TOMINGLEY
GOLD OPERATIONS PTY LTD
(A wholly owned subsidiary of Alkane Resources Ltd)
ABN 53 149 040 371

Tomingley Gold Operations
Annual Review
1 January – 31 December 2015

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Definitions

Term	Definition
$CaCO_3$	Calcium carbonate
Council	Narromine Shire Council
CCC	Community Consultative Committee
DSC	Dam Safety Committee
EEC	Endangered ecological community
EC	Electrical Conductivity
EPA	Environment Protection Authority
EP&A	*Environment Planning and Assessment Act 1979*
EPL	Environment Protection Licence
DP&E	Department of Planning & Environment
DRE	Division of Resources and Energy (Department of Trade and Investment, Regional Infrastructure and Services)
ha	Hectares
HVAS	High volume air sampler
LDP	Licensed discharge point
LFA	Landscape function analysis
Mining Act	*Mining Act 1992*
MOP	Mining operations plan
ML	Mining Lease
NGERS	National Greenhouse and Energy Reporting Scheme
NMP	Noise Management Plan
NOW	NSW Office of Water
NSS	Noise and Sound Services
OEH	Office of Environment and Heritage
PM10	Particulate matter
RMS	Roads and Maritime Services
SEEC	Strategic Environmental and Engineering Consulting
TARP	Trigger action response plan
TEOM	Tapered Element Oscillating Microbalance
TGO	Tomingley Gold Operations
TGP	Tomingley Gold Project
TSP	Total suspended particulates
WAD	Weak acid dissociable cyanide
WAL	Water access licence
WHS	Workplace Health & Safety
TIM	Total Insoluble Matter
WRE	Waste rock emplacement
LOR	Limit of Reporting

Title Block

Table 1: Annual Review title block

Name of operation	Tomingley Gold Operations
Name of operator	Tomingley Gold Operations Pty Ltd
Development consent / project approval #	PA 09_0155
Name of holder of development consent / project approval	Alkane Resources Ltd
Mining lease #	ML 1684
Name of holder of mining lease	Tomingley Gold Operations Pty Ltd
Water licence #	WAL20270; WAL28643; WAL29266
Name of holder of water licence	Alkane Resources Ltd
MOP/RMP start date	14 April 2014
MOP/RMP end date	31 March 2021
Annual Review start date	01 January 2015
Annual Review end date	31 December 2015

I, Mark Williams, certify that this audit report is a true and accurate record of the compliance status of Tomingley Gold Operations for the period 01 January 2015 to 31 December and that I am authorised to make this statement on behalf of Alkane Resources Pty Ltd.

Note.

a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).

Name of authorised reporting officer	MARK WILLIAMS
Title of authorised reporting officer	ENVIRONMENT AND COMMUNITY MANAGER
Signature of authorised reporting officer	
Date	29.2.16.

1 Statement of Compliance

Table 2 provides a statement of compliance status for Tomingley Gold Operations Pty Ltd (TGO) with its project approval (PA) and mining lease (ML), as at the end of the reporting period.

Table 2: Statement of Compliance

Were all conditions of the following approvals complied with?	
PA 09_0155	NO
ML 1684	NO

Table 3 provides a summary of approval conditions not complied with as at the end of the reporting period.

Table 3: Non-compliances

Relevant approval	Condition #	Condition description (summary)	Compliance status	Comment	Rlevent Section
PA 09_0155	Schedule 3, Condition 3	Exceedance of noise criteria	Non-compliant	Investigated and addressed	6.1
PA 09_0155	Schedule 3, Condition 7	Exceedance of airblast overpressure criteria	Non-compliant	Investigated and addressed	6.2
PA 09_0155	Schedule 3, Condition 17	Exceedance of 24 hour average PM_{10} and deposited dust criteria	Non-compliant	Investigated and addressed	6.3
PA 09_0155	Schedule 3, Condition 23	Non-licenced offsite water discharge	Non-compliant	Reported to EPA	7.3.3
PA 09_0155	Schedule 3, Condition 32	Water Management Plan still not approved	Non-compliant	In progress	7
ML 1648	Condition 3(a)	Non-compliance with MOP rehabilitation schedule	Non-compliant	Reported to DRE	8.1

Compliance status key for Table 3		
Risk level	**Colour Code**	**Description**
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Administrative non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

2 Introduction

2.1 Tomingley Gold Mine

This Annual Review reports on operational and environmental management activities undertaken at Tomingley Gold Operations Pty Ltd (TGO) during the calendar year 2015, and provides details on activities proposed for 2016. The report has been produced in accordance with the *Post-approval requirements for State significant mining developments. Annual Review Guideline* (DP&E, October 2015) to meet the annual reporting requirements conditioned in the TGO Mining Lease (ML 1684) and Project Approval (PA09_0155).

TGO is a wholly owned subsidiary of Alkane Resources Ltd. TGO is a medium-sized gold project with approximately 687,000 ounces of gold in the current defined resource space. TGO aims to produce 50,000-70,000 ounces of gold per year, over the next 5.5years years, based on an annual ore throughput of around one million tonnes.

The Tomingley area has a long history of gold mining and exploration, with gold first discovered and mined from the Tomingley Goldfield in the 1880s. Numerous underground mining operations were subsequently located in the McPhail area, immediately south of the TGO minesite. The last economic 'mining' activities were completed in the late 1990s and involved the re-treatment of tailings from the McPhail Mine.

The current mining operations are focused on the area immediately north of the historic Myalls United Mine. Mining commenced in three open cut mines (Wyoming One, Wyoming Three and Caloma) on the site in November 2013. The process plant, with associated residue facilities, was commissioned between December 2013 and February 2014.

2.2 Mine Contacts

The primary contacts for the TGO during the review period are detailed in Table 4.

Table 4: Tomingley Gold Operations Key Contacts

Key Contact	Position	Contact Details
Sean Buxton	Operations Manager	PO Box 59 Peak Hill, NSW, 2869 Phone: (02) 6867 9780
Mark Williams	Environment and Community Manager	PO Box 59 Peak Hill, NSW, 2869 Phone: (02) 6867 9780
Community Information Line		(02) 6865 6116

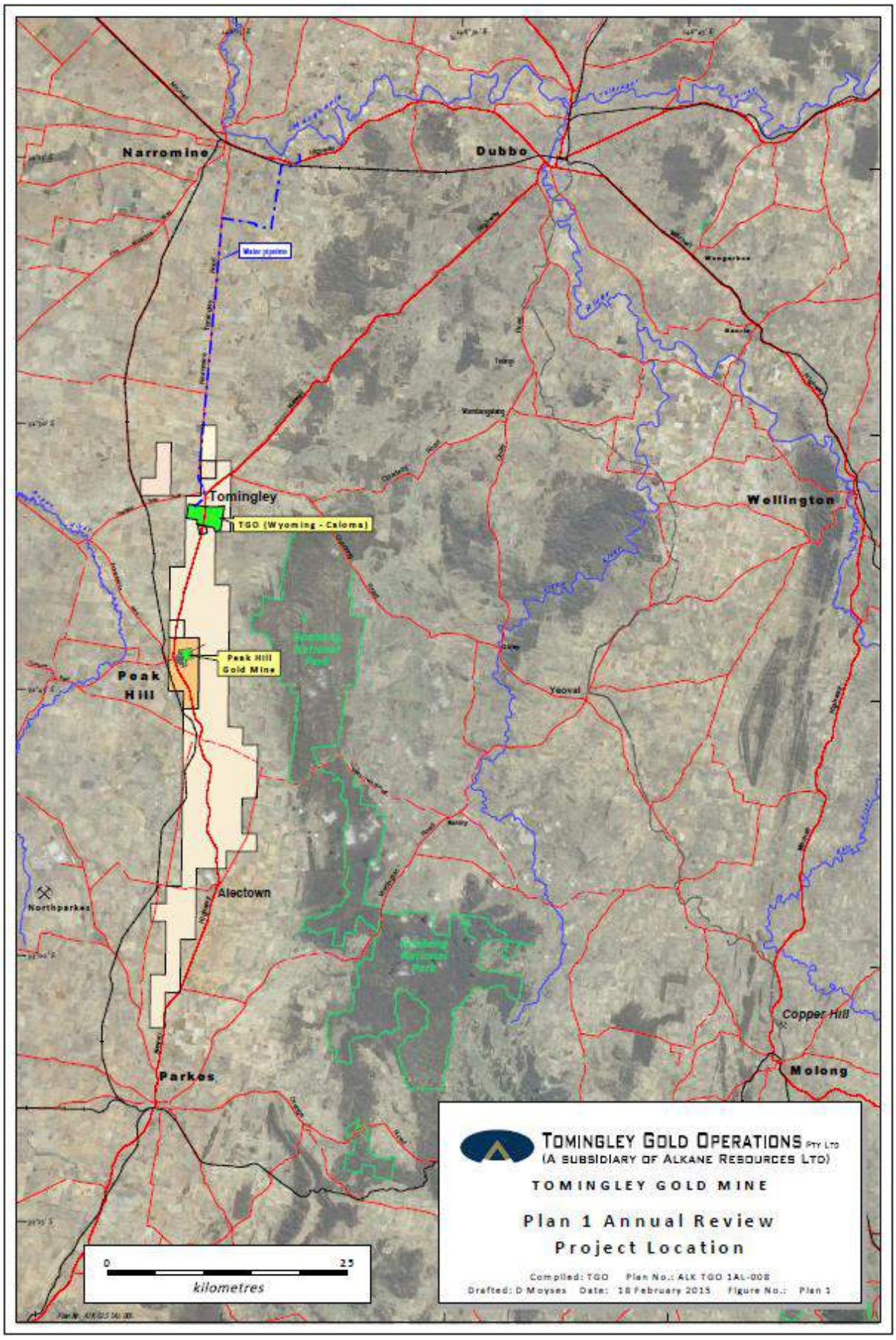


Figure 1: Tomingley Gold Operations – regional setting.

Figure 2: Tomingley Gold Operations – site layout

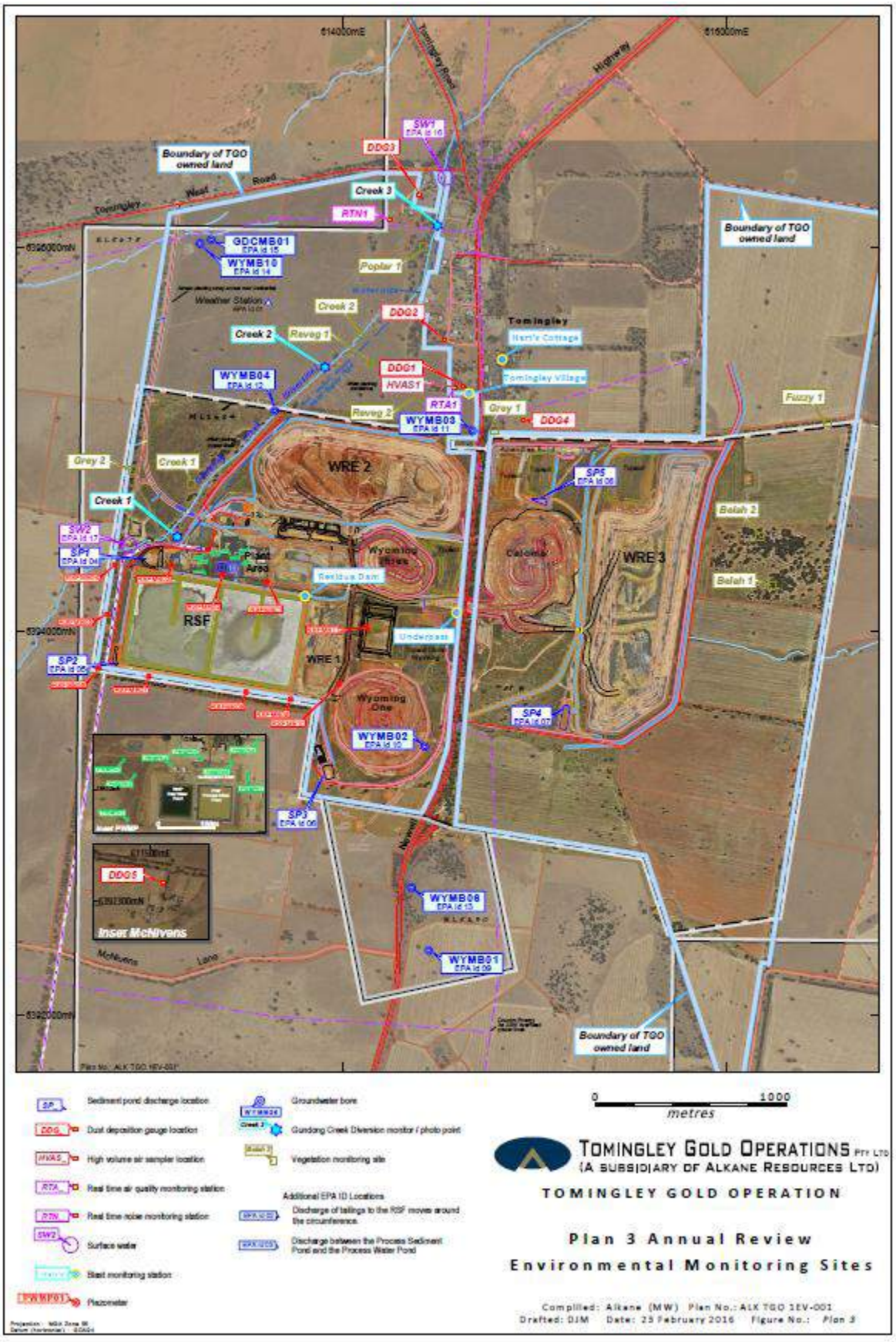


Figure 3: Tomingley Gold Operations – environmental monitoring locations.

3 Approvals

TGO operates under the environmental consents, leases and licenses specified in Table 5.

Table 5: Consents, leases and licenses

Title	Legislation	Regulatory Authority	Approval Duration/ Expiry
Project approval 09_0155 (MOD 1 – 24 July 2012) (MOD 2 – 13 May 2015)	Environmental Planning & Assessment (EP&A) Act 1979	NSW Department of Planning and Infrastructure (DP&I)	31 December 2022
Mining Lease 1684	Mining Act 1992	NSW Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS)	11 February 2034
Environment Protection License (EPL) 20169	Protection of the Environment Operations (POEO) Act 1997	NSW Environment Protection Authority (EPA)	Ongoing until surrendered (Next review 23 October 2018)
Controlled Works Approval 80CW809661 (Gundong CK levy)	Water Management Act 2000	NSW Office of Water (NOW)	02 January 2018
Groundwater licences WAL20270, WAL28643 and WAL29266	Water Management Act 2000	NSW Office of Water (NOW)	N/A
Notification of Dangerous Goods NDG200150	Work Health & Safety Act (WHS) 2011	WorkCover NSW	NA

4 Operations Summary

4.1 Mining

Open cut mining operations continued in Caloma 1 and Wyoming 3 pits during the reporting period, with mining in Wyoming 1 commencing in April 2015. Waste rock was hauled to Waste Rock Emplacement (WRE) 1, 2 and 3. Ore was hauled to the Run-of-mine (ROM) stockpile pad for processing at the site processing plant. Process residue was emplaced in the onsite residue storage facility (RSF).

The following changes were made to the TGO open cut mobile plant fleet during the reporting period:

- 3 x rear dump trucks introduced
- 1 x 320D rock breaker introduced
- 1 x wheeled dozer removed
- 1 x loader introduced
- 1 x flat drum roller introduced

Table 6: Production Summary

Material	Approved limit (specify source)	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Waste rock (m^3)	-	7,003,964	7,750,000	7,387,084
Ore (kt)	1,500,000 (PA 09_0155)	956.1	1073.7	1378.7
Process Residue (tailings) (t)	-	956,077	1,073,700	1,110,746
Saleable Product (Oz)	-	64,137	63,211	66,000
Note: No course process waste produced at TGO				

4.2 Other Operations

In accordance with Schedule 3, Condition 4 of PA 05_0155, vegetation clearing and topsoil stripping was confined to the hours of 6am-6pm and rehabilitation was undertaken between 7am and 10pm.

TGO scehuled open cut operations to comply with Schedule 3, Condition 4A which was included in PA 09_0155 during reporting period. Condition 4A requires that:

"The Proponent shall only undertake construction works on the modified amenity bund between 7am and 6pm Monday to Friday and 8am and 1pm Saturday."

TGO also employed 144 people onsite, meeting Condition 9 of ML 1648, which requires that:

"The lease holder must: (a) ensure that at least 30 competent people are efficiently employed in relation to the mining process or mining operations on the lease area OR (b) expend on operations carried out in the course of prospecting or mining the lease area, an amount of not less than $525,000.00 per anuum whilst the lease is in force."

4.3 Next reporting period

During the next reporting period, open cut mining and processing operations will continue as described in the 2015 MOP, with the following modifications:

- pit expansion areas;
- infrastructure development/upgrades;
- mining fleet upgrades; and
- preparation for commencement of underground

5 Actions required from previous Annual Review

A review of the 2015 TGO AEMR was held on 22 September 2015, and was attended by officers from Narromine Council (Council), Department of Industry - Division of Resources and Energy (DRE), EPA and NSW Department of Planning and Environment (DPE).
A summary of requirements resulting from these reviews are presented in Table 4.

Table 7: Actions from review of 2014 AEMR

Actions Required from previous AEMR Review	Requested by	Action taken by Operator	Section where discussed
Include an update on the effectiveness of the measures implemented to prevent future incidents, in particular measures to ensure compliance with the project specific noise, air and water criteria;	DPE	Monitoring results compared to previous period as measure of previous control effectiveness	Noise – 6.1 Air – 6.3 Water – 7.4 to 7.6
Include a comparison of the monitoring results required over the reporting period with the relevant predictions in the EA, as required under condition 4 (b) (iv) of Schedule 5 of the approval;	DPE	Only EA noise and air quality predictions are relevant, and they have been compared with monitoring results	Noise- Table 8 Air quality – Table 10
Identify any trends in the monitoring data over the life of the project, as required under condition 4 (d) of Schedule 5 of the approval;	DPE	2014 was only previous year of operations. Results are compared to 2014, but not possible to identify longer term trends.	Noise – 6.1 Blasting – 6.2 Air – 6.3 Water 7.4 – 7.7
Include identification of any discrepancies between the predicted and actual impacts of the project, and analysis of the potential cause of any significant discrepancies, as required under condition 4 (e) of Schedule 5 of the approval; and	DPE	Monitoring results are compared with PA limits for noise and air quality, which are based on EA assessment criteria	Noise- Table 8 Air quality – Table 10
Ensure there are no reference errors throughout the document	DPE	Addressed	Throughout document
Please include trigger levels for all graphs in future documents	EPA	Regulatory limits shown in air quality monitoring result graphs.	Appendix B
WAL28643 and WAL29266 expired 5/4/15 so Alkane's intent for these bores needs clarification.	DPI (water)	TGO has provided a commitment to DPI –Water to address pit ground water interference as a part of MOD 3 documentation	7.1

WALs in Table 1 are not currently linked to any works on the mine site that would be related to GW inflows. So clarification will be requested on volume of GW inflows (either metered and/or modelled) for direct take and/or evaporative take and which WALs this is to be accounted against. If groundwater is yet to be intercepted based on an understanding of local GW levels this will aid in addressing this comment.	DPI (water)	As mentioned in previous point.	7.1
Section 3.9.2 and Appendix G shows water levels in the McPhails workings (WYMB01) to have fluctuated significantly, but no explanation is provided as to why and if it relates to the mining activity.	DPI (water)	WYMB01 has shown steady water level for 2015. Water levels are influenced by rainfall not TGO operations. Area was inspected by DPI Water on 28/10/15	7.6
RSFMP09 and RSFMP010 show drops in water level with the bores now potentially being dry. An explanation of the drop in water level is requested and consideration of whether monitoring of the RSF in this area needs to be altered.	DPI (water)	These are shallow bores that do not intercept aquifers and are highly influenced by rainfall. They are expected to dry out during extended dry periods.	7.6

6 Environmental performance

6.1 Noise management

Attended noise monitoring at seven locations near TGO over three evening and night periods (7-9 September 2015) indicated that mine noise was exceeding DA noise criteria at four locations, as shown in Table 8.

The 2015 noise monitoring also indicates increased mine noise impacted compared to attended noise monitoring from 2014 (the only previous year of operational noise). 2014 monitoring results indicated exceedance of DA noise criteria only at residence R3, with LAeq 15 minute measurements of 44-51 dBA.

A copy of the Annual Noise Compliance Report is included as Appendix A.

Table 8: Noise Management

Night time noise at Residence	Approval criteria* LAeq 15 min (dBA)	Performance during reporting period	Key management implications	Implemented management actions
R2	36	32-42	Exceedance of DA noise limits (and EIS noise assessment criteria)	Acoustic assessments and treatment of residences completed
R3	38	42-46		
R29	37	39-42		
7 Burrill St	38	42-46		

*Approval Criteria from PA 09_0155, Schedule 3, Condition 3, based on 2012 Project EIS Noise Assessment Criteria

6.1.1 Management Measures

The four residences identified during attended monitoring as being impacted by mine noise exceeding DA noise criteria were amongst the 17 residences in, or near, Tomingley village that have been acoustically assessed and treated during the reporting period.

Night time mining and waste rock emplacement practices were modified during the reporting period to reduce offsite noise impact, including:

- the cessation of dumping along the south east boundary of the site (WRE 3);
- establishing low elevation night dump locations;
- establishing night paddock dumping areas;
- introducing a maxiumum tip head of 5m for night time dumping.

TGO also has also established an online site specific weather forcasting service, which is used to predict meteorological conditions that may enhance offsite noise impacts.

6.1.2 Proposed Improvements

Where triggered by noise monitoring results of community interactions, further acoustic assessment and treatment of Tomingley village residences will be undertaken during the following reporting period.

Further opportunities for modification of night time mining practices will be investigated and trialled during the next reporting period.

TGO has arranged for it's noise consulatant to carry out a technical review of the the Noise Mangement Plan and develop new site specific procedures for monitoring.

6.2 Blasting

Blasting at TGO is managed in accordance with the Blast Management Plan (BMP), which was prepared to meet Schedul3, Condition 14 of PA 09_0155 and relevant conditions of EPL 20169.

During the reporting period 163 blasts were shot at TGO. Of these 163 blasts, three exceeded DA criteria for airblast overpressure, as indicated in Table 9.

This is an increase from the previous reporting period (only previous period during which blasting occurred) which had one airblast overpressure exceedance from 90 blasts.

Table 9: Blasting Management

Aspect	Approval criteria* (dB (Lin Peak))	Performance during the reporting period	Key management implications	Implemented/ proposed management actions
Airblast Over-pressure	120	123.8 (04/5/2015) 124.1 (01/7/2015) 122.4 (06/7/2015)	Exceedance of DA airblast overpressure criteria	Exceedances investigated and reported to EPA.

*Approval Criteria from PA 09_0155, Schedule 3, Condition 7

Three complaints were also received during the reporting period, claiming property damage due to TGO blasting. An independent inspection of the subject properties was arranged in accordance with Schedule 3, Condition 11 of the DA. The inspection reports, which advise that the damage to the properties was not caused by blasting, were provided to the complainants.

With regards to blast timing, TGO complied with:

- Schedule 3, Condition 8 of the DA, which restricts TGO to blasting between 9am and 5pm, Monday to Saturday (excluding public holidays); and
- Schedule 3, Condition 9 of the DA, which restricts TGO to three blasts per day.

6.2.1 Management Measures

Blasts are designed and scheduled to ensure airblast overpressure and ground vibration levels remain within DA blast criteria. Weather conditions are also monitored to avoid blasting in conditions that will enhance offsite impacts, such as south westerly winds and low cloud cover.

6.2.2 Proposed Improvements

Investigation od 2015 blast exceedances reccomended the following modifications to blast design and preparation.

- Presplitting be fired in no more than 10 holes at any one time to reduce maximum instantaneous charge and noise;
- Eliminating surface detonating cord by using down hole detonators and surface delays to be trailed;
- Covering surface detonating cord with protection barriers such as conveyor belt or soil coverage;
- Competent person signoffs of drill and charge designs;
- Validation dip check for variances of hole depth actuals to design;
- Validation dip following blast hole charging to ensure adequate stemming depths;
- Trim shots to be fired with adequate free face burden availble;
- Blast crew to ensure grade control holes have prescribed volume of stemming; and
- Additional false burden material is placed on the surface for collpased holes.

6.3 Air Quality

The TGO Noise Management Plan (NMP) was prepared to describe dust control measures at TGO and meet Schedule 3, Condition 19 of PA 09_0155.

With the exception of DDG 4, depositional dust gauges were below the long term assessment limit of 4g/m^2/month (annual average). The annual avereage for DDG 4 was 8.2g/ m^2/month, which is a reduction from the previous reporting period of 8.5g/ m^2/month. TGO considers the elevated dust levels are a result of external factors.The location of DDG 4 is highly exposed to to locally generated dust from agricultural activities such as grazing, ploughing and harvesting which have been responsible for increases in depositional dust in this location over a number of months during the reporting period. As further evidence of this, no dust complaints have been received from the property owner during the reporting period following the introduction the dust control SSP, whereas complaints relating to dust were received during the previous reporting period from this reporting period.

Ten results exceedenced the 24 hour average limit, as shown in Table 10. One of these exceedances (02 March) was due to other sources as the wind direction for 21 hours of that day was from the north east. Three days (6-7 May and 21 November) were days of high regional dust and smoke.

