise their location and plan accordingly. Further protection measures will be assessed and if warranted the trees will be fenced and signs erected. If removal ultimately becomes unavoidable SEB will be calculated in accordance with the Native Vegetation Council and applied as recommended.</p>
<p>Need to clarify if any clearance will occur for installing infrastructure (fig 35)</p>	<p>Clearance of land for the construction of infrastructure is inevitable; this land is currently used by a quarry, a landfill and the remaining is covered by introduced pasture and weeds species. Some native vegetation including melaleucas was identified and documented in the draft MARF along fence lines.</p> <p>Terramin does not anticipate the need of removing the majority of this vegetation. The SEB for any native vegetation that may unavoidably have to be removed will be calculated. Contingency planning includes collecting and propagating seeds for revegetation.</p> <p>Terramin will leave the site with as much of the existing native flora as possible and ensure that their propagules have been used in the revegetation program.</p>
<p>Action Requested by PIRSA</p>	<p>Terramin's reply</p>
<p>Need more detailed survey on flora present in area to identify all flora</p>	<p>Agree. A second vegetation survey will be undertaken in the spring of 2006 to enable more precise species</p>

of conservation significance.	identification.
Criteria may need revision after more detailed survey completed.	Agree. It is not anticipated that the identification of a few plants that could not be identified down to their species level in the first survey will generate any new significant findings. However, should it be warranted the criteria will be reviewed in the MARP.
Include risk from salt water vapour from vents	Agree. Terramin does not anticipate any significant risks from salt in water vapour from vents because they will be located in highly disturbed land. This risk assessment will be included in the MARP
Outcome 17.6 - Silt & stormwater control <i>"Prevent contamination of storm water leaving site"</i>	
Issue	Action to be taken by Terramin
No contaminated water to leave site	<p>The mine will operate a closed loop for process water; stormwater that comes in contact with potentially contaminated surfaces will be redirected to the mine water circuit and not released from the property other than by evaporation from storage ponds.</p> <p>Uncontaminated stormwater will be directed with bunding around the operational areas into the natural drainage systems.</p>
More monitoring details of stormwater runoff from tailings dam	<p>Terramin will have an environmental monitoring program that will include any runoff from around the Tailing Storage Facility and stockpiles to ensure that the closed system is working to design specifications. The monitoring program will also include upstream and downstream sites to verify that these streams receive no contamination from the mine.</p> <p>A baseline monitoring is planned for the winter of 2006, it is anticipated that streams will be monitored monthly following significant rainfall events for environmental reporting purposes. There will be no stormwater runoff from the Tailing Storage Facility or other storage areas; to verify this during the operational stage, runoff from around the site will be monitored continuously at strategic locations with pH and conductivity meters for management purposes.</p> <p>Any water leaving the site will comply with current EPA water quality policy, or no higher than 2 standard deviations of stormwater entering the site (i.e. within natural background variations).</p> <p>Samples taken during significant rainfall events will be monitored for Pb, Zn, As, Cd, Fe, Mn, pH, TDS, organics and surface water level for flow determinations if required.</p>
Need to demonstrate stormwater diversion around Tailings Storage	The current drainage plans for the area surrounding the Tailings Storage Facility consist of a perimeter drain around

<p>Facility will be sufficient to cope with storm</p>	<p>the Tailings Storage Facility. The proposed catchment area to the head of the Tailings Storage Facility is minimal, and thus any surface water arriving on the Tailings Storage Facility or from its limited catchment will become part of the mine water circuit.</p> <p>The Tailings Storage Facility will be designed to withstand the expected volume of rainfall from a 1:100 ARI five day storm event to occur on one day (this is a very conservative engineering design standard). The flow from stormwater diversion will be diverted to a sump to trap sediments and silt, and then returned to the environment.</p>
<p>Need to address stormwater runoff of stockpiles</p>	<p>Stormwater will be diverted by a combination of bunds and drains around the portal, ore stockpiles, plant and any structure that may be a potential source of contamination. All potentially contaminated water will report via holding sumps to the process water circuit.</p> <p>Silt traps and sumps will be used at strategic locations to maximise silt capture within the property. Conceptual locations were shown in Appendix O to the MARP; detailed planning will carry these principles.</p> <p>The design of ROM stockpiles will include a liner and bunding at the toe of the stockpile so that all water will be captured and directed the tailings thickener - process water circuit.</p> <p>Sulphidic wastes will be temporarily stockpiled on a lined pad and runoff water collected and returned to the tailings thickener – process water circuit. All potential AMD material will be returned underground as space becomes available through mining.</p>
<p>Action Requested by PIRSA</p>	<p>Terramin's reply</p>
<p>Revise Outcome to "No water contaminated as a result of mining operations to leave lease area or result in contamination of soil at closure within lease area".</p>	<p>Agree. This outcome will be achieved by constructing engineered drains and silt traps to prevent potentially contaminated silt and storm water runoff. A monitoring program will provide a feedback mechanism to management to ensure the systems are operating as designed and to reassure the stakeholders that this outcome is being met.</p>
<p>Criteria to be water discharged from site to be compliant with current EPA water quality policy, or to be no higher than current background levels.</p>	<p>Agree. These criteria will be accepted by Terramin. To allow for natural variability the two standard deviations above background mean will be considered as exceeding background level, as incorporated in 17.2 of the draft MARP.</p>
<p>Need to acquire data on current quality of surface water leaving site.</p>	<p>Agree. Is currently being addressed by AWE</p>
<p>Review criteria to include some</p>	<p>Agree. There will be no runoff from the Tailings Storage</p>

onsite monitoring near Tailings Storage Facility and stockpiles.	<p>Facility and runoff from the stockpiles will be collected and transferred to the tailings thickener-process water circuit.</p> <p>Water runoff from property will be monitored to ensure that the control measures are working as planned.</p>
Stormwater diversion infrastructure to be designed to cope with largest known historical storm event.	Agree. Terramin has designed the stormwater diversion infrastructure to meet the largest storm event on record which occurred on 25 January 1941 at 142mm of rain.
Include detail of control measures to be employed to demonstrate capable of coping with largest known historical storm event.	Agree. Terramin will provide design calculations in the MARP to demonstrate the ability of stormwater diversion infrastructure to meet the largest historic storm event.

Outcome 17.7 - Waste disposal/hazardous substances

“Prevent contamination and pollution from the management of waste products and spillages”

Issue	Action to be taken by Terramin
Detail hazardous waste management process to give confidence that risk can be managed	<p>All potentially hazardous materials will have individual handling and storage protocols (safe operating procedures) based on their physical and chemical form and including all recommendations on the Manufacturer's MSDS sheets, e.g. Xanthate:</p> <p>Handling: Use safe work practices to avoid eye or skin contact and inhalation. Observe good personal hygiene. Prohibit eating, drinking and smoking in contaminated areas. Wash hands before eating. Remove contaminated clothing and protective equipment before entering eating areas.</p> <p>Storage: Store in cool, dry, well ventilated area, removed from direct sunlight, oxidising agents (e.g. peroxides, hypochlorites), acids (e.g. sulphuric acid), heat sources and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Check regularly for leaks or spills. Large storage areas should have appropriate ventilation.</p> <p>Security systems will be implemented to ensure that all safe storage and handling systems are operating as specified.</p> <p>No employee or contractor will be permitted to handle these materials unless they have been certified by a Terramin approved trainer. In most cases this will be the Health and Safety Officer.</p>

	The Draft MARP provides a contingency plan for emergency situations in Section S. The handling and storage of hazardous material will be according to relevant legislation or manufacturers directions. The implementation of an Environmental Management System will define the procedures required for acceptable handling and storage procedures.
Recycling strategies should be documented, including opportunities to recycle waste material currently onsite.	Recycling and disposal of material during all phases of mining will comply with the relevant legislation. A recycling policy will be implemented for all recyclable materials brought on site. Assessment of recycling options will be made for materials currently on site. Local recycling facilities will be utilised where practicable. All non-recyclable waste will be disposed of in an appropriate manner. No waste from off site to be disposed of on site.
Action Requested by PIRSA	Terramin's reply
Revise outcome to "No contamination and pollution either on or off site caused by waste products and hazardous materials".	Agree. Outcome revised in MARP by changing the word "Prevent" to "No".
Review criteria to include recycling where possible.	Agree. Recycling where possible has been added to the criteria in the MARP.
Include more detail on hazardous chemicals to be used and management strategies.	Agree. A list was presented in the draft MARP, an updated list of all process chemicals with reference to the manufacturer's MSDS sheets will be provided in the MARP.
No waste from off the site to be disposed of on site.	Agree to this condition.
Need to plot existing licensed landfill on all maps of mine site.	Agree , will include in final MARP.
Outcome 17.8 - Acid mine drainage <i>"Prevent contamination of surface water, groundwater, and soils by acid mine drainage"</i>	
Issue	Action to be taken by Terramin
Doubt leakage/contamination (groundwater and surface water) can be managed (risk rating is high)	<i>Tailing Storage Facility:</i> The engineering risk assessment (as opposed to "perceived" risk – "doubt") in the draft MARP rated leakage to groundwater from the unlined Tailings Storage Facility as high, the residual risk after the initial tailings dam design was rated as low by ATC. The new Tailings Storage Facility design with an HDPE will have even less likelihood of leakage than the previous design. No detectable infiltration is expected into the underlying groundwater. Therefore the residual engineering risk rating is anticipated to remain at the least rating of "low" – the classification system does not recognise a "no risk" category. However, the new design will also reduce the perceived risk rating to "low".

	<p>The structural design of the Tailings Storage Facility will meet the standards set by the ANCOLD Guidelines and the additional requirements set by PIRSA and EPA in “Guidelines for the Management of Tailings at the Proposed Angas Zinc Project, Strathalbyn, South Australia”.</p> <p>The final design of the Tailings Storage Facility will demonstrate the ability of the structure to achieve the proposed outcome to the satisfaction of PIRSA, DWLBC and EPA. Wall stabilisation is an integral part of design and construction. Terramin plans to revegetate the retaining walls soon after construction, and ensure that the vegetation is well established at closure.</p> <p>To ensure the Tailings Storage Facility is located at least 100m from the 100 ARI flood level, Terramin have engaged the services of Tonkin, recognized as experts in the flood modelling field, to assist in determining the most appropriate placement of the Tailings Storage Facility.</p> <p><i>AMD from underground mine and general operational areas:</i></p> <p>Terramin has commissioned EGi (an internationally recognised geochemical consulting firm) to conduct a geochemical study on the underground mine and material to be temporarily stored on the surface. The potential to generate acid and the kinetics of both waste rock and tailings will be evaluated. Recommendations from EGi will be incorporated in the final MARP and if modifications are required to the environmental management plan they will be initiated prior to mining.</p> <p>All alternative locations for the storage of potentially acid generating material have been and will continue to be considered, including the effluent ponds and the potential for underground storage. Underground storage will be able to provide a stable setting for AMD material.</p> <p>In preparing the MARP, storage of tailings in the area of effluent ponds was investigated and considered geotechnically unsuitable because the area is prone to inundation and environmentally inappropriate because it is a wetland area for native species.</p>
Risk of embankment failure	<p>The risk of embankment failure is a major consideration for the development of the Tailings Storage Facility. As such, a variety of worst case scenarios were considered for the final Tailings Storage Facility design, including flooding and earthquake conditions. The material selected for the Tailings Storage Facility walls will meet engineering criteria and be geotechnically suitable.</p>
Potential for seismic failure - must withstand 7 on Richter scale for 1	<p>To ensure the stability of engineered structures Terramin has, and is continuing to address the potential risks</p>

minute.	<p>associated with both seismic activity and reactive soils. Engineered structures were developed under stringent modelling assumptions for seismic activity (including Operating Basis Earthquake 1 in 100 Annual Exceedence Probability; Maximum Design Earthquake 1 in 1000) and reactive soils. The design of the Tailings Storage Facility to appropriate standards is being undertaken by Australian Tailings Consultants, (ATC) who are recognized as global experts in the field. ATC and their consultants are currently undertaking a seismic risk assessment for the proposed structure as required by ANCOLD Guidelines. The results will be included in the risk assessment section of the MARP.</p>
Potential for reactive soils to cause failure	<p>All materials used in the construction of pads and the Tailings Storage Facility walls will be selected on strict engineering criteria to provide the desired geotechnical stability.</p> <p>In addition a liner will be placed at the base of the ROM pads and the Tailings Storage Facility to prevent the potential for leakage caused by cracking clays.</p>
Design to be worlds best practice - specify design parameters and include monitoring facilities	<p>The Tailings Storage Facility is being designed to ANCOLD guidelines, which are the operational standard in Australia. Terramin is also incorporating additional site specific criteria developed by PIRSA and its consultants which make these Tailings Storage Facility criteria the most stringent known in Australia. Terramin consultants ATC have incorporated all these criteria in the design and included additional design measures, particularly in the water storage capacity, making this Facility one of the most over-designed in the World.</p> <p>Groundwater monitoring bores will be placed in strategic locations around the Tailings Storage Facility to record water levels and water quality parameters relevant to detecting acid generation. A baseline surface and groundwater monitoring program is planned and should, subject to council and property owners' approval, commence in April 2006.</p> <p>The results of the initial baseline survey were reported in the draft MARP, a more comprehensive set of water quality parameters currently being monitored will be reported in the MARP or the first environmental report to the EPA.</p>
Risk of damage due to flooding underestimated (should be 500m from 100ARI flood level of Burnside Creek).	<p>Terramin is currently working towards the placement of the Tailings Storage Facility above the 1:100 ARI flood levels for Burnside Creek - [Tonkin Consultants are currently confirming this]. The placement of the Tailings Storage Facility relative to potential flooding areas will be more than 100m from 1:100 ARI flood levels.</p>
Demonstrate Cyanide and daughter products do not pose	<p>The projected levels of cyanide in the process at the Angas project will be very low, as provided in the draft MARP. The</p>

<p>threat to humans or fauna.</p>	<p>final MARP is likely to show lower levels because the cyanide and breakdown product concentrations in the thickened tailings will be lower than originally projected. This is the result of the thickening process recovering a high percentage of process water that includes cyanide. The current projected total cyanide in thickened tails is 2 parts per million. Terramin is currently negotiating with a buyer of concentrates, which if successful will not use any cyanide in the process.</p>
<p>Investigate alternate locations for Tailings dump.</p>	<p>Alternative locations for the placement of Tailings Storage Facility were investigated by Terramin and its consultants. The current location was selected because it is geotechnically stable, has a minimal environmental footprint and is located more than 100m from the 100 year flood level (currently being modelled by Tonkin Consulting).</p> <p>Other sites considered include sites further down in the valley, the Alexandrina Council Effluent Ponds and underground storage as backfill mixed with cement. These options failed the stringent criteria imposed by Terramin, with the exception of underground storage as backfill; this option will not have sufficient capacity but will be used in conjunction with the Tailings Storage Facility to place as much tailings underground as practically possible.</p> <p>A subsequent request by PIRSA on behalf of the Alexandrina Council, the EPA and DWLBC to use the Strathalbyn Effluent Ponds was received by Terramin, who's reply was that the site was investigated but not selected because it was considered to be prone to flooding (it is a local wetland) and was identified by the site flora and fauna survey as an environmentally sensitive area. Terramin has offered to discuss this further with the relevant authorities; a reply was not forthcoming at the time of preparing this submission.</p>
<p>AMD risk from temp storage of waste rock need to define "non-sulphidic" waste.</p>	<p>An AMD classification system is currently being developed by EGi. It is likely to be based on sulphide material in the waste rock. Extensive calcareous deposits that overlay the ore body will also be geochemically characterised for its acid neutralising capacity. There will also be relatively inert material that contains no significant reactive sulphur. The acid neutralising and inert material are defined as "non-sulphidic" waste. EGi will if advisable recommend any improvements to the current acid drainage management and Terramin will examine if these can be incorporated.</p> <p>Terramin has already designed the Tailings Storage Facility and Stockpiles on the presumption that they will be acid generating, incorporating HDPE base layers and diverting water that comes in contact with potentially acid generating material back to the thickeners for acid modification and reuse in the process water.</p>

