ALKANE RESOURCES LTD

ABN: 35 000 689 216

Tomingley Gold Project

Response to Submissions

Major Project Application
No. PA 09_0155

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED

March 2012

This page has intentionally been left blank

Tomingley Gold Project

Response to Submissions

Prepared for:

Alkane Resources Ltd
ABN: 35 000 689 216
65 Burswood Road
BURSWOOD WA 6100

PO Box 4384
VICTORIA PARK WA 6979

Telephone: (08) 9328 9411
Facsimile: (08) 9227 8178
Email: mail@alkane.com.au

Prepared by:

R.W. Corkery & Co. Pty. Limited
Geological & Environmental Consultants
ABN: 31 002 033 712

Brooklyn Office:
1st Floor, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083

Telephone: (02) 9985 8511
Facsimile: (02) 9985 8208
Email: brooklyn@rwcorkery.com

Orange Office:
62 Hill Street
ORANGE NSW 2800

Telephone: (02) 6362 5411
Facsimile: (02) 6361 3622
Email: orange@rwcorkery.com

Brisbane Office:
Level 19, 1 Eagle Street
BRISBANE QLD 4000

Telephone: (07) 3360 0217
Facsimile: (07) 3360 0222
Email: brisbane@rwcorkery.com

Ref No. 616/20 March 2012

This Copyright is included for the protection of this document

APPENDICES

FIGURES

TABLES

PLATES

This page has intentionally been left blank

1. INTRODUCTION

Following the public exhibition of the *Environmental Assessment* for the proposed Tomingley Gold Project, submissions were received by the Department of Planning and Infrastructure (DP&I) from:

- seven government agencies or authorities; and
- one special interest group (the Lower Macquarie Water Utilities Alliance[1]).

Notably, no submissions were received from the general public.

All submissions were forwarded by the DP&I to the Proponent (Alkane Resources Ltd) and R.W. Corkery & Co. Pty Limited (RWC) requesting the preparation of a response to the issues raised. Each of the submissions has been comprehensively reviewed to enable an appropriate response to be prepared.

This document presents the requested "Response to Submissions" prepared by RWC on behalf of the Proponent. RWC has been assisted in preparing responses to issues raised by the following specialist consultants.

- SLR Consulting Australia Pty Ltd (SLR) has provided assistance in addressing issues raised relating to the Noise and Vibration Assessment.
- PAEHolmes (PAEH) has provided assistance in addressing issues raised relating to the Air Quality Impact Assessment.
- Strategic Engineering & Environmental Consulting (SEEC) has provided assistance in addressing issues raised relating to the Surface Water Assessment.
- OzArk Environmental & Heritage Management Pty Ltd (OzArk) provided assistance in addressing issues raised relating to the Biodiversity and Cultural Heritage Assessments.
- Mintrex has provided assistance in addressing issues related to the design and management of the Residue Storage Facility and Eastern Surface Water Drainage Structure, as well as hazardous material management.
- Geolyse has provided assistance in addressing issues raised in relation to the water pipeline infrastructure of the Project.

Where a response has been prepared by one of these specialist consultants, it is either included as an annexure (with a summary provided in the main text) or prefaced as having been prepared by or prepared with the assistance of the relevant consultancy.

This document was reviewed by a range of employees of the Proponent, namely, Messrs Michael Sutherland, Alkane's General Manager NSW, Terry Ransted, Alkane's Chief Geologist & Tony Wright, Alkane's Commercial Manager.

[1] The Lower Macquarie Water Utilities Alliance (LMWUA) consists of the Bogan, Bourke, Brewarrina, Cobar, Dubbo, Narromine, Warren and Wellington Councils:

This document is structured as follows.

Section 1 Provides an introduction to the document and identifies the contributing authors.

Section 2 Provides additional information related to the Cultural Heritage Assessment requested by the DP&I prior to the public exhibition of the Environmental Assessment.

Section 3 Provides a response to those government agency submissions received. Where appropriate, the submissions have been reproduced in their entirety (in italics) and a response is provided (in normal text) to each issue raised.

Section 4 Provides a response to the submission received from the single special interest group (the Lower Macquarie Water Utilities Alliance).

Section 5 Provides an updated and final version of the Statement of Commitments originally included as Section 5 in the *Environmental Assessment*. Where the commitments have been amended, the amended text has been tracked and is underlined and in red.

Appendices A range of supporting documentation is provided.

2. ADDITIONAL CULTURAL HERITAGE ASSESSMENT

2.1 INTRODUCTION

On reviewing the adequacy of the *Environmental Assessment*, the Archaeology and Heritage Adviser of the DP&I identified several aspects of the Cultural Heritage Assessment which required clarification and/or additional information. Whilst the majority of the issues raised were resolved to the satisfaction of the DP&I, there remained two issues for which further survey and assessment were identified as necessary.

- Clarification as to the status of site TGP-ST7, i.e. what form of culturally modified tree the site represents (carved tree or scarred tree) or whether the scarring is more likely to be of non-Aboriginal origin, identification of any associated sites, update to proposed management and update to the assessment of significance.
- Confirmation as to the content of site TGP-HS6 in order for the historical context of the site to be catalogued and assessed.

Noting the delays that undertaking such investigation would have on the public exhibition of the *Environmental Assessment* (and therefore the assessment and determination of the TGP), and the highly specific nature of the issues to be addressed which do not require general public consideration, the DP&I agreed to receive the results of the requested additional survey and assessments as a component to a "Response to Submissions" (following public exhibition of the *Environmental Assessment*).

2.2 ASSESSMENT OF SITE TGP-ST7

2.2.1 Background

During the initial field archaeological survey of the Mine Site, undertaken and managed by OzArk Environment and Heritage Management (OzArk), archaeological consultants to the Proponent who managed the archaeological investigations and completed the Cultural Heritage Assessment (*Part 5* of the *Specialist Consultant Studies Compendium* accompanying the *Environmental Assessment*), identified a modified tree (Fuzzy Box, *Eucalyptus conica*). The modified tree included evidence from two different periods of what appears to be carving within the scar (see **Plates 1** and **2**). Assessment at the time was that the 'carving' was likely to have been made with a steel axe at the base, however, the possibility a stone axe was used in the remnant surface part of the heartwood at the top of the scar could not be discounted. At the time of the survey, the Aboriginal community indicated the tree was of high significance as it was believed it may be associated with a burial.

Plate 1: TPG-ST7, within the proposed Wyoming One Open Cut Mine of the MLA

Plate 2: TPG-ST7. Detail of zig-zag axe marks

Despite reservations regarding the authenticity of the modifications to the tree as being Aboriginal in origin, a conservative position on the classification of the site was taken and the wishes of the Aboriginal community that the site be identified as a possible 'carved tree' taken into account. Management options for Site TGP-ST7 were developed and distributed to the Aboriginal community for review and consideration. Several meetings to discuss management of the site were held and it was agreed that the preferable option would be to delay further ground disturbing activities (which could disturb a burial site if present) until such time as the

site was under immediate threat of destruction, i.e. conditional approval being granted for the TGP.

Despite preparation of a Cultural Heritage Management Plan, which was distributed to the Aboriginal community and accepted without formal objection, the DP&I have requested that additional works be undertaken to ascertain more accurately the attributes of the markings on the tree such that the significance of TGP-ST7 can be more accurately determined. This aids in determination of the likelihood of a burial site, which in turn enables the development of appropriate management measures to enable the assessment of significance to be completed to the DP&I's satisfaction.

2.2.2 Site Investigations

A staged investigation and assessment methodology was planned by OzArk and the Proponent.

- Stage 1: Site classification through additional investigative strategies.
- Stage 2: Investigation for evidence of burial site[2].

Stage 1 investigations were undertaken as follows.

1. The Proponent advertised and invited the identified Aboriginal stakeholders to meeting to discuss further investigation of Site TGP-ST7. It was explained at this meeting (held on 28 September 2011 in Peak Hill) that the purpose of the investigations was to determine the origin of scarring and carving on the tree and therefore inform additional management measures for the site.

2. The Proponent commissioned Peter Blank of Tree Test Australia P/L to undertake scientific tree ageing and wood compartmentalisation using a Resistograph. The tree ageing of Site TGP-ST7, along with 12 other trees (with and without scarring), was completed on 1 December 2011. Aboriginal community stakeholders Jenny and Frances Robinson and Dr Jodie Benton of OzArk observed the tree ageing activities. The complete report of Tree Test Australia P/L, which provides further details on the ageing methodology, results and interpretation, is provided as **Appendix 1**.

3. The results of the tree ageing was reviewed by OzArk to further assess the classification of the scar and carving provided to AHIMS following the initial identification of the site. The results of this review concluded the following.

    - The tree identified as Site TGP-ST7 is likely to be 269 years old.
    - The scar, within which the carving occurs, does not appear to have been made in an oval shape (which would suggest cultural origin). Testing of the regrowth (as shown in the attached photo) does not reveal that there is dead wood beneath the regrowth growing over the edge of the scar.
    - This indicates the scar is unlikely to have been cultural in origin, and therefore also unlikely to bear carving.

[2] Stage 2 investigations would only proceed if Stage 1 investigations deemed the site to be a Carved Tree likely to be associated with a burial site.

4. A meeting was convened in Peak Hill on 14 December 2011 to discuss the results of the tree ageing and an interpretation of the results. At the meeting, the following decision was made in relation to management of the tree.
    - The AHIMS register will be updated to note this TGP-ST7 is unlikely to be a carved tree but may be a scarred tree[3].
    - Management will be to remove the tree trunk carefully in two portions and retain these on the Mine Site for community assessment/protection and possibly education.
    - Aboriginal Stakeholders will be offered the opportunity to be present for the tree removal.
    - The Aboriginal Heritage Assessment Report (associated with obtaining a permit to disturb the site) will be updated to reflect this management.
5. The conclusions of the tree ageing, interpretation of results and proposed management were then distributed by letter to the Aboriginal stakeholders for the TGP for consideration and comment (on 15 December 2011) (a copy of the letter sent to Peak Hill LALC is provided as **Appendix 2**[4]). No formal objection to the proposed management has subsequently been received.

Based on the results and conclusions of the Stage 1 investigations, it has not been deemed necessary to undertake Stage 2 investigations, i.e. investigation for evidence of a burial site.

2.2.3 Assessment of Significance

2.2.3.1 Overview

The following review of the significance of TGP-ST7 is based on a review of the cultural, scientific and public significance of the site as outlined in *Section 7.3* of *Part 5* of the *Specialist Consultant Studies Compendium* (pp. 5-83 to 5-84). The reviewed assessment relies on the fact that the site is no longer considered to be a carved tree and the derivation of the scar being inconclusive, i.e. it cannot be certain as to whether this represents a cultural scar.

2.2.3.2 Cultural Significance

As noted in *Section 7.4.1* of *Part 5* of the *Specialist Consultant Studies Compendium* (pp. 5-84 to 5-85) it is noted that all site types are culturally significant to the Aboriginal community because they provide physical evidence of Aboriginal occupation of the local area. After the completion of the additional investigations on Site TGP-ST7, it is no longer considered as having extremely high cultural significance to the local Aboriginal traditional owners.

[3] While the lower scar (with the carvings contained) is unlikely to be of cultural origin, the upper braches are also scarred and are considered to be potential canoe scars.

[4] A letter was also sent to a further 10 Aboriginal stakeholders who had registered interest in the Project, namely: Narromine LALC, Bogan River Peak Hill Wiradjuri Aboriginal Corporation, Bulgandramine Youth Development Aboriginal Corporation, Little Burning Mountain Aboriginal Corporation, Neville Williams (Mooka), Peter Peckham, Trevor Robinson, Wiradjuri Council of Elders, Dorothy Stewart and Paul (Midnight) Brydon

2.2.3.3 Scientific Significance

As a site type scarred trees have a relatively low potential to increase our understanding of the area's prehistory. However, as noted in *Section 7.4.2* of *Part 5* of the *Specialist Consultant Studies Compendium* (p. 5-85), what is somewhat unusual is the high number of scarred trees recorded in close proximity to each other.

In accordance with the previous assessment of significance attributed to the modified trees of the Project Site, TGP-ST7 is considered to be of low scientific significance (given only the upper scars are thought of as being of possible Aboriginal origin).

2.2.3.4 Public Significance

As Site TGP-ST7 is no longer considered to be a carved tree, it is assessed as being of low public significance (being hard to locate and not on property that is accessible to the general public, as well as comprising evidence that would be challenging for the lay person to identify).

2.2.3.5 Conclusion

The results of the additional investigations of Site TGP-ST7 have been documented and presented to the Aboriginal stakeholders who have registered an interest in the Project (see **Appendix 2**). There has been no objection to the proposed management and the Proponent intends on removing and preserving the scarred portion of the tree, under a Section 90 Permit to be issued by the Office of Environment and Heritage and in accordance with the wishes of the local Aboriginal traditional owners and other stakeholders.

2.3 ASSESSMENT OF SITES TGP-HS5 AND TGP-HS6

2.3.1 Introduction

Sites TGP-HS5 and TGP-HS6 are located within the proposed disturbance footprint of Waste Rock Emplacement 3 and would be removed as a consequence of the TGP. The two sites are within 100 metres of each other, located in a previously cropped paddock that has a history of heavy agricultural use and mining exploration. In reviewing the Cultural Heritage Assessment prepared for the TGP which documented these two sites, the DP&I concluded that insufficient information was supplied on these sites to enable determination of historic significance and therefore assess the impact of the proposed removal.

In order to provide more detailed information on the content and context of these two sites, OzArk was commissioned to complete test archaeological excavations at historic site TGP-HS6 and further investigation of site TGP-HS5. Excavations at TGP-HS6 were required to determine whether the mounded material on site is the remains of an "in-situ" dwelling or bulldozed material containing mixed objects in a secondary deposit. TGP-HS5 is a collection of agricultural machinery requiring further consideration to determine historical significance and any association with TGP-HS6.

A detailed report documenting the methodology, results and conclusions of these investigations is provided in the report entitled *Archaeological Test Excavation Report - Tomingley Gold Project: Archaeological Test Excavations at site TGP-HS6 and further investigation of site TGP-HS5, February 2012* (OzArk, 2012), provided in full as **Appendix 3**.

2.3.2 Objectives

The objectives of the investigations undertaken by OzArk were as follows.

- To excavate and investigate TGP-HS6 for evidence of a possible dwelling; relics below bulldozed material to enable a more accurate assessment of the significance of the site.
- To investigate site TGP-HS5 to determine the significance of the machinery there and the relationship of this area to TGP-HS6 (100m to the south).
- To analyse the archaeological findings.
- To use the archaeological findings from TGP-HS6 and TGP-HS5 to inform future management of the site in regards to the proposed impacts from the TGP.

2.3.3 Investigations

Field investigations to document and catalogue the two sites were undertaken on 7 and 8 February 2012. The methodology of investigations is provided in Section 3 of OzArk 2012.

2.3.4 Results

2.3.4.1 TGP-HS6

The surface material from the mounded portion of Site TGP-HS6 was primarily twisted and entwined rusted metal objects mixed with burnt wood and bricks. The twisted and entangled nature of the surface material strongly indicated that the material had been pushed up and mounded via machine action. The current landholder (Glenn Pugh), stated that the artefacts found at both TGP-HS5 and TGP-HS6 were originally strewn across the area and that he had used a bulldozer to make two separate piles five to six years ago.

The artefacts identified at Site TGP-HS6 included the following.

- Metal objects. Commonly found were twisted, heavy gauge fencing wire, as though they had held together fencing posts. Elements from a horse drawn wagon with axle wheel rims were also recovered.

  Two rusted single cast iron bed frames and broken pieces of at least one wood stove (cast iron) with lighthouse decoration were recovered, being some of the few objects that can be ascribed to a domestic rather than agricultural setting.

  Many of the elements recovered from the site were disassociated and difficult to interpret.

- Bricks. Many bricks were recovered, all appearing to be hand-made sandstock bricks (probably dating from 1850-1870, but possibly later considering the rural context) from a fire place/chimney. The bricks found had varying diamond and oval shaped indents otherwise known as frogs. The mixture of brick types, as well as the lack of any bonding holding two bricks together, increases the likelihood of these bricks being in a secondary deposit.
- Miscellanea. Small pieces of broken glass and pottery were also found scattered around the mounded area of TGP-HS6.

OzArk (2012) conclude that the excavations at site TGP-HS6 provide no definitive evidence of a structure with any "*in-situ*" elements remaining extant. More detailed descriptions of the identified artefacts are provided in Section 6.1 of OzArk (20112) (see **Appendix 3**).

2.3.4.2 TGP-HS5

This site is a collection of agricultural machinery pushed up against a large box tree. The machinery is a mixture of items, but at minimum, the following items could be discerned (or parts thereof).

- Meadow Bank Mouldboard Ploughs.
- Ballast Tank.
- H.V McKay 'Sunshine' header-harvester.
- Noxon seeder.
- A horse drawn whim.
- Miscellanea (including an unidentified heavy-duty object was found bearing the insignia of Victorian-based agricultural implement makers, T. Robinson & Co).

OzArk (2012) conclude that the machinery that comprises site TGP-HS5 is primarily agricultural, with one possible item that could have derived from mining activities. It is now understood that the machinery of this site was, up until 5-6 years ago, strewn across the surrounding paddock between TGP-HS5 and TGP-HS6, and was thus original associated with TGP-HS6. The two sites can therefore be assessed collectively due to their known connectedness, i.e. site TGP-HS5/6. More detailed descriptions of the identified artefacts are provided in Section 6.1 of OzArk (20112) (see **Appendix 3**).

2.3.5 Assessment of Significance

Neither of the sites are listed on any government heritage databases. The following significance assessment is based on the significance criteria of the Heritage Council of NSW.

- Criterion (a) – an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);

  The remains attest to the agricultural history of the area and possibly also the mining history. The remains of a possible ephemeral blacksmiths hut cannot be ruled out, but there was little direct evidence for this. Such sheds may be considered a common phenomenon on early agricultural properties, for the repair of machinery.

- Criterion (b) – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area);

  Despite considerable historical research, the items of Site TGP-HS5/6 (possible hut and agricultural machinery), cannot be seen to directly relate to this significance criterion

- Criterion (c) – an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);

  Site TGP-HS5/6 does not relate specifically to this significance criterion.

- Criterion (d) – an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;

  Site TGP-HS5/6 does not provide evidence of particular connections on a social, cultural or spiritual level to parts of the Peak Hill and Tomingley community.

- Criterion (e) – an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area)

  As the remains of the possible hut of TGP-HS6 bear no foundation evidence and as excavations have been undertaken, OzArk (2012) concludes that there is no further information to be gleaned from the site to relate to the cultural or natural history of the area.

- Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).

  Site TGP-HS5/6 does not contain uncommon, rare or endangered aspects of the local area's history.

- Criterion (g) – an item is important in demonstrating the principal characteristics of a class of NSW's:
  - cultural or natural places; or
  - cultural or natural environments; or
  - a class of the local area's:
    - cultural or natural places; or
    - cultural or natural environments.

  TGP-HS5/6 does not demonstrate the principal characteristics of a class of NSW's or the local areas cultural or natural place

OzArk (2012) concludes that Site TGP-HS6 is of limited local interest. Nothing recovered demonstrates in situ structures although an ephemeral hut cannot be completely ruled out. If one did exist, it is so destroyed as to be now impossible to interpret.

OzArk (2012) indicate that sufficient material has been obtained and documented from the site for recording purposes and as there is none to limited local historical significance for both sites there is no need for a management plan for these sites.

3. GOVERNMENT AGENCY SUBMISSIONS

3.1 INTRODUCTION

The following sub-sections present the submissions received from seven government agencies and authorities (in *italics).* A response to each issue raised is presented (in normal text). Where one of the specialist consultants identified in Section 1 has provided the relevant response, reference to this consultancy is made. Where text has been drawn directly from the Environmental Assessment, it is identified in *underlined italics*.

3.2 Narromine Shire Council

3.2.1 Introduction

Narromine Shire Council provided a submission to the Director-General of DP&I (dated 19 December 2011) raising issues related to environmental, social, and economic impacts discussed in the EA.

In the submission, Narromine Shire Council states that the TGP has merit as a development within the Narromine Shire LGA, however, the support of Council is contingent upon agreement being reached on two key issues, namely:

1. that the Proponent makes a fair and equitable financial contribution to Council. reflective of the impacts of the development on local infrastructure and services; and
2. that the safeguards to be included in any planning consent are sufficiently comprehensive and robust to protect the residents and local community of the village of Tomingley from any adverse environmental, social and economic impacts.

The following paraphrases the submission of Narromine Shire Council in relation to the two key issues noted above and provides a formal response for each specific environmental, social or economic issue raised or statement made.

It is noted that in order to progress the development of an acceptable arrangement between the Proponent and Council over community contributions, representatives of the Proponent met with Council officers on 13 January 2012. The responses contained within this document reflect the discussions held during this meeting and subsequent correspondence between the Proponent and Narromine Shire Council. The Council agreed to provide Alkane with a draft Voluntary Planning Agreement detailing its position and all financial and other obligations it expects Alkane to meet, by 1 February 2012 and to meet again on 8 February 2012 for further discussions. Resolution to some of the issues raised remains outstanding, however, these will be incorporated into a Voluntary Planning Agreement to be negotiated between the Proponent and Council. Reflecting this, the Proponent has included an additional commitment to achieving a Voluntary Planning Agreement with Narromine Shire Council prior to the commencement of mining (Commitment 17.7).

3.2.2 Council Road Infrastructure

Narromine Shire Council wrote:

"In general terms, Council requires the Proponent to meet all additional costs associated with local roads impacted by the project. Such costs include road infrastructure upgrades and ongoing repairs and maintenance for the duration of the project. Thus Council requires an agreement with Alkane Resources regarding the detailed terms and conditions regarding road infrastructure matters before any planning consent is issued.

The Proponent plans to upgrade 1.6 km of the Tomingley West Road and build a substantial intersection with the new main site access road. This intersection is to be constructed as per Part 4 of Austroads (2009) standard and sealed. Council understands that Alkane Resources proposes to pay for and undertake upgrading works to the 1.6 km of Tomingley West Road as follows:

1. *Geotechnical investigations into the current pavement depths, materials and subgrade conditions and determine if pavement modification or strengthening is required;*
2. *Pavement modifications or strengthening works so required;*
3. *Construction of a sealed road with two lanes each at least 3 m in width;*
4. *Installation of line marking;*
5. *Installation of road guide posts;*
6. *Installation of more guide posts on the Gundong Creek culvert crossing; and*
7. *Placement of "narrow bridge" signs on the approaches to the Gundong Creek culvert crossing.*

Council supports items listed 1 to 5 above, however Council requires an upgrade of the culvert on Gundong Creek such that it provides for two lanes, each with sufficient width to allow heavy vehicles carrying oversized equipment to pass safely. The present culvert was not designed to accommodate large numbers of heavy vehicles. Also, the culvert is close to the intersection with Narromine Road, thus there is limited sight distance turning onto Tomingley West Road from Narromine Road. Both matters are safety concerns that necessitate the culvert upgrade. Council also seeks to reach an agreement with the Proponent whereby the Proponent pays for the ongoing damage repair and maintenance costs of this 1 .6 km section of Tomingley West Road for the duration of the project."

Response

The Proponent has committed to meet the cost to upgrade part of the Tomingley West Road, as nominated in 1 to 7 above, and repair and maintain this section of road as required.

The Proponent remains firm in the assertion that, due to the limited heavy vehicle movements to and from the Mine Site, it is very unlikely that two heavy vehicles would pass over the culvert and therefore that the cost to widen it is unjustifiable. Furthermore, traffic at this point will be relatively slow as it is close to the recently upgraded intersection of the Tomingley West Road and the Narromine-Tomingley Road. The Proponent is committed to maximising road safety and believes that installing a safety barrier on the culvert and "narrow bridge" signage on both approaches adequately addresses safety concerns.

As an agreed outcome of the January 13 meeting between the Proponent and Council, Council agreed that usage of other roads would be monitored to measure the effect of project related traffic, if any, before determining what costs should be met by the Proponent.

Narromine Shire Council also wrote:

Furthermore, Council also wishes to reach an agreement with the Proponent regarding:

a) The adequacy to both parties of the intersection with the Tomingley-Narromine Rd (Main Rd 89). If it is not deemed satisfactory to both parties then it will be necessary to determine what alterations are required. The Proponent would be required to pay for any upgrade works together with ongoing repairs and maintenance for the life of the project. Council needs to be satisfied that the intersection subgrade and pavement surface is sufficiently robust to withstand sharply turning heavy and oversize trucks; and

b) Financial contributions to other roads consistent with usage generated by the project.

Response

With reference to the adequacy of the intersection between Tomingley West Road and the Narromine-Tomingley Road, it is noted that this intersection was recently upgraded (by the RTA). The Proponent subsequently engaged Macquarie Geotech to undertake Benkeleman Beam Testing of this intersection in December 2011. A letter report prepared by Macquarie Geotech (dated 16 January 2012) confirms that this section of road is Class 7 and has been built to above specification standards with an average deflection of 0.35mm, thereby addressing Council's concerns over the 'robustness' of the intersection subgrade and pavement surface. The letter report of Macquarie Geotech is provided as **Appendix 4**.

As stated above, the Proponent has committed to meeting the costs to repair and maintain this section of the Tomingley West Road.

With respect to Proponent contributions to other roads, Council agreed at the meeting of 13 January 2012 that usage of other roads would be monitored to measure the effect of project related traffic, if any, before determining what costs should be met by the Proponent.

3.2.3 Water Resources Management

Narromine Shire Council wrote:

"Council notes that the Proponent plans to fund and construct a water pipeline from the "Woodlands" property, seven km east of Narromine to the project site, in a corridor 46km long and 5 m wide within road and rail reserves. Council understands that the water source will be groundwater (accessing up to 1,000 ML per annum - 878 ML/yr for processing, 60ML/yr for dust suppression (p 2-57) and 1.2 ML pa for potable use (p4 - 70))."

"Council also notes that the NSW Government has agreed to provide financial assistance for a proportion of the water and infrastructure costs for the project, budgeted at $9.7 M. (We understand that the Government funds will assist in upgrading electricity supply to the mine site, comprising construction of a 66Kv electricity transmission line from the Peak Hill Substation and transformer at the mine substation and construction of a 22kV electricity distribution line of 950 metres to the water bore on "Woodlands"). We seek further details of this arrangement to understand how NSW taxpayers' dollars are being allocated, and the implications that may have for Council - Alkane Resources negotiations."

Response

The infrastructure grant amount is confidential at this point in time and is significantly less than the $9.7M referenced by Council.

The Proponent has not been advised, and therefore cannot provide further information on the proportion of NSW funds allocated to the water pipeline.

Narromine Shire Council also wrote:

"Council notes that the Proponent commits in the EA to 'make available' surplus water for Tomingley village for domestic purposes during the life of the project (p 4-217), and after mine closure the pipeline will remain and be 'potentially available for other developments' (p 2-10). Council understands from a meeting with Alkane Resources on the 15th December 2011 that the surplus water and the pipeline post closure would be donated free of charge to Council. Whilst Council appreciates the Proponent's offers in this regard, Council also needs to consider:

a) How water from the pipeline would be reticulated throughout Tomingley and how it would be treated and at what cost; and

b) What condition the pipeline will be in at the end of mining life; what the ongoing repair and maintenance and any upgrade costs may be. In essence Council needs to determine its policy position on the matter.

Response

The Proponent has never committed to, or suggested that it would undertake responsibility for the reticulation of water within Tomingley nor treatment of the water. The Proponent's offer simply recognises that at the conclusion of the Project, infrastructure of potential value to Tomingley village could be utilised by Council to assist in maintaining water security to this community.

Following from the noted 13 January 2012 meeting, the Proponent agreed to review the design specifications and obtain indicative costing to install a pipeline with a 50 year life. Geolyse were subsequently commissioned to complete the design review and comment on the likely post-mining life of the Tomingley-Narromine Water Pipeline (TNWP) and associated infrastructure, and likely future repair and maintenance costs. The review completed by Geolyse is provided as **Appendix 5**, with the results summarised as follows.

- Given the water to be pumped would not be abrasive (non-turbid), and the non-aggressive nature of the soils (near neutral pH), the life expectancy of the HDPE pipeline would be in the order of at least 50 years.
- Valving and pump station components typically have a serviceable life of 5 to 15 years in applications where non-turbid, non-aggressive water is being pumped. The valving and pump station components would either be replaced or left in fair condition allowing for a further 10 to 12 years of operational service.
- It is assumed that the TNWP in its entirety would be in good condition at the conclusion of the 10 to 12 year operational period. Pipeline annual maintenance costs are typically budgeted as a percentage of the initial capital investment. Depending on the complexity of the pipeline system, maintenance budgets vary from 0.5% to 3% of the initial capital investment. Given the simple nature of the TNWP, an annual average maintenance cost of around 1% of initial capital investment would appear reasonable. This equates to $50,000pa (based on the capital investment attributed to the TNWP - $5.2M). It is noted that this cost assumes that the volume of water delivered by the pipeline is at maximum capacity, i.e. 1,000ML, however, average maintenance costs will ultimately be influenced by the actual volume of water delivered. As the volume of water likely to be delivered post mining will be much less than that during the life of the Project, it is expected that the annual maintenance costs will be similarly reduced.

The review by Geolyse indicates that the TNWP and associated infrastructure **would** provide an asset as opposed to a liability to Narromine Shire Council as suggested in the *Environmental Assessment*. The Proponent is prepared to decommission the pipeline and remove pump station infrastructure at the conclusion of the Project (should Council choose not to utilise this infrastructure following the cessation of the Project), however, the Proponent believes there is far greater value in providing this infrastructure to Council. Further discussion of this issue has been deferred to a meeting planned for 8 February 2012.

Narromine Shire Council also wrote:

> *"Because of the open cuts, the lateral extent of the groundwater drawdown cone is predicted to be between 2.3 km and 5.6 km- depending on the geology (p 4-86). Council requires confirmation from the Proponent that there will be no reduction in the yield or quality from Council's groundwater bores in the Gundong Creek Alluvium. To this end, Council requires that there be a consent condition that stipulates that Council's water supply on Gundong Creek will not be compromised by the mine and if it is then "make good" provisions will apply at no cost to Council".*

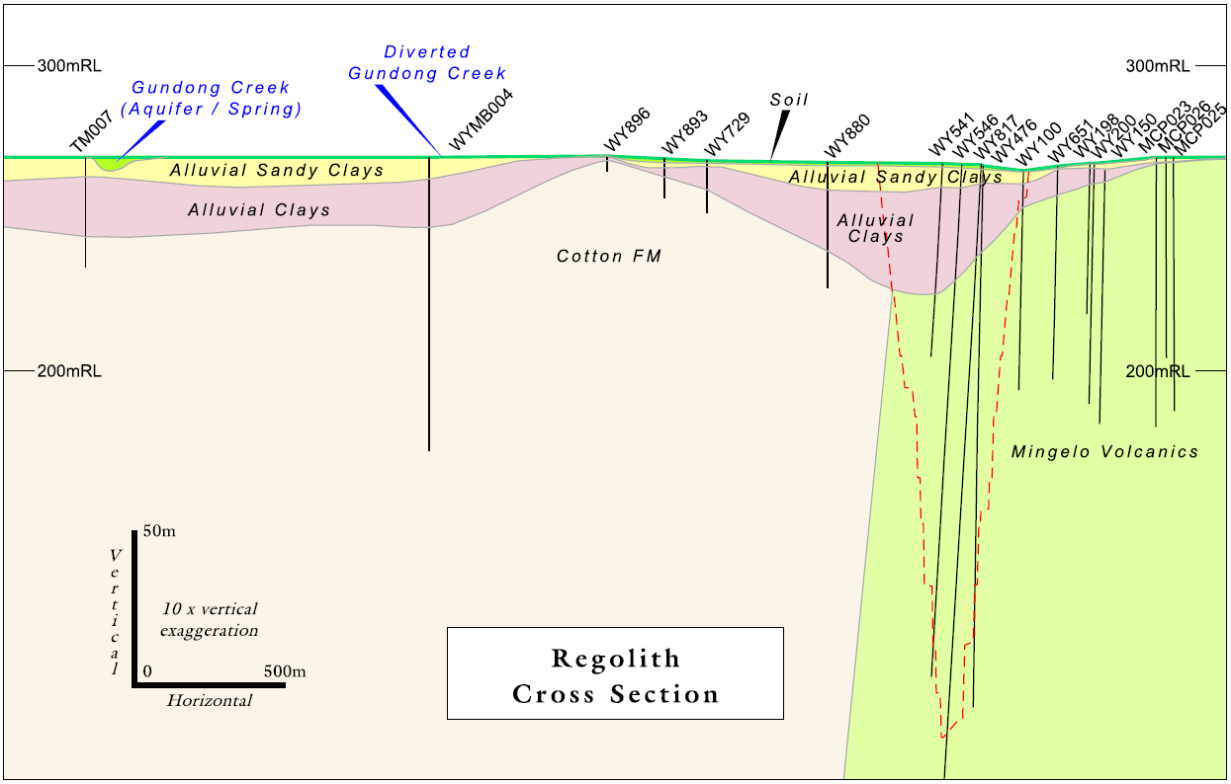
Response

Section 4.4.7.1 of the *Environmental Assessment* provides the explanation as to why the proposed mining operations will not affect the Council bores in the Gundong Creek Alluvium. The relevant text from Section 4.4.7.1 is reproduced here.

> ***Shallow Alluvium Aquifers***
>
> *Impax (2011) concludes that the Project is unlikely to have any adverse impact on the groundwater contained within the shallow alluvium of Gundong Creek for the following reasons.*

- *No groundwater has been identified in shallow alluvium or clay material in any of the exploration holes drilled within the Mine Site. These observations indicate that there are no significant aquifers located in shallow alluvium within the vicinity of the proposed open cuts.*
- *The alluvium of the Mine Site and surrounding areas is located within well-defined palaeochannels. Therefore, if groundwater was drained from alluvium adjacent to the open cuts the effects of this dewatering would only propagate as far as the palaeochannel boundary (the nearest bedrock high). As such, potential dewatering of alluvium at the Mine Site (if groundwater is encountered) is not expected to propagate off the Mine Site, and is unlikely to impact on other potential users of groundwater within the underlying alluvium.*

Figure 4.20 of the *Environmental Assessment* (reproduced below) illustrates in cross-section the positioning of the Cotton Formation bedrock between the Mine Site paleochannel alluvium and Gundong Creek alluvium within which the Council bores draw water.



Source: Alkane Resources Ltd

Figure 4.20
GEOLOGICAL CROSS SECTION IDENTIFYING AQUIFERS

Narromine Shire Council also wrote:

> *"Figure 2.1 shows the Eastern Surface Water Diversion Structure appearing to catch and transfer water from a large catchment area to a discharge point adjacent to the Newell Highway. Council seeks advice as to the discharge arrangements for this water and its possible impact on the Newell Highway (eg culvert capacity, flow paths, etc)."*

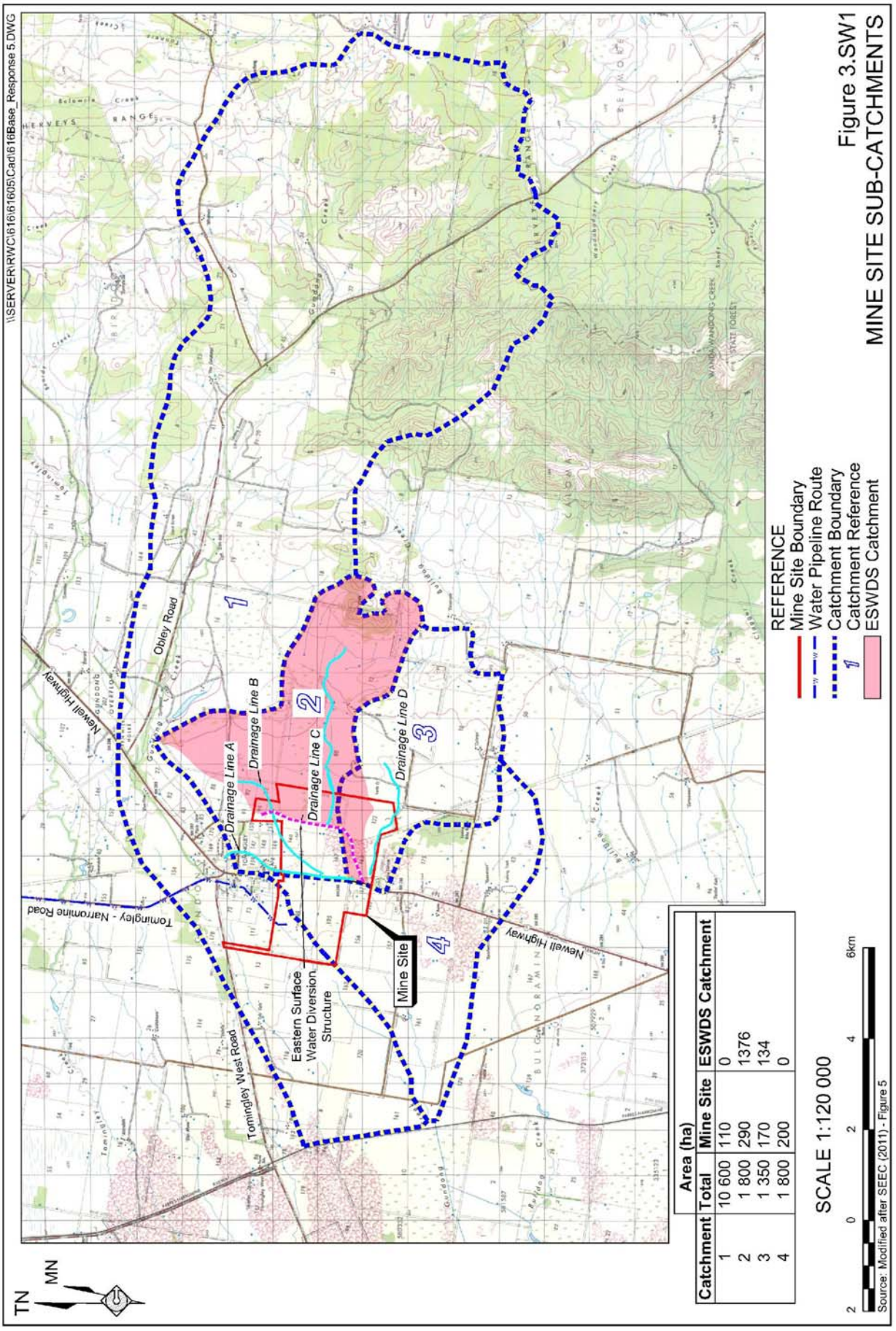
Response

Authors of the Surface Water Assessment *(Part 2* of the *Specialist Consultant Studies Compendium* accompanying the *Environmental Assessment*), SEEC, have assisted in the preparation of the following response to this issue.

The Eastern Surface Water Diversion Structure (ESWDS) is located within Mine Site Catchments 2 and 3, and would convey surface flows from approximately 75% of Catchment 2 and 10% of Catchment 3 (affecting Drainage Lines B, C and D) (see **Figure 3.SW1**). The diverted flow would be discharged to the east of Newell Highway between the two existing culverts (nominated as Culverts 1 and 2 on Figure 7 of the Surface Water Assessment).

Notably, this provides a similar (but slightly reduced volume of water to these culverts as currently occurs, i.e. all flows from Catchments 2 and 3 travel in a roughly westward direction across the Mine Site until they reach the Newell Highway, where the highway itself acts to divert flows to the south and into the aforementioned culverts. As a result, the proposed eastern surface water diversion would not increase the catchment size or volume of water reporting to these culverts. In fact, by virtue of the water capturing structures such as the Caloma open cuts and sediment basins, the volume of water reporting to the Newell Highway culverts would be reduced.

Anecdotal evidence noted in Surface Water Assessment prepared by SEEC, which Council would be aware of, notes that these culverts are periodically overtopped, with short-term (less than 3 hours) flooding over the highway. It is likely that during high rainfall and runoff periods, a similar level of flooding would be experienced. Therefore, given the lack of change to the local catchments reporting to these culverts, it is highly unlikely that the proposed water management measures proposed for the Tomingley Gold Project would alter the existing hydrological regime at this point.


\\SERVER\RWC\616\61605\Cad\616Base_Response 5.DWG
Figure 3.SW1
MINE SITE SUB-CATCHMENTS
REFERENCE
Mine Site Boundary
Water Pipeline Route
Catchment Boundary
Catchment Reference
ESWDS Catchment
Drainage Line A
Drainage Line B
Drainage Line C
Drainage Line D
Obley Road
Newell Highway
Tomingley - Narromine Road
Tomingley West Road
Eastern Surface Water Diversion Structure
Mine Site
1
2
3
4
Area (ha)
Catchment | Total | Mine Site | ESWDS Catchment
1 | 10 600 | 110 | 0
2 | 1 800 | 290 | 1376
3 | 1 350 | 170 | 134
4 | 1 800 | 200 | 0
SCALE 1:120 000
2 0 2 4 6km
Source: Modified after SEEC (2011) - Figure 5
TN
MN

3.2.4 Financial Contributions to Narromine Shire Council

Narromine Shire Council wrote:

> *"…the infrastructure funding needs of resource regions throughout Australia far surpasses the funding that mining companies have contributed to date.*
>
> *Narromine Shire Council is keen to avoid making that mistake and wishes to ensure it derives direct and appropriate financial benefit from the proposed Tomingley Gold Mine, consistent with its needs to provide the social and hard infrastructure required to support the mining activities.*
>
> *Council understands the socio-economic features of the proposed gold mine…and seeks clarification of the following matters:*
>
> *a) What is the total amount of gold to be extracted, including the Caloma 2 reserve?*
>
> *b) Does the $90 Mil capex include development of the Caloma 2 reserve? If not, what is the capex when Caloma 2 is included?;*
>
> *c) Given the amount of gold to be extracted from Caloma 2 is not declared in the EA, do the impact assessment predictions for the project address the development of three or four gold deposits (eg overburden placement, tailings volumes, noise, dust and visual impacts, etc)?"*

Response

The total recoverable amount of gold is currently estimated to be 360,000 ounces, excluding Caloma Two which has yet to be quantified.