2014 was the first year of TEOM data, and the RTA1 TEOM was only operational from 12 May. Over that eight month period, the RTA1 TEOM measured 20 days exceeding the PM_{10} 24 hour average criteria. As seven of the ten 2015 exceedences were in March, and 2014 PM_{10} measurements didn't start until May, this indicates a significant reduction in 24 hour PM_{10} exceedances.

Total Suspended Patrticulates (TSP), as measured via high volume air sampler (HVAS) at monitoring location HVAS1, are compared with the long term assessment limit of 90 µg/m^3 (annual avereage). The annual average for TSP was 50.01µg/m^3, which is below the long term assessment limit and a reduction from 59.4 µg/m^3 in the previous reporting period.

Air quality monitoring results for the reporting year presented in Appendix B.

Table 10: Air Quality Management

Date	Approval criteria* PM_{10} (ug/m^3)	Performance during reporting period	Key management implications	Implemented management actions
PM10 as measured at RTA1				
2/03/2015	50 µg/m^3	52.4	Wind from north east	N/A
4/03/2015		51.8	Exceedance of DA air quality criteria	See Section 6.3.1
5/03/2015		98.4		
6/03/2015		108		
7/03/2015		64		
9/03/2015		53.4		Section 6.3.1 and EPA reported
21/03/2015		68.2		
6/05/2015		126	High levels of regional dust and smoke	N/A
7/05/2015		62.8		
27/11/2015		51.8		
Deposited dust measured at DDG 4				
Annual average	4 (g/m^2/month)	8.2	Exceedance of DA air quality criteria	Dust source not mine related. No management actions planned for next reporting period.

*Approval Criteria from PA 09_0155, Schedule 3, Condition 17, based on 2012 Project EIS Assessment Criteria

During the reporting period, TGO received two dust complaints, down from eleven in the previous reporting period. Both of these complaints were investigated, with monitoring data reviewed, and complainants responded to. Following compaints, dust generating activities were temporarily halted, relocated or scaled down until conditions improved.

6.3.1 Management Measures

Shift supervisors, and the mining production team are provided with dust forecasts in the pre-shift meeting consistant with Dust Control SSP (such as hot, dry south westerly winds) via the Weatherzone. During these conditions, PM_{10} levels measured at RTA1 are monitored online and, where required, modifications are made to mining operations until conditions improve. Such modifications include the:

- reduction, cessation or relocation of dust generating activities;
- increased watering of the operational footprint.

24 hour PM_{10} exceedenaces were reported to the EPA on 09 March and 21 March.

GHD was engaged to investigate the seven 24 hour average PM_{10} exceedances recorded in March and provide recommendations for dust management improvements. The investigation reported a link between warm dry weather, strong south to south westerly winds, and high dust results. Recommendations from the report were used to modify the existing site dust control response procedures. Following the tightening of response procedures, only three exceedances were recorded for the remainder of the year, and these were primarily attributable to regional high dust and smoke, rather than TGO mining contributions.

The site dust control procedure (incorporating the site dust Trigger Action Response Plan) was also modified during the reporting period to inlude triggers and specific dust control actions for the ROM pad and processing area. Solenoid activators were also installed on the crusher circuit irrigator sprays, to automate dust control spraying.

A trial application of surface stabilising polymer on temporary topsoil stockpiles and RSF embankments was undertaken during the reporting period to reduce potential offsite dust and erosion impacts.

The introduction of these dust control initiatives, combined with existing sitewide measures should see a continued reduction of the elevated annual average dust depostion results.

6.3.2 Proposed Improvements

During the next reporting period further opportunities to optimise operational control of dust generation will be investigated. The ongoing campaign to reduce the area of wind exposed unsealed surfaces through temporary or permanent revegetation will continue. The trial application of dust suppressant polymer on temporary unsealed surfaces will also be expanded, where suitable opportunities are identified.

6.4 Biodiversity

Biodiversity at TGO is managed under the Biodiversity Management Plan (BMP), completed in accordance with Schedule 3, Condition 37 of PA 09_0155.

A component of the BMP is the Biodiversity Offset Strategy, which delineates the biodiversity offset areas and management actions selected to protect and enhance remnant vegetation communities. A key milestone in securing these selected offset areas in perpetuity is the registration of a conservation property vegetation plan (PVP) under the *Native Vegetation Act*

2003. During the previous reporting period, TGO lodged a draft PVP with Local Land Services (LLS). A final copy of the PVP was revieved from LLS in April 2015, and notification was received on 21 May 2015 stating that the PVP had been registered on title with Land and Property Information. Registration of the PVP meets Schedule 3, Condition 34 of PA 09_0155, with suitable arrangements having been made by the 31 January 2015.
A copy of PVP registration is attached as Appendix D.

No terrestrial mammal deaths on the residue storage facility (RSF) were recorded during the reporting period. One bird death was recorded in April 2015. The death was investigated and reported to the EPA. An autopsy indicated that the bird death was not attributable to cyanide.

6.4.1 Management Measures

TGO biodiversity monitoring is completed annually and is based on Landscape Function Analyses (LFA) and ecosystem diversity / habitat value measurements adapted from the Biometric methodology. Ten monitoring sites were established in August 2014, consisting of six remnant woodlands sites, two EEC woodland revegetation sites and two riparian woodland sites along Gundong Creek. These sites were re-monitored in august 2015, with key findings summarised below.

- Offset revegetation sites are showing signs of recovery largely as a result of livestock exclusion, but also due to woodland tree species planting.
- Remnant vegetation monitoring sites were recovering at varying rates, depending on grazing and cultivation history.
- Boxthorn control should be accelerated across most offset areas.
- Supplentary tree planting of canopy and understorey trees would benefit the large revegetation area to the north of the northern TGO site boundary, and understorey species planting would benefit the Belah offset area.
- Exclusion fencing and mulching of exposed crusted soil areas would also improve the groundcover layer and surface stability of the Belah offset area.

To minimise fauna deaths resulting from site operations, TGO has implemented measures to reduce the potential for interaction between native fauna and potentially cyanide-contaminated water in the RSF. Such measures were continued through the reporting period, and include:

- daily sampling and monitoring of WAD cyanide levels in RSF residue;
- management of RSF decant water to minimise appeal to native avifauna; and
- regular inspection of the RSF for fauna deaths.

6.4.2 Proposed Improvements

During the next reporting period, TGO will continue to implement the biodiversity conservation and enhancement measures outlined in the BMP. The biodiveristy monitoring program continue, with fauna and vegetation monitoring scheduled for spring 2016.

Management actions, such as livestock exclusion and feral animal/weed control, will be expanded in scope to cover the newly established offset areas, and supplementary planting of woodland tree species tubestock in biodiversity offset area is planned for autumn 2016.

6.5 Heritage

A Cultural Heritage Management Plan (CHMP), which outlines measures to manage Aboriginal and Non-Aboriginal heritage sites at TGO, was prepared during the 2013 reporting year, and reviewed during the 2014 reporting year, with no changes made. The CHMP was developed from a previous assessment, which identified 60 Aboriginal sites and eight Non-Aboriginal heritage features.

With all existing or relocated sites adequately maintained, no active cultural heritage management occurred during the reporting period.

6.5.1 Management Measures

As recorded heritage sites are located away from site operational areas, and no new sites or items were identified during the reporting year, management of the existing sites mainly consisted of periodic inspection and local site maintenance.

6.5.2 Proposed Improvements

No improvements to the management of cultural heritage sites and items is proposed in the next reporting period.

6.6 Contaminated Land

As TGO completed construction and transitioned to operations in early 2014, risk of site contamination is relatively low. The contamination assessment completed as part of the project environmental assessment, also determined risk of land contamination onsite to be very low.

No contaminated sites were identified at TGO during the reporting period.

During the reporting period four hydrocarbom spills were reported at TGO, including:

- 28/04/2015 – Hydrolic oil leaking out of IBC;
- 01/07/2015 – Engine oil leaking from telehandler once parked;
- 20/11/2015 – Damaged fuel line in LV; and
- 16/12/2015 – Grease escape from wash bay following HV service.

No major spill incidents were reported.

6.6.1 Management Measures

At this early stage of the operation, the safe and responsible storage and handling of hazardous materials (as discussed in Section 2.8) is the key strategy to preventing, and therefore managing, land contamination.

All chemical and hydrocarbon storage at TGO has been designed and constructed in accordance with the relevant Australian Standard, including:

- AS/NZS 4452: The Storage and Handling of Toxic Substances; and
- AS 1940-2004: The storage and handling of flammable and combustible liquids

The construction of new purpose-designed and constructed vehicle washdown and re-fuelling facilities, which were commissioned during reporting period and assist greatly in the prevention of land contamination.

Following a dangerous goods review by Advitech Pty/Ltd on 15 July 2015 and subsequent reccomendations, IBC storage and handing techniques were altered so as to ensure that any leaks or spills as a result of handling and movement would be more effictively contained within the bunded storage area.

6.6.2 Proposed Improvements

No improvements to the management of contaminated sites is proposed in the next reporting period.

7 Water Management

The TGO Water Management Plan was not finalised at the time or writing. Although an earlier version had been submitted to DP&E for approval, it was subsequently identified that this version was inadequate and needed revision. This revision is in progress, and is expeted to be finalised in the next reporting period (early 2016)

During the reporting period *Water Performance Measures* were included in the TGO project approval. Schedule 3, Condition 27 of the project approval requires TGO to comply with these measures. Table 10 presents these *Water Performance Measures* and where each measure is addressed in this Water Management section.

Table 11: Water Performance Measures (PA 09_0155, Schedule 3, Condition 27)

Feature	Performance Measure	Relevant Section
Water management - General	Minimise the use of clean water on site Minimise the need for make-up water from external potable water supplies	7.1
Construction and operation of infrastructure	Design, install and maintain erosion and sediment controls generally in accordance with the series Managing Urban Stormwater: Soils and Construction including Volume 1, Volume 2A – Installation of Services and Volume 2C – Unsealed Roads Design, install and maintain the infrastructure within 40 m of watercourses generally in accordance with the: • Guidelines for Controlled Activities on Waterfront Land (DPI 2007), or its latest version • Guidelines for fish habitat conservation and management – Chapter 4 (DPI 2013), or its latest version.	7.5
Clean water diversion & storage infrastructure	Design, install and maintain the clean water system to capture and convey the 100 year ARI flood Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site	7.3
Sediment dams	Design, install and maintain the dams generally in accordance with the series Managing Urban Stormwater: Soils and Construction – Volume 1 and Volume 2E Mines and Quarries	7.5
Mine water management system, including residue storage facility and associated collection pond	• No unlicensed or uncontrolled discharge of mine water off-site (except in accordance with condition 23) • Ensure that the capacity of the residue storage facility and associated collection pond is designed to meet the requirements of the Environmental Guidelines – Management of Tailing Storage Facilities (Vic DPI, 2004), or its latest version, and that the floor and walls are lined to achieve a permeability standard of at least 1 x 10-9 m/s, unless otherwise agreed by the EPA and the Secretary • Maintain adequate freeboard (i.e. minimum 500 mm) in the residue storage facility at all times • All water storages on site that receive chemical or salt laden water, including the dewatering ponds, raw water dams and process water dams are lined to achieve a permeability standard of at least 1 x 10-9 m/s, unless otherwise agreed by the EPA and the Secretary • Maintain adequate freeboard (i.e. minimum 200 mm) in the process water and raw water dams at all times	7.4
Chemical and hydrocarbon storage	Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standards	6.6.1
Gundong Creek	Maintain or improve baseline channel stability	7.3

	Develop site-specific water quality trigger levels in accordance with ANZECC 2000 and Using the ANZECC Guidelines and Water Quality Objectives in NSW procedures (DECC 2006), or its latest version	

7.1 Water Supply

The principal source of water for TGO is a licensed production bore located approximately 7km east of Narromine, with water transported to site via the Narromine water pipeline. During extensive dry periods, emergency water haulage from Peak Hill Mine may also be used. This option was utlised in April of the reporting period.

Maximum Harvestable Rights Dams Capacity (MHRDC) is the volume of water landholders are entitled to capture and use without need for licencing, based on up to 10% of the rainfall and runoff from their property. The maximum capacity of rainfall/runoff captured on TGO-owned land is 56.0ML/yr. Sediment or pollution control structures are exempt from the MHRDC consideration, unless the water captured is to be re-used on the site/property for non-environmental purposes.

Although the TGO open cut pits are licenced to intercept aquifer water (WAL28643 expired, as mentioned in Table 7), negligible groundwater has been intercepted to date. Water pumped from the open cuts consists almost entirely of captured rainfall.

Processing water (including RSF decant) is recovered and pumped to the Process Water Dam for re-use in processing. During the year, it is estimated that 564.1 ML was recycled process/decant water, significantly reducing the volume of water needing to be imported.

An onsite water treatment plant is used to produce potable water onsite, eliminating the requirement to import potable water.

Table 12: Water Supply

Water Licence	Water sharing plan, source and management zone (as applicable)	Entitlement (ML)	Passive take / inflows	Active pumping	TOTAL
WAL20270 (Narromine Pipeline)	Lower Macquarie Zone 6 Groundwater Source	1000	nil	859.5	859.5
WAL28643 (open cut)	NSW Murray Darling Basin Fractured Rock Aquifer	220	negligible	nil	negligible
N/A	Onsite dams, under harvestable rights	56	56	nil	56
WAL 34968 (Peak Hill Gold Mine)	Upper Bogan River Water Source/ Macquarie Bogan Unregulated and Alluvial Water Sources 2012	300	nil	33.4	33.4

7.2 Water Balance

The site water balance was reviewed during the reporting period. The water balance indicates that TGO is dependent on raw water imported via Narromine pipeline which is expected to account for approximately 50% of TGO's water supply over the next five years.
The modelling also predicts minimal requirement for offsite discharge.

7.3 Clean Water Management (Surface)

For reporting purposes, clean water management is divided into:

- onsite management;
- Gundong Creek; and

- offsite discharge.

7.3.1 Site Water

Clean water consists of through-flow from offsite and water from onsite non-mine disturbed catchments. This water is diverted away from contamination sources (mine disturbance and infrastructure) and directed offsite. Management includes the construction of drains and bunds to collect and divert surface water flow past, or away from, mining disturbed catchments. Site drains and sediment basins were remediated as discussed in Section 7.5.

7.3.2 Gundong Creek

Gundong Creek is an ephemeral watercourse which flows along the northern and western boundaries of the TGO site. Nine samples were collected for reference purposes from monitoring sites SW01 and SW02 during Gundong Creek flow events between July and November 2015. Three samples were also collected from locations downstram of SW02. No TGO discharges to Gundong Creek occurred during the reporting period.

Until sufficient water quality monitoring data within Gundong Creek is collected, the TGO draft WMP recommends the adoption of water quality trigger values based on (whichever is higher of) the lowest primary industry trigger values (ANZECC, 2000) or the EPL 20169 trigger values. The proposed interim trigger values are shown in Table 13.

Samples collected from both the upstream (SW01) and downstream (SW02) monitoring locations in Gundong Creek generally exceded the proposed trigger values for lead and copper, and all samples exceded for zinc. This indicates that lead, copper and zinc are natural background concentrations and not related to TGO. Analytical results for Gundong Creek samples, compared against the adopted ANZECC guideline criteria are presented in Table 14.

Due to limited flows, only one sample was collected during the 2014 reporting period. This sample exceeded the adopted assessment criteria (95% species protection trigger values for freshwater aquatic ecosystems (ANZECC, 2000)) for copper, lead and zinc at both SW01 and SW02.

7.3.3 Discharge

No licenced discharges occurred during the reporting period.

A single unlicenced discharge event occurred over the two days of 5-6 January 2015 at the point where the Caloma Central Drain outlet reports into the Newell Highway table drain. Each day of the discharge event was sampled and the event was reported to the EPA (Report No. C001132015). GHD was engaged to investigate potential downstream impacts from the discharge. Although four of the six samples collected showed elevated aluminium levels, when compared against the ANZECC (2000) livestock drinking water guidelines, adverse impact were determined to be unlikely due to the short term nature of exposure. A copy of the GHD report is included as Appendix E.

Table 13: Proposed Gundong Creek water quality trigger values from draft Water Management Plan, based on ANZECC (2000) trigger values for primary industries.

Pollutant	Current EPL 20169	Proposed Trigger Value	Justification
Arsenic	0.024 mg/L	0.05 mg/L	Lowest reference value for primary industry use within ANZECC/ARMCANZ (2000b)
Cadmium	0.0002 mg/L	0.0005 mg/L	Lowest reference value for primary industry use within ANZECC/ARMCANZ (2000b)
Copper	0.0014 mg/L	0.005 mg/L	Lowest reference value for primary industry use within ANZECC/ARMCANZ (2000b)
EC	350 µS/cm	350 µS/cm	No change proposed
Lead	0.0034 mg/L	0.007 mg/L	Lowest reference value for primary industry use within ANZECC/ARMCANZ (2000b)
Nickel	0.011 mg/L	0.1 mg/L	Lowest reference value for primary industry use within ANZECC/ARMCANZ (2000b)
Nitrogen (total)	250 µg/L	5 mg/L	Lowest reference value for primary industry use within ANZECC/ARMCANZ (2000b)
pH	6.5 to 8.5	6.5 to 8.5	No change proposed
Phosphorous (total)	0.02 mg/L	0.05 mg/L	Lowest reference value for primary industry use within ANZECC/ARMCANZ (2000b)
TSS	50 mg/L	50 mg/L	No change proposed
Zinc	0.008 mg/L	0.008 mg/L	No change proposed

Table 14: Gundong Creek water quality samples compared against ANZECC (2000) water quality trigger values for primary industries

		Inorganics				Lead	Metals					
		EC *(lab)	Nitrogen (Total)	pH (Lab)	TSS	Lead	Arsenic	Cadmium	Copper	Nickel	Phosphorus	Zinc
		µS/cm	µg/L	pH_Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L
EQL		1	100	0.01	5	0.001	0.001	0.0001	0.001	0.001	10	0.005
LocCode	**Sampled_Date-Time**											
Gundong downstream	20/07/2015	120	1700	6.94	15	<0.01	0.02	<0.005	<0.01	<0.01	<1000 - 130	0.02
Gundong downstream	27/07/2015	130	1400	7.16	8	0.004	<0.001	<0.0001	0.007	0.005	120	0.03
Gundong McNivens	20/07/2015	116	1800	6.87	21	<0.01	<0.01	<0.005	<0.01	<0.01	<1000 - 130	0.02
SW1	20/07/2015	111	1800	6.8	15	<0.01	0.02	<0.005	<0.01	<0.01	<1000 - 100	0.02
SW1	27/07/2015	124	2100	6.87	<5	0.003	0.001	0.0002	0.005	0.003	90	0.035
SW1	4/08/2015	150	1700	7.44	9	0.006	0.003	<0.0001	0.009	0.006	140	0.034
SW1	10/08/2015	150	1300	7.4	<5	0.008	0.002	<0.0001	0.009	0.008	130	0.027
SW1	19/08/2015	181	700	7.81	12	0.009	0.003	<0.0001	0.01	0.009	360	0.046
SW1	26/08/2015	186	1500	7.29	6	0.021	0.003	<0.0001	0.013	0.01	230	0.045
SW1	9/09/2015	195	1500	7.59	<5	0.01	0.004	<0.0001	0.013	0.013	280	0.046
SW1	14/09/2015	222	1400	7.61	29	0.01	0.003	<0.0001	0.014	0.013	200	0.042
SW1	17/11/2015	206	4900	7.39	9	0.077	0.003	<0.0001	0.024	0.014	520	0.053
SW2	20/07/2015	112	1800	6.87	22	<0.01	0.02	<0.005	<0.01	<0.01	<1000 - 80	0.02
SW2	27/07/2015	124	1000	7.06	10	0.004	<0.001	0.0001	0.006	0.003	60	0.036
SW2	4/08/2015	153	1300	7.33	5	0.005	0.002	<0.0001	0.008	0.006	120	0.034
SW2	10/08/2015	152	1300	7.35	<5	0.01	0.002	<0.0001	0.008	0.006	140	0.024
SW2	19/08/2015	184	800	7.57	10	0.008	0.003	<0.0001	0.01	0.009	160	0.035
SW2	26/08/2015	-	1200	-	-	0.014	0.004	0.0002	0.014	0.01	180	0.05
SW2	9/09/2015	195	1800	7.56	5	0.012	0.005	<0.0001	0.016	0.016	280	0.053
SW2	14/09/2015	201	1800	7.04	<5	0.009	0.005	<0.0001	0.012	0.011	270	0.039
SW2	17/11/2015	189	1900	7.49	24	0.008	0.005	<0.0001	0.011	0.01	260	0.022

7.4 Mine Water Management

Water which has been impacted by mining operations, is not considered not suitable for offsite discharge and requires onsite managmeent or treatment is known as mine water. This includes:

- ***Sediment Laden Water*** **-** retained in sediment basins. If required, flocculated to promote the settlement of sediment load and/or pumped to Central Storage Dam (CSD) dirty-water cell.
- ***Open cut pit water*** – retained onsite in the CSD dirty-water cell and re-used for site operations.
- ***Process water*** – recycled for re-use via decant from the RSF, the raw water dam and process water dam.
- ***Oily water*** – treated at onsite oily water separator, with clean discharge to Sediment Basin 1.
- ***Onsite sewerage*** - treated at an onsite treatment plant and used to irrigate site revegetation areas.

Table 15: Stored Water

Description and structure name	Storage Capacity m^3	Start of Reporting Period m^3	At end of Reporting Period m^3
Clean water CSD – clean water cell	17,400	14,500	14,060
Mine Water [1] CSD – mine water call	78,200	7,500	588
Residue Storage Facility[1]	1,310,000 (Jan) – 423,870 (Dec)[2]	500	30,000
Raw Water Dam[1]	10,700	10,700	10,700
Process Water Dam[1]	9,200	1,840	9,200

[1] Operational water storage - volumes fluctuate frequently based on operational demand.
[2] Storage capacity decreases as RSF fills with residue.

Decant water from the RSF is sampled daily during the reporting period for Weak Acid Dissociable (WAD) Cyanide. The following results were recorded during the reporting period.

- 622 daily residue samples were collected from decant cell 1, with no WAD Cyanide concentrations above 20mg/L.
- 617 samples were collected from decant cell 2, with two samples returning WAD Cyanide concentrations above 90th percentile limit of 20mg/L (1/1 and 28/2), but no concentrations above maximum limit of 30mg/L.

This compares to previous reporting period, which had one sample recorded with WAD Cyanide concentration above 20mg/L from 655 samples and no exceedances of 30mg/L.

7.5 Erosion and Sediment Control

An ongoing upgrade program of sediment control structures continued during the reporting period. Civil works were completed on Sediment Basin 5 to increase the storage capacity and improve basin stability. Works to remediate and revegetate the drain that separates the infrastructure area from WRE 2 were also completed to reduce erosion and improve quality of water flow to Sediment Basin 1. Treatment included:

- regrading to establish a suitable cross-sectional profile and remediate erosion gullies;
- application and integration of gypsum into the regraded surface layer;
- hay-mulching (with bitomous binder) of drain bed and embankments;
- placement of geotextile fabric and rock-armouring on inflow drains; and
- vegetation establishment via spray-seeding of pasture grass seedmix.

Soil dumps modified during rehabilitation works were regraded and re-vegetated with a pasture seedmix to reduce erosion and sedimentation od adjacent drains. Plates 1 to 3 show the remedial works in progress.

Staggered inspections of site sediment basins were conducted monthly, with all site sediment basins being inspected once per quarter. Sediment basins were also inspected following heavy rain and/or dewatering. When sufficient water was being held in sediment basins, samples were collected on an approximately fortnighly basis for internal managemwnt purposes. No offsite discharges from sediment basins occurred during the reporting period.

Plate 1: Dirty Water Drain immediately post rehabilitation (December 2015)

Plate 2: Dirty Water Drain January 2016

Plate 3: Enlargement of Sediment Basin 5

7.6 Groundwater

Sampling and inspection of local groundwater bores and RSF monitoring piezometers continued during the reporting period.

As shown in Table 16, all seven bores recorded relatively steady water levels during the reporting period, with the maximum range being 0.42m fall in bore WYMB06. WYMB06 was also the only bore to record incremental fall in water level over the four sampling events of the.

These groundwater levels are of similar depth range to the previous year's results, with less variation throughout the year. WYMB06 recorded 4m movement from levels recorded in the previous year.

Field and laboratory water quality measurements for the reporting period were also comparable to the previous reporting period. Water quality trigger values based on the 95% species protection recommended by ANZECC and ARMCANZ (2000a) have been adopted only for bore GDCMB01 due to its location within the alluvium. Due to the high electrical conductivity of water within the deep aquifers, and no registered production bores within 8km of TGO, trigger values for the deep water bores (WYMB01 – 04, WYMB06 and WYMB10) are based on community groundwater complaints. GDCMB01 excceded the adopted water quality trigger values for Copper, as it did in the previous reporting period. Analytical results are shown in Appendix F.

Table 16: Groundwater bore water levels during reporting period.

2015	WYMB01 (EPA09)	WYMB02 (EPA10)	WYMB03 (EPA11)	WYMB04 (EPA12)	WYMB06 (EPA13)	WYMB10 (EPA14)	GDCMB01 (EPA15)
March	-38.56	-59.1	-54.27	-62.59	-37.17	-72.2	-2.17
June	-38.74	-59.17	-54.06	-62.69	-37.37	-72.15	-2.18
September	-38.9	-59.19	-53.97	-62.61	-37.45	-72.11	-2.02
December	-38.62	-59.12	-53.97	-62.59	-37.59	-72.11	-1.94
Range	0.34	0.09	0.30	0.10	0.42	0.09	0.24

RSF Piezometers

With the exception of RSFMP03 and RSFMP06, the RSF monitoring piezometers were dry during the reporting period. Water level in RSFMP03 rose 2.46m over the reporting period. Water level RSFMP06 fluctuated between 0.81m and 1.62m over the reporting period. Four samples were collected from RSFMP03 during the reporting period, and two samples collected from RSFMP06. No cyanide was detected in in either piezometer and an investigation in 2014 by GHD indicated that the RSF is not the likely source of the rising groundwater.