	<p>Terramin has strategic plan to use the acid neutralising overburden (rock and soil) for constructing pads, bunds and in other acid neutralizing roles, provided this material also meets the geotechnical criteria for the intended use.</p>
<p>Tailings Storage Facility to be designed to EPA "Guidelines for Solid waste landfills" and managed and de-commissioned in accordance with "Landfill Environmental Management Plan" (LEMP)</p>	<p>Section 7.1 of the EPA landfill guideline states that semi-solid sludge is not to be stored in a licensed landfill. Therefore a specific design is required to store tailings. PIRSA has developed and issued site specific guideline in "Guidelines for the Management of Acid Mine Drainage at the Proposed Angas Zinc Project, Strathalbyn, South Australia". These guidelines include relevant components of the recently released EPA draft guidelines for landfill management. Terramin will ensure that these conditions are the minimum criteria in the final Tailings Storage Facility design.</p> <p>Geotechnical testing is ongoing, and the likely formulation of thickened tailings is undergoing wind tunnel tests to confirm predictions regarding wind erosion. AWE and ATC have completed geophysical and hydrological testing on the potential Tailings Storage Facility sites to confirm geotechnical and hydrological assumptions.</p> <p>The final design of the Tailings Storage Facility will demonstrate the ability of the structure to achieve the proposed Outcome to the satisfaction of PIRSA, DWLBC and EPA.</p>
<p>Action Requested by PIRSA</p>	<p>Terramin's reply</p>
<p>Revise outcome to "No contamination of natural drainage systems, ground water and soils either on or off site, during operation and post closure term, caused by permanent disposal or temporary storage of mine ore or waste material".</p>	<p>Agree. Terramin has revised this outcome by the NO DISCHARGE policy. During operations, potentially contaminated water and soil will be prevented from reaching the natural drainage systems by installing and maintaining HDPE lined bases and engineered drainage system to return all potentially contaminated water to the process circuit.</p> <p>The closure plan will ensure that the Tailings Storage Facility and all operational areas, both above and below ground will not become a potential source of contamination. The backfilling and flooding of the underground mine, the use of HDPE liners to encapsulate the Tailings Storage Facility and strategically placed acid neutralising materials will prevent any further generation of acid.</p> <p>Terramin will validate this closure plan through the current geochemical study by EGi (an internationally recognised geochemical consulting firm) and will explore new and better acid prevention measures throughout the mine life to ensure that the world's best practice is identified and used for the Strathalbyn Mine.</p> <p>EGi are currently assisting Terramin to refine their AMD</p>

	<p>management program for all potential sources and potential pathways, these outcomes will be incorporated in the final MARP. Terramin will ensure that these outcomes will be achieved through the proposed monitoring program and with ongoing verification studies.</p>
<p>Revise risk assessment to include comprehensive risk assessment for all pathways of AMD into environment including abnormal situations such as embankment failure due to seismic event, flooding, and reactive soil.</p>	<p>Agree. Terramin has commissioned geochemical and seismic consultants to undertake comprehensive studies of the risks associated with AMD and the stability of the Tailings Storage Facility, to verify the acid generation control measures will work as designed throughout the life of the mine and ensure that the site is left in a low risk status at closure.</p> <p>On completion of these studies a new risk assessment will be conducted to investigate all potential AMD sources and identify all pathways including abnormal situations such as embankment failure due to seismic events, flooding and reactive soils. The results will be incorporated in the final MARP.</p>
<p>Revise criteria to include comprehensive monitoring plan, including monitoring of temporary storage of waste rock land post closure monitoring of Tailings Storage Facility.</p>	<p>Agree. Terramin will implement a monitoring program for all potentially contaminated sites post closure, the details will be determined in consultation with PIRSA and based on the results of the operational phase monitoring program.</p> <p>An environmental monitoring program that includes the temporary waste rock storage and Tailings Storage Facility will be incorporated in the revised MARP.</p>
<p>Terramin to nominate standards and principles for design of Tailings Storage Facility, and demonstrate these will achieve outcomes. If not proposing to adopt EPA recommendations (for wet tailings: Guideline 509/04 <i>Wastewater and evaporation lagoon construction</i>, If thickened tailings: Guideline for <i>Landfill facilities for domestic, commercial and industrial solid waste</i> (currently in draft format)) then must demonstrate to satisfaction of PIRSA, EPA and DWLBC, and Planning SA that standards to be adopted are superior to these, prior to lease grant.</p>	<p>Agree. The first component of this issue is redundant since PIRSA and EPA has developed a site specific Tailings Storage Facility Guideline. Terramin accepts these new guidelines. The final design will be presented to PIRSA and Terramin will demonstrate in the MARP that the final Tailings Storage Facility design uses the PIRSA guidelines as the minimal design standards and exceeds these in significant areas such as water storage capacity and safety.</p>
<p>Must demonstrate final Tailings Storage Facility design will meet outcome and monitoring criteria to be to satisfaction of PIRSA, DWLBC, EPA.</p>	<p>Agree. The Tailings Storage Facility engineering design will be audited by Golders and Metago against the specified criteria to ensure the outcomes and monitoring criteria are met to the satisfaction of PIRSA and its stakeholders. The outcomes of the Tailings Storage Facility design and</p>

	auditing results will be incorporated in the MARP document.
100 year flood level must be modelled and included in MARP.	Agree. Terramin has commissioned a study to model and map the 100 year flood levels. Initial results indicate that the Tailings Storage Facility will be more than 100m from the 100 year flood level. Results will be incorporated in the final MARP.
Alternate locations to be considered (including on effluent ponds site and underground disposal) and demonstrate preferred location will achieve outcomes.	Agree to this condition. See response to Community Consultation.
Must have appropriate EPA licence for Tailings Storage Facility.	Agree. Terramin understands that the specific PIRSA Tailings Guidelines will satisfy the EPA conditions and will therefore design accordingly.
Ensure Tailings Storage Facility is located at least 100m from the 100 ARI flood level.	Agree. Terramin is currently constrained by the Mining Lease boundary and regional geotechnical properties in where to locate the Tailings Storage Facility. Terramin is currently undertaking studies to map the 100 year flood level, after which it will be in a better position to determine if it can meet this criteria. Final outcomes will be communicated with PIRSA and incorporated in the MARP.
Separate LEMP not required - aspects will be included in MARP.	Agree.
Outcome 17.9 – Ventilation	
<i>“Prevent public nuisance impacts from noise and fumes emanating from the vent fan and prevent adverse impacts on vegetation surrounding the fan”</i>	
Issue	Action to be taken by Terramin
Doubts dust will be controlled	<p>Terramin does not anticipate dust from the ventilation system; however mine dust management protocols are being developed to ensure dust production is managed to meet the NEPM standard. These protocols will include measures such as revegetation to control dust generation and provide a wind break, incorporating dust extractors in the crushers, install a vehicle wash down bay, watering of exposed operational surfaces, particularly during windy conditions and the construction of additional dust barriers where indicated during the operational stage.</p> <p>Monitoring of dust levels will be an integral component of the monitoring program. The method of measurement for air quality will be that proposed by the EPA. Baseline dust level monitoring was initiated in August 2005 and this monitoring is currently being continued by Tonkin Consultants to determine existing dust levels.</p>
Doubts Odours will be controlled	Terramin does not anticipate nuisance odours from the ventilation system but mine site protocols are being

	<p>developed to meet the EPA standards. Limit for maximum change of odour from a baseline level is 2 odour units higher than an agreed reference point, or CS₂ below 0.042 parts per million.</p> <p>Terramin has commissioned Tonkin Consultants to undertake an odour study at Perilya Mine Broken Hill (which has similar mineralogy and uses the same floatation reagents). This information will be used to develop an Odour Model for the Strathalbyn Mine.</p> <p>Current understanding of the process chemicals used at Strathalbyn indicates no significant odour emissions will occur; Terramin undertakes to implement whatever engineering or management actions required ensuring that the odour levels do not exceed the EPA guidelines.</p>
Need to model gas emissions from exhaust fans and demonstrate noise acceptable	<p>Gas / odour emissions and noise modelling presented in the Draft MARP are currently being refined by Tonkin (dust and meteorological consultants) and Bassett (acoustic specialists). The outcomes will be presented in the MARP.</p> <p>Fumes from mine ventilation are expected to be minimal, based on modelling and meteorological conditions. All complaints regarding fumes will be addressed as part of Environmental Management protocols. Terramin will comply with all air quality parameters agreed to with the EPA. Noise modelling is being undertaken by Bassett Acoustic, final results will be presented in the MARP.</p>
Monitoring for noise, soil and air quality should be more frequent than annual	Terramin will continually monitor the environmental performance of the mine and plant against the prescribed conditions for the protection of human and environmental health. Independent monitoring of environmental conditions will be conducted by PIRSA and the EPA. Terramin will also undertake independent auditing (by an EPA approved auditor) to validate the monitoring program.
Action Requested by PIRSA	Terramin's reply
Delete outcome and address risks under appropriate outcomes for noise, dust, odour and vegetation.	Agree.

Outcome 17.10 – Traffic

"Prevent accidents, dust and the spread of pest/diseases associated with mine traffic"

Issue	Action to be taken by Terramin
Traffic danger, close to schools etc (impact on cycling)	The concentrate trucks will not be going through Strathalbyn or past any schools in that town. There are no cycle tracks

	in the vicinity of the mine entrance. The new location and the proposed upgrading of the entrance area will meet Transport SA road safety standards and will not add to the inherent risk of traffic in the area.
Noise	In the draft MARP traffic noise was not found to exceed the guideline noise levels. Terramin is currently reinvestigating the overall projected noise levels including traffic noise.
Damage to roads	Apart from the general wear and tear that all traffic contributes, Terramin does not foresee any situation where Terramin trucks will add to this. All contractors to Terramin will operate registered trucks which contribute to road maintenance. Terramin undertakes to repair and maintain all roads on its property.
Dragout	Terramin is committed to ensuring that dragout onto public roads is prevented. The management approach is to install a truck wash down bay approximately 100m from the public road. The road from the wash station to the public road will be sealed.
No dust from trucks (cover load - Tarpaulin may not be sufficient).	Terramin will prescribe that contractors responsible for delivery of ore products will use suitable covers on the transport vehicles as a contract condition.
No trucks through town or on town roads including chemical transport trucks as well as concrete trucks.	Terramin will ensure that trucks will not pass through Strathalbyn by implementing contractual conditions to ensure that all suppliers and transport operators using heavy vehicles (class 10 and above) will not pass through the town, unless prior permission is received in writing from PIRSA.
Clarify hours of vehicle movements.	It is currently proposed that concentrate trucks will operate between 6:30am and 10:00pm.
Could extend 80km/hr speed limit to mine entrance to increase safety.	Terramin will welcome and support this outcome.
Changing road access improves safety, but increases noise for residents.	Restricted truck times and EPA guidelines will ensure that noise levels will not be an increased nuisance to local residents.
Pollution from increased diesel exhaust	Road registered B-double trucks (who must comply with current state and Government regulations including exhaust emissions) are currently allowed to and do use the Gazetted B-double route along the Callington-Strathalbyn Road. Terramin intends to report all emissions to the National Pollution Inventory (NPI). It will conform to any state and national diesel emission regulation.
Consider use of railway for transport instead of trucks.	The potential to utilise the existing railway line as a transport route for ore has been considered. Terramin have examined the effectiveness of this option compared to road transport,

	and have decided that less risk is posed by road transport. This is due to the level of handling effort in road transport of ore to a suitable train siding, loading onto trains, and then another set of double handling between rail and road once the ore arrives at the train destination. The risk for accidental losses and potential environmental damage is greatly increased by the train carriage option.
Prescribe conditions which preclude disconnection of B-double trailers to allow trucks thru town.	Terramin will be using contractors to transport concentrate. It does not wish to impose additional conditions on its contractors, when they are not transporting Terramin concentrate. However, it will support the Council if it decides to prohibit this activity in Strathalbyn by stipulating in their contracts Council regulations must be obeyed.
Existing Callington road not suitable for B-doubles- requires widening.	Terramin will abide by current road ratings. Terramin is not in a position to change road ratings; it understands and will observe Transport SA regulations.
Entrance on to Callington Rd should have a C junction and deceleration lane.	Terramin will install any appropriate alterations to the road as instructed and permitted by Transport SA.
Entrance to mine should cater for 2 way traffic, and be sealed.	Terramin will install any appropriate alterations to the road as instructed and permitted by Transport SA.
Where will tyre wash down pad be located and how will contaminated water and dust be disposed of?	The tyre wash down station will be located 100m from the entrance to the public road. The water from this wash down station will be contained and returned to the mine process water circuit.
Suggested B-Double traffic be restricted to reasonable hours.	Current operating times are between 6:30 am and 10:00 pm; Terramin will consult with the Community Consultation Group on these times during the operational phase.
Action Requested by PIRSA	Terramin's reply
Revise outcome to "No accidents, noise, dust and dragout impacts offsite caused by traffic from or to mine site ".	Agree. Terramin will meet this outcome by including strict conditions for compliance with SA Road Traffic Regulations in all contractual arrangements, and implement an auditing process to ensure that all contractors comply with these conditions. All vehicles leaving the property will pass through a wash-down bay; this will ensure that dragout impacts will not occur.
Review criteria to include monitoring of road condition, accidents and near misses, dragout.	Agree. Road condition around the Terramin Strathalbyn Mine will be monitored. The monitoring program will confirm that measures to maintain road conditions, prevent accidents, avoid near misses and dragout are within the stated criteria.
No heavy vehicles to be taken through Strathalbyn town roads, unless approved by PIRSA.	Agree. Terramin will meet this outcome by implementing contractual conditions to ensure that all suppliers and transport operators using heavy vehicles (class 10 and

	above) will not pass through the town of Strathalbyn unless prior permission is received in writing from PIRSA.
Heavy vehicle movement offsite limited to agreed hours.	Agree. Terramin will ensure that all contractors work within the agreed hours.
All concentrate trucks to be covered to prevent dust impacts, and wheels washdown to prevent dragout.	Agree all concentrate trucks will have a suitable cover.
Mine road/ Callington Road intersection to be upgraded and maintained to Transport SA specifications.	Agree to upgrade the intersection of the mine entrance and Callington Road to Transport SA specifications.
Investigate possibility of extending 80km/hr speed restriction zone to cover mine entrance.	Agree Terramin will support any Council or Transport SA decisions to change the speed to an 80 km zone to reduce noise and risk of accidents around the entrance to the mine.
Demonstrate alternate transport options not practical e.g. railway	Agree Terramin has investigated other transport options and given a brief description of reasons for selecting the proposed transport option in the response to the community consultations issues above. This will be revised in the final MARP.