The capex, based on the method of calculation used by the DP&I, has been revised downwards to approximately $75.45M. Capital expenditure to develop Caloma Two will be minimal. It is expected that Caloma Two, if developed, will extend the mine life by 6 months.

The inclusion of the Caloma Two open cut in the assessment of the Tomingley Gold Project was referenced in Section 2.1.2 of the *Environmental Assessment* (p.2-6) which stated.

> *It is noted that the design of the proposed Caloma Two Open Cut is an indicative design only, with additional drilling required to further define the mineralisation. As a result, the indicative design for the Caloma Two Open Cut presented in this document represents the maximum area that would be developed. The development of this maximum impact footprint has been taken into account in all other aspects of the Project, including the required capacity, layout and design of the waste rock emplacements and residue storage facility. Approval is sought for the proposed design, acknowledging that the final design of the open cut would be the same size or smaller than that displayed on* ***Figure 2.1****.*

The footprint of the Caloma Two Open Cut was considered in all specialist assessments (***Figures 4.21, 4.23, 4.26, 4.31*** *&* ***4.37*** of the *Environmental Assessment* illustrate how the Caloma Two Open Cut was considered in assessing impacts).

Narromine Shire Council also wrote:

"On page 2-59 of the EA it states that the 'Council rates and community contribution' to be provided by Alkane Resources will amount to $35K pa and $254K over the life of the mine. Council believes this financial contribution offer by the Proponent is unreasonably low. It believes a more appropriate and equitable figure is at least 1 % of the $90 – 100 Mil capital cost, namely about $1 Mil over the life of the project. Such an amount is more in line with current state planning policies and precedents. In addition, a mining rate will be applied to the mine site land at Tomingley.

"Council seeks therefore to establish a Planning Agreement with Alkane Resources whereby:

a) Financial contributions are agreed for the upgrading, repair and maintenance of various roads and intersections for the life of the mine;

b) Financial and technical arrangements are determined regarding the water pipeline during and after mining operations, for water that might be taken from the pipeline for use by Tomingley residents and the treatment and reticulation of this water supply for the town;

c) Appropriate waste management strategies and fees are determined for the various types and volumes of waste generated by the mine, together with the wastes generated by Tomingley residents, such that the town may receive an improved waste management service; and

d) Financial contributions for general community enhancement to address social amenity and community infrastructure requirements arising from the project. Agreed contributions are to be as per March 2012 and are to be CPI indexed each year."

Response

The Proponent accepts that a mining rate will be applied over relevant land of the Project and that the annual rates will therefore be greater than the quoted $35Kpa. The Proponent does not agree that a Voluntary Planning Agreement contribution equivalent to 1% of CIV is "*more in line with current state planning policies and precedents*" and a review of the executed VPA's on the Department of Planning & Infrastructure's website confirms this.

The above notwithstanding, the Proponent is committed to reaching agreement with Council over an appropriate and equitable community contribution which reflects both the scale of impacts and those most affected by the Project. With respect to points a) to d) raised by Council as components of a Planning Agreement, the Proponent responded as follows at the meeting of 13 January 2012.

a) The Proponent agrees to this, subject to monitoring the effect of Project-related traffic on road conditions as noted in Section 3.1.2.

b) This remains the subject of negotiations between the Proponent and Council, however both parties remain committed to reaching a mutually acceptable position. The issue will be discussed further at the planned meeting between the Proponent and Council on February 8.

c) The Proponent agrees to this component of a planning agreement.

d) The Proponent continues to negotiate an appropriate contribution with Council but remains committed to ensuring that this adequately reflects both the scale of impacts and those most affected by the Project.

3.2.5 Management of Potential Adverse Impacts on the Residents of Tomingley Village

Narromine Shire Council wrote:

"In evaluating the EA Council is concerned that the residents of Tomingley will be exposed to potential impacts that will compromise their quality of life… To this end Council is concerned about the following:
*a) **Noise** & **Blasting Impacts***
Council is concerned to ensure that the onus is not unfairly placed on aggrieved residents to negotiate noise mitigating controls, for instance air conditioning, double glazing or noise retarding fencing."

Response

The Proponent has a proven track record of operating as part of a small community (at nearby Peak Hill). The Proponent recognises that in negotiating compensatory measures, such as those nominated by Council, the negotiations must be undertaken in a non-adversarial manner as far as possible.

The above notwithstanding, the Proponent recognises that the DP&I is likely to apply conditions of approval requiring the satisfaction of specified noise criteria or attainment of negotiated agreements. Furthermore, the approval is likely to include dispute resolution conditions where the onus is placed on the Proponent to demonstrate adequate compensation or mitigation of impacts.

Narromine Shire Council also wrote:

"Blasting will occur 9am-5pm six days per week, with the closest residence to blasting sites being some 700 m away (p 4-185). Council seeks to have this distance reassessed as it appears from the diagrams that Residence No 3 in Tomingley is only 500 m from the Caloma 1 Pit. There will be ground and air vibration from blasting and there is a risk (albeit slight) of structural damage to buildings and subsidence of land in the village due to the collapse of historic mine workings under the village. Council requires the inclusion of a consent condition that protects residents and landowners in the event of subsidence and structural damage to buildings and other infrastructure, together with 'make good' provisions."

Response

The distance between R3 and the most proximal blast within Caloma Open Cut has been reviewed and can be confirmed as approximately 700m (it is noted that blasts will not be required from the very outer perimeter of the open cut as initial excavation of waste rock will be undertaken by rip, load and haul methods).

The above notwithstanding, the Proponent accepts that each blast will have to be designed to meet the nominated ground vibration and air overpressure criteria and that monitoring of each blast will also be required to demonstrate compliance.

Narromine Shire Council also wrote:

> *"Council believes noise compliance will be difficult because the proposed measures relying part on daily management of the use of plant and equipment, with adjustments required especially for night-time operations. Such a measure is considered likely to pose major logistical challenges and we seek demanding consent conditions applied to protect our citizens and ratepayers from noise and blasting impacts.*

Response

The Proponent recognises that operations will have to be managed effectively to ensure that the noise levels nominated in the *Environmental Assessment* can be achieved. The Proponent accepts this and has committed to implementing real time noise monitoring to both assist in operations management (to reduce noise levels received) and demonstrate achievement of the noise levels predicted by modelling and nominated in the *Environmental Assessment.*

Narromine Shire Council also wrote:

> *b) **Dust Impacts***
>
> *"Whilst the EA states there will be minimal increase in dust levels (p 4-181) with exceedances at up to six houses one day every 3-4 years (p 6-28), Council is concerned however that, given the close proximity of the mine to the village, there is likely to be some increase in dust on occasions, and that the amount will vary depending on the seasons/weather conditions and the stage of operations of the mine. Council requires consent conditions to be applied that are rigorous enough to protect citizens and ratepayers from dust nuisance and amenity impacts."*

Response

The Proponent agrees that dust emissions will be noticeable on occasions and as a result of local meteorological conditions conducive to dust generation and dispersion. However, varying dust deposition levels are already a feature of the local setting with dust emissions increasing during the hotter and drier summer months or during periods of increased agricultural activity. The Proponent is comfortable accepting rigorous conditional requirements (in line with the relevant NSW guidelines) for maintaining local air quality.

Narromine Shire Council also wrote:

> *c) **Visual Impacts***
>
> *"Waste rock (spoil) emplacements numbered 2 (west of the highway) and 3 (east of the highway) will abut the southern edge of Tomingley village. They will be built to a maximum height of 40 m, with a 15 m acoustic and visual bund on the northern edge of the stockpiles. This vista represents a dramatically different one compared to the current landscape (see Figure 4.34).*

Clearly the post-mining visual profile from the town looking south will be significantly different. Night time lighting from the mine during its lifetime will also be evident. Robust consent condition safeguards are required to prevent excessive illumination."

Response

The impact associated with the change in visual outlook from the southern outskirts of Tomingley village was considered in the *Environmental Assessment*. Subject to the implementation of the nominated mitigation measures (*Section 4.8.3* of the *Environmental Assessment*), the following conclusion was made (see *p. 4-166* of the *Environmental Assessment*).

> *…… the visual amenity in the vicinity of the Mine Site would be altered through the addition of three waste rock emplacements and the RSF. However, the impacts of that change to the existing visual amenity would be minimised as far as practicable through the construction of amenity bunds and early commencement of amelioration and rehabilitation. Furthermore, the Proponent would seek to address individual concerns in relation to impacts on visual amenity through discussions and negotiations with individual residents.*

The Proponent would operate lights on the Mine Site is such a way as to direct these towards the ground and away from the village of Tomingley as far as practicable. The creation of a glow above the mine is recognised as an unavoidable impact associated with 24 hour mining operations.

Narromine Shire Council also wrote:

d) ***Water Impacts***

"Given that gold processing activities will occur at the site, Council seeks the assurance of comprehensive and robust water quality safeguards to mitigate the risk of pollution of groundwater and/or surface water due to the leaching of cyanide contaminants from the slurry stockpile and acid mine drainage from waste rock. We also wish to ensure that birds and animals are protected from cyanide-contaminated water.

The EA states there are no registered users of groundwater from deep fractured rock aquifers within 10 km of the mine (p 4-89). Council wishes this statement to be verified by the state water authorities to ensure that no farmer's bores will be adversely affected by the water drawdown cone in the fractured rock that, according to the EA, extends from 2.3 km to 5.6 km".

Contamination of groundwater as a result of leaching of contaminants from the RSF and/or dams containing saline or process water is highly unlikely as each of these structures would be constructed within compacted clay (with a permeability of $<1 \times 10^{-9}$m/s) and/or incorporate an impermeable plastic liner. The design, construction and management of these ponds is discussed in further detail in Section 3.4.2.1 in response to issues raised by the Office of Environment & Heritage.

The Proponent, through consultation with the local community and surrounding land owners is confident if any unregistered bores occur within 10km of the Mine Site, these would have been identified. It is further noted that the NSW Office of Water has not raised the potential of unregistered bores sourcing water from the deep fractured rock aquifers within 10km of the Mine Site adding validity to the claims made.

3.2.6 Planning Agreement

Narromine Shire Council wrote:

"As mentioned, Council requires a Planning Agreement with the Proponent whereby the matters mentioned above are addressed. The Planning Agreement shall also contain the following elements:

a) The Agreement is strictly limited to the scope and intent of the proposal as outlined in the current EA. Council reserves the right to modify and amend the Agreement in the event of any change in the scope or intent of the project or there is any subsequent expansion or modification of operations;

b) The Agreement will be subject to amendment when the gold resources in Caloma 2 are fully defined and quantified; and

c) Council reserves the right to modify and amend the Agreement in the event of any change in ownership of the Company."

Response

The Proponent accepts the more general elements nominated (subject to the establishment of a reasonable planning agreement that reflects both the scale of impact and those most affected by the Project). The Proponent has committed to the preparation and implementation of a Voluntary Planning Agreement (Commitment 17.7).

3.2.7 Transparency in Department of Planning and Infrastructure Deliberations

Narromine Shire Council wrote:

"Council seeks close co-operation and dialogue with the Department as it deliberates on the mine proposal. To this end we request:

a) A meeting with the Department to discuss this Submission during its evaluation of the EA and other submissions;

b) Receiving a copy of the Proponent's response to all submissions; and

c) Receiving a copy of any draft consent conditions at the same time that they might be forwarded to the Proponent for comment.

These steps are important to Council as we wish to be kept fully informed and engaged in the planning decision process."

Response

This is a matter for the DP&I and Council.

3.3 PARKES SHIRE COUNCIL

3.3.1 Introduction

Parkes Shire Council provided a submission to the Director-General of DP&I (dated 2 December 2011). The following paraphrases the key issues raised in the Parkes Shire Council submission and provides the formal response of the Proponent to these.

3.3.2 Socio-Economic Assessment

Parkes Shire Council wrote:

> "*… The EA makes the assumption that employees of the mine will not move to Peak Hill but rather will commute from Dubbo or Narromine. While the EA does acknowledge that some people already living in Peak Hill may be employed at the mine, the possibility of an influx of new residents to Peak Hill has not been considered. Council respectfully requests that the application provide further detail on the socio-economic impacts, including the impact this potential influx could have on service and infrastructure enjoyed in the Township by its residents.*"

Response

The Proponent stands by the assessment of the socio-economic impacts of the Tomingley Gold Project (see Section 4.14.3 of the *Environmental Assessment*) though will concede it could have made more obvious the minimal negative impacts on existing infrastructure in the Parkes Shire.

With respect to the impact of a potential increase in new residents within Peak Hill, the Proponent provides the following additional information.

A full time equivalent workforce of up to 100 people may be employed during the 12 month construction period of the Project. The construction phase of the Project will be made up of several discrete projects employing contractor teams which will likely use motel accommodation in Peak Hill, Tomingley, Narromine and Dubbo. Construction workers will also be sourced locally wherever possible, however, due to the temporary nature of the construction phase, it is anticipated that these employees will commute daily from their current place of residence (Peak Hill, Parkes, Narromine, Dubbo and Tomingley) rather than relocate to Peak Hill.

Peak Hill has three motels (40 rooms), two caravan parks with 10 units, and two en-suite vans plus powered sites. Tomingley has 26 rooms and can sleep 53 people. The Proponent has also been contacted by rural property owners offering cottages and farmhouses for rent. Together with existing accommodation in Narromine, Parkes and Dubbo there will not be a shortage of accommodation for the construction workforce. Rather than placing a burden on the township of Peak Hill, the arrival of the construction workforce and increased demand for local (motel or other temporary) accommodation, goods and services is considered to be of net benefit to the business operators within Peak Hill

The permanent workforce for the Project is estimated to be between 85 and 90 and it is the preference of the Proponent to source the majority these people locally. Only those specialised,

highly technical or highly skilled positions for which no appropriately qualified local people are available will be filled by people who will migrate to one of the surrounding towns. Of those local employees, it is anticipated that a large proportion will be drawn from Dubbo and the immediate surrounds and it is again expected that most will commute from their current place of residence to the Mine Site.

Depending on lifestyle preference, it is possible that some employees who currently reside in the larger centres of Dubbo, Narromine or Parkes may choose to relocate to be closer to the Mine Site, i.e. Peak Hill or Tomingley. It is also possible that a proportion of the employees sourced from outside the region will wish to live in closer proximity to the Mine Site than Dubbo. Community amenities are more abundant in the larger centres, however, those facilities come with a higher cost of housing and a longer daily commute to the Mine Site.

The Proponent has reviewed the available accommodation in Peak Hill and notes that there are approximately 24 houses in Peak Hill for sale (from $75,000 to $299,000). There is also rental accommodation available. This indicates two things.

1. Should some employees wish to reside in Peak Hill, they could be easily accommodated.
2. As new housing is unlikely to be required, the existing infrastructure and services should be sufficient to cater for a 'filling' of the vacant housing.

As noted above in relation to the construction workforce, it is also expected that an influx of residents to Peak Hill would provide a net benefit to the town through increased patronage of local businesses and community groups.

While the Tomingley Gold Project will be a small mine development when compared with Cadia Valley Operations, North Parkes Mines and Cowal Gold Mine, it will provide a 10 year opportunity to boost economic activity through employment and flow on services. These benefits through boosted economic activity are likely to be shared between the local government areas of Narromine, Parkes and Dubbo City. Furthermore, the Proponent has a proven track record of integrating and benefiting the local community within which it operates (as demonstrated by its contribution to the Peak Hill community over the life of the Peak Hill Gold mine, 1996-2005). It is also notably that the Proponent has continued to support Peak Hill's community through sponsorship of the Peak Hill Show, sporting clubs, the Open Cut Gallery, Peak Hill FM and others.

On the basis of the above, while there could be a small influx of employees to Peak Hill:

- the proportion of the workforce is anticipated to be relatively modest:
- there is existing capacity for both temporary (motel, caravan, etc) and permanent accommodation for such a modest influx;
- the availability of this accommodation suggests that existing infrastructure and services should be sufficient; and
- the influx of residents (both temporary and long-term) within Peak Hill is likely to be of net benefit to business operators, the local community and the LGA.

3.3.3 Road Haulage

Parkes Shire Council wrote:

> "*Council would also like to advise that the Tomingley West Road is a B-Double road in the Narromine Shire, but when the road crosses in the Parkes Shire, it is not a B-Double approved route and there are legislative restrictions associated with this. This should be considered when considering haulage.*"

Response

The Proponent notes that Tomingley West Road is not a B-Double road in the Parkes Shire and confirms that it will not be used for road haulage of products, reagents or equipment.

3.4 OFFICE OF ENVIRONMENT AND HERITAGE (ENVIRONMENT PROTECTION AUTHORITY)

3.4.1 Introduction

The Environment Protection Authority (EPA) of the Office of Environment and Heritage (OEH) provided a submission to the Director-General of DP&I (dated 15 December 2011) stating its determination to support the proposal subject to amendments to the draft Statement of Commitments and the Proponent further clarifying issues related to biodiversity, groundwater, hazardous material management, waste, air, noise and surface water raised in the *Environmental Assessment*.

The following paraphrases the key issues raised in the OEH submission and provides the formal response of the Proponent to these.

3.4.2 Proposed Amendments to the Draft Statement of Commitments

3.4.2.1 Hazardous Chemicals and Waste Management

The EPA wrote:

> *"The EPA recommends an additional heading be created for "Hazardous Chemical and Waste Management". The EPA also recommends that a commitment be added to this section to read:*
>
> > *"Sodium Cyanide and other Toxic Chemicals will be stored in accordance with the requirements of AS/NZS 4452- The Storage and Handling of Toxic Substances."*
>
> *The EPA notes storage requirements for sodium cyanide and other toxic chemicals may not have been satisfied by the measures outlined in the EA."*

Response

The recommended commitment has now been included (see Section 5 – Commitment 15.1).

The EPA also wrote:

"The EPA also recommends that a commitment be added to this section to read:

"A Reagent Management Plan will be prepared prior to commencement of Works."

The EPA also recommends that the timing for the above commitment reads:

"Following Project Approval and prior to commencement of Works."

The EPA also recommends that a commitment be added to this section to read:

"The Reagent Management Plan will identify measures that would be implemented to ensure the appropriate transportation, handling, storage and use of this material."

Response

The Proponent has added a commitment to preparing a Reagent Management Plan, specifying that the plan will "*identify measures that would be implemented to ensure the appropriate transportation, handling, storage and use of this material*" (see Section 5 – Commitment 15.2). The Proponent has proposed that the timing for the above commitment be "*prior to the acceptance and storage of chemical reagents onto the Mine Site*".

The EPA also wrote:

"The EPA recommends an additional commitment be added to this section to read:

"Dangerous Goods will be transported in accordance with the requirements of the "Australian Code for the Transport of Dangerous Goods by Road and Rail-Current Edition."

Response

The recommended commitment has now been included (see Section 5 – Commitment 15.3).

3.4.2.2 Groundwater

The EPA wrote:

The EPA recommends an additional commitment be added to this section to read:

"Undertake monitoring of groundwater underlying and in vicinity of potentially polluting surface infrastructure to ensure groundwater is not polluted."

Response

As per Commitment 15.1 (see Section 5), sodium cyanide and other toxic chemicals will be stored in accordance with the requirements of *AS/NZS 4452 - The Storage and Handling of Toxic Substances*, within bunded, low permeability compounds. This will effectively eliminate the risk of contamination through leaching to soil and groundwater.

The potential for pollution by leaching of contaminants (including saline water) from the Raw Water Dam, Process Water Dam and Dewatering Ponds will be minimised as the Proponent has now committed to lining these dams with an impermeable HDPE plastic liner. Commitment 5.17 has now been included to this effect.

Processing operations would be constantly monitored, both by physical inspections and telemetry to ensure no leaks or spills of potentially contaminating materials occur. In the event of a spill or leak, this would be immediately identified and the contamination material excavated and removed preventing the movement of contaminated water or slurry to the soil and/or groundwater beneath.

On the basis of the controls that the Proponent has committed to, the potential for contamination of groundwater below the surface infrastructure which store or use potentially polluting chemical reagents is extremely low and does not warrant the installation of monitoring points surrounding this infrastructure. It is worth noting, however, that the Proponent has included in a detailed RSF design, the installation and monitoring of 11 shallow monitoring bores around the RSF (see **Drawing 174-11-001 Rev.0**). Of these bores, three are located between the potentially contaminating surface infrastructure and the RSF. The topography in this area of the Mine Site is towards the RSF and so it is expected that should any sub-surface contamination occur, it would move towards the RSF and be identified in one of these three monitoring bores.

The above notwithstanding, Commitment 15.4 has now been included which provides for the sampling of soil beneath the surface infrastructure which store or use potentially polluting chemical reagents to confirm no land or aquifer contamination has occurred prior to the creation of the final landform and rehabilitation of the Mine Site.

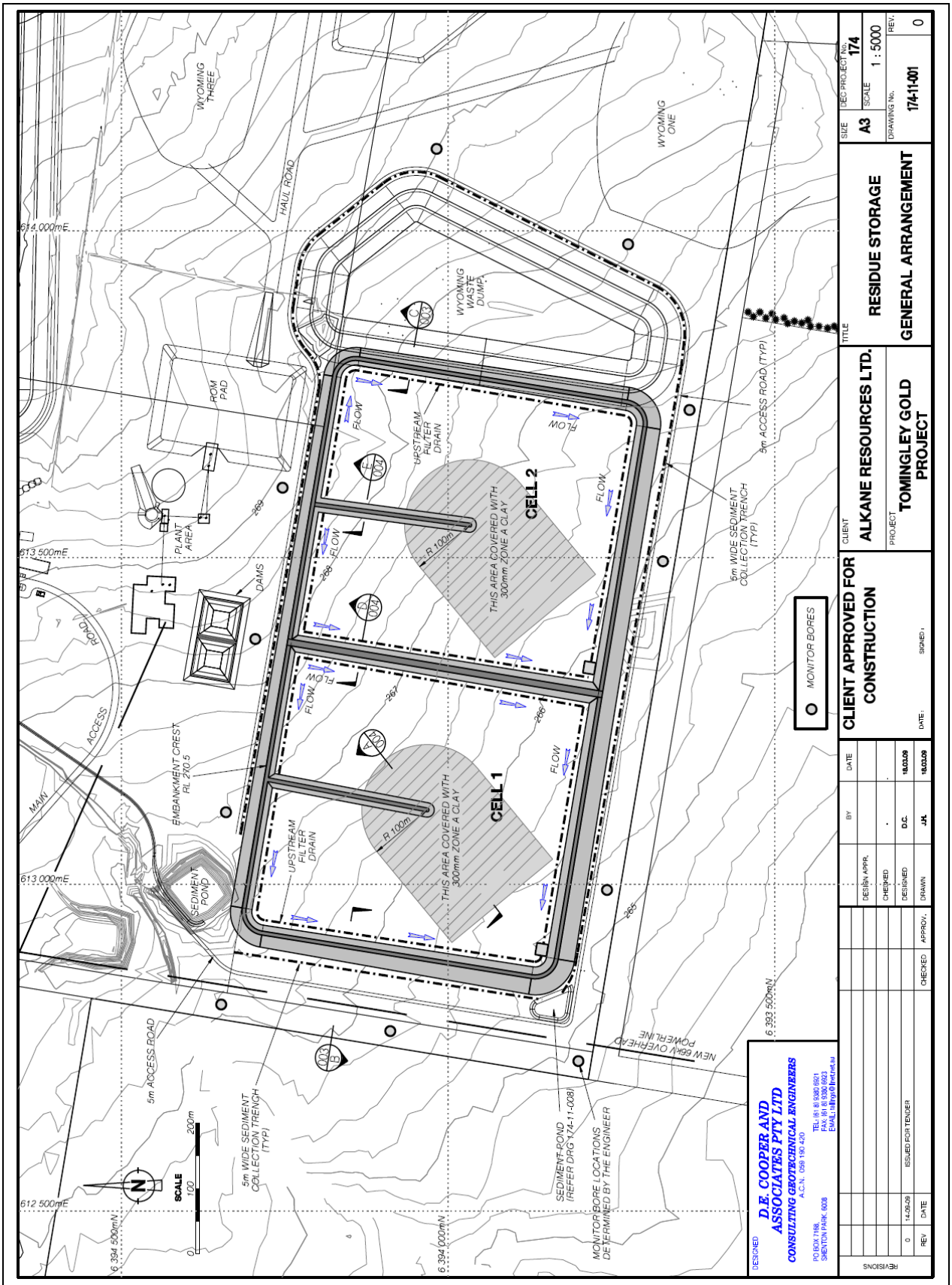
3.4.2.3 General Amendments

The EPA wrote:

> *"The draft Statement of Commitments should be updated to reflect commitments identified following provision of additional information outlined below."*

Response

Section 5 presents the updated statement of commitments reflecting the additions and modifications made in order to, or subsequent to responding to the EPA's submission.



Source: D.E. Cooper & Associates Pty Ltd / Mintrex

Drawing 174-11-001 Rev.0
Residue Storage – General Arrangement

3.4.3 Assessment of the Proposal and Request for Additional Information

3.4.3.1 Biodiversity Impacts

The EPA wrote:

"Some inaccuracies remain in the proposed Biodiversity Offset Strategy (BOS). Clarification of the area to be included in the offset is required…and the EA presents conflicting information regarding the security of the offset.

Recommendations:

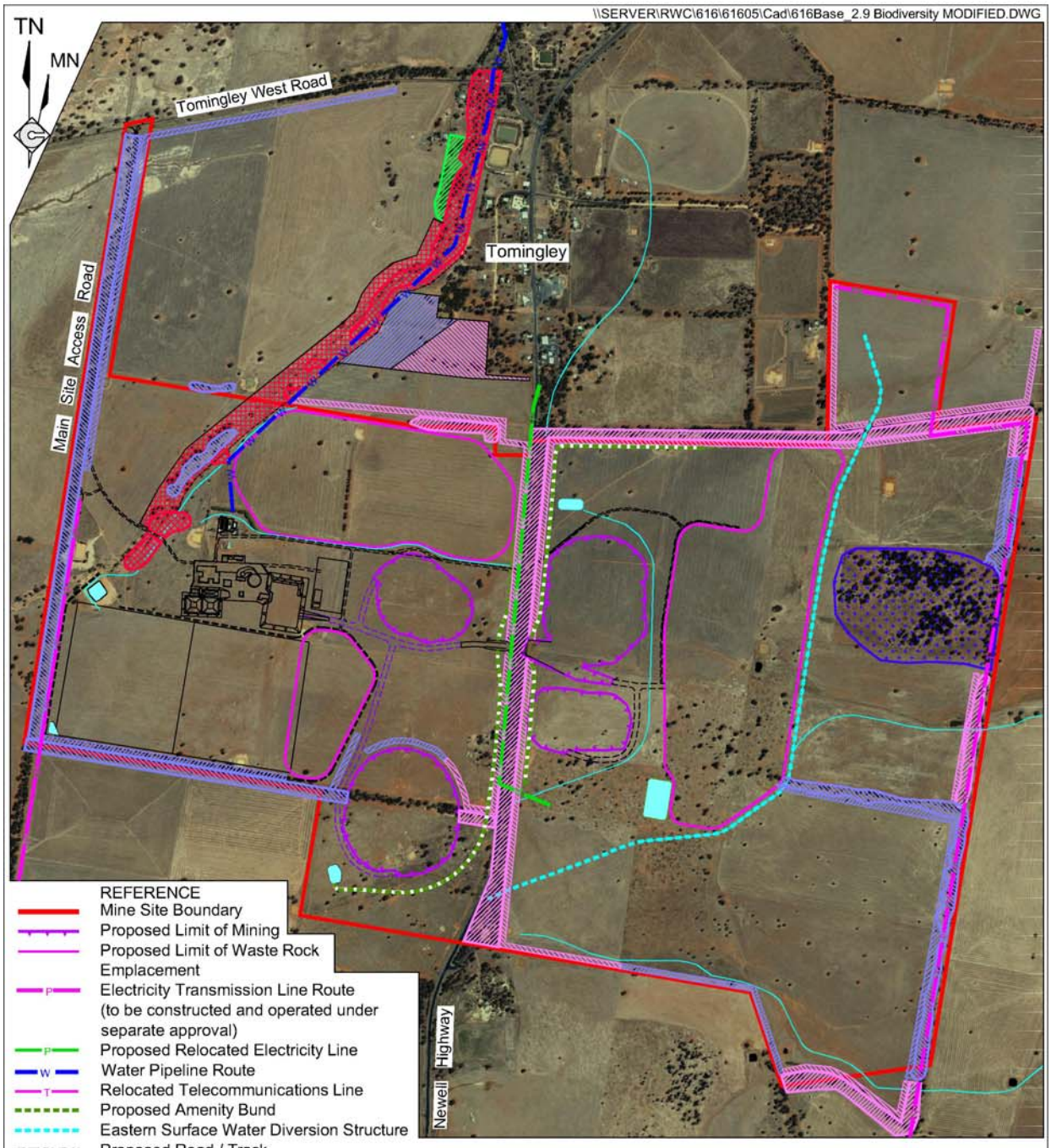
That, prior to granting any approval to the project, the Department of Planning and Infrastructure:

- *Clarify with the proponent the exact location of all infrastructure in relation to the proposed offset (including proposed amenity bunds and relocated powerlines and optic fibre cables that are not included on the offset maps) and determine whether these impact the proposed offset.*
- *Require the proponent to commit to a clearly defined BOS, which includes clear map of the specific areas to be included within the offset, excluding other remnant vegetation*
- *Clarify with the proponent whether the BBAM has included areas of native vegetation or proposed revegetation that will not actually form part of the offset.*
- *Require the proponent to implement suitable in-perpetuity conservation arrangements for all components of the BOS. The EPA prefers the proponent to implement one of the following methods:*
  - *Biobanking Statement Agreement*
  - *Conservation Agreement*
  - *Trust Agreement or*
  - *Planning Agreement.*

The Statement of Commitments should be updated to reflect commitments to implementing the BOS as discussed above.

Response

Author of the Biodiversity Assessment *(Part 4* of the *Specialist Consultant Studies Compendium* accompanying the *Environmental Assessment*), OzArk, met with personnel from the Dubbo office of the OEH to discuss the issues raised by the OEH. The following summarises the response of OzArk to the issues raised (provided as **Appendix 6**) and provides the referenced **Figure 2.19 (Modified)**. It is noted responses specific to the methodology employed in the application of the BioBanking Assessment Methodology (BBAM) are provided in **Appendix 6** only.



	Community					
	1	2	3	4	5	6
Area to be Disturbed (ha)	2.7	0	1.0	0	18.0	0.7
Remnant to be Conserved (ha)	21.1	13.1	5.0	1.9	34.3	0
Remnant Extension (Protection & Ameliorative Planting) (ha)	21.5	13.5	26.0	0	0	0

Figure 2.19 (modified)
BIODIVERSITY OFFSET STRATEGY

Figure 2.19 (Modified) includes all infrastructure associated with the Project. With the exception of the Eastern Surface Water Diversion Structure (which will require disturbance to approximately 30m x 30m [0.1ha] of Community 3), the inclusion of these additional areas (of very minor disturbance) are not deemed to have any material effect on the proposed Biodiversity Offset Strategy. The following provides an overview of the impacts and effect on the BOS as proposed.

- Powerlines. The easements selected for the power lines will be aligned such that they are either:
  - outside the areas nominated as part of the proposed BOS; or
  - within areas of 'Remnant Extension Zone', i.e. not within the remnant vegetation itself.

  Where the easements occur within the "Remnant Extension Zone', e.g. along the Newell Highway, the vegetation used in revegetation will target native shrubs and grasses of Community 3.

  Where the power line passes over remnant native vegetation, the final alignment of the power line will be chosen such that the lines avoid existing trees (avoiding the necessity for tree trimming or clearing).
- Water Pipeline and Optic Fibre Cable. The majority of the disturbance would be located within the 'Remnant Extension Zone', and would be completed prior to the commencement of revegetation / remnant extension activities. In any case, the area of disturbance associated with the pipeline would be minimal and restricted to the width of the trench (30cm to 40cm wide).
- Amenity Bunds. These would be constructed over cleared areas. Where areas available between the mining related disturbance and the remnant vegetation are limited small sections of the "Remnant Extension Areas" will occur over the lower slopes of the bunds.

To account for the minor increase in disturbance associated with the construction of the Eastern Surface Water Diversion Structure, the area of disturbance (to Community 3) has been increased by 0.1ha (to 1.0ha) and the area conserved reduced to 5.0ha.

Figure 2.19 Modified has also excluded the remnant vegetation on the properties which the Proponent does not hold an existing agreement. The effect of this on the proposed BOS is to reduce the area of Community 4 included in the BOS from 4.9ha to 1.9ha. Notably, this community would not be disturbed by the Project.

It is noted that 4.9ha rather than 1.9ha of Community 4 was included in the BBAM calculations. Given Community 4 will not be impacted by the Project, and will therefore retain a net surplus of BioBanking credits, this is not considered material to the assessment of the proposed BOS. It is noted that in finalising the BOS following receipt of project approval, BBAM calculations will be reviewed and updated to reflect the comments made in the OEH submission (see also **Appendix 6**).

The Proponent accepts that it will be required to implement suitable in-perpetuity conservation arrangements for all components of the BOS (see Commitment 7.27). At this time, the Proponent favours implementing a change in title arrangement to conserve the BOS, e.g. creation of a covenant(s) on the affected titles.

Commitments 7.26 to 7.28 have been updated to reflect the requirements of the OEH in relation to the development and security of a BOS for the Project.

3.4.3.2 Groundwater

The EPA wrote:

1) *"The EA makes reference to lining several contaminated or dirty water/waste storage structures with compacted clay, to achieve a permeability of 1 x 10^{-9} m/s or less. These structures include:*
    - *The 2 dewatering ponds;*
    - *Raw Water Dams; and*
    - *Process Water Dams.*

Recommendations:

Further information regarding construction of these clay liners is required. This includes the location of liners (e.g. floor and walls), overall thickness of liners, thickness of successive layers, gradients of sides of structures of clay liners etc for the structures referred to above.

The EPA's standard requirement for these types of liners is to achieve a permeability of 1 x 10^{-9} metres per second (m/s) or less with a re-compacted clay liner of at least 90 centimetres (cm) in thickness. Where the proposed liner will not meet this thickness and the natural geology of the site in conjunction with constructed clay liners is considered sufficient in meeting this requirement, sufficient evidence must be provided in support of this to demonstrate the construction will be adequate to prevent pollution of groundwater (e.g. geological evidence, groundwater modelling etc).

Response

The ponds noted are to be lined with HDPE plastic over a compacted clay surface (see Commitment 5.17). This will provide for an impermeable layer.

The EPA also wrote:

It is noted that the floor of the TSF will be lined with 900 millimetres (mm) of material compacted to achieve a permeability of less than 1 x 10^{-9}m/s. Whilst this meets the requirements of the EPA in terms of lining, at this rate, the contaminants in the waste gold processing slurry still have potential to permeate from the TSF within about 28 years of commencement of use of the facility.

Response

Mine planning and design consultants to the Proponent, Mintrex, have assisted in the preparation of following response to this issue.

A detailed design report was prepared by the RSF designer (D.E. Cooper & Associates Pty Ltd) and submitted to the NSW Dams Safety Committee. The RSF design, based on proven RSF structures which have been installed on many mines in Australia and overseas, was approved by the NSW Dam Safety Committee in November 2011. The most up to date design drawing for the RSF (**Drawing 174-11-001 Rev.0**), as prepared by D.E. Cooper & Associates Pty Ltd and referenced in the detailed design report to the NSW Dams Safety Committee, is attached.

The design takes advantage of the local sub-soil material which has a high clay component, and can be compacted to form a hard base for the floor and embankments of the RSF. Geotechnical investigations were carried out on the RSF site to evaluate the in-situ clay material. The conclusions of these investigations as included in the detailed design report of D.E. Cooper & Associates Pty Ltd (2011) are as follows.

> "*The foundations of the embankments comprise stiff clay with some traces of sand. The clay is dry and becomes more competent with depth. The material has a high bearing capacity. There should be no difficulties with settlement of the embankment fill due to foundation movement. The only preparation required before construction of the embankments will be to strip the topsoil and lightly rip, moisture condition and compact the foundation areas.*"
>
> *"The overburden material can be classified under the Unified Soil Classification as CL, an inorganic clay to sandy clay of low to medium plasticity. The material, when compacted, has a permeability of <10^{-10} m/s. This is classified as a very low permeability."*
>
> *"The compaction of reconstituted material recovered from the boreholes has provided data indicating the maximum compacted dry density will be in the region of 1.8 t/m^3. The optimum moisture content (OMC) for compaction should be around 14-16%."*

In addition, hydrogeological investigations were carried out on the RSF site and are summarised (from D.E. Cooper & Associates Pty Ltd, 2011) as follows.

> *"The hydrogeological investigations were carried out by drilling five (5) bore holes across the site of the RSF. The holes were logged and falling head testing was carried out to determine the average permeability of the strata.*
>
> *The deeper strata were shown to be largely clays and sandy clays. Towards the bottom of the holes, weathered rock was encountered.*
>
> *Water was not encountered in any of the holes. Drilling for water in the general area of the project has been unsuccessful, suggesting that if water does occur at some depth, the water will be confined to discontinuities in the basement rock.*
>
> *The calculations to determine the average permeability of the strata up to 25 m below the foundations of the RSF are given in* ***Appendix E****. The highest permeability was 2 x 10^{-8} m/s and the lowest 2 x 10^{-9} m/s. These permeabilities are regarded as being very low. Provided that the amount of water held within and on the surface of the deposited residue is minimized, seepage losses from the storage should be insignificant."*

The geotechnical and hydrogeological investigations therefore illustrate that the natural geology of the location exceeds the minimum EPA nominated permeability requirement of <1x10^{-9}m/s.

Notwithstanding the natural restriction on movement of water particle provided by the local geology, strategic areas in the base which expect higher moisture contents have a designated 300mm clay liner (see ***Drawing 174-11-001 Rev.0***), which would be similar in composition to the local sub-soil material.

Mintrex note that there is no need to clay line the walls as they have been compacted in layers which are very hard, so any moisture will run downwards. This notwithstanding, D.E. Cooper & Associates Pty Ltd (2011) states that a *"trial embankment will be constructed, and the fill tested, to confirm the assumptions made in this Report prior to the commencement of embankment construction."*

Finally, the planned operation of the RSF will further add to the creation of an impermeable structure. By operating two cells, the residue slurry would be deposited in one cell while the other was allowed to dry out, forming a dry and compacted layer onto which the next layer of residue would be deposited. Mintrex explain this operation as it affects the permeability of the RSF as follows.

> *"To address concerns over the potential for water to seep out of the RSF cells, we feel that we should explain how the RSF is used when in operation. Only one RSF cell is filled at a time, allowing the other unit to dry out under solar evaporation. The estimated lift height is approximately 1.7 metres per annum. Each cell is typically filled for 6 months, then allowed to dry out. This dry layer then forms part of the impermeable barrier, as the tailings are very fine and bind together to form a solid layer. Each cell is filled by a network of pipes with droppers along the cell walls. This creates a "dishing effect" as the solids fill from the outside to the inside. This also forces the surface water into a central pond around the decant towers. Any tailings water that is caught between the embankment and the deposited tailings is collected in the toe drains which run around the base of the cell, as the water will follow the path of least resistance.*
>
> *Therefore in practice, the risk of any seepage is extremely low as the bulk of any free water is collected in the toe drains, or decant tower, rather than seeping through the floor or walls. As time goes by the dried solids collected in the RSF contribute to the impermeable floor layers and further reduce any risk of seepage."*

The rationale used by the OEH to suggest that the slurry has the potential to permeate the RSF floor within a set period of time relies on the constant movement of particles at the noted rate ($1x10^{-9}$m/s). This rationale relies on the slurry being maintained as a liquid in order to permeate the RSF floor. However, the preceding discussion on the design, construction and operation of the RSF identifies that the residues will not remain in liquid form capable of moving through the low permeability clay. Furthermore, as the residue dries, it will then form part of the very low permeability barrier to the slurry deposited on top of a layer of compacted clay which will be far thicker than 90cm.

The EPA also wrote:

2) *"Details of the proposed QA/QC program must also be provided to ensure earthworks (compaction etc) are undertaken in the appropriate manner and the design criteria are achieved."*

Response

Significant detail of the RSF technical specification, design and construction, including QA/QC program requirements is provided in the detailed design report of D.E. Cooper & Associates

Pty Ltd. In summary the basic QA/QC program consists of compaction testing the various elements of each cell as follows.

> "*The Contractor shall appoint a NATA registered geotechnical field testing organisation (who will establish an onsite laboratory) to carry out field and laboratory tests on representative samples of borrow material and fill to determine the moisture content and percentage dry density of the compacted fill. Copies of the completed test certificates shall be made available to the Engineer on a daily basis. The results shall be used to assess the acceptability or otherwise of the placed fill.*
>
> *Testing will be undertaken as follows:*
>
> ***Borrow Areas***
>
> *The following testing schedule will be adhered to:*
>
> *(i) at least one test per 5 000m3 of compacted embankment fill;*
>
> *(ii) at least one test where, in the Engineer's opinion, there has been a change in the borrow material which could affect the compaction properties.*
>
> *No placing of the material to which the testwork relates is to be undertaken until written notification is given to the Contractor by the Engineer.*
>
> ***Embankment fill***
>
> *Determination of the dry density and moisture content of compacted fill shall be undertaken by the independent testing team with the results provided to the Engineer and the Contractor.*
>
> *The following testing schedule will be adhered to:*
>
> *(i) at least one test per 2 000m^3 of compacted fill;*
>
> *(ii) at least one test per shift involving placing of the earth fill;*
>
> *(iii) at least one test in fill where, in the Engineer's opinion there has been a change in the borrow material which could affect the compaction properties (ie at least one test per Standard Compaction test).*
>
> *The single test result determined by the Engineer shall be taken as representative of the 2 000 m3 of fill (or lesser volume depending upon the frequency of testing) and shall be the sole means of determining the acceptability of the fill. If the test result is outside the acceptable limits stated in Section 10.6, the whole of the fill subject to the test shall be reconditioned and recompacted.*"

The EPA also wrote:

3) *"Further information is required regarding the proposed groundwater monitoring network particularly around the TSF, but also any other groundwater monitoring across the site. This includes the number and locations of piezometers, as well as parameters to be monitored.*

   Noting it is the EPA's expectation that piezometers are located in strategic locations, depending on the location of structures with the greatest risk to groundwater and

other factors such as groundwater flow direction etc. This would include locating piezometer up gradient and down gradient of structures with the greatest risk to groundwater.