These results reflect RSFMP results from the previous reporting year, which saw all piezometers (except RSFMP03) largely dry (or drying) over the year. RSFMP03 showed an incremental rise in water level over the previous reporting year; however, no cyanide was detected in analytical sampling.

RSFMP monitoring analytical results for the reporting period are included in Appendix F.

7.7 Proposed Water Management Improvements

The stabilisation and/or revegetation treatment of earthworks batters and site drains will continue in the next reporting period. Priorities for treatment in 2016 will include further sections of the Gundong Creek levee bund, the drain between the store yard and processing workshop upstream of Sediment Basin 1, drains below the RSF, and the RSF embankment, as the embankment raising project progresses.

No improvements are proposed to groundwater management at TGO in the next reporting period.

8 Rehabilitation

The 2015 Annual Review reporting period was the second year of mining operations at TGO and largely overlapped with Year 2 of the 2014 MOP, which runs from 14 April 2015 to 13 April 2016. According to the MOP progressive rehabilitation tables (MOP Tables 18 and 20 – 22), 57.3 ha of final rehabilitation was scheduled to have been seeded by the end of Year 2, including:

- 48 ha of Primary Domain 4 – *Waste Rock Emplacements* / Secondary Domain C *Woodlands*; and
- 9.3 ha of Primary Domain 6 – *Open Cut* / Secondary Domain I – *Final Void*

8.1 Rehabilitation during reporting period

No rehabilitated areas were completed (seeded) during the reporting period. Nor has rehabilitation in any Domain been completed to date. Figure 4 shows land management activities completed for the reporting period.

Sodic subsoils were identified within the TGO project area during the assessment phase of the project; however, as operations have progressed over the past two years, it has become evident that the sodic properties of subsoils and near surface overburden material are more extensive than first identified. The long term geotechnical integrity of the original final landform design for WRE constructed with this material was potentially problematic without careful consideration being given to erosion control and drainage. Substantial re-design of the final reshaped WRE landform (from that originally described in the 2012 MOP) has occurred over the reporting period, as well as variation to the rehabilitation processes required to achieve this stable design.

TGO has sought input from two specialist consultancies (PSM for geotechnical advice and SLR for rehabilitation design) to produce a suitable revised landform final design. The revised design incorporates detailed bench/berm and drainage specifications, as well as comprehensive rehabilitation treatment to acheive a final landform that sheds and safely conveys water to ground level. The revised bench/berm design is shown in Figure 5 and a full copy of the most recent design specifications is included as Appendix G.

Due to the more exacting requirements of the revised design, rehabilitation that had originally been scheduled for completion during the reporting period has been delayed. However, substantial reshaping works have been completed during the reporting period to achieve the the revised design. Construction to achieve the revised water management design (rock armoured drop structures every 200m) have also been commenced. Plates 4 to 6 show reshaping works progress during the reporting period.

Plate 4: Reshaping works at WRE 2.

Plate 5: Drop structure construction at WRE 2.

Plate 6: Reshaped WRE 2 batter.

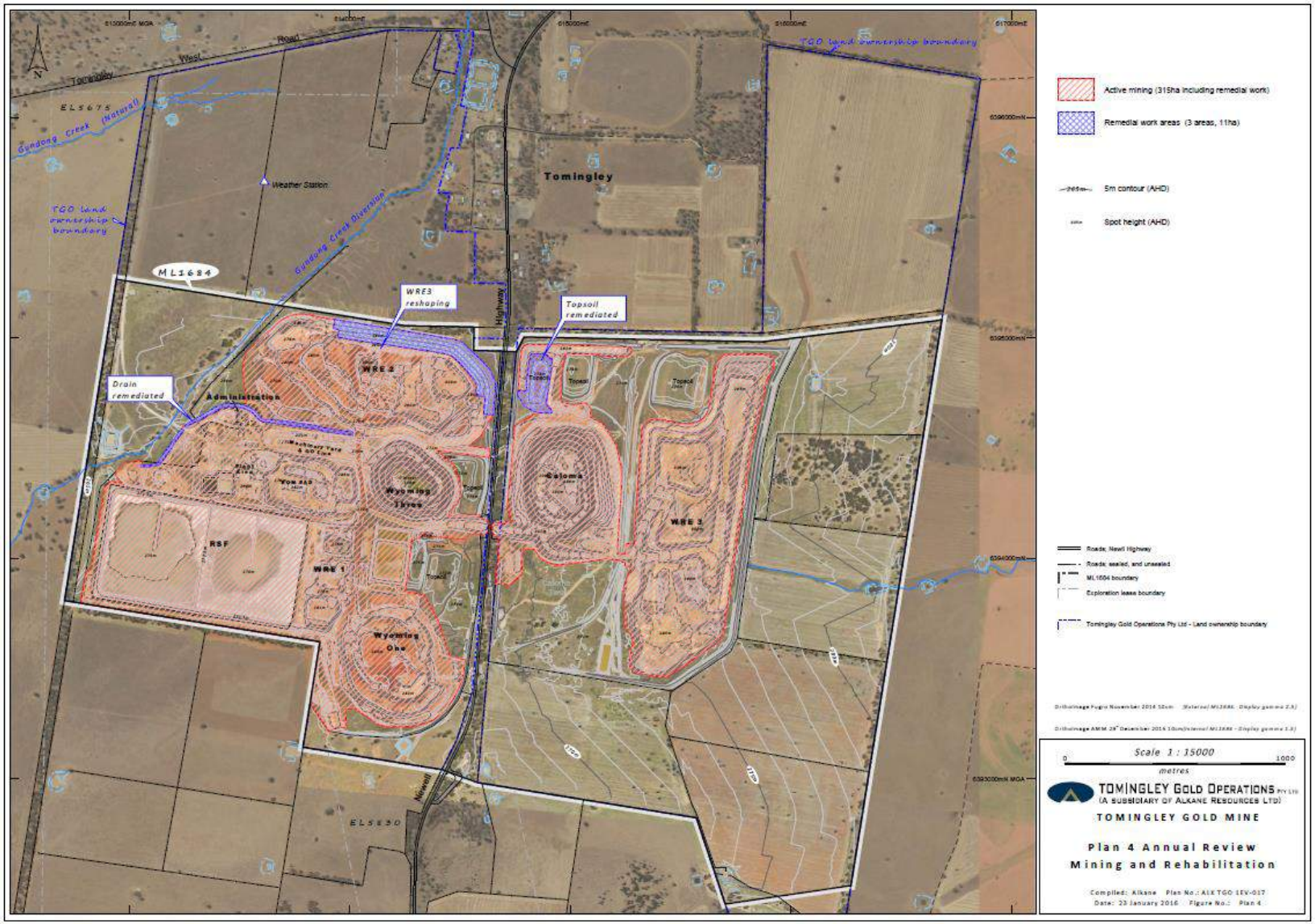


Figure 4: Rehabilitation and land management activities completed during the reporting period.

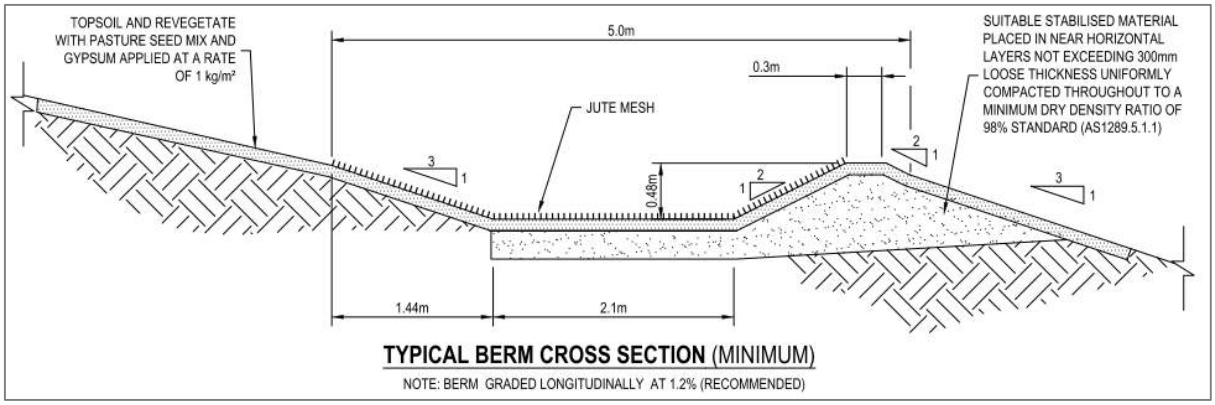


Figure 5: Revised bench/berm design for reshaped WRE.

The delays in rehabilitation, and reconsideration of the rehabilitation design, have been discussed onsite with DRE during a November 2015 site visit. Changes of rehabilitation design and schedule will be captured during the next MOP amendment.

Progress against key rehabilitation performance indicators is shown in Table 16. Mine disturbance and rehabilitation activities activities are shown on Figure 4.

8.2 Post Rehabilitation Landuse

According to the 2012 MOP, the TGO post rehabilitation area is proposed to consist of the following land uses.

- Infrastructure - entrance roads and void safety berms
- Water Management Areas - water bodies on floor of final voids
- Grasslands – rehabilitated WRE outside batters
- Woodlands - rehabilitated WRE outside batters
- Rural Land – existing open buffer land
- Final Void – residual open cut voids
- Conservation and Biodiversity Offset – registered offset areas under PVP.

These post-rehabilitation land uses are shown on MOP Plan 4, included as Figure 6.

8.3 Buildings, Infrastructure and other Rehabilitation

All buidings and infrastructure were still operational during the reporting period and no decommissioning, removal or demolition was undertaken.

Temporary stabilisation works on soil stockpiles (Primary Domain 5b) was completed during the reporting period. The western Caloma soil dump (north and north east of Caloma pit) was substantially modified, reshaped and revegetated during the reporting period.

8.4 Completed Rehabilitation

No areas of final rehabilitation have received formal relinquishment sign-off from DRE. Nor are any areas anticipated to do so in the next reporting period.

Table 17: Rehabilitation Status

Mine Area Type	Previous Reporting Period (Actual)	This Reporting Period (Actual)	Next Reporting Period (Forecast)
	Year 1(ha)	Year 2 (ha)	Year 3 (ha)
A. Total mine footprint	434.9	434.9	434.9
B. Total active disturbance	265.1	382.7	393.43
C. Land being prepared for rehabilitation	4	4	13
D. Land under active rehabilitation	0	0	27
E. Completed rehabilitation	0	0	0

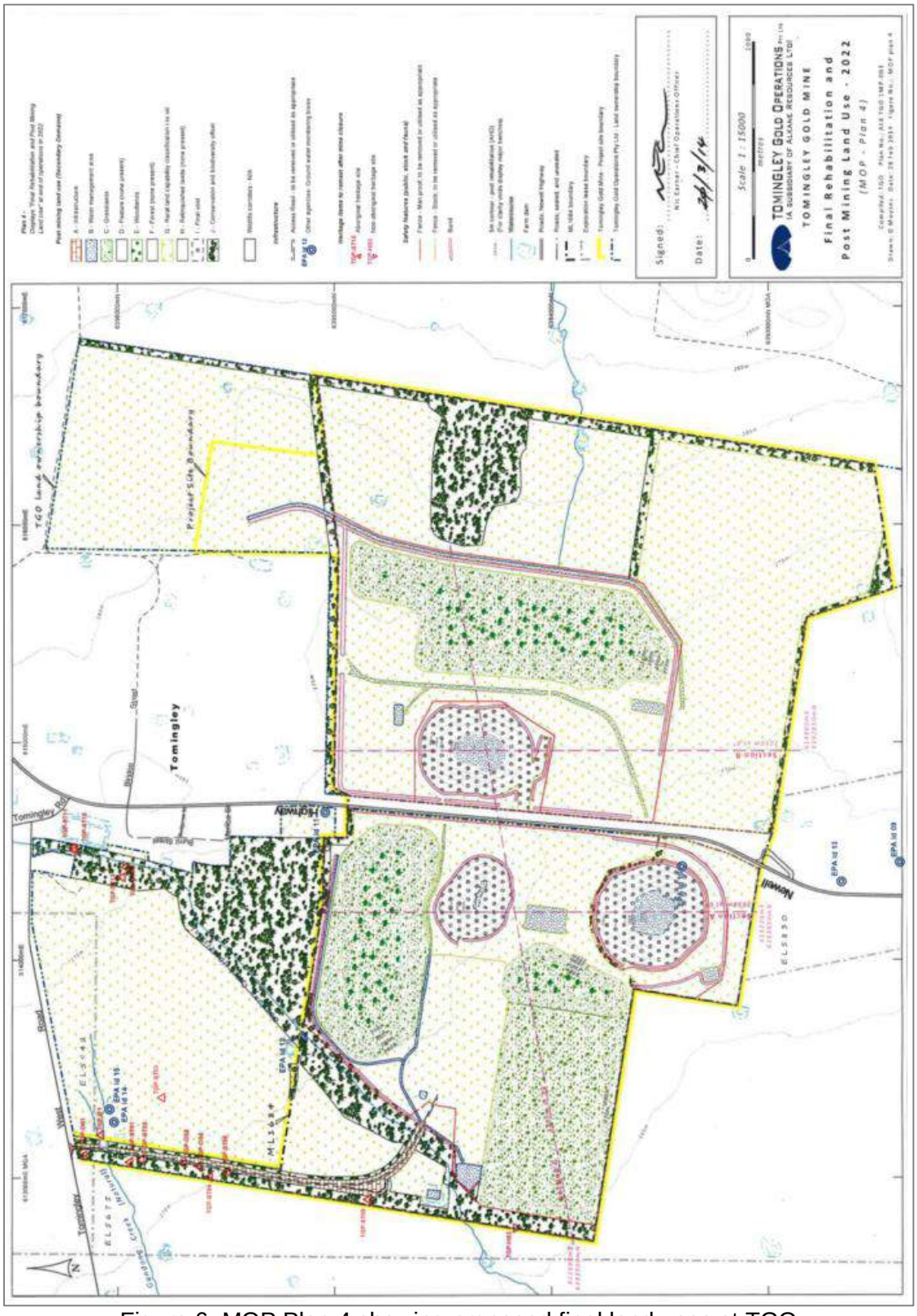


Figure 6: MOP Plan 4 showing proposed final land uses at TGO

8.5 Trials, Monitoring and Research

Significant resources have been allocated over the reporting period to develop a suitable final reshaping design and rehabilitation treatment for the WRE. As rehabilitation works

progress, an inspection and evaluation regime will be established to closely monitor the performance of this design in shedding water whilst maintaining slope and landform stability.

During rehabilitation works, plots will be established on WRE batters. Within the confines of the revised rehabilitation specifications, variables such as soil depth, ameliorant (i.e. gypsum) application and revegetation methods will be trialled. The relative success of these early trial plots will provide guidance for future rehabilitation planning.

As final rehabilitation areas are completed, they will be incorporated into the vegetation monitoring program already established for remnant native vegetation and revegetated offset areas, as detailed in the TGO Biodiveristy Management Plan.

8.6 Key rehabilitation risks

As discussed in Section 8, the main threats to successful rehabilitation stem from the highly sodic properites of the subsoil and near surface overburden that dominate the TGO project area. The proposed solution (revised WRE design) which will undergo early evaluation and refinement before being expanded and applied across the remainder of the site landforms.

8.7 Actions for next reporting period

The proposed final rehabilitation and landuse has been communicated to the public via more general project consultation and via the TGO Community Consultative Committee (CCC). Over the next reporting period, the TGO CCC will be specifically addressed regarding the proposed post-mining landuse. CCC feedback on proposed final landuse will be used to gauge the need for further consultation.

During the next reporting period the WRE reshaping and rehabilitation design will be finalised. Reshaping works will continue, with 4.4 ha being reshaped (including drop structure construction) on the northern face of WRE 2. A formal inspection regime will be implemented to assess the performance of reshaped slopes, identify potential problems and trigger remedial actions.

Following reshaping, ground preparation and seeding will be completed on 4.4 ha of WRE 2.

Any rehabilitated areas completed (seeded) by August will be assessed as part of the annual biodiversity monitoring program.

9 Community

9.1 Consultation

The key strategy to ensure an effective passage of information between TGO and the surrounding community is the Community Consultative Committee (CCC). The CCC is an independently chaired ten member committee representing TGO, the local community, the Aboriginal community. During the reporting period, the CCC met on the:

- 12 February;
- 15 May;
- 15 August; and
- 12 November.

At CCC meetings, members are updated by TGO personnel on the progress of current and proposed mining operations and projects. Community representatives are given the opportunity to raise concerns regarding the project and to offer advice regarding TGO's consultation with the community. CCC meeting minutes are available via the Alkane Resources website (www.alkane.com.au). Quarterly CCC meetings will continue in the next reporting period.

In addition to the CCC, TGO utilised a number of methods of communication/consultation with the community during the reporting period, including:

- Making relevant information regarding mine approvals, operations and environmental monitoring available to the public on the Alkane Resources website;
- Distributing a community newsletter, to provide the Tomingley community with information on TGO operations;
- Providing a 24 hour community information;
- Sending issue-specific letters to the residents of Tomingley regarding TGO's approach to sensitive issues such as residentail acoustic treatment.

These methods of community consultation will continue during the next reporting period.

9.2 Support

Over the life of the mine, TGO has committed to contribute (subject to annual CPI increases):

- $430 000 to the Tomingley Gold Project - Community Fund
- $360 000 for road maintenance and
- $160 000 for Narromine Shire Council environmental expertise.

The Tomingley Gold Project Community Fund has been established to support projects within the Narromine Shire that promote the long term economic growth, community connectivity, education and training, or community infrustructure.

Allocation of funds is decided by a fund panel, consisting of two TGO representatives and two from Narromine Shire Council, based on annual applications from community members, groups or organisations.

9.3 Complaints and enquiries

TGO manage complaints in accordance with the protocols and procedures contained in the EMS. During the reporting period, 16 complaints were received, compared to 53 during the previous reporting period, and nine during the 2013 period. The majority of these complaints were received through the community information line or other Alkane/TGO phone lines, with three received by email or text message and three in person. Figure 7

shows the number and type of complaints received during the reporting period, compared to the previous period.

TGO staff responded to all complainants and conducted investigations into specific concerns. Investigation outcomes consisted of corrective action, where required, and follow-up communication with the complainant. All enquiries and complaints have been closed out for the reporting period, with recent noise complaints being incorporated into the ongoing acoustic investigation and treatment program.

A register of complaints and enquiries received from the commuinity is maintained by TGO. A modified version of this register (excluding personal details of complainants) is published on the Alkane Resources website. A copy of the TGO community complaints register for the reporting period is included as Appendix H.

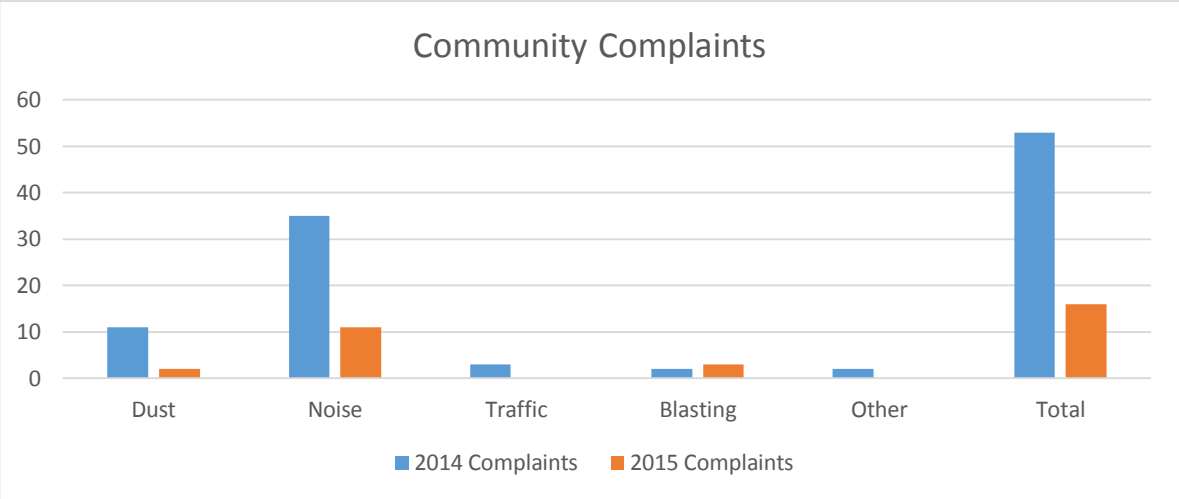


Figure 7: Summary of community complaints by type received in 2014 and previous reporting periods.

10 Independent Audit

An Independent Audit was conducted during the reporting period. Key findings of the audit included:

Air emissions

- A review of the community enquiry database (complaints register) up until February 2015 and the exceedances of the dust criteria reveals that dust is an issue for the local community of Tomingley. This was also observed onsite during the audit with high levels of dust impacting on the nearest receptors as a result of strong winds and site activities. Dust management measures in the Dust Management Plan were not being effectively implemented.
- The site is currently experiencing a prolonged period of dry conditions and a shortage of water for dust suppression makes dust management challenging.
- TGO have an effective realtime dust monitoring system in place and adequate weather forecasting tools however the link between the monitoring systems and TGO management response requires improvement. A procedure needs to be developed that enables instant notification to site management resulting in implementation of the Dust Management Plans.

Noise

- A review of the complaints register up until February 2015 and the exceedances of the noise criteria reveals that noise is an issue for the local community of Tomingley.
- TGO have a realtime noise monitoring system in place however this is a reactive system as it requires a specialist consultant to filter through the data to determine mine site noise contribution to the overall noise level.
- TGO are aware that certain mining operations and weather conditions will cause noise levels at the receptors in Tomingley that may exceed the criteria, however these have only triggered limited management response and implementation of the Noise Management Plan.

Water management

- A review of the complaints register up until February 2015 reveals that water management is not a key issue for the local community of Tomingley with no complaints reported. TGO were however notified by NSW Office of Water (NOW) of a complaint by a neighbouring property who had drilled a groundwater bore, failed to locate groundwater. NOW investigated the incident and concluded that TGO had not impacted on the local groundwater.
- Water management on site has proven challenging at TGO since operations commenced. The site was experiencing prolonged dry weather significantly restricting water harvesting opportunities from the site. Restricted water is impacting on the water balance of the site in particular for operation of plant, and dust suppression. Soil moisture levels are also hampering the commencement of rehabilitation activities .TGO are supplementing water supply from the raw water supply pipeline (from Narromine bore) and the adjacent Peak Hill gold mine.
- On two occasions, water has discharged offsite through unlicensed discharge points to the road reserve and farmland. These incidents were under investigation by the EPA. To prevent future incidents of unlicensed discharges and improve the performance of the site during storm events, TGO have completed the construction of the clean and dirty water infrastructure and provided induction training of site personnel on the management of clean and dirty water.
- Observations from the site audit were that the site is very dry, and at the time of audit there was no evidence of discharges occurring offsite. The site's water management infrastructure was observed to be constructed, however TGO personnel advised that the stormwater water management structures have not been implemented strictly in accordance with the ESCP as:

- Eastern Surface Water Diversion Structure was not constructed to achieve the specified erosion protection (c-factors)
- certain catchments have not achieved the percentage groundcover on disturbed areas.

Table 18 presents progress status action plan to address key audit findings.

Table 18: Progress against 2015 Independent Audit key findings action plan.

Ref	Proposed Response	Status at end of 2015
1	Update the noise model developed by SLR based on most recent mine survey and mining equipment locations. Model to be updated with any recent source sound measurements over a range of meteorological conditions.	Completed
2	Implement the controls in the Dust SSP to prevent exceedances of the dust criteria.	Completed
3	Conduct a flood study to determine the impact of surface water diversion structures constructed as part of the project on flooding frequence on the Newell Highway.	Completed
4	Undertake a risk assessment in accordance with Environmental Guidelines - Mangement of Tailing Storage Facilitites (Vic DPI, 2004) to determine whether the permeability standardachieved for the residue storage facility and associated collection pond is acceptable.	Completed
5	Finalise the Water Management Plan to address ensuring sufficient water for operations, water harvesting, flooding risk, water balance, surface and ground water management plans addressing all of the requirements of Clause 32 (b) and (c), and submit it to DP&E for approval.	Started
6	For noise and air quality exceedances, develop processes that allow timely review of the monitoring data and notification to affected residences in accordance with the Project Approval.	Completed
7	Develop a procedure that addresses notification and reporting requirements for instances of exveedances of performance criteria for both the EPA and DP&E.	Completed
8	Implement the temperature inversion monitoring and calculation capability of the weather station.	Completed
9	Finalise consultation with adjoining landholders and prepare a Pest Animal Control Strategy as relevant to the known population of pest animals on the mine site.	Not commenced
10	Develop area-specific dust controls for the crushing and screening circuit and associated conveyors.	Completed
11	Any future noise compliance reports need to include the Industrial Noise Policy modifying factor adjustments to the measured mine site noise levels.	Completed

The next Independent Audit is scheduled in 2018.

11 Incidents and non-compliances during reporting period

This section provides further detail on the incidents and non-compliances reported in Section 1 as well as any other official regulatory interaction that occurred during the reporting period.