Outcome 17.11 – Noise	
<i>"Prevent public nuisance impacts from noise emanating from the operating site"</i>	
Issue	Action to be taken by Terramin
Noise need to characterise tone, pitch etc operation	Terramin have currently engaged the services of Bassett Acoustic, recognised experts in the field of noise modelling, to perform further investigations into the noise that will be generated by the operation.
Noise limit for night time (40db) too high wants no noise at night	The EPA standard for allowable noise will be employed as the standard for noise which is 47 dB during the day and 40 dB at night. This volume will be measured at the outside wall of the nearest non-Terramin owned residence. Other noise monitoring points will be specified after consultation with Community Advisory Committee. These locations may be reviewed from time to time.
Definition of "daytime" is not 7am to 10pm.	The EPA noise policy states 7.00 a.m. to 10.00 p.m. is used to categorise "day".
What days of week will mine operate	The operating hours for mining will be 24 hours/day, 7 days/week. However, in recognition of community needs Terramin will only operate the crushing plant for 12 hours day to reduce the level of noise at night.

<p>Noise during daytime to be comparable with existing rural noise levels</p>	<p>All planning and operational efforts will be made to ensure noise levels will be similar to existing noise levels at the boundary of the mining lease. Terramin is implementing management strategies to ensure that noise levels at the lease boundary are in compliance with the EPA prescribed noise levels.</p> <p>Management measures will include the development of noise abatement bunding, revegetation schemes to establish noise barriers, the construction of cladding to contain noise around the plant, sound proofing strategic equipment and the use of silencers on exhaust fans and machinery where practicable.</p>
<p>Doubts that noise can be controlled to stated/acceptable limits</p>	<p>Every effort is being made to ensure the noise target will be met. Bassett Acoustics are nationally recognized acoustic experts, and their input is critical to noise modelling as well as making recommendations on ensuring noise abatement technology is fit for purpose.</p>
<p>Doubts that EPA able to enforce noise limits</p>	<p>The EPA has a strong track record in South Australia of acting on public complaints, especially with regard to the operation of industry. Terramin will comply with all recommendations by the EPA regarding operational conditions.</p>
<p>Need to consider shift workers, not all are 9-5</p>	<p>Terramin's noise policy, enforced by EPA regulations is based on average conditions. It is possible that even within the prescribed limits of noise generation some people will feel affected by the mine process.</p> <p>Terramin understands the need to contain noise levels and is implementing several measures (see previous response) to ensure that noise levels will be modulated to background levels within a short distance of the plant, therefore it is not envisaged that shift workers in the area will be affected by noticeable incremental noise.</p>
<p>Suggest 55 or 43db during day and 45-40db at night, to account for schools.</p>	<p>The EPA prescribed noise limits are within or lower than those suggested by the respondent.</p>
<p>Noise limits not clear</p>	<p>Terramin will comply with the prescribed limits for noise. The current limits are prescribed by the EPA Noise Policy are: 47dB during the day, and 40 dB at night. Details provided in the draft MARP will be upgraded to include the recent improvements.</p>
<p>Noise at night now from music, mine won't be any worse</p>	<p>The noise produced by licensed premises may unduly influence the amenity of an area. This is not under the direct control of the EPA noise policy, or the proposed mine. The mining and construction proposed by Terramin are controlled by and will operate within the relevant EPA Noise</p>

	Policy.
Limit crushing pant to 7am to 7pm Mon-Sat, no crushing Sun and Public Holidays.	Terramin recognises the need to limit noise generation and has taken several measures to control the level of noise. Terramin does not recognise the impositions of when it can conduct its business provided it meets all noise and other requirements, any more than other industries in the district. However, Terramin will in the spirit of cooperation with the community only operate the crushers between 7am and 7pm or similar 12 hour time frame in consultation with the Community Consultation Group.
Noise limits suggested in MARP not appropriate WHO guidelines recommend 50db during day, 45 at night (some people will still be adversely affected by these levels e.g. shift workers, elderly).	The World Health Organisation sleep disturbance criteria values for noise are higher than those proposed for the area, which has been classified as rural. As such, Terramin will comply with the lower of the two standards. This is in line with Terramin's policy of ensuring that local residents are not disadvantaged by the proposed development.
Action Requested by PIRSA	Terramin's reply
Outcome adequate, but change "Prevent" to "No".	Agree to change this in the final MARP
Revise Criteria to EPA noise policy (40dB at night, 47dB during day) at outside wall of nearest residence (non Terramin owned) as interim standard.	Agree , Terramin is currently undertaking noise modelling to ensure that this criterion is met. Final outcomes will be communicated with PIRSA and incorporated in the MARP.
Noise monitoring points to be specified and in consultation with Community Advisory Committee from time to time.	Agree , Terramin will communicate and incorporate suggestions from the Community Advisory Committee on this condition.
Outcome 17.12 - Blasting	
<i>"Prevent public nuisance impacts from vibration caused by blasting"</i>	
Issue	Action to be taken by Terramin
Damage to buildings	Buildings will be protected by the adoption of the vibration velocity "damage" criteria recommended in the Australian Standards Explosives Code, AS 2187.2-1993. Terramin will monitor the influence of blasting using the appropriate technology, including vibration monitors. The monitoring points for detection of noise and vibration will be determined in consultation with the Community Advisory Committee. These locations may be reviewed from time to time. Terramin assumes that by complying with the ANZECC standards, the risk of structural damage to local residences will be averted.
Need to warn residents of blasting	Terramin will consult with the Community Advisory Committee to identify the most appropriate method of notifying residents of blasting activities.

Limit blasting to after 7:30am, (or 7am-7pm) not 24hr nor 7days a week, no blasting Sundays or Public Holidays.	Terramin will consult with the Community Advisory Committee to identify the most appropriate time. Blasting has overriding safety constraints in particular blasting must coincide with shift change to ensure that all personnel are evacuated from the mine during a blast.
Action Requested by PIRSA	Terramin's reply
Revise outcome to "No public nuisance impacts from airblast and vibration caused by blasting.	Agree this will be revised in the MARP.
Revise criteria to ANZEC guidelines: (Vibration max 10mm/sec, 5% 5-10mm/sec, airblast max 120dB, 55 115-120dB. Blasting only 0900-1700 Mon-Sat, no Blasting Sundays or Pub Hols) - (or consider vibration limit for non working hours that will not be felt by residents).	Agree , Terramin have considered the vibration limits requested by PIRSA and agree to the criteria as stated: Vibration max 10mm/sec, 5% 5-10mm/sec, airblast max 120dB, 55 115-120dB. Blasting only 0900-1700 Mon-Sat, no Blasting Sundays or Public Holidays.
Monitoring points to be specified and as agreed with Community Advisory Committee from time to time.	Agree to implement monitoring stations at strategic points to be identified in consultation with the Community Advisory Committee.
MARP to be revised to include blasting impact modelling.	Agree the MARP will be revised to include the outcomes of the Blast Impact Model.
Consider notification process to residents for blasting.	Agree An appropriate notification process will be developed in consultation with the Community Advisory Committee.
Outcome 17.13 - Public health nuisance	
<i>"Prevent public health and nuisance impacts from the ingestion of dust and harmful substances and odour dust associated with mining activities"</i>	
Issue	Action to be taken by Terramin
Doubts /lack of detail over dust control measures	Dust control measures to be implemented as part of the environmental management plan include cladding around dust prone areas, dust extractors fitted to the crushers, a revegetation program and watering of unsealed surfaces during dry and windy conditions. Baseline dust level monitoring was initiated in August 2005, and this monitoring is currently being continued by Tonkin Consultants. Terramin intends to meet the EPA guideline for total suspended particle (TSP) concentrations in the air of a maximum of 90 micrograms/ m ³ , or no higher than that measured at the agreed off site control location. The baseline dust monitoring locations were selected by the Dust Specialist.
No guarantees there will be no health impacts from chemicals or dust	Terramin guarantees that there will be no incremental health risk to Strathalbyn residents by exposure to chemicals or dust from the mining operation. This guarantee will be

	supported by an extensive environmental monitoring program for dust and chemicals used in mine operations.
Lead dust in rainwater tanks	<p>The modelling performed for the draft MARP did not identify any additional risk from the deposition of lead dust. To verify this outcome, Terramin will monitor representative rainwater tanks in the area before and during mining operations. Terramin has been advised that metals such as zinc and cadmium from metal roofs will be higher than tiled roofs therefore the monitoring program will include representatives of each type of roof.</p> <p>The issue of lead uptake by children in areas surrounding the lead smelter in Pt Pirie were raised as a public concern in community meetings. Terramin advises that the proposed mining activities will not include smelting, the process that converts lead sulphides into the bioavailable form (oxides). Lead sulphides (galena) occur naturally in the environment.</p>
Health impacts from ventilation of underground workings	Mine exhaust vent will be located between the ridge and the road. A map showing the final location will be provided in the MARP, fans will be located underground to reduce noise and dust.
No odour off site	<p>Terramin has engaged the services of Tonkin Consultants to develop an odour model based on real values obtained from a similar process in Broken Hill. The main purpose of the odour model is to predict the potential distribution and intensity of any odour plume. The EPA limit for maximum change of odour from a baseline level is 2 odour units higher than an agreed reference point, or CS₂ below 0.042 parts per million.</p> <p>Terramin will implement management strategies to ensure that odour emissions meet the EPA criteria, and confirm that the proposed development does not expose local neighbours to unacceptable odours.</p> <p>A relative reference point will be selected well away from the council effluent ponds which are expected to generate significant odour units that would influence Terramin's monitoring program.</p>
Suggest EPA standard limit of 2 odour units	<p>Terramin will ensure air quality parameters as prescribed by the EPA are adhered to by routine surveillance of the plant and Tailings Storage Facility. Reports of odour from the mine personnel or the community will be address immediately.</p> <p>Subject to confirmation by the Odour Model, Terramin does not envisage an issue with odour from the mining operation. However, given the proximity of the Council Effluent Ponds and Landfill, the EPA limits of 2 odour units may be hard to</p>

	achieve in the locality even if there were no mining activities. If appropriate, Terramin will develop a method of sampling and isolating odour sources, alternatively assume that the primary source of odour from the mine is CS ₂ and measure the level of this gas.
Doubt/ more detail on how odours from tailings dam can be managed	No odours are expected to occur from the tailings dam. The Odour Model will confirm this assumption. Odours associated with this type of mining are associated with xanthates breaking down to the gas CS ₂ . This reaction can be managed through changing the type of flocculants used, changing pond pH by the addition of lime and the removal of organics such as kerosene, diesel and detritus. Terramin tailings will have no organic material.
Dust to be contained on site	The containment of dust to onsite will be achieved by a variety of management plans and procedures; see previous response.
Need for baseline blood and environmental lead level data	The Health Department advises that there is no need to perform a baseline survey of blood lead levels. Environmental baseline soil lead levels are naturally high above the proposed ore body but this is mostly galena a low risk form. Terramin is not a smelter and will not generate the same lead issues as those found around old (uncontrolled) lead smelters.
Impacts on organic vegetable growing	Certified organic vegetable production will not be adversely affected by the presence of the mining operation. The main causes of soil pollution from heavy metals are irrigation with contaminated water, the application of contaminated solid wastes and the use of former industrial land contaminated by spilled oil and industrial wastes. Terramin will not be discharging into the environment.
Transport and use of toxic chemicals (e.g. Xanthate)	<p>An inventory of all MSDS for the chemicals used and stored on the mining lease will be prepared as part of the environment management system. Hazardous materials brought onto and used onsite will include: zinc sulphate, SE Xanthate, SIB Xanthate as well as copper sulphate. Other potentially hazardous material may include sodium metabisulphate or sodium cyanide, dependant on the final extraction method chosen.</p> <p>All potentially hazardous material to be brought onsite will be handled, used and stored according to the manufacturer's MSDS. The instructions for storage and usage for each chemical will be strictly followed. Appropriate training will be undertaken by all contractors and employees to ensure handling and use of potentially hazardous material is as prescribed. Safety audits will be undertaken on a regular basis on a frequency of no less than once a year.</p>

Monitoring of dust levels on boundary of operation	<p>Six gravimetric dust sampling locations have been specified on the mining lease boundary. Two high volume samplers are currently running on a six day cycle to collect background to monitor TSP and dust lead data these will be strategically relocated to during the construction phase in consultation with the EPA.</p> <p>The limit for lead concentration in dust is set by the NEPM standard; lead < 0.5 micrograms/ m³ (no exceedences of this concentration), PM₁₀ < 50 micrograms/ m³ (up to 5 exceedences per year).</p>
Monitor CS ₂ levels - to be below 0.042parts per million (WA EPA)	Terramin agree to ensure that the concentrations of aerosols developed by the operation are within the limits prescribed by the SA EPA.
Risk of zinc metal or oxide dust ingestion	<p>The risk of ingestion of metal or oxide dusts for the surrounding community will be no greater than currently exists. Terramin will ensure that levels of all EPA prescribed contaminants fall within acceptable limits at all times. Environmental Management and Occupational Health and Safety Plans are being developed to protect the health of employees and contractors working onsite.</p>
Higher stress levels for residents due to noise, traffic, fear of contaminated rainwater	<p>Terramin will alleviate community concerns regarding contamination by having an Environmental Management Plan that ensures transparency through annual reporting to the EPA to confirm that all management measures are meeting the stated outcomes.</p> <p>All public complaints/concerns regarding noise, water quality, odour and dust will be recorded and addressed in a timely manner. Terramin intends to communicate with the general community through the Community Advisory Committee and envisages this as a medium to alleviate any mine related community stress.</p>
Compensate affected landowners with double glazing, air-conditioning, filters for rainwater tanks	Terramin does not anticipate the need to provide compensation in these forms, because it intends to comply with the stringent EPA noise, air and water quality guidelines.
No compensation if objectives not met - no confidence in ability of regulators to enforce requirements.	Terramin will comply with the legislation regarding compensation as required by law. Any compensation for breaches of appropriate standards is prescribed by relevant legislation e.g. the Mining Act. The role of governmental regulators in enforcing requirements for environmental performance is enshrined in legislation.
Lead concentration limit to be NEPM std: lead<0.5ug/m3 (no exceedences per yr) and (PM10) <50ug/m3 (5 exceedences per yr).	Terramin will comply with the limits for environmental conditions as prescribed by the SA EPA, as outlined in the MARP. Current modelling and metallurgical trials suggest that these conditions will be met.