Information must also be provided regarding the reasoning behind the proposed groundwater monitoring network (locations of monitoring points, depth of groundwater monitoring bores, parameters monitored etc).”

Response

Drawing 174-11-001 Rev.0 identifies the location of 11 monitoring bores around the RSF cells. The locations of these bores provides for complete coverage around the RSF, both up gradient and down gradient.

Monitoring would also be undertaken in exiting bores WYMB01, WYMB03 and WYMB06 to monitor potential impacts on deep fractured aquifer groundwater at the Mine Site. At least one monitoring bore will be installed within the Gundong Creek alluvium to confirm the Project does not impact on the standing water level or water quality within this aquifer, i.e. confirming the isolation of any alluvial paleochannel aquifers on the Mine Site.

The parameters to be monitored would be confirmed as part of the development of a Water Management Plan for the Mine Site, however, it is anticipated the monitoring will approximate the following

- Suite 1. General Water Occurrence and Chemistry: to provide an overall indication of any changes to groundwater occurrence or quality.
- Suite 2. Reagent & Production Contaminants: to identify any seepage or leachate from the TSF or ponds and stockpiles within the Processing Plant and Office Area as well as to identify if operations are having any other impact on water chemistry.

Table 1 provides the anticipated frequency of monitoring for the two analyte suites.

Table 1
Indicative Monitoring Regime for Groundwater

Analyte		Unit	Frequency	Sampling Method
Suite 1	Standing Water Level	m (AHD)	Monthly	In situ
	pH	pH		
	Electrical Conductivity	µS/cm		
Suite 2	Cyanide (WAD)	mg/L	Quarterly	Grab Sample (Representative)
	Alkalinity (as Calcium Carbonate)	mg/L		
	Antimony	mg/L		
	Arsenic	mg/L		
	Cadmium	mg/L		
	Calcium	mg/L		
	Chloride	mg/L		
	Copper	mg/L		
	Lead	mg/L		
	Magnesium	mg/L		
	Potassium	mg/L		
	Selenium	mg/L		
	Silver	mg/L		
	Sodium	mg/L		
	Sulphate	mg/L		
	Total hardness	mg/L		
	Zinc	mg/L		

The bores would be purged prior to sampling until pH and salinity measurements have become stable. This usually involves removal of at least three bore volumes of groundwater or purging until dry. Samples would be collected and placed in appropriately preserved containers and kept cool. Samples would be transported under chain of custody documentation and arrive at the laboratory within appropriate holding times.

The EPA also wrote:

> ***"Recommendations:***
>
> *Given the nature of the gold processing slurry and the potential legacy of the contaminants to be stored in the TSF, ¡t is recommended that the proponent be requested to provide:*
>
> *i. an assessment of the long term fate of contaminants in the TSF;*
>
> *ii. an assessment of potential impacts on groundwater quality in the longer term, against ANZECC 2000 criteria for any beneficial uses likely to be impacted; and*
>
> *iii. longer term arrangements for management, monitoring and response to any such impacts beyond the operational life of the proposed mine.*
>
> *The Statement of Commitments should be updated to reflect commitments to implement measures to protect groundwater as discussed above."*

Response

On the basis that the RSF design as submitted to and approved by the NSW Dams Safety Committee provides for adequate containment of the residue generated by the process, the requested assessments of the long term fate of contaminants in the RSF and potential impacts on groundwater quality in the longer term are not considered necessary in order for the Project to be determined.

The Proponent commits to the preparation and implementation of a Groundwater Monitoring Program which will incorporate a Groundwater Monitoring Program and Groundwater Contingency Plan for identifying and addressing any contamination issues identified as a result of the monitoring.

Commitments 5.17, 5.18, 5.19, 5.25, 6.2, 6.3, 6.7, 6.9, 19.5 and 20.2 have been modified or added to reflect the detailed RSF design and response to the OEH submission.

3.4.3.3 Hazardous Material Management

The EPA wrote:

"Clarification is required regarding:

1) *Whether the proponent is able and willing to commit to discharge limits of 20mg/L (90th percentile) and maximum of 30mg/L of WAD cyanide at the discharge point to the proposed TSF to ensure consistency with EPA policy.*
2) *Depending on 1) above clarify wildlife monitoring requirements to ensure compliance with category 2 of NICNAS.*
3) *Provide further information on a response program in case impacts occur and provide a commitment to prepare a formal Response Program.*
4) *Provide confirmation that proposed wildlife exposure minimisation strategies will be provided upfront and not in retrospect.*

This information will assist the EPA in determining suitable concentration limits for discharge to the proposed TSF and what monitoring and controls details need to be included on the licence.

The Statement of Commitments should be updated to reflect commitments regarding wildlife exposure minimisation strategies to cyanide as discussed above."

Response

The Proponent commits to discharge limits of 20mg/L (90th percentile) and maximum of 30mg/L of WAD cyanide at the discharge point to the RSF. Commitment 7.18 has been updated to reflect this.

On the basis of the above modified commitment, the management measures presented in *Section 4.5.7.3.4* of the *Environmental Assessment* are considered to be appropriate and in accordance with the NICNAS Recommendation 5a (Framework for management of risks to wildlife from sodium cyanide use in gold mining) (p. xxvii of NICNAS, 2010) for facilities meeting the classification for Category 2.

3.4.3.4 Waste

The EPA wrote:

"Under the "tyres" heading it is indicated that if re-use or recycling of tyres is not practicable, then used tyres would be encapsulated within the waste rock emplacements. This is not considered an appropriate means of disposal due to potential problems associated with achieving required compaction rates and to ensure tyres do not 'float' to the surface, which may have implications in terms of rehabilitation. It is recommended consideration be given to offsite. That further consideration be given to offsite reuse or recycling of waste tyres or return to supplier for appropriate disposal options."

"*The Statement of Commitments should be updated to reflect commitments regarding reuse, recycling or disposal of waste tyres as discussed above."*

Response

The Proponent accepts the request of the OEH and will dispose of tyres off-site, either at a licensed waste management facility or to a third party approved to recycle tyres. Commitment 16.6 has been added to the Statement of Commitments

3.4.3.5 Air

Author of the Air Quality Assessment *(Part 6* of the *Specialist Consultant Studies Compendium* accompanying the *Environmental Assessment*), PAEHolmes, have assisted in the preparation of the following responses to the air quality related issues raised. Mintrex has also provided advice on the chemical pathway of cyanide from the discharge point of the RSF.

The EPA wrote:

> *"Receptors to the north of Mine Site will be most vulnerable to adverse air quality impacts during the first four years of mining, due to WRE2 and WRE3…*

Response

The Proponent recognises this and will provide for appropriate monitoring at locations to the north of the Mine Site. The exact locations of monitoring, methods and parameters will be documented in an *Air Quality Monitoring Program* to be prepared and implemented following receipt of project approval (see Commitment 20.2).

The EPA also wrote:

> *"Emissions of non-particulate pollutants from the project such as cyanide emissions have not been addressed in the AQIA.*
>
> *Given the use of cyanide in gold extraction, it understood that residual amounts of cyanide would be deposited with the Tailings Storage Facility (TSF). It would be expected that the TSF when operational would be a source of cyanide and population exposure to cyanide vapour emission would be of concern from this Project. The AQIA has not addressed this aspect of the project."*

Response

Whilst the TSF will contain cyanide, as detailed in *Section 2.6.3.3* of the *Environmental Assessment*, in order to ensure protection of fauna, the plant cyanide levels will be managed to reduce concentrations of WAD cyanide in the residue at low concentrations (90^{th} percentile of 20mg/L and maximum of 30mg/L).

Cyanide emissions (cyanide gas - HCN) from tailings dams accepting residues at these or even greater concentrations are normally very low to non-detectable. This is due to the fact that most of the cyanide in the residue is weak acid dissociable (WAD), i.e. attached to metals such as zinc, cadmium or copper and only dissociates under acidic conditions. In order to generate cyanide gas (HCN), the cyanide ion CN^- must dissociate from the metal ion. Due to the alkaline environment of the tailings slurry (pH 9 to 9.5), the WAD cyanide remains bound to the metals, and generally lodges within the solid material during the evaporation phase of the residue deposit cycle.

It is only the dissolved HCN component of the much smaller proportion of free cyanide within the residue (CN^- ion or HCN) that has the potential to be released as cyanide vapour. The free cyanide within the liquid residue is vulnerable to UV radiation (broken down to Carbon and Nitrogen by), as is any HCN gas which evaporates from solution. In the pH range of 9 to 9.5, the free cyanide is split approximately 50:50 between the CN- ion and dissolved HCN.

Considering the above physical and chemical properties of the discharged residue (low cyanide concentration with the majority to remain bound to metal ions), it is concluded that the available HCN in solution on discharge and within the decant pond will be very low, and likely to be destroyed by UV radiation before it can vaporise. Should any HCN gas be emitted, it will quickly be dispersed by wind and destroyed by UV radiation. Given the large size of the RSF cells, any HCN gas is quickly diluted to undetectable levels.

Further advice is provided with respect to the possible accumulation of cyanide within the RSF by the United Nations Environment Program fact sheet on cyanide (ASTDR, 2010):

> "*Cyanides are not persistent in water or soil. Cyanides may accumulate in bottom sediments, but residues are generally as low as 1 mg/kg even near polluting sources. Majority of accidental release of cyanide is volatilised to the atmosphere where it is quickly diluted and degraded by ultra violet. Other factors, such as biological oxidation, precipitation and the effects of sunlight also contribute to cyanide degradation. There is no evidence of bioaccumulation in the food chain, and hence, secondary poisoning does not occur*".

As such, there is limited potential for any adverse air quality impacts due to cyanide emissions from the TSF.

The EPA also wrote:

> *"It would be expected that ore crushing and screening operations would also contribute to metallic emissions, which are not addressed in the assessment undertake."*

Response

Whilst low levels of metals may be present in the ore, as shown in **Table 2** the levels of trace element concentrations (including metals) are very low, typically less than 0.01%.

Table 2
Trace Element Ore Concentration

Element	Concentration (ppm)	Percentage (%)
Silver	<0.5	5.00E-05
Arsenic	2600[(a)]	0.26
Barium	800.0	8.00E-02
Bismuth	0.1	6.00E-06
Cobalt	10.0	1.00E-03
Copper	169.0[(a)]	1.69E-02
Mercury	0.0	3.00E-06
Molybdenum	<1.0	1.00E-04
Nickel	7.0	7.00E-04
Lead	9.0	9.00E-04
Sulfur	1.6[(c)]	1.6
Antimony	<1.0	1.00E-04
Selenium	<1.0	1.00E-04
Tellurium[(b)]	0.9	8.60E-05
	20	2.00E-03
Zinc	120.0	1.20E-02

Source: Alkane Resources Ltd, 2012

Notes:
a) Average from block model
b) Extremely variable mostly <1 ppm but up to >20ppm in small parts of ore body)
c) % not ppm

In addition, crushing and screening activities will take place inside purpose built enclosures (nominally constructed to reduce noise emissions but which will also function to prevent dust emissions). On the basis of the preceding, the potential for any adverse air quality impacts due to metal emissions is considered to be negligible.

A public health assessment by the Colorado Department of Public Health and Environment (CDHPE) monitored on-site levels of lead, cadmium, chromium and arsenic in TSP from 1993 to 1996 at the Cripple Creek and Victor Gold Mining Company. The monitoring results showed that the maximum levels detected were all at least 1000 times below the lowest levels known to cause adverse health impacts in humans and not significantly different from samples collected at other similar operations. As a result, monitoring was discontinued and the CDHPE concluded that no adverse health impacts were expected to occur to people living near the mining activities (ASTDR, 2010).

The EPA also wrote:

> *"Emissions from mobile fleet sources on the Mine Site have not been addressed."*

Response

Table 2.4 of the EA (R.W. Corkery, 2011) provides an indicative mining fleet and shows that a maximum of 27 vehicles would be used on site.

The particulate emissions are inherently included in the emission factors used in the dispersion modelling. Non-particulate emissions from these vehicles will be negligible compared with the existing Newell Highway which as detailed in the Traffic Report (FJF Group, 2011) currently has Average Daily Traffic flows in excess of 2500 per day with approximately 25% HGV's and peak hourly flows of 300 vehicles (approximately 30% HGV's).

The EPA also wrote:

> *"TAPM-generated wind data for the Mine Site does not appear to accurately reflect observations and the zone of affection may extend further north of Mine Site than predicted."*

Response

Figure 3.AQ1 shows the Peak Hill Gold Mine meteorological station, and the proximity of trees and the portable building. **Figure 3.AQ2** shows the satellite (Google) image of the site and the location of the meteorological station.

As discussed in *Section 4.2.1* of the *Air Quality Impact Assessment* (AQIA), the proximity of the trees and portable building are considered to have influenced the measurement of the high level of calms and the wind directions, especially from the south.

Figure AQ1: Peak Hill Gold Mine meteorological station - 28th April 2009

Figure 3.AQ2: Google image of Peak Hill Gold Mine meteorological station

It is agreed that the Bureau of Meteorology (BoM) station located at Peak Hill Post Office (Station ID: 050031) also shows both a high level of calms and a strong southerly component. However, it is important to note that the data are only available for 9am and 3pm and it has been confirmed with BoM that the wind rose plots (see **Figure 3.AQ3** and **Figure 3.AQ4**) are based on data collected in the last 10 minutes of the hour preceding (i.e. the 9am wind rose is based on data collected between 8.50am and 9am, and the 3pm wind rose is based on data collected between 2.50pm and 3pm). The data from the Peak Hill Gold mine site is based on a year of data, and as such a direct comparison between the two datasets is not possible.

In addition, neither station meets the siting requirements of USEPA (2000) which states in Section 3.2.1.3 that:

> "*The instruments should be located over level, open terrain at a height of 10 m above the ground, and at a distance of at least ten times the height of any nearby obstruction.*"

It is evidence from Figure AQ1 and Figure AQ2 that there are obstructions within 10m of the Peak Hill Gold Mine station and as shown on Figure AQ5, there are a number of obstructions within ten times the distance of the Peak Hill Post Office station, including two 4m high buildings, and two trees 6m and 10m high.

As discussed in *Section 4.2.1* of the AQIA, it was apparent from the initial TAPM run that the predicted percentage of calms was unrealistically low (see **Figure 3.AQ6**). As noted in the AQIA, and in the EPA submission, TAPM is known to under-predict the percentage of calms, and therefore, despite the data from the Peak Hill Gold Mine not being fully compliant with the siting requirements, it was incorporated into the TAPM model. This increased the annual predicted calms form 0.9% to 8.9%. The percentage of winds from the south also increased (see **Figure 3.AQ7**), though they are still not as significant as the data collected from the site (see **Figure 3.AQ8**). As discussed above, it is our opinion that the location of the Peak Hill Gold Mine station in relation to the building and trees is a significant influence on the dominant winds from the south.

The EPA also wrote:

> *"Source of background PM_{10} concentration used to derive cumulative 24-hr PM_{10} concentrations is unclear."*

Response

To determine a background value of 25µg/m^3 for the PM_{10} 24-hour cumulative assessment, the raw TSP monitoring data from Peak Hill were analysed.

Table 5.2 of the AQIA (Section 5.3) presents annual average TSP concentrations measured at each of the monitoring sites (59 Euchie Street and Frazer Court). As discussed in *Section 5.3* of the AQIA, PM_{10} monitoring data are not available from the site however, as a result of extensive monitoring and analysis in the Hunter Valley, it can be said that approximately 40% of TSP will be in the form of PM_{10}. Due to a lack of PM_{10} monitoring data in the area, this relationship was adopted for the PM_{10} 24-hour cumulative assessment.

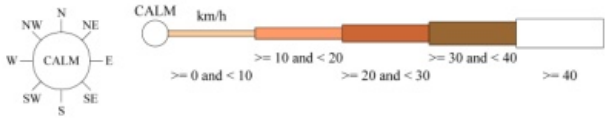
Rose of Wind direction versus Wind speed in km/h (23 Jul 1965 to 28 Feb 2010)

Custom times selected, refer to attached note for details

PEAK HILL POST OFFICE

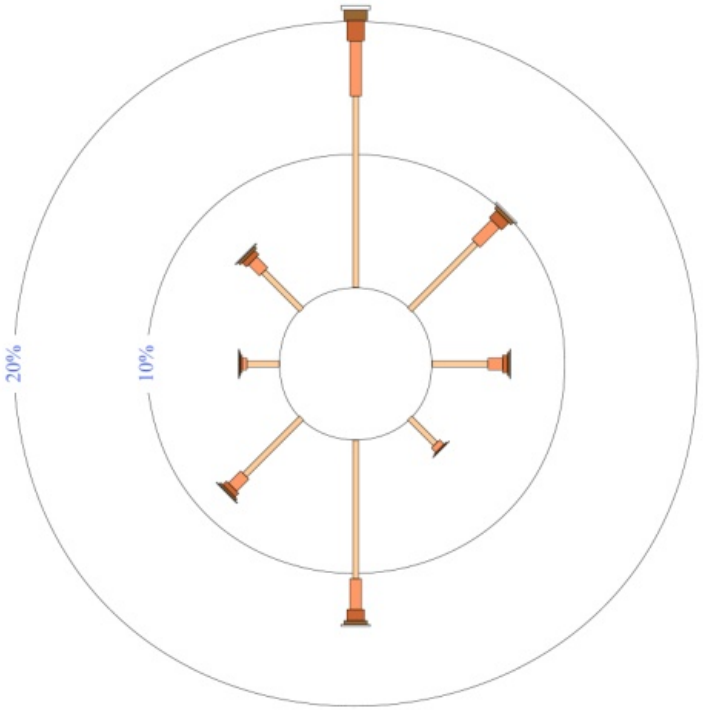
Site No: 050031 • Opened Jan 1890 • Still Open • Latitude: -32.7235° • Longitude: 148.1902° • Elevation 285m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



9 am
15755 Total Observations

Calm 29%



TCZANNUAL Page 1

Figure 3.AQ3: Peak Hill BoM station – 9am wind rose

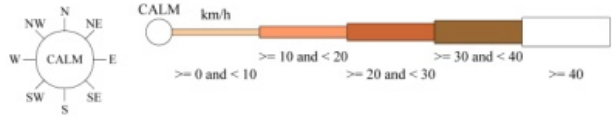
Rose of Wind direction versus Wind speed in km/h (23 Jul 1965 to 28 Feb 2010)

Custom times selected, refer to attached note for details

PEAK HILL POST OFFICE

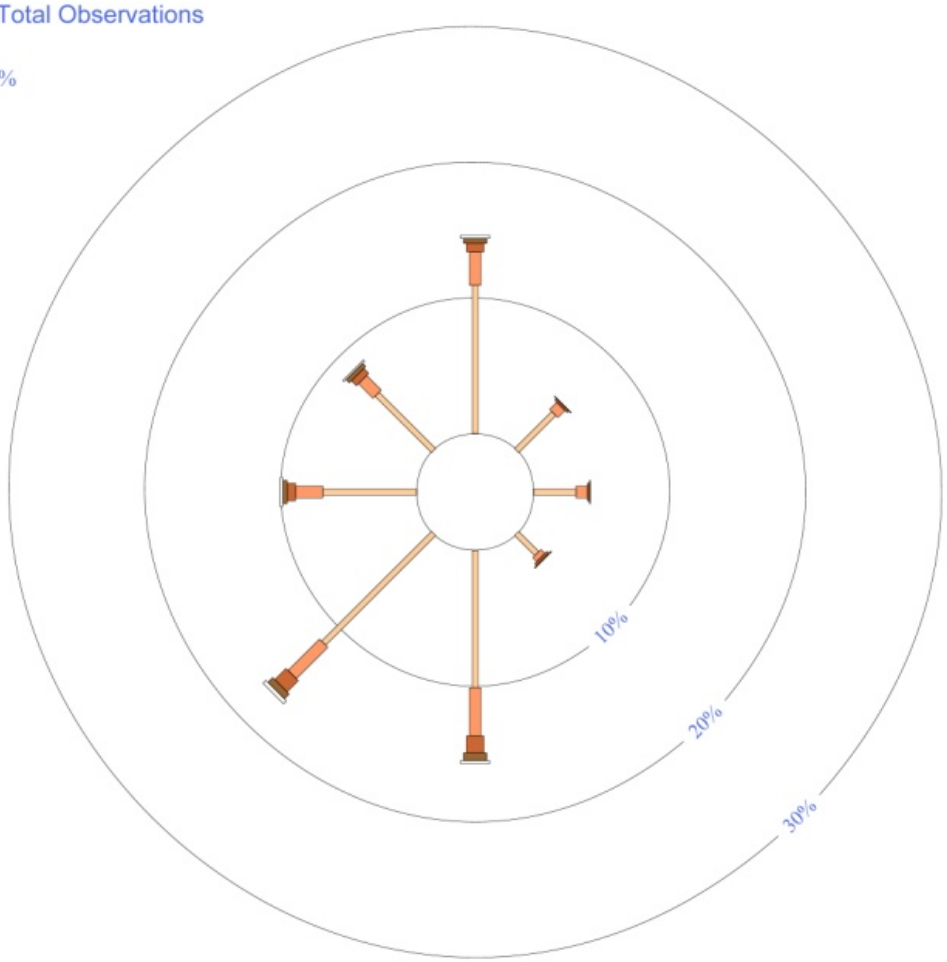
Site No: 050031 • Opened Jan 1890 • Still Open • Latitude: -32.7235° • Longitude: 148.1902° • Elevation 285m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



3 pm
15655 Total Observations

Calm 22%



TCZANNUAL Page 1

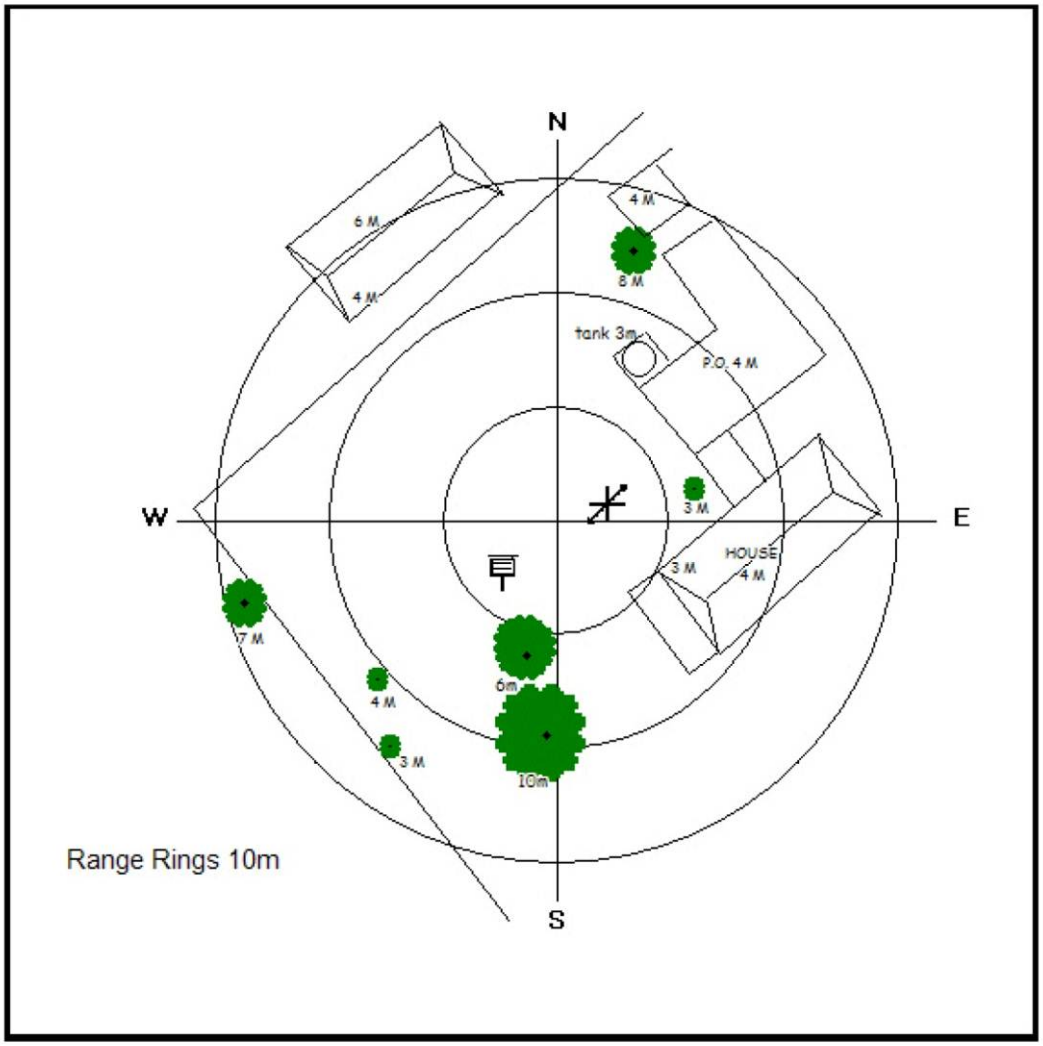
Figure 3.AQ4: Peak Hill BoM station – 3pm wind rose

Australian Government
Bureau of Meteorology

Extended Climatological Station Metadata
All History

Station:	PEAK HILL POST OFFICE			**Location:**	PEAK HILL POST OFFICE			**State:**	NSW
Bureau No.:	050031	**WMO No.:**	94721	**Aviation ID:**	NO ID	**Opened:**	01 Jan 1890	**Current Status:**	Still open
Latitude:	-32.7235	**Longitude:**	148.1902	**Elevation:**	285 m	**Barometer Elev:**		**Metadata compiled:**	04 OCT 2011

Instrument Location and Surrounding Features
13/11/2007(most recent)



Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Prepared by National Climate Centre of the Bureau of Meteorology.
Contact us by phone on (03) 9669 4082, by fax on (03) 9669 4515, or by email on climatedata@bom.gov.au
Station metadata is compiled for a range of internal purposes and varies in quality and completeness. The Bureau cannot provide any warranty nor accept any liability for this information. Page 4.

Figure 3.AQ5: BoM Peak Hill Post Office meteorological station location

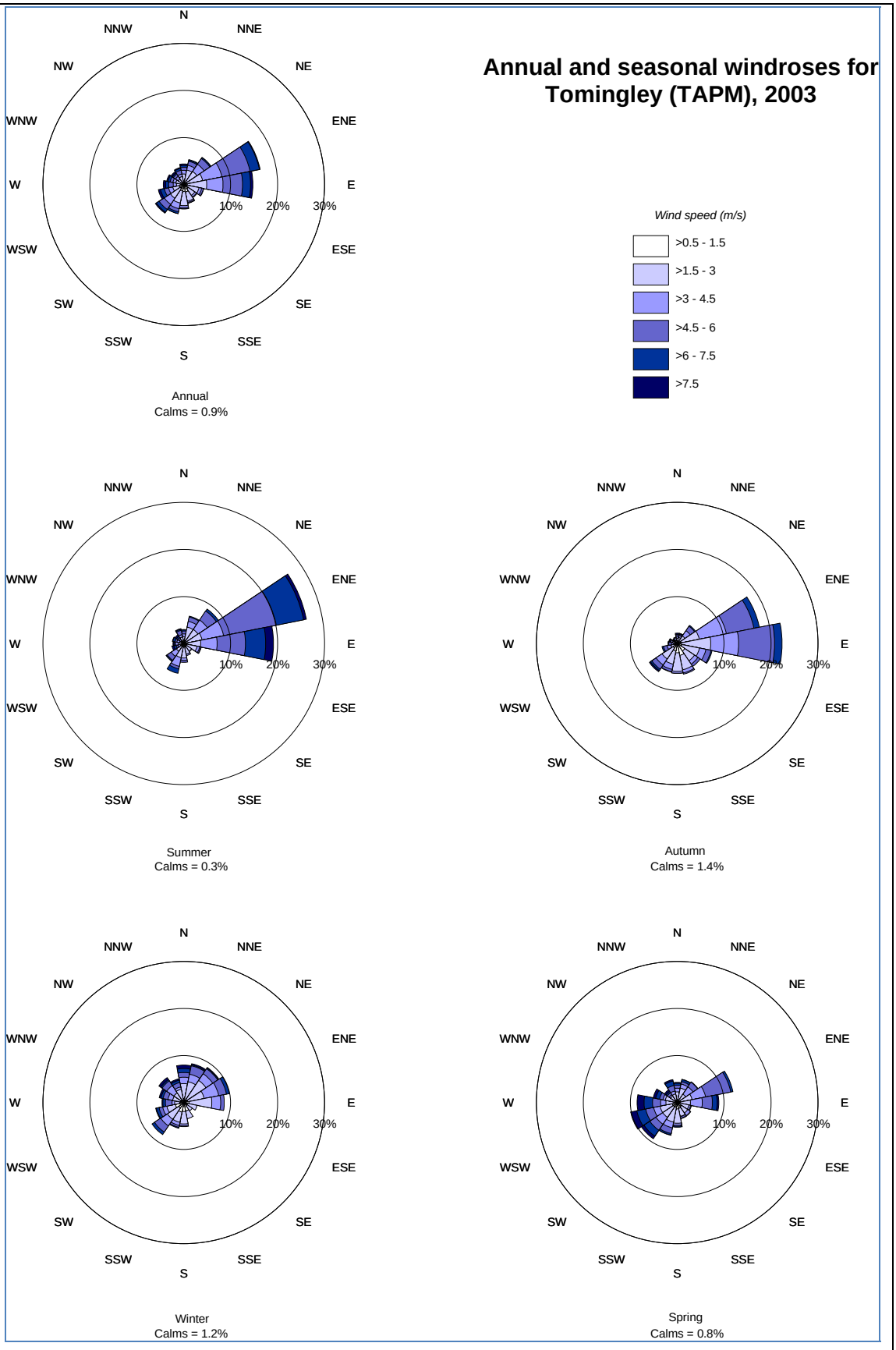


Figure 3.AQ6: Tomingley Gold Project – TAPM no local observations

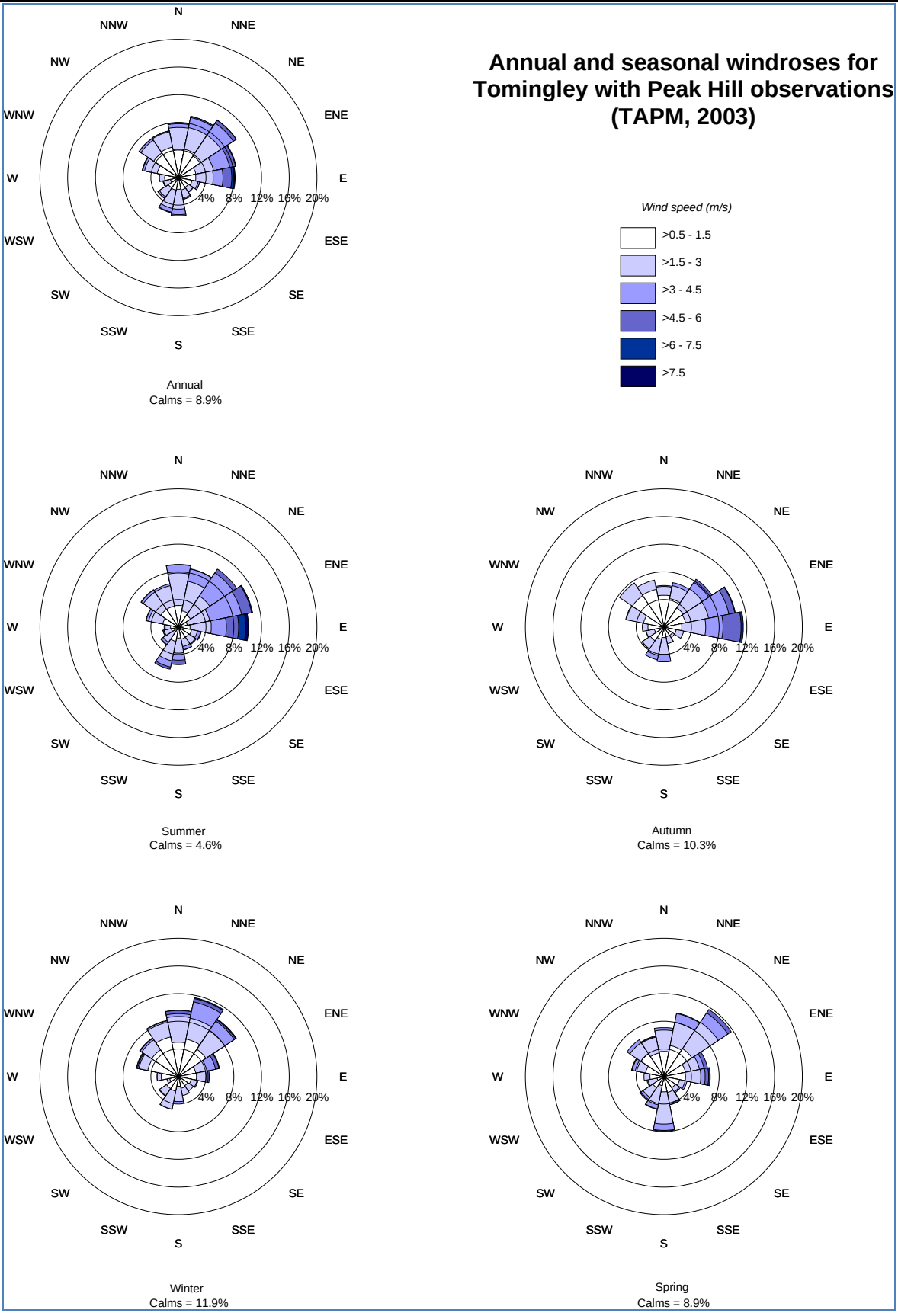


Figure AQ7: Tomingley Gold Project – TAPM with Peak Hill Gold Mine observations

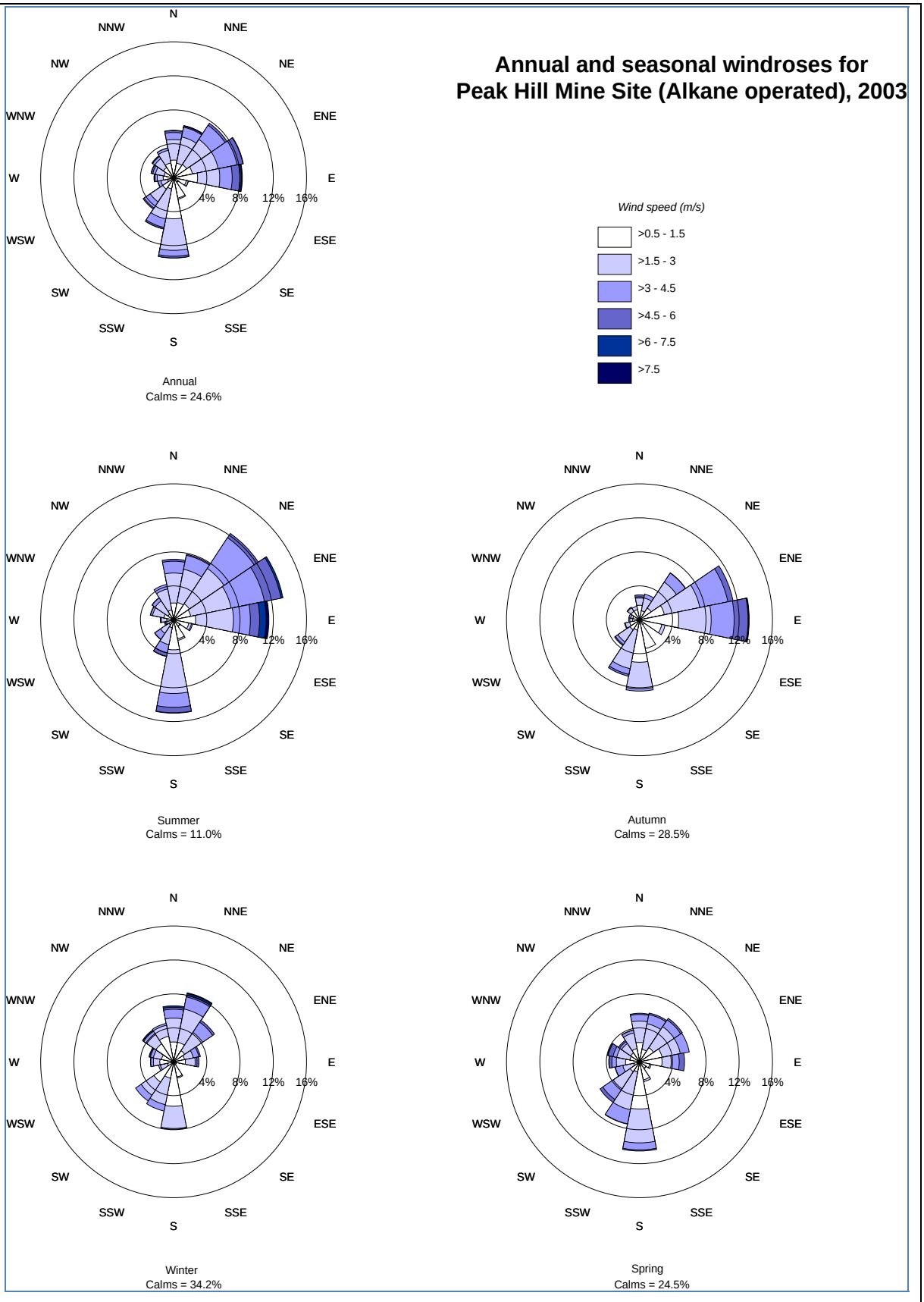


Figure AQ8: Peak Hill Gold Mine

TSP monitoring data from the Euchie Street monitoring site were selected as this site showed more years of recordings than the Frazer Court site and also a higher overall average therefore providing a conservative approach. The raw 24-hour data between 1996 and 2000 were calculated into PM_{10} concentrations using the 40% relationship as discussed above, and the 70^{th} percentile was then calculated from the full data set resulting in a background value of $25\mu g/m^3$.

The full TSP monitoring data sets were provided in ***Appendix 4*** of the Air Quality Impact Assessment (*Part 6* of the *Specialist Consultant Studies Compendium*).

The EPA also wrote:

> ***"Recommendations***
>
> *That the Air Quality Impact Assessment be revised to address the issues identified above.*
>
> *The Statement of Commitments should be updated to reflect additional commitments identified following the revised assessment as discussed above."*

Response

The issues raised in relation to the Air Quality Impact Assessment have been addressed. No additional commitments, or modification to commitments are considered necessary as a result of the additional information supplied.

3.4.3.6 Noise

Author of the Noise and Blasting Assessment (NBA) *(Part 6* of the *Specialist Consultant Studies Compendium* accompanying the *Environmental Assessment*), SLR Consulting, have provided the following responses to the noise related issues raised.

The EPA wrote:

> *"Table l0 of the Noise and Blasting Assessment (NBA) identifies the locations and dates during which unattended noise monitoring was undertaken, together with the ambient LA90(15min) noise levels during day/evening and night time. Monitoring was undertaken in May 2009 at some locations and during October 2009 at locations R3 and R23. Further information, explanation and justification should be provided as to why R3 and R23 were monitored at a different time and season, including further assessment of the implications (if any) of this on the overall noise assessment."*

Response

Monitoring was undertaken at all locations during the May 2009 monitoring program, however, due to failure of loggers at R3 and R23 (due to flat batteries), monitoring was repeated at these locations during October 2009. The results obtained in May and October correlate and therefore it is not believed that this is likely to have any implications on the establishment of criteria or assessment of impacts.

The EPA also wrote:

> *"The EPA notes Table 1 1 of the NBA shows the results of operator-attended noise surveys at locations R1 to R5; these were undertaken at the end of May 2009 and not concurrently with the unattended noise monitoring during early May and October 2009. Further information should be provided to confirm that the operator-attended survey results were still representative of the noise environment during the unattended monitoring sessions."*

Response

Operator-attended noise surveys were undertaken to qualify the ambient noise environment. No unusual activities occurred in the area surrounding the Mine Site during all monitoring periods. Accordingly, the observations made during the operator-attended surveys are representative of the noise environment during the unattended monitoring programs.

The EPA also wrote:

> *"Section 6.3 of the NBA discusses the concept of a 'principal haulage route 'with reference to Tomingley West Road and Tomingley - Narromine Road. It is unclear whether the local authority has formally identified these roads as 'principal haulage routes' and confirmation should be provided that this is the case before adopting the collector road criteria for these roads. Section 11.1.1 of the NBA states that "Tomingley West Road is a local road administered by Narromine Shire Council".*
>
> *"This information is required to confirm that the project specific operational noise, construction noise, sleep disturbance, road traffic and blasting criteria presented in Section 6 of the NBA have been derived correctly."*

Response

Based on the RTA's latest travel restrictions vehicle routes (see **Figure 3.N1**), Tomingley - Narromine Road is identified as designated heavy vehicle route and is therefore a "Principal Haulage Route" as defined by the ECRTN. According to the ECRTN, the applicable criteria for a "Principal Haulage Route" should match the criteria for collector roads:

- Daytime $L_{Aeq(1\ hour)}$ of 60dBA; and
- Night-time $L_{Aeq(1\ hour)}$ of 55dBA.

Tomingley West Road links traffic between Bulgandramine - Peak Hill Road and the Newell Highway and is therefore considered to be a collector road (under the ECRTN).

It is worth noting that under the EPA's current Road Noise Policy, both Tomingley - Narromine Road and Tomingley West Road would be considered as arterial and sub-arterial roads respectively, and would be subject to a criteria of:

- Daytime $L_{Aeq(15\ hour)}$ of 60dBA; and
- Night-time $L_{Aeq(9\ hour)}$ of 55dBA.