11.1 Incidents and Non-compliances

11.1.1 Exceedance of noise criteria

The annual compliance noise monitoring identified exceedances of noise crieria included in Schedule 3, Condition 3 of PA 09_0155 at residences in, or near, Tomingley village over the nights of 7-9 September 2015. These exceedances, and the management measures implemented to address them, are described in Section 6.1.

11.1.2 Exceedance of airblast overpressure criteria

Monitoring of blasting at TGO recorded three airblast overpressure exceedences of blasting criteria inluded in Schedule 3, Condition 7 of PA 09_0155. The exceedences occurred on 04 May, 01 July and 06 July. These exceedances, and the management measures implemented to address them, are described in Section 6.2.

11.1.3 Exceedance of 24 hour average PM10 and deposited dust criteria

Monitoring of particulate matter at the nearest residence to TGO identified ten exceedences of the 24 avereage PM_{10} criteria as included in Schedule 3, Condition 17 of PA 09_0155. Monitoring of deposited dust at monitoring location DDG4 also recorded an annual avereage exceeding the criteria included in Schedule 3, Condition 17 of PA 09_0155. These exceedances, and the management measures implemented to address them, are described in Section 6.3.

11.1.4 Non-licenced offsite water discharge

TGO received 10mm of rain on the 4th January and 37mm of rain on the 5th January. At 11.40am on 5 January 2015, during a site inspection of water management structures, it was noted that dirty water had commenced discharging from the Caloma Central Drain onto the Newell Highway Road reserve. The incident was caused by an onsite drainage windrow not being reinstated following road maintenance. This allowed dirty water flow into the Caloma Central Drain and offsite. The type of material discharged was water containing colloidal clay material. The volume of material discharged is unknown.

Once the issue was identified (11.55am), a temporary bund was constructed within 30 minutes to prevent the further flow offsite. A permanent drive over bund has subsequently been reinstated at the location. The site workforce has received training on the roles and importance of the various drainage structures on site, and the importance of inspecting relevant drains during heavy rain.

GHD were engaged to investigate the likely potential downstream impacts from the discharge. Although four of the six samples collected showed elevated aluminium levels, when compared against the ANZECC (2000) livestock drinking water guidelines, adverse impact were determined to be unlikely due to the short term mature of exposure. A copy of the GHD report is included as Appendix E.

TGO received a letter from the EPA dated 13 March 2015 requesting further information on the measures that TGO have in place to prevent recurrence.

11.1.5 Water Management Plan still not approved

Water management at TGO is generally undertaken in accordance with commitments and actions outlined in the draft Water Management Plan (WMP). An earlier version of the draft WMP was submitted to DP&E for approval. However, following several unlicenced discharge events, TGO determined that the draft WMP required further review and modification prior to finalisation and submission for approval. The WMP is in the final

stages of finalisation and it is expected that submission will be midway through the next reporting period.

11.1.6 Non-compliance with MOP rehabilitation schedule

Final rehabilitation of mining disturbed land at TGO is not in compliance with the rehabilitation schedule included in the 2014 TGO MOP. The reason for this delay in rehabilitation, and the actions being undertaken to address the non-compliance, are described in Section 8.1.

11.2 Official Regulatory Interaction

Other than the incidents discussed in Section 11.1, no reportable incidents or warning letters, penalty notices or prosecution proceedings by any regulatory agency were received during the reporting period. The EPA prosecution for a site water dischage from the previous reporting period was finalised in October 2015.

12 Activities to be completed in next reporting period

Environmental activities and initiatives to be implemented in the next reporting period will focus on reduction of offsite impacts such as noise and dust, management and monitoring of biodiversity offset areas, finalising the WRE final landform plans, and commencing WRE rehabilitation. Details on these activities are shown in Table 19.

Table 19: Activities proposed for 2016

Proposed Activities	**Location**	**Proposed Completion Date**
Fauna monitoring	TGO site and offset areas	October 2016
Control of Box Thorn and other noxious weeds	TGO site and offset areas	December 2016
Carry out tree and shrub planting in accordance with the biodiversity management plan	Offset areas	April/May 2016
Carry out LFA of biodiversity and rehabilitation areas.	Biodiversity and rehabilitation areas	August 2016
Conduct weed management and follow up planting where necessary	Biodiversity offset area	Autumn and Spring 2016
Ongoing rehabilitation of WRE2 and WRE3	Waste rock emplacements	Ongoing
Finalise Surface Water Management and submit to DP&E for approval	N/A	March 2016
Review site Management Plans	N/A	March 2016

Appendix A

Annual Noise

Noise and Sound Services

Noise Compliance Report

At:-

Tomingley Gold Project
Tomingley, NSW 2869.

October 2015

Report No. nss22290 – Final

Prepared at the request of:-

Tomingley Gold Operations Pty Ltd
(A wholly owned subsidiary of Alkine Resources Ltd)
Tomingley West Road, Tomingley, NSW 2869

Prepared by:-

NOISE AND SOUND SERVICES
Spectrum House, 3, Cassandra Avenue, St Ives, NSW 2075
Tel: (02) 9449 6499. Mob: 0411 648153
E-mail: noiseandsound@optusnet.com.au Website: www.noiseandsound.com.au
A member firm of the Association of Australian Acoustical Consultants
ABN: 7277 134 9599

Association of Australian Acoustical Consultants

C O N T E N T S

SUMMARY

A compliance noise survey, in line with the NSW Environment Protection Authority (EPA) licence conditions, evening and night time, has been carried out during the operational phase for the Tomingley Gold Project, in Tomingley, NSW 2869. The purpose of the survey is to carry out an independent and accurate assessment of the noise levels external to neighbouring residential dwellings and compare these to the EPA noise limits.

The residential areas have been assigned into 'Noise Assessment Groups' in the SLR Consulting Australia Pty Ltd Noise Report dated September 2011 (Report Number 10-791R1D10 Draft 10). The EPA day time noise limits ($L_{Aeq,\ 15\ minutes}$) as given in the Environment Protection Licence are between 36 dBA and 49 dBA.

To provide a good cross section of the Noise Assessment Groups, attended noise measurements were carried out at seven locations neighbouring the mine site over a three day period.

Road traffic noise, particularly B-double trucks using the Newell Highway, was a major sound source in the area. This resulted in the measured sound pressure level ($L_{Aeq,\ 15\ minutes}$) exceeding the EPA noise limit for almost all of the evening and night time samples and all of the night time samples at some locations.

During this three day period the weather conditions were mainly favourable for measurements without extraneous noise other than on-road trucks. In addition, there was negligible noise from fauna.

During this measurement period three locations were not affected by mine noise. These were:- ***"Rosewood'', "Dunoon"*** and ***"Lilyvale".*** Four locations were affected by mine noise for all or on some occasions the EPA noise limit on evening and night time was exceeded at ***"Ellerslie",*** **40 Myall Street** ***"Budgerie"*** and at **7 Burrill Street.**

As non-compliance has been found at four of the seven sites assessed, mitigation is required. Hence the most feasible and reasonable mitigation method is considered to be the sound insulation upgrade of individual dwellings for those occupants who are agreeable to this.

1. INTRODUCTION

Noise and Sound Services was requested by Tomingley Gold Operations Pty Ltd (a wholly owned subsidiary of Alkine Resources Ltd) of Tomingley West Road, Tomingley, NSW 2869 to carry out a compliance noise survey. The noise survey is in line with the NSW Environment Protection Authority (EPA) licence conditions during the operational phase for the Tomingley Gold Project.

The purpose of the survey is to carry out an independent and accurate assessment of mine noise levels external to neighbouring residential dwellings and compare these to the EPA noise limits.

2. SITE AND DEVELOPMENT DESCRIPTION

The Tomingley Gold Mine site is located in the central west slopes of NSW, immediately south of Tomingley Township, approximately 15 km north of the town of Peak Hill and approximately 53 km southwest of the town of Dubbo.

3. NOISE LIMITS

The residential areas have been previously grouped in the SLR Consulting Australia Pty Ltd Noise Report dated September 2011 (Report Number 10-791R1D10 Draft 10). These Noise Assessment Groups are:-

A. Ambient noise influenced by both local roads and the Newel Highway;
B. Rural setting noise with minimal traffic noise influence;
C. Ambient noise highly elevated due to the Newell Highway; and
D. Ambient noise elevated due to the Newell Highway.

The EPA noise limits are given in the Environment Protection Licence number 20169. The full noise limits are given in Appendix A below and, relevant to the current measurements, are as shown Table 1 below:-

TABLE 1 - EPA NOISE LIMITS.

Noise Assessment Group	Day $L_{Aeq, 15\ minute}$ (dB)	Evening $L_{Aeq, 15\ minute}$ (dB)	Night $L_{Aeq, 15\ minute}$ (dB)	Night $L_{AF1, 1\ minute}$ (dB)
A (R6)	36	36	36	45
A (R5)	37	37	37	45
B	36	36	36	45
C (R3)	49	38	38	45
C (R29)	48	37	37	45
D	43	38	38	46

For the purpose of determining the noise generated at the neighbouring residential premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied to the noise level measured by the noise monitoring equipment.

4. NOISE MEASUREMENTS

To determine compliance with the EPA noise limits, attended noise measurements were carried out at the following seven locations:

- Group A - R5 – *"Rosewood'* off the Newell Highway past McNivens Lane - stud farm and residential home of Graham and Lynne Hando;
- Group A - R6 – *"Dunoon"* McNivens Lane, Tomingley – agricultural farm and residential home of Anne and Max McNiven;
- Group B - R2 – *"Lilyvale"* Tomingley West Road, Tomingley – sheep farm and residential home of Sally and Wes Bourchier;
- Group B – *"Ellerslie"* Thornycroft Road, Tomingley residential home of Gai Strahorn;
- Group C - R3 – 40 Myall Street, Tomingley - residential home of Christine Sonter;
- Group C - R29 – *"Budgerie"* Genangie Street Tomingley - residential home of Nigel and Brenda Harper; and
- Group D –7 Burrill Street Tomingley- residential home of Ben Rees.

4.1 Instrumentation

The instrumentation used during the noise source survey consisted of three Brüel and Kjær sound level meters model 2250 (serial numbers 3004748, 2449942 and 2685757). These meters conforms to Australian Standard AS IEC 61672.1-2004 : '*Electroacoustics - Sound level meters – Specifications*' as class 1 precision sound level meters and have accuracies suitable for both field and laboratory use. The calibration of the meters was checked before and after each of the measurement periods with three Brüel and Kjær acoustic calibrators model number 4231 (serial numbers 2385023, 2445349 and 268864). No significant system drift occurred over the measurement periods.

The sound level meters and calibrators were checked, adjusted and aligned to conform to the Brüel and Kjær factory specifications and issued with conformance certificates within the last 24 months as required by the regulations. The internal test equipment used is traceable to the National Measurement Laboratory at C.S.I.R.O., Lindfield, NSW, Australia.

4.2 Measurement Procedure

The acoustical measurements were carried out in accordance with the NSW Industrial Noise Policy (2000) and the Australian Standards AS 1055 '*Acoustics – Description and Measurement of Environmental Noise'*, (1997).

The evening and night time measurements are normally required to compare to the EPA noise limits. Sample noise measurements were carried out at each site. Where practical these were for one hour in the evening time within the period from 6:00 pm to 10:00 pm and one hour in the night time from within the period 10:00 pm to 01:00 am. In some cases, adverse weather or extraneous noise prevented the full hour being measured.

The attended measurements were carried out from Monday 7 September 2014 to Wednesday 9 September 2014. The 'A' frequency weighting and 'fast' time weighting were used for each measurement.

The weather conditions were mostly clear sky (with occasional light cloud) cool to mild, 20 °C at 6:00 pm to 7 °C just after midnight. No rain was recorded for the first two days but rain prevented continuous measurements on Wednesday 24 September 2014. Mostly negligible winds (very still to 1.2 m/s) in the evening but easterly winds increased in the night time particularly in the elevated out-of-town areas (up to 4.0 m/s on occasions).

4.3 Measurement Results

This section gives the measured sound pressure level results for each area type as shown in Tables 2 to 6 below. The average noise energy level ($L_{Aeq,\ 15\ minute}$) represents the base descriptor and measurement period and is used for the EPA noise limit. This level is also often referred to as the 'ambient' noise level. The naturally occurring ambient noise level in any area is omnipresent and, in some cases, well above the mine noise limit set by the EPA. It is often difficult to distinguish between mine noise, on-road traffic noise and naturally occurring ambient noise levels particularly where the mine noise is at a low level.

Environmental noise levels can naturally vary considerably with time; therefore it is not adequate to use a single number to fully describe the acoustic environment. The preferred, and now generally accepted, method of recording and presenting noise measurements is based upon a statistical approach. For example, the L_{AF10} noise level is the level exceeded for 10% of the time, and is approximately the average maximum noise level. The L_{AF50} noise level is the level exceeded for 50% of the time and is the numerical average of the decibels. The L_{AF90} level is the level that is exceeded for 90% of the time, and is considered to be approximately the average of the minimum noise level recorded. This level is

often referred to as the 'background' noise level. To set noise goals the 'background' noise level is measured without the source noise in operation.

TABLE 2 - MEASUREMENT RESULTS GROUP A - R5 *"Rosewood'*

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
07/9/15	18:45 – 19:00	44	52	49	39	30
	19:00 – 19:15	43	51	47	39	27
	19:15 – 19:30	45	54	49	38	31
	19:30 – 19:45	44	54	49	34	23
07/9/15	22:00 – 22:15	46	56	51	35	20
	22:15 – 22:30	45	55	50	37	19
	22:30 – 22:45	46	55	51	38	26
	22:45 – 23:00	43	52	48	37	24
08/9/15	19:00 – 19:15	47	58	52	42	31
	19:15 – 19:30	44	57	49	32	25
	19:30 – 19:45	48	59	52	38	25
	19:45 – 20:00	50	60	55	44	29
08/9/15	22:00 – 22:15	42	52	47	34	22
	22:15 – 22:30	43	51	48	31	22
	22:30 – 22:45	44	53	49	34	23
	22:45 – 23:00	46	53	50	40	24
09/9/15	18:00 – 18:15	45	55	48	39	31
	18:15 – 18:30	43	52	47	40	31
	18:30 – 18:00	47	55	51	34	33
	18:45 – 19:15	47	54	51	42	25
09/9/15	22:00 – 22:15	41	51	45	35	23
	22:30 – 22:45	42	50	47	37	23
	22:45 – 23:00	42	52	47	35	21
	23:15 – 23:30	44	53	49	35	21

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **37 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **37 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **37 dBA**

Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 3 - MEASUREMENT RESULTS GROUP A - R2 – *"Dunoon"*

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
07/9/15	20:00 – 20:15	28	37	29	25	21
	20:15 – 20:30	28	32	26	23	20
	20:30 – 20:45	27	37	28	24	22
	20:45 – 21:00	26	31	27	25	22
07/9/15	23:00 – 23:15	29	37	31	25	20
	23:15 – 23:30	29	35	31	27	22
	23:30 – 23:45	35	44	40	32	27
	23:45 – 24:00	28	38	32	25	19
08/9/15	20:15 – 20:30	30	44	25	21	19
	20:30 – 20:45	24	36	24	21	18
	20:45 – 21:00	22	29	24	20	19
08/9/15	23:15 – 23:30	29	42	29	21	19
	23:30 – 23:45	22	30	24	20	18
	23:45 – 00:00	24	35	26	21	19
09/9/15	19:10 – 19:35	30	40	33	28	23
	19:35 – 19:50	31	39	34	28	21
09/9/15	23:00 – 23:15	27	37	30	23	19
	23:15 – 23:30	29	36	32	28	24

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**

Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 4 - MEASUREMENT RESULTS GROUP B - R2 – *"Lilyvale"*

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
07/9/15	20:15 – 20:30	34	45	35	26	24
	20:30 – 20:45	30	43	29	26	25
	20:45 – 21:00	30	42	29	27	25
	21:00 – 21:15	28	32	28	27	26
07/9/15	23:15 – 22:30	33	45	32	28	26
	23:30 – 23:45	33	44	33	29	26
	23:45 – 24:00	32	41	33	28	27
08/9/15	18:45 – 19:00	34	47	34	25	22
	19:00 – 19:15	34	45	33	25	22
	19:15 – 19:30	32	46	28	24	23
	19:30 – 19:45	31	44	28	27	22
08/9/15	22:00 – 22:15	31	44	27	21	19
	22:15 – 22:30	30	44	25	21	19
09/9/15	23:40 – 23:55	32	44	26	21	19
	23:55 – 00:10	31	43	26	20	18

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**

Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 5 - MEASUREMENT RESULTS GROUP B – *"Ellerslie"*

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
07/9/15	18:50 – 19:05	41	48	44	39	33
	19:05 – 19:20	41	47	43	39	35
	19:20 – 19:35	42	49	45	41	37
	19:35 – 19:50	42	50	44	41	38
07/9/15	22:00 – 22:15	40	45	41	38	35
	22:15 – 22:30	40	46	43	39	36
	22:30 – 22:45	39	46	42	37	34
	22:45 – 23:00	39	48	41	38	34
8/9/15	18:00 – 18:15	38	45	40	37	34
	18:15 – 18:30	36	43	38	35	32
	18:30 – 18:45	38	46	40	36	33
	18:45 – 19:00	38	45	40	37	33
8/9/15	22:55 – 23:10	38	45	40	36	32
	23:10 – 23:25	40	47	43	37	32
	23:25 – 23:40	42	48	45	41	38
	23:40 – 23:55	42	47	45	42	39
09/9/15	18:05 – 18:20	36	48	37	30	26
	18:20 – 18:35	34	45	35	28	23
	18:35 – 18:50	37	45	40	34	31
	18:50 – 19:05	36	43	38	34	30
09/9/15	22:00 – 22:15	34	46	35	28	25
	22:15 – 22:30	32	43	33	28	23
	22:30 – 22:45	34	42	37	32	26
	22:45 – 23:00	34	42	37	32	29

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **36 dBA**

Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 6 - MEASUREMENT RESULTS GROUP C - R3 – 40 Myall Street

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
	Including On-Road Traffic					
07/9/15	20:55 – 21:10	63	77	63	49	42
	21:10 – 21:25	62	77	59	46	41
	21:25 – 21:40	62	75	62	49	42
	21:40 – 21:55	65	78	64	49	43
	Excluding On-Road Traffic					
07/9/15	23:50 – 00:05	47	54	50	46	43
	00:05 – 00:20	45	53	49	44	41
08/9/15	Excluding On-Road Traffic					
	11:55 – 00:10	44	48	46	43	41
	00:10 – 00:25	43	47	44	42	39
	Including On-Road Traffic					
09/9/15	19:25 – 19:40	65	78	64	50	45
	19:25 – 19:40	67	80	66	51	46
	19:25 – 19:40	63	77	62	49	44
	19:25 – 19:40	64	79	63	51	46
	Excluding On-Road Traffic					
09/9/15	23:10 – 23:25	44	47	46	44	40
	23:25 – 23:40	46	53	49	44	41
	23:40 – 23:55	47	53	50	46	42
	23:55 – 00:10	46	51	48	45	41

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **49 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **38 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **38 dBA**

Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 7 - MEASUREMENT RESULTS GROUP C - R29 – *"Budgerie"*

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
07/9/15	18:40 – 18:55	47	55	50	45	42
	18:55 – 19:10	48	55	51	46	43
	19:10 – 19:25	49	54	51	48	45
	19:25– 19:40	48	55	51	46	39
07/9/15	22:10 – 22:25	51	57	53	50	47
	22:25 – 22:40	50	56	53	49	45
	22:40 – 22:55	49	56	52	47	44
	22:55 – 23:10	49	56	51	47	44
08/9/15	18:45 – 19:00	44	51	48	42	39
	19:00 – 19:15	46	55	49	43	39
	19:15 – 19:30	45	51	47	44	40
	19:30– 19:45	45	57	48	44	41
08/9/15	21:25 – 21:40	47	55	50	44	41
	21:55 – 22:10	46	56	49	44	41
	22:10 – 22:25	49	57	52	46	42
	22:25 – 22:40	48	56	51	47	44
09/9/15	17:55 – 18:10	49	57	52	46	43
	18:10 – 18:25	46	53	49	44	41
	18:25 – 18:40	48	54	51	47	43
	18:40 – 18:55	50	57	52	48	44
09/9/15	21:55 – 22:10	45	52	48	44	38
	22:10 – 22:25	45	52	48	43	37
	22:25 – 22:40	45	52	48	43	40
	22:40 – 22:55	46	53	49	45	42

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **48 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **37 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **37 dBA**

Night time Noise Limit $L_{AF1,\ 1\ minute}$ **45 dBA**

TABLE 8 - MEASUREMENT RESULTS GROUP D – 7 Burrill Street

Date	Time (approximate)	Sound Pressure Level, 15 minutes (dB)				
		L_{Aeq}	L_{AF1}	L_{AF10}	L_{AF50}	L_{AF90}
07/9/15	19:45 – 20:00	48	55	51	47	44
	20:00 – 20:15	49	55	51	48	44
	20:15 – 20:30	47	52	50	47	43
	20:30 – 20:45	50	59	52	48	44
07/9/15	23:20 – 23:35	50	56	53	47	45
	23:35 – 23:50	49	56	51	48	44
	23:50 – 00:05	47	53	50	47	43
	00:05 – 00:20	48	55	50	46	43
08/9/15	19:50 – 20:05	45	52	48	44	40
	20:05 – 20:20	45	51	48	43	40
	20:20 – 20:35	46	55	49	44	41
	20:35 – 20:50	46	51	49	45	41
08/9/15	23:15 – 23:30	49	57	52	47	43
	23:30 – 23:45	46	53	49	44	42
	23:45 – 00:00	48	54	52	47	43
	00:00 – 00:15	49	57	52	47	44
09/9/15	19:05 – 19:20	49	54	52	48	43
	19:20 – 19:35	50	56	53	50	44
	19:35 – 19:40	48	54	51	48	43
	19:40– 19:55	50	57	53	48	43
09/9/15	23:00 – 23:15	46	53	49	45	42
	23:15 – 23:30	50	57	53	43	44
	23:30 – 23:45	51	58	54	48	44
	23:45 – 00:00	48	55	51	46	42

Day time Noise Limit $L_{Aeq,\ 15\ minutes}$ **43 dBA**
Evening time Noise Limit $L_{Aeq,\ 15\ minutes}$ **38 dBA**
Night time Noise Limit $L_{Aeq,\ 15\ minutes}$ **38 dBA**

Night time Noise Limit $L_{AF1,\ 1\ minute}$ **46 dBA**

5. DISCUSSION

During this three day period the weather conditions were mainly favourable for measurements without extraneous noise. In addition, there was negligible noise from fauna. The only significant extraneous noise was from on-road traffic using the Newell Highway. During this measurement period three locations were not affected by mine noise. These were:-

- Group A - R5 – *"Rosewood'* off the Newell Highway past McNivens Lane;
- Group A - R6 – *"Dunoon"* McNivens Lane, Tomingley; and
- Group B - R2 – *"Lilyvale"* Tomingley West Road, Tomingley.

During this measurement period four locations were affected by mine noise and for all or some occasions the EPA noise limit during the evening and night time was exceeded. These were:-

- Group B – *"Ellerslie"* Thornycroft Road, Tomingley;
- Group C - R3 – 40 Myall Street, Tomingley;
- Group C - R29 – *"Budgerie"* Genangie Street; and
- Group D –7 Burrill Street Tomingley.

At the measurement site Group A - R5 ***"Rosewood'*** off the Newell Highway past McNivens Lane - stud farm and residential home of Graham and Lynne Hando (Group A - R5), mine noise was just audible during Newell Highway traffic lulls. Traffic lulls did not last for 15 minutes on any occasion and on-road traffic was not visible at the site; therefore it was not possible to directly measure the 15 minute energy average ($L_{Aeq,\ 15\ minute}$). However the mine noise was measured in short term energy averages ($L_{Aeq,\ short\ term}$). These did not exceed 35 dBA. Hence it is concluded that the noise due to the Tomingley Gold Mine project did not exceed the EPA noise limit at any time during the monitoring at this location.

At the measurement site Group B - R6 ***"Dunoon"*** McNivens Lane, Tomingley – agricultural farm and residential home of Anne and Max McNiven, mine noise was just audible on a few occasions. The sound pressure level was generated by distant road traffic. Traffic lulls and low wind conditions did last for 15 minutes on occasions and the mine noise did not exceed 30 dBA as shown in Table 3 above. Hence the noise due to the Tomingley Gold Mine project did not exceed the EPA noise limit at any time during the monitoring at this location.

At the measurement site Group B - R2 ***"Lilyvale"*** Tomingley West Road**,** Tomingley – sheep farm and residential home of Sally and Wes Bourchier, mine noise was audible and it was possible on occasions to directly measure the 15 minute energy average ($L_{Aeq,\ 15\ minute}$) mine noise. This was between 30 dBA and 35 dBA as shown in Table 4 above. Where noise levels exceeding 35 dBA were measured it was due to extraneous noise and not mine noise. Hence the noise due to the Tomingley Gold Mine project did not exceed the EPA noise limit at any time during the monitoring at this location.

At the measurement site Group B – ***"Ellerslie"*** Thornycroft Road, Tomingley residential home of Gai Strahorn, the mine noise was clearly audible on occasions and it was possible, to directly measure the 15 minute energy average ($L_{Aeq,\ 15\ minute}$) mine noise without the influence of any significant extraneous noise. This was between 32 dBA and 42 dBA as shown in Table 5 above. Hence at this location noise levels exceeded the 36 dBA limit on 16 out of the 32 fifteen minute measurements and was non-compliant (more than 2 dB above the limit) for 11 out of 32 fifteen minute measurements. The lights from the mine plant were visible through the trees at this location.