Need for odour / HCN modelling	Odour modelling is currently being developed by Tonkin Consultants. This is being developed in adherence to the requirements for modelling prescribed by the EPA.
Need to demonstrate no risk from hydrogen cyanide volatilisation for flotation process.	If Cyanide is to be used in the process, the risk assessment in the final MARP will be upgraded to include any potential for volatilisation of HCN. It is unlikely that HCN will be generated as the pH of the pulp is around 9 for lead floatation and 10 for zinc floatation.
Dust/emissions risk should also assess potential for PM10, CO, SOx, VOCs, NOx and asbestos.	Terramin will comply with the limits for environmental conditions as prescribed by the SA EPA and the NEPM standard for these parameters. Terramin does not anticipate any significant risks from particulates, excessive combustion emissions or asbestos. The risk assessment in the final MARP will be upgraded to include these parameters.
Risk is HIGH extensive monitoring required using modern technology	Terramin and the external consultants employed in the MARP process have identified 20 out of 80 aspects of the mining process that are potentially high risk. All aspects, regardless of assessed risk level, have been carefully considered. Control processes will be put in place to deal with all risk identified; measures to control risk will include the elimination of risk, substitution for a safer process, the implementation of engineering processes to reduce risk and the application of administrative controls. All monitoring programs that will be implemented will employ the most appropriate technology available for the task, including the use of NATA accredited laboratories.
Need to assess PM2.5 risk and set appropriate standards	Terramin will comply with the particulate limits for environmental conditions as prescribed by the SA EPA. There are no standards for PM2.5 but Terramin will if indicated by the standard monitoring equipment, use the recommended NEPM for PM _{2.5} of 25 micrograms/ m ³ (daily average) and 8 micrograms/ m ³ (annual average).
If adverse weather conditions, close down operations temp	Terramin does not envision any adverse weather conditions occurring that have not been included under the modelling conditions used to engineer the plant. However, Terramin places the highest priority on safety and all necessary measures will be taken to protect the lives of its employees and the community if an unforeseen weather pattern occurs.
More detail on ore composition required	The heavy metals in ore are in the sulphide form as outlined in Section 5.3 of the MARP.
Baseline monitoring of blood lead levels not required	Terramin accept the decision from the Health Department that baseline monitoring of blood lead levels is not required.
Need to ensure lead bearing dust is not transported offsite by workers	Lead dust will not be transported offsite by workers due to the implementation of environmental management plan. This plan is will incorporate standard mining industry

	practice for Occupational Health and Safety, which include measures such as clothes change and showering prior to leaving the site.
Baseline dust monitoring required	A baseline dust monitoring is currently being implemented prior to the construction and operational phase. This information will be used in the environmental management plan to monitor performance against background conditions.
Effluent ponds are incorrectly referred to as "grey water ponds", but present risks to public health due to pathogen content.	Effluent ponds are recognized to carry a potential risk from pathogenic infection, usually occurring through direct contact with impacted material. Terramin does not intend to use water from the effluent ponds and is currently undertaking a survey to assess if leakage from the ponds could possibly seep into the underground mine or contaminate mine water.
Appendix P (Blood lead Management Guidelines) is incomplete requires revision.	Terramin to address in the final MARP and in consultation with the Department of Health.
Action Requested by PIRSA	Terramin's reply
Revise outcome to "No public health, loss of amenity and nuisance impacts to local residents from air emissions, dust and odour generated on site".	Agree this outcome will be revised in the final MARP.
Consider baseline monitoring of rainwater tanks and establishing monitoring criteria.	Agree , Terramin will sample and test water from representative rainwater tanks in the potential impact area and a control site in a non-impact area for future reference.
Consider baseline monitoring of existing dust levels.	Agree , a dust baseline survey is currently underway; results will be included in the MARP.
Dust concentrations to meet EPA advised limits and using EPA preferred monitoring technology.	Agree to this condition. Terramin is currently conducting baseline dust monitoring based on NEPM dust criteria and using the methodology used by the EPA. The preliminary results will be included in the final MARP.
Dust monitoring points and acceptable dust levels to be specified in consultation with the Community Advisory Committee from time to time.	Agree , Terramin will consult with PIRSA and the Community Advisory Committee to select appropriate sites based on the results of the baseline studies.
Review air emissions risk to include all possible health and nuisance effects including daughter products (eg HCN, CS ₂ , ZnO, PM ₁₀ , PM _{2.5} etc)	Agree to review air emissions risk to include all possible health and nuisance effects within practical and acceptable industry standards.
Detail management strategies and demonstrate outcome able to	Agree , Terramin will review the management strategies in the draft MARP and update it to include the recent changes,

be met.	particularly the implementation of the NO DISCHARGE policy and provide more detail and show how the proposed outcomes will be achieved.
Review Appendix P	Agree to review Appendix P in the final MARP
Include missing section 7.1 in revised MARP.	Agree editorial changes to the final MARP will include renumbering to include Section 7.1
Outcome 17.14 – Fire <i>"Prevent fires onsite, and if unavoidable, control to ensure no off site impacts"</i>	
Issue	Action to be taken by Terramin
Risk posed by concentration of flammable/explosive chemicals	Storing flammable chemicals carries a high risk, but engineering measures to negate this risk are well established for example urban petrol stations. Terramin will reduce this risk by storing as little flammable or explosive chemicals on site as absolutely necessary and will implement all the engineering measures developed for the storage and handling of such chemicals. This will be reviewed and if necessary updated in the final MARP.
Action Requested by PIRSA	Terramin's reply
Outcome adequate, but change "Prevent" to "no"	Agree to this change in the final MARP
Review risk assessment to include risk posed by storage of flammable and explosive chemicals.	Agree this was done in the initial risk assessment but it will be reviewed and if necessary updated in the final MARP.
Outcome 17.15 – Seismic <i>"Prevent damage to public infrastructure, injuries/deaths and pollution of the environment resulting from seismic induced catastrophic failure of mine infrastructure"</i>	
Issue	Action to be taken by Terramin
Risk of seismic action and reactive soils	Terramin has, and is continuing to address the issues and potential risks associated with both seismic activity and reactive soils, especially with the potential for failure of engineered structures. Engineering structures are being developed under stringent modelling assumptions for seismic activity (e.g. Operating Basis Earthquake 1 in 100 Annual Exceedence Probability; Maximum Design Earthquake 1 in 1000), and reactive soils, as well as significant potential meteorological events (e.g. 1 in 100 year storm events).
Action Requested by PIRSA	Terramin's reply
Delete outcome, covered under Acid Mine Drainage outcome	Agree ; this outcome will be removed from the final MARP.
Outcome 17.16 - Vertical openings/Site security	

<i>"Prevent public injuries/deaths resulting from unauthorised entry to the mine site"</i>	
Issue	Action to be taken by Terramin
No comments received	
Action Requested by PIRSA	Terramin's reply
Outcome adequate, but change "Prevent" to "no".	Agree to make this change in the final MARP.
Outcome 17.17 - Geotechnical stability <i>"Prevent damage to public infrastructure and injuries/deaths resulting from pillar failures both during and after mine closure"</i>	
Issue	Action to be taken by Terramin
Risk of effluent pond collapse due to mining - who will be liable for repair of damage?	The underground mine will be under the current Strathalbyn effluent ponds. The geotechnical investigations currently underway suggest that a 30m vertical pillar will provide enough stability to ensure no surface collapse. A Geotechnical Report will be completed on the final crown pillar design.
Risk acid generating tails will weaken cemented tailings underground	Terramin plans to trial tailings and cement mixtures to ensure that their engineering properties meet the highest safety standards.
Callington-Goolwa Rd integrity must be protected	Terramin is preparing engineering reports investigating the most appropriate approach to developing the lease. The under-road excavation Terramin will provide engineering structures and geotechnical support to ensure the integrity of the overlying roadway is maintained.
Potential for surface subsidence of Tailings Storage Facility if located over ore extraction areas	The Tailings Storage Facility will not be located over the underground mine. Backfilling of stopes was described in Section 6.6 p 65. Geotechnical stability issues were addressed in Section 17.21 - p102 Appendix T. It is Terramin's intention and current mine practice to undertake routine geotechnical assessments of the stability of the underground mine.
Action Requested by PIRSA	Terramin's reply
Outcome adequate, but change "Prevent" to "No"	Agree ; this change will be made in the final MARP.
Review monitoring criteria to demonstrate no voids left underground that could allow surface subsidence to occur.	Agree to review these monitoring criteria to include geotechnical measures to demonstrate underground stability.
Outcome 17.18 - Visual impact <i>"Minimise visual impact of site and operations"</i>	
Issue	Action to be taken by Terramin
Lighting at night to focussed	The lighting at the head of the portal and around the plant

down, or operations enclosed - so as to not be visible from town.	will be directed in such a way that it does not unduly influence the scenic amenity of the town.
Screening of tailings dam from town - if vegetation to be used, when will this be effective.	Terramin anticipate that planting of vegetation to screen the Tailings Storage Facility will commence as soon as practical after construction. Terramin has engaged a local revegetation consultant to plan the revegetation program with the objective of achieving a cover as soon as is naturally possible.
Locate plant in existing quarry, not on exposed sthn hillside, or locate away from town.	All alternatives for locating the plant have been investigated to ensure minimum disruption to local amenity.
Need to clarify how large and visible the stockpiles will be.	Terramin intends to maintain a low profile with the ore and waste rock stockpiles. These are not expected to have visual impact. More detail will be provided in the final MARP.
Visual aspects of large ugly trucks on road	Terramin intends to use local contractors to transport concentrate to Port Adelaide, the trucks will be indistinguishable from ordinary trucks currently utilizing the roads. In addition Terramin has agreed to the request of not allowing concentrate trucks to pass through Strathalbyn.
Plant visible to local residents - which roads will be used to determine if visible or not?	The observation points for determination visual impacts will be made in consultation with the Community Advisory Committee. Building structures will have a low profile design, and be painted in eucalyptus green or similar earth tones. Vegetation screens and natural hills will also provide ample screening from all main roads and most rural roads.
Tailings dam not to be increased in height from initial approval	Terramin agree to comply with all approval provisions. The approval process for the Tailings Storage Facility is guided by several government departments, including PIRSA and EPA. Terramin will not exceed any of the conditions agreed to with the appropriate regulators during the development of the Tailings Storage Facility.
Buildings to be painted in earth tones	Terramin agree to comply with all approval provisions, including painting all structures in appropriate colours and tones (currently looking at eucalyptus green) to ensure that local visual amenity is not unduly influenced by the presence of the structures on this site.
If plantings are used to screen, use local species to increase biodiversity in region	Terramin plan to utilize local indigenous native plants for the revegetation of the mining lease. The exact species composition will be developed in consultation with local revegetation specialists and recommendations from DEH.
Action Requested by PIRSA	Terramin's reply
Revise outcome to "Improve visual impact and amenity of site"	Agree , this change will be made in the final MARP.
Review criteria to demonstrate	Agree , criteria in the final MARP will be selected to

improving appearance of site only, not to be no worse than current"	demonstrate the improvement of site appearance.
Review criteria to include night lighting impacts.	Agree , criteria for night light impacts will be included in the final MARP.
Monitoring points on public roads to be specified and as agreed with Community Advisory Committee from time to time.	Agree to this change and the final MARP will be upgraded to reflect this.
Structures to be painted in non-reflective earth tones.	Agree to use non-reflective earth tone – eucalyptus green paint will be the colour of choice wherever practical.
Vegetation screens to be local native species where practical.	Agree , Terramin has commissioned a revegetation consultant to provide a list of appropriate native species and a cost estimate to implement the revegetation program.
Include more detail on visual impacts arising from final infrastructure design and develop management plan.	Agree more detail will be provided on visual impact in the final MARP.
Night lighting to be designed to avoid light spillage to adjacent areas.	Agree to implement this design criterion.

Outcome 17.19 – Fauna

"Prevent impact of site operations on native fauna"

Issue	Action to be taken by Terramin
Threats to wildlife in general area and in Tucker's swamp area (especially frogs - sensitive to low level toxins). Swamp is breeding area for vulnerable birds. Need to consider implications of groundwater impacts on wetlands.	The general threat to wildlife will be mitigated by the provision of local indigenous plant revegetation procedures. Progressive revegetation will enhance local biodiversity through the planting of indigenous flora, and by the provision of habitat for indigenous fauna. Such habitat is currently absent for the most part on the mining lease area. Part of the Terramin commitment to environmental management of groundwater is to ensure groundwater and surface waters are not contaminated by any of the operating or construction processes.
River black fish (protected), Mountain Galaxis, Carp Gudgeon in Angas river and not mentioned in MARP.	These species were not recorded during the site survey, this does not mean that they are not present therefore Terramin will include these submissions on the species list and attribute sources.
Risks to birds and fauna (especially rare and vulnerable) from cyanide, heavy metal toxins etc in Tailings Storage Facility.	There will be no water in the Tailings Storage Facility for most of the year. Cyanide if used at all will not be at toxic levels in tailings (predicted to be around 2 parts per million in tailings. Pond pH is anticipated to be alkaline during mine

	operations and therefore toxic metal levels in puddles would not be expected.
Fauna survey required especially migratory birds.	A literature search and another fauna survey will be commissioned this may need to allow for seasonal variation to record a wider range of species.
One weed species of national significance has been identified on site -weeds need to be managed.	The introduction of weeds will be significantly less than current land use practice where stock and stock feed are imported. Terramin will implement a weed management program based on the weeds species found.
Need to ensure infrastructure areas are designed to avoid traps for ground dwelling fauna.	Consideration to prevention of entrapment of ground dwelling fauna will be made in all infrastructure design. Part of the environmental management plan will include checking and reporting any incidents where native fauna are threatened by any building or process associated with the proposed development. Terramin will erect fencing to prevent large animals from wondering onto the property.
Need to implement phytophthora management	Phytophthora is a soil borne pathogen, which can be transmitted by vehicles travelling through contaminated sites. The main vehicles leaving and entering the property will use sealed public roads. A vehicle wash bay designed to remove potential lead bearing dust will also provide significant protection from phytophthora.
Action Requested by PIRSA	Terramin's reply
Revise outcome to "No net negative impact of site operations on native fauna in lease area and in adjacent areas".	Agree to this change.
More detail required on fauna present in area.	Agree this will be provided in the final MARP.
Need to include risks from weed propagation.	Agree to include an investigation of this risk.
Review criteria to include weed/phytophthora management criteria.	Agree to include criteria for weed and phytophthora management.
More detail required on weed and phytophthora management strategies.	Agree to include detail regarding the management strategies for weeds and phytophthora.
Outcome 17.20 - Stakeholders	
<i>"Maintain good relationships with local community and minimise other negative impacts on public amenity and values"</i>	
Issue	Action to be taken by Terramin
Will restrict future growth and development of town, impact	Terramin anticipates that mining will increase the local population with new workers for the construction and

existing business	operation phases and will increase demand on local produce and services. The associated economic benefits of such a significant employer in the area should have flow-on benefits for local existing businesses.
Impact on quality of life (non specific)	<p>The Strathalbyn mine is a small operation which will contribute significant quantities of zinc and lead to common everyday applications such as the automotive (batteries), building (galvanising) and skin care (sun screen) industries.</p> <p>The mine will provide direct employment in the region, which will add value and quality to the life of those currently unemployed from recent lay-offs caused by the downturn in the manufacturing and wine industries.</p> <p>The small increase in population will have on-flow effects on the service industry in Strathalbyn such as retail shops, schools, churches and medical services.</p> <p>Terramin is putting a significant effort into protecting the environment; the benefits of the proposed development will outweigh any perceived impacts of mining.</p>
May cause labour shortage for other business (e.g. vineyards)	Mine employees are generally drawn from a different skill based pool. Vineyards generally employ seasonal workers and tap a transient work force; the wine industry is currently experiencing a down turn therefore any additional work in the district will help moderate the impacts.
Lower property values	Terramin anticipate that property values in the region will increase, directly because of the premium being paid for property by the mine and due to the increased demand for accommodation by mine workers and any associated flow on business.
Impacts on electricity and water supplies SA water and ETSA to confirm infrastructure sufficient	Terramin does not anticipate any impacts on the supply of electricity, more details will be provided in the final MARP. A conceptual water recycling circuit was presented in Appendix K of the MARP. This conceptual plan has been modified to allow for the higher water recovery anticipated from using "thickened" tailings storage. Current hydrological modelling indicates that around 5 -7 l/s of groundwater will come from dewatering the underground mine. This combined with recycled water particularly from the thickeners will meet all process needs.
Effect on heritage/wine/food tourism	<p>The proposed mine at Strathalbyn is to be located in an existing quarry and is adjacent to a landfill and the Strathalbyn sewage effluent pond. Terramin argues that the proposed land use will not be out of place with the current land use.</p> <p>Terramin is developing a transparent environmental monitoring and reporting program that will enable the</p>