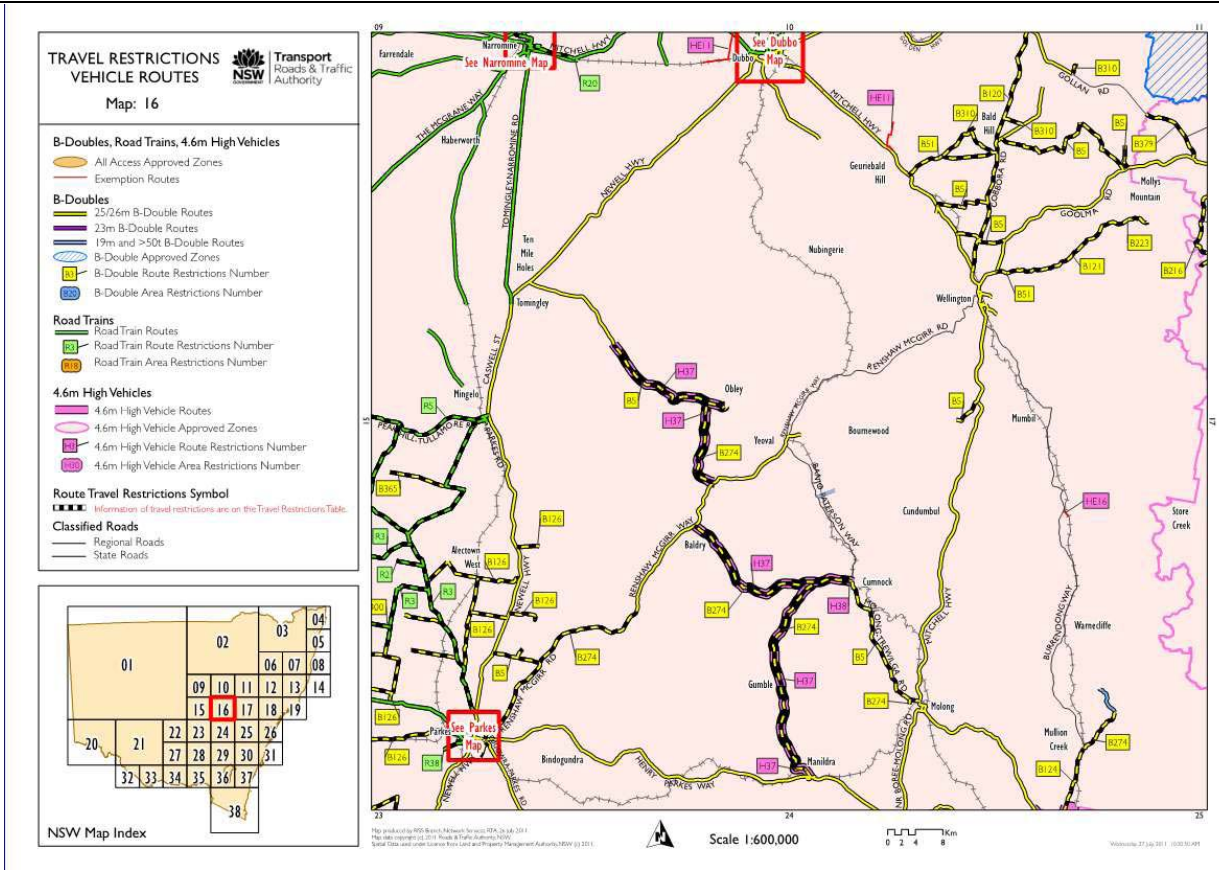


Figure 3.N1

Travel Restrictions Vehicle Routes (Map 16) – Issued by the NSW RTA

The EPA also wrote:

> *"Section 7 .2.2 of the NBA states that the overall LAeq sound power levels (SWL) for mine equipment in Table 25 are indicative only, and that the total mine SWL is to be used to manage on-site noise emissions. In contrast, however, the second last paragraph of this section states that reasonable and feasible noise controls to be adopted in the modelling and assessment of noise impacts include achieving the SWLs in Table 25. These two statements should be reconciled to clarify this apparent inconsistency."*

Response

The SWLs presented in *Table 25* of the NBA would be used to manage the performance of each plant item with the overarching goal of achieving the total SWL of the plant presented in *Table 25*.

The EPA also wrote:

> *"The NBA in Section 10.2 should show the expected distances between residences and pipeline construction activities at their closest point. "*

Response

The alignment of the pipeline is currently indicative only. Nevertheless, the alignment will be well in excess of 29m from the nearest residence, which is the minimum distance predicted to comply with the Highly Noise Affected Management Level of 75dBA ($L_{Aeq(15\ minute)}$).

The EPA also wrote:

> *"Although the EPA does not regulate structural damage due to blasting, it is noted that Section 12.2.2 identifies an offset distance of 105m as corresponding to a 50 millimetre per second (mm/s) structural damage vibration level at the Newell Highway Underpass. The text then goes on to say that monitoring is strongly recommended when blasting is to take place within 70m of the underpass, well within this range. It is possible that this statement is in error and the distances should be reviewed and clarified."*

Response

Reference to monitoring when blasting is to take place within 70m of the underpass, is correct as it is at this distance that the potential for minor damage is possible.

The EPA also wrote:

> *"The EPA notes that blast MICs at the mine may need to be reduced in some cases to achieve the ANZECC 1 15dBL airblast criterion, and that monitoring should be undertaken for all blasts at the site."*

Response

This is noted and accepted.

The EPA also wrote:

"Recommendations:

> *That the Noise Impact Assessment be revised to address the issues identified above.*
>
> *The Statement of Commitments should be updated to reflect additional commitments identified following the revised assessment as discussed above."*

Response

The issues raised in relation to the Noise and Blasting Assessment have been addressed. No additional commitments, or modification to commitments, are considered necessary as a result of the additional information supplied.

3.4.3.7 Water

Author of the Surface Water Assessment *(Part 2* of the *Specialist Consultant Studies Compendium* accompanying the *Environmental Assessment*), SEEC, and Mintrex have assisted in the preparation of the following responses to the water related issues raised.

The EPA wrote:

> ***"Mine Site Flood Management***
>
> *It appears the proposal is designed to exclude flood waters from a 100 year ARI event from entering mine structures and operational areas. However, there is no categorical statement of this nature."*

Response

The OEH is correct, the mine site and operational areas have all been designed to withstand a 100 year ARI event, as documented in the *Part 2* of the *Specialist Consultant Studies Compendium*. All bunds will prevent flood water from entering the site. Internal drains and bunds will direct water to the sedimentation bunds first, which will eventually fill and over top their respective spill ways.

The EPA also wrote:

> ***"Tailings Storage Facility, Process and Raw Water Dam Freeboards***
>
> *It is noted that the Tailings Storage Facility (TSF) will be designed to store 4.8 million cubic metres (m^3) of material, and that the expected volume of residue 3.9 million m^3 over the mine life. It is also noted that the TSF will be constructed in stages and as such it is unclear what freeboard depth will be maintained at any point in time to prevent overtopping during a rainfall event. Similarly, it is unclear what freeboard will be maintained in the process water and raw water dams."*

Response

As per instructions from the NSW Dams Committee, the freeboard design criteria for the RSF cells is 1:10,000 year ARI 72 hour event, which equates to 460mm of freeboard. The key design criteria of the RSF structures, is no overtopping under this design event. The design freeboard of the cells is 500mm. Relevant excerpts from D.E. Cooper & Associates Pty Ltd (2011) are provided.

> *"There are two documents which have been referred to in determining the freeboard requirements. The NSW Dams Safety Committee, in publication DSC19, has provided freeboard requirements. The Western Australian DMP publication "Guidelines on the Safe Design and Operating Standards for Tailings (Residue) Storage" dated May 1999, also defines the way in which the freeboard, upstream of the embankments, should be measured. Freeboard (**Figure 9.1**) comprises three (3) elements:*
>
> *a) Operational Freeboard – the difference in level between the head of the residue beach and the embankment crest – recommended minimum 300 mm*
>
> *b) Beach Freeboard – the difference between the head of the beach, and the level of the pond which would result from a 1:10,000 year return period 72 hour rainfall event (maximum pond level)*

c) Total Freeboard – the difference between the maximum pond level and the embankment crest - recommended minimum 500 mm

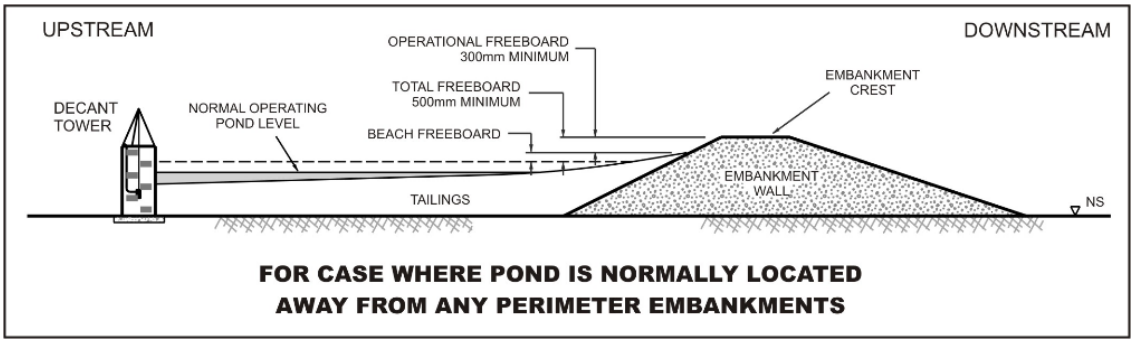


Figure 9.1 *Freeboard (taken from Figure 1 the WA DMP Residue (Tailings) Manual 1999)*

The Stage 1 embankments forming the storage have been designed to be constructed to ensure that all freeboard conditions are met. The Operating Manual, which will be issued prior to the storage being commissioned, will clearly state the timing required to construct successive lift of the embankments to maintain those freeboard conditions. "

The freeboard design criteria for the Raw Water and Process Water Dams is 1:100 year ARI 72 hour event, which equates to 189mm of freeboard. The key design criteria of these 2 dams, is no overtopping under this design event. The design freeboard of the dams is 200mm. These levels are controlled by water level sensors which turn off the water supply based on high level set points in the plant control system. In practice these are conservatively set more than 200mm below the spillway invert levels.

The EPA also wrote:

"Sediment Basin Design Sizing

It is recommended that the proponent consider increasing the sediment basin sizes to a cumulative 51ML to maximise the potential for on-site reuse and minimise the water extraction needs and energy requirements from sourcing this additional water from the proposed pipeline."

Response

The Proponent will consider the recommendation of the EPA and address when preparing an Erosion and Sediment Control Plan for the Project.

The EPA also wrote:

"Sediment Basin Discharge
It is recommended that the proponent provide information about the type, toxicity and management of flocculants proposed to treat water captured in sediment basins. In the absence of further information the EPA will use a licence limit for polyelectrolyte flocculants used in sediment basins of LG50 less than 100mg/L."

Response

The Proponent accepts the licence limit noted by the EPA.

The EPA also wrote:

"Monitoring of Sediment Basin Discharges

As a precautionary measure it is recommended that pH, electrical conductivity and a full scan of metals that may be contained in waste rock also initially be monitored in the sediment basins before any discharge to receiving waters, and that this monitoring be included in a water management plan for the site (see recommended approval conditions under "Water" heading below).

This monitoring may be removed once it is demonstrated that pH, salinity and relevant metal levels potentially associated with stormwater runoff from disturbed and rehabilitating surfaces do not impact on the water quality objectives of receiving waters."

Response

The Proponent accepts the EPA's recommendation and will incorporate the monitoring of those metals contained in trace amounts within the waste rock.

The EPA also wrote:

"Open Cut Void De-Watering and Onsite Groundwater Reuse

The proposed open cuts will intercept fractured groundwater-bearing layers with subsequent inflows into the open cut void. The proposal indicates this groundwater will be pumped to one of two dewatering ponds for use in processing and dust suppression and that the salinity, potential heavy metals and the presence / absence of cyanide will be monitored.

Given the nature of the groundwater and its potential impacts on soil and vegetation, it is recommended that the proponent prepare Groundwater Reuse Procedures as part of a broader Groundwater Management and Monitoring Plan."

Response

The Proponent accepts the EPA's recommendation and will include Groundwater Reuse Procedures as part of a Water Management Plan for the Project.

The EPA also wrote:

"Tailings Storage Facility

Although the proponent has committed to a shallow groundwater monitoring program to confirm the integrity of the TSF (S4.13.3.2), it is unclear what duration for which this monitoring would be undertaken.

Given the nature of the gold processing slurry and the potential legacy of the contaminants to be stored in the TSF, it is recommended that the proponent be requested to provide:

(i) an assessment of the long term fate of contaminants in the TSF;

(ii) an assessment of potential impacts on groundwater quality in the longer term, against ANZECC 2000 criteria for any beneficial uses likely to be impacted; and

(iii) longer term arrangements for management, monitoring and response to any such impacts beyond the operational life of the proposed mine."

Response

On the basis that the RSF design as submitted to and approved by the NSW Dams Safety Committee provides for adequate containment of the residue generated by the process (see responses contained within Section 3.4.3.2), the requested assessments of the long term fate of contaminants in the RSF and potential impacts on groundwater quality in the longer term are not considered necessary in order for the Project to be determined.

The Proponent commits to the preparation and implementation of a Groundwater Monitoring Program which will incorporate a Groundwater Monitoring Program and Groundwater Contingency Plan for identifying and addressing any contamination issues identified as a result of the monitoring.

The EPA also wrote:

"Process water dam

Process wastewater is reused during the mining process. However, it is not clear how the remaining process water will be managed after mining operations are completed.

It is recommended that the proponent be requested to advise how all residual water will be managed at the end of the mining operations.

The material used to construct process water dams may also be contaminated during the mine life and should be considered as part of waste management in the decommissioning of the dam and rehabilitation of the site."

Response

The Process Water Dam will be a turkey's nest structure and as evaporation rates exceed rainfall rates locally, the excess water would be allowed to evaporate.

The Process Water Dam will be lined with HDPE plastic and so the dam walls and floor will not be exposed to contaminated water and so the material within these will not be contaminated. The HDPE plastic and any residual salts and silts will be removed and disposed of at a facility licensed to accept such waste.

The EPA also wrote:

"Bunding of the Carbon in leach Process Area and Chemical Storage Areas

The proponent should consider any reduction in effective volume of bunded areas due to the cumulative volume of all the containers stored and whether there is any likelihood that more than one container could fail at a time. For example, if damage to one container is likely to damage another then the size of the containment area may need to be increased."

Response

All storage areas will be constructed and maintained in accordance with the appropriate Australian Standard, i.e. AS/NZS 4452- The Storage and Handling of Toxic Substances.

3.5 NSW OFFICE OF WATER

3.5.1 Introduction

The NSW Office of Water provided a submission to the Director-General of DP&I (dated 16 December 2011) raising issues related to water included in the *Environmental Assessment*. The following reproduces the submission of NSW Office of Water in relation to these issues along with a formal response.

3.5.2 Water Supply

The Office of Water wrote:

> *"The EA indicates the primary water supply for the project is via a pipeline which proposes to access groundwater from an existing irrigation property near Narromine. The Office of Water acknowledges the proponent has purchased a Water Access Licence (WAL20270) with 1000 shares of entitlement in the Lower Macquarie Groundwater Source (Zone 6). This represents a licence to extract 1 000ML each year assuming allocations are 100% and no other restrictions are in place. The proposed site of extraction has had a hydrogeological assessment carried out which has been assessed by the Office of Water. This assessment has identified no hydrological impediment to the ability to extract the proposed volume from the site. However the Office of Water advises that the licence holder must comply with all restrictions and reductions of extraction rates declared or ordered to apply in a Local Impact Area (if declared) under the Water Management Act 2000. If this occurs this may represent a risk from accessing the required volume from the proposed extraction point."*

Response

The Proponent accepts the risk noted by the Office of Water in relation to water supply. Should the allocation available from WAL20270 be reduced, the Proponent would source an additional allocation (through purchase or lease) for the "Woodlands" bore(s).

3.5.3 Groundwater Assessment

The Office of Water wrote:

> *"The modelling estimates groundwater inflow to the open cuts to range between 3 and 20L/s (94.6ML/yr-630.7ML/yr). This dewatering requirement if removed from the Wyoming underground would be sufficient to keep the open cuts free of water. The EA indicates evaporation is anticipated to be adequate in most instances to dewater the open cuts with average evaporation estimated to be 759.2ML/yr. This evaporation rate,*

however, is based on the surface area of each pit at the ground surface which will be limited in its applicability to groundwater storage in the pits during the mine life."

Response

The statement in Section 4.4.6.1.6 of the EA which states that "*if the Wyoming One underground is kept free of water the resulting aquifer drawdown would be sufficient to dewater the adjacent open cuts"* reflects the fact that the cone of depression required to dewater the underground would include all four open cut voids. It follows therefore that the maximum dewatering rate for all mine voids would be that required to dewater the underground, i.e. between 3L/sec and 20L/sec.

The EA does, however, recognise the variability of dewatering rates and provides a range of annual dewatering requirements which take into account annual rainfall, in-flow of groundwater and evaporation (see ***Table 4.33*** of the *Environmental Assessment*). Furthermore, Section 4.4.6.2 includes the following statement.

"In reality, groundwater in-flow, rainfall and evaporation are likely to vary significantly during the year. Therefore, it is probably that there would be some periods when pumping would be necessary and other periods where evaporation would be sufficient to remove groundwater and incident rainfall inflows to the open cuts. ……"

It is acknowledged that depending on seasonal rainfall and evaporation rates, and the depth below surface of the open cut sumps, rainwater may accumulate in the open cuts. As required, this water would be pumped to the surface Dewatering Ponds which will be lined with HDPE plastic to prevent leaching of contaminants from the water.

The Office of Water also wrote:

"The closest registered groundwater user of the deep fractured rock groundwater system is 7km from the mine site and is outside of the predicted drawdown zone. Potential dewatering of the alluvial aquifer adjacent to Gundong Creek is not predicted to propagate off the mine site hence although there are users of this aquifer they are not expected to be impacted. A comprehensive monitoring program will be required to ensure impacts to the shallow and deep aquifers are monitored during the mine life."

Response

The Proponent has committed to preparing and implementing a Groundwater Monitoring Program (see Commitment 20.2) which will include monitoring within the shallow alluvial aquifer adjacent to Gundong Creek.

The Office of Water also wrote:

"Narromine Shire Council has a shallow bore that is used to extract groundwater from the alluvial aquifer for Town Water Supply north east of Tomingley. Further to this there are a number of shallow bores licensed for stock and domestic use within a 10km radius of the mine site accessing the shallow alluvium. The proponent must take all necessary steps to ensure that this shallow alluvium is not contaminated and any impacts to water availability are adequately identified and mitigated."

Response

Section 4.4.7.1 of the *Environmental Assessment* provides the explanation as to why the proposed mining operations will not affect the Council bores in the Gundong Creek Alluvium (see also the response provided in Section 3.2.3).

The lack of predicted impact notwithstanding, the Proponent would provide for the installation and monitoring of a piezometer in the Gundong Creek alluvium to confirm the mine has no impact.

The Office of Water also wrote:

> *"Groundwater dependent ecosystems were not identified in the EA however mature trees present along Gundong ck were identified to potentially use groundwater from the shallow alluvium. This is sufficient to constitute a GDE therefore monitoring of groundwater within the shallow alluvium combined with monitoring of the riparian vegetation is recommended."*

Response

Gundong Creek, as identified as traversing the Mine Site is not the true channel of this creek and subsequently is not associated with the Gundong Creek alluvium (which is further to the north and west) (see ***Figure 4.20*** of the *Environmental Assessment* for an illustration of this – see also p.13). As the trees referred to are not located over the alluvial aquifer, these trees are not considered as sourcing groundwater and are therefore not considered groundwater dependant ecosystems.

The Office of Water also wrote:

> *"Office of Water supports the proposal to line the floor and wall of the Residue Storage Facility with compacted clay to a permeability of 1 x 10^{-9}m/s. This will aid in mitigating impacts to groundwater quality and the associated water users and the environment."*

Response

As discussed in Section 3.4.3.2, the RSF will not be formally lined with 900mm of compacted clay, rather it will be constructed over naturally occurring clay (up to 25m deep) which achieves the nominated permeability requirements of <1x10^{-9}m/s. A layer of 300mm of clay will be placed over those sections of the two cells which are expected to be subject to higher moisture contents of the initial residue deposition (see ***Drawing 174-11-001 Rev.0***).

3.5.4 Surface Water Assessment

Author of the Surface Water Assessment (SWA) *(Part 6* of the *Specialist Consultant Studies Compendium* accompanying the *Environmental Assessment*), SEEC, and Mintrex assisted in the preparation of the following responses to the surface water related issues raised.

The Office of Water wrote:

> *"Appendix 6 of the Surface Water report provides spatial mapping of the flood extent created by the bund adjacent to Gundong Ck for a 1 in 2yr ARI flow event. This map indicates the flood extent downstream of the mine site boundary extends beyond the 1 in*

2yr ARI flood extent, however there is no clear assessment of the potential impact to the downstream landholders. Office of Water recommends mapping be provided for the range of ARI flow events up to the in 1 in 100yr ARI and adequate consideration of impacts to adjacent lands."

Response

Additional flood modelling was undertaken by SEEC in response to NOW's submission and a subsequent teleconference between Mr Tim Baker of NOW, Messrs Andrew Macleod and Jason Armstrong of SEEC and Mr Alex Irwin of RWC. **Appendix 8** presents a figure illustrating the modified flooding resultant from a 1 in 100 year ARI event (off the Mine Site) and discussion as to the implications on local land owners.

The area of modified flooding is restricted to areas surrounding the Gundong Creek Channel immediately upstream and downstream of the Mine Site with the maximum predicted change being an increase of +0.64m, where an aflux occurs immediately upstream of the site access road crossing over the Mine Site bund. This increase quickly dissipates on the adjoining lands to the point where no impact occurs. SEEC's modelling illustrates that the area of land impacted by an increase in flood height is very minor.

It is noted that the results presented in **Appendix 8** differ slightly from those presented in *Part 2* of the *Specialist Consultant Studies Compendium* (SEEC, 2011) resultant from slightly modified model calibration. The difference is not significant and does not alter the validity of the results or conclusions made by (SEEC, 2011), which are inherently conservative.

The Office of Water also wrote:

"The bund adjacent to Gundong Ck is proposed to be greater than 20m from the watercourse bank and the core riparian zone is to be managed within the biodiversity strategy. Whilst the concept of a buffer distance and riparian management is supported, the Office of Water recommends a 40m buffer distance between the top bank of Gundong Ck and the base of the proposed bund. …….."

Response

Although an offset distance for riparian protection of 20m was nominated in the SWA, the mapped offset of the bunds around the Project Site show it at least 40m from the top-of-bank of this watercourse. We believe that a 40m buffer can be maintained.

The Office of Water also wrote:

"The impacts to watercourses due to the proposed pipeline route are not clearly assessed in the EA. The Office of Water requests any temporary or permanent crossings for vehicle access be clearly identified and the impacts assessed. Confirmation is also requested as to whether all watercourses are to be underbored and whether all works are to be more than 40m from watercourses. Works within 40m of a watercourse (including the main access crossing over Gundong Creek) are to be consistent with Office of Water's Controlled Activity Guidelines."

Response

No temporary or permanent crossings of the watercourses traversed by the water pipeline will be required, rather access will be obtained on either side of the watercourse from the relevant property.

As written in Section 2.2.2.2 of the *Environmental Assessment*, the drill rig used to complete the horizontal drilling would be set back at least 40m from the bank of the watercourses. It is noted that between 40m and 20m from the bank of the watercourse, there may be some minor disturbance associated with vehicle movements. This level of disturbance would, however, be commensurate with standard farming operations and a Controlled Activity Approval is not considered necessary.

The Office of Water also wrote:

> *"The proposal includes construction of 5 sediments basins around the site. These structures are excluded from a licence requirement under the Water Management Act 2000 however it is recommended the design be in accordance with the guideline, Managing Urban Stormwater: Soils and Construction (Landcom 2004). It is also recommended that these structures are located a minimum of 40m from Gundong Ck where relevant."*

Response

As noted in Section 2.2.6.2, the sediment basins have been designed in accordance with the requirements of Landcom (2004) and DECC (2008b) for the 5-day, 90th percentile rainfall depth.

All sediment basins will be at least 40m from Gundong Creek.

The Office of Water also wrote:

> *"The EA includes a statement of commitment to carry out additional flood modelling of the diversion bund to the north of the Caloma open cut. Office of Water recommends this impact assessment be carried out prior to determination of the project due to the potential to result in modifications to other surface water infrastructure and associated impacts."*

Response

The area likely to be affected by the construction of the amenity bund to the north of the soil stockpiles on the Caloma side of the Mine Site has been reviewed. **Figure 3.SW2** identifies an area of 10.4ha within the catchment to Drainage Line B from which runoff would be blocked by the amenity bund. This represents less than 0.6% of the total Catchment 2.

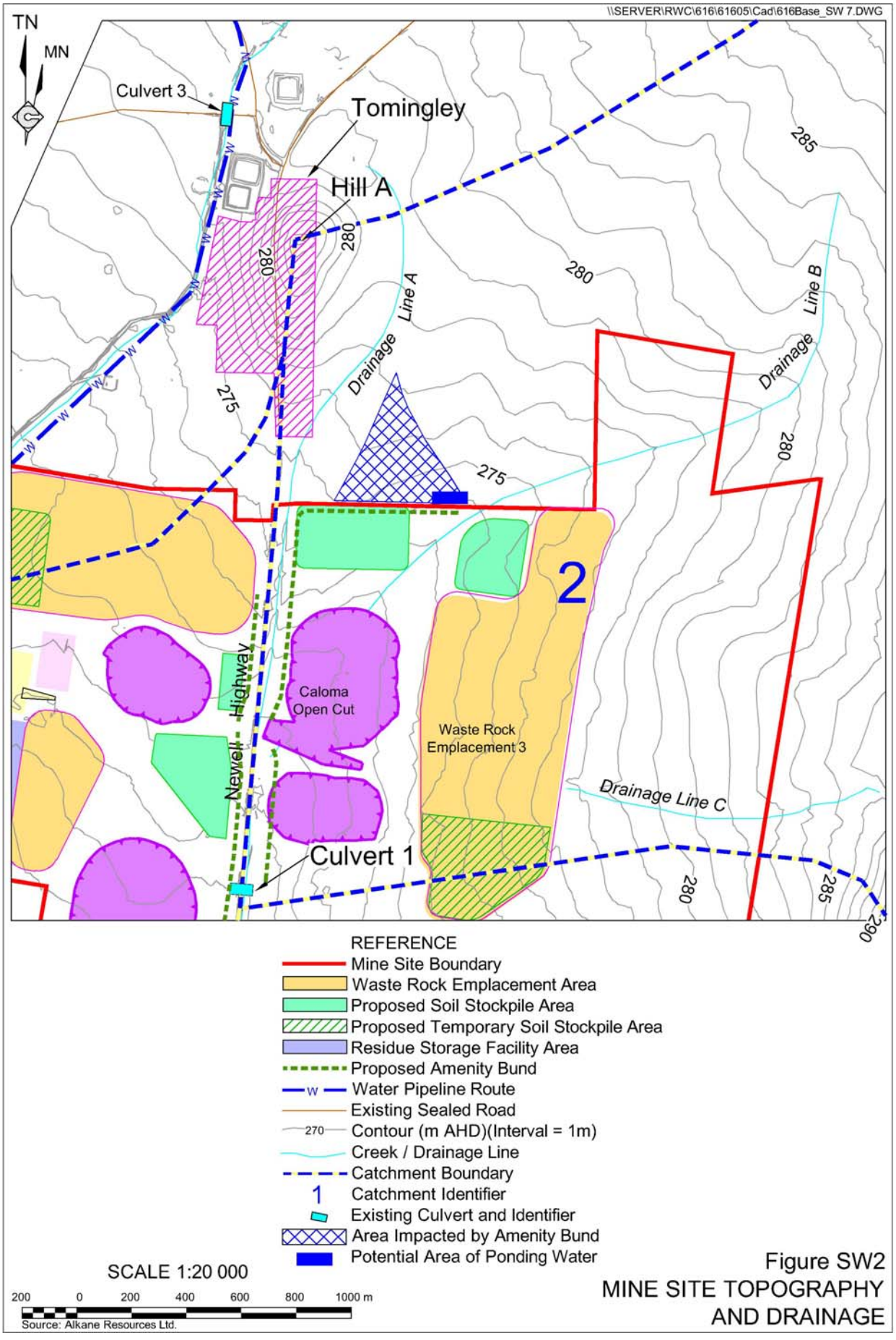


Figure SW2
MINE SITE TOPOGRAPHY AND DRAINAGE

It is acknowledged that there is the potential for slight accumulation of water against the bund at the southeastern corner of the triangular area (see **Figure 3.SW2**), however, this accumulation of water would not reach a significant height (and therefore not impact on a significant area) before overflowing into Drainage Line B. Furthermore, as a large proportion of the pre-mining catchment to Drainage Line B would now be diverted by the Eastern Surface Water Diversion Structure, in-flow to Drainage Line B would not be restricted by existing flows from higher in the catchment.

On the basis of the preceding, it is now considered that flood modelling is not warranted.

The Office of Water also wrote:

> *"The proposed diversion of drainage line B around waste rock emplacement 3 represents a significant modification to the natural flow regime. This is due to concentration of flows within a confined channel and the re-direction of flow. Cross-section B-B in Figure 14 of the Surface Water Assessment indicates the proposed channel dimensions to be approximately 3.4m deep with a base of 6.5m. These dimensions are a significant variation from the gentle slopes that are currently under cultivation with no channel incision. The batter slopes of the proposed diversion channels range from 2 in 1 to 1 in 1 which is of significant concern from a stability perspective as it is generally understood that such angles cannot easily be stabilised by vegetation. The Office of Water requests further consideration is given to channel dimensions and bank stabilisation, and consideration of the proposed diversion from a safety perspective on the upstream side."*

Response

As discussed in a teleconference with Mr Tim Baker of NOW on 25 January 2012, the design of the ESWDS is highly conservative and reflects the primary objective to ensure that concentrated flows captured within the structure (from a catchment of 1 510ha - see **Figure 3.SW1**) cannot enter the open cut voids. Noting this objective, the channel has been designed for a 1 in 100 year ARI (see *pp. 2-29* to *2-30* of *Part 2* of the *Specialist Consultant Studies Compendium*).

Mintrex have reviewed the channel design and, assuming average flows across the entire drain, determined that a maximum depth of 1.95m could be expected under 1 in 100 year ARI conditions. Furthermore, the total volume of the channel of the ESWDS is 51 700m^3. This exceeds the total volume of water expected from a 1 in 100 ARI event (46,000m^3), hence even if the channel were to be totally blocked it would be able to hold the entire volume of stormwater runoff (with overtopping and entry to the open cuts therefore impossible.

SEEC have reviewed the design of the ESWDS and indicate (see **Appendix 8**) that although the ESWDS has relatively steep sides and is significantly incised at various points, it can be suitably armoured to minimise the risk of erosion and ensure stability for the life of the structure. As noted in **Appendix 8**, SEEC suggest that armouring would involve achieving an appropriate level of ground cover, using a material (or materials) that can cope with the anticipated flow volumes and velocities. Ultimately, ground cover to a C-factor of 0.05 (equivalent to 70% grass cover) would be the minimum, in accordance with the recommendations and guidelines in the NSW Blue Book Volumes 1 and 2E (Landcom, 2004 and DECC, 2008). This might necessitate the use of rock armouring, geofabric or similar. The final design would be considerate of cost while ensuring that the requirement for stability was met.

The Proponent commits to the implementation of the required channel and bank armouring to achieve a C-Factor of 0.05 (or better) (see Commitment 5.9). Acknowledging NOW's concerns, the Proponent will review the ESWDS design as part of the preparation of a Water Management Plan (see Commitments 5.8 and 20.2) and consult with NOW as part of this design review and management plan preparation.

Noting the significant variation from the surrounding setting, and acknowledging the fact that vegetation growth on the banks of the ESWDS is likely to be limited due to the steep angles, the Proponent intends on backfilling and rehabilitating the ESWDS in the final landform to reinstate the pre-mining topography. (Although it is noted that final landform creation and rehabilitation will be the subject of further review and consideration as part of the Mining Operations Plan and Mine Closure Plan development.)

3.5.5 Monitoring and Mitigation

The NSW Office of Water wrote:

> *"Baseline monitoring is critical to provide a clear understanding of natural conditions prior to commencement of activities. The Office of Water supports the proponents intent to collect baseline data, however is concerned that the EA indicates baseline monitoring of groundwater is to occur only once prior to commencement. This would be considered inadequate to establish baseline conditions and recommends a minimum 12 months of monitoring with monthly sampling of water level and water quality."*

Response

Monitoring will commence on receipt of project approval and given the planned period of site establishment of 6 to 9 months, and the delay in mining operations reaching a depth where the groundwater table will be impacted, there will be sufficient data collected to provide an effective baseline for monitoring impacts.

The NSW Office of Water also wrote:

> *"The development of a groundwater monitoring network including number of bores, sampling design and location etc. should be undertaken in consultation with the Office of Water. The deep and shallow aquifers will require monitoring."*
>
> *"Additional monitoring bores will require licensing prior to installation."*

Response

The Proponent accepts that the development of a Groundwater Monitoring Program will require consultation with the NOW. The monitoring network will include a combination of existing bores within the deep fractured aquifer, shallow bores installed around the RSF and at least one piezometer installed within the Gundong Creek alluvium.

All additional bores will be licensed appropriately.

The NSW Office of Water also wrote:

> *"The Office of Water recommends the proponent prepare a water management plan to address the surface water and groundwater management, monitoring and mitigating requirements. Office of Water supports the concept of an impact response protocol detailed in the EA for surface and groundwater management and recommends this be included within the water management plan. The identification of a groundwater dependent ecosystem associated with Gundong Ck will also need to be incorporated into the monitoring plan."*

Response

As provided for by Commitment 20.2, the Proponent will prepare and implement a Water Management Plan.

It is noted that the NOW refers to vegetation located along the channel through the Mine Site referred to as Gundong Creek as being potentially groundwater dependent. However, as noted previously, there is no perched alluvial aquifer located along this artificial channel (see **Figure 4.20**, reproduced on p.13) and hence this vegetation is not considered to be groundwater dependent. As noted previously, the groundwater monitoring program will incorporate a piezometer within the Gundong Creek alluvium to confirm the mining operations do not adversely impact on this aquifer or the vegetation which may be dependent on it.

3.5.6 Water Licensing

The NSW Office of Water wrote:

> *"The following activities identified within the EA require licensing under the Water Act 1912 prior to construction or the activity occurring.*
>
> - *Bund adjacent to Gundong Creek (Part 8 licence).*
> - *Groundwater interception and/or dewatering of groundwater and the purchase of necessary entitlement (volume)(Part 5 licence).*
> - *Monitoring bores (Part 5 licence)*
>
> *"Upon commencement of a Water Sharing Plan for groundwater and surface water the works identified in this section would need to be considered for approval requirements under the Water Management Act 2000. The relevant groundwater sharing plan is anticipated to commence in January 2012 and the surface water sharing plan in Mid-2012."*

Response

Noted. The Proponent accepts the requirement to obtain these licences (and identified this requirement in Section 2.1.3 of the *Environmental Assessment*).

The NSW Office of Water also wrote:

> *"Due to the significant uncertainty in groundwater modelling the Office of Water recommends the proponent obtain a licensed entitlement based on the maximum modelling scenario. The Office of Water advises that the appropriate licensed entitlement and license under the Water Act 1912 must be obtained prior to groundwater interception and/or dewatering of groundwater occurring."*

Response

Noted. As identified in Section 2.1.3 of the *Environmental Assessment*, the Proponent has a Call Option with the owner of "Woodlands" to purchase a 1 000ML share of WAL 20270 to the Lower Macquarie Zone 6 Groundwater Source. It is also noted that a licence will only be required for incidental access to groundwater, i.e. as a consequence of operations below the groundwater table, should this removal of groundwater actually occur. That is, if the groundwater is only predicted to be impacted after 18 months operation, the Proponent has 18 months to obtain the appropriate licensed entitlement.

The NSW Office of Water also wrote:

> *"The proponent will be required to retain licensed groundwater entitlement at the site post mining activity to licence the ongoing groundwater inflow during filling of the voids and replacement of water lost through evaporation after the level in the voids reach equilibrium."*

Response

Noted. The Proponent accepts this requirement.

3.5.7 Recommended Conditions of Approval

The NSW Office of Water wrote:

> *"The proponent must ensure that it has sufficient water for all stages of the project to the satisfaction of the NSW Office of Water, and if necessary, adjust the scale of operations to match its licensed water entitlements."*
>
> *"The proponent must prepare a Water Management Plan to address surface water and groundwater management, monitoring and mitigation requirements. This plan is to be prepared in consultation with and to the satisfaction of the NSW Office of Water prior to commencement of activities.*
>
> *"The proponent must obtain relevant licences to the satisfaction of the NSW Office of Water under the Water Act 1912 for the construction of levees prior to commencement of activities."*
>
> *"The proponent must obtain relevant licenses to the satisfaction of the NSW Office of Water under the Water Act 1912 for all activities which intercept or extract groundwater prior to commencement of these activities."*

Response

The Proponent accepts the recommended conditions.

3.6 DEPARTMENT OF TRADE & REGIONAL INFRASTRUCTURE & SERVICES – DIVISION OF RESOURCES AND ENERGY

3.6.1 Introduction

The Department of Trade & Investment, Regional Infrastructure & Services – Division of Resources & Energy (DTIRIS – DRE) provided a submission to the Director-General of DP&I (dated 20 December 2012) raising issues related to the mineral resources quoted in the Environmental Assessment, mining title, rehabilitation and final landform. The following paraphrases the submission of DTIRIS – DRE in relation to these issues along with a formal response.

3.6.2 Mineral Resources

DTIRIS-DRE wrote:

> *"There appears to be a discrepancy between the amount of ore treated during the life of the mine (6.56 million tonnes) compared to the volume of tailings produced (3.9 million cubic metres - section 2.7.3, page 2-50)."*

Response

The discrepancy noted by DTIRIS-DRE has been correctly identified. At the project design specified SG of the ore (2.8), 6.56Mt of ore is equivalent to 2 340 000m^3 of ore. The treated ore is sent to the RSF at 60% solids, so the volume of slurry sent to the RSF is 2.34/0.6 = 3 900 000m^3. The RSF design capacity of 4 800 000m^3 is intentionally conservative. As stated in section 2.7.3 of the *Environmental Assessment* (p. 2-50):

> "*It is anticipated that throughout the life of the Project approximately 3 900 000m^3 of solid residue material would be produced.*"

In fact only 2 344 000m^3 of solid residue material would be produced from 6.56Mt of ore.

DTIRIS-DRE also wrote:

> *"Low grade ore/mineralised waste - there is no indication of where low grade ore and/or mineralised waste would be stored in the mine layout. Given that the rate of ore extraction rate varies over the life of the mine from a peak of 1.5 million tonnes to a few hundred thousand tonnes near the end of the mine life there is a need for the temporary storage of low grade ore/mineralised waste. If this material is to be sterilised by placing it onto the waste dumps then there is a significant resource utilisation issue that needs to be addressed.*

Response

The detailed layout drawing produced by Mintrex (**Drawing TGP-1130-00-G-001 rev5** - see **Appendix 7**), identifies that 1 500 000m^3 of WRE1 provides for a low grade ore stockpile in the *Earthworks Quantities* table. The remainder of WRE1 will accept waste rock. This location was selected as the closest to the ROM and therefore requiring the shortest haul distance for the

inevitable rehandling. The material would not be sterilised in WRE1 because it would not be buried under waste rock, but rather placed beside the waste rock within WRE1. 1 500 000m^3 for the low grade stockpile is more than the schedule requires and is therefore a conservative allowance.

DTIRIS-DRE also wrote:

> *"There is a lack of detail regarding the rate of ore processing given that the ore extraction rate varies significantly from year to year.*

Response

A Combined Mining Schedule (CMS) has been prepared for the Project (and is presented in the Definitive Feasibility Study for the Project). The CMS details ore movements by source (open pit or underground), grade (high or low grade) and month for the first 24 months and quarterly thereafter. It details the source of all ore through the mill in order to identify the milled grade, and in doing so details the tonnage of ore on and off high and low grade stockpiles. The stockpiles are used to blend ore where possible but also to smooth the differences between mining and milling rates in the short term. The level of detail included in CMS was not considered necessary for the *Environmental Assessment*, however, will be included in a Mining Operations Plan that will be prepared for the Project post approval.

3.6.3 Mining Title

DTIRIS-DRE wrote:

> "*……the proponent is required to hold appropriate mining titles from DRE in order to mine this mineral……....*"

Response

Noted. A mining lease application (MLA 399) has been lodged with DTIRIS-DRE.

3.6.4 Rehabilitation

DTIRIS-DRE wrote:

> **"Geotechnical Stability**
>
> *The issue of pit stability was raised with regard to the Caloma Pit and the Newell Highway in the DRE submission to the Director General Requirements (DGRs). That issue and the related matter of the location of Waste Rock Emplacement 3 possibly within the zone of instability of the Wyoming Three open cut, has not been addressed in the EA or recognised as a risk in the EA risk analysis."*

Response

An extensive geotechnical assessment of the open pit areas was undertaken by Mining One in 2009, with the results of this assessment used in the design parameter for the open pits.

For Wyoming Three this geotechnical evaluation was based on the completion of nine cored drill holes throughout the open pit area. For the Caloma Open Cut six cored drill holes were completed. The assessment included detailed geological and fracture logging of the drill core, including determination of the hardness, plasticity and a number of other parameters. The field logging was complimented by numerous laboratory tests for moisture content, atterberg limits, particle size distribution, hydrometer, density, emersion crumb, consolidated undrained triaxial and direct shear.

The resultant geotechnical model identified a number of domains for each open pit and slope stability assessments were completed using SLIDE 5.0 to derive slope angles with a minimum Factor of Safety (FoS) of 1.2. These derived slope angles were superimposed on other structural measurements the define Inter Ramp Slope Angles (IRSA's) and batter angles having a Probability of Failure (PoF) of 20% to 30%.

3.6.5 Final Landform

DTIRIS-DRE wrote:

"……..…..The company was advised at the time that the retention of 4 mine voids in the post closure landform would require justification and that opportunities for backfilling mined out voids should be explored.

As submitted, the EA proposes a final land form consisting of four final voids that are between 100 and 180 metres deep, two each either side of and in close proximity to the Newell Highway. These voids will progressively fill with water that over time will become gradually more saline. The likely fact that the four remaining and unrehabilitated open cuts will provide no benefit to the community and have the potential to become a long term liability is not acknowledged in the EA.