At the measurement site Group C - R3 **40 Myall Street,** Tomingley - residential home of Christine Sonter, the noise level is dominated by close road traffic using the Newell Highway (approximately 12 metres from the boundary of the house to the kerb). The lights from the mine plant were partly visible through the trees at this location and the closest point of mine activity was estimated to be at 500 metres. Mine noise was audible and measurable during road traffic lulls on all three evening and night-time measurements periods. At night time it was possible to measure the mine noise without the influence of any significant extraneous noise by using the pause facility on the sound level meter. (There were too many truck movements during the evening time to use this technique). Hence the mine noise was between 42 dBA and 46 dBA as shown in Table 6 above. Hence at this location, noise levels exceeded the 38 dBA limit by 4 dB to 8 dB and was found to be continuously non-compliant (more than 2 dB above the limit).

The measurement site Group C - R29 ***"Budgerie"*** Genangie Street**,** Tomingley - residential home of Nigel and Brenda Harper, is close to road traffic noise using the Newell Highway and a truck stop is approximately 100 metres to the west of the property boundary. The lights from the mine plant were clearly visible and estimated to be working at 800 metres from the property. The sound pressure level was mainly generated by road traffic using the Newell Highway, trucks with reversing alarms using the truck stop, occasional dog barking and fauna. However the mine noise was audible on occasions. The noise was possibly the metal to metal impacts of the drill rigs and mine trucks. Here the estimated mine noise was 39 dBA to 42 dBA and hence at this location noise levels exceeded the 37 dBA limit by 2 dB to 5 dB was found on occasions to be non-compliant (more than 2 dB above the limit).

At the measurement site Group D **7 Burrill Street,** Tomingley- residential home of Ben Rees, the lights from the mine plant were visible and estimated to be working at 750 metres from the property. The mine plant noise was audible during road traffic lulls and the estimated mine noise was 42 to 46 dBA and hence at this location noise levels exceeded the 38 dBA limit by 4 dB to 8 dB was found on occasions to be non-compliant (more than 2 dB above the limit).

6. MITIGATION

As non-compliance has been found at four of the seven sites assessed, mitigation is required. Extensive noise bunds have already been established. Hence the most feasible and reasonable mitigation method is considered to be sound insulation upgrade of the individual dwellings for those occupants who are agreeable to this. It is understood that this upgrade of sound insulation has been completed in many areas with successful results.

7. CONCLUSIONS

The noise levels from plant and equipment operating during the three day measurement period of 7th to 9th September 2015 has been carried out. During this three day period the weather conditions were mainly favourable for measurements without extraneous noise other than on-road trucks.

Three locations were found to be unaffected by mine noise. These were:- ***"Rosewood'', "Dunoon"*** and ***"Lilyvale".*** Four locations were affected by mine noise for all, or some occasions, the EPA noise limit during evening and night time was exceeded at ***"Ellerslie",*** **40 Myall Street** ***"Budgerie"*** and at **7 Burrill Street.**

The most feasible and reasonable mitigation method is considered to be a sound insulation upgrade of those dwellings.

Status	**Date**	**Prepared by:**
Draft	22nd September 2015	Ken Scannell MSc MAAS MIOA.
Status	**Date**	**Issued by:**
Final	8th October 2015	Ken Scannell MSc MAAS MIOA.

Important Note. *All products and materials suggested by 'Noise and Sound Services' are selected for their acoustical properties only. All other properties such as airflow, aesthetics, chemical, corrosion, combustion, construction details, decomposition, expansion, fire rating, grout or tile cracking, loading, shrinkage, ventilation, etc are outside of 'Noise and Sound Services' field of expertise and* ***must be*** *checked with the supplier or suitably qualified specialist before purchase.*

APPENDIX A – EPA NOISE LIMITS

Limit conditions: Noise generated at the premises must not exceed the noise limits in the table below. The location groups referred to in the tables below are indicated by Table 4 of *'Tomingley Gold Project – Noise and Blasting Assessment'* (NBA) prepared by SLR Consulting dated September 2011 (Report Number 10-7910R1D10 Draft 10).

TABLE A1 - EPA NOISE LIMITS.

Noise Assessment Group	Day $L_{Aeq, 15\ minute}$ (dB)	Evening $L_{Aeq, 15\ minute}$ (dB)	Night $L_{Aeq, 15\ minute}$ (dB)	Night $L_{AF1, 1\ minute}$ (dB)
A (R6)	36	36	36	45
A (R5)	37	37	37	45
A (all other receivers)	35	35	35	45
B (all receivers)	36	36	36	45
C (R3)	49	38	38	45
C (R29)	48	37	37	45
C (all other receivers)	46	37	37	45
D (all receivers)	43	38	38	46
All other residential receivers	35	35	35	45

APPENDIX B – GLOSSARY OF TECHNICAL TERMS

'A' Frequency Weighting – The most widely used sound level frequency filter is the A scale, which roughly corresponds to the inverse of the 40 dB (at 1 kHz) equal-loudness curve. Using this filter, the sound level meter is less sensitive to very high and, in particular, very low frequencies. Sound pressure level measurements made with this filter are commonly expressed as **dBA.**

Ambient Sound – The all-encompassing sound associated with that environment being a composite of sounds from many sources, near and far.

Decibel (dB) – The logarithmic ratio of any two quantities and relates to the flow of energy (power). Scale used for acoustic measurement related to power, pressure and intensity. Expressed in dB, relative to standard reference levels.

Energy Average Levels ($L_{Aeq, T}$). The L_{Aeq} level represents the average noise energy during the measurement period (T). This level is used to describe the source noise and when the source noise is not present it is used to describe the 'ambient' noise level.

'Fast' Time Weighting – The root-mean-squared energy averaging of the sound pressure with time. 'Fast' time weighting is 125 milliseconds.

Percentile Levels (L_{AF1}, L_{AF10}, L_{AF90}) - Environmental noise levels can vary considerably with time; therefore it is not adequate to use a single number to fully describe the acoustic environment. The preferred, and now generally accepted, method of recording and presenting noise measurements is based upon a statistical approach. For example, the L_{AF1} noise level is the 'A' frequency weighted and 'fast' time weighted level exceeded for 1% of the measurement time, and is approximately the maximum noise level. The L_{AF10} noise level is the 'A' frequency weighted and 'fast' time weighted level exceeded for 10% of the time, and is approximately the average maximum noise level. The L_{AF90} level is the level that is exceeded for 90% of the time, and is considered to be approximately the average of the minimum noise level recorded. This level is often referred to as the 'background' noise level.

Sound Power - Sound power is the energy rate - the energy of sound per unit of time (J/s, Watts in SI-units) from a sound source.

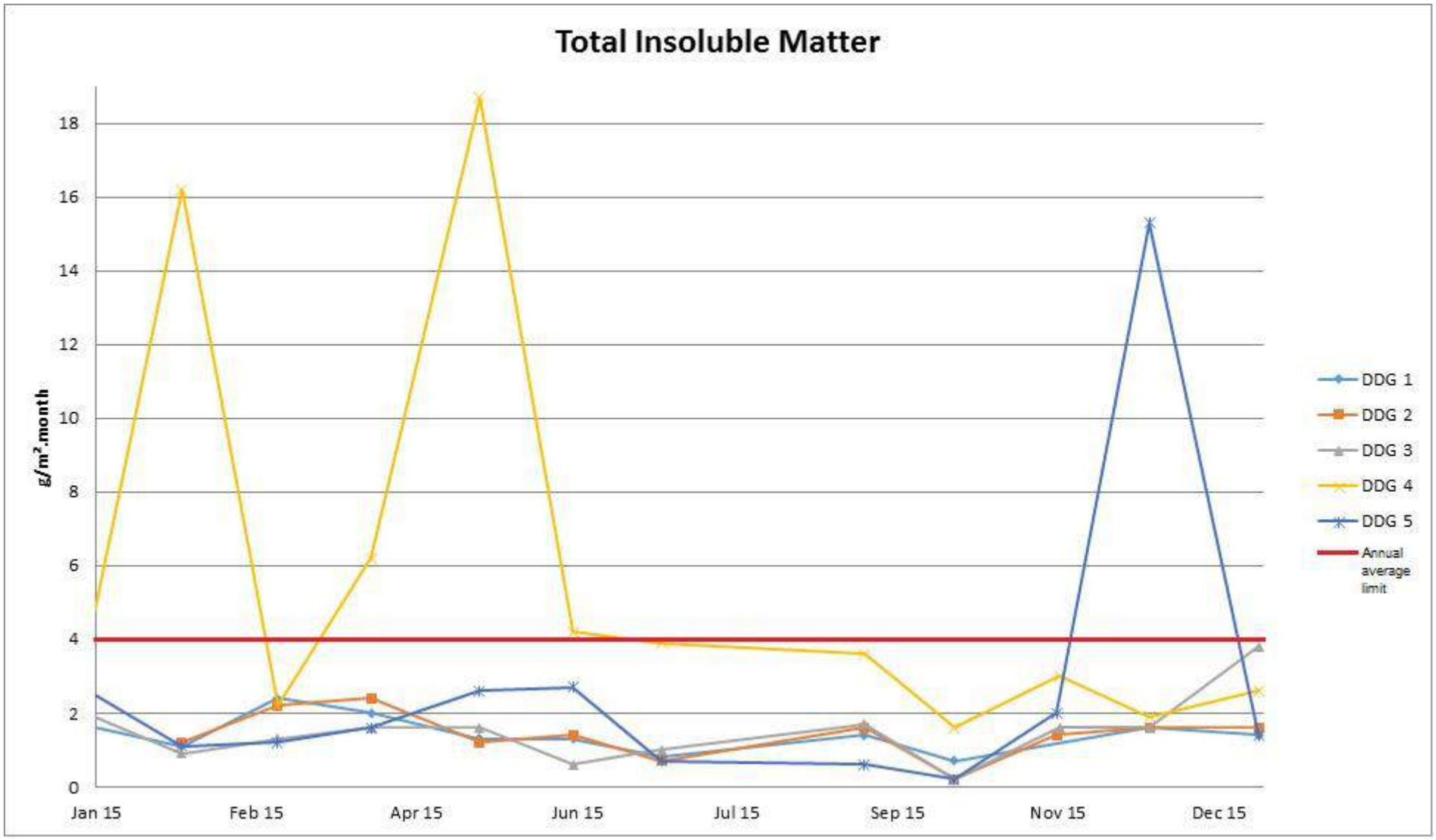
Sound Power Level (L_W) – Sound power level is a logarithmic measure of the sound power in comparison to a specified reference level (10^{-12} Watts). The unit less decibel term is a measure of the sound emission of a source independent of distance. When 'A' frequency weighted the symbol becomes **L_{WA}.**

Sound Pressure - Sound Pressure is the force (N) of sound on a surface area (m^2) perpendicular to the direction of the sound. The SI-units for the Sound Pressure are N/m^2 or Pa.

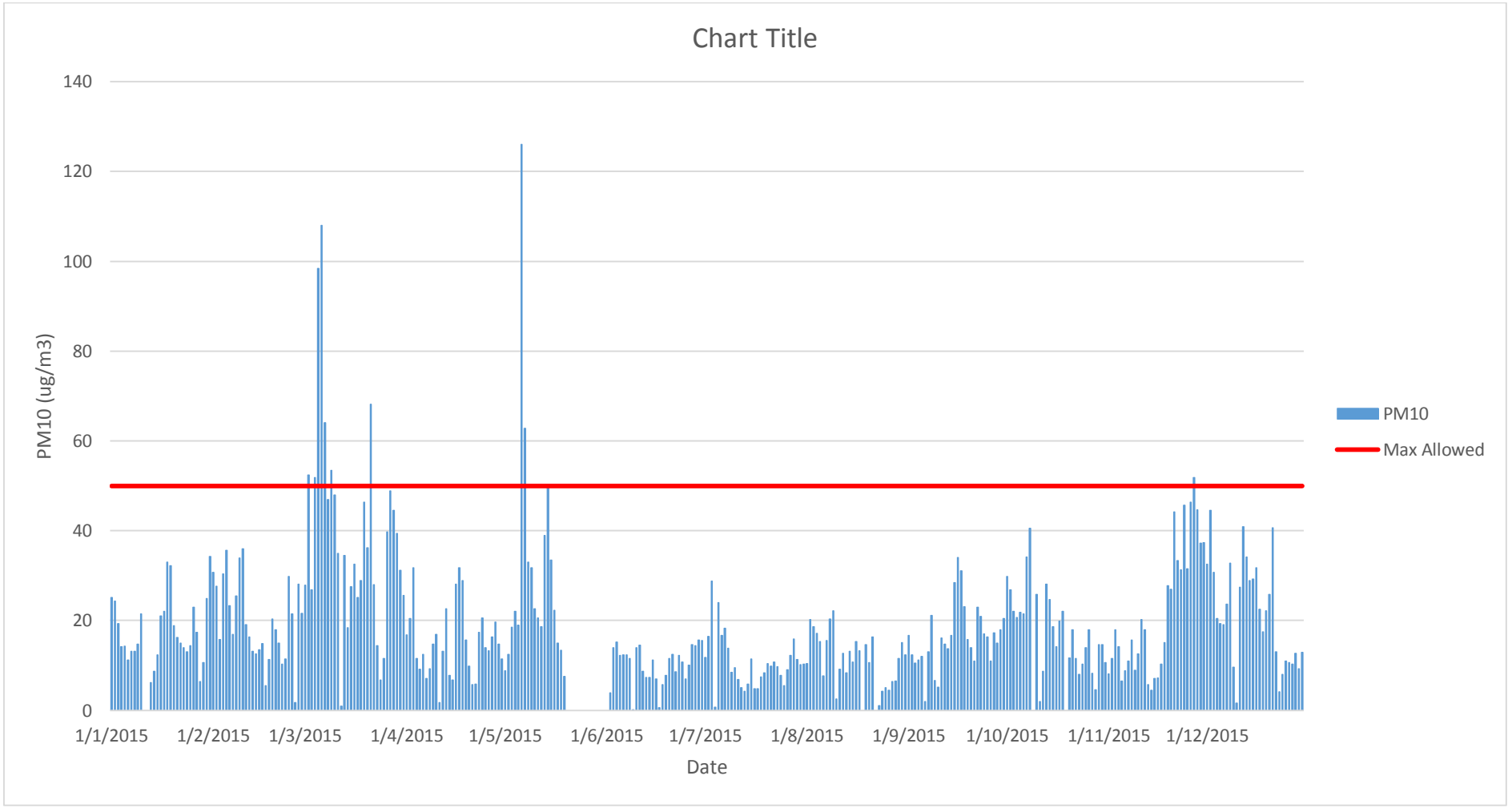
Sound Pressure Level (L_p) - Sound pressure level is a logarithmic measure of the square of the sound pressure in comparison to a specified reference level (20 μPa). The unit less decibel term is a measure of the sound immission of a source at a specified distance. When 'A' frequency weighted the symbol becomes $\mathbf{L_{PA}}$.

Appendix B

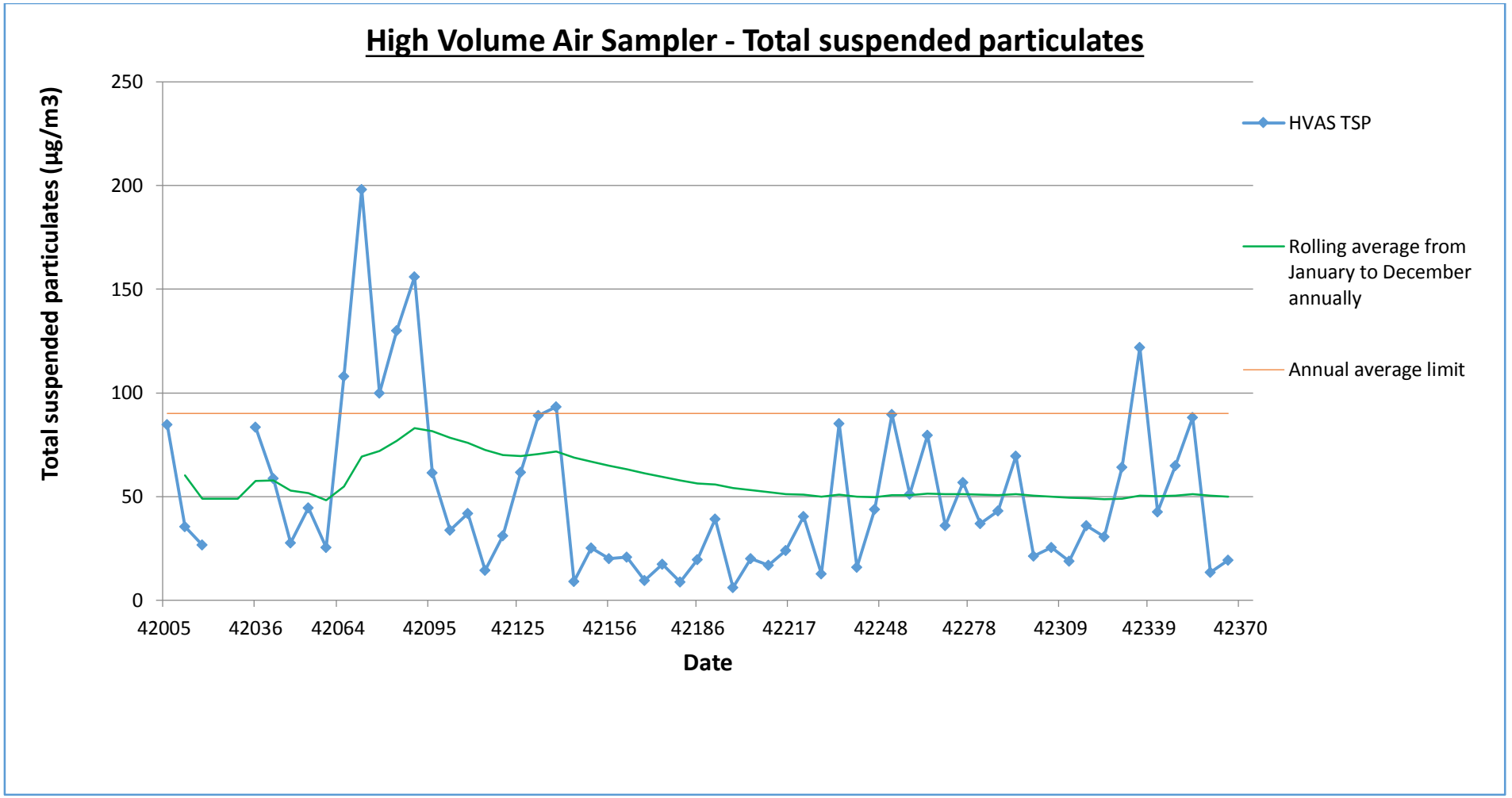
Air Quality Monitoring Results



2015 TGO depositional dust gauge (DDG) monitoring results



PM10 mass concentration (24 hour average) at TEOM RTA1



Total Suspended Particulates at HVAS1

Appendix C

Dust Review Report

Tomingley Gold Operations

Tomingley Gold Operations
March 2015 Dust Monitoring Report

April 2015

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Figure index

Appendices

1. Introduction

Tomingley Gold Operations (TGO) conducts an air quality monitoring program within and beyond ML1684. The program utilises a network of:

- Five Dust Deposition Gauges (DDG) to determine the rate of dust deposition;
- One High Volume air sampler (Hi-Vol) to measure ambient concentrations of Total Suspended Particles (TSP). The Hi-Vol is run for a 24-hour period every six days; and
- One Tapered Element Oscillating Microbalance (TEOM) for continuous direct mass measurements of particulates (Situated in the township of Tomingley and located generally north of site at the interface of operations and residences).

The monitoring program undertaken by TGO is implemented to assess the impact of dust in the local area, to understand the source contribution to the ambient dust load and to improve the management and mitigation of dust emissions associated with site activities. Site monitoring locations and utilities are attached in Appendix B.

1.1 Purpose of this report

GHD have been engaged to analyse site air quality exceedances under section 17 of project approval no. 09_0155, specifically the 'short term impact assessment criteria for particulate matter' as shown in Table 1.

Table 1 Dust impact assessment criteria

Pollutant	*Averaging Period*	*Criterion[d]* ($\mu g/m^3$)
Total Suspended Particulate (TSP)	Annual	90
Particulate matter <10µm (PM_{10})	24 hour	50[a]

[a] *Total impact (i.e. incremental increase in concentration due to the project plus background concentrations due to all other sources).*

[d] *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Director-General.*

1.2 Scope

GHD has examined the 5-minute data from the TEOM to identify events associated with high dust loads. A memo-report has then been produced for each measured exceedance (attached in Appendix A) that summarises the event, weather conditions at the time, and postulates as to the likely source of the dust. This applies primarily to the TEOM PM_{10} data as supplied and limited Hi-Vol data which aligns with days of elevated dust reading

This review utilised data supplied from the TEOM, meteorological station and Hi-Vol sampler, including:

- PM_{10} and TSP concentration levels;
- Wind speed;
- Wind direction, and
- Rainfall.

Site weather data was utilised to determine the likely contribution of dust from the mine site to the exceedances identified at the TEOM and Hi-Vol. In the event of lack of data, regional weather can be utilised by triangulating the results of the Bureau of Meteorology (BoM) Sites for Dubbo, Narromine and Parkes.

1.3 Limitations

This report: has been prepared by GHD for Tomingley Gold Operations and *may only be used and relied on by Tomingley Gold Operations for the purpose agreed between GHD and the Tomingley Gold Operations as set out in section 1.2 of this report.*

GHD otherwise disclaims responsibility to any person other than Tomingley Gold Operations arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 1 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Tomingley Gold Operations and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Meteorology

2.1 Wind Rose

The wind rose for the months of February and March 2015 are shown below in Figure 1 and Figure 2. A major difference is evident between the months with winds from the southwest sector. In February, these winds are very infrequent, occurring less than 5 % of the time from each sub sector (SSW, SW and WSW). Comparatively, March has a much higher percentage of winds from the southwest sector, with 38 % of winds arriving from the S, SSW and SW.

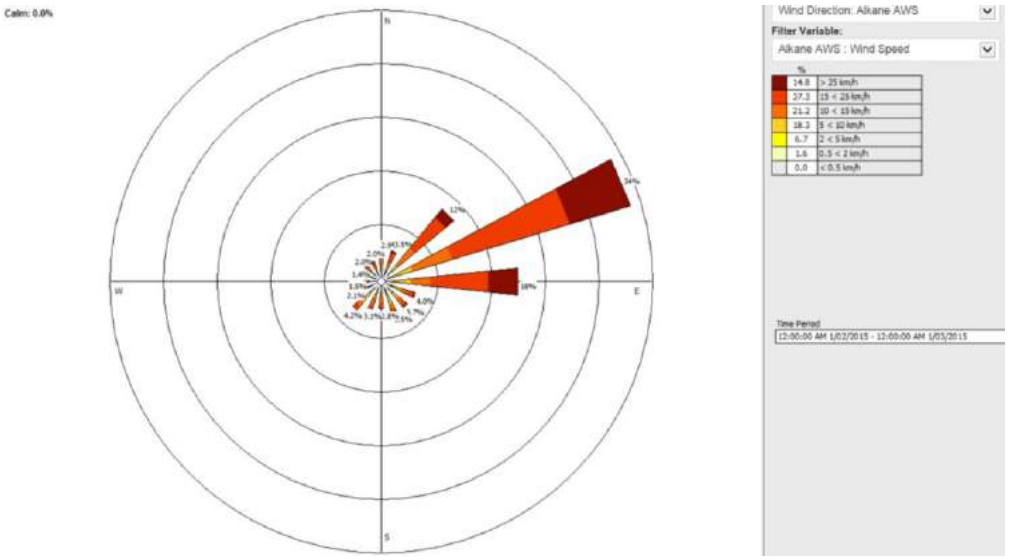

Figure 1 Wind rose for February 2015

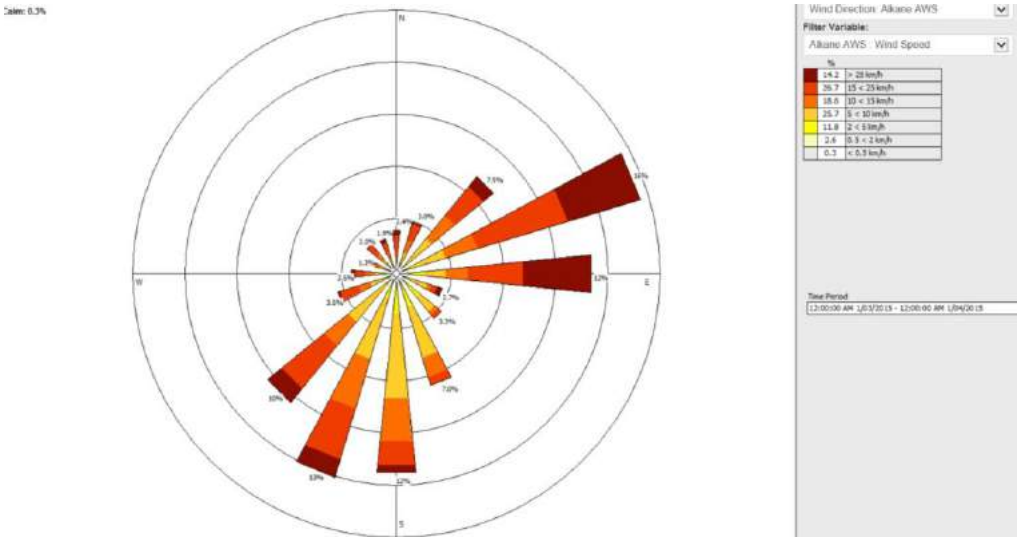

Figure 2 Wind rose for March 2015

2.2 Rainfall

Rainfall can provide natural dust mitigation. Rainfall days in Peak Hill, the nearest BoM AWS to Tomingley, are shown in Figure 3 over February and March 2015.