	<p>community to assess the outcomes and build confidence in the operation of the proposed mine.</p> <p>Strathalbyn was the location for Australia's second mine; mining is actually part of the heritage of the region. Terramin does not expect to affect heritage, the quality of wine or food or detract from the tourism industry. On the contrary it anticipates that its employees will support the heritage and will contribute to the growth of the current local industries.</p>
Better to mine now rather than later, before town expands	Mining is driven by demand for its products, at present the demand for zinc and lead is very high, therefore mining at this time will ensure the best returns for this natural resource are achieved. The proposed mining development will be a part of the community and will contribute to its development in a sustainable manner.
Positive impacts on commerce, employment, education, health/hospital services, transport in the town	Terramin will show preference to local service providers based on quality and price competitiveness.
Positive effect on community sponsorship.	Terramin has provided a commitment to direct resources towards the development of local community groups and activities.
Will improve ugly site	Terramin are committed to providing a natural habitat to a site that is currently degraded, especially with respect to local flora and fauna. The planned revegetation program will enhance the attractiveness of the site above its current state.
Vermin control will improve environment for native flora/fauna in area	As the site currently stands, some of the motor vehicle wrecks and a degraded grazing area provide habitat for introduced flora and fauna, which have the potential to inhibit or degrade the biodiversity of native plants and animals. The removal of the feral habitats, as well as the planned revegetation program, will significantly improve biodiversity.
Mains water supply on Callington Rd will be upgraded.	Terramin has no authority on mains water supply; by using available water from mine dewatering and runoff from stockpiles, and recycling process water Terramin aims to become self-sufficient with water for processing purposes.
May address environmental impacts of existing effluent ponds	The local council is currently responsible for the management of human and environmental health risks associated with the effluent ponds. Terramin is willing to cooperate with the Alexandrina Council in improving the environmental conditions around the effluent ponds.
Employment only short term	Terramin anticipate a mine life of 5-7 years, and will require a fulltime workforce for that period. Short term contracts

	and employment will also occur during the construction and closure phases of the project.
No certainty new jobs created will attract new residents	Terramin already has a workforce of both local and non-local residents and anticipates that this trend will continue into the operational period. Several Adelaide based engineers will probably move to Strathalbyn on mine start-up.
Impact on Strath Model aircraft club - what happens to them?	No anticipated effect on model aircraft club. The mine is physically separated from the club by pastures. The mine lease will have no large buildings, and will not influence the ability of the model aircraft club to operate as it currently does. It is unlikely that any remotely controlled devices in use in the lease area or radio frequencies will interfere with the frequencies used for model aircraft operation.
Use of effluent ponds for water source may leave recreation grounds without water	Terramin does not currently see any value in the use of the effluent pond water for use in the mining process, owing to the risk posed to human and environmental health from the pathogens present in the pond water. All planning regarding the water required for mining operations is based on the presumption that water will be accessible from other cleaner sources. As such, Terramin does not see other users of the water of the region being disadvantaged in any way.
Will the new substation the mine is proposing give benefit to residents (i.e. more secure supply?)	Terramin does not anticipate any impact on local electricity grid, more details on power supply and affect on local community will be provided in the final MARP
Terramin promised sponsorship to clubs other than sport, but have only sponsored football club.	Terramin has made a commitment to contribute to the social life of the region. This commitment is ongoing, and other applications for sponsorship will be considered.
New residents may not contribute to social life in town due to long shift work.	The contribution by Angas employees to the social life of the region will depend on individual circumstances, as would occur with any new resident who chooses to relocate to the region.
Process to inform and deal with landowner access issues not good	Terramin has made every effort to ensure open dialogue with local residents is maintained. More information sessions and individual consultations regarding access issues are ongoing. A local consultative committee has been established by PIRSA and terms of reference are currently being formulated.
Need for more consultation including formation of consultative committee esp. closure issues	PIRSA is in the process of forming a Community Advisory Committee. The preliminary terms of reference for this committee have been prepared for consideration by Community Advisory Committee. In line with Terramin's commitment to achieving the desired environmental outcomes, planning for mine closure is at an

	advanced conceptual stage. Closure Planning is required by regulatory bodies such as PIRSA and EPA at an early stage in the permitting process. Terramin will engage the Community Advisory Committee throughout the mine life particularly in the process of closure planning.
Want measurable objectives (not world's best practice).	The MARP cites a number of quantifiable environmental objectives for the mine. Specific criteria for a number of environmental aspects are prescribed by government agencies; Terramin has agreed to adhere to these criteria.
Severe penalties for not meeting objectives.	Penalties for not meeting environmental objectives and breaches of condition are prescribed in relevant legislation.
Want problems prevented, not punished after they occur	The application of putative measures enforced following a breach of any condition of the mining lease or affiliated environmental monitoring, will generally represent a financial penalty as well as a duty to repair. Terramin believe such outcomes are negative from both an environmental and economic basis. As such all processes and engineering are being designed from the ground up to meet, at a minimum, the environmental responsibilities of the company.
Site already degraded due to presence of landfill, quarry and effluent ponds	Terramin recognise the nature of the site as it currently stands, and as part of the closure planning process will ensure that after remediation, the environment will be significantly improved relative to its current condition.
Location of mine in quarry will minimise off site impacts	<p>The access to the underground mine, vent shafts, plant and building structures will be placed within the quarry footprint, with the exception of the Tailing Storage Facility.</p> <p>Terramin is currently investigating other locations that may provide even greater social and environmental advantages and minimise off site impacts. The underground mine can not be relocated from the ore body; however, if a better site for the above ground structures is located and subject to purchase of property and planning approval, Terrain will consider relocating these structures.</p>
Management of issues critical to maintain amenity, given close proximity to Strathalbyn	Terramin recognise the importance of the planning process to ensure that the visual amenity of the region, which is crucial to the nature of the town of Strathalbyn, is maintained. All efforts are being made to ensure that the mine and associated plant fit as unobtrusively as possible into the existing environment. Measures such as extensive revegetation using native plants as screening and painting any built structures in neutral tones (as advised by Planning SA) are being pursued.
Section 7.1 on power supplies missing.	Terramin to make appropriate amendments to the final MARP

No evidence that grid capacity is sufficient	Terramin has been advised that there is sufficient capacity but will confirm this in the final MARP.
Action Requested by PIRSA	Terramin's reply
Rename "social impacts".	Agree to title change
Delete outcome and replace with "No net impact on social amenity and economy of Strathalbyn community".	Agree to this condition. Terramin believes that it will have a net positive impact on social amenity and the economy of Strathalbyn and assumes that these are desirable outcomes.
Develop criteria to measure social amenity and economic impact of mine, in conjunction with Community Advisory Committee.	Agree: Terramin will, in conjunction with the Community Advisory Committee develop the required criteria and include details in the MARP. However, Terramin anticipates these criteria will include the monitoring and recording of elements of social amenity "i.e. noise, dust and odour" and confirm that these elements are all within regulatory guidelines and, therefore, not impacting adversely on residents. Economic benefit will include measurement of jobs wages, payments to local suppliers of goods and services and the flow-on effects of these outlays to local enterprises.
Document all social and economic benefits of proposal.	Agree to document social and economic benefits in the final MARP. Preliminary assessment suggests direct economic benefits will arise from job creation, services and around \$6 million in wages that will be spent in region.
Establish outcomes relating to water and electricity supply.	Agree; Terramin will place control measures to ensure that its operations will not cause an overload to the electricity grid or reduce main water pressure by using more than its agreed allocation.
Must where possible and practical, engage local contractors and suppliers, and preferentially employ local residents.	Agree; Terramin has already employed local residents and will continue to do so.
Demonstrate no impacts on electricity and water supply.	Agree Terramin will become self-sufficient in water supply for the processing plant and is currently undertaking an engineering review of the electricity supply, details will be provided in the final MARP
Must form and maintain Community Advisory Committee, with terms of reference as specified by PIRSA.	Agree Terramin agree to participate in a Community Advisory Committee to be formed with terms of reference as specified by PIRSA
Review adequacy of emergency services to cope with an emergency onsite	Agree to meet with the Emergency Services to evaluate their capability to meet an emergency related to mining activities.

Closure	
Issue	Action to be taken by Terramin
Long term liability of tailings dam (may end up with the community to fix and monitor)	<p>As part of the planning process, Terramin has developed a Mine Closure Plan. In the nine months since the original draft plan, consultation has indicated the need for ongoing monitoring of the site. Terramin is currently negotiating with the EPA and other relevant bodies regarding the specific details of such monitoring. The EPA has suggested the potential for an environmental bond to be lodged, as well as financial provisions for monitoring over an extended period.</p> <p>Terramin intends to close the Tailings Storage Facility at the end of mine life in a stable, safe and environmentally responsible manner. To achieve this Terramin intends to landform the tailings to be water-shedding and apply a geofabric above the thickened tailings to prevent water passing through the tailings. This will be covered with a layer of soil and revegetated. The soil cover and revegetation program will be trialled during mine operations so that refinements to the final Tailings Storage Facility cover can be made prior to closure. Monitoring will continue for a reasonable period of time to confirm the integrity of the closure structures, as determined in consultation with the relevant regulatory agencies.</p>
Long term residual, liability re health effects	As with the construction and operational phases, Terramin has agreed to meet environmental objectives that ensure public and environmental health are maintained during and after the closure phase for the mine. Terramin will ensure that all requirements prescribed by the relevant agencies are adhered to.
Will vegetation grow on tailings dam given contamination	On closure the Tailings Storage Facility will be capped with an impermeable layer to prevent movement of water in and out of the tailings, and a soil cover layer. Revegetation will consist of planting native shrubs and grasses which should prosper on the soil cover. Native grasses are important habitat for small indigenous fauna currently precluded from existing land uses.
Rehab required beyond working life of mine	The Mine Closure Plan has provisions for the monitoring and rehabilitation beyond the working life of the mine. The closure phase monitoring will continue for as long as is required to demonstrate that the site is in a stable, non-polluting condition. This is a requirement for the release of the environmental Bond.
Potential to lower value/damage land post rehabilitation	The minimum requirement for rehabilitation of land as currently prescribed by government agencies is that the land is returned to its state equivalent to that in existence prior to the initiation of operations. The current mine closure plan will lead to an environment that exceeds these minimum requirements.

<p>Post mine land use not clear (reopening as waste disposal may not be allowed)</p>	<p>The site has been divided into four separate domains based on geological, ecological, operational and current land use. The current closure plan is based on these divisions:</p> <p><u>The North Domain</u>, which includes some areas of revegetated land, will be restored as close as possible to its current state.</p> <p><u>The Buffer Domain</u>, which currently has residential premises as well as some cropping systems in place will remain relatively untouched during the operational phase, and as such any remediation will be minimal.</p> <p><u>The Central and Southern Domains</u> are the two areas where the topography, catchment characteristics and vegetation cover may be modified. Minimum remediation requirements will be to remove all mine structures seal the mine portal and vent shaft, reshape the landform and revegetate before returning the site to its original land use.</p> <p>The final land use after remediation will be developed in consultation with the current land owners, the Community Advisory Committee, local and state government and stakeholders.</p>
<p>Establish trust fund to compensate for impacts</p>	<p>As part of the environmental management directives of Terramin and the prescriptions made by appropriate licensing bodies, including the SA EPA, it is likely that an environmental bond will be established at the outset of the project which will be used to ensure licensing requirements for returning a site to an agreed condition are achieved.</p>
<p>Need to demonstrate Tailings Storage Facility will be stable and non polluting</p>	<p>Terramin's consultants are finalising the design of the Tailings Storage Facility, this will be followed by a risk based assessment using the criteria developed by PIRSA engineers specifically for the Angas Mine to demonstrate the integrity of the Tailing Storage Facility and that it will meet the desired outcomes. The environmental monitoring program will demonstrate that the Tailings Storage Facility is stable and non-polluting.</p>
<p>3yr post closure monitoring program may not be sufficient, need to model appropriate monitoring period</p>	<p>Terramin agrees to the ongoing monitoring of the site as part of the closure process, as prescribed by relevant agencies. It is envisaged that monitoring will continue until the site has stabilised. Terramin has engaged geochemical and hydrogeological consultants to model the time delay for any potential contamination from the underground mine or Tailings Storage Facility to reach the monitoring bores. The duration of the post closure monitoring program will be objective/criteria based and depend on the time lag for any contamination to appear plus a considerable margin for error. If 3 years is not sufficient Terramin undertakes to extend the monitoring period.</p>
<p>Proposed closure plan complies with Development Plan policies.</p>	<p>Terramin are pleased to note Planning SA comment that the draft Mine Closure Plan complies with the relevant policies. Terramin aim to comply with all of the requirements for</p>

	planning and development prescribed by statutory bodies.
LEMP for Tailings Storage Facility required to be developed, may require monitoring/bond for up to 25yrs.	Terramin will continue to consult with the relevant bodies to ensure all of the necessary licensing requirements for all aspects of the mining operation are developed as required. Terramin will abide by the requirements of PIRSA and the EPA in their "Guidelines for the Management of Acid Mine Drainage at the Proposed Angas Zinc Project, Strathalbyn, South Australia".
Need to specify what native species will be used in rehab	The native species that may be included in site rehabilitation are those described by Natural State during a flora survey of the site. Terramin has engaged this consultant to develop a revegetation program for each domain and to take into consideration the final land form and soil type.
Need to monitor for soil erosion post closure	Terramin acknowledge the potential risk to the environment posed by soil erosion. Considerable engineering effort has been directed into designing stable land forms using appropriate soil materials, compaction where required or revegetation. All these efforts will prevent soil erosion. This will be verified post closure by the use of photo-point surveys of erosion prone areas. Terramin undertakes to remediate and revegetate any minor erosion if it occurs and will continue to do so until the site is declared stable.
Action Requested by PIRSA	Terramin's reply
Include outcomes for closure, e.g.: "Upon mine closure, the site (including the Tailings Storage Facility) is to be left in stable, non polluting state". "Upon mine closure, the site to be returned to current land use, consistent with the Strathalbyn development plan and determined in conjunction with the Community Advisory Committee".	Agree Terramin intends to leave the Tailings Storage Facility and any mine disturbed land in a stable non-polluting state and intends to demonstrate the effectiveness of the closure plan by monitoring after mine closure. Terramin will propose a closure plan in the MARP, which will be subject to further development through the Community Advisory Committee.
Completion criteria and timeframes for monitoring to be developed in conjunction with EPA and PIRSA	Agree Terramin will propose completion criteria and timeframes for the full environmental monitoring program including post-closure monitoring in the final MARP, but will continue the consultation process with the EPA, PIRSA and the Community Advisory Committee through the operating life of the mine.
BOND not to be refunded until PIRSA, EPA satisfied completion criteria are met.	Agree to an environmental bond but Terramin requests that clear responsibilities and achievable milestones are established in consultation with PIRSA and its stakeholders.
Other Issues	
Issue	Action to be taken by Terramin