Furthermore, the EA's justification for the retention of the voids in the rehabilitated landscape is superficial as it presents no quantitative information. The justification for not utilising the Caloma (both pits) and Wyoming void spaces to store waste rock; is that gold mineralisation continues beneath and that backfilling the pits would potentially prevent future underground mining of resources. However no resource information has been submitted to substantiate these statements, nor an estimation of the value of the underground resources for each pit.

DRE would be seeking further justification for this proposed final landform."

Response

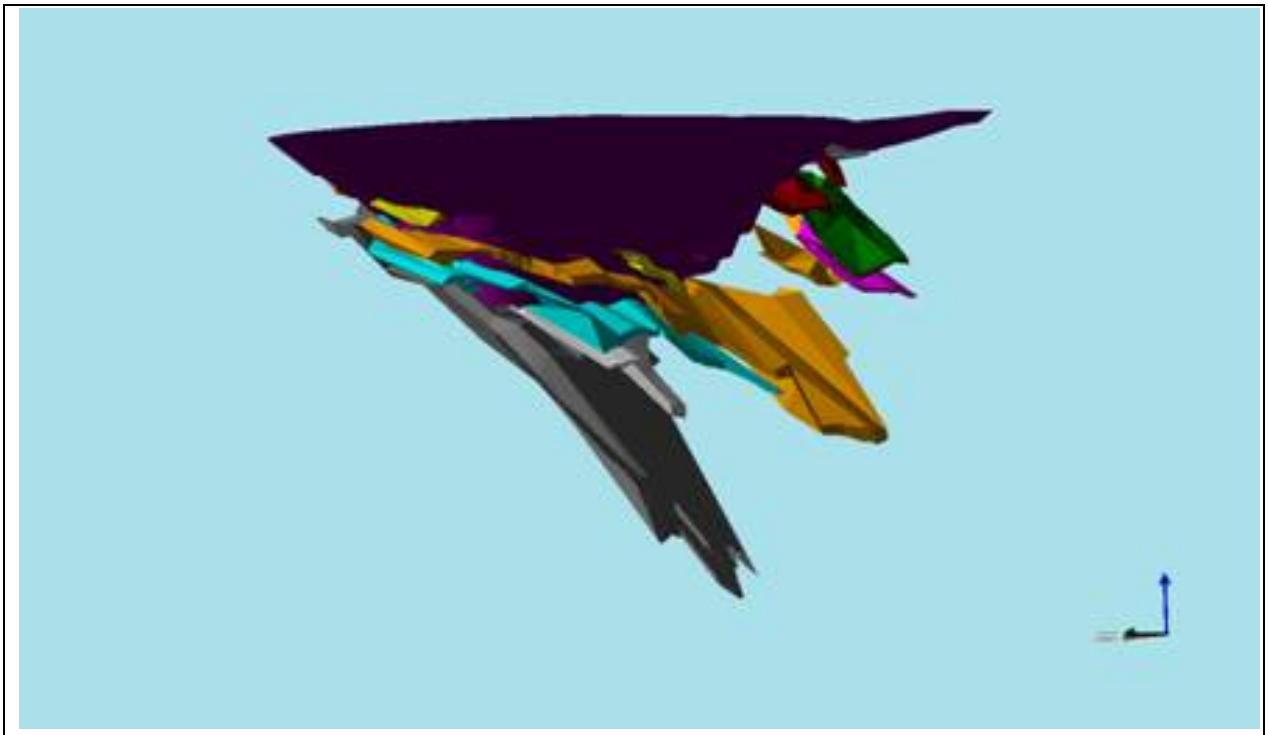
It is noted that *Section 6.1.6* of the *Environmental Assessment* did review as an alternative the placement of waste rock from the Caloma Two and Wyoming One Open Cuts within the Wyoming Three and Caloma Open Cuts. In fact, the option of placing waste rock within the Wyoming Three Open Cut remains a possibility, subject to the confirmation that this would not sterilise access to a continuation of the mineralisation which might be mined in the future by underground methods.

Due to the cost of drilling to the depths required to confirm the size, grades and therefore value of the continued mineralisation below the open cuts, a commitment to continued exploration cannot be made until such time as the currently defined project is approved. This is not unusual for metalliferous mining projects.

The following provides additional information to that presented in the *Environmental Assessment* on the mineralisation of the Caloma and Wyoming Three deposits. This additional information, although not able to quantify the size nor value of the additional resources, does illustrate that by committing to and commencing open cut backfill the future extraction of these resources would likely be sterilised.

Caloma

The Caloma Open Cut will recover 2.67Mt of ore at a grade of 2.06g/t Au from a total resource of 3.70Mt at 2.06g/t Au (approximately 72% of the defined resource). In addition seven widely spaced core drill holes were completed in early 2010 to provide the geological information regarding the depth continuity of the ore zones and hence the potential for an underground resource. These drill holes confirmed the broad geological concepts and the potential for underground resource as can be seen **Figure 3.MR1**.



Note: The coloured zones represent the various zones of mineralisation beneath the defined open cut.

Figure 3.MR1

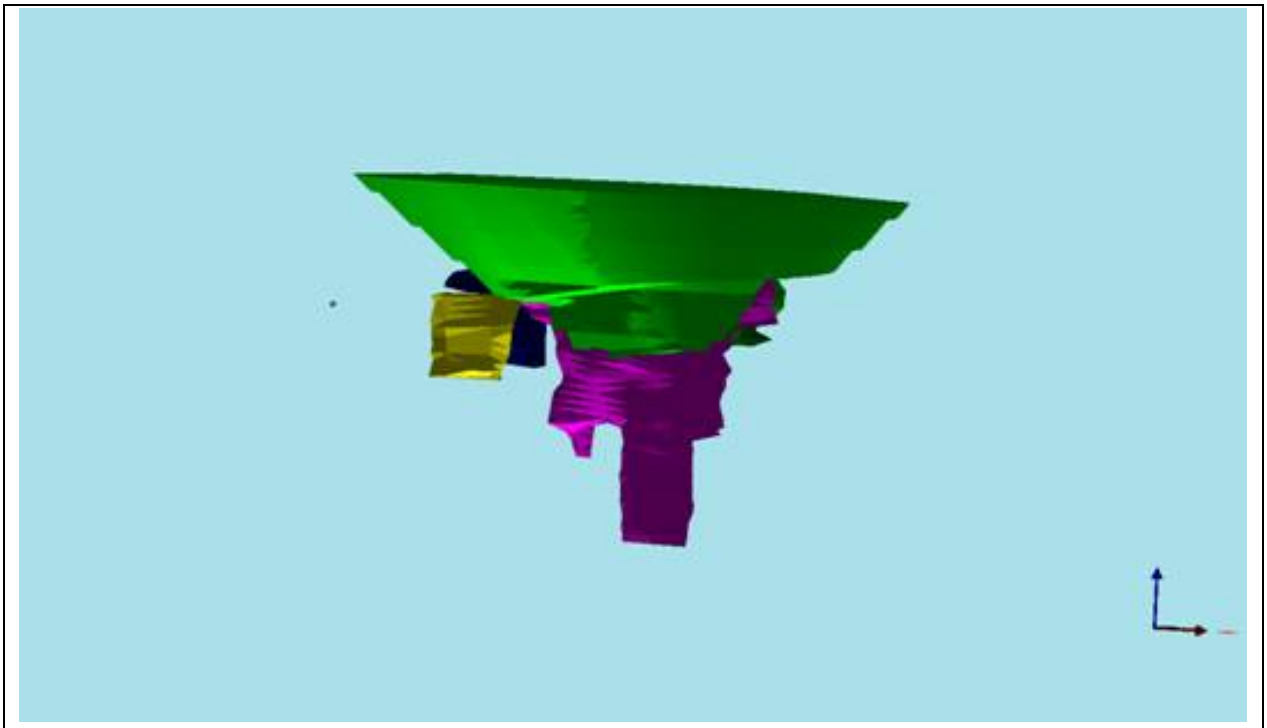
Caloma Ore Deposit

Wyoming Three

The Wyoming Three open Cut will recover 552 000t at a grade of 1.85g/t Au from a total defined resource of 808 000t at 1.92g/t Au (Approximately 66% of the defined resource). Two deeper core drill holes are programmed to be completed in the first quarter of 2012 to assess the broad geological concepts and the potential for underground resource as can be seen **Figure 3.MR2**.

The results of the deeper drilling will be used to further assess the depth potential of the Wyoming Three deposit which will inform as to whether backfilling the open cut can be undertaken without sterilising the resource.

It is noted that the retention of voids at the completion of mining would reduce the commercial and aesthetic value of the final landform. As noted in *Section 6.1.6* of the *Environmental Assessment*, the Proponent has committed to continually reviewing waste rock management and should the underground mining of the Caloma or Wyoming Three ore bodies be confirmed as unviable, the backfilling alternative will be reviewed and reconsidered. The Proponent also views the backfilling of voids in the final landform as the preferred option.



Note: The coloured zones represent the various zones of mineralisation (geological concept) beneath the defined open cut.

Figure 3.MR2

Wyoming Three Ore Deposit (Geological Concept)

If and when backfilling of one or more of the open cuts is identified as viable due to confirmation that mining of the deeper mineralisation would be uneconomic, the Mining Operations Plan for the Project would be updated to reflect this. However, in the event that backfilling is not a viable option for waste rock management (due to the likely continuation of mining by underground methods), the final landform would be left in a safe and stable form. Removal from commercial agriculture and establishment of native vegetation would also provide local habitat for native species (in particular native birds) (which would be unfazed by the reduced aesthetic appeal of the retained void). Considering the impact on local agricultural production, the total area removed from agriculture in the post-mining landform would also be proportionally very small when compared to expanse of surrounding agricultural land surrounding the Mine Site.

Summarising the above, while it is the preferred option of the Proponent to backfill the completed open cuts as completed, the need to ensure future underground mining is not sterilised prevents a commitment to this being made at this time. This notwithstanding, it is assessed that the relatively small area affected by the retained open cuts is justified on the basis of the value generated by the Project through the creation of employment, stimulus to local business, payments to local, NSW and Commonwealth governments, as well as the net increase in biodiversity outcomes generated by the proposed Biodiversity Offset Strategy.

3.6.6 Other Rehabilitation Considerations

DTIRIS-DRE wrote:

> *"The post closure proposal of leaving the 66KV substation, water pipeline, buildings and highway underpass intact upon mine closure is at this stage not acceptable, until planning approval for the subsequent uses of those facilities is obtained. Until post mine closure uses are better defined, it is appropriate to assume that mine infrastructure will be de-commissioned and removed from the site."*

Response

The Proponent accepts that if post-mining uses for the nominated infrastructure cannot be justified, this infrastructure will be decommissioned, removed and the landform rehabilitated. This information will be included in a Mine Closure Plan to be developed closer to cessation of the Project (should it be approved).

3.6.7 Rehabilitation Strategy

DTIRIS-DRE wrote:

> *"Figure 2.18 of the EA indicates that at mine closure there will be no revegetation of the open cut voids and surrounds. The nominated final land use for this area is stated as Native Vegetation Conservation. It is the Departments experience that an active revegetation strategy will need to be adopted to achieve the stated land use goal."*

Response

Contrary to the statement made in the *Environmental Assessment*, the Proponent has reviewed the proposed rehabilitation strategy for the open cut voids and surrounds. It is agreed that some planting of tree and shrub species will be undertaken around the perimeter of the open cuts and on the retained berms (where safe to do so), however, the Proponent refers DTIRIS-DRE to the rehabilitation of the Peak Hill Gold Mine (PHGM).

At PHGM, limited hand planting of trees and shrubs on the upper berms of open cut was completed in 1997 (with variable success). However, by far the most successful rehabilitation was achieved by natural revegetation, i.e. natural seed dispersal from nearby trees and shrubs into the open cut and germination on the berms. The Proponent estimates that 99% of the revegetation of the PHGM open cut has occurred in this fashion. **Plate 3** illustrates the revegetation of the Bobby Burns open cut at PHGM.

Trees in the open cuts are up to 10m tall (10 years after mining was completed in 2002). Two areas of the open cut were partially backfilled (Parkers Cutback and Bobby Burns) and topsoiled with soil collected during pre-strip. This rehabilitation has been highly successful and indeed there is a dense accumulation of Eucalypts and Wattles over areas of the mine site that were treated this way. Other than the Proprietary Open Cut which intersects the water table (20m of standing water), all other areas have naturally revegetated with locally occurring species for arguably a very small net loss of native vegetation. It is also worthy of note that the rehabilitation of the Peak Hill tenements (which contrary to the submission of DTIRIS-DRE has been achieved without the need for an active revegetation strategy) has resulted in improved biodiversity outcomes when compared to the environment preceding the Proponent's mining operations (pre-1996).

Plate 3: Natural Revegetation of Bobby Burn Open Cut

3.7 DEPARTMENT OF TRANSPORT – ROADS AND MARITIME SERVICES

3.7.1 Introduction

The Department of Transport - Roads and Maritime Services (RMS) provided a submission to the DP&I in January 2012 raising issues related to the Newell Highway Underpass, licensing, and signage. The following paraphrases the submission of RMS in relation to these issues along with a formal response.

3.7.2 Newell Highway Underpass

The RMS wrote:

> *"The Environmental Assessment does not refer to the Works Authorisation Deed executed Alkane Resources Ltd and the RTA (now RMS) effective from 12 May 2011".*
>
> *"Any other works as provided for in Section 138 of the Roads Act 1993 not expressly referred to in the Works Authorisation Deed, such as the connection of the proposed emergency access roads to the Newell Highway, will also be governed by the terms of the Works Authorisation Deed".*
>
> *"RMS suggests that the project approval should expressly acknowledge the executed Works Authorisation Deed and the terms of the Works Authorisations Deed will prevail to the extent of any inconsistency between the matters set out in the Environmental Assessment and the terms of the Works Authorisation Deed".*
>
> *"The RMS concurrence role as provided for by the Section 138 of the Roads Act 1993 and consent role as provided for by the Works Authorisation Deed includes all works affecting classified roads, namely: Newell Highway (Hw17); Mitchell Highway (HW7); and, Tomingley-Narromine Road (MR89)".*

Response

It is noted that the referenced Works Authorisation Deed was referenced in Section 2.1.3 of the *Environmental Assessment* (p. 2-7) as follows.

> *"It is noted that a Works Authorisation Deed was executed by Alkane Resources Ltd and the RTA effective from 12 May 2011. A Works Authorisation Deed is the agreement by which all works (as per the definition provided for in Section 138 of the Roads Act 1993), including the underpass of the Newell Highway pipeline, and transmission line crossings of classified roads and works connecting to classified roads, will be administered by the RTA (including the design, construction, alteration, maintenance and demolition of those works). The terms of the Work Authorisation Deed also govern any other works as provided for in Section 138 of the Roads Act 1993, not expressly referred to in the Work Authorisation Deed, such as the connection of the proposed emergency roads to the Newell Highway.*
>
> *In the event of any inconsistency between information provided in this Environmental Assessment and the executed Work Authorisation Deed, the terms of the Work Authorisation Deed will prevail."*

The Proponent recognises that concurrence and consent of the RMS is required (under Section 138 of the *Roads Act 1912*) prior to any works being undertaken on the identified classified roads.

The RMS also wrote:

> *"Further information is to be provided regarding the proposed "Blasting" signage within Tomingley village. If the signage is proposed within the Highway road reserve, it will require approval from RMS".*
>
> *"A Road Occupancy Licence is required prior to any works commencing within 3m of the travel lanes of the Newell Highway, Mitchell Highway or Tomingley-Narromine Road".*
>
> *"Road Safety Audits are to be conducted at the design and pre-opening stages in accordance with Austroads Guide to Road Safety Part 6: Road Safety Audit (2009").*
>
> *"The applicant is required to obtain permits for any oversized and over-mass loads from RMS Special Permits Unit in Glen Innes, Ph 1300 656 371".*

Response

The Proponent will seek approval from the RMS should blasting signage be required for the Newell Highway road reserve.

The Proponent recognises the requirement to obtain a Road Occupancy Licence prior to any works commencing within 3m of the travel lanes of the Newell Highway, Mitchell Highway or Tomingley-Narromine Road.

The Proponent will ensure that Road Safety Audits are conducted at the design and pre-opening stages for all proposed roadworks in accordance with nominated Austroads guideline.

Appropriate permits for oversized and/or over-mass loads will be obtained as required.

3.8 DEPARTMENT OF PRIMARY INDUSTRIES – CATCHMENTS & LANDS

The Department of Primary Industries – Catchments & Lands (DPI-CL) provided a submission to the DP&I in January 2012 signage. The following paraphrases the submission of DPI-CL along with a formal response to the issues raised.

The DPI-CL wrote:

"Following a review of the documentation provided, CLD comments are related to the Tomingley to Narromine Water Pipeline (TNWP) route and requests that the following matters are noted:

1. *Reference 'Vol 2 Parts 5-8', page 5-22, 1.3.3 "It is noted that in two places the location of road crossings provided initially by Alkane was not reflected in the final drawings provided." CLD notes that the figures and diagrams provided indicate the likely route but due to the scale of the mapping do not clearly show the TNWP location in relation to some Crown Land parcels.*
2. *CLD requests that the proponent confirm the pipeline location in relation to the following Crown Land parcels:*
   - *It is not clear from the diagrams whether the TNWP from Webbs Siding Road to the Mitchell Highway will intersect Crown Reserves R47923 (Lot 7002 DP 1032703) and R34248 (Lot 50 DP 755119) or the Crown Public Road south of Lot ADP 380855.*
   - *It is not clear from the diagrams whether the TNWP will intersect the Crown Road to the north of Narromine Road between Lot 18 DP 755119 and Lot 8 DP 755119. The Crown Road is held (sic) under Enclosure Permit 29032.*

   If the TNWP intersects the Crown Land identified above the proponent will be required to obtain a Licence to occupy the site(s)."

Response

The Proponent notes that Crown Lands Lot 7002 DP1032703 (Crown Reserves R47923) and the southeast corner of Crown Lands Lot 7003 DP1032703 will be traversed by the TNWP. Neither Lot 50 DP 755119, nor the Crown Public Road south of Lot A DP 380855 will be crossed.

The second part of the query refers to the "Crown Road north of Narromine Road". While it is understood that this road reserve, used as the entrance to the "Woodlands" property has been closed and converted to freehold by the owner of "Woodlands", the proposed alignment of the TWNP is now Lot 18 DP755119.

The Proponent understands that a licence from DPI-CL will be required to 'occupy' portions of Lots 7002 & 7003 DP1032703.

4. SPECIAL INTEREST GROUP SUBMISSIONS

4.1 LOWER MACQUARIE WATER UTILITIES ALLIANCE

The Lower Macquarie Water Utilities Alliance (LMWUA) provided a submission to the DP&I (dated 19 December 2011) raising issues related to water in the *Environmental Assessment*. The following paraphrases the submission of LMWUA in relation to these issues along with a formal response.

It is noted that where the issues raised replicate those made by Narromine Shire Council, reference is made to the response to the Council raised issue (in Section 3.2).

The LMWUA wrote:

> *"The NSW Government has agreed to provide financial assistance for a proportion of the water and infrastructure costs for the project, budgeted at $9.7M. ……*
>
> *As the NSW Government is funding part of the cost of the pipeline, which in particular is impacting on sensitive roadside vegetation corridors, consideration should be given to design and selection of the pipe and water supply system with the aim of constructing a long term asset (50 to 100 years) that provides an ongoing sustainable water supply."*

Response

Following a meeting between the Proponent and Narromine Shire Council on 13 January 2012, the Proponent agreed to review the design specifications and obtain indicative costing to install a pipeline with a 50 year life. The results of this review are summarised in Section 3.2.3 which indicates that the TNWP would remain an asset rather than a liability to Narromine Shire Council in securing the water security of Tomingley.

Further discussion of this issue has been deferred to a meeting planned for 8 February 2012.

The LMWUA also wrote:

> *"LMWUA notes that the Proponent commits in the EA to 'make available' surplus water for Tomingley village for domestic purposes during the life of the project, and after mine closure the pipeline will remain and be 'potentially available for other developments'. It is understood that the surplus water and the pipeline, post closure, would be donated free of charge to Narromine Shire Council."*
>
> *Consideration must be given to:*
>
> *a) How water from the pipeline would be reticulated throughout Tomingley, how it would be treated and at what cost; and*
>
> *b) What condition the pipeline will be in at the end of mining life, what the ongoing repair and maintenance and any upgrade costs may be. Narromine Shire Council in conjunction with the LMWUA will need to determine its policy position on the matter."*

Response

This replicates an issue raised by Narromine Shire Council. A response to this issue is provided in Section 3.2.3.

The LMWUA also wrote:

> *"The Eastern Surface Water Diversion Structure appears to catch and transfer water from a large catchment area and divert it to a discharge point adjacent to the Newell Highway. The LMWUA seeks advice as to the discharge arrangements for this water and its possible impact on the Newell Highway (eg culvert capacity, flow paths, etc)."*

Response

This replicates an issue raised by Narromine Shire Council. A response to this issue is provided in Section 3.2.3.

The LMWUA also wrote:

> *"Because of the open cuts, the lateral extent of the groundwater drawdown cone is predicted to be between 2.3 km and 5.6 km– depending on the geology. The Proponent must confirm that there will be no reduction in the yield or quality from Council's groundwater bores in the Gundong Creek Alluvium. It is suggested that there should be a consent condition that stipulates that Council's water supply on Gundong Creek will not be compromised by the mine and, if it is, then "make good" provisions will apply at no cost to Council."*

Response

This replicates an issue raised by Narromine Shire Council. A response to this issue is provided in Section 3.2.3.

The LMWUA also wrote:

> *"a) **Water Impacts***
>
> *Given that gold processing activities will occur at the site, the LMWUA seeks the issuance of comprehensive and robust water quality safeguards to mitigate the risk of pollution of groundwater and/or surface water due to the leaching of cyanide contaminants from the slurry stockpile and acid mine drainage from waste rock. We also wish to ensure that birds and animals are protected from cyanide-contaminated water."*

Response

The *Environmental Assessment* details the safeguards and mitigation measures to be implemented by the Proponent. Further information has also been provided in Section 3.4.3.2 and 3.4.3.3 (Response to OEH) further documenting the safeguards associated with the RSF, processing areas and chemical reagent storage areas.

Furthermore, the Proponent has committed to preparing and implementing a Water Management Plan which will incorporate Ground and Surface Water Monitoring Programs, and a Groundwater Contingency Plan (Commitment 20.2).

The LMWUA also wrote:

> *"b) **Reuse of storm water***
>
> *Consideration must be given to the management and reuse of storm water both during the operation of the mine and also post closure. Large volumes of water which will accumulate in the abandoned mine pits may be able to be treated and used for industrial or horticultural operations post mine closure."*

Response

The *Environmental Assessment* accounts for the capture and reuse of available stormwater and groundwater seepage for dust suppression purposes (in order to reduce reliance on the groundwater source provided by the TNWP). Notably, no discharge of captured water will occur other than under extreme rainfall conditions (5 day 95th percentile event) when a discharge from the sediment basins may occur.

The value of water accumulating in the open cuts following the cessation of mining to future commercial activities will continue to be investigated (although potentially limited by the likely salinity of this water).

The LMWUA also wrote:

> *"In conclusion, the Lower Macquarie Water Utilities Alliance (LMWUA) seeks consent conditions that:*
>
> *1) Require the efficient use and reuse of water, stormwater and waste water.*
>
> *2) Ensure that the water supplied for people meets the Best Practice Guidelines of the NSW Office of Water.*
>
> *3) Ensure that the design, operation and maintenance of the water supply assets are such that they are integrated into the overall water supply system of the Lower Macquarie, both during operation of the mine and post closure."*

Response

The Proponent is comfortable that the Project is conditioned to reflect the concerns of the LMWUA.

5. FINAL STATEMENTS OF COMMITMENTS

Table 3 presents a revised set of commitments, reflecting additional commitments made in response to issues raised in the submissions of the government agencies or general public. Commitments revised or added to those presented in the *Environmental Assessment* are provided in red text.

Table 3
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action	Timing
1. ENVIRONMENTAL MANAGEMENT		
Compliance with all conditional requirements in all approvals, licences and leases.	1.1 Comply with all commitments recorded in **Table 3** (this table).	Continuous and as required
	1.2 Comply with all conditional requirements included in the: • Project Approval; • Environment Protection Licence; • Mining Lease(s); and • any other approvals.	Ongoing
2. AREA OF ACTIVITIES		
All approved activities are undertaken generally in the location(s) nominated on the figures shown in Sections 2 and 4.	2.1 Mark, and where appropriate, survey the boundaries of the areas of proposed disturbance on the Mine Site.	Prior to the commencement of the relevant activity
	2.2 Mark, and where appropriate, survey the alignment of the Tomingley Narromine Water Pipeline.	Prior to the commencement of the relevant activity
	2.3 Mark, and where appropriate fence, boundaries relevant to the biodiversity offset strategy.	Within 6 months of approval of the biodiversity offset strategy
	2.4 Construct perimeter security fence as early as possible during construction operations to limit the potential for inadvertent or unauthorised access to the operational sections of the Mine Site.	Within 3 months of commencement.
3. OPERATING HOURS		
All operations are undertaken within the approved operating hours.	3.1 Undertake all activities, where practicable, in accordance with the following operating hours.	Continuous and as required

Activity	Proposed Hours of Operation
Vegetation clearing and topsoil stripping	7 days per week (6:00am to 6:00pm)
Construction operations	7 days per week (24 hours)
Open cut mining operations	
Underground mining operations	
Blasting operations	Monday to Saturday (9:00am to 5:00pm[1])
Maintenance operations	7 days per week (24 hours)
Processing operations	
Rehabilitation operations	7 days per week (7:00am to 10.00pm)

Note 1: Unless required for misfire re-blast, emergency or safety reasons.

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
4. NOISE			
Noise generated by operational activities does not exceed intrusiveness criteria nor significantly impacts on neighbouring landowners and/or residents.	4.1	Operate mining equipment in accordance with **Figures 4.11** to **4.15**, or equivalent arrangement that provides for the same whole of mine sound pressure level, i.e. provides for compliant noise emissions from the Mine Site.	Ongoing
	4.2	Provide for the enclosure, cladding or other mitigation of the crushing, screening and processing plant to reduce sound power levels and ensure compliant noise emissions from the Mine Site.	Prior to commencement of crushing operations
	4.3	Install frequency modulated reversing alarms on mobile equipment.	Ongoing
	4.4	Undertake land preparation operations, including vegetation clearing and soil stripping, during the daytime only.	Ongoing
	4.5	Construct, Waste Rock Emplacements 2 and 3 from the northern margin of the emplacement towards the south to create a 15m high acoustic and visual amenity bund.	Ongoing
	4.6	Ensure that noisy equipment is operated in exposed locations (such as on top of the acoustic bunds) or in close proximity to residences (during the daytime only and preferentially when the wind is blowing from the northwest, north or northeast).	Ongoing
	4.7	Preferentially operate noisy equipment during the evening and night, including bulldozers, excavators and haul trucks, in the southern section of the Mine Site, as close as possible to the acoustic bunds on Waste Rock Emplacements 2 and 3 and in the deepest sections of the open cuts where there would be an the most effective topographic barrier between the sources of mining-related noise and nearby residences.	Ongoing
	4.8	Progressively stand down the mining fleet during the onset of a temperature inversion, or as required in response to real-time noise monitoring (see Commitments 4.8 to 4.11).	Ongoing
Noise generated by the Project is monitored and procedures developed and implemented to respond to ensure compliance is maintained.	4.9	Install a real-time noise monitor and appropriate communication equipment at an appropriate location within the southern section of the Tomingley village.	Prior to the commencement of activities on the Mine Site
	4.10	Establish, in consultation with a suitably qualified and experienced noise consultant and the community, appropriate noise trigger levels at the real-time noise monitoring location that would ensure that the relevant noise criteria are not exceeded at residences surrounding the Mine Site.	
	4.11	Establish a procedure whereby appropriate personnel are notified when noise levels recorded by the real-time monitor reach the identified trigger levels.	

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
4. NOISE (CONT'D)			
Noise generated by the Project is monitored and procedures developed and implemented to respond to ensure compliance is maintained. (cont'd)	4.12	Establish a procedure whereby the noisiest equipment is progressively relocated or shut down to prevent further increase in the noise level received at the monitoring station (see also Commitments 4.5 to 4.7).	Prior to the commencement of activities on the Mine Site
Noise management plan prepared and implemented.	4.13	Prepare a *Noise Management Plan* that is consistent with the procedures to be developed in accordance with Commitments 4.1 to 4.12 and any negotiated agreements with residents.	Within 3 months of receiving project approval
	4.14	Ensure that a 24-hour complaints telephone line is maintained and that the surrounding community is made aware of the number. If noise-related complaints are received.	Prior to the commencement of activities on the Mine Site
	4.15	Ensure that prompt action is taken to identify the nature of any complaint received and verify the relevant noise levels using the real-time noise monitoring equipment.	Within 24 hours of receipt of complaint
5. SURFACE WATER			
Appropriately document Erosion and Sediment Control management measures.	5.1	Prepare a detailed *Erosion and Sediment Control Plan*, including a description of surface water management structures and procedures to ensure that the criteria identified in the Environment Protection Licence or project approval, assuming that they are granted, are achieved.	Prior to commencement of mining operations.
Construct and maintain access to the Mine Site	5.2	Construct a culvert and causeway crossing over Gundong Creek to accept flows generated by rainfall events up to a 1 in 10-year ARI event before overtopping.	During site establishment phase (prior to mining)
	5.3	Maintain an alternative emergency access during flood events via the emergency site access road to the Newell Highway	Ongoing
Separate clean water from dirty water (General)	5.4	Construct temporary diversion banks on the upslope boundary of all areas to be stripped of groundcover and soil.	Prior to clearing and stripping operations
	5.5	Construct catch banks and/or install a sediment fence on the downslope boundary of an area to be stripped of groundcover and soil.	Prior to clearing and stripping operations

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
5. SURFACE WATER (CONT'D)			
Separate clean water from dirty water (General) (cont'd)	5.6	Direct sediment-laden runoff into sediment basins for treatment prior to discharge (if required).	Ongoing
	5.7	Construct all water management infrastructure in accordance with Volume 2E of the guideline document "*Soils and Construction: Managing Urban Stormwater*" (DECC, 2008b).	Construction of water management infrastructure
Design and construct surface water management structures to prevent the discharge of polluted (elevated suspended solids) water from the Mine Site and minimise impacts on environmental flows	5.8	Construct the Western, Central and Eastern Surface Water Diversion Structures with the design specifications provided in Section 4.3.3.2.3 (unless modified by approved *Erosion and Sediment Control Plan*).	During site establishment phase (prior to commencement of mining)
	5.9	Armour the ESWDS to achieve a C-factor of 0.05 (or better). This could necessitate the use of rock armouring, geofabric or similar.	
	5.10	Construct Catch Banks 1 to 5 with the design specifications provided in Section 4.3.3.2.3 (unless modified by approved Erosion and Sediment Control Plan).	
	5.11	Construct Sediment Basins 1 to 5 with the design specifications provided in Section 4.3.3.2.4 (unless modified by approved *Erosion and Sediment Control Plan*).	
	5.12	Construct drop-down structure and energy dissipaters as described in Section 4.3.3.2.6 (unless modified by approved *Erosion and Sediment Control Plan*).	Ongoing
	5.13	Construct a table drain along the eastern side of the Newell Highway with the design specifications provided in Section 4.3.3.2.8 (unless modified by approved *Erosion and Sediment Control Plan*).	During site establishment phase (prior to commencement of mining)
	5.14	Install a Relocatable Waste Water Treatment Plant (RWWTP) to provide secondary treatment of sewage within the Mine Site.	
	5.15	Ensure that all fuel and reagent storage, delivery and handling areas are appropriately sealed and bunded and that overflow pipes are installed in a manner that would minimise the potential for pollution in the event of overfilling.	Ongoing
Design and construct surface water management structures to prevent the discharge of contaminated (hydrocarbon, cyanide, trace metals etc.) water from the Mine Site	5.16	Construct the RSF in accordance with design specifications and have QA/QC assessment completed.	During site establishment phase (prior to commencement of mining)
	5.17	Construct the RSF over naturally occurring clays that achieve a permeability of 1 x 10^{-9} m/s or less.	
	5.18	Line the Raw Water and Processing Water Dams with an impermeable HDPE liner.	

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
5. SURFACE WATER (CONT'D)			
Design and construct surface water management structures to prevent the discharge of contaminated (hydrocarbon, cyanide, trace metals etc.) water from the Mine Site (Cont'd)	5.19	Provide for design specific freeboard within the RSF (500mm which exceeds that required to prevent overtopping following a 1:10,000 year ARI 72 hour event - 460mm of freeboard), and Raw Water and Process Water Dams (200mm which exceeds that required to prevent overtopping following a 1:100 year ARI 72 hour event - 189mm of freeboard).	
	5.20	Securely store all hydrocarbon and chemical products.	Ongoing
	5.21	Ensure all hydrocarbon and chemical storage tanks are either self-bunded tanks or bunded with an impermeable surface and a capacity to contain a minimum 110% of the largest storage tank capacity.	Ongoing
	5.22	Refuel all equipment within designated areas of the Mine Site, where practicable.	Ongoing
	5.23	Undertake all maintenance works involving hydrocarbons, where practicable, within designated areas of the Mine Site such as the maintenance workshop.	Ongoing
	5.24	Direct all water from wash-down areas and workshops to oil/water separators and containment systems.	Ongoing
Design and construct surface water management structures to prevent the discharge of saline water from the Mine Site	5.25	Line the Dewatering Dams with an impermeable HDPE liner.	During site establishment phase (prior to commencement of mining)
Only capture surface water on the Mine Site up to the 'Maximum Harvestable Right' of Proponent owned or controlled properties	5.26	Fill in or isolate from natural flows dams which would result in the capture (when combined with the Mine Site sediment basins) of greater than 51.0ML.	During site establishment phase (prior to commencement of mining)
Implementation of a comprehensive and ongoing surface water monitoring program.	5.27	Monitor surface water quality for pH, electrical conductivity, total suspended solid concentration, Oil & Grease levels, within:	
		• licensed discharge points;	Quarterly and during surface overflow events from licensed discharge points
		• receiving waters (Gundong Creek); and	Quarterly and within 12 hours after an overflow event to the receiving waters
		• Clean, Dirty and Dewatering Dams.	Quarterly from Clean, Dirty and Dewatering Dams

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
6. GROUNDWATER			
Effective management of water dewatered from the open cuts	6.1	Remove water accumulating in the open cuts, transfer to Dewatering Dams and use preferentially for dust suppression activities.	Ongoing
Minimisation of groundwater contamination	6.2	Design and construct the RSF as described in the detailed design report to the NSW Dams Safety Committee prepared by D.E. Cooper & Associates Pty Ltd and illustrated by **Drawing 174-11-001 Rev.0**. Key design parameters would be as follows. • Area - two cells with a combined area of 42ha. • Crest elevation – 280.5m AHD. • Crest width – 6m. • Slope of outer face – 1:3 (V:H). • Slope of inner face – 1:1.5(V:H). • Key trench – up to 2m deep, base 3m wide, side slopes = 2:1 (V:H). • Maximum elevation of residue – 280.0m AHD.	During site establishment phase
	6.3	Construct the residue storage facility over naturally occurring clays which have a permeability of less than $1x10^{-9}$m/day.	During site establishment phase
	6.4	Construct a drainage channel at the base of the inside wall of the RSF and directly beneath the residue inflow spigots to capture the drainage that occurs at the time of residue placement.	During site establishment phase
	6.5	Construct central decant towers fitted with submersible pumps in the centre of each residue cell.	During site establishment phase
	6.6	Place residue uniformly around the perimeter of the RSF via several slurry spigots.	Ongoing
	6.7	Alternate placement of residue between the two cells, creating residue layers of approximately 1.7m in height at roughly 6 monthly intervals	Ongoing
	6.8	Ensure immediate return of water from the RSF decant to the Raw Water Dam.	Ongoing
	6.9	Install piezometers around the perimeter of the RSF (in accordance with the plan provided by **Drawing 174-11-001 Rev.0**) and monitor these regularly to assess the integrity of the facility.	During site establishment phase
Ensure the availability of groundwater to surrounding users is maintained.	6.10	In the event that routine monitoring indicates that mining activities could be resulting in reduced groundwater availability to surrounding landholders, commission a hydrogeologist to review the data, and provide independent advice as to the cause of the trigger.	In the event that routine monitoring indicates that a groundwater availability is reduced

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
6. GROUNDWATER (CONT'D)			
Ensure the availability of groundwater to surrounding users is maintained. (Cont'd)	6.11	If a reduction in groundwater availability is determined to be as a consequence of operations associated with the Project, negotiate with the affected landowner(s) with the intent of formulating an agreement.	In the event that monitoring identifies a reduction in groundwater availability is consequence of the Project
7. BIODIVERSITY			
Avoid impacts on native flora and fauna.	7.1	Align the Main Site Access Road using an existing farm track to avoid as many mature trees as practicable within a corridor containing remnant stands of Inland Grey Box – Poplar Box – White Cypress Pine.	During site establishment phase (prior to commencement of mining)
	7.2	Locate the Mine Site activities and infrastructure so as to avoid the majority of remnant native vegetation. Restrict disturbance of remnant native vegetation to (approximately): • 2.7ha (of 36.9ha) of Inland Grey Box – Poplar Box – White Cypress Pine tall woodland on red loams; • 0.9ha (of 30.9ha) of Fuzzy Box – inland Grey Box on alluvial brown loam soils; and • 18.0ha (of 70.3ha) of Belah / Black Oak Western Rosewood Wilga woodland.	Ongoing
	7.3	Locate the Mine Site activities and infrastructure so as to avoid disturbance to all but approximately 476 paddock trees.	During site establishment phase (prior to commencement of mining)
Minimise impacts on native flora and fauna.	7.4	Modify the alignment of the water pipeline as necessary to avoid disturbance to a stand of vegetation which is categorised as a remnant of the Inland Grey Box Woodland EEC.	During site establishment phase (prior to commencement of mining)
	7.5	Clearly mark areas of ground disturbance prior to commencement of activities and disturbance restricted to these areas.	
	7.6	Establish clearing procedures or protocols to identify (and avoid) disturbance to nests or roosting sites of threatened fauna, e.g. grey-crowned babbler. If impact is unavoidable, engage a suitably qualified and experienced ecologist would be engaged to remove the animal(s) and/or nest/roosting habitat nests prior to clearing.	During site establishment phase (prior to commencement of mining)
	7.7	Schedule the clearing of trees with moderate or high habitat value between April to September to reduce risk of impact to tree dependant microbats and birds, in particular the Grey-crowned babbler.	Ongoing

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
7. BIODIVERSITY (CONT'D)			
Minimise impacts on native flora and fauna. (cont'd)	7.8	Protect the ten known habitat trees on the western side of the Newell Highway and four habitat trees on the eastern side of the Newell Highway by installing high visibility fencing around these trees to provide a 25m buffer exclusion area.	Ongoing
	7.9	Undertake all clearing of trees in accordance with a *Vegetation Clearing Protocol* (VCP) which requires that the clearing supervisor: • check all trees for the presence of nesting or roosting fauna before felling or pushing then start tree removal immediately after visual inspection; and the operator; then • gradually nudge a hollow that requires removal, at intermittent intervals so that any animal occupying a habitat tree has the chance of vacating the area after the initial disturbance period.	Ongoing
	7.10	(If Grey-crowned babblers identified) delay clearing until nests are vacated. If roosting babblers persist, a suitably qualified and experienced ecologist would be engaged to remove the animal(s) and/or nest/roosting habitat prior to clearing	Ongoing
Mitigate unavoidable impacts on native flora and fauna.	7.11	Clear sufficient vegetation for the subsequent 12 months of mining operation only.	Ongoing
	7.12	Directly transfer stripped soil materials onto rehabilitation areas where practicable.	Ongoing
Mitigate unavoidable impacts on native flora and fauna.	7.13	Undertake a program of weed control prior to soil stripping activities and following re-vegetation to ensure native plants are not overgrown during their early periods of growth.	Ongoing
	7.14	Salvage tree trunks, major limbs and, if practicable, minor branches for use in rehabilitation of the Mine Site or amelioration areas	Ongoing
	7.15	Erect signs to notify of the location and significance of vegetation stockpiles.	Ongoing
	7.16	Implement an erosion and sediment control plan for all areas of disturbance likely to generate sediment or be subject to erosion.	Ongoing
	7.17	Revegetate the Mine Site as described in Section 2.14 and in accordance with a MOP or REMP to be prepared prior to the commencement of activities on the Mine Site.	Ongoing

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
7. BIODIVERSITY (CONT'D)			
Avoid, minimise or mitigate impacts on native flora and fauna associated with residue management.	7.18	Ensure that the maximum WAD cyanide concentration reporting to the RSF is less than 30mg/L and the 90th percentile discharge limit is 20mg/L.	Ongoing
	7.19	Manage the RSF without a central decant pond.	Ongoing
	7.20	Construct fencing using a combination of a large (tall >1.8m) chain mesh fence (to exclude large mammals) with a fine mesh skirt at its base (to exclude small mammals and reptiles).	Ongoing
	7.21	Cover any standing water at the decant tower with floating plastic balls (to deter birds and arboreal mammals from landing on the water surface).	Ongoing
	7.22	Maintain alternative water sources in the vicinity of the Mine Site, including establishment of aquatic and edge species to attract bird species to these areas and away from any standing water within the RSF.	Ongoing
	7.23	Monitor the concentration of WAD cyanide within the RSF, the presence or otherwise of standing water on the surface of the facility and wildlife mortality, if any.	Ongoing
	7.24	Monitor fauna usage and/or mortality on or in the vicinity of the residue storage facility (in accordance with the recommendations of OzArk (2011a), and Section 4.5.7.3.4).	Ongoing
	7.25	Report to DECCW, investigate and implement additional measures in the event of unacceptable wildlife mortality.	As required
Offset residual impacts on native flora and fauna.	7.26	Develop a biodiversity offset strategy, in consultation with DECCW, in accordance with the general strategy presented in Section 2.14.8 and **Figure 2.19 (Modified)**. The biodiversity offset strategy should provide for the following. • Protection and conservation of existing remnants of Inland Grey Box – Poplar Box – White Cypress Pine tall woodland on red loams, Fuzzy Box – inland Grey Box on alluvial brown loam soils; and River Red Gum riverine woodland forest. An illustration of remnants to be protected and conserved is provided by **Figure 2.19 (Modified)**. • enhancement, through protection, ameliorative revegetation and conservation of land adjacent to remnant native vegetation. An illustration of remnant vegetation to be protected, conserved and enhanced is provided by **Figure 2.19 (Modified)**.	Within 12 months of receipt of project approval