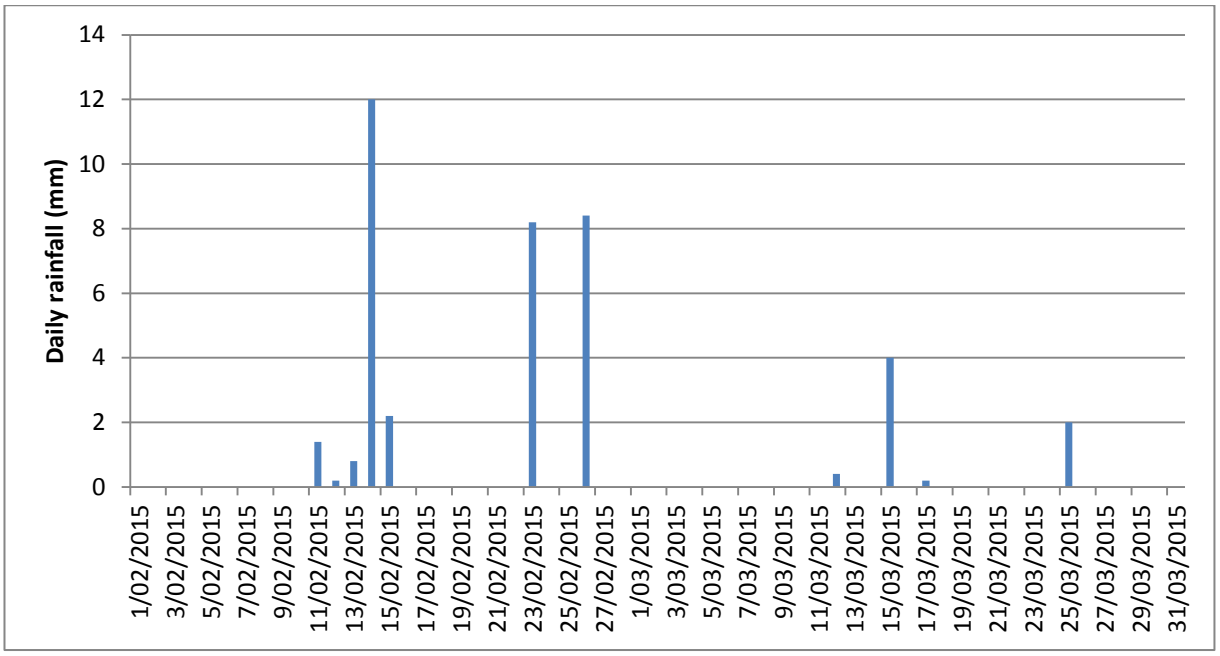

Figure 3 Daily rainfall over February-March 2015

3. Results

3.1 Summary of TEOM data

The 5-minute data from the TEOM instrument was obtained from the instrument operators so as to calculate longer term averages. A summary of each recorded day of an exceedance of the 24 hour PM_{10} criteria is shown below in Table 2.

Table 2 Exceedances during March 2015

Date	TEOM 24 hour average µg/m^3	Hourly maximum µg/m^3	Time(s) of highest dust levels
1 March 2015	60.7	270.2	16-17
4 March 2015	63.0	165.3	16-17
5 March 2015	152.7	377.1	8-9
6 March 2015	74.3	148.0	10-11
7 March 2015	55.8	153.1	7-8
9 March 2015	51.7	208.5	4-5
20 March 2015	71.0	149.6	11-12
27 March 2015	53.5	106.8	7-8
28 March 2015	51.3	205.1	20-21

3.2 Summary of dust impacts

A directional pollution analysis can be used to indicate the prevailing wind directions and wind speeds that create the highest and average dust load for discrete weather conditions. The directional pollution analysis for March 2015 is shown in Figure 4. As consistent with previous analyses of dust levels, high wind speeds in the south west sector are highly conducive to producing dust impacts. Sources within this directional arc (from the TEOM) contribute the most to the high values that elevate the daily mean dust concentration. Particular dust mitigation measures, especially during the high wind days, should be targeted at the identified sources.

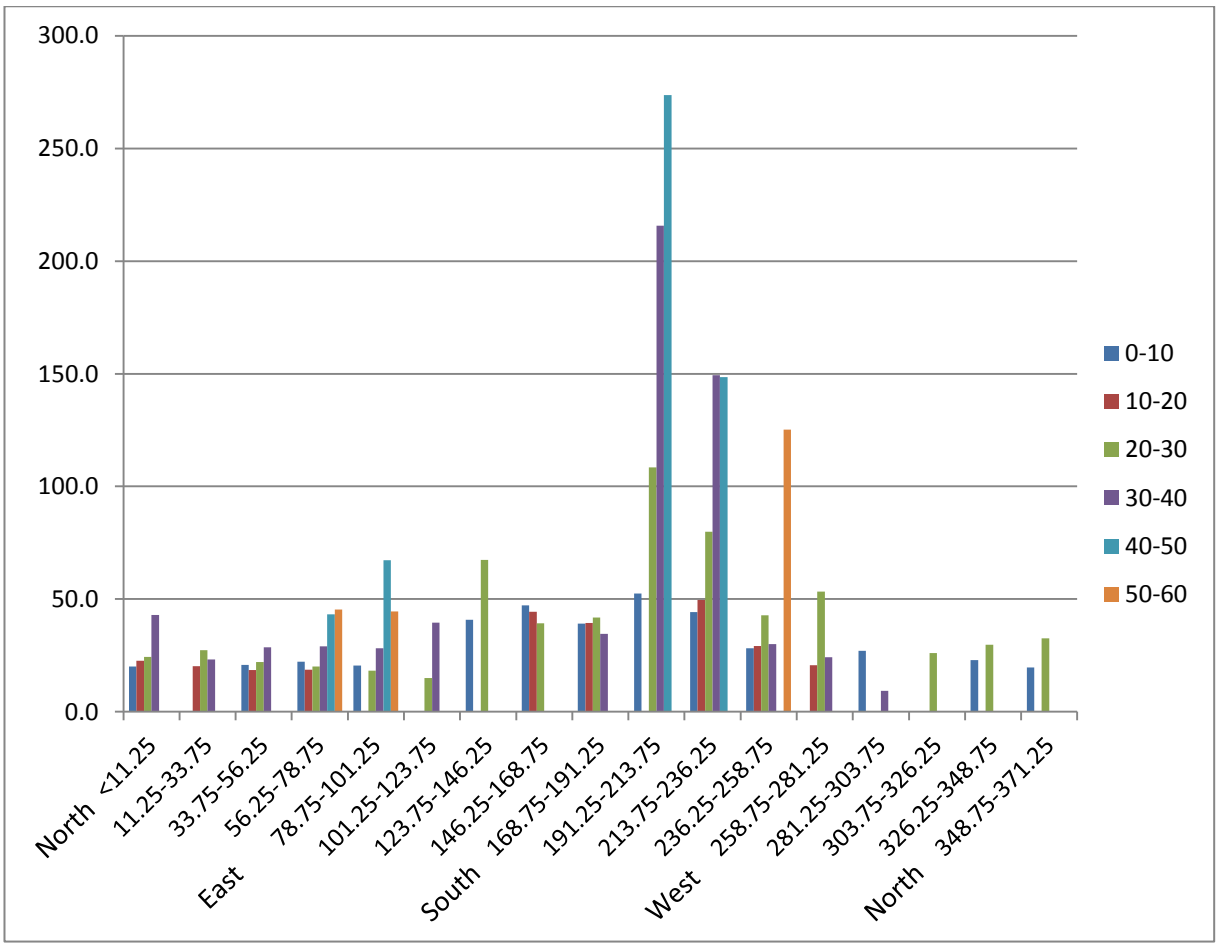

Figure 4 Directional analysis of 15-minute PM_{10} concentrations as a function of wind speed (km/h) and wind direction

Rainfall is also shown to be of importance for dust impact mitigation. As evident from Figure 3, increased rainfall in February has provided more mitigation than in March; where there are distinctive dry periods corresponding to days of dust exceedances. The wind roses also explain why no daily exceedances of the PM_{10} criterion were recorded in February, with a much lower incidence of winds from the southwest sector compared with March 2015.

4. Conclusion

Wind speeds above 30 km/h from the southwest sector have been shown to be the most likely wind condition to cause elevated dust impacts and have been shown to be a contributing factor to high dust levels off site and above the assessment criteria. This finding is consistent with the previous periods reported on.

As previously recommended, additional watering on haul roads and unsealed areas should be implemented during these periods when high winds speeds from the south or southwest are forecast. Targeting such dust mitigation practices at both Wyoming Three and Wyoming One may reduce dust impacts. An alternative is the temporary cessation of the dustiest operations if the TEOM can be used to transmit an alarmed state to operational managers or supervisors during higher wind speeds from the south west sector.

Appendices

Appendix A – Exceedance Reports

This appendix provides an analysis of days where the 24 hour average criterion is exceeded, as noted in section 3 above. For each exceedance day, a plot of 15-minute averaged data is shown for PM_{10} concentration (given in blue), wind direction (given in red) and wind speed in km/h (given in green). A wind rose is also provided to show general meteorological trends for the day.

1 March 2015

1 March 2015 recorded a PM_{10} exceedance of 60.7 $\mu g/m^3$ (24 hour average). The hourly average peaked at 270.2 $\mu g/m^3$ between the hours of 4:00 pm and 5:00 pm.

Wind direction and speed is shown in Figure 5 below. Strong wind speeds are evident on this day from the south southwest, with winds from this direction occurring 14 % of the time and 7.3% of the time from the southwest.

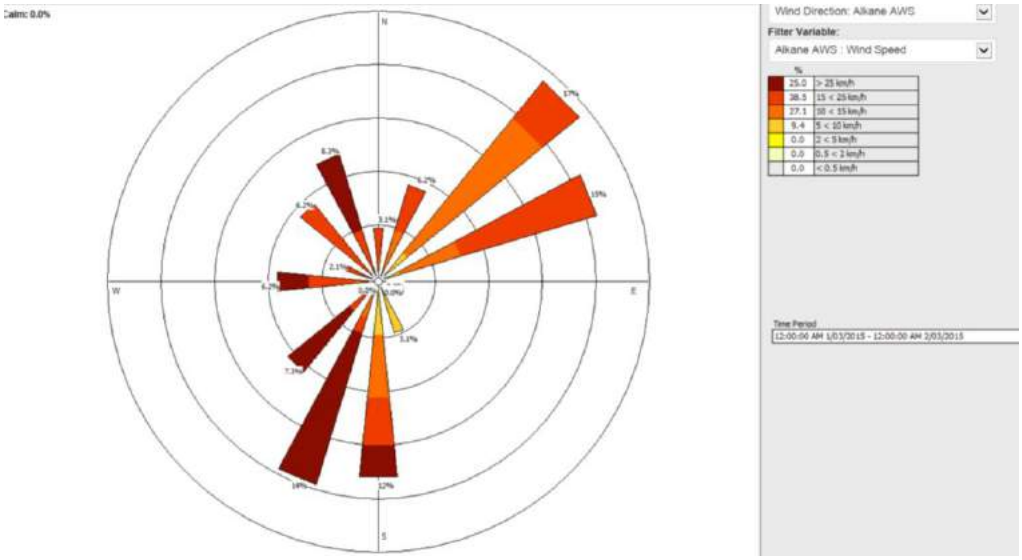

Figure 5 Wind rose for 1 March 2015

Daily (15 minute average) analysis of PM_{10} as well as wind speed and direction on 01 March is graphed in Figure 6. The highest recorded 15 minute concentration of PM_{10} occurred in the evening when winds swung around from the west to the south and PM_{10} levels reached 367 $\mu g/m^3$. An increase in wind speed is also evident during this period, where wind speeds reached up to 43 km/h. During this time, the township was downwind of the mine and dust impacts were thus likely due to mine operations.

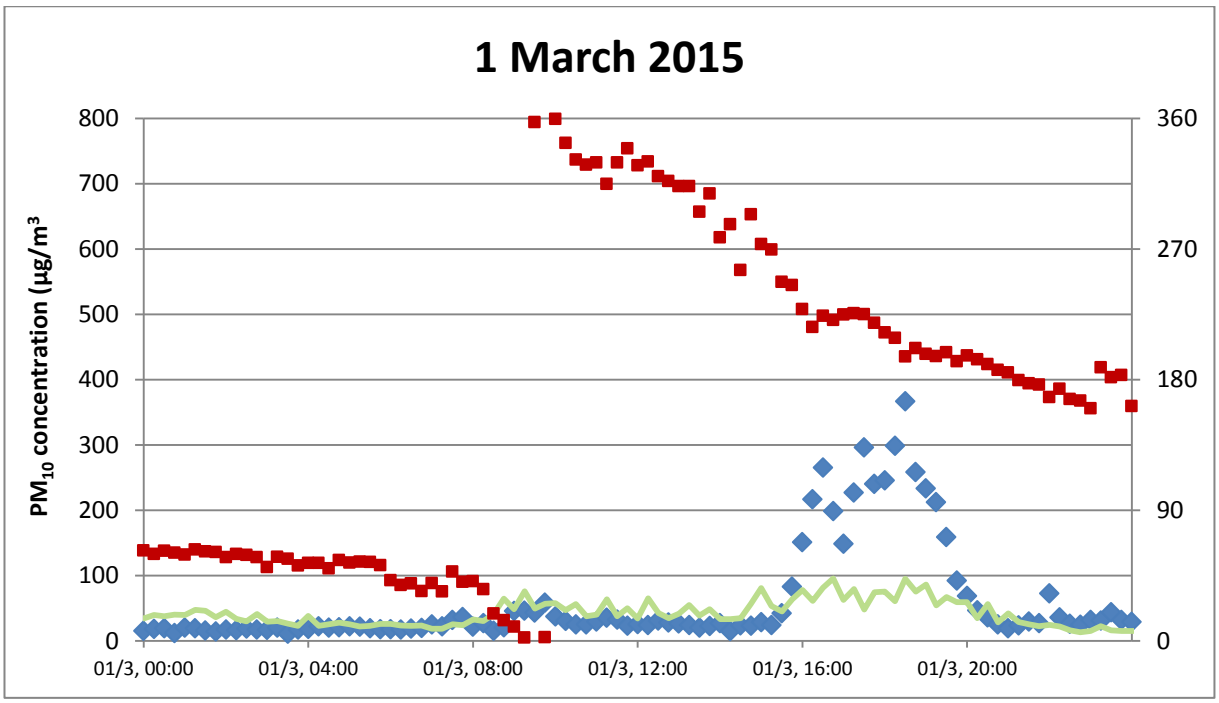

Figure 6 Dust impacts for 1 March 2015 (15 minute averages, µg/m^3)

4-7 March 2015

This four day period in March 2015 recorded PM_{10} exceedances of 63.0, 152.7, 74.3 and 55.8 $\mu g/m^3$. The hourly average peaked at 377.1 $\mu g/m^3$ between the hours of 8:00 am and 9:00 am on 05 March 2015.

Wind direction and speed for 4-7 March 2015 is shown in Figure 7 below as a wind rose. Winds were predominantly from the southwest quadrant and southerly sector over this time, with winds from the southwest occurring 27 % of the time. A high proportion of these winds were above 25 km/h. Winds were virtually absent from the north.

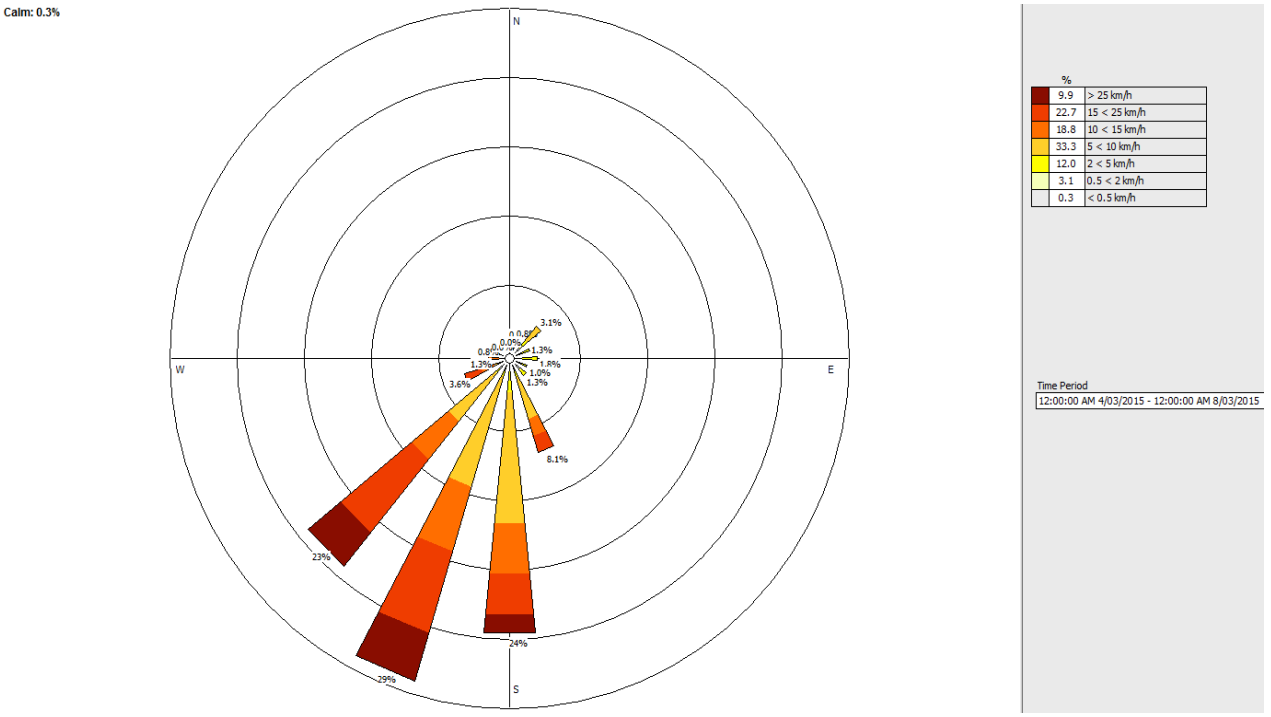

Figure 7 Wind rose for 4-7 March 2015

Daily (15 minute average) analysis of PM_{10} as well as wind speed and direction over the four day period is graphed in Figure 8. Over this period, high incidences of winds are evident from the south southwest and throughout much of these periods the incidence of dust levels increase. Higher wind speeds on 5 March throughout much of the day result in raised levels of PM_{10} and some spikes occurring throughout. This trend is evident throughout the four-day period, with the combination of higher wind speeds and southwest winds increasing levels of PM_{10}. This suggests that dust from the mine affects the levels of PM_{10} during periods of winds from this sector.

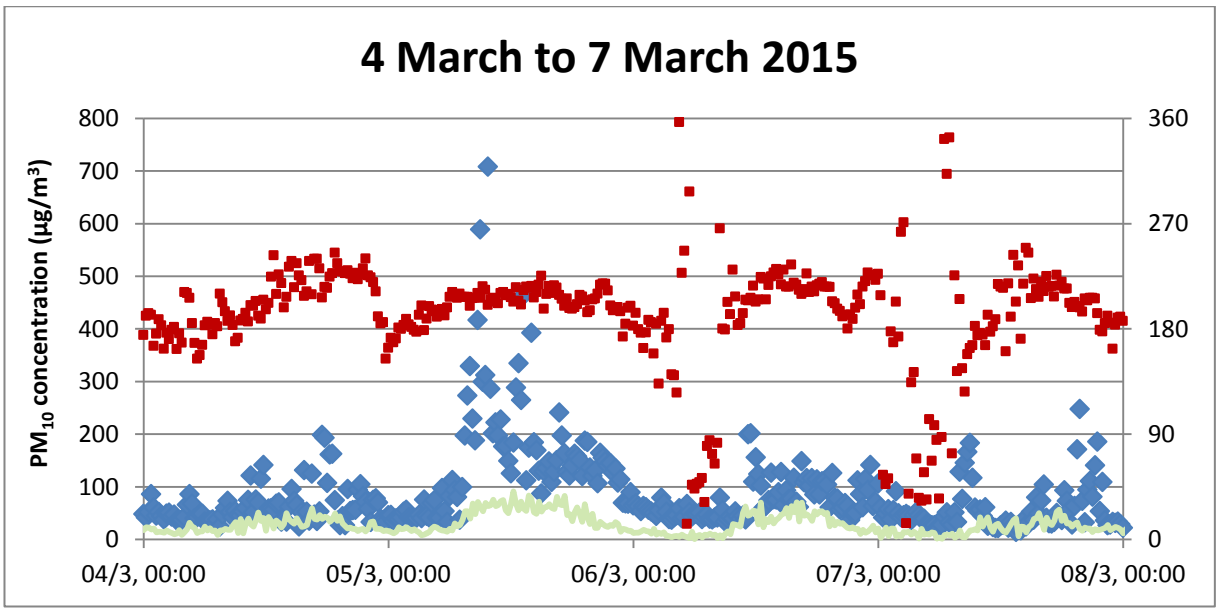

Figure 8 Dust impacts for 4 March to 7 March 2015 (15 minute averages, µg/m³)

9 March 2015

9 March 2015 recorded a PM_{10} exceedance of 51.7 $\mu g/m^3$ (24 hour average). The hourly average peaked at 208.5 $\mu g/m^3$ between the hours of 4:00 am and 5:00 am.

Wind direction and speed for 9 March 2015 is shown in below in Figure 9 as a wind rose. The predominant wind direction was ENE (18%) however the stronger dominating winds ranged from a SSE through to WSW (63%). A high proportion of these winds were between 15 and 25 km/h.

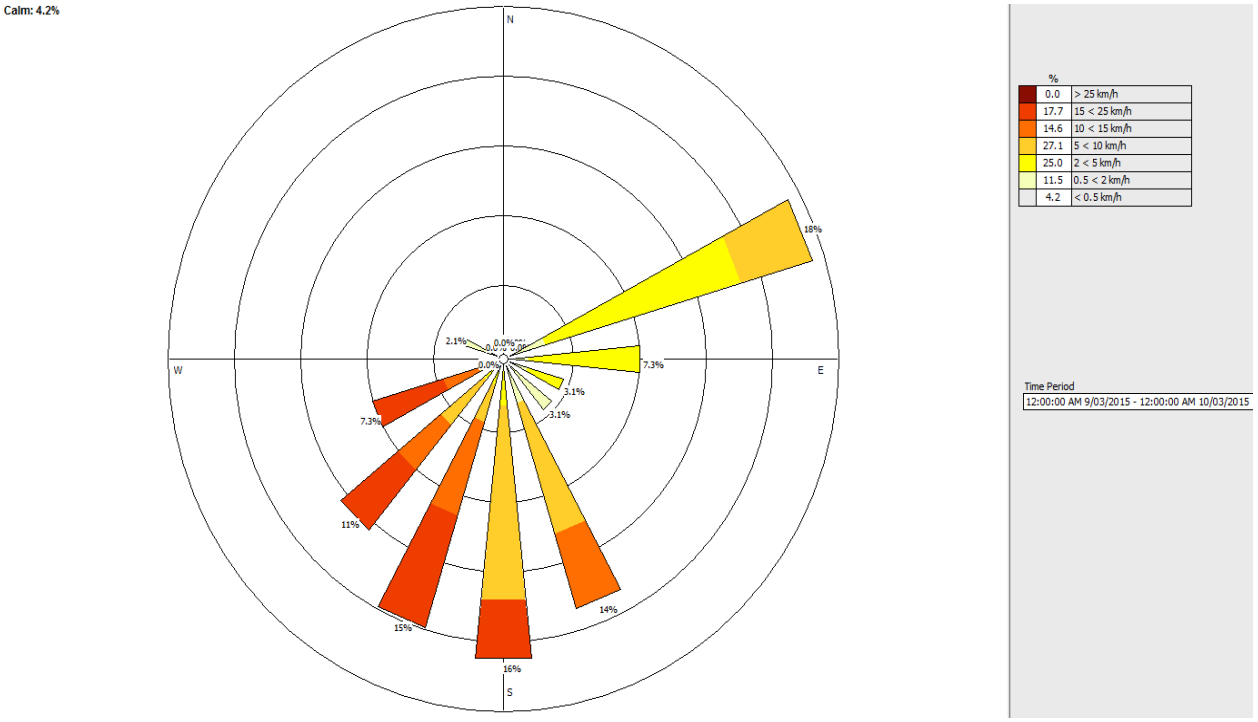

Figure 9 Wind rose 9 March 2015

Daily (15 minute average) analysis of PM_{10} as well as wind speed and direction on 09 March is graphed in Figure 10. A significant spike in PM_{10} levels is evident in the early morning from 5am to 6 am, during light wind speeds and inconsistent wind directions. A slight increase in dust levels is evident around mid-afternoon in Figure 10 when winds speeds increase slightly and the predominant wind direction is southwest. Wind speed throughout the day was light to moderate, however, coupled with the predominate wind direction and the lack of any regional rainfall between events suggest that dust from the mine affects the levels of PM_{10} during this period.