Potential for further future leases, or operation beyond 7 years, conversion to open cut, establishment of smelter.	Open cut mining and a smelter are much larger scale projects than the defined ore body could support. Even if this was feasible all development proposals would have to be addressed on their own merits. Open cut mining or the building of a smelter would not be viable and will not occur.
Greenhouse gas emissions from power usage.	Terramin has a policy for using energy efficient equipment where available. The exact details of the methods to achieve energy savings to limit greenhouse gas emissions will be provided in the environmental management plan being developed.
Uncertainty over size	Terramin does not envisage the need to expand the above ground facilities in size. Future exploration may uncover new resources but any extensions beyond that proposed in the MARP will need further approval.
Environmental monitoring to be conducted by independent authority	<p>PIRSA and EPA will implement additional monitoring over and above those monitoring programs implemented by Terramin. All monitoring of environmental objectives by Terramin will meet the minimum standards for analytical techniques required by the relevant regulatory body.</p> <p>The location and timing of environmental monitoring sampling will be agreed to between Terramin and the relevant regulatory body, and in consultation with the Community Advisory Committee.</p>
Monitor at High school on Callington Rd - could be used as part of curriculum.	There is scope to develop this concept; Terramin would be interested in exploring this possibility further, subject to strict quality control and safety measures.
Risk of pollution if electricity supplies fail.	Under the NO DISCHARGE policy electricity failures have been considered in the engineering design. For example the Tailings Storage Facility has been designed with over capacity in the event of pump failure during an extreme storm event. The storage capacity is for twice the runoff that would occur if the worst 5 day rain event recorded in Strathalbyn history was to fall in one day, and this excludes a one metre freeboard around the facility to allow for wave action.
MARP should better characterise proximity to housing, (Burnside area) schools , hospital etc (section 3.3)	This suggestion for showing the location of schools, hospital etc will be included in the final MARP.
Climate data at mine (esp. wind directions) may differ from Strathalbyn due to local topographic effects or fails to account for predicted climate change	Local topographic and microclimate difference will be negligible over such a short distance as that between the racecourse Bureau of Meteorology station and the mine. The overriding meteorological information required for the design stage is the mean direction and strength of wind, and precipitation intensity and duration. These are expected to be relatively similar over the small distance between the

	<p>mine and the Bureau of Meteorology station. Terramin will install a weather station on site for environmental management and reporting purposes.</p> <p>Climate change models are currently not robust enough to provide reliable information on a local scale; however, Terramin has designed critical structures such as the Tailings Storage Facility to withstand extreme climatic conditions experienced within the climate region.</p>
Emergency services must be supplemented to respond to accident on site.	Terramin intends to support the local Emergency Services. The exact form of this support will be developed in consultation with the local emergency services.
Risk assessment inadequate - too many are still rated "medium" after control measures, (especially social impacts); some have not rating due to lack of information, and risks should be assessed independently.	<p>The original risk assessment was based on qualitative evaluations of likelihood and consequence. The level of acceptable risk is based on social and company expectations. The hierarchical procedure of the risk assessment method used is particularly conservative.</p> <p>Terramin has implemented control measures on previously higher levels of risk and changed its plans accordingly. It was this process that led to the changes incorporated in the NO DISCHARGE policy and these additional engineering measures required.</p>
Increased lead impacts on residents of Port Pirie.	Most if not all of Terramin's concentrate is destined to overseas markets where it will be smelted to produce lead and zinc. No processing of Terramin concentrates will occur at the Angas Mine site.
More baseline environmental sampling required (not specified)	Initial baseline water quality data was presented in the MARP (Section 6.5 Table 5) but an extended program is being implemented to measure more water quality parameters in both the existing and proposed wells. Terramin has already undertaken a baseline noise survey which was reported in the draft MARP and is in the process of collecting background dust data which will be reported in the final MARP.
Contingencies for premature closure or sell off part way through.	Once the environmental bond has been lodged with the State Government, Terramin will be unable to reclaim the bond until the closure outcome is achieved as required.
Action Requested by PIRSA	Terramin's reply
Lease operations limited to processing only ore recovered on the lease area.	Agree to this outcome.
If size of operation increases beyond 2.5Mt reserves, MARP will be required to be reviewed.	Agree to this condition. Terramin intends to keep PIRSA informed of all significant exploration developments.
Community Advisory Committee	Agree to this outcome, provided all safety and quality

to consider value of establishing environmental monitoring location in high school (e.g. EPA "Airwatch")	standards meet those prescribed by the relevant authority.
PIRSA & EPA to conduct independent environmental monitoring as required.	Agree ; Terramin will assist both PIRSA and the EPA to meet this outcome.
Review risk assessment in conjunction with Community Advisory Committee.	Agree to this outcome, provided that suitably qualified representatives of the Community Advisory Committee address their area of expertise.
Bond to be required to cover full cost of rehabilitation liability at any time - must be reviewed at least every year.	Agree to this condition. In recognition of its planned progressive mine rehabilitation it requests that PIRSA consider setting achievable milestones and closure targets and reviewing environmental outcomes on an annual basis.
Include more detail on proximity to housing, (Burnside area) schools, hospital etc (section 3.3).	Agree ; Terramin will include these locations in the final MARP.
Investigate any other local wind or rainfall data that may be available including historic flood levels.	Agree ; Terramin will investigate and include the outcome in the final MARP.
Compensation rights for residents if outcomes not met.	Agree to this condition. Terramin recognises the right of any individual or group to seek compensation through a court of law.
Require \$20 million public liability insurance.	Agree to this insurance requirement.
Require Terramin to undertake independent audit of achievement of outcomes, by independent expert acceptable to PIRSA, and as requested by PIRSA.	Agree to undertaking audits of performance against the stated outcomes by independent experts approved by PIRSA as requested.

11.3 TERMS OF REFERENCE FOR STRATHALBYN COMMUNITY CONSULTATIVE COMMITTEE

TERMS OF REFERENCE

The Minister for Mineral Resources Development announced in February, 2006 that the assessment of the mining lease application for the proposed Angas Zinc Mine would involve the establishment of a Community Consultative Committee (CCC) representing key stakeholders in the proposed mine approval process.

Objectives

- To provide a forum for timely exchange of information on issues related to the mining proposal and on progress of the Government assessment process.
- To provide a forum for community feedback to Terramin Australia, PIRSA Minerals & Energy Resources and other relevant government agencies on all matters relating to the proposed Angas Zinc Mine.
- To ensure accurate and effective communication between all stakeholders by the development of a communication strategy, including the use of information meetings and communiqués.
- To facilitate a wide community consultation on issues relating to the proposed mining operations in the area.
- To provide appropriate access to all relevant government departments and assessment authorities.

Outcomes

- The Committee should have the opportunity through the Chair to raise issues and to provide comments and recommendations to Terramin Australia, PIRSA Minerals & Energy Resources and to other relevant government agencies on all matters relating to the proposed Angas Zinc Mine.
- All stakeholders should gain a comprehensive understanding of the assessment process for mining proposals.
- The environmental risks and impact of this mining proposal will be fully assessed and reviewed and reported to all stakeholders.

Committee Membership and Committee Operation

- An independent Chair will be appointed by the Minister for Mineral Resources Development.
- The independent Chair to have the authority to meet with people or groups to discuss their issues with the mining lease application or its subsequent operations, and to be authorized to report directly to the Minister.
- The independent Chair will carry out other duties requested by the Minister.

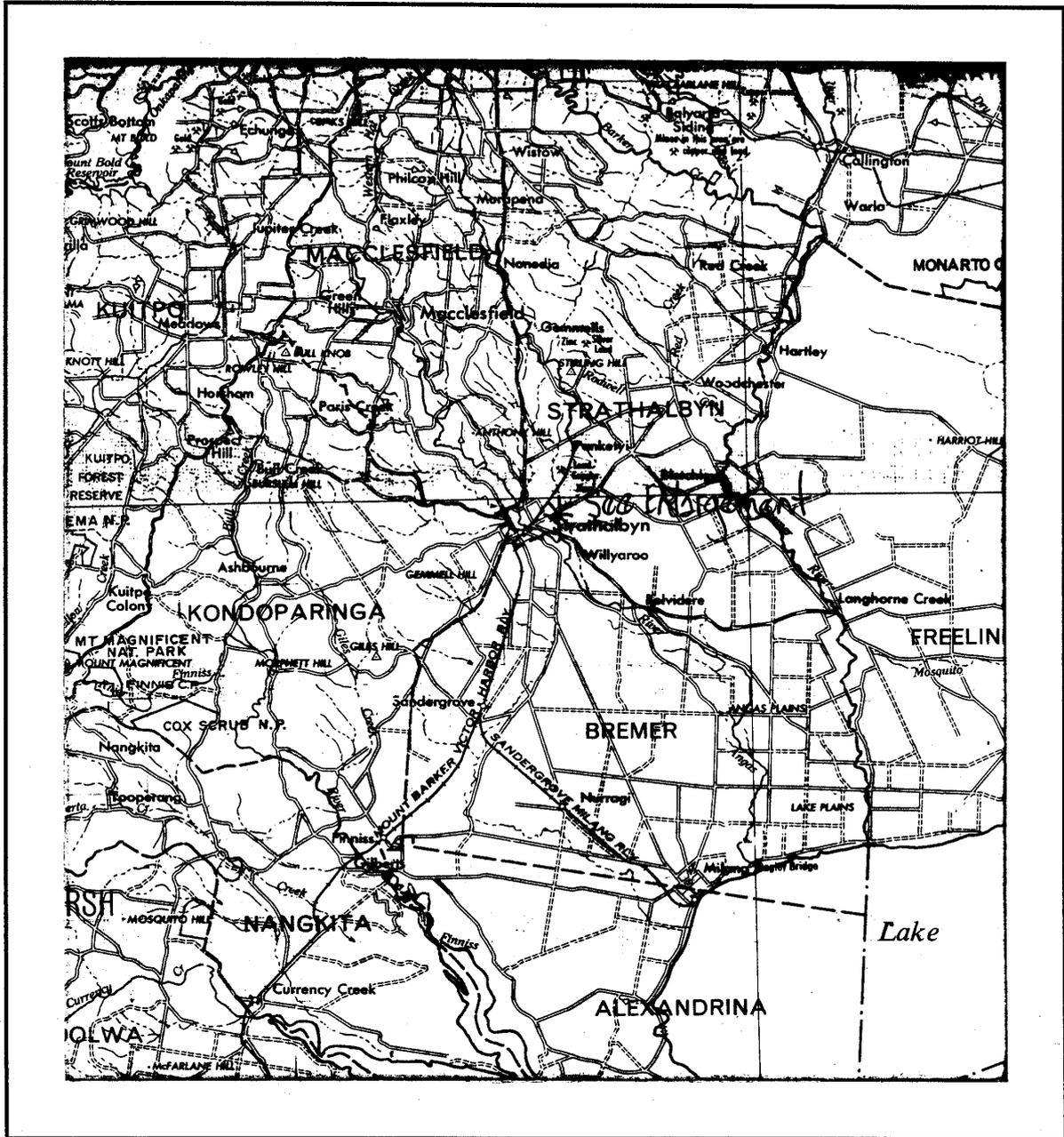
- The Minister for Mineral Resources Development in conjunction with the independent Chair will initially appoint local representatives from the nominations received through an advertised invitation for expressions of interest in local newspapers.
- The Chair, on behalf of the Committee, will be authorized to call in technical specialists and representatives of government agencies to address specific issues e.g. PIRSA, EPA, DEH, DLWBC etc;
- The meeting schedule should be determined by the Chair in agreement with the Committee. An indicative schedule for meetings would be bi-weekly to monthly.
- Appropriate timing of meetings where possible to facilitate attendance by community representatives with work or care obligations
- Committee members would commit to contribute in an open and orderly manner with due respect to others;
- A stable membership with representatives familiar with the operation and able to speak authoritatively on behalf of those they represent;
- Committee members should be familiar with the proposed operation (regular site inspections can assist);
- Committee members must able to keep personal interests outside of Committee meetings;
- There will be adequate notice of meetings and prompt distribution of meeting minutes to members and the local community;
- An agreed reporting framework and format will be established;
- Full and open follow-up by both government and company representatives on any unresolved issue(s) within a nominated timeframe;
- Any landowner or individual concerns or issues with Terramin's activities and operations should be pursued in the first instance with Terramin and not the Committee.

Committee Communications

- Summary of meetings and other relevant information to be made available from the Committee via Newsletter (monthly) to all stakeholders.
- The Chair and his/her delegate are the only person who can speak to the media on behalf of the Committee. Individual members may speak about how they are personally affected but not with respect to Committee matters.

11.4 LOCATION PLANS

LOCALITY PLAN



SCALE 1 : 250 000



TYPE OF APPLICATION MC 3567

DME REFERENCE T2538

11.5 EPA/PIRSA GUIDELINE FOR MANAGEMENT OF TAILINGS

Guidelines for the Management of Tailings

at the

**Proposed Angas Zinc Project,
Strathalbyn, South Australia**



Government of South Australia
Primary Industries and Resources SA



April, 2006

Background

The geochemical assessment data from tests reported on the tailings samples from this project demonstrate that the tailings composition at the ANGAS project is unusual in terms of its high net acid producing potential. Oxidation of the Angas orebody has been demonstrated to be an extremely rapid process and the potential for AMD generation and release of some heavy metals raise the real potential of contamination from this project.

At issue are the potential for contaminant release from surface operations and processing, surface waste storage (waste rock dumps and the TSF), and the underground mine. Provided the surface operations are suitably decommissioned after the mine ceases to operate, the surface drainage issue should cease at that time. On the other hand, contamination resulting from seepage from the underground mine should be contained during operations providing all mine water is pumped to the surface. After operations cease, there is a risk of acid and heavy metal ion drainage from the underground mine, but with appropriate management and a suitable mine backfill technique this risk should be reduced to an acceptable level.

There is potential for contaminant release from the TSF both during operations and into the future. However, with appropriate design criteria and competent operating techniques these risks can be appropriately managed so that there will be very low (or no) risk of release. This guideline has been prepared specifically to cover the TSF, which for this purpose includes the:

- TSF cell and confining embankments.
- Associated wastewater reclaim ponds.
- Tailings delivery system.
- Water return system

This guideline has been compiled for this specific project by drawing from applicable Australian TSF Guidelines and SA EPA Guidelines prepared to cover the containment of non-mining solid wastes. Applicable Guidelines include:-

“Guidelines on the Safe Design and Operating Standards for Tailings Storage Facilities” (Western Australia 1999);

“Management of Tailings Storage Facilities” (Victoria Nov 2004);

ANCOLD “Guidelines on Tailing Dam Design, Construction and Operations” (October 1999)

“Guidelines on landfill facilities for domestic, commercial and industrial solid waste” (SA EPA, Draft rev C-March 2005) and associated EPA Guidelines, which include:

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- *Guideline for leachate containment and management systems for domestic, commercial and industrial solid waste landfills (EPA, draft rev C-March 2005).*
- *Guideline on the use of geosynthetic materials in base liner systems (EPA, draft rev 2-August 2004).*
- *Guideline for closure and post-closure plans for domestic, commercial and industrial solid waste landfills (EPA, draft rev C-March 2005).*
- *Guideline for capping systems for domestic, commercial and industrial solid waste landfills (EPA, draft rev 3-March 2004).*

“Guidelines on Waste water and evaporation lagoon construction” (SA EPA 509/04, issued March 2004).