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
7. BIODIVERSITY (CONT'D)			
Offset residual impacts on native flora and fauna. (cont'd)	7.27	Establish legally binding arrangement over lands included in the biodiversity offset strategy to for conservation of the land in perpetuity. The arrangement would take the form of a Biobanking Statement Agreement, Conservation Agreement, Trust Agreement or Planning Agreement (through change in title of the affected land).	Within 18 months of receipt of project approval
	7.28	Prepare a *Biodiversity Offset Management Plan* (BOMP). The BOMP would include the following components. • A plan of management for the BOS detailing the biodiversity-related actions and management to be undertaken. • BioBanking Credit Report(s) to define the quantum of the BOS. • Details of how the land will be secured in perpetuity. • Details of how the BOS will be funded.	Within 18 months of receipt of project approval
	7.29	Develop a pest animal strategy in conjunction with relevant government agencies and surrounding landholders to manage introduced fox, rabbit, hare and feral cat.	Within 12 months of commencement of mining operations
	7.30	Develop a weed control program to manage weed species within the Mine Site.	Within 12 months of commencement of mining operations
Rehabilitate disturbed areas in order to maintain biodiversity values of the Project Site.	7.31	Create a final landform more diverse and complex then the pre-mining landform, i.e. approximating the conceptual final landform provided by **Figure 2.18**.	Ongoing
	7.32	Revegetate the final landform as nominated by **Figure 2.18** (or MOP or REMP).	Ongoing
8. ABORIGINAL HERITAGE			
Impact on Site TGP – ST7 is undertaken in accordance with the requirements of the registered Aboriginal stakeholders.	8.1	Remove the tree trunk and retain these on the Mine Site for community assessment/protection and possibly education. The exact location and procedure for scar removal and transfer will be included in a Cultural Heritage Management Plan, however, will likely involve the following. • Hold a meeting involving the Proponent, the tree-removing contractor, Aboriginal community representatives and an archaeologist to confirm the tree-removal methods. • Remove the tree carefully in two portions using a chainsaw below the base of the carving and transport the removed section to an appropriate keeping place. • Transfer the scarred section to the nominated keeping place.	Prior to disturbance of Site TGP-ST10

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
8. ABORIGINAL HERITAGE (CONT'D)			
Impact on Site TGP – ST10 is minimised and undertaken in accordance with the requirements of the registered Aboriginal stakeholders.	8.2	Remove the scarred section of the tree and transfer to an appropriate keeping place in accordance with the wishes of the registered Aboriginal stakeholders. The exact location and procedure for scar removal and transfer will be included in a Cultural Heritage Management Plan, however, will likely involve the following. • Hold a meeting involving the Proponent, the tree-removing contractor, Aboriginal community representatives and an archaeologist to confirm the tree-removal methods. • Remove the tree using a chainsaw below the base of the carving and transport the removed section to an appropriate keeping place. • Transfer the scarred section to the nominated keeping place.	Prior to disturbance of Site TGP-ST10
Impact on Site TNWP – OS1 with PAD is minimised and undertaken in accordance with the requirements of the registered Aboriginal stakeholders.	8.3	Invite representatives of the Aboriginal community to be in attendance to monitor the excavation and to retrieve any Aboriginal artefacts.	During construction
	8.4	Confine cars and machinery, to the extent practicable, to an existing dirt road when in the vicinity of TNWP-OS1 with PAD.	During construction
	8.5	Cease construction, notify OEH and obtain advice as to how to proceed should in excess of 100 artefacts be identified.	As necessary
	8.6	Cease all work and notify local police should human skeletal material be noticed. If the skeletal remains are deemed to be historical, OEH and the Narromine LALC would be contacted to determine how to proceed.	As required
Impact on Site TGP – OS2 is minimised and undertaken in accordance with the requirements of the registered Aboriginal stakeholders.	8.7	Place geofabric directly on the ground within the disturbance footprint of the Main Site Access Road in the vicinity of Site TGP-OS2 prior to ground disturbing activities commencing. Cover this with or sand or gravel before constructing the base of the Main Site Access Road.	Prior to commencement of mining operations
	8.8	Plant by hand native vegetation adjacent to the Main Site Access Road in the vicinity of Site TGP-OS2 to prevent vehicular access to other sections of the site.	Prior to commencement of mining operations
	8.9	Fence and mark the area of Site TGP-OS1 to prevent inadvertent disturbance of the site.	Prior to commencement of mining operations
	8.10	Fence around the drip lines of Sites TGP-ST8 and TGP-ST9 to prevent inadvertent disturbance of these sites.	Prior to commencement of mining operations

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
8. ABORIGINAL HERITAGE (CONT'D)			
Impact on remaining sites of the Mine Site avoided.	8.11	Ensure that all identified sites are identified on plans held by the Mine Planning and Environmental Officers.	Prior to commencement of mining operations
	8.12	Ensure that all ground disturbing activities do not disturb the identified sites.	Ongoing
	8.13	Construct, where required, appropriate fencing or other identifying markers around identified sites where those sites occur in the vicinity of areas of proposed disturbance or in areas where inadvertent disturbance may occur.	Prior to commencement of mining operations
	8.14	Prepare, in consultation with the Aboriginal community, a Cultural Heritage Management Plan identifying procedures to protect or salvage all identified Aboriginal sites and prevent damage to all sites that may be identified during the life of the Project.	Within 6 months of receiving project approval
Impact on sites identified along the alignment of the TNWP are minimised and undertaken in accordance with the requirements of the registered Aboriginal stakeholders.	8.15	Mark all identified scarred trees with high visibility fencing at a suitable distance from the tree prior to construction of the pipeline commencing to prevent inadvertent disturbance of the trees	Prior to construction of the pipeline commencing
	8.16	Ensure all disturbance remains within the nominated TNWP corridor and that the minimum area required for installation of the pipeline is disturbed.	During construction
	8.17	Any soil excavated for the water pipeline would be replaced in the area and not removed to some other location.	During construction
Maintain Aboriginal heritage values on site.	8.18	In the event the disturbance footprint changes, ensure that appropriate consultation and field survey is undertaken to confirm no sites or objects of Aboriginal heritage significance are impacted.	If the disturbance footprint changes
	8.19	Ensure work in an area is suspended should any Aboriginal sites be uncovered. The OEH Western Regional Archaeologist (Dubbo Office) and local Aboriginal community will be contacted to discuss how to proceed.	If a previously unidentified object or Aboriginal site is uncovered
9. NON ABORIGINAL HERITAGE			
Site activities are undertaken to minimise impacts on non-Aboriginal heritage items.	9.1	Identify all identified sites on mine plans and ensure that activities in the vicinity of those sites are appropriately managed.	Prior to the commencement of site establishment operations.
	9.1	Protect and erect appropriate signage around sites TGP-HS1, TGP-HS2 and TGP-HS3.	
	9.2	Mark sites TNWP-HS1 and TNWP-HS2 with high visibility fencing at a suitable distance from the tree.	Prior to construction of the pipeline

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
9. NON ABORIGINAL HERITAGE (CONT'D)			
Site activities are undertaken to minimise impacts on non-Aboriginal heritage items. (cont'd)	9.3	Document the site TGP-HS5, by photography, prior to removal of the artefacts. Discussions would be held with local historic society as to the potential use of these items in a display to document the history of the site.	Prior to disturbance to site TGP-HS5
	9.4	Undertake an assessment and archaeological investigation of site TGP-HS6 in accordance with the Historical Archaeology Code of Practice, published by the Heritage Office (of the then Department of Planning) (2006) and the Australia ICOMOS Burra Charter as 'good heritage practice'.	Prior to disturbance to site TGP-HS6
10. VISUAL AMENITY			
Limit the visibility of operational areas from nearby residences and the Newell Highway.	10.1	Construct vegetated amenity bunds as nominated on **Figure 2.5** and **2.6** as follows. • Adjacent to the eastern and western boundary of the Newell Highway. • To the north of the Caloma Open Cut. • To the south of the Wyoming One Open Cut. • to the north of Waste Rock Emplacement 2,	Within the initial 12 months of operations
	10.2	Construct and rehabilitate the northern faces of Waste Rock Emplacements 2 and 3 to an initial height of 15m above the remainder of the waste rock emplacement.	Continuous for the life of the Project
	10.3	Progressively reshape and rehabilitate areas, including waste rock emplacements, no longer required for mining related purposes.	
	10.4	Undertake remnant vegetation protection and enhancement as described in Section 2.14.8, including ameliorative tree plantings to the south of Tomingley (**Figure 2.19**).	
	10.5	Construct the processing plant and other infrastructure within the Mine Site from non-reflective, neutral coloured material.	During the site establishment phase
Limit the visibility of operational areas from nearby residences and the Newell Highway. (cont'd)	10.6	Place and operate lighting on the Mine Site that: • are not directed towards, and therefore do not impact on the vision of motorists using, the Newell Highway; • do not point towards surrounding residences; and • minimise the 'loom' created by the lights.	Continuous for the life of the Project
	10.7	Provide for additional visual screening in response to reasonable and feasible request from surrounding land holders.	As required
	10.8	Maintain the Mine Site in a clean and tidy condition at all times.	Continuous for the life of the Project
	10.9	Implement commitments related to air emissions management.	

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
11. AIR QUALITY			
Minimise impacts to air quality relating to the Project.	11.1	Disturb only the minimum area necessary for mining.	Ongoing
	11.2	Shape, topsoil and rehabilitate completed sections of the waste rock emplacements as soon as practicable.	Ongoing
	11.3	Operate water carts to minimise wind-blown and traffic-generated dust.	Continuous for the life of the Project
	11.4	Clearly mark all roads with marker posts or equivalent to control their locations, especially when crossing large overburden emplacement areas.	Ongoing
	11.5	Rehabilitate all roads as soon as practicable once no longer required for mining-related purposes.	Continuous for the life of the Project
	11.6	Limit development of minor roads as far as practicable.	Ongoing
	11.7	Ensure that all appropriate dust management measures are used during drilling operations, including dust aprons, dust extraction and water injection.	Continuous for the life of the Project
	11.8	Undertake blasting operation in appropriate weather conditions only.	Ongoing
	11.9	Ensure that adequate stemming is used during blasting operations.	Ongoing
	11.10	Ensure that all conveyor transfer points within the crushing and screening circuit of the processing operations are enclosed.	Ongoing
Minimise impacts to air quality relating to the Project. (cont'd)	11.11	Install and operate spray bars within the crushing and screening circuit of the processing operations to produce a fog of water to suppress dust. Points at which this control will be installed are as follows. • The ROM Bin back and side walls. • The mouth of the Primary Crusher. • The conveyor between the primary crusher and secondary crusher (CV01). • The discharge point to the Head Chute in the Screening Tower (CV02). • The inlet to the Screening Tower. • The oversize outlet to the Screening Tower. • Loading points to the conveyors for the transfer of screened material to and from the screening Tower and Surge Bin (CV03, CV04, CV05 and CV06).	Ongoing
Monitor and manage dust emissions.	11.12	Prepare an *Air Quality Monitoring Program* for the Project.	Within 12 months of project approval

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
12. BLASTING AND VIBRATION			
Minimise impacts from blasting on surrounding receptors and infrastructure.	12.1	Ensure that all blasts are designed by a suitably qualified and experienced blasting engineer or shot-firer and that each blast has an MIC of no greater than 68kg (unless more precise predictions of blast emissions are completed indicating compliance with air overpressure and ground vibration criteria at using larger MIC).	Continuous for the life of the Project
	12.2	Ensure appropriate stemming and burden is provided for each blast hole to minimise the potential for fly rock.	Ongoing
	12.3	Use aggregate for all stemming operations.	Ongoing
	12.4	Ensure that fragmented material is directed away from the Newell Highway.	Ongoing
	12.5	Identify the blast envelope during design of each blast.	Ongoing
	12.6	Inspect all blasts following initiation and any note the presence of fly rock outside the blast envelope. Where required, amend the blast design procedures to manage fly rock.	Ongoing
	12.7	Initiate blasts between the hours of 9:00am and 5:00pm Monday to Saturday only.	Ongoing
	12.8	Establish and maintain an environmental complaints line and register of complaints in accordance with the requirements of the Environment Protection Licence, once issued.	Ongoing
	12.9	Respond promptly to any issue of concern or complaint raised by the community or a government agency.	Ongoing
	12.10	Erect signage to advise local traffic of blasting operations.	Prior to first blast
13. TRAFFIC AND TRANSPORTATION			
Achieve safe and efficient transport operations.	13.1	Develop and enforce a Code of Conduct for all drivers for all heavy vehicles that travel to and from the Mine Site regularly. The Code of Conduct would stipulate safe driving practices must be maintained at all times.	During site establishment operations
	13.2	Investigate immediately any complaints received and substantiated incidents acted on decisively, which could include the banning the offending driver(s) from the Mine Site.	Continuous during the life of the Project
	13.3	Widen the section of Tomingley West Road between the Main Site Access Road and Tomingley - Narromine Road to provide for two sealed lanes of at least 3m width.	Prior to commencement of mining
	13.4	Construct the Main Site Access Road intersection with Tomingley West Road in accordance with the *RTA Road Design Guide* for rural property access.	During site establishment phase (prior to commencement of mining)

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
13. TRAFFIC AND TRANSPORTATION (CONT'D)			
Achieve safe and efficient transport operations. (cont'd)	13.5	Undertake the following road upgrades on Tomingley West Road. • Provide for line marking of the road for a length of 1.6km with a broken central separation line. • Install guide posts for improved delineation of the road. • Install additional guide posts at the culvert and "narrow bridge" signage on approach to the culvert.	Prior to commencement of mining
	13.6	Undertake a geotechnical investigation of pavement depths, materials and sub-grade conditions on Tomingley West Road and complete the modifications or strengthening works so required.	Prior to commencement of mining
	13.7	Prepare an individual *Traffic Control Plan* for each over mass and over weight delivery.	As required
	13.8	Prepare and implement a comprehensive *Transport Management Plan* for construction and mine operation.	Prior to commencement of construction
Construct and Operate the Newell Highway underpass without adverse impact on regional traffic conditions.	13.9	Design and construct the Newell Highway underpass to meet the requirements of the Austroads "*Guide to Road Design*" and to the specifications presented in Section 2.4.2.2.	Prior to commencing construction of the Newell Highway underpass
	13.10	Construct a temporary diversion of the Newell Highway in accordance with RTA requirements and to the specifications presented in Section 2.4.2.3.	During site establishment phase (prior to commencement of mining)
	13.11	Reconstruct the Newell Highway over the underpass as described in Section 2.4.2.2 and to the required standard of the RTA.	
	13.12	Prepare, in consultation with the Roads and Traffic Authority, a *Construction Road Traffic Management Plan*.	Prior to commencing construction of the Newell Highway diversion
14. SOILS AND LAND CAPABILITY			
Maintenance of soil value for rehabilitation and minimisation of soil loss through erosion.	14.1	Strip soil material to the depths no more than those identified in **Table 4.60**.	Ongoing
	14.2	Ensure that soil materials are not stripped when in either an excessively dry or wet condition.	Ongoing
	14.3	Grade or push soil into windrows using graders or bulldozers for later collection by elevating scrapers or loading into trucks by front-end loaders to minimise compaction of soil materials, where practicable.	Ongoing
	14.4	Use soil materials immediately following stripping in areas undergoing progressive rehabilitation, where practicable. Where this is not practicable place soil transported by truck directly into storage or place soil transported by scrapers in thick "lifts" to minimise compaction.	Ongoing
	14.5	Minimise, as far as practicable, the operation of machinery on soil stockpiles to reduce compaction.	Ongoing

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
14. SOILS AND LAND CAPABILITY (CONT'D)			
Maintenance of soil value for rehabilitation and minimisation of soil loss through erosion. (Cont'd)	14.6	Ensure that soil stockpiles have a maximum height of 5m (3m of subsoil and 2m of topsoil).	Ongoing
	14.7	Leave the surface of the soil stockpile with an even but roughened surface to assist in erosion control and seed germination and emergence.	Ongoing
	14.8	Establish an appropriate vegetative cover on all soil stockpiles to be retained for more than 3 months.	Ongoing
	14.9	Assess soil stockpiles prior to respreading for weed infestation and spray of otherwise treat as required.	Six monthly
	14.10	Consider and assess the requirements for soil additives such as gypsum prior to commencing respreading operations.	Ongoing
	14.11	Spread soil materials at least 200mm thick on the shaped landform during rehabilitation operations.	During rehabilitation operations
Create a final landform that is safe, stable and is amenable to a combination of agricultural and native flora/fauna conservation activities.	14.12	Maintain a soil inventory: • to ensure appropriate volumes of different soil units are stripped consistently with the soil requirements of the final landform. • to identify the age of various soil stockpiles on the Mine Site and therefore assist in minimising the length of time soils remained stockpiled. • to assist the Proponent in using the most appropriate soils for the different elements of the final landform.	Ongoing
Create a final landform that is safe, stable and is amenable to a combination of agricultural and native flora/fauna conservation activities. (cont'd)	14.13	Ensure that the land capability of those sections of the final landform to be used for agricultural purposes is similar to the current land capability. Any agricultural land that forms part of the final landform will be more heavily treed than it is at present due to proposed biodiversity and screen plantings.	Rehabilitation phase
15. HAZARDOUS MATERIAL MANAGEMENT			
Prevent contamination of the surrounding environment.	15.1	Store sodium cyanide and other toxic chemicals in accordance with the requirements of *as/nzs 4452 - the storage and handling of toxic substances.*	Ongoing

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
15. HAZARDOUS MATERIAL MANAGEMENT (CONT'D)			
Manage the transport, storage and use of all reagents on the Mine Site.	15.2	Prepare a reagent management plan (rmp) identifying all hazardous reagents to be used on the mine site. the rmp will identify the measures to be implemented to ensure the appropriate transportation, handling, storage and use of this material	Prior to the acceptance and storage of chemical reagents onto the Mine Site
	15.3	Transport dangerous goods in accordance with the requirements of the "australian code for the transport of dangerous goods by road and rail - current edition".	Ongoing
Confirm no land contamination in the final landform as a result of hazardous materials management.	15.4	Sample soil and subsoil from beneath the surface infrastructure where potentially polluting chemical reagents are stored or used for evidence of hydrocarbon, salinity or other chemical contamination.	Prior to creation of the final landform and rehabilitation of the Mine Site
16. WASTE			
Manage waste appropriately on the Mine Site.	16.1	Maintain a register of the types and quantities of wastes produced on the project site.	Ongoing
	16.2	Design and maintain storage areas to contain spillages.	Ongoing
	16.3	Segregate and retain recyclable and non-recyclable waste in designated storage areas prior to removal from the project site.	Ongoing
	16.4	Keep the project site in a clean and tidy condition.	Ongoing
	16.5	Ensure waste is regularly removed from the project site by a licensed contractor.	Ongoing
	16.6	Dispose of tyres to a licensed waste management facility or a third party approved to recycle tyres.	Ongoing
17. SOCIO ECONOMIC SETTING			
Maximise the positive impacts and minimise any actual or perceived adverse impacts on the social fabric or facilities available to the community surrounding the Mine Site.	17.1	Engage the community surrounding the project in regular dialogue in relation to the proposed and ongoing operation of the project and maintain an "open door" policy for any member of the community who wishes to discuss any aspect of the project.	Ongoing
	17.2	Proactively and regularly consult with those residents most likely to be adversely impacted by the project.	Ongoing

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action		Timing
17. SOCIO-ECONOMIC SETTING (CONT'D)			
	17.3	Continue to support community organisations, groups and events, as appropriate, and review any request by a community organisation for support or assistance throughout the life of the Project.	Ongoing
	17.4	Advertise and maintain a community complaints telephone line.	Continuous for the life of the Project
	17.5	Make available excess water from the water supply bores and pipeline to Narromine Shire Council for supply to the residents of Tomingley.	As feasible
	17.6	Ensure that infrastructure and services installed for the Project, including the water supply bores and pipeline, electricity transmission line, appropriate buildings and hardstand areas, remain available for alternative uses following completion of the Project, provided that such uses are consistent with the final land uses identified in this document or any subsequent approval.	Post-mining
	17.7	Prepare and implement a voluntary planning agreement with Narromine shire council to provide for contributions to the affected community (and wider LGA) commensurate with the level of impact.	Within 12 months of receipt of project approval[5]
18. CONSULTATION			
Maintain ongoing consultation with the local community and Council.	18.1	Form and maintain a Community Consultative Committee (CCC), including representative members of the community and Narromine Shire Council.	Within 6 months of receipt of project approval
	18.2	Regularly brief the CCC on activities within the Mine Site and seek feedback in relation to Project-related impacts whether real or perceived.	Quarterly
Respond to environmental complaints.	18.3	Establish and maintain an environmental complaints line and register of complaints in accordance with the requirements of the Environment Protection Licence, once issued.	Within 6 months of receipt of project approval
	18.4	Respond promptly to any issue of concern or complaint raised by the community or a government agency.	Ongoing

[5] This will enable the Community Consultative Committee to have some input to the development of the Voluntary Planning Agreement.

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action	Timing
19. ENVIRONMENTAL MONITORING		
Implement a comprehensive and ongoing surface water monitoring program.	19.1 Monitor surface water quality at Sampling Points 1 and 2 for: • Dissolved oxygen (% saturation); • pH or Acidity; • Total Suspended Solids or Turbidity (NTU); • Total phosphorus (mg/L); • Total nitrogen (mg/L); and • Electrical conductivity (mS/cm).	After rainfall events which result in local flow within Gundong Creek
	19.2 Monitor surface water quality within sediment basin 2 for: • Dissolved oxygen (% saturation); • pH or Acidity; • Total Suspended Solids or Turbidity (NTU); • Total phosphorus (mg/L); • Total nitrogen (mg/L); • Electrical conductivity (mS/cm); • WAD Cyanide (mg/L); and • Total Cyanide (mg/L).	Quarterly once the residue storage facility is in use
	19.3 Monitor the quality of the residue discharge for: • pH or Acidity; • WAD Cyanide (mg/L); and • Total Cyanide (mg/L).	Daily
Implement a comprehensive and ongoing groundwater monitoring program.	19.4 Monitor standing water levels within groundwater bores WYMB01, WYMB03 and WYMB06.	Quarterly
Implement a comprehensive and ongoing groundwater monitoring program. (cont'd)	19.5 Install and monitor shallow piezometers around the RSF (in accordance with the plan provided by Drawing 174-11-001 rev.0) and monitor for: • pH or Acidity; • Electrical conductivity (mS/cm); • WAD Cyanide (mg/L); and • A suite of other analytes to be confirmed in consultation with the EPA.	Prior to commencement of residue discharge and then quarterly

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action	Timing
19. ENVIRONMENTAL MONITORING (CONT'D)		
Implementation of an appropriate noise monitoring program to ensure continuing compliance with DECCW guideline levels.	19.6 Prepare and implement a Noise Management Plan which would include the following. • Real-time noise monitoring procedures and trigger levels. • Weather station monitoring procedures and adverse weather trigger levels. • Routine and complaint-driven attended noise monitoring procedures. • Reporting procedures, including reporting to relevant government agencies and the surrounding community.	Within 3 months of project approval
	19.7 Monitor ground vibration and air overpressure at the residences closets to the Mine Site.	Every blast.
Table 3 (Cont'd) Draft Statement of Implementation of an appropriate air quality monitoring program to ensure continuing compliance with DECCW guideline levels.	19.8 Establish dust deposition gauges at residences surrounding the Mine Site. Residences to be chosen from include: • Residence R3. • Residence R28. • Residence R29. • Residence R32. • Residence R33. • Residence R40.	Ongoing
20. ENVIRONMENTAL MANAGEMENT SYSTEM		
A systematic set of documents are in place to guide the planning and implementation of all environmental management strategies.	20.1 Incorporate the environmental procedures in an on-site management system.	Prior to relevant activity

Table 3 (Cont'd)
Draft Statement of Commitments for the Tomingley Gold Project

Desired Outcome	Action	Timing
20. ENVIRONMENTAL MANAGEMENT SYSTEM (CONT'D)		
A systematic set of documents are in place to guide the planning and implementation of all environmental management strategies. (Cont'd)	20.1 Prepare the following management and monitoring plans; • Mining Operations Plan • Cultural Heritage Management Plan • Water Management Plan, incorporating: – Erosion & Sediment Control Plan – Surface Water Monitoring Plan – Groundwater Monitoring Plan – Groundwater Contingency Plan • Noise Management Program • Air Quality Monitoring Program • Biodiversity Offset Management Plan	Various and as nominated by project approval
	20.2 Incorporate relevant environmental data / information in Annual Environmental Management Reports.	Annually

6. REFERENCES

Agency for Toxic Substances and Disease Registry (USA) (ASTDR) (2010). Petitioned Public Health Assessment. Cripple Creek and Victor Gold Mining Cripple Creek, Teller County, Colorado. Agency for Toxic Substances & Disease Registry http://www.atsdr.cdc.gov/hac/pha/pha.asp?docid=826&pg=1

D.E. Cooper & Associates Pty Ltd (2011). Residue Storage Facility Design Report. Report to Tomingley Gold Operations Pty Ltd for review by the NSW Dam Safety Committee.

FJF Group (2011). *Traffic Impact Assessment for the Tomingley Gold Project.* Volume 2, Part 7 of the Specialist Consultant Studies Compendium.

Geolyse (2012). Letter Report to Alkane Resources Ltd. Tomingley Gold Project Narromine To Tomingley Pipeline Operational Condition and Ongoing Maintenance Costs

Landcom (2004). Managing Urban Stormwater: Soils and Construction, Vol. 1 2nd eds, Landcom, NSW, Sydney.

Macquarie Geotech (2011). Letter Report to Alkane Resources Ltd. Additional Benkelman Beam Testing - West Tomingley Road, Tomingley.

OzArk Environmental and Heritage Management Pty Limited (OzArk) (2011a). *Ecology Assessment for the Tomingley Gold Project.* Volume 1, Part 4 of the Specialist Consultant Studies Compendium.

OzArk Environmental and Heritage Management Pty Limited (OzArk) (2011b). *Cultural Heritage Assessment for the Tomingley Gold Project.* Volume 2, Part 5 of the Specialist Consultant Studies Compendium.

OzArk Environmental and Heritage Management Pty Limited (OzArk) (2012). *Archaeological Test Excavation Report - Tomingley Gold Project: Archaeological Test Excavations at site TGP-HS6 and further investigation of site TGP-HS5, February 2012*.

PAEHolmes (2011). *Air Quality Assessment for the Tomingley Gold Project.* Volume 2, Part 6 of the Specialist Consultant Studies Compendium.

R.W. Corkery & Co. Pty Limited (RWC) (2011). "Tomingley Gold Project Environmental Assessment" prepared by R.W. Corkery & Co. Pty Ltd, November 2011.

Strategic Environmental and Engineering Consultants (SEEC) (2011). *Surface Water Assessment for the Tomingley Gold Project.* Volume 1, Part 2 of the Specialist Consultant Studies Compendium.

SLR Consulting (2011). – *Noise and Blasting Assessment for the Tomingley Gold Project.* Volume 1, Part 1 of the Specialist Consultant Studies Compendium.

Tree Test Australia (2011). Resistograph Tree Ageing for Alkane Resources Ltd. – Dubbo.

USEPA (2000). "Meteorological Monitoring Guidance for Regulatory Modelling Applications", EPA-450/R-99-005, United States Environmental Protection Agency, Washington DC, USA.

This page has intentionally been left blank

Appendices

(Total No. of pages including blank pages = 76)

Appendix 1	Resistograph Tree Ageing for Alkane Resources Ltd. - Dubbo
Appendix 2	Results of the investigation of TGP-ST7-Tomingley Gold Project and meeting held on the 14th of December 2011– Letter to Peak Hill LALC
Appendix 3	Archaeological Test Excavation Report - Tomingley Gold Project: Archaeological Test Excavations at site TGP-HS6 and further investigation of site TGP-HS5, February 2012
Appendix 4	Additional Benkelman Beam Testing - West Tomingley Road, Tomingley
Appendix 5	Tomingley Gold Project Narromine to Tomingley Pipeline Operational Condition and Ongoing Maintenance Costs
Appendix 6	OzArk Response to OEH Queries over the Tomingley Gold Project Biodiversity Offset Strategy and BioBanking Credit Calculations
Appendix 7	Detailed Mine Site Layout (Drawing TGP-1130-00-G-001 rev5)
Appendix 8	Additional Flood Modelling and Flood Heights - Tomingley Gold Project (SEEC)

This page has intentionally been left blank

Appendix 1

Resistograph Tree Ageing for Alkane Resources Ltd. - Dubbo

(Total No. of pages including blank pages = 12)

This page has intentionally been left blank

T.T.A.
TREE TEST AUSTRALIA P/L
ABN: 13 125 947 113
P.O Box 82
NORTHLANDS QLD 4350
Mob: 0418 709 846 E-mail: tree_test_australia@bigpond.com

1/9

Client: Alkane Resources Ltd.
P.O. Box 910
Dubbo NSW 2830
Att: Michael Sutherland

Resistograph Tree Ageing for Alkane Resources Ltd. - Dubbo

Testing Date: 2nd December 2011

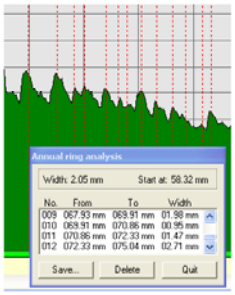
Scope of Work: Scientific age testing (Resistograph) on the specified 13x trees within the mining property/area.

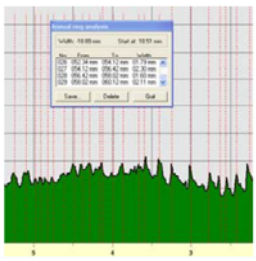
Testing area: Tree # 1 & 2 Cemetery area
Tree # 4 – 9 "Dunoon" area
Tree # 10 – 12 Water pipeline Area
Tree # 14 Tomingley West Road

Methodology:

The Resi PD 400 inserts a 1.4 mm needle (drill bit) into the tree to measure the resistant's of wood. The growth rings are shown as slight spikes in the magnified graph.
In the data processing the "IML Growth Ring Analyzing Software" is employed to quantify the age of the tree.
This method does NOT harm the tree ! (*C. Mattheck*)

As the Resistograph only measures a maximum of 40 cm or decay/dead wood, then for larger trees the following formula is used to extrapolate:
Average number of growth rings per cm (graph) x the ½ diameter (DBH) of trunk equals the age of tree.



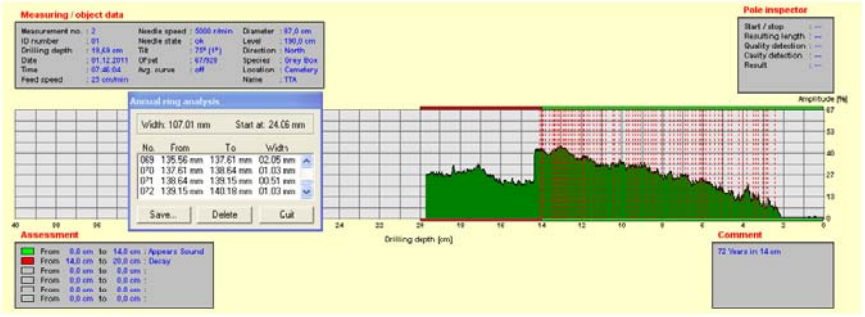


Examples of the highly magnified growth rings

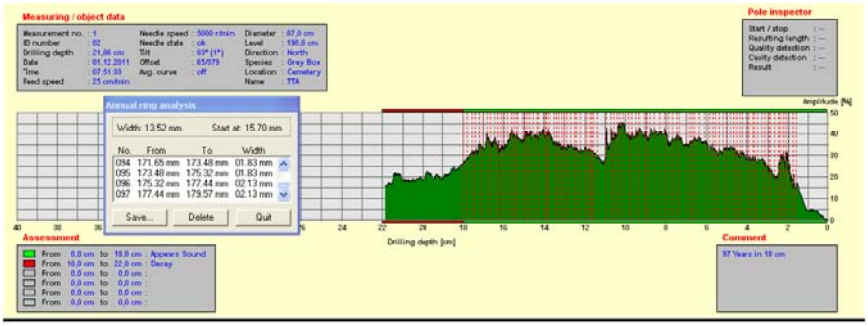
2/9

Age Test Measurement Results

 # 1: ***Grey Box***, *Eucalyptus microcarpa*, Cemetery – DBH 870 mm – 1 cm = 5 years – 5 x 43.5 cm (½ diameter) = **217 Years** Drill No. 2.

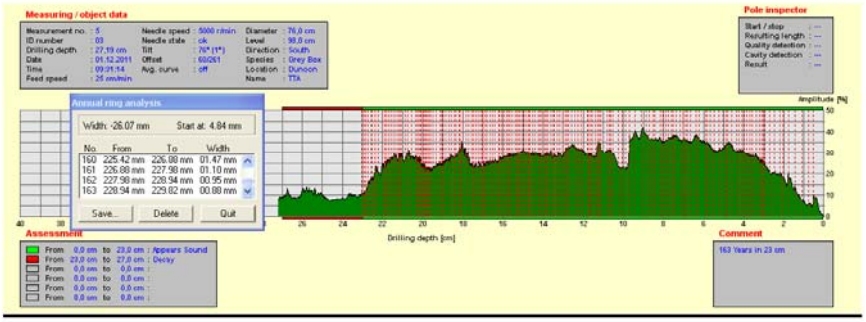


 # 2: ***Grey Box***, *Eucalyptus microcarpa*, Cemetery – DBH 870 mm – 1 cm = 5.3 years – 5.3 x 43.5 cm (½ diameter) = **230 Years** Drill No. 1.

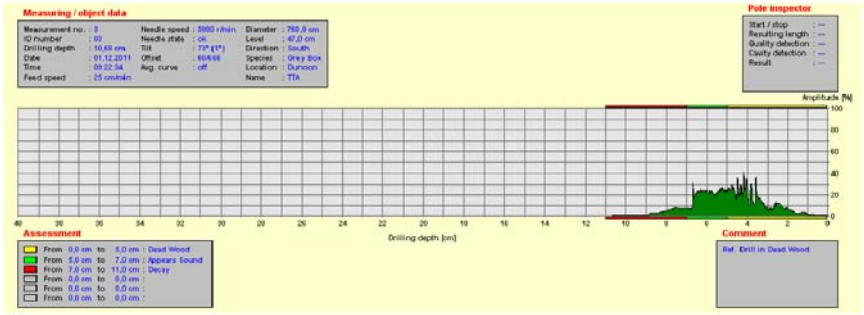


3/9

 # 3: ***Grey Box***, *Eucalyptus microcarpa*, (Caved Tree ?) Dunoon – DBH 760 mm – 1 cm = 7.08 years – 7.08 x 38 cm (½ diameter) = **269 Years** Drill No. 4.



 # 3: ***Grey Box***, *Eucalyptus microcarpa*, Dunoon – DBH 760 mm – Reference drill in dead wood. Drill No. 3.

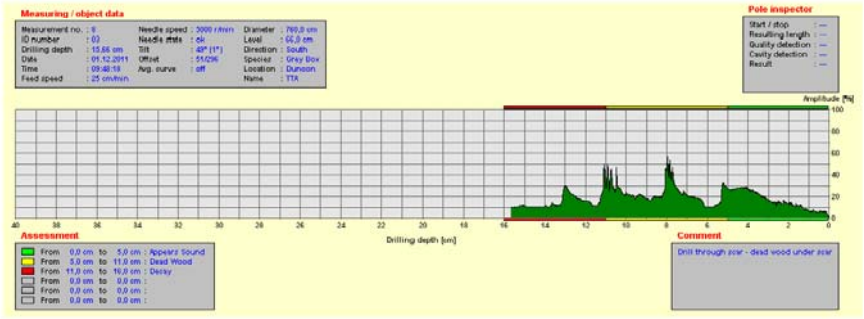


 # 3: ***Grey Box***, *Eucalyptus microcarpa*, Dunoon – DBH 760 mm –Drill through scar tissue – Some dead wood under scar at 85 cm
Drill No. 4.

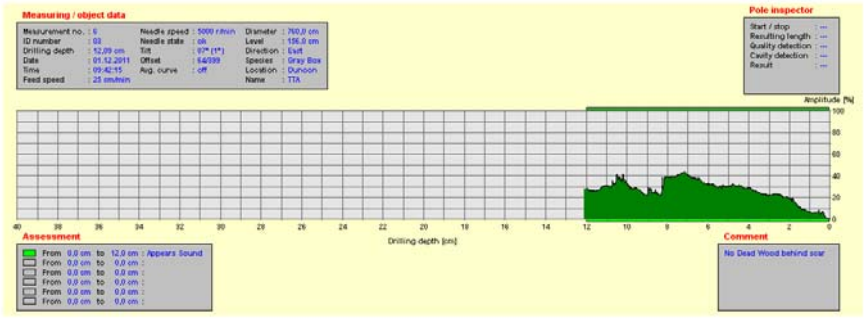
4/9

 # 3: ***Grey Box***, *Eucalyptus microcarpa*, Dunoon – DBH 760 mm –Drill through scar tissue –
NO dead wood under scar at **85 cm** Drill No. 7

 # 3: ***Grey Box***, *Eucalyptus microcarpa*, Dunoon – DBH 760 mm –Drill through scar tissue –
Some dead wood under scar at **66 cm**
Drill No. 8.

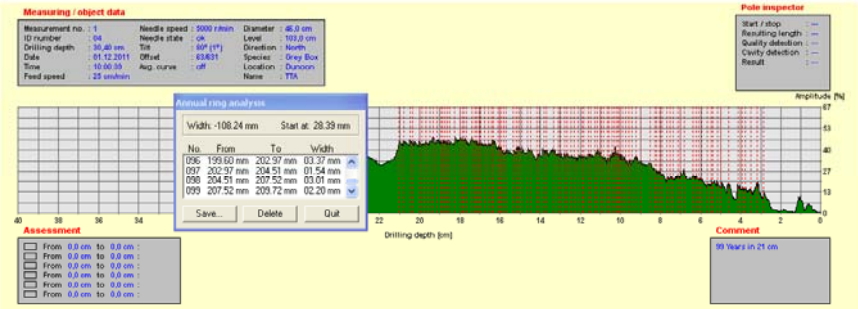


 # 3: ***Grey Box***, *Eucalyptus microcarpa*, Dunoon – DBH 760 mm –Drill through scar tissue –
NO dead wood under scar at **156 cm > East** Drill No. 6.

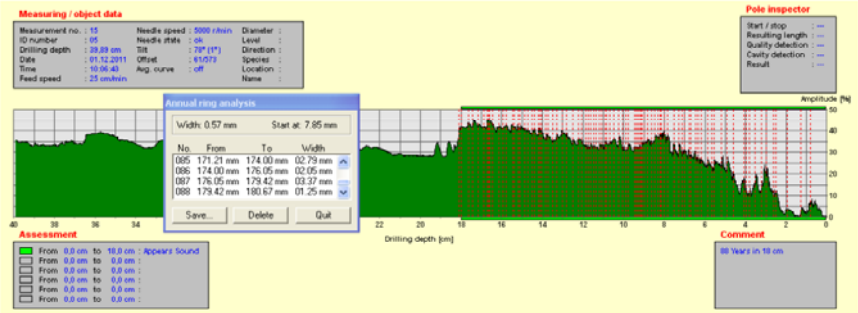


5/9

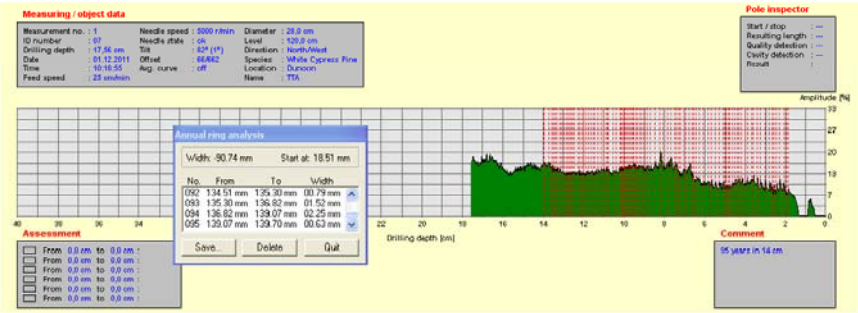
 # 4: ***Grey Box****, Eucalyptus microcarpa*, Dunoon – DBH 460 mm – 1 cm = 4.7 years – 4.7 x 23 cm (½ diameter) = **108 Years** Drill No. 1.



 # 5: ***Grey Box****, Eucalyptus microcarpa*, Dunoon – DBH 730 mm – 1 cm = 4.7 years – 4.8 x 36.5 cm (½ diameter) = **175 Years** Drill No. 1.

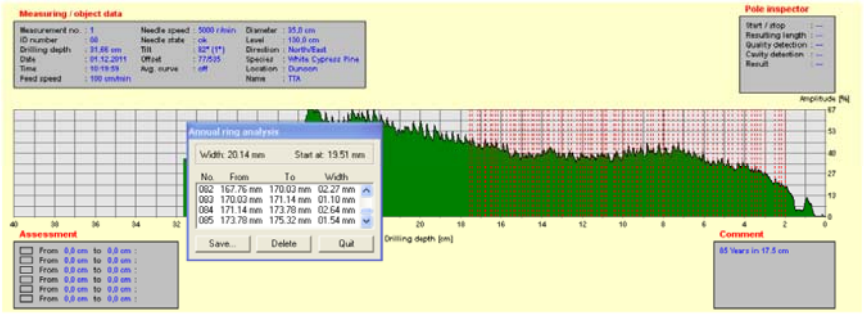


 # 7: ***White Cypress Pine****, Callitris columellaris*, Dunoon – DBH 280 mm – 1 cm = 6.78 years – 6.78 x 14 cm (½ diameter) = **95 Years** Drill No. 1.