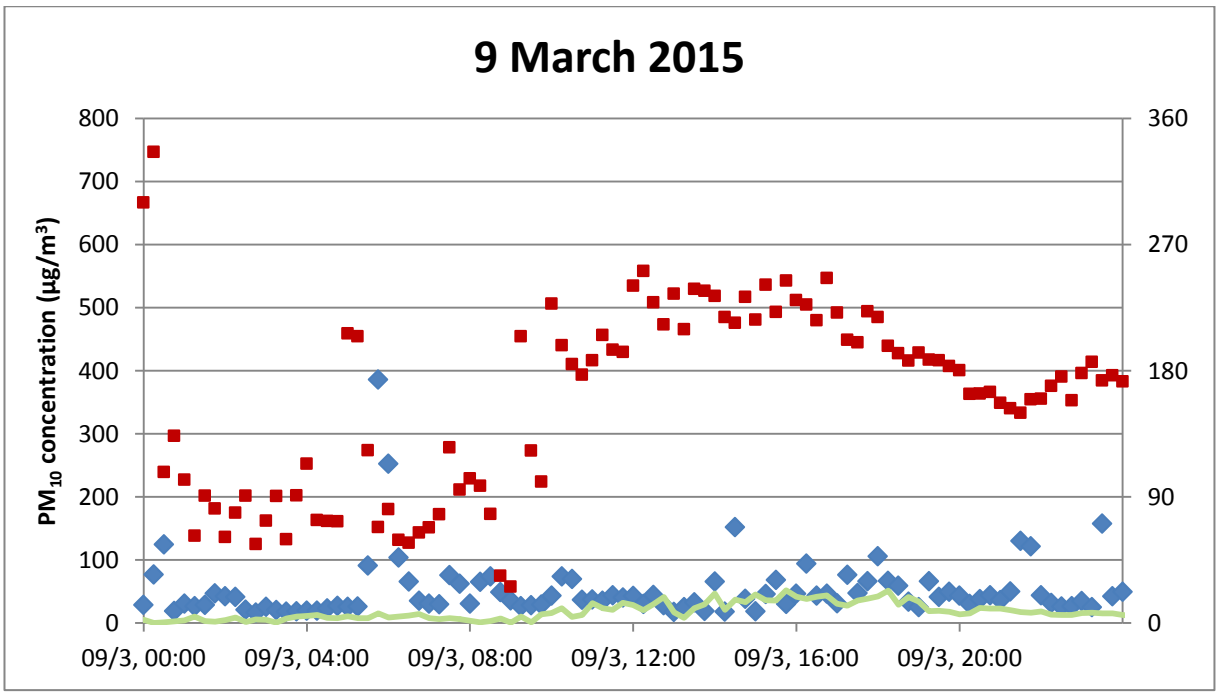

Figure 10 Dust impacts for 9 March 2015 (15 minute average, µg/m^3)

20 March 2015

20 March 2015 recorded a PM_{10} exceedance of 71.0 µg/m^3 (24 hour average). The hourly average peaked at 149.6 µg/m^3 between the hours of 12:00 pm and 1:00 pm.

Wind direction and speed for 20 March 2015 is shown in below in Figure 9 as a wind rose. The predominant wind direction was SSW (27%), and the majority of high wind speeds arriving from the south to southwest. Lighter wind speeds are also evident from the northeast and east northeast.

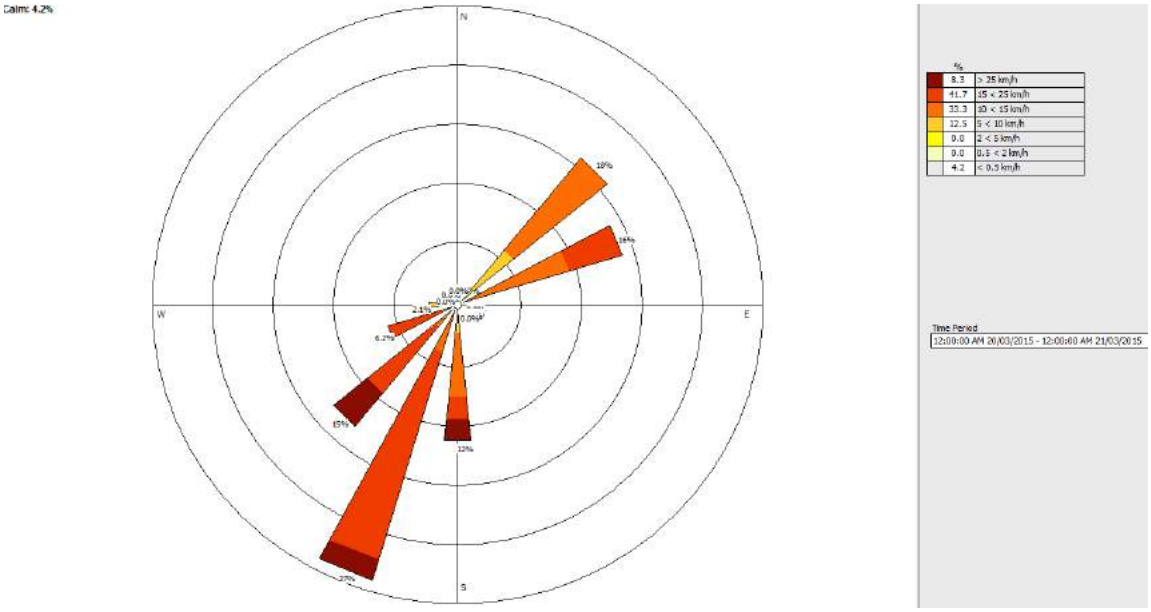

Figure 11 Wind rose 20 March 2015

Daily (15 minute average) analysis of PM_{10} as well as wind speed and direction on 20 March 2015 is graphed in Figure 12. An increase in dust levels is evident in the afternoon in Figure 12 when winds speeds increase slightly and the predominant wind direction switches to a south/south southwest for the remainder of the day. Considering this, the lack of regional agricultural activities reported to be undertaken during this period, suggest that dust from the mine affects the levels of PM_{10} during this period.

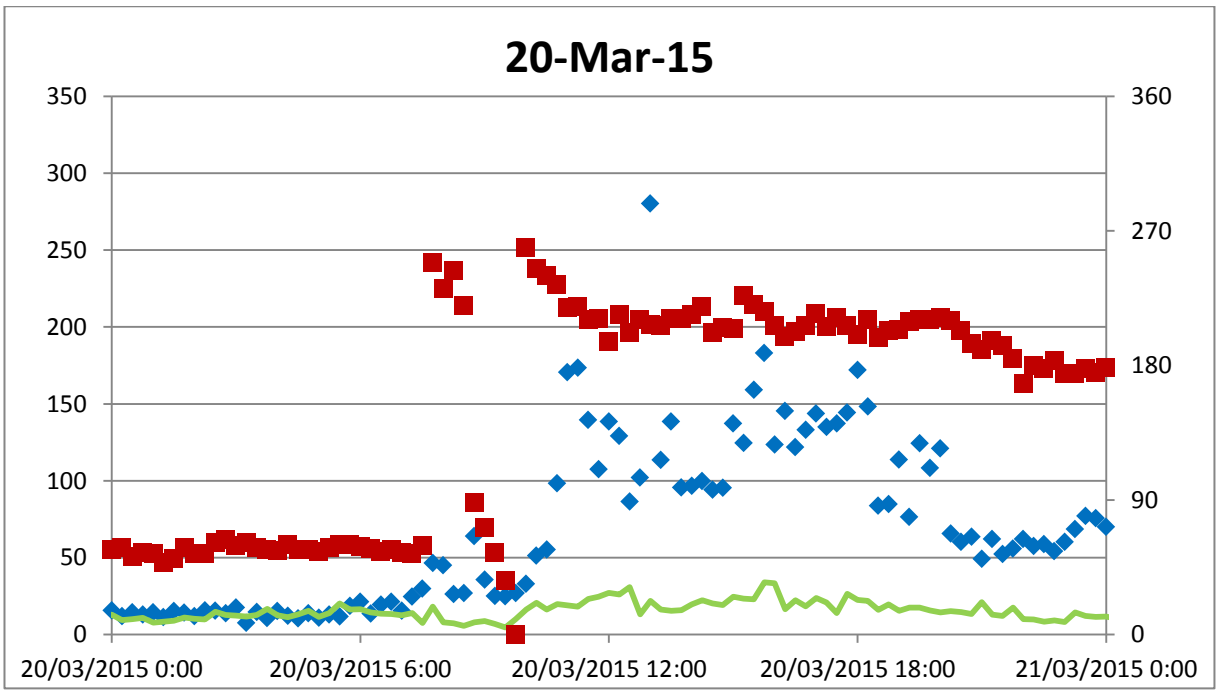

Figure 12 Dust impacts for 20 March 2015 (15 minute average, µg/m^3)

27 – 28 March 2015

27 to 28 March 2015 recorded PM_{10} exceedances of 53.5 and 51.3 µg/m^3 respectively (24 hour average). The hourly average peaked at 205.1 µg/m^3 between the hours of 8 pm and 9 pm on 28 March 2015.

Wind direction and speed for 27 to 28 March 2015 is shown in below in Figure 9 as a wind rose. Winds are almost exclusively from the southern sectors, consisting of light to moderate wind speeds.

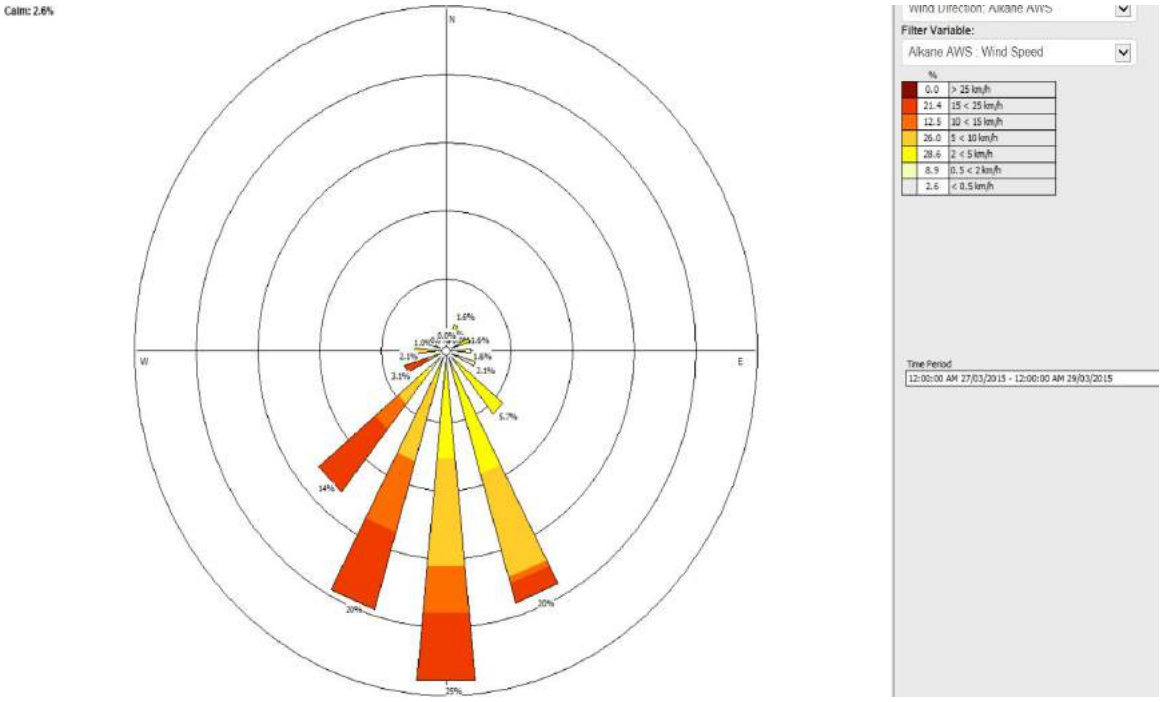

Figure 13 Wind rose for 27 to 28 March 2015

Daily (15 minute average) analysis of PM_{10} as well as wind speed and direction for 27 to 28 March 2015 is graphed in Figure 14. Dust levels are shown to remain moderately high for much of the period, dominated by winds with a distinct southerly component. This distinct southerly, meant that the township was downwind of the mine's dust sources over the two day period.

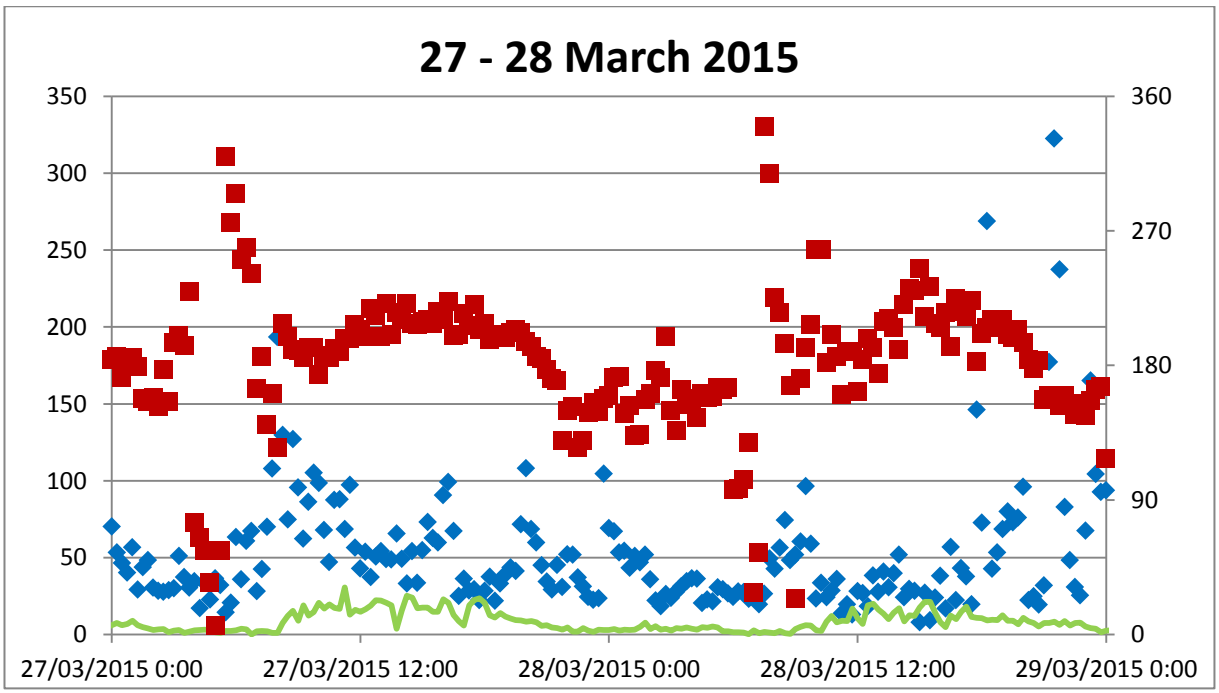

Figure 14 Dust impacts for 27 to 28 March 2015 (15 minute average, µg/m^3)

GHD

72 McNamara St, Orange, NSW 2800
PO BOX 950, Orange, NSW 2800
T: (02) 6393 6400 F: (02) 6393 6401 E: oagmail@ghd.com

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	Brett McKay James Locke	Barry Cook	*Barry Cook #*	Daniel Mees		8 April 2015

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Appendix D

Notification of Property Vegetation Plan Registration

Local Land Services
Central West

RECEIVED
21 MAY 2015

Contact: Paul Nicholls
T: 02 6851 9516 M: 0428 973 194
E: paul.nicholls@lls.nsw.gov.au

File: CW01825
Request Number: 18458

Mr Mark Williams
Tomingley Gold Operations Pty Ltd
PO Box 59
TOMINGLEY NSW 2869

7 May 2015

Dear Mr Williams

The Tomingley Gold Operations Property Vegetation Plan is now registered on title with Land and Property Information.

Registration date	Dealing number
6/05/2015	AJ459447

Please retain the attached copy of the Registration Notice for your records. For any enquiries please contact Paul Nicholls on telephone 02 6851 9516 or e-mail on paul.nicholls@lls.nsw.gov.au.

Yours sincerely

Paul Nicholls
Senior Land Services Officer
Central West Local Land Services

Box : 6256D

CENTRAL WEST LOCAL LAND SERVICES
P.O. Box 2105
Dubbo 2830

NSW GOVERNMENT Land & Property Information
A division of the Department of Finance & Services
1 Prince Albert Rd
Sydney NSW 2000
Ph 1300 052 637
Fax (02) 9233 4357
www.lpi.nsw.gov.au

Date: 6/5/2015

REGISTRATION NOTICE

THE UNDERMENTIONED DEALING(S) WERE REGISTERED/RECORDED ON 6/5/2015

DEALING NUMBERS: AJ459447 VP

LODGMENT INVOICE NUMBER: C610726

YOUR REFERENCE: 20PVP00168

TITLE REFERENCE(S): 185/43458
31-32/755110
35/755110
73-74/755110
81/755110
AND OTHERS.

REGISTRAR GENERAL

Appendix E

GHD Discharge Impacts Investigation Report

Memorandum

12 February 2015

To	Tomingley Gold Operations		
Copy to	Mark Williams, Ady Watson		
From	Dr Jill Woodworth	Tel	61 3 6332 5532
Subject	TGO breach of haul road drainage line	Job no.	21/24324

1 Introduction

Tomingley Gold Operations (TGO) engaged GHD to provide advice to assist in assessment of metal concentrations and other water quality parameters contained in stormwater runoff samples. The samples were taken to provide information on the potential environmental impacts of an incident where stormwater ran offsite at TGO on 5 January 2015 in breach of their Environment Protection Licence number 20169 (EPL20169).

The following information was provided in relation to the incident:

- A copy of the initial written report to the EPA
- A copy of water quality results taken during and immediately after the occurrence, and
- Photos of the area during the occurrence.

2 Water Quality Results

Samples were taken from the following locations along the Caloma Central Drainage line:

- Fence line (sampled 5 and 6 January)
- Clean drain culvert (6 January)
- Clean drain north (6 January)
- Clean drain far north (6 January)
- Clean drain south (6 January)

The results of stormwater runoff leaving site and entering the Newell Highway Road reserve were compared to the ANZECC (2000) livestock drinking water guidelines (Table 1). The stormwater runoff did not enter any waterways surrounding the site therefore livestock and native animals are the most likely organisms to come into contact with the water. The ANZECC (2000) aquatic environment species protection trigger levels were not used in this assessment as there are no receptor freshwater ecosystems at this site. Metals were analysed and reported as total metals.

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Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia
T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Memorandum

Table 1 Water quality results summary

Parameter	Units	ANZECC 2000 Stock Watering	Clean Drain Far North	Clean Drain North	Clean Drain Culvert	Clean Drain South	Fence line	Fence line
			6/01/2015	6/01/2015	6/01/2015	6/01/2015	5/01/2015	6/01/2015
EC (lab)	µS/cm		506	376	405	387	343	388
pH (Lab)	pH Units		7.16	7.44	7.18	7.28	7.06	7.15
TSS	mg/L		12	38	74	58	3340	77
TDS	mg/L	5000	339	252	271	259	230	260
Aluminium	mg/L	5	1.08	5.79	7.41	5	152	5.63
Arsenic	mg/L	0.5-5	0.004	0.021	0.058	0.049	0.657	0.051
Cadmium	mg/L	0.01	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	<0.0001
Chromium	mg/L	1	0.005	0.004	0.008	0.007	0.203	0.008
Copper	mg/L	0.4	0.006	0.005	0.016	0.016	0.435	0.021
Lead	mg/L	0.1	<0.001	0.002	0.002	0.001	0.034	0.002
Nickel	mg/L	1	0.004	0.004	0.007	0.006	0.15	0.006
Zinc	mg/L	20	0.025	0.043	0.045	0.05	0.564	0.076
Nitrate (as N)	mg/L	90	<0.01	1.19	0.09	<0.01	0.12	<0.01
Phosphorus	mg/L		0.22	0.19	0.23	0.19	3.4	0.19

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Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia
T 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

3 Discussion

On 5 January 2015, following 47 mm of rainfall in the preceding 48 hours, rainfall runoff flowed along the haul road from Waste Rock Emplacement 3 and onto the Sediment Basin 4 access road then flowed from the access road into the Caloma Central Drain. The incident resulted from the failure to reinstate a windrow on completion of road works at the intersection of the haul road and access road, allowing water to pond at this location and overflow into the Caloma Central Drain. Stormwater from the drain then entered the Newell Highway road reserve where it was assimilated into the surrounding terrestrial environment. The stormwater runoff from the TGO site did not enter any natural waterways.

As discussed previously, the incident involved only stormwater surface runoff and did not include any dirty water from the site sediment basins. Therefore comparison of the stormwater runoff water quality results against the EPL concentration limits is not applicable. The stormwater runoff did not enter any natural waterways therefore the application of ANZECC (2000) trigger values is not appropriate. The water quality results have been compared to the livestock watering guidelines.

As there are no livestock drinking water quality guidelines for TSS, the TDS was calculated for the sample sites using the formula:

EC (µS/cm) x 0.67 = TDS (mg/L) (ANZECC 2000, Section 4.3.3.5).

The TDS was calculated as it does have the potential to adversely impact stock upon ingestion, whereas, TSS will not cause adverse impacts as stock usually stand at the edge of the water to drink and stir up sediment thus increasing the TSS during the process. The calculated TDS is below the concentration that would adversely impact stock as shown in Table 1.

Aluminium is commonly detected in elevated concentrations in stormwater runoff as it is naturally occurring in soils and is related to the geology of an area. The results along the fence line show that the elevated concentrations detected on the 5 January 2015 dropped rapidly by the 6 January 2015. The aluminium results from the clean drain sites indicated that aluminium may be naturally occurring in high concentrations in this area.

There were four exceedances of the livestock guideline limit for total aluminium of 5 mg/L at the following locations; Caloma Central Drain north (5.79 mg/L) and culvert (7.41 mg/L) sampling locations, and at the fence line samples (152 mg/L and 5.63 mg/L). Short term exposure of livestock ingesting concentrations of aluminium above the guideline is unlikely to pose an adverse risk to the animals.

ANZECC (2000) livestock drinking water guideline provides a range of concentrations for total arsenic with a minimum of 0.5 mg/L up to a maximum of 5 mg/L as long as arsenic is not provided as a food additive and natural levels in the diet are low. No exceedances were observed of the maximum total arsenic limit, however one exceedance of the minimum limit of 0.657 mg/L was detected at the fence line location during the 5 January 2015 sampling event. As discussed above, the risk of adverse impacts occurring from a short term exposure is low, particularly as the concentration at that site decreased substantially within 24 hours.

GHD
Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia
T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

4 Conclusions

Stormwater runoff collected from the fence line exceeded livestock drinking water on the 5 January 2015 for the naturally occurring metals, aluminium and arsenic. However, the metals reduced substantially at the site within 24 hours. The risk of harm to any animal ingesting small volumes of the stormwater in a short time frame would be low. Further, the ultimate fate of the stormwater runoff may possibly be a farm dam, if this is correct, the metals associated with the suspended solids would reduce quickly in a static water body as the particles will drop out of suspension and adhere to the clayey sediment in the dam, thus reducing the total metal concentrations in the water.

Please contact Demelza Scott or the undersigned if you require any additional assistance.