Best Practice Environmental Management in Mining “Tailings Containment” (DEH (Commonwealth) 1995 publication).

Ministerial Council for Mineral and Petroleum Resources “Strategic Framework for Tailings Management” (2003).

This guideline has been jointly produced by PIRSA and the EPA to address the risks specific to the Angas Zinc Project, and if followed will be accepted as an alternative (in regards to the approval of an EPA licence and the MARP) to a requirement to comply with the EPA 2005 "Guidelines on landfill facilities for domestic, commercial and solid waste" and related guidelines.

In view of the high potential for contamination from any discharge from this site and the outcomes – be they real or perceived, in this environmentally important location, the environmental outcome set for the proponents to meet is:

No contamination of natural water drainage systems, ground water, land and soils either on or off site during operation and indefinitely post closure caused by mine ore or waste material. This is intended to primarily cover surface or underground seepage containing AMD or heavy metal ions or the transport of solid waste products as a result of embankment failure, weathering or dusting.

As part of the process outlined in this guideline, the proponents will be required to undertake a comprehensive risk assessment of all relevant aspects of their proposed design and to detail the measures they will be implementing to monitor, report and remedy any deviation from this outcome. To assure the stakeholders that they can meet the set environmental outcome, the proponents will need to demonstrate that their design is practicable and that a safe and stable facility will result from the construction, operation and decommissioning of the TSF.

The risk assessment and the risk based design upon which that assessment is to be based is to be undertaken in accordance with the *Risk Management Guidelines, HB 436:2004 (companion to AS/NZS 4360:2004) incorporating Amendment No. 1 dated Dec 2005.*

The basis for evaluating risks will be: -

- The guidelines listed above
- The contextual notes listed below.

The proponents have indicated that they will be conforming to the ANCOLD guidelines (1999) as a minimum standard in the design criteria for the TSF.

Contextualizing Notes

In order to produce a concise guideline for this project, it was decided to build upon the existing guidelines listed earlier rather than develop a completely stand alone document. Using the numbering in the table of contents in the ANCOLD guidelines as a guide (and the text of that document), the criteria most relevant to this project will include:

Section 4 Tailings Storage Concepts.

- The proponent has undertaken to thicken the tailings in a high rate thickener or similar prior to deposition and to deposit towards the confining embankment from an upstream inclined ramp. This will require that the embankment is designed to store water during operations and that a self shedding profile to the TSF is left after closure with the embankment cut back to a safe and stable profile.

Section 5 Water Management

- *Item 5.4 Tailings decant water* – high rate and deep cone thickeners in operation rarely produce a consistent high density tailings product.
 - The proponents will need to detail how their design will cope with supernatant water and provide the details of a system to remove the "decant pond" water from the TSF.
- *Item 5.6 Water Recovery* – a separate water retention pond will be required to receive and store all excess supernatant water and precipitation removed from the TSF (and possibly contaminated surface water run-off from the site).
 - The depth of water that this could hold will produce driving heads that could produce far greater base seepage than will occur within the TSF and will require a suitably designed lining system.
 - Unless this contaminated water can be pumped for secure storage elsewhere on the site or for reuse in the plant, the reclaim pond area will need to be suitably designed to ensure that there is no release from the site and that the water can be dissipated by evaporation.
- *Item 5.7 Floods* – to be allowed for as per the ANCOLD guidelines.
- *Item 5.8 Underdrainage and Seepage* – the concept to be adopted for and the design of the base liner system to satisfy the stated environmental outcome while producing a dense stable bed of tailings will be a most critical aspect of the design.

Section 6 Design Criteria for Tailings Dams

- *Item 6.1 Hazard Rating* – as per the ANCOLD guidelines.
- *Item 6.4 Design Flood and Freeboard* – as referenced in Item 5.7.
- *Item 6.6 Foundations* – the embankments are to be engineered earthen structures, designed and constructed to ANCOLD specifications.
- *Item 6.7 Seepage and Pore Pressure* – seepage modelling must demonstrate that the required environmental outcome will be met.
 - Measures that can be taken to minimize seepage from the TSF (and reclaim pond) are discussed in Item 6.7.5 in the ANCOLD document and under Item 5.8 above.
- *Item 6.8 Filters* – it may be desirable to construct a drainage layer between the liner and tailings to ensure that the “head of water” on the base liner is kept to a minimum (possibly reducing the specification for the liner) and enabling the water reporting to the base of the tailings during consolidation to drain to a sump and be removed from the TSF.
- *Item 6.9 Liners* – the provision of leachate containment and management systems to meet the environmental outcome is probably the most crucial of all design considerations.
 - In particular this is applicable to the upstream face of the confining TSF embankment and to the base of the TSF and water reclaim pond.
 - In addition to the guidance provided in this section of the ANCOLD document, the “considerations and details” set out in the Guideline for leachate containment and management systems for domestic, commercial and industrial solid waste landfills (SA EPA, draft rev C-March 2005) should be incorporated.
 - Useful information on geosynthetic materials used as liners as part of a barrier system is contained in *Guideline on the use of geosynthetic materials in base liner systems (SA EPA, draft rev 2-August 2004)*.
- *Item 6.11 Stability Scenarios* – design as per the ANCOLD guidelines.
- *Item 6.12 Earthquake Analysis* – design as per the ANCOLD guidelines using the earthquake intensity appropriate to this location.
- *Item 6.13 Settlement* – after deposition the tailings will settle due to consolidation.
 - This settlement must be taken into account when establishing the final profile of the TSF after capping, particularly with respect to the final height of the perimeter embankment.

Section 7 Construction Issues

- The base preparation for the TSF, the perimeter embankments and the water reclaim ponds are to conform to best engineering practice as typified by the ANCOLD guidelines and the “considerations and details” in the *Guideline for leachate containment and management systems for domestic, commercial and industrial solid waste landfills (SA EPA, draft rev C-March 2005)*.

The construction of the perimeter embankments of the TSF (including liners, reclaim ponds etc) are to conform to best engineering practice and to be certified by a chartered professional geotechnical engineer.

Section 8 Operation and Monitoring

- Management practices for operation and monitoring are to be established in accordance with Section D (Operation) in the document *“Management of Tailings Storage Facilities” (Victoria Nov 2004)*. *Relevant operational procedures to be addressed (as listed in this document) include:*
 - Roles and responsibilities
 - method of tailings deposition
 - water management and maintenance of freeboard
 - inspection schedule and maintenance
 - dam safety
 - environmental monitoring (groundwater, surface water, soil, fauna, flora etc.)
 - record keeping
 - reporting requirements and
 - any additional requirements specified by the designer.
- Also in accordance with these guidelines, tailings delivery and water return systems (pumps, pipelines etc.) need to be bunded to control spillages.
- The proponents are to detail monitoring arrangements for all measurement systems, specify KPIs that action remedial measures and the specific action to be taken to redress real and potential breakdowns in operations and of protective measures.
- The proponents are in particular to identify all instrumentation and inspection techniques to be established and monitoring undertaken to detect any seepage from the site.

Section 9 Decommissioning

The objectives, principles and minimum requirements for decommissioning, closure and aftercare as outlined in Section 9.1 in the ANCOLD Guidelines include the following criteria that should be complied with:

- Decommissioning and aftercare should ensure that:
 - the health of humans and fauna, and the integrity of property and infrastructure are safeguarded;
 - adverse existing and residual environmental impacts are assessed and minimized to statutory or acceptable levels and positive effects are maximized;
 - all the procedural and substantive needs of the involved parties / role-players / stakeholders are addressed;

- the final land-use or land capability adopts suitable land forms and can be achieved on a sustainable basis; and
- closure approval can be obtained by a mine within a reasonable time scale.
- Aftercare of tailings storage provides for ongoing monitoring, maintenance, review and adjustment if necessary to reach a state where the closure environmental outcomes are achieved indefinitely.

Measures implemented after cessation of operation of a storage facility should:

- ensure that the structural integrity and stability of the storage is maintained on a sustainable basis; including the long term erosion resistance;
- residual impacts on all of the environmental aspects are quantified and measures implemented to achieve the agreed post decommissioning environmental outcomes; and
- the physical and chemical stability of the storage is such that risk to any environmental aspect can be maintained at an acceptable level.

There are several other documents that present these criteria, for Australian conditions and in similar terms. Being written at different times they reflect an emerging terminology, but all reflect on issues relevant to this project and should be consulted in planning for decommissioning. These include: -

- Section 12, Appendix D (Page 25) of the *“Guidelines on the Safe Design and Operating Standards for Tailings Storage Facilities” (Western Australia 1999)*.
- Section E, (Page 23), *“Management of Tailings Storage Facilities” (Victoria Nov 2004)*.
- *Guideline for closure and post-closure plans for domestic, commercial and industrial solid waste landfills (SA EPA, draft rev C-March 2005)*.

And specifically for capping systems: -

- *Guideline for capping systems for domestic, commercial and industrial solid waste landfills (SA EPA, draft rev 3-March 2005)*.

The proponents will be required to provide a detailed plan for decommissioning this facility. Specific issues that are to be addressed will include: -

- The proposed profile for the TSF after closure.
- The proposed capping system.
 - The measures proposed for encapsulating the tailings (with a HDPE membrane) to ensure that additional water cannot infiltrate into and saturate the contained tailings.
 - The details of the soil cover, and plans for revegetation of the TSF.
- The stormwater management strategies, covering: -

- Management of surface water on the site;
 - Management of stormwater on the surface of the TSF;
 - The plans for closure of the reclaim water pond.
- Soil erosion mitigation strategies for the surface of the TSF and the surfaces of the confining embankment left exposed.
 - Techniques to be employed for ongoing monitoring of the facility for base seepage – and action plans for remedying the situation should any contamination be detected.
 - The details of the ongoing monitoring program to be instituted after closure and of the program of reporting to PIRSA. This will continue until such time that it is agreed that the facility has met the completion criteria.

Risk Based Design

In the above, any reference to risk assessment means the risk assessment and the risk based design upon which that assessment is to be based which is to be undertaken in accordance with the *Risk Management Guidelines, HB 436:2004 (companion to AS/NZS 4360:2004) incorporating Amendment No. 1 dated Dec 2005*.

In order to consider all risks and yet concentrate effort on the high-risk issues, a staged approach is required. The relevant sections in the guidelines are identified below: -

- Stage 1 is a qualitative assessment that identifies all hazards and risks and identifies higher risk items (Section 6.1.3).
- Stage 2 is a semi-quantitative and quantitative assessment as set out in Sections 6.1.4 and 6.1.5.
- In Stage 3, the mitigations that form the basis of the design are assessed in accordance with Section 8 and based upon the risk evaluation process as set out in Section 7.
- Stage 4: The proponents specify the monitoring and review procedures that will be used to verify the assumptions, performance and reliability of the design.
- Stage 5: The proponents will then prepare a risk assessment plan in accordance with Section 11.

11.6 RECOMMENDED LEASE CONDITIONS

FIRST SCHEDULE

1. Mining operations are authorised for the recovery of metallic mineral ores from the area of the lease.
2. The Lessee must keep proper and accurate books and records showing the quantity and value of all minerals mined from the said lands and the manner of disposition of all minerals and, whenever required to do so, shall submit such books and records for inspection by any person authorised by the Minister.
3. The Lessee must, from time to time as requested by the Chief Inspector of Mines, demonstrate to the satisfaction of the Chief Inspector of Mines, the Lessee's capability and competence to comply with the requirements of the *Mining Act, 1971*, the conditions of this lease and the approved Mining and Rehabilitation Program (MARP) by demonstrating aspects of the management system for the mine operations including:
 - a. Work procedures and practices;
 - b. Risk management system;
 - c. Compliance monitoring system;
 - d. Emergency response plans;
 - e. Communication strategies to employees, contractors and visitors;
 - f. Resources allocated to compliance monitoring activities; and
 - g. Previous experience of operator
4. This Lease permits processing operations only for ore recovered on the lease area. Ore from outside the lease area must not be brought on to the lease.
5. The Lessee must ensure that all detailed plans and specifications relating to the design and construction of all structural elements associated with the proposed development are accompanied by certification provided by a practicing professional structural engineer or an accredited certifier certifying the structural adequacy of the proposed building design and compliance with the Building Code of Australia.
6. Should the lease holder request any of the lease conditions in Schedule 1 or 2 to be modified to reflect a change in scope of the mining project from that originally proposed, the proposal will be required to follow the same statutory assessment and consultation process as is required for a new mining lease under the *Mining Act, 1971*.

SECOND SCHEDULE

Community Consultative Committee

1. The Lessee must take responsibility for resourcing, participating with and maintaining to the satisfaction of the Minister, a Strathalbyn Community Consultative Committee (CCC) for the term of the lease, with terms of reference as specified from time to time by the Minister.

Mining and Rehabilitation Program (MARF)

2. The Lessee must ensure that mining operations on the land are carried out in an orderly and skilful manner in accordance with a program for mining and rehabilitation of the land (MARF) approved from time to time by the Minister in consultation with the Environment Protection Authority (EPA), Planning SA, Department of Water Land and Biodiversity Conservation (DWLBC) Department of Health and Transport Services Division (TSD).
3. The MARF must comply with the requirements of the guidelines approved by the Chief Inspector of Mines and include environmental outcomes and measurement criteria that are developed in consultation with relevant stakeholders.
4. The approved MARF will be available to the public in manner and form as determined by the Chief Inspector of Mines in consultation with the Community Consultative Committee.
5. The MARF must be reviewed and resubmitted by the Lessee for approval if at any time the sum of the total mine production and the remaining ore reserve exceeds 2.5 Million tonnes.

Reporting

6. The Lessee will be responsible for recording and addressing complaints received from the public with respect to the mining operations by: -
 - 6.1 Providing a dedicated and publicly advertised telephone line, 24 hours a day, 7 days a week;
 - 6.2 Record details of complaints and the Lessee's response in a register, which will be made available to authorised officers under the *Mining Act, 1971*;
 - 6.3 Ensuring that a response is provided to the complainant as early as possible and within two working days; and
 - 6.4 Reporting the complaint details and the Lessee's response at the next relevant Strathalbyn Community Consultative Committee meeting.
7. The Lessee must, if requested by the Chief Inspector of Mines, undertake an independent audit of achievement of the environmental outcomes any or all in clauses 16 to 63 below, by an independent

expert approved by the Chief Inspector of Mines. The audit will be made available to the public, in a manner and form as determined by the Minister in consultation with the Community Consultative Committee.