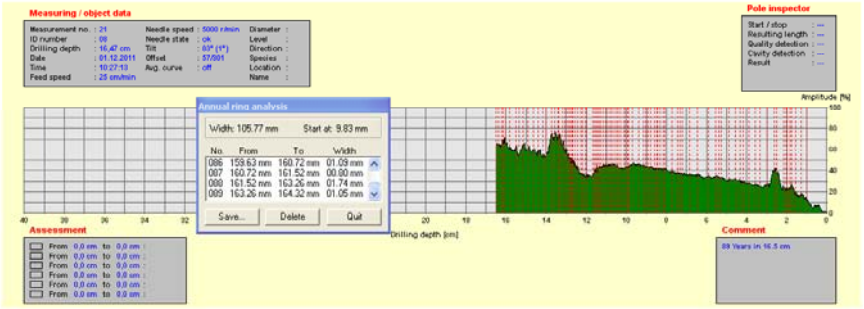


6/9

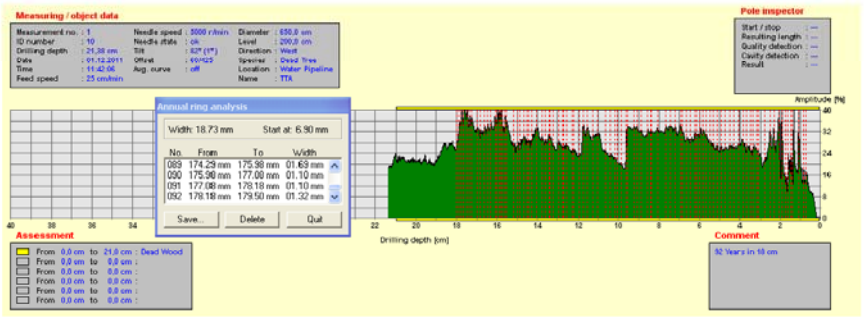
 # 8: ***White Cypress Pine****, Callitris columellaris,* Dunoon – DBH 350 mm – 1 cm = 4.85 years – 4.85 x 17.5 cm (½ diameter) = **85 Years** Drill No. 1.



 # 9:*Buloke**, Allocasuarine luehmannii,* Dunoon – DBH 335 mm – 1 cm = 5.4 years – 5.4 x 16.75 cm (½ diameter) = **90 Years** Drill No. 1.

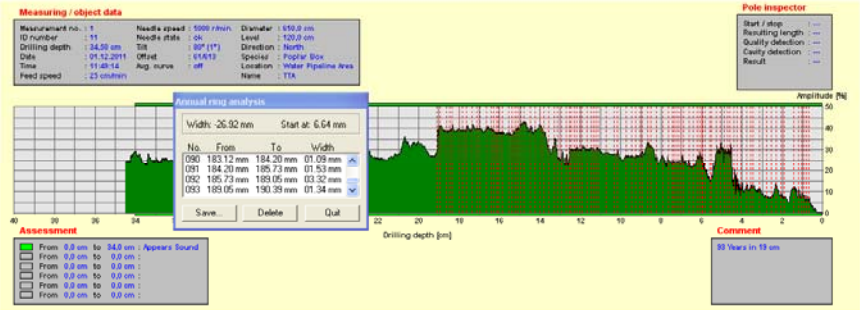


 # 10: *Dead Tree,* Water Pipeline Area – DBH 650 mm – 1 cm = 5.1 years – 5.1 x 32.5 cm (½ diameter) = **165 Years** Drill No. 1.

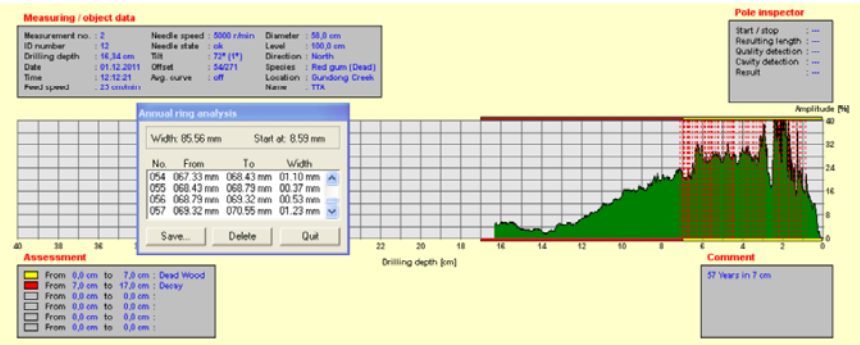


7/9

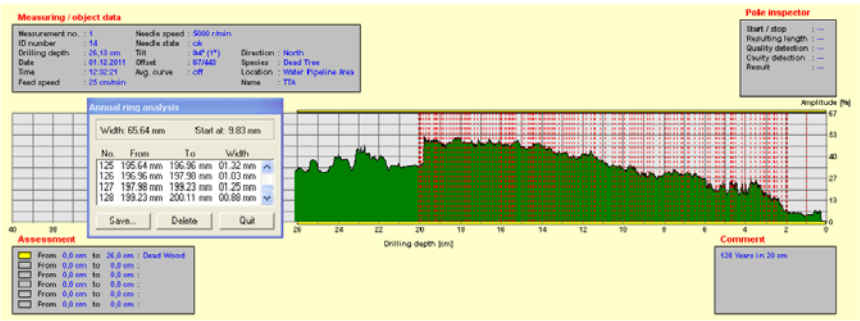
 # 11: *Dead Tree*, Water Pipeline Area – DBH 650 mm – 1 cm = 4.89 years – 4.89 x 32.5 cm (½ diameter) = **158 Years** Drill No. 1.



 # 12: ***Dead Tree***, *Eucalyptus camaldulensis*, Gundong Creek – DBH 580 mm – 1 cm = 8.14 years – 8.14 x 29 cm (½ diameter) = **236 Years** Drill No. 2. (*this test might not be 100% accurate due to the small amount of good wood available.*)



 # 14: ***Grey Box***, *Eucalyptus microcarpa*, Tomingley West Road – DBH 660 mm – 1 cm = 6 years – 6 x 33 cm (½ diameter) = **198 Years** Drill No. 1.



8/9

Aging Results Summary:

Tree # 01 - **217 Years** DBH: 870 mm
Tree # 02 - **230 Years** DBH: 870 mm
Tree # 03 - **269 Years** DBH: 760 mm
Tree # 04 - **108 Years** DBH: 460 mm
Tree # 05 - **175 Years** DBH: 730 mm
Tree # 06 - **Not enough good wood for accurate data.**
Tree # 07 - **95 Years** DBH: 280 mm
Tree # 08 - **85 Years** DBH: 350 mm
Tree # 09 - **90 Years** DBH: 335 mm
Tree # 10 - **165 Years** DBH: 650 mm
Tree # 11 - **158 Years** DBH: 650 mm
Tree # 12 - **236 Years** DBH 580 mm (shield tree on Gundong Creek)
Tree # 14 - **198 Years** DBH: 660 mm

Please refer to the individual measurements.

Summary:

Thirteen (13x) individual trees have been Resistograph tested for age. One (1x) tree # 6 did not have enough sound wood for accurate data processing. Therefore there is no data available for this tree.
Species tested: *Eucalyptus. microcarpa, Callitris columellaris, Allocasuarine luehmannii, Eucalyptus camaldulensis*

Growth rates do vary within the individual trees, even of the same species.
Some influential factors are: Soil quality and consistency, water (exact elevation), domination and competition by surrounding trees, various root and trunk damage etc. etc.
The growth rate for the tested Grey box (*Eucalyptus microcarpa*) ranges from 4.7 years to 7 years per centimeter of growth in this area.
As for tree # 3, tests are showing that there appears to be very little dead wood extending under the scar tissue. (Tests 6 & 7)
See photograph with test points below.
The actual dating of the scars was impossible due to the lack of good wood available and the significant amount of decay in the tested trees.

- *DBH: Diameter at Breast Height*

Equipment used:

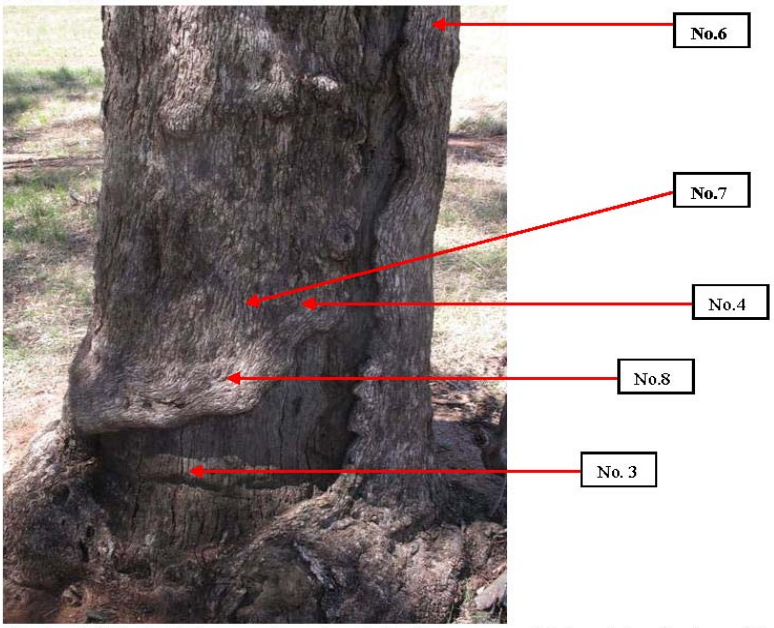
- IML Resi PD 400 Electronic Resistograph
- IML Growth Ring Analyzing Software - PD-Tools Pro
- Canon G10 Digital Camera
- Richter steel diameter tape

Please contact us anytime if you have any further questions.

TTA - *P.Blank*
Qualified Consulting Arborists Q.A.A. Certified Member, I.S.A. T.C.A.
Quantified Tree Risk Assessment (QTRA) Registered Licensee # 1729
IML Certified Senior Resi PD/FS Operator.

9/9

Tree # 3



The 4 x drill/test points on northern trunk for the purpose of determining dead wood behind scar tissue.

This page has intentionally been left blank

Appendix 2

Results of the investigation of TGP-ST7- Tomingley Gold Project and meeting held on the 14th of December 2011– Letter to Peak Hill LALC

(Total No. of pages including blank pages = 4)

This page has intentionally been left blank

Environmental & Heritage Management P/L
ABN 59 104 582 354

15th December 2011

Members: Peak Hill LALC
88 Caswell Street
Peak Hill NSW 2869

Dear Cherie Keed

Re: Results of the investigation of TGP-ST7- Tomingley Gold Project and meeting held on the 14th of December 2011

As you have been aware, OzArk and Alkane have been investigating TGP-ST7 for the Tomingley Gold Project due to possible evidence of carving.

In Summary:

On the 1st of December 2011 Peter Blank (Tree Test Australia, Toowoomba) undertook Resistograph Tree Ageing for the scarred tree on the Tomingley Gold Project mining property area. Jenny and Francis Robinson were present for the assessment.

The results of the assessment in terms of tree age, were that ST7 is likely to be 269 years old.

In terms of assessment of the scar itself, the following test was undertaken. Holes were drilled into the edges of the regrowth (see attached Figure) in an attempt to determine whether there is heartwood behind the regrowth that was once exposed (hence becoming compartmentalised). This is because if the scar was created for cultural reasons, it is likely to have originally been larger than it is now and oval or elongated in shape. The exposed wood of the scarred area (which is the area that would have been carved) would have suffered certain types of damage, that the Resistograph can pick up. So if the regrowth was covering previously scarred or carved heartwood, then the drill holes would have found compartmentalised wood beneath the regrowth. The drill holes found no such wood underneath the regrowth.

The interpretation of these findings is that the regrowth is relatively narrow and does not cover parts of a scar, hence the scarring looks quite similar now, to how it would have looked when the scarring occurred. This indicates it is a very irregular shaped scar and far more likely to be associated with ring barking or later damage than with older cultural activities.

If accepted, these findings make it unnecessary to impact the tree any further by removing the bark from around the scarred area in an tempt to determine if there is exposed heartwood beneath the regrowth.

If you would like a full copy of the report's findings, please contact us so that a copy can be sent out.

Alkane held a meeting on Wednesday the 14th of December to discuss the results of the tree investigations. Present were Jodie Benton, Mike Sutherland and Jenny Robinson. Several people gave their apologies as they were unable to attend the meeting. According to Jenny Robinson she feels that there may be an old canoe scar in the higher parts of the tree, but lower marks are unlikely to be Aboriginal carving for a burial tree. Jenny also noted that she thought the location of

OzArk Environmental & Heritage Management P/L – 145 Wingewarra Street / PO Box 2069 Dubbo NSW 2830
Tel: 6882 0118; Mob: 0403 763 504 / 0423 198 898
E-mail: jodie@ozarkehm.com.au ; phil@ozarkehm.com.au ; cheryl@ozarkehm.com.au
Web: www.ozarkehm.com.au

ST7 was in area unlikely to have been used for burials, due to the clayey soil and the distance from water.

As a result the following decision was made on managing this tree in the face of the Tomingley Gold Project impacts:

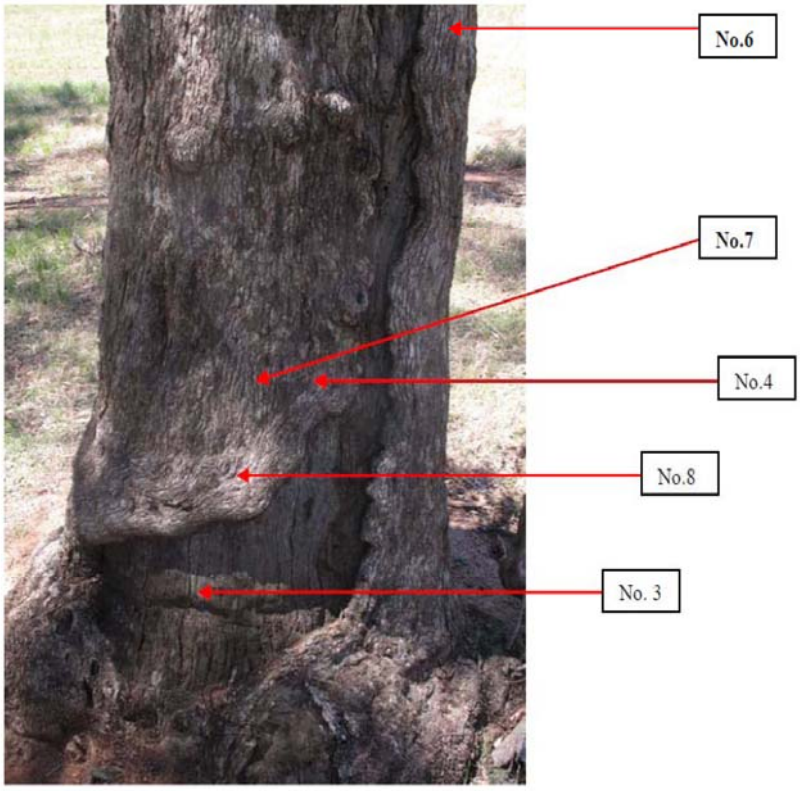
1. OEH AHIMS will be updated to note this tree ST7 is unlikely to be a carved tree but may be a scarred tree;
2. Management will be to remove the tree trunk carefully in two portions and retain these on the mine site for community assessment/protection and possibly education.
3. Aboriginal Stakeholders will be offered the opportunity to be present for the tree removal.
4. The Aboriginal Heritage Assessment Report will be updated to reflect this management.

We would like to thank the Tomingley Gold Project Aboriginal community stakeholders for their participation and input into the processes we have been undertaking in relation to this tree and please let us know if you have any additional feedback that you would like to be considered.

Yours faithfully

Cheryl Burke
Office Administrator

Tree # 3 (ST7) (Tree Test Australia). The drill/test points for determining dead wood behind scar tissue.



2

Appendix 3

Archaeological Test Excavation Report - Tomingley Gold Project: Archaeological Test Excavations at site TGP-HS6 and further investigation of site TGP-HS5, February 2012

(Total No. of pages including blank pages = 34)

This page has intentionally been left blank

TGP –HS6 Site. View south, showing bricks, metal objects and some timber.

Environmental and Heritage Management P/L

ARCHAEOLOGICAL TEST EXCAVATION REPORT

Tomingley Gold Project: Archaeological Test Excavations at site TGP-HS6 and further investigation of site TGP-HS5

February 2012

Report Prepared by
OzArk Environmental & Heritage Management Pty Ltd
for Alkane Resources

OzArk EHM
145 Wingewarra St
(PO Box 2069)
Dubbo NSW 2830

Phone: (02) 6882 0118
Fax: (02) 6882 0630
jodie@ozarkehm.com.au
phil@ozarkehm.com.au
www.ozarkehm.com.au

DOCUMENT CONTROLS

Proponent	Alkane Resources		
Client	RW Corkery		
Project No / Purchase Order No			
Document Description	Test Excavations at site TGP-HS6 and further investigation of site TGP-HS5 February 2012		
	Name	Signed	Date
Client's Reviewing Officer			
Client's representative managing this document		OzArk Person(s) managing this document	
		Jen McGhee	
Location Tomingley Gold Mine Site TGP-HS6		OzArk Job No. 677	
Document Status V1.2		Date:	
Draft V1.1 Author to Editor OzArk 1st Internal (Series V1.X = OzArk internal edits)		Version 1.1: JM to JB 15.2.12 Version 1.2 JB edits 23.2.12	
Draft V1.2 Report Draft for release to client (Series V2.X = OzArk and Client edits)		V2.1 OzArk to Alkane/RWC 23.2.12 V2.1 edits from RWC 24.2.12	
FINAL once latest version of draft approved by client		V3.0 OzArk to Alkane/RWC 24.2.12	
Prepared For		Prepared By	
Mike Sutherland Alkane Resource		Jen McGhee and Dr Jodie Benton OzArk Environmental & Heritage Management Pty. Limited P 02 6882 0118 F 02 6882 6030 Email: jodie@ozarkehm.com.au	

EXECUTIVE SUMMARY

Alkane Resources Ltd (the Proponent) proposes to develop the Tomingley Gold Project (TGP) which will involve the establishment of mining operations over 734ha of land adjacent to the township of Tomingley (referred to as the Mine Site), as well as a 46km water pipeline from a groundwater bore located on private property (Woodlands) 7km east of Narromine to the Mine Site (referred to as the TNWP Study Area) and a 20km electricity transmission line to bring power from Peak Hill (referred to as the PHTETL Study Area). The life of the TGP would be approximately 5 to 8 years.

This report details the results of test archaeological excavations carried out at historic site TGP-HS6 and further investigation of site TGP-HS5, both of which are located within the Mine Site Study Area.

The location of sites TGP-HS5 and TGP-HS6 is within the area proposed for Waste Rock Emplacement 3 (**Figure 1**). The two sites are within 100 metres of each other, located in a previously cropped paddock that has a history of heavy agricultural use and mining exploration.

The impacts to the sites from the TGP will see the complete destruction of any surface manifestations of the existing land across this entire area.

Excavations at TGP-HS6 and further assessment of the implements at TGP-HS5 indicate that these sites are of limited local interest. Nothing recovered demonstrates *in situ* structures although an ephemeral hut cannot be completely ruled out. If one did exist, however, it is so destroyed as to be now impossible to interpret.

The artefacts present include domestic and agricultural materials that are common and of limited historical value. The agricultural machinery is in very poor condition and, due to bulldozing, is twisted, entwined and unrecognisable as individual machinery items. These items are prolific in the surrounding areas and no longer function as originally designed.

In conclusion, it is determined sufficient material has been obtained and documented from the sites TGP-HS6 and TGP-HS5 for recording purposes. As there is none to limited local historical significance for both sites there is no need for a management plan for these sites.

No further archaeological investigation is warranted prior to the destruction of these sites. A comprehensive photographic record was collected throughout the excavations such that no further archival documentation is considered necessary.

CONTENTS

FIGURES

1 INTRODUCTION

1.1 BRIEF DESCRIPTION OF THE PROPOSAL

Alkane Resources Ltd (the Proponent) proposes to develop the Tomingley Gold Project (TGP) which will involve the establishment of mining operations over 734ha of land adjacent to the township of Tomingley (referred to as the Mine Site), as well as a 46km water pipeline from a groundwater bore located on private property (Woodlands) 7km east of Narromine to the Mine Site (referred to as the TNWP Study Area) and a 20km electricity transmission line to bring power from Peak Hill (referred to as the PHTETL Study Area). The life of the TGP would be approximately 5 to 8 years.

1.2 PROPOSED WORKS

This report details the results of test archaeological excavations carried out at historic site TGP-HS6 and further investigation of site TGP-HS5, both of which are located within the Mine Site Study Area (Figure 1).

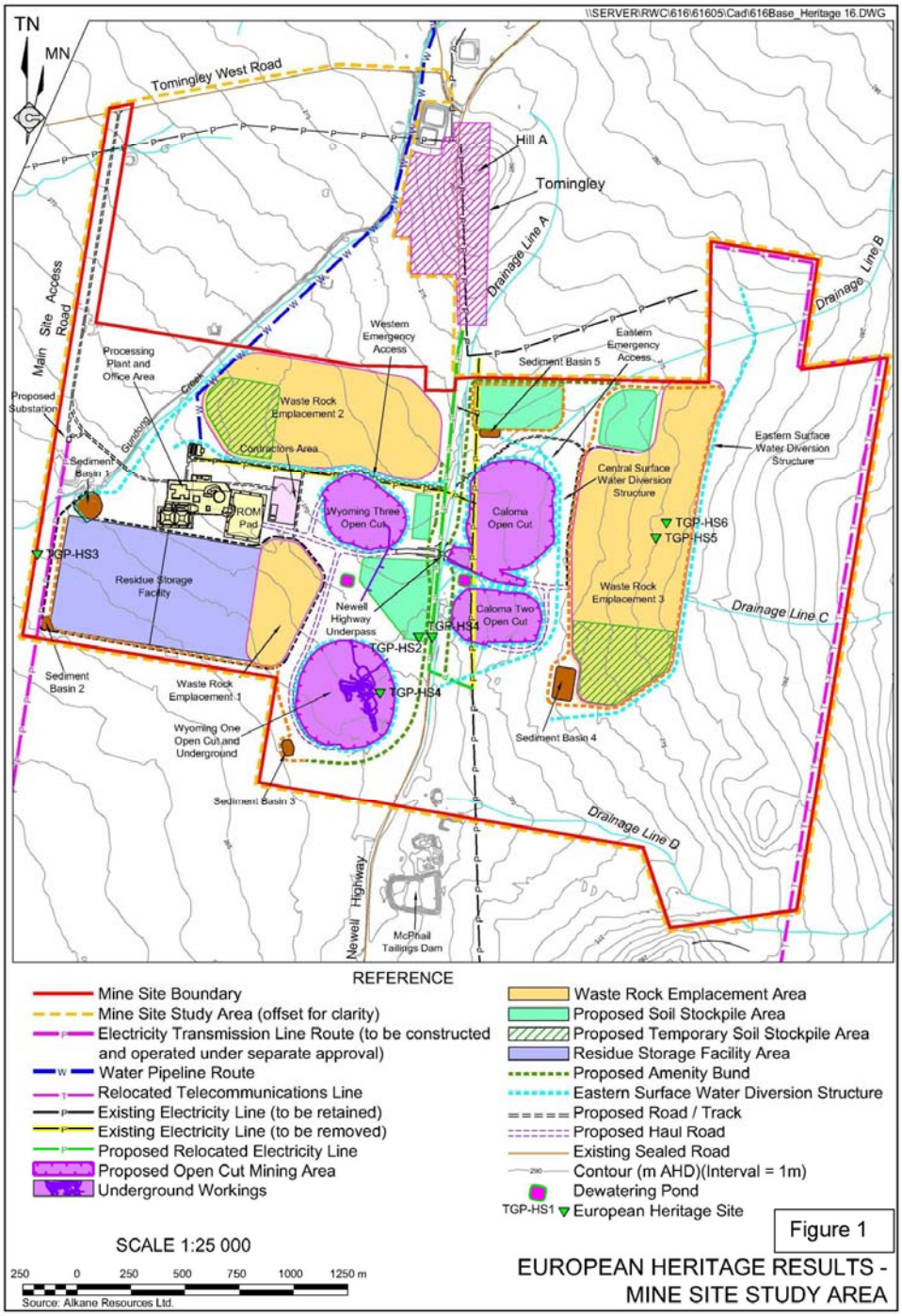
The location of sites TGP-HS5 and TGP-HS6 is within the area proposed for Waste Rock Emplacement 3 (**Figure 1**). The two sites are within 100 metres of each other, located in a previously cropped paddock that has a history of heavy agricultural use and mining exploration.

The impacts to the sites from the TGP will see the complete destruction of any surface manifestations of the existing land across this entire area.

1.3 ARCHAEOLOGICAL INVESTIGATIONS

Excavations at TGP-HS6 were required to determine if this site has any historical significance. To do so, it was necessary to determine whether the mounded material on site was the remains of an "*in-situ*" dwelling or bulldozed material containing mixed objects in a secondary deposit. TGP-HS5, 100 metres to the south of TGP-HS6 is a collection of agricultural machinery that will be researched to determine historical significance and any association with TGP-HS6.

Figure 1: Location map showing TGP-HS5 and TGP-HS6.



2 THE PROJECT

2.1 PURPOSE AND OBJECTIVES OF THE TEST EXCAVATION

The purpose of the current excavation is to determine the nature and extent of site TGP-HS6 and TGP-HS5. The objectives of the study are as follows:

Objective One: To excavate and investigate TGP-HS6 for evidence of a possible dwelling; relics below bulldozed material to enable a more accurate assessment of the significance of the site.

Objective Two: To investigate site TGP-HS5 to determine the significance of the machinery there and the relationship of this area to TGP-HS6, which is 100 metres to the south.

Objective Three: to analyse the archaeological findings.

Objective Four: to use the archaeological findings from TGP-HS6 and TGP-HS5 to inform future management of the site in regards to the proposed impacts from the TGP.

2.2 DATE OF TEST EXCAVATION

7-8 February 2012.

2.3 OZARK EHM INVOLVEMENT

2.3.1 FIELD ASSESSMENT

The fieldwork component of the archaeological test excavation was undertaken by:

- Fieldwork director: Dr Jodie Benton (Director of OzArk EHM); and
- Archaeological assistants: Jen McGhee and James Sutherland.

2.3.2 REPORTING

The reporting component was undertaken by:

- Report author: Jen McGhee; and
- Reviewer: Dr Jodie Benton (PhD, University of Sydney).

3 PROJECT METHODOLOGY

The test excavation programme was designed to:

- Determine whether sub-surface archaeological deposits are present at TGP-HS6 and, if so, the integrity, spatial distribution, extent, and nature of these deposits;
- Characterise the objects found at TGP-HS5 and TGP-HS6, types of materials and structures if any and their historical significance;
- Assess the significance of any archaeological deposits; and
- Provide management recommendations.

Determining the *integrity* of the site involves an assessment of the 'intactness' of the archaeological material within the landscape. This leads into the second factor, which involves an assessment of the amount of disturbance that has occurred in the landscape either through taphonomic processes or through other forms of sub-surface disturbance such as agriculture practice.

Determining the *extent* of the site involves broad assessment of the boundaries of the artefactual material. This includes attempting to determine the background presence of artefacts versus higher densities or unusual/diagnostic artefact types (i.e. 'features'). Have agriculture and gold mining activities impacted the site.

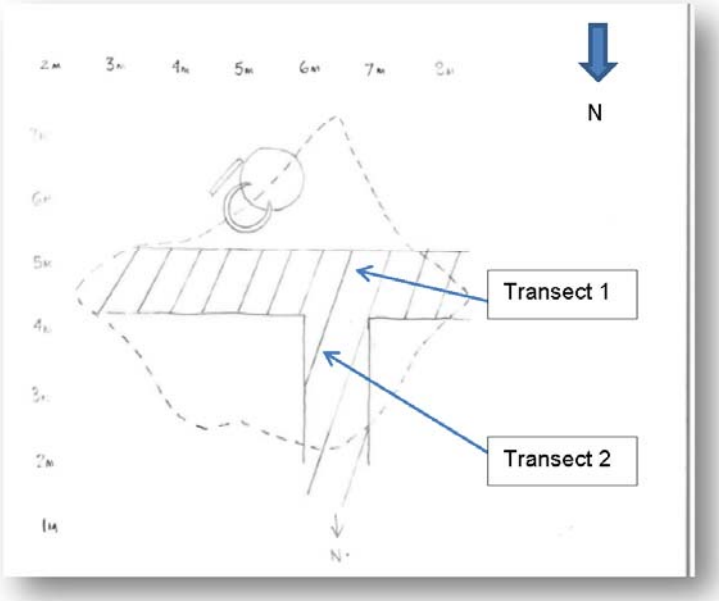
3.1 TEST EXCAVATION CONSTRAINTS

There were no constraints at either TGP-HS6 or TGP-HS5 as the area was clear of physical obstructions, the weather was fine and the soil at TGP-HS6 was soft. Trenches were dug easily with the help of a backhoe.

3.2 LAYOUT OF EXCAVATION TRENCHES

TGP-HS6 has a site focus comprising an 8 metre x 8 metre central mound rising approximately 60cm above the ground surface. After site photography was undertaken and site maps drawn, objects from the surface of the mound were removed and laid out to the side to avoid impact from the backhoe. A single linear trench (Transect 1), 1 metre wide was excavated in an east-west direction through the centre of the site (**Figure 2**). This trench was excavated in two spits of approximately 30 cm depth. A perpendicular trench (Transect 2) was excavated from the centre of Transect 1 out to the north, through the centre of the site, again in two spits. Both trenches were excavated to a basal clay layer clear of any objects.

Figure 2: Diagram shows trench location through TGP-HS6



3.4 OBJECTIVES OF ANALYSING ARTEFACTS

Analysing the artefacts allows us to better understand the possible context of the site, which will aid in determining historical significance. The objects at both sites may be from the same time period or may represent secondary deposits from another time and place. Analysis will allow us to assess and determine the historical significance of both sites and determine any correlation between the two sites.

3.5 ARTEFACT RETRIEVAL

Excavation was conducted on both days of the programme. Site TGP-HS6 was photographed and drawn before the removal of obvious surface objects from the main mounded area and the surrounding area. The soil from the excavations was stock-piled and raked through to retrieve artefacts. Sieving of deposits was not considered necessary, as most material present was large in scale. An inventory was made of the objects found.

A representative sample of artefacts, as well as anything unusual, was collected from TGP-HS6 and have been photographed and retained for a future Mine Office display should project approval be forthcoming. They have been stored with OzArk at their Dubbo premises for collection by the Propoent when required.

TGP-HS5 was photographed; however, no artefacts were collected from this site as it was mostly comprised of large pieces of agricultural machinery.

4 LANDSCAPE CONTEXT

4.1 BRIEF LAND USE HISTORY

Tomingley is within the Wiradjuri tribal area, situated in Central West NSW. The region was used by Aboriginal people for millennia prior to European settlement.

The area was then explored and inhabited by European settlers as early as the 1830s. European settlers used this land for agriculture in the 1840s and 50s, with mining exploration and operations beginning around 1879. The most recent century has mostly seem the Mine Site Study Area used for agricultural purposes; cropping and grazing.

5 HISTORICAL CONTEXT

Refer to Section 9.4 of the Cultural Heritage Report 2011 (Part 5 of the Specialist Compendium supporting the EA for the TGP) for detailed information which will not be repeated here. The objects found at TGP-HS6 and TGP-HS5 may relate to either of the two primary historical uses of the land, namely gold mining and agriculture.

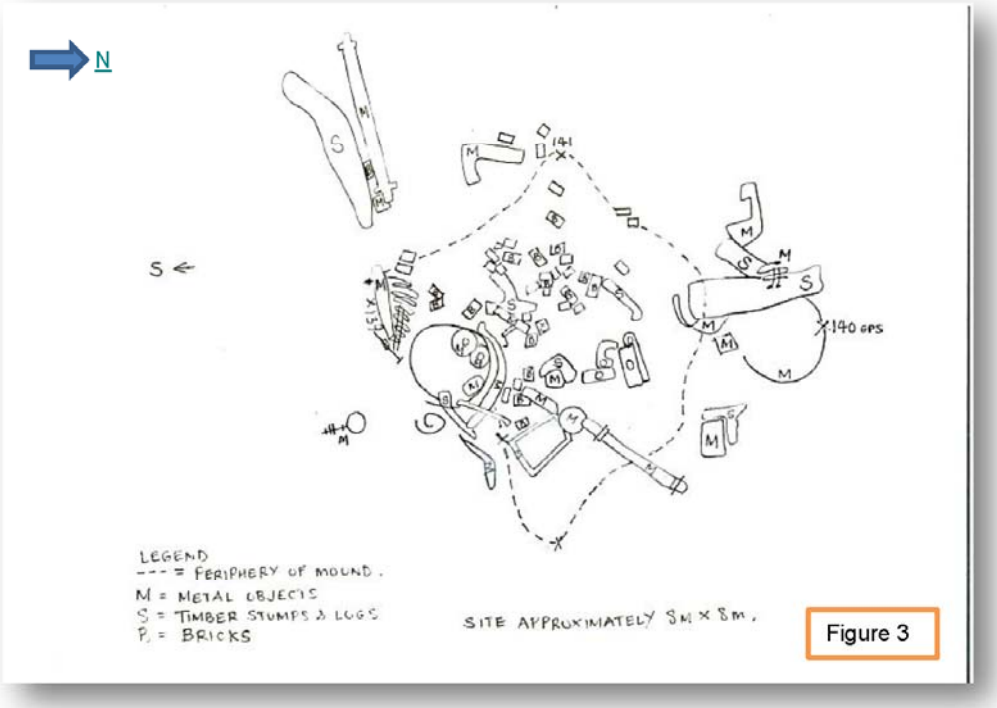
6 EXCAVATION RESULTS

6.1 SITE TGP-HS6

The surface material from the mounded portion of Site TGP-HS6 was primarily twisted and entwined rusted metal objects mixed with burnt wood and bricks. **Figure 3** is a plan drawing of the surface material with **Plates 1** and **2** showing the nature of the material.

The twisted and entangled nature of the surface material strongly indicated that the material had been pushed up and mounded via machine action. The current landholder[1], stated that the artefacts found at both TGP-HS5 and TGP-HS6 were originally strewn across the area and that he had used a bulldozer to make two separate piles five to six years ago. He also mentioned that he had burnt a pile of rubbish on the TGP-HS6 site around this time.

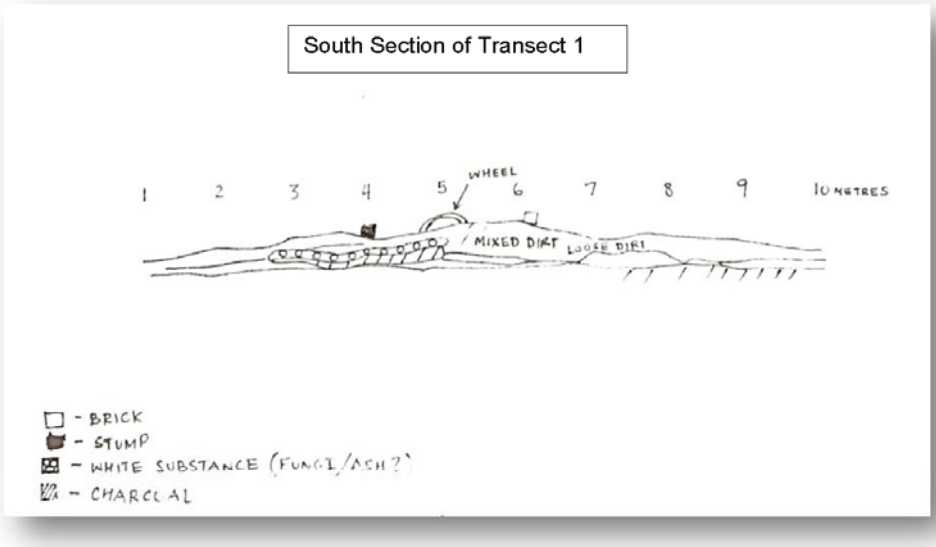
Figure 3: Showing site diagram of TGP-HS6



[1] Mr Glenn Pugh. OzArk would like to thank Glenn for his input whilst we were undertaking excavations.

The excavation of Transects 1 and 2 into the mounded portion of site TGP-HS6 showed that artefactual material, along with ash and charcoal extended to a depth of c. 40-50 cm below the surface of the mound, sitting directly onto a reddish clay soil basal layer. **Figure 4** shows the section of Transect 1, also shown in **Plate 5.**

Figure 4: South Section of TGP-HS6 East West Trench showing charcoal and clay seams as well as surface objects



The soil removed by the backhoe was put to the side and raked through for any objects. Recovered were bricks, assorted pieces of metal, some ash and small pieces of burnt timber (**Plates 2, 7-11**). Collected from the near vicinity were additional similar materials as well as ceramic and glass fragments (**Plates 12 - 13**).

6.1.1 ARTEFACTS FROM TGP-HS6

6.1.1.1 METAL OBJECTS

Many of the elements recovered from the site were disassociated and difficult to interpret. Commonly found were twisted, heavy gauge fencing wire, as though they had held together fencing posts. Elements from a horse drawn wagon with axle wheel rims were also recovered, and although it was not possible to discern manufacturer or dates, many wagon wheels were recovered from the area surrounding TGP-HS6.

Two rusted single cast iron bed frames (**Plate 11**) with decorative badges were found, being some of the few objects that can be ascribed to a domestic rather than agricultural setting

Broken pieces of at least one wood stove (cast iron) with lighthouse decoration was recovered. The front door of this stove bears the typical beacon lighthouse that points to the manufacturer, Metters Ltd of Sydney. Metters was an Australian stove manufacturing company, established in Adelaide in 1891, that supplied mid-priced wood and fuel stoves first to south and western Australia, later expanding to the east coast. Metters products followed established practice and were often directly copied from American or British imports. The Beacon Light series of stoves patented the 'top-fire' fuel stoves, that heated a hob above and an oven below, and were manufactured between 1900 and 1939 (PowerhouseMuseum.com).

6.1.1.2 BRICKS

Many bricks were recovered from site TGP-HS6, all appearing to be hand-made sandstock bricks (probably dating from 1850-1870, but possibly later considered the rural context) from a fire place/chimney (**Plate 7**). The bricks found had varying diamond and oval shaped indents otherwise known as frogs. Sandstock bricks found in the Sydney area and shown to have the diamond shaped frog, are often described as 'convict' bricks.

The first bricks made in Australia were sandstock bricks. Soft clays were thrown into a timber box (the *stock*) which had sand sprinkled in it to prevent the clay sticking to the box. The resulting bricks, sun-dried in the earliest days of colonisation but later fired in primitive kilns (as the bricks at TGP-HS6 have been), had their own unique combination of lumps and folds, with a rough sandy texture (Birmingham et al 1983).

The mixture of brick types (different frogs, brick sizes and possibly firing temperature/ methods), as well as the lack of any bonding holding two bricks together increases the likelihood of these bricks being in a secondary deposit.

6.1.1.3 MISCELLANEA

Small pieces of broken glass and pottery were also found scattered around the mounded area of TGP-HS6 (**Figures 12 – 13**). These were very non-descript items – the ceramics all plain white and the glass primarily too small to interpret. One base of a glass sauce bottle was found.

6.2 SITE TGP-HS5

This site is a collection of agricultural machinery pushed up against a large box tree. The machinery is a mixture of items, but at minimum, the following items could be discerned (or parts thereof).

<u>Meadow Bank Mouldboard Ploughs</u>

A major advance in plough design was the mouldboard, which comprised a knife or skeith cutting into the ground ahead of frog. Such ploughs came in a horse-drawn single-furrow type with a single wheel at the front and handles at the back for steering. Remnants of a single

furrow plough were seen at TGP-HS5. Other mouldboard ploughs were designed with wheels at either side and either two, three or four plough blades between them for multiple furrowing. These were again horse drawn although more horses were required for the weight of the broader plough. A four disc mouldboard plough was also seen at site TGP-HS5.

The Meadowbank Manufacturing Company's advertisement in the 1911 Sydney Morning Herald exhibit included a great variety of agricultural implements, including mouldboard ploughs.

Ballast Tank

An old ballast tank was also found at site TGP-HS5. Ballast tanks were original created for use on ships to control weight. Once no longer needed, however, they were put to a multiple of different uses and can often be found lying around farming properties. Landowner Glenn Pugh noted that farmers re-used them for a number of purposes, including for storage and for use as dog kennels.

H.V McKay 'Sunshine' header-harvester

Among the machinery pieces were the remnants of an old H.V McKay 'Sunshine' header-harvester (**Plate 16**), being a ground drive model (Glenn Pugh Pers. Comm. 8.02.12). Ground driving is an "in-hand" technique where the horse is equipped with a saddle or surcingle, bridle, and a pair of long 'reins' which are held by a handler who walks behind the horse and drives him forward (http://forequestrians.com/Articles).

HV McKay is an Australian company, established several times through the late 1800's due to changing fortunes. With the help of friends, McKay eventually managed to regain enough capital to re-purchase his own business and begin building harvesters again. This was around the same time that he saw a lecture by Rev. Dr. Thomas De Wit Talmage, which prompted him to rename his business "Sunshine". The following day, in July 1893, McKay, with the help of Jim Menzies (father to Robert Menzies, later Prime Minister of Australia) painted "Sunshine" across all the McKay harvesters (Arnold 2005: 14).

Noxon seeder

A seeder of the Noxon brand had also been pushed up in the pile of machinery at TGP-HS5 (**Plate 17**). Two parts bore the labels 'L315' and 'L388', which relate either to the single or double furrow function of the seeder.

The Noxon Brothers Manufacturing Company was incorporated in Canada in 1872, manufacturing a wide range of seeders, reapers and mowers.