Regards

Dr Jill Woodworth
Principal Environmental Scientist
Ph: 03 6332 5532

Appendix F

Groundwater Monitoring Data

2015 Groundwater Bore Monitoring Results

Analyte	Trigger values for GDCMB01	GDCMB 01			WYMB 01			WYMB 02			WYMB 03			WYMB 04			WYMB 06			WYMB 10		
		Concentration			Concentration			Concentration			Concentration			Concentration			Concentration			Concentration		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Alkalinity (Bicarbonate as CaCO3)		55	82	72.25	343	362	353.5	982	1080	1020.25	1120	1220	1165	959	1020	982.5	1080	1160	1122.5	892	965	929.25
Alkalinity (Carbonate as CaCO3)		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Alkalinity (Hydroxide) as CaCO3		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Alkalinity (total) as CaCO3		55	82	72.25	343	362	353.5	982	1080	1020.25	1120	1220	1165	959	1020	982.5	1080	1160	1122.5	892	965	929.25
Ammonia as N	0.9	0.01	0.04	0.02333	0.13	0.16	0.146667	0.01	0.04	0.023333	0.01	0.1	0.046667	0.03	0.03	0.03	0.01	0.06	0.03	0.01	0.08	0.05
Anions Total		3.51	4.74	4.1125	128	144	134	248	258	254	238	249	243.25	303	317	311	149	175	161	318	329	323.25
Arsenic	0.024	0.002	0.005	0.004	0.003	0.006	0.0045	0.001	0.01	0.004	0.002	0.01	0.004	0.001	0.01	0.0055	0.019	0.036	0.02675	0.002	0.01	0.008
Cadmium	0.0002	0.0001	0.0001	0.0001	0.0001	0.0002	0.000125	0.0001	0.001	0.000325	0.0001	0.001	0.000325	0.0001	0.001	0.00055	0.0001	0.0002	0.000125	0.0002	0.001	0.0008
Calcium		2	11	5.25	235	301	254.75	54	166	127.5	171	214	191.75	227	298	267	101	166	147.5	131	251	211.5
Cations Total		3.32	4.89	4.2575	109	127	120.5	240	309	262.75	220	275	241.5	288	314	300.75	124	159	148.75	309	394	338.25
Chloride		54	75	61	3620	3840	3707.5	6750	6950	6850	6200	6420	6307.5	8270	8590	8400	2920	3460	3207.5	8560	8730	8650
Chromium (III+VI)	0.025	0.003	0.02	0.0145	0.001	0.005	0.002	0.001	0.01	0.00325	0.001	0.01	0.0035	0.001	0.01	0.00575	0.001	0.006	0.00325	0.001	0.01	0.00775
Copper	0.002	0.006	0.015	0.0115	0.001	0.012	0.005	0.002	0.01	0.0045	0.001	0.01	0.00475	0.003	0.01	0.00675	0.005	0.019	0.013	0.004	0.01	0.0085
Cyanide (Free)	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Cyanide (WAD)	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Cyanide Total	0.004	0.004	0.004	0.004	0.004	0.01	0.00575	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.045	0.077	0.064	0.004	0.004	0.004
Electrical conductivity *(lab)	706	472	510	493.75	12200	12300	12250	22600	22900	22775	21400	21500	21450	27100	27500	27300	13000	14700	13925	28300	28700	28500
Fluoride		0.2	0.3	0.26667	0.1	0.2	0.166667	0.6	0.6	0.6	0.6	0.7	0.633333	1.7	2	1.8	0.4	0.5	0.466667	0.8	1	0.866667
Hardness as CaCO3		13	40	22.25	1480	1670	1592.5	1960	2310	2117.5	2340	2860	2502.5	3010	3700	3240	1370	1990	1700	2690	3210	2977.5
Ionic Balance		2.88	9.22	4.9275	1.23	13.9	5.2575	0.27	8.98	3.225	0.9	4.9	3.02	0.82	4.53	2.1325	2.19	8.86	5.1525	0.97	8.84	3.34
Iron	21.1	3.51	18.6	13.7025	0.1	2.77	0.9475	0.15	0.52	0.345	0.05	0.5	0.2375	0.23	1.63	0.8725	0.05	2.52	1.0775	0.31	1.67	0.8475
Lead	0.015	0.003	0.012	0.007	0.002	0.053	0.01775	0.006	0.012	0.0095	0.001	0.01	0.00475	0.002	0.012	0.00775	0.001	0.056	0.0215	0.001	0.01	0.00775
Magnesium		2	3	2.25	214	263	232.25	395	529	437	454	566	492.5	588	723	624.5	271	382	323.25	521	700	595.25
Mercury	0.0006	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.00015	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Nickel	0.015	0.003	0.014	0.00925	0.003	0.009	0.00625	0.002	0.01	0.004	0.005	0.041	0.01725	0.003	0.01	0.007	0.022	0.055	0.03725	0.009	0.01	0.00975
Nitrate (as N)		11	14.6	12.75	0.02	0.08	0.035	0.65	0.69	0.665	0.35	0.38	0.3675	0.12	0.24	0.1525	0.18	0.32	0.2425	0.44	0.8	0.5675
Nitrite (as N)		0.01	0.01	0.01	0.01	0.11	0.035	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.0125	0.01	0.03	0.015
Nitrite + Nitrate as N		11	14.6	12.75	0.02	0.13	0.0625	0.65	0.69	0.665	0.35	0.38	0.3675	0.12	0.24	0.1525	0.2	0.32	0.2475	0.47	0.8	0.575
pH (Lab)	6-8.5	6.95	7.11	7.03	7.37	7.9	7.54	7.37	7.85	7.5175	7.23	7.84	7.425	7.38	7.93	7.535	7.42	8.13	7.7175	7.36	7.86	7.5075
Potassium		1	2	1.5	5	9	6.5	8	11	9.75	12	16	14.25	14	18	16.5	5	10	7.75	20	24	22.5
Reactive Phosphate		0.18	0.32	0.25	0.04	0.16	0.1	0.21	0.23	0.22	0.09	0.15	0.13	0.01	0.1	0.06	0.09	0.36	0.256667	0.3	0.79	0.48
Reactive Phosphorus as P		0.03	0.1	0.06	0.01	0.05	0.03	0.07	0.08	0.075	0.03	0.05	0.045	0.01	0.02	0.015	0.02	0.12	0.0675	0.1	0.26	0.1475
Sodium		69	95	86.75	1820	2140	2035	4560	6030	5057.5	3980	4990	4392.5	5220	5590	5412.5	2230	2840	2635	5800	7560	6390
Sulfate as SO4 - Turbidimetric		22	25	23.75	886	1360	1063.5	1790	2180	1932.5	1850	2330	2025	2410	2910	2607.5	2020	2730	2305	2660	3300	2925
TDS		390	705	589.25	7060	7860	7532.5	12800	14600	13475	12900	14200	13475	17800	19200	18500	7940	9870	9022.5	19000	19900	19300
TSS		5	378	101	5	32	11.75	5	24	10.5	5	8	5.75	5	659	178.5	5	38	14	5	24	13.25
Zinc	0.071	0.02	0.044	0.03325	0.014	0.097	0.05075	0.014	0.054	0.03625	0.034	0.079	0.05325	0.05	0.18	0.10675	0.049	0.18	0.11325	0.05	0.077	0.06125

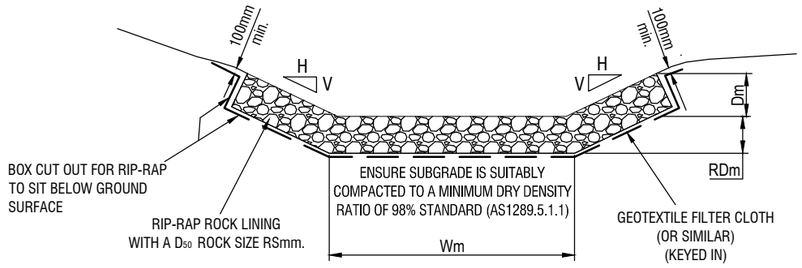
2015 RSF Piezometer Monitoring Results

Piezometer	Sampling Date	Depth of water	Field pH	Field EC (uS_cm)	Ionic Balance	Lab_pH	Lab_EC_uS_cm	Dissolved solids	Suspended solids	Ammonia	Alkalinity ($CaCO_3$)	Aluminium	Arsenic	Bicarbonate	Cadmium (mg/L)	Calcium (dissolved)	Carbonate	Chromium	Chloride (mg/L)	Copper (mg/L)	Cyanide (Free)
RSFMP05	08-Jan-15				0.56	7.52	14300	9300	186	0.04	366	0.75	0.002	366	<0.0001	74	<1	<0.001	4120	0.064	<0.004
	02-Feb-15	5.37			0.49	7.27	15200	9880	1780	0.01	594	<0.1	0.001	594	<0.0001	78	<1	<0.001	4330	0.003	<0.004
	02-Jun-15	6.22			1.5	6.78	13000	8450	150	<0.01	207	<0.01	0.002	207	<0.0001	61	<1	<0.001	3420	0.008	<0.004
	08-Sep-15	-7.14	6.91	9410	2.9	7.27	9990	6490	729	<0.01	429	0.01	0.002	429	<0.0001	52	<1	<0.001	2720	0.002	<0.004
RSFMP06	02-Feb-15	1.27			4.39	8.03	1030	670	1140	424	0.03	0.02	0.015	424	<0.0001	1	<1	<0.001	36	0.004	<0.04
	02-Jun-15	1.23			2.97	8.11	871	566	503	360	0.02	0.03	0.018	360	<0.0001	2	<1	<0.001	29	0.002	<0.04
RSFMP07	09-Sep-15	5.5			2.53	7.01	3700	2400	8190	0.15	433	0.01	0.002	433	<0.0001	41	<1	<0.001	749	0.005	<0.004

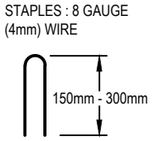
Piezometer	Sampling Date	Cyanide (weak acid dissociable)	Hardness (as calcium carbonate)	Iron (Total)	Lead	Magnesium (mg/L)	Mercury (mg/L)	Nickel	Nitrate (mg/L)	Nitrate + Nitrite	Nitrite	Total nitrogen	TJK Nitrogen	Phosphate (mg/L)	Total Phosphorus	Reactive Phosphorus	Potassium (dissolved)	Selenium	Sodium (dissolved)	Sulphates	Zinc (mg/L)
RSFMP05	08-Jan-15	<0.004	1120	0.41	0.001	227	<0.0001	0.002	17.4	17.4	<0.01					<0.01	14	0.03	2760	845	0.035
	02-Feb-15	<0.004	1180	<0.05	<0.001	239	<0.0001	0.002	16	16	<0.01					0.02	16	0.03	2980	865	0.01
	02-Jun-15	<0.004	976	<0.05	<0.001	200	<0.0001	0.002	21.3	21.3	<0.01					<0.01	11	0.03	2360	872	0.025
	08-Sep-15	<0.004	694	<0.05	0.048	137	<0.0001	0.001	21	21	<0.01					0.01	9	0.04	1780	559	0.027
RSFMP06	02-Feb-15	<0.04	11	<0.05	<0.001	2	<0.0001	0.001	3.46	3.46	<0.01				0.05		5	<0.01	252	41	0.007
	02-Jun-15	<0.04	17	<0.05	<0.001	3	0.0001	<0.001	2	2	<0.01				0.04		5	<0.01	198	26	0.016
RSFMP07	09-Sep-15	<0.004	321	<0.05	0.007	53	<0.0001	0.02	2.68	2.7	0.02			0.12	0.12	0.12	5	0.02	623	268	0.012

Appendix G

Waste Rock Emplacement Rehabilitation Design



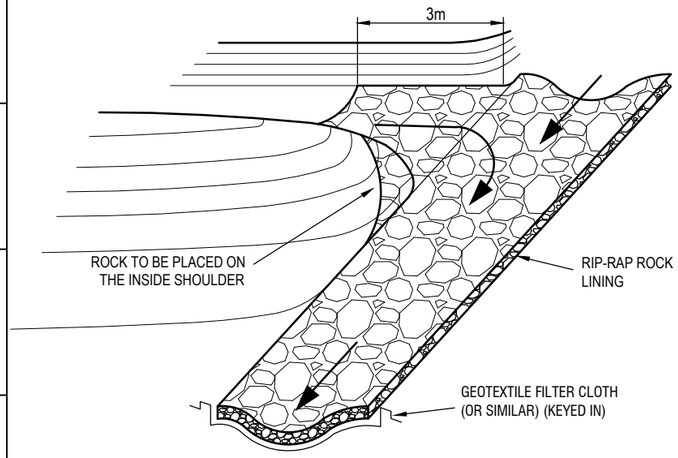
DROP STRUCTURE TYPICAL SECTION DETAIL



DESIGN LONGITUDINAL GRADE = G%

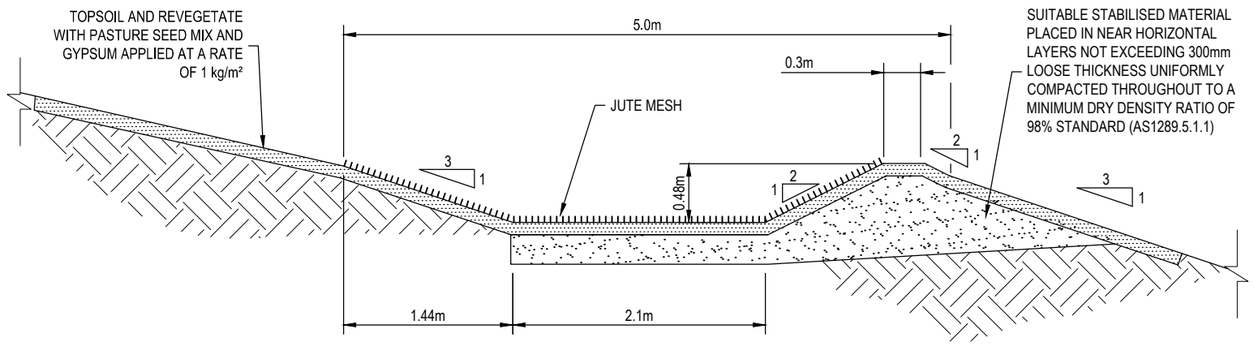
Option	ARI Event (Years)	Base Width W (m)	Side Slopes H:V	Longitudinal Slope G (%)	Channel Depth D (m)	Rock Depth RD (m)	Rock SIZE RS (mm)
1	100	3	3:1	33.33	0.70	0.75	500
2	100	4	3:1	33.33	0.60	0.70	450

NOTE: MAXIMUM ROCK SIZE SHALL NOT EXCEED THE ROCK DEPTH SPECIFIED



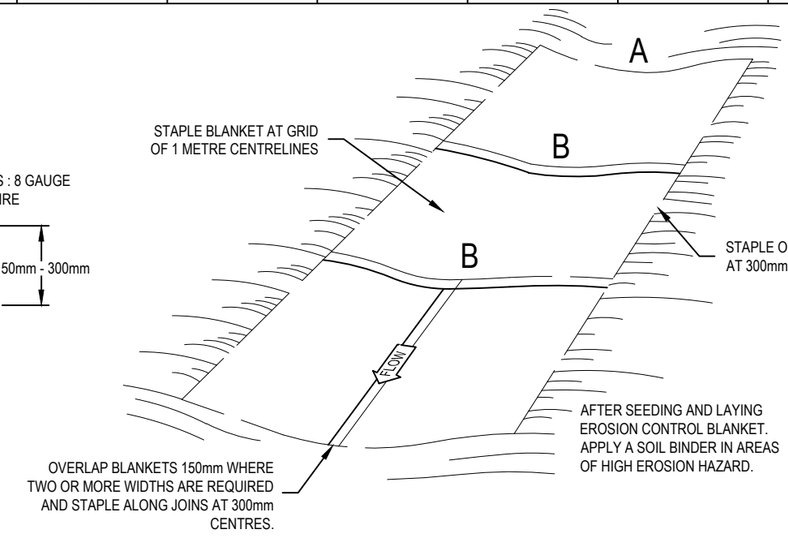
DROP STRUCTURE SCOUR PROTECTION

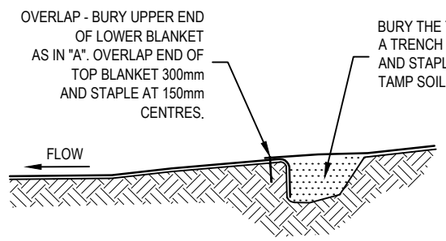
NOTE: IT IS IMPERATIVE THAT THE ENTRY POINTS OF ANY BERMS ARE LINED WITH GEOFABRIC AND RIP-RAP TO PROTECT AGAINST SCOUR. THE PROTECTION SHOULD EXTEND UP THE BERMS A MINIMUM OF 3m FROM THE EDGE OF THE DROP STRUCTURE.



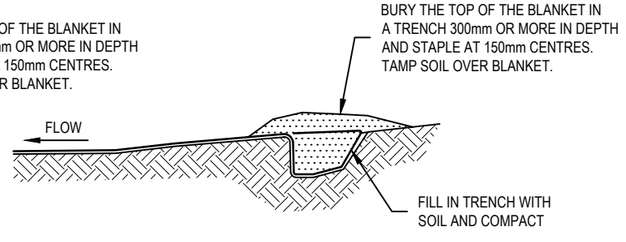
TYPICAL BERM CROSS SECTION (MINIMUM)

NOTE: BERM GRADED LONGITUDINALLY AT 1.2% (RECOMMENDED)





CENTRELINE SECTION AT POINT "B"



CENTRELINE SECTION AT POINT "A"

MATERIAL SPECIFICATIONS

GEOFABRIC

MS1 USE BIDIM A44 (MINIMUM) NON-WOVEN GEOTEXTILE FILTER CLOTH (GEOFABRIC)(OR SIMILAR) BETWEEN THE RIP RAP AND THE PARENT MATERIAL. MAXIMUM RESISTANCE BETWEEN THE RIP-RAP AND THE CLOTH IS REQUIRED. THIS CAN BE ACHIEVED BY:

- ENSURING PREPARATION OF THE BANK TO A ROUGH AND UNEVEN BATTER BEFORE PLACING THE CLOTH
- NOT STRETCHING CLOTH TIGHTLY OVER THE UNDERLYING BANK
- AVOIDING CLOTHS WITH LOW FRICTION SURFACES
- LAY GEOFABRIC IN "SHINGLE-FASHION", WITH THE END OF EACH UPSTREAM ROLL OVERLAPPING THOSE DOWNSTREAM. ENSURE EACH ROLL IS ANCHORED PROPERLY AT ITS UPSLOPE END.

ROCK RIP-RAP:

MS2. USE GRADED DURABLE RIP-RAP (ROCK) OVERLYING A SINGLE ONE-METRE-DEEP BASE OF STABILISED AND WELL COMPACTED SUBGRADE MATERIAL (MIN. SDDR 98%). STABILISE BY MIXING GYPSUM (NOM. 500mm DEEP INTO SUBGRADE) AT 0.5% BY WEIGHT AND THOROUGHLY COMPACT. RIP RAP SHOULD NOT BE SINGLE SIZED, BUT SHOULD BE A WELL-GRADED MIXTURE DESIGNED TO ENSURE THAT ALL GAPS BETWEEN LARGE ROCKS ARE FILLED WITH ROCK OF PROGRESSIVELY SMALLER SIZE SO THAT NO SIGNIFICANT VOIDS OCCUR IN THE RIP-RAP BLANKET. GRADING RECOMMENDATIONS ARE PROVIDED IN **TABLE 1** BELOW.

MS3. ROCK FOR RIP RAP SHOULD BE HARD, TOUGH AND DURABLE WITH A CRUSHING STRENGTH OF AT LEAST 25MPA. THE ROCK SHOULD BE FREE OF DEFINED CLEAVAGE PLANES AND SHOULD NOT BE ADVERSELY AFFECTED BY REPEATED WETTING AND DRYING. ROCK SHOULD PREFERABLY BE PREDOMINANTLY ANGULAR IN SHAPE WITH NOT MORE THAN 25% OF ROCKS, DISTRIBUTED THROUGH THE GRADATION, HAVING A LENGTH MORE THAN TWICE THE BREADTH AND THICKNESS.

TABLE 1 - RIP-RAP GRADING RECOMMENDATIONS

EQUIVALENT SPHERICAL DIAMETER [1]	PER CENT (BY WEIGHT) OF RIP RAP OF SMALLER SIZE
1.5 -2.0 TIMES D_{50} [2]	100%
D_{50}	50%
0.3 D_{50}	10 - 20%

[1] THE DIAMETER OF A SPHERE WITH AN EQUIVALENT VOLUME TO THE INDIVIDUAL ROCK.
[2] D_{50} IS THE MEDIUM RIP-RAP DIAMETER OF THE ROCK MIX. (I.E. 50% BY WEIGHT IS SMALLER THAN THIS SIZE).

SOURCE : DEPARTMENT OF LAND AND WATER CONSERVATION (1999)

NOTE: MAXIMUM ROCK SIZE SHALL NOT EXCEED THE ROCK DEPTH SPECIFIED

MS4 ALL DISTURBED AREAS (OUTSIDE ROCK RIP-RAP) AND ADJACENT BARE PATCHES, SHOULD BE SOWN WITH A PASTURE SEED MIX IN ACCORDANCE WITH THE TGO PROCEDURES

MS5 IMPORTANT TO EXTEND GEOFABRIC AND ROCK RIP-RAP INTO THE ENTRY POINTS OF THE BERMS TO PROVIDE ADEQUATE PROTECTION AT THESE CONTROL POINTS.

JUTE-MESH

MS6 MATERIAL - 100% JUTE FIBRE (WOVEN WEAVE)
DIMENSIONS - 1.22m x 548m BALE
TYPICAL MESH SIZE - 13mm x 20mm
GROSS WEIGHT - 345kg/BALE

STAPLES/PINS FOR JUTE-MESH

MS7 IT IS RECOMMENDED THAT U-PINS ARE USED AS FASTENERS. THE PINS SHOULD BE MADE FROM MINIMUM 4mm DIAMETER MILD STEEL NAIL WIRE. THE PIN LENGTH SHOULD BE MINIMUM 150mm TO HAVE A GROUND PENETRATION SUFFICIENT TO RESIST PULLING OUT ONCE INSTALLED.

JUTE-MESH INSTALLATION

MS8 SPREAD TOPSOIL AT A THICKNESS OF 50mm THROUGHOUT THE WATER CONVEYANCE STRUCTURES

MS9 PREPARE THE SEEDBED BY SCARIFYING THE TOP 100mm OF SOIL

MS10 APPLY SEED AND FERTILISER MIX IN ACCORDANCE WITH TGO PROCEDURES AND APPLY GYPSUM AT A RATE OF 1kg/m².

MS11 FASTEN TO THE GROUND, THE JUTE-MESH EDGES AND OVERLAPS AT INTERVALS OF APPROXIMATELY 1m (DEPENDING ON GEOMETRY OF CHANNEL) USING 150mm PINS/STAPLES. A GUIDE SHOULD BE 2-3 FASTENERS PER SQUARE METRE. HOWEVER WHERE ROLLS OVERLAP PERPENDICULAR TO THE FLOW, INSTALL TWO ROWS OF STAPLES/PINS SPACED 450mm x 450m APART (FOR FURTHER DETAIL ON RECOMMENDED FASTENING FREQUENCY REFER TO THE JUTE-MESH MANUFACTURES GUIDELINES). PINS SHOULD BE INSTALLED FLUSH WITH THE SOIL SURFACE.

MS12 JUTE-MESH SHALL OVERLAP THE GEOFABRIC BY A MINIMUM 100mm

MS13 AFTER THE JUTE-MESH IS INSTALLED, GO BACK OVER AND INSTALL ADDITIONAL FASTENERS AS REQUIRED TO ENSURE THE JUTE-MESH IS IN CONTACT WITH THE SOIL IN ALL AREAS.

REVISIONS			
0	11.12.2015	CONSTRUCTION ISSUE	MS
	DATE	DESCRIPTION	

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION UNLESS ENDORSED BELOW

Responsible Principal Signature | Date

DRAWN:	MS	DATE:	30.10.2015
DESIGN:	DB	DATE:	30.10.2015
DRG. CHECK:	RM	DATE:	10.12.2015
DES. CHECK:	RM	DATE:	10.12.2015

SLR
10 KINGS ROAD
NEW LAMBTON
NEW SOUTH WALES 2305
AUSTRALIA
T: 61 2 4037 3200
F: 61 2 4037 3201
www.slrconsulting.com

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CLIENT: TOMINGLEY GOLD OPERATIONS PTY. LTD.
PROJECT: TOMINGLEY GOLD REHAB ADVICE
DRAWING TITLE: **ALTERNATE WATER MANAGEMENT STRUCTURE CROSS SECTIONS**
DRAWING NUMBER: 630.11302 - FIGURE 1
ISSUE: 0

H:\Projects-SLR\630-SrvNTL\630-NTL\630.11302 Tomingley Gold Rehab Advice\06 SLR Data\01 Drawings\630.11302-FIGURE 1 (REV 0).dwg

CONSULTANT PROJECT 630.11302 FULL SIZE ON ORIGINAL A3

Appendix H

Community Complaints Register

TGO Community Enquiry Database

TOMINGLEY GOLD OPERATIONS PTY LTD
(A wholly owned subsidiary of Alkane Resources Ltd)

Date	Time	Mode of contact	Complaint regarding	The complaint	Action Taken
28/01/2015	9:30pm	Telephone	Noise	Dozer noise reported to be quite loud	Further temporary real time noise monitoring will occur in the short term.
10/02/2015	1.02pm	Telephone	Dust	Dust from blast was obvious. It did not move towards the village.	Complainant was advised that TGO has systems in place to ensure blasting is delayed if threat of dust going over village. Timely reminder to be vigilant of weather conditions.
27/02/2015	9.27am	Telephone	Noise	Noise from mine had been bad during the night, noise from reverse squawkers	Call made to complainant. Discussion with mining to identify tasks or activities that may have caused excessive noise.
2/03/2015	1.24pm	Telephone	Noise	Noise was bad over the weekend	Spoke to and advised that accoustic treatment will be commencing shortly. Planning had taken longer than expected.
5/03/2015	1.37pm	Telephone	Dust	Dust was very bad. It was across the whole village	Operations were supsended on WRE3, EPA visited site and discussed with EPA via telephone
5/04/2015	10.06am	Text message	Noise	Dozer noise noted to be loud on Easter Sunday	Accoustic treatment wil be carried out at the subject residence.
21/05/2015	2.55pm	Telephone	Noise	General noise compaint, enquiring about action by TGO.	Process of noise mitigation explained to the complainant.
4/06/2015	4:00pm	In person	Property damage	Complainant asserts that property has sustained damage due to blasting activity.	Complainant asserts that property has sustained damage due to blasting activity.
26/06/2015	9:11am	Telephone	Property damage	Complainant asserts that property has sustained damage due to blasting activity.	Procedure followed as per Project Approval requirements
30/06/2015	10:47am	Telephone	Noise	Noise apparent again, for about the past month. Most obvious in the middle of the night. Noise is clacking of dozers and rocks going into trucks.	Temperature inversion has been a feature of past week. Discussion had with complainant regarding the management of the noise impact.
6/07/2015	12.48	Telephone	Noise	Noise is still really bad between 12 and 2am	Temperature inversion complicating attempts manage noise.
10/07/2015	11:20am	Email	Noise	Noise is having an impact on sleep again. Additional concerns regarding the traffic on Tomingley West Road and the state of this road and associated drainage.	Meeting held with the complainant. Discussion held on noise and TGO's management of the issue. TGO advised Tomingley West Road and associated drainage has been constructed to the satisfaction of Narromine Shire Council.
6/08/2015	4.20pm	Telephone	Noise	Noise was bad between 10am and 2am	Portable real time noise monitor installed on 20/08/15 to carry out extended monitoring at premises. Discussions ongoing between property owner and TGO.

13/09/2015	9.03pm	Email	Noise	Property owner has not noticed mine noise previously however is now noticing noises from plant and trucks/dozers	Arrangements made for installation of portable real time monitor to collect datat.
9/11/2015	8.00am	In person	Noise	Noise during Saturday evening, Sunday morning, Sunday night was quite noticeable.	Property owner has ongoing regular discussions with TGO.
21/11/2015		In person	Property Damage	Complainant asserts that property has sustained damage due to blasting activity.	Procedure followed as per Project Approval requirements