8. The Lessee must, on an annual basis, provide to the satisfaction of the Chief Inspector of Mines a survey of mine workings.
9. The Lessee must provide to the Chief Inspector of Mines a Mining and Rehabilitation Compliance Report (MARCR) on operations carried out on the lease and compliance with the MARP.
10. The MARCR must include a geotechnical and operational audit of the Tailings Storage Facility undertaken by an independent certified geotechnical engineer.
11. The MARCR must be submitted every year, or any other period as requested in writing and agreed with the Chief Inspector of Mines.
12. The MARCR must be submitted within 2 months after the anniversary of a date agreed with the Chief Inspector of Mines.
13. The MARCR must be prepared in accordance with guidelines approved by the Chief Inspector of Mines.
14. The MARCR will be made available to the public in a manner and form as determined by the Chief Inspector of Mines in consultation with the Community Consultative Committee.
15. The following significant incidents, should they occur, must be reported to the Chief Inspector of Mines, immediately after the Lessee is aware of them:
 - 15.1 Any unexpected groundwater flow in the underground mine workings;
 - 15.2 Any unplanned collapse of underground workings;
 - 15.3 Any detection of microbiological material in the mine water, likely to be sourced from the overlying effluent ponds;
 - 15.4 Any fires caused by mining operations;
 - 15.5 Any unauthorised entry to site by any member or members of the public, or breach of security measures;
 - 15.6 Any injury to member of the public caused by mining operations (including by truck movements);
 - 15.7 Any breach of environmental outcomes to be achieved as detailed in clauses 16 to 63; and
 - 15.8 Any flora and/or fauna deaths or sickness likely to be caused by the mining operation.

Groundwater and surface water:

16. The Lessee must, in constructing and operating the lease and post mine closure, ensure that there is no adverse impact to the supply of water by the lessees operations to existing users and water dependent ecosystems.
17. The Lessee must ensure that groundwater monitoring well locations and all data are supplied to PIRSA and Department of Water Land and Biodiversity Conservation (DWLBC) on an annual basis in a format stipulated by DWLBC.
18. The Lessee must report on an annual basis groundwater ingress zones encountered within the mine workings and report on groundwater flow and quality and microbiological content.

Erosion:

19. The Lessee must, in constructing and operating the lease and post mine closure, stabilise disturbed areas and prevent sediment from leaving the site.

Topsoil:

20. The Lessee must, in constructing and operating the lease and post mine closure, ensure that soil quality and quantity are protected.
21. The Lessee must ensure that topsoil stockpiles are protected from erosion (eg be sown with a cover crop) and monitored for erosion.

Vegetation clearance and weed management:

22. The Lessee must, in constructing and operating the lease, and post mine closure, avoid permanent loss of biodiversity through clearance of native vegetation.
23. The Lessee must minimise the spread of weeds and plant pathogens (including phytophthora) and ensure that all employees and contractors on-site are made aware of this requirement.
24. The Lessee must undertake a detailed baseline survey on flora present in the lease area to identify all flora of conservation significance and include the results from the completed survey as part of the MARP documentation.

Silt and stormwater:

25. The Lessee must, in constructing and operating the lease and post mine closure, ensure no water contaminated as a result of mining operations leaves the lease area or results in contamination of soil at mine closure within the lease area.
26. The Lessee must ensure that surface water monitoring site locations and data is supplied to the Chief Inspector of Mines and Department

of Water Land and Biodiversity Conservation (DWLBC) on an annual basis in a format stipulated by DWLBC.

27. The Lessee must ensure water discharged from the site is compliant with the relevant environment protection policy under the *Environment Protection Act, 1993*.
28. The Lessee must, prior to commencement of mining, design and construct stormwater diversion infrastructure to manage the largest known historical storm event or the estimated 1 in 100 year storm event, whichever is the larger.

Waste disposal and hazardous substances

29. The Lessee must, in constructing and operating the lease, and post mine closure ensure that no contamination and pollution is caused by waste products and hazardous materials used in the mine operations.
30. The MARP must include a waste management and recycling plan.
31. The Lessee must ensure that fuel and liquid chemical storage is adequately bunded to capture spillage and to prevent the migration or infiltration of any spillage or leakage to the surrounding environment in conformance with relevant Environment Protection Authority guidelines.
32. The process water ponds must include a double liner and leakage detection and leachate recovery system to the satisfaction of the Environment Protection Authority.

Acid mine drainage and tailings management

33. The Lessee must, in constructing and operating the lease and indefinitely post mine closure, ensure that no contamination of natural water drainage systems, streams and rivers, groundwater, land and soils occurs either on or off site resulting from permanent disposal or temporary storage of mine ore or waste material.
34. The Lessee must dispose the tailings into the underground workings to the extent it is technically feasible. Material other than tailings should only be disposed of underground if it can be shown that this will not decrease the maximum amount of tailings and other sulphidic waste that can be placed in the underground workings.
35. The Lessee must design, operate, close and rehabilitate the Tailings Storage Facility (TSF) according to the following conditions:-
 - 35.1 The 100-year flood level for the site must be modelled to the satisfaction of the Department of Water Land & Biodiversity Conservation (DWLBC) and included in the MARP;

- 35.2 The TSF must be located above the modelled 100-year flood level with a buffer of at least 100m horizontally outside of that zone;
- 35.3 The tailings must be produced to < 30% moisture (by weight);
- 35.4 The TSF must be designed, constructed, operated and decommissioned in accordance with the tailings management guidelines as approved from time to time by the Chief Inspector of Mines and Environmental Protection Authority (EPA);
- 35.5 The MARP must include the design of the TSF and management plan prepared in accordance with the tailings management guidelines;
- 35.6 The TSF must include a double liner and leakage detection and leachate recovery system to the satisfaction of the Environment Protection Authority
- 35.7 Engage an independent certified geotechnical engineer to audit the design of the TSF and management plan against the tailings management guidelines, and submit the audit to the Chief Inspector of Mines with the MARP;
- 35.8 Provide to the Chief Inspector of Mines certification by an appropriate chartered professional that the TSF has been constructed in accordance with the approved design;
- 35.9 The Run of Mine (ROM) pad, waste rock stockpiles must be suitably contained and bunded. The Run of Mine pad, waste rock stockpiles, must collect any run off water from those areas for reuse or disposed to the TSF or for treatment and disposal off site; and
- 35.10 The location of the TSF footprint must be no closer than 10 metres from the lease boundary.

Traffic

- 36. The Lessee must, in constructing and operating the lease, ensure that no impacts offsite are caused by accidents, noise, dust and dragout by traffic from or to the mine site.
- 37. The Lessee must ensure that there will be no truck dragout onto the Callington- Strathalbyn Road.
- 38. All traffic accidents or near misses involving mine vehicles on public roads must be investigated by the Lessee and reported to the Chief Inspector of Mines.
- 39. The Lessee must monitor all traffic movements associated with the mine construction, operation and closure and must ensure that: -
 - 39.1 No B-Double vehicles are to be driven through Strathalbyn township roads;

- 39.2 B-Double vehicle movements on public roads limited to hours as approved in the MARP in consultation with Transport SA;
 - 39.3 All concentrate trucks on public roads must be covered and well sealed to prevent loss of loaded material; and
 - 39.4 All vehicles leaving the site that have entered the operating area must go through an approved wheel wash to prevent dragout on public roads;
 - 39.5 Drivers are to be instructed on school bus routes and schedules.
40. The Lessee must liaise with the Transport Services Division (TSD) to upgrade and maintain the intersection of the proposed "Mine Road" with Callington Road to specifications determined by TSD. The upgrade shall be designed and constructed to the satisfaction of TSD, with all costs (design, construction and project management) being borne by the Lessee. With regards to the design, the Lessee is required to seek approval for the concept plan from TSD before undertaking any detailed design work.

Noise

- 41. The Lessee must, in constructing and operating the lease ensure that there are no public nuisance impacts from noise emanating from the operating site.
- 42. Noise must at all times comply with the relevant environment protection policy under the *Environment Protection Act, 1993*.

Blasting

- 43. The Lessee must, in constructing and operating the lease, ensure that there are no public nuisance impacts from airblast and vibration caused by blasting.
- 44. The Lessee must ensure that airblast and ground vibration levels from blasting operations comply with the following requirements at the nearest, non-Terramin owned residence: -
 - 44.1 Vibration to not exceed 10mm/sec at any time, with no more than 5% of blasts in any one year to within the range 5-10mm/sec; and
 - 44.2 Airblast to not exceed 120dB Linear at any time, with no more than 5% of blasts in any one year to be within the range 115-120dB Linear.

Public health and nuisance

- 45. The Lessee must, in constructing and operating the lease and post mine closure, ensure that there are no public health, loss of amenity and nuisance impacts to local residents from air emissions, dust and odour generated on site as a result of mining operations.

46. The Lessee must measure within 3 months of start-up of the ore processing plant, the odour emission rates at the following locations, and demonstrate that they have not exceeded the following limits:

TSF pond	550 Odour Units
TSF wet beach (winter)	13,000 Odour Units
TSF wet beach (summer)	3,800 Odour Units

The odour emission rates must be measured using AS4323.3:2001 Stationary Source Emissions - Determination of odour concentration by dynamic olfactometry.

The Lessee must submit within 3 months of start-up of the ore processing plant (and at any other time if requested by the Chief Inspector of Mines) a revised odour dispersion model (prediction of odour impact from TSF and flotation processes) produced by a recognised independent expert approved by the Chief Inspector of Mines and based on the additional sampling of odour emission rates from the TSF pond and the TSF wet beach, that demonstrates odour levels in the vicinity of the site do not exceed those in Attachment A.

47. The Lessee must ensure that noise; blasting, visual amenity and dust monitoring points are determined and approved by the Minister in consultation with EPA, Health Department and the Community Consultative Committee.
48. The Lessee must ensure that no lead contaminated items (including clothing, tools and equipment) are taken off the mine site.
49. The Lessee must manage this operation to comply with the Environment Protection Authority's National Environment Protection Measures for Ambient Air Quality, including EPA criteria for all dispersions, depositions and dust management standards.
50. The Lessee must include in the MARP an environmental dust-monitoring program to the Ministers satisfaction, in consultation with the Department of Health and the EPA.

Fire

51. The Lessee must, in constructing and operating the lease, ensure that there are no unplanned fires onsite, and ensure control measures are in place to manage potential off site impacts.

Public safety

52. The Lessee must, in constructing and operating the lease and post mine closure, ensure that there are no public injuries/deaths resulting from unauthorised entry to the mine site.

Geotechnical stability

53. The Lessee must, in constructing and operating the lease and post mine closure, ensure that no damage occurs to third party infrastructure and no injuries/deaths result from collapse of the underground workings.
54. The Lessee must demonstrate that the mine design cannot allow surface subsidence to occur at any time during mining operations. The demonstration must be made by submitting to the Chief Inspector of Mines (prior to commencing mine development under the Callington Road) a review of the design of the proposed underground operations undertaken by an independent chartered professional mining engineer. The section of the report pertaining to mining under the Callington Road must also be submitted to Transport Services Division (TSD) for its advice.

The Lessee must survey the road prior to, during and post mining to ascertain if subsidence has occurred. TSD requires the Lessee to pay for any remediation works on the Callington Road that are required as a direct result of the mining operations, irrespective of the amount of subsidence. This condition applies from the commencement of the mine operation to 1 year after the mine closure.

The Lessee shall be responsible for the cost of any remediation works required to be undertaken to the Strathalbyn effluent ponds located north of the Callington Road that has occurred as a direct result of mining operations.

55. The Lessee must demonstrate that all underground voids are filled to the extent that subsidence cannot occur at any time after mine closure.

Visual impact

56. The Lessee must, in constructing and operating the lease, minimise the adverse visual impact and maintain a clean, rubbish free site.
57. The Lessee must improve the visual amenity of the mine site in the long-term post mine closure.
58. The Lessee must ensure that all external materials, colours and finishes are non-reflective and of a natural colour and tone to blend with the landscape.
59. The Lessee must, in areas visible to the public and where it is not possible to completely ameliorate visual impacts, use bunding and/or vegetation to improve visual screening.
60. The Lessee must ensure that the screening utilizes local species and is maintained in good condition at all times, to the reasonable satisfaction of the Chief Inspector of Mines.

61. The Lessee must ensure that external lighting on the site, including car-parking areas and around buildings is designed and constructed to conform to Australian Standards. External lighting must not cause any nuisance, inconvenience or loss of amenity to any person beyond the mine site.

Fauna

62. The Lessee must, in constructing and operating the lease and post mine closure, ensure that there are no net adverse impacts from site operations on native fauna in the lease area and in adjacent areas. The lessee must, prior to construction, undertake baseline monitoring of all fauna in the area.

Aboriginal Heritage

63. The Lessee must ensure that all employees and contractors on-site are properly advised of the significance of Aboriginal heritage and culture and are to take due care to preserve all Aboriginal Sites and Objects as defined by the *Aboriginal Heritage Act, 1988*.

Rehabilitation and mine closure

64. The Lessee must ensure that upon mine closure, all plant and equipment (unless otherwise agreed with the Chief Inspector of Mines) is removed from the site.
65. The Lessee must ensure that upon mine closure, the site (including the Tailings Storage Facility) is left in a stable, non-polluting state indefinitely post closure.
66. The Lessee must ensure that upon mine closure, the site is returned to a land use as agreed with the landowner, consistent with practicalities of ensuring the integrity of the TSF and consistent with the Alexandrina Council Development Plan, after consulting with the Strathalbyn Community Consultation Committee.
67. The Lessee must ensure that upon mine closure, the decline under the Strathalbyn- Callington Road is be backfilled in a manner to ensure the long term integrity of the public road structure.
68. The Lessee must ensure that the MARP includes measurable completion criteria for the mine site and must include measures to indicate that the stability and integrity of the site (including the TSF) is likely to continue to be met indefinitely into the future.
69. The Lessee must ensure that the area of the TSF and a 10m wide buffer on all sides is protected in perpetuity from development that may affect the integrity of the TSF design. This protection must include a caveat on the relevant freehold land title.

Financial security

70. The Lessee must, before commencing operations under this lease, lodge a Rehabilitation Bond (Bond) in accordance with Section 62 of the Mining Act, 1971 of such an amount of the surety as determined from time to time by the Minister, to cover the full cost of rehabilitation liability assessed by an independent third party at any time.
71. The Minister may review the Bond from time to time, and in reviewing the Bond the Minister may request that written quotes from a third party are obtained by the Lessee for the cost of rehabilitating the site to the approved completion criteria.
72. The Lessee must meet all charges and costs in obtaining and maintaining the Bond.
73. The Bond will not be refunded until the Minister (in consultation with the EPA) is satisfied the completion criteria as stated in the current MARP have been met.
74. To enable consideration of whether or not the completion criteria have been met, the Lessee must provide an independent audit of the achievement of the completion criteria, to be carried out by an independent auditor approved by the Minister.
75. The Lessee must, prior to commencing operations under this lease and for the duration of the lease, maintain public liability insurance to cover operations under the lease (including sudden and accidental pollution) in the name of the Lessee for a sum not less than \$50 million or such greater sum as specified by the Chief Inspector of Mines, and make such amendments to the terms and conditions of the insurance as the Chief Inspector of Mines may require.
76. A copy of the cover note of certificate of currency for the insurance must be provided to the Chief Inspector of Mines upon request.
77. In specifying the level of insurance required, the Chief Inspector of Mines accepts no liability for the completeness, adequacy of the sum insured, the limit of liability, the scoped coverage, the conditions or exclusions of the insurance in respect of how the Lessee may or may not respond to any loss, damage or liability.

Attachment A

Odour Dispersion Model Prediction of Odour Impact from TSF & Flotation Process