Miscellanea

An unidentified heavy-duty object was found bearing the insignia of Victorian-based agricultural implement makers, T. Robinson & Co. This was a long-lived Melbourne-based agricultural

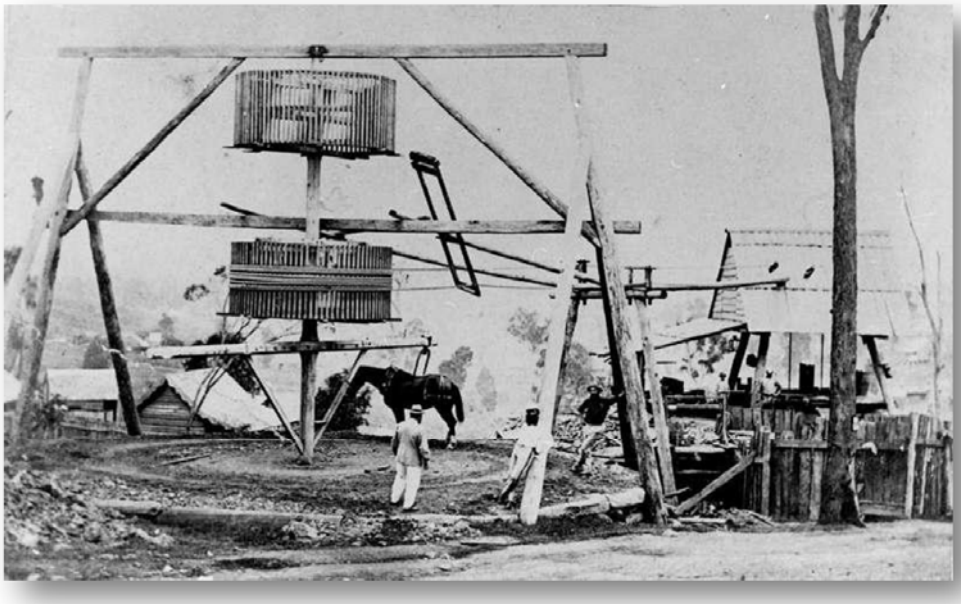
implement maker and importer. In business for over 120 years, the company operated in a number of locations including Melbourne, Spotswood and Sydney. In 1855 the company was first listed in the Melbourne directories. After Robinson's death in 1862, James Hutchings took over as the main proprietor until the 1884, when James Hutchings died. The firm remained a private company up to 1889 (www.museumofvicotoria.com).

T. Robinson & Co. was awarded several prize medals, including one at the 1870 Intercolonial Exhibition, Sydney. The company displayed no fewer than 45 implements and machines, including a 'four-way motion for driving four machines at the same time', a self-filling canvas water bucket, a thistle mower with wrought iron fingers, a cultivator, a horse hoe, a horse chaffcutter and a four-horse threshing and cleaning machine (museum of Vicotoria.com).

A horse drawn whim

Items possibly related to a horse powered whim implement were also found at the site. The whim which was made up of several iron cogs was used as a power generator for activities such as shearing (Glenn Pugh. Comm.08.02.12) or for raising materials from mine shafts (**Figure 5**).

Figure 5: A horse powered whim, in operation on a gold mine in Gympie, Qld in the 1870s (source - www.bonzle.com/pictures).



7 DISCUSSION

7.1 SITE TGP-HS6

Excavations at site TGP-HS6 provided no definitive evidence of a structure with any "*in-situ*" elements remaining extant. There was no evidence of any sub surface objects or foundations and ash layers and charcoal remains in the section walls of Transects 1 and 2 provided evidence of a fire on the top of the mounded materials. The mixted nature of the objects in this intense zone on the site showed that more than likely the area was a dump and all the objects had been pushed up into a mound. Current landowner Glenn Pugh confirmed these findings by stating that he had pushed the objects found at TGP-HS5 and TGP-HS6 to their current locations five to six years ago and had a fire at TGP-HS6 at that time (Glenn Pugh Pers.Comm.08.02.12).

Discussions with Mr Bruce Maclean, however, whose family owned this property for 60 years prior to Glenn Pugh, records that it was purchased from the Clarkes in the 1950's, and that part of the old wagon was still standing in the 1980's (Bruce Maclean Pers. Comm. 20.10.09). Bruce also notes that his father described an old shed as being in that location (Pers. Comm. 20.10.09).

If there was an old hut on this site, it may have been an ephemeral surface dwelling with no foundations or sub-surface evidence remaining of its existence in this location. Horseshoes were found in the area, one in a half-complete stage and both landholder Glenn Pew and the OzArk team discussed the possibility of their being a small blacksmith / forge hut that could have been used for machinery repairs and horseshoe making, hence the amount of metal equipment clustered in the area.

7.2 SITE TGP-HS5

The machinery that comprises site TGP-HS5 is primarily agricultural, with one possible item that could have derived from mining activities.

It is now understood that the machinery of this site was, up until 5-6 years ago, strewn across the surrounding paddock between TGP-HS5 and TGP-HS6, and was thus original associated with TGP-HS6. From this point forward, the two sites will be assessed as a single entity due to their known connectedness, and will be referred to as site TGP-HS5/6.

8 SIGNIFICANCE

8.1 GENERAL PRINCIPLES

The assessment of heritage significance is a process of examining the various factors and values which bear upon a place, building or structure and determining what level of significance, if any, the item may have with respect to an established set of heritage criteria. Broadly speaking, these criteria are based on the four values set out in the Australia International Council on Monuments and Sites (ICOMOS) Burra Charter and are the methodology accepted by heritage authorities and professional consultants. These criteria are:

- historic significance;
- aesthetic significance;
- scientific significance; and
- social significance.

The Heritage Council of NSW has defined a set of heritage significance criteria against which the heritage significance of an item may be judged. The use of standardised criteria helps achieve consistency in the assessment process and provides a basis for comparative assessment between types or classes of items.

The Heritage Council significance criteria are as follows:

- **Criterion (a)** – an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);
- **Criterion (b)** – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area);
- **Criterion (c)** – an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);
- **Criterion (d)** – an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;
- **Criterion (e)** – an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);
- **Criterion (f)** – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);
- **Criterion (g)** – an item is important in demonstrating the principal characteristics of a class of NSW's:
  - cultural or natural places; or
  - cultural or natural environments: or
  - a class of the local area's:

- cultural or natural places; or
- cultural or natural environments.

In many cases, items or places will be significant under only one or two of these criteria. Structures or items that do not function in their original context are much less able to demonstrate the qualities for which they were originally designed and this thereby reduces their heritage significance.

8.2 SIGNIFICANCE ASSESSMENT OF TGP-HS5/6

The following significance assessment is based on the significance criteria of the Heritage Council of NSW, as outlined in **Section 8.1**.

Neither of the sites are listed on any government heritage databases. The following relates the significance criteria to site TGP-HS5/6, for which we now have additional information based on the results of the investigations documented in this report. Please note that the assessment of these sites will be combined as we are aware that this material once formed a contiguous spread of materials.

Criterion (a) – an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);

- TGP-HS5/6 (Possible structure remains, agricultural machinery and possibly one item of mining machinery): Development of agriculture in the Tomingley area predated mining but also no doubt expanded significantly once mining had caused the population increases of the late nineteenth century. These remains attest to the agricultural history of the area and possibly also the mining history. The remains of a possible ephemeral blacksmiths hut cannot be ruled out, but there was little direct evidence for this. Such sheds may be considered a common phenomenon on early agricultural properties, for the repair of machinery.

Criterion (b) – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area);

- TGP-HS5/6 (Hut(?) and agricultural machinery): Despite considerable historical research, these items cannot be seen to directly relate to this significance criterion

Criterion (c) – an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);

- Neither of the sites can be seen to relate specifically to this significance criterion.

Criterion (d) – an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;

- Neither of the sites provide evidence of particular connections on a social, cultural or spiritual level to parts of the Peak Hill and Tomingley community.

Criterion (e) – an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area)

- TGP-HS5/6 (Dwelling and agricultural machinery): As the remains of the possible hut of TGP-HS6 bear no foundation evidence and as excavations have been undertaken, we can conclude that there is no further information to be gleaned from the site to relate to the cultural or natural history of the area.

Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).

- The site does not contain uncommon, rare or endangered aspects of the local area's history.

Criterion (g) – an item is important in demonstrating the principal characteristics of a class of NSW's:

- *cultural or natural places; or*
- *cultural or natural environments: or*
- *A class of the local area's:*
- *cultural or natural places; or*
- *cultural or natural environments.*

- Again, TGP-HS5/6 does not demonstrate the principal characteristics of a class of NSW's or the local areas cultural or natural place.

8.2.1 Summary Statement of Significance

Excavations at TGP-HS6 and further assessment of the implements at TGP-HS5 indicate that these sites are of limited local interest. Nothing recovered demonstrates *in situ* structures although an ephemeral hut cannot be completely ruled out. If one did exist, it is so destroyed as to be now impossible to interpret.

The artefacts present include domestic and agricultural materials that are common and of limited historical value. The agricultural machinery is in very poor condition and, due to bulldozing, is twisted and entwined and unrecognisable as individual machinery items. These items are prolific in the surrounding areas and no longer function as originally designed.

9 RECOMMENDATIONS

Sufficient material has been obtained and documented from the sites TGP-HS6 and TGP-HS5 for recording purposes. As there is none to limited local historical significance for both sites there is no need for a management plan for these sites.

No further archaeological investigation is warranted prior to the destruction of these sites. A comprehensive photographic record was collected throughout the excavations such that no further archival documentation is considered necessary.

10 REFERENCES

Arnold 2008 — Arnold, K. *Harvester Works. HV McKay: An Agricultural Icon*. Trojan Press, Victoria.

Birmingham et al 1983 — Birmingham, J. Jack, I. and Jeans, D. 1983 *Industrial Archaeology in Australia: Rural Industry*. Heinemann Publishers: Victoria.

http://forequestrians.com/Articles

OzArk 2010 — OzArk Environmental & Heritage Management P/L. *Tomingley Gold Project, Heritage Assessment*. Report for RW Corkery.

www.powerhousemuseum.com.

www.museumofvicotoria.com

PLATES

Plate 1: Overhead view of site TGP-HS6. Main mounded section showing surface objects.

Plate 2: Section view (to the north) of the main mound of TGP-HS6.

Plate 3: TGP-HS6 looking to the south. Plate 1 shows the Transect 1, excavated down to a basal clay level.

Plate 4: TGP-HS6 showing the clay basal layer and the north section of Transect 1. Evidence of rabbit burrows were present in the section and a layer of ash and clay.

Plate 5: TGP-HS6 showing south section of Transect 1 and intersection with Transect 2. Charcoal and ash are clearly visible in the layers below the site mound.

Plate 6: TGP-HS6 showing east section of Transect 2. Note the lack of objects at depth in the section and the base layer free of objects and artefacts.

Plate 7: A variety of sandstock bricks found on TGP-HS6.

Plate 8: Cast iron stove pieces found on TGP-HS6

Plate 9: Miscellaneous metal objects found on TGP-HS6.

Plate 10: Two horseshoes found in the general area of TGP-HS6.

Plate 11: Bed frame remains with detail of ornamentation.

Plate 12: Ceramic sherds from TGP-HS6.

Plate 13: Glass from TGP-HS6.

Plate 14: Agricultural implements in the area of TGP-HS5.

Plate 15: Agricultural implements in the area of TGP-HS5.

Plate 16: H.V McKay Sunshine Harvester emblem. Site TGP-HS6

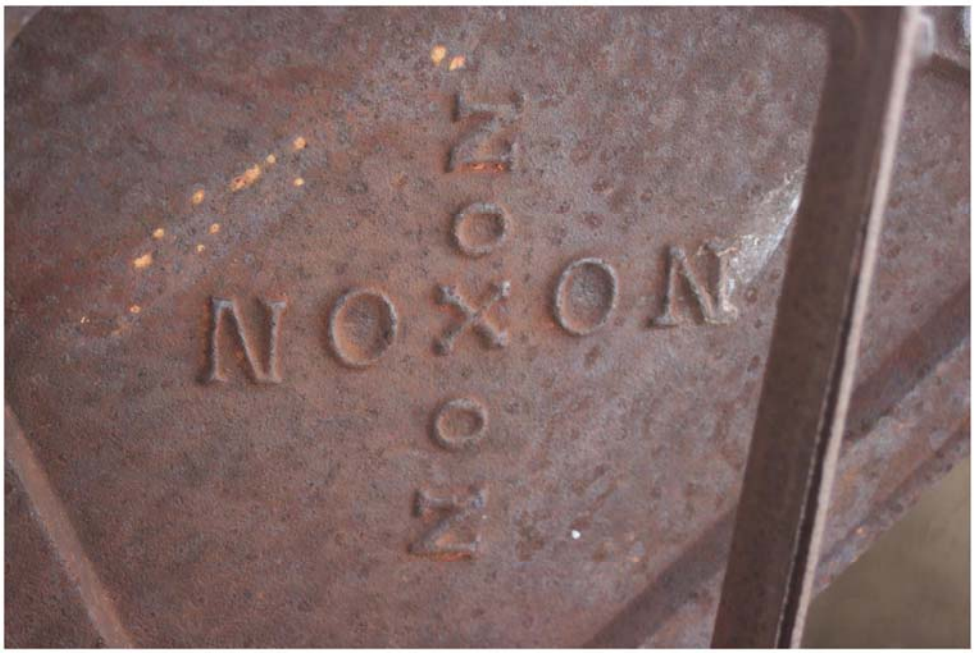


Plate 17: Noxon emblem from one of the implements at TGP-HS5.

Appendix 4

Additional Benkelman Beam Testing - West Tomingley Road, Tomingley

(Total No. of pages including blank pages = 6

This page has intentionally been left blank

MACQUARIE GEOTECH

Geotechnical Engineers & Engineering Geologists
NATA Accredited Construction Materials Testing
Laboratory for Soils, Aggregates and Concrete
Geotechnical & Environmental Drilling

NATA

RECEIVED
DATE 20/1/12 BY MDS

16 January, 2012

Geolyse
1st Floor
62 Wingewarra Street
Dubbo NSW 2830

Attention: Stephen Hoynes

Additional Benkelman Beam Testing – West Tomingley Road, Tomingley

At the request of Stephen Hoynes, Geolyse on behalf of Alkane Resources Ltd, Macquarie Geotechnical has carried out additional benkelman beam testing from the junction of Tomingley-Narromine Road and the concrete causeway on West Tomingley Road, Tomingley. The objectives of this investigation were to determine the condition of the pavement prior to construction of the pavement & intersection upgrade.

Benkelman Beam testing for surface deflection of the pavement was performed. The field work was undertaken utilising Macquarie Geotechnical's Benkelman Beam and ballasted truck with 8.2 tonne load over the rear axle with weigh bridge certificate. The truck had dual rear wheels and a single rear axle. Tyre pressures were 550 kPa (85 Psi) with consistent wear on all tyres. Both inside and outside wheel-paths of each lane from Chainage 0+000m to 0+100mm were tested in a staggered pattern such that one test point was taken every 10m along the alignment.

The detailed Benkelman Beam test report is attached and the following paragraphs summarises the main findings of the deflection testing.

A Road Functional Class of "**Class 7**" was adopted for assessment of the results.

Traffic volumes were calculated on the basis of traffic count provided by the client which is **2.0 x 10^6** ESAs.

- The deflection data was variable with deflections generally ranging between 0.072mm and 1.248 mm.
- The deflection values derived from the data are summarised overleaf.

Average Deflection	0.35mm
Standard Deviation	0.22mm
Characteristic Deflection	0.53mm

Bathurst 9 Bant Street PO Box 71 Bathurst NSW 2795 (T) 6332 2011 (F) 6334 4213
Dubbo 21 Beni Street PO Box 1804 Dubbo NSW 2830 (T) 6885 4033 (F) 6885 5533
Lithgow 1/5 Castlereagh Hwy Lidsdale NSW 2790 (T) 6355 7991 (F) 6355 7994
Gulgong 1/9 Industrial Ave Gulgong NSW 2852 (T) 6374 1858 (F) 6374 1752
www.macgeo.com.au macgeo@macgeo.com.au

If you have any further questions please contact the undersigned on 6332 2011.

Yours sincerely

John Boyle

Senior Engineering Geologist
BSc (Hons) Affil MIE Aust

Reviewed by

Robert Cox

Principal Engineering Geologist
B.App. Sc (Geology) Affil MIE Aust

Attached: Benkelman Beam Results

Benkelman Beam Deflection Test Report

Client:	Alkane Resources Ltd c/- Geolyse	**Job No.:**	11-439
Client Address:	PO Box 910, Dubbo NSW 2830	**Date of Test:**	1-12-11
Project:	Pavement Investigation & Design	**Report No.:**	18-BB
Location:	Tomingley West Road, Tomingley NSW	**Layer:**	Surface

Test Procedure: RTA T160 **Road Temperature:** N/A

Thickness of AC Layer: 50mm **Air Temperature:** N/A

Chainage	lane	Wheel path	dial gauge reading (mm)					max. deflection (mm)
			200mm	600mm	900mm	2.7m	9.0m	
0	West Bound	inner					0.311	0.622
10	West Bound	outer					0.146	0.292
20	West Bound	inner					0.083	0.166
30	West Bound	outer					0.417	0.834
40	West Bound	inner					0.044	0.088
50	West Bound	outer					0.322	0.644
60	West Bound	inner					0.153	0.306
70	West Bound	outer					0.162	0.324
80	West Bound	inner					0.095	0.190
90	West Bound	outer					0.116	0.232
100	West Bound	inner					0.119	0.238
0	East Bound	outer					0.061	0.122
10	East Bound	inner					0.061	0.122
20	East Bound	outer					0.178	0.356
30	East Bound	inner					0.150	0.300
40	East Bound	outer					0.112	0.224
50	East Bound	inner					0.110	0.220
60	East Bound	outer					0.174	0.348
70	East Bound	inner					0.462	0.924
80	East Bound	outer					0.228	0.456
90	East Bound	inner					0.113	0.226
100	East Bound	outer					0.207	0.414

Deflection parameters

sub-section	mean deflection (mm)	standard deviation (mm)	characteristic deflection (mm)	Inner = Inner Wheel Path
East/West	**0.35**	**0.22**	**0.53**	Outer = Outer Wheel Path

AUSTROADS road functional class: factor f: 1.65

MACQUARIE GEOTECH

Macquarie Geotechnical
9 Bant Street
BATHURST NSW 2795

PO Box 71 BATHURST NSW 2795
Phone: 02 6332 2011
Fax: 02 6334 4213

Report Form: 18-BB Issue 1 - Revision A Issue Date:2/6/03 Page 1 of 1

This page has intentionally been left blank

Appendix 5

Tomingley Gold Project Narromine to Tomingley Pipeline Operational Condition and Ongoing Maintenance Costs

(Total No. of pages including blank pages = 4

This page has intentionally been left blank

GEOLYSE

CIVIL & ENVIRONMENTAL ENGINEERING
TOWN PLANNING ARCHITECTURE SURVEYING
ENVIRONMENTAL CONSULTING

Our Ref: 111122_LEO_001

E-MAILED
24 January 2012

The General Manager NSW
Alkane Resources Ltd
PO Box 910
DUBBO NSW 2830

Attention: Mr Michael Sutherland

Dear Sir

TOMINGLEY GOLD PROJECT NARROMINE TO TOMINGLEY PIPELINE OPERATIONAL CONDITION AND ONGOING MAINTENANCE COSTS

We understand that Narromine Shire Council has lodged a submission in regards to the proposed Tomingley Gold Project concerning matters relating to the Narromine to Tomingley pipeline. We understand that the issues raised by Narromine Council include the following:

- The condition of the pipeline at the end of the mine life and the future life expectancy of the pipeline; and
- Ongoing repair and maintenance costs.

We understand that the Tomingley Gold Project has a production life of 10 to 12 years and our response to Council's issues is based on that assumption.

Pipeline Condition and Life Expectancy

There are various components that make up the Narromine to Tomingley pipeline, namely the HDPE pipeline itself, valves (air, scour and control) and the pump station and its pump and various fittings.

Following 10-12 years of operational service, it is anticipated that the HDPE pipeline would be in good condition. The life expectancy of HDPE pipe would be influenced by properties of the soil in which it is constructed and the quality of the water that the pipeline is conveying. It is not uncommon for HDPE pipe to be used in circumstances where a pipeline may be required to have a design life of 50 to 100 years.

Given the nature of the water to be pumped to the Tomingley Gold Project, significant internal abrasion of the pipeline would not be expected to occur and the general soil quality along the pipeline route does not appear to be aggressive in nature, so the life expectancy of the HDPE pipeline would be in the order of at least 50 years.

The condition of the valving and pump station components after 10-12 years of serviceable life would again be directly influenced by the quality of water being extracted from the 'Woodlands' bore. Valving and pump station components typically have a serviceable life of 5-15 years in applications where non turbid non aggressive water is being pumped. The valving and pump station components would be expected to be either newly replaced or in fair condition following 10-12 years of operational service.

Po Box 1842
1st Floor, 62 Wingewarra Street Dubbo NSW 2830
T: 02 6884 1525 F: 02 6884 1470 E: dubbo@geolyse.com W: www.geolyse.com ABN: 73 492 152 535

GEOLYSE

Ongoing Repair and Recurrent Pipeline Maintenance Costs

It is assumed that the overall Narromine to Tomingley pipeline in its entirety would be in good condition at the conclusion of the 10-12 year operational period. The annual maintenance and repair cost of a pipeline system is influenced by numerous factors, namely the complexity of the pipeline system, the quality of the pipeline components, quality of water being transferred and the usage/hours in operation.

It would be expected that a relatively simple rising main system such as the proposed Narromine to Tomingley pipeline would incur an annual maintenance fee much lower than that of a complex municipal water reticulation system.

Pipeline annual maintenance costs are typically budgeted as a percentage of the initial capital investment. Depending on the complexity of the pipeline system, maintenance budgets vary from 0.5% to 3% of the initial capital investment. Given the simple nature of the Narromine to Tomingley pipeline, an annual average maintenance cost of around 1% of initial capital investment would, at this preliminary assessment stage, appear reasonable.

Any maintenance budget for the pipeline system should include labour and parts to replace, repair or clean the following components:

- air valves;
- scour valves;
- control valves;
- telemetry; and
- pump station components such as; inlet screen, impellor replacement, electrical maintenance.

It is anticipated that the annual maintenance and repair costs incurred during the first 10-12 years of the pipeline's operational life would not be significantly less than that in future years beyond the initial 10-12 years.

Following the closure of the Tomingley Gold Project, the annual volume of water transferred by the pipeline system would be significantly reduced. It is reasonable to assume that the annual maintenance costs of the pipeline system would reduce with this decreased usage of the pipeline.

We trust that the provision of this information is satisfactory for your purposes at this point in time, however, if there are any further questions in regards to this matter or any issue requires clarification, please do not hesitate to contact our Dubbo office.

Yours faithfully
Geolyse Pty Ltd

STEPHEN J HOYNES
Civil Engineer

PAGE 2
111122_LEO_001.DOCX

Appendix 6

OzArk Response to OEH Queries over the Tomingley Gold Project Biodiversity Offset Strategy and BioBanking Credit Calculations

(Total No. of pages including blank pages = 6)

This page has intentionally been left blank

Environmental & Heritage Management Ltd
ABN 59 104 582 354

RW Corkery & Co Pty Limited
c/o Alex Irwin
Senior Environmental Consultant
Geological and Environmental Consultants

Brooklyn
Level 1, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083
Phone: (02) 9985 8511
Fax: (02) 9985 8208
Email: brooklyn@rwcorkery.com

Orange
62 Hill Street
ORANGE NSW 2800
Phone: (02) 6362 5411
(02) 6393 2302
Fax: (02) 6361 3622
Email: orange@rwcorkery.com

Brisbane
Level 19, 1 Eagle Street
BRISBANE QLD 4000
Phone: (07) 3360 0217
Fax: (07) 3360 0222
Email: brisbane@rwcorkery.com

Website: www.rwcorkery.com

Re: Alkane Resources Pty Limited Tomingley Gold Project

Dear Alex,

In response to correspondence from Mr Brad Tanswell of the NSW Environmental Protection Authority (EPA) dated 15/12/2011 the following responses have been provided as requested and responses supplied:

BIODIVERSITY

Biodiversity Impacts

Issue: Some inaccuracies remain in the proposed Biodiversity Offset Strategy (BOS). Clarification of the area to be included in the offset is required.

Response: The Proponent has re-issued a figure (**Figure 2.19 (Modified)**) showing the location of offsets (vegetated area to be removed has not been highlighted). You will note that there are two main changes to the areas identified on the original *Figure 2.19* of the Environmental Assessment (and *Figures A10.1 and A10.2* of the Biodiversity Assessment) and included in the BioBanking credit calculations.

1. To accommodate the Eastern Surface Water Drainage Structure the Proponent will be required to remove a small (30m x 30m) patch from the remnant vegetation (of Community 3). This has increased disturbance by 0.1ha and reduced conservation by 0.1ha.

2. The area of Community 4 conserved has been reduced to 1.9ha as it has been identified that 3.0ha of the original area was located on land for which the Proponent holds an agreement with the land owner. It is noted that areas to the south of the Mine Site on the eastern side of the Newell Highway identified in the

OzArk Environmental & Heritage Management P/L –145 Wingewarra Street ; PO Box 2069 Dubbo NSW 2830
Tel: 6882 0118; Fax: 6882 0630; Mob: 0403 763 504;
E-mail: jodie@ozarkehmlcom.au ; phil@ozakehm.com.au ; cheryl@ozarkehm.com.au
Web: www.ozarkehm.com.au

original Figure 2.19 were not included in BioBanking calculations and have also been removed from **Figure 2.19 (modified)**.

With respect to isolated paddock trees, the Mine Site is under cultivation for wheat, hence there are few isolated paddock trees in areas to be affected. When the calculations were entered into BBAM 10m2 was added per paddock tree to be affected in the requisite community. We believe this is adequate as loss of the paddock trees was considered for both the development site and offset site credit reports.

It is duly noted that the Peak Hill to Tomingley transmission line is not being considered by the EPA as a component of this project.

It is acknowledged that the scales of the figures supplied in the *Environmental Assessment* and Biodiversity Assessment have made it difficult to provide the level of confidence the OEH requires to determine if ancillary infrastructure (i.e. relocated telephone lines, transmission lines, amenities and bunds) affect the offset area.

The consultant has liaised with the Proponent and can confirm that ancillary infrastructure will be, with limited exceptions where the linear nature of the disturbance requires linear strips of remnant vegetation to be crossed, placed adjacent to remnant vegetation. The disturbance will also be preferentially placed beyond (adjacent to) the proposed remnant extension areas, however, where overlaps are unavoidable due to the compressed nature of the Mine Site, grasses and shrubs would be planted in preference to trees (which could interfere with the powerline or pipeline infrastructure). In essence, the structure of a grassy woodland community can be easily designed in these areas when planning landscaping to facilitate effective offsets without reducing the quantum of the offset or change the number of tube stock or kilograms of seed purchased for the rehabilitation activity.

With respect to Figures A10.1 and A10.2, the discussion related to the isolated paddock trees provides the detail required from your query. **Figure 2.19 (Modified)** has been provided for your perusal.

An error in the tables compiled for the purpose of BioBanking credit calculations: 4.9ha of Poplar Box–Belah Woodland (Community 4) would **not** be affected by the activity.

Inaccuracies with the BioBanking calculations are further addressed below. The issue identified by OEH is provided in *italics*, with the response provided in regular text.

- *Erroneous inclusion of some vegetation in the loss component of the assessment.*
  - 4.9ha of Poplar Box–Belah Woodland (Community 4) has been incorrectly identified as being affected by the activity.
- *Low condition classification of one vegetation community in the assessment where EPA concludes the data supports a 'moderate to good' classification.*
  - Idiosyncrasies in data collection in BioBanking are the issue.
    - The consultant suspects the Belah Black Oak Western Rosewood Wilga community (Community 5) (Benson 57) in the impact footprint of the Waste Rock Emplacement, may also be the river red gum community in some areas along the man-made drainage line (Gundong Creek).

OZARK ENVIRONMENTAL & HERITAGE MANAGEMENT P/L –145 Wingewarra Street ; PO Box 2069 Dubbo NSW 2830
Tel: 6882 0118; Fax: 6882 0630; Mob: 0403 763 504;
E-mail: jodie@ozarkehmlcom.au ; phil@ozakehm.com.au ; cheryl@ozarkehm.com.au
Web: www.ozarkehm.com.au

- Several factors may have played a role - namely the data entry into the overstorey regeneration category is the main issue. Sometimes an area will be heavily grazed but an individual tree from each cohort would be observed growing in a place that cannot be grazed (growing though a drum / abandoned farm machinery), the majority of the area assessed does not support regeneration (due to grazing pressure) hence judgment was applied where 'low condition' reflected the 'true' nature of the ecological condition (as opposed to technical where one tree is regenerating but it won't lead to local recovery of the current extent of the patch. In the case of the river red gum area these areas were ploughed right up to the banks of the creek, in places you couldn't plough there were signs of regeneration but again contribution of these bits of regeneration in a ploughed 20m buffer on the creek were limited hence 'low condition' applied.

- *Failing to place the 100ha assessment circle over the area of greatest change therefore underscoring the landscape change.*

  - The circle was placed over the area which had the greatest effect to the areas species, populations and community's ecology i.e. Fuzzy Box Woodland EEC, Inland Grey Box Woodland EEC, removal of trees with substantive hollows and spouts.

  - A meeting with OEH in January 2012 noted that the circle should have been placed over the vegetation type undergoing the greatest change in extent. Benson 57 is in 'low condition' does not provide the same ecological values i.e. there are no EECs or tree hollows / spouts however the requisite process is now noted.

- *Rerun of required credit points.*

  - The consultant appreciates and thanks OEH for re-running the data and updating the information.

- *Tier 2 'No Net Loss'*

  - Thank you for bringing this to our attention, the Tier system we are now aware is the lowest common denominator that can be achieved by the project, not for individual communities.

  - In this instance the Project will achieve Tier 3 'Mitigated Net Loss' as the number of credits generated for Community 5 is inadequate for offsetting.

  - The Proponent will modify the rehabilitation plan to include requisite species (Belah / Black Oak, Western Rosewood and Wilga). The number of hectares required (prior to OEH review) was 18ha. The Proponent will ensure 25ha of this community is incorporated into the rehabilitation plan. Although currently Tier 3 is achieved we can independently undertake this activity to facilitate 'appropriate' habitat offset requirements.

OZARK ENVIRONMENTAL & HERITAGE MANAGEMENT P/L –145 Wingewarra Street ; PO Box 2069 Dubbo NSW 2830
Tel: 6882 0118; Fax: 6882 0630; Mob: 0403 763 504;
E-mail: jodie@ozarkehmlcom.au ; phil@ozakehm.com.au ; cheryl@ozarkehm.com.au
Web: www.ozarkehm.com.au

- *Design of the offset.*
  - The advice of the OEH is noted and appreciated. It is duly noted that the offset design is not the most desirable. The design has been proposed to address the needs for specific local populations of regionally significant species and listed threatened species within the design constraints associated with the activity.
    - In this instance, within this highly fragmented landscape the best ecological outcome for known species of interest are associated with improving habitat for Grey-crowned Babblers (V –TSC Act) and the Fat-tailed Dunnart (regionally significant). Both species were recorded in association with linear corridors and from experience, utilise this habitat resource in the region.
    - Both species have been adopted as 'flagships'. At least two possibly four families of Grey-crowned Babblers live in the Mine Site and an unknown nature and extent of a population of Fat-tailed Dunnarts. The most achievable habitat restoration for these species was considered to be doubling (at least) the width of the linear remnant, re-establishing a functional ecosystem (mainly native grasses and shrubs) and establishing a new cohort of trees. Relocating offsets in other locations would not address effects to these known local populations. It is however accepted that other designs in other areas would be preferable however this scenario does not help the species in the Mine Site within the constraints of developing the area.
- Offset Security
  - The inconsistent information within the EA and statement of commitments will be addressed to note 'in-perpetuity conservation arrangements would be implemented'. This will be achieved either by a Property Vegetation Plan, Conservation Agreement, Trust Agreement or Planning Arrangement.

Thanks you for the feedback and direction to assist with future BOS assessments.

Regards

Phil Cameron
Senior Project Manager / Principal Ecologist
OzArk Environmental & Heritage Management Pty Limited
PO Box 2069 DUBBO 2830
Ph 02 6882 0118 / 0423 198 898
Fax 02 6882 0630 phil@ozarkehm.com.au

OZARK ENVIRONMENTAL & HERITAGE MANAGEMENT P/L –145 Wingewarra Street ; PO Box 2069 Dubbo NSW 2830
Tel: 6882 0118; Fax: 6882 0630; Mob: 0403 763 504;
E-mail: jodie@ozarkehmlcom.au ; phil@ozakehm.com.au ; cheryl@ozarkehm.com.au
Web: www.ozarkehm.com.au

Appendix 7

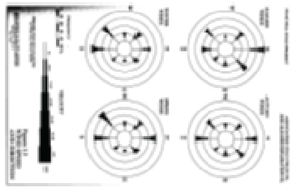
Detailed Mine Site Layout
(Drawing TGP-1130-00-G-001 rev5)

(Total No. of pages including blank pages = 4)

This page has intentionally been left blank

DO NOT SCALE - WORK TO DIMENSIONS

WIND DATA



EARTHWORK QUANTITIES

EARTHWORK QUANTITIES	CUBIC M
WYOMING	
ROM PAD AND RAMP	367,281
RSF BUNDING	202,000
WRE 1 - LOW GRADE STOCKPILE	1,500,000
WRE 1 - WASTE	1,036,795
WRE 2 - 40m HIGH	14,303,700
TOPSOIL WYOMING (2m high)	193,000
LEVEE BANKS - WYOMING	29,000
TOTAL	17,631,776
CALOMA	
WRE 3	17,384,270
LEVEE BANKS - CALOMA	44,000
TOPSOIL CALOMA (2m HIGH)	272,609
TOTAL	17,700,879

NO	DATE	DRN	CHD	ENG	REVISION
5	18/8/19	RMA			POTENTIAL CALOMA TWO PIT AND WASTE EXTENSION ADDED
4	01/08/19	RMA			CALOMA TOP SOIL DUMP ALTERED, EXTRA DUMP ADDED, TABLE ADJUSTED TO SUIT
3	22/07/19	JR			WRE 3 MOVED, CALOMA TOPSOIL DUMPS MOVED, ROADS AND DRAINS ADJUSTED TO SUIT.
2	28/06/19	JR			WRE 2 AND 3 CHANGED, CALOMA TOPSOIL, WATER SUPPLY, ROADS ADJUSTED TO SUIT
1	17/6/19	JR			PIT FOOTPRINTS CHANGED, HAUL ROADS ADJUSTED TO SUIT.
0	6/12/18	JJR			ISSUED FOR EPS

REFERENCE DRAWING TITLE | DRAWING NUMBER

ALKANE RESOURCES LTD

mintrex consulting division of Northshore Pty Ltd — Job No. ALK 1130

ABN 84 064 105 488
ph. (0161) 0442 3333
fax.(0161) 0442 3300

FULL SIZE ON A1 ORIGINAL – IF PRODUCED AT A3 DOUBLE SCALE

PROJECT: TOMINGLEY GOLD PROJECT

DRAWN	CHECKED	APPROVED	DATE
JJR			
DESIGN ENG.	DESIGN CHK.		

TITLE: GENERAL SITE LAYOUT PLAN

SCALE 1:10000 | DRAWING No TGP-1130-00-G-001 | REV 5

PROJECTION AMG Zone 55
Datum Horizontal AGD66

This page has intentionally been left blank

Appendix 8

Additional Flood Modelling and Flood Heights - Tomingley Gold Project (SEEC)

(Total No. of pages including blank pages = 8)

This page has intentionally been left blank

SEEC

STRATEGIC ENVIRONMENTAL
AND ENGINEERING CONSULTING

www.seec.com.au

Alex Irwin
RW Corkery & Co Pty Ltd
62 Hill Street
ORANGE NSW 2800

our reference: 09000056-01
your reference:

1 February 2012

Dear Alex,

Additional Flood Modelling and Flood Heights - Tomingley Gold Project

In response to our discussions with Tim Baker from NSW Office of Water on 25 January 2012, we have conducted additional flood modelling around the Tomingley Gold Project site. Following are the results of that modelling.

In addition, please also find following further details concerning the Eastern Surface Water Diversion Structure (ESWDS).

Flood Modelling and Flood Heights

Figure 1 below shows the results of additional flood modelling around the Project Site for the 100-year ARI event. The purpose of this modelling is to show the extent of change in flood heights on adjacent properties. The hatched area shows the limit of the changed flood heights - beyond that zone, modelling shows no change. Spot height changes note where flood levels will either decrease (negative values) or increase (positive values).

The maximum change is an increase of +0.64m, where an aflux occurs immediately upstream of the site access road crossing over the site bund. As can be seen from the spot heights, this increase quickly dissipates on the adjoining lands to the point where no impact occurs. As a result, the area of land impacted by an increase in flood height is relatively minor.

Suites 9 and 10 Bowral Mall
Cnr Boolwey & Station Streets, Bowral
PO Box 1098, Bowral NSW 2576

t 02 4862 1633
f 02 4862 3088
e reception@seec.com.au

Principals: MV Passfield CPESC and AP Macleod CPSS, CPESC

ABN 12 291 237 901

This page has intentionally been left blank

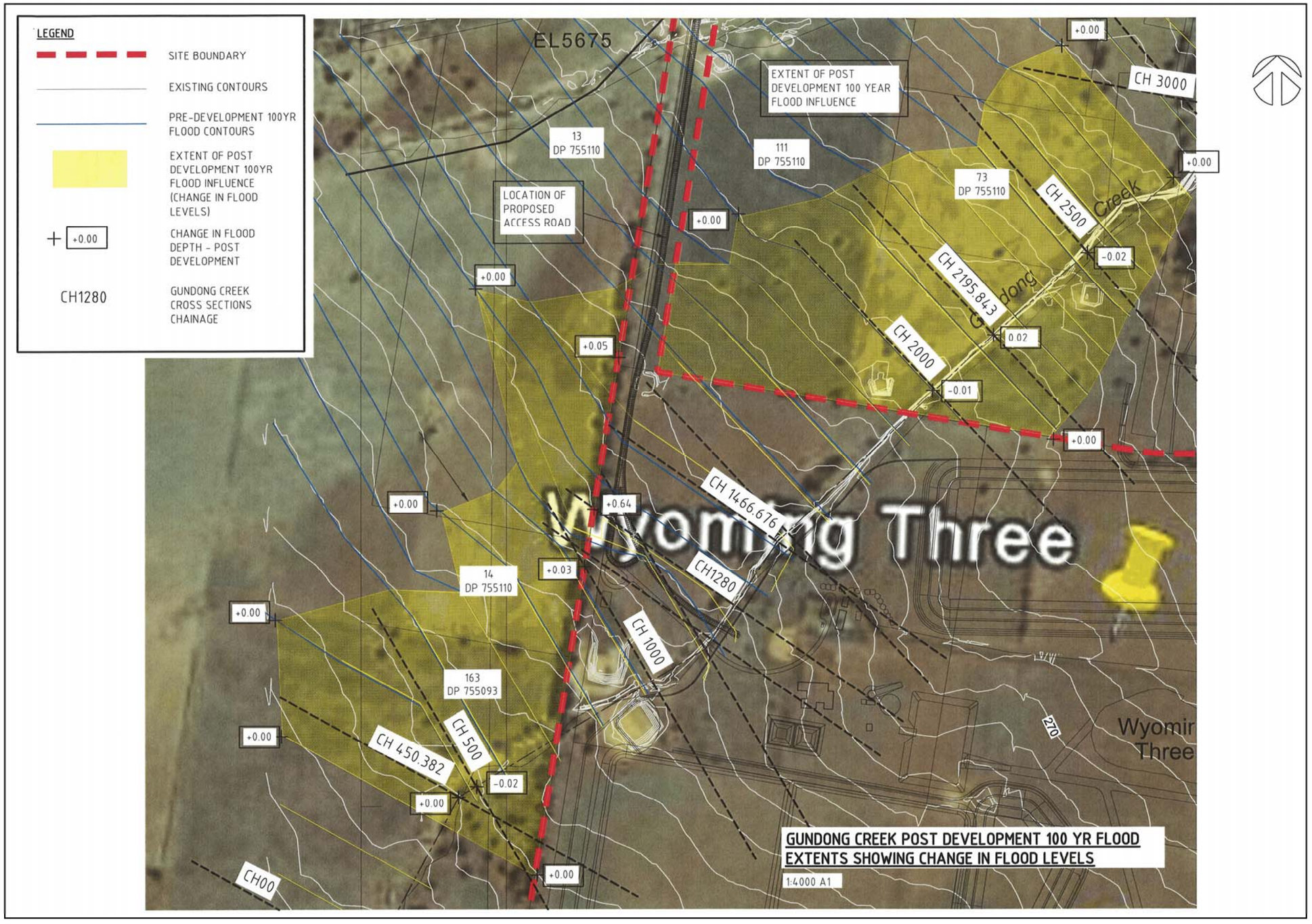


Figure 1 Results of additional flood modelling (100-year ARI event), showing the extent of change in flood heights around the Project Site.

This page has intentionally been left blank

Note that the results shown in **Figure 1** differ slightly from those presented in the Surface Water Assessment (SEEC, 2010). This is as a result of slightly different model calibration although this variation is not significant. The results presented in the Surface Water Assessment (SEEC, 2010) are still considered valid as they are inherently conservative.

Eastern Surface Water Diversion Structure (ESWDS)

We concur with the NSW Office of Water that the ESWDS needs to be stable. We have investigated the design provided for this structure (by others) to determine whether it can be adequately stabilised. Although the ESWDS has relatively steep sides and is significantly incised at various points, we consider that it can be suitably armoured to minimise the risk of erosion and ensure stability for the life of the structure.

Armouring would involve achieving an appropriate level of ground cover, using a material (or materials) that can cope with the anticipated flow volumes and velocities. Ultimately, ground cover to a C-factor of 0.05 (equivalent to 70% grass cover) would be the minimum, in accordance with the recommendations and guidelines in the NSW Blue Book Volumes 1 and 2E (Landcom, 2004 and DECC, 2008). This might necessitate the use of rock armouring, geofabric or similar. The final design would be considerate of cost while ensuring that the requirement for stability was met.

If you have any questions or comments regarding the above, please feel free to contact either me or Jason Armstrong on 02 4862 1633.

Yours faithfully,

Andrew Macleod

This page has intentionally been left blank