

Attachment 2 -337 Gundagai Road, Bangor - Development Proposal and Environmental Management Plan (Pages = 364)

# GUNDAGI QUARRY, BANGOR

## DEVELOPMENT PROPOSAL AND ENVIRONMENTAL MANAGEMENT PLAN



## FOREWORD

### FUNCTION OF THE DEVELOPMENT PROPOSAL AND ENVIRONMENTAL MANAGEMENT PLAN

The Development Proposal and Environmental Management Plan (DPEMP) has been prepared to support a Development Application by DTK Logging Pty Ltd (trading as Bardenhagen Quarries) for a Planning Permit to increase annual production levels at an existing hard-rock quarry at Gundagi. The DPEMP follows the generic and specific guidelines provided to the proponent by the Environment Protection Authority (Appendix A).

The existing hard-rock quarry is an approved Level 2 Activity (Appendix B) as defined by Schedule 2 of the *Environmental Management and Pollution Control Act 1994 (Tas)* (EMPCA). Level 2 Activities must be referred by the Planning Authority (in this case, Launceston City Council) and to the Environment Protection Authority (the EPA), for assessment under EMPCA.

Current approved production levels are up to 50,000 cubic metres per annum. This application is to seek approval for an increase to production levels of up to 200,000 cubic metres per annum.

This DPEMP provides information on -

1. the present environment of the hard-rock quarry, including such matters as zoning, land use, flora, soils and climate. It also describes the hard-rock quarry operation in detail, the emissions sources, and the development timetable; and
2. each of the potential environmental issues associated with the hard-rock quarry, and provides detail regarding the mitigation measures that will be undertaken to address each issue. Infrastructure matters of the expanded operation are also discussed.

### ROLES IN THE APPROVAL PROCESS

The EPA will use the DPEMP to assess the activity in accordance with the Environmental Impact Assessment Principles provided in S74 of *EMPCA*. The DPEMP will be referred to other relevant State agencies as part of this process to seek comments in relation to the proposed development. The EPA assessment will generate environmental conditions that are to be included in the Planning Permit that may be issued by Council.

The Launceston City Council (LCC) will use the DPEMP as the basis for assessing the Development Application and for drafting conditions under which a Permit may be granted.

### STATUTORY RIGHTS OF ANY PERSON TO MAKE REPRESENTATIONS

When the EPA is satisfied that sufficient information regarding the proposed development has been received, the Director will provide written notice to the Council to advertise the application. The Council will advertise the application for a 28 day period within which anyone can make a representation about the project. These representations should be directed to the Launceston City Council.

General Manager  
Launceston City Council  
PO Box 396  
LAUNCESTON TAS 7253

When the representation period has closed the Council will forward all representations to the EPA, which will complete the assessment of the environmental aspects of the project. The EPA takes into

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**PLANNING EXHIBITED DOCUMENTS**  
Ref. No: DA 0074/2015  
Date submitted: 09/05/2015  
Planning Administration: 

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Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

**Gundagi Quarry, Bangor - DPEMP**

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consideration the representations and the comments received from other State agencies to which the DPEMP was referred. An addendum or 'supplement' to the DPEMP may be required of the project proponent to respond to representations and comments from referral agencies.

When the EPA has made its decision about environmental aspects of the development it advises Council of its decision, which may include specific conditions that relate to environmental management and mitigation measures. Council then determines whether a Planning Permit will be issued. Following the decision of Council, the proponent and those members of the public whom made a representation have 14 days to appeal the decision of issuing a Planning Permit to the Resource Management and Planning Appeals Tribunal.

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## ABBREVIATIONS / GLOSSARY

ABO	Air Blast Overpressure (noise test parameter)
ACDC	Assessment Committee for Dam Construction (DPIPWE)
DA	Development Application
DIER	Department of Infrastructure, Energy and Resources
DPEMP	Development Proposal and Environmental Management Plan
DPIPWE	Department of Primary Industries, Parks, Water and Environment
DRP	Decommissioning and Rehabilitation Plan
EMPCA	<i>Environmental Management and Pollution Control Act 1994 (Tas)</i>
EPA	Environment Protection Authority
EPN	Environment Protection Notice
LCC	Launceston City Council
LUPAA	<i>Land Use Planning and Approvals Act 1993 (Tas)</i>
TIA	Traffic Impact Assessment
WPMP	Weed and Pathogen Management Plan



## EXECUTIVE SUMMARY

### PROPOSED ACTIVITY

The Development Proposal and Environmental Management Plan (DPEMP) has been prepared to support a Development Application by DTK Logging Pty Ltd for a Planning Permit to increase annual production levels at an existing hard-rock quarry at Bangor. Current approved production levels are up to 50,000 cubic metres per annum.

This application is to increase production levels to a maximum of 200,000 cubic metres per annum.

The quarry currently employs four staff however at the expanded volume at full capacity the quarry will employ up to six people, consisting of three full time and an additional three casual positions.

### LOCATION

Gundagi Quarry is located on 13.64 hectares of land at Bangor in north-eastern Tasmania (Figure 1-1).

### PROPONENT

DTK Logging Pty Ltd (trading as Bardenhagen Quarries) has operated a quarry at Gundagi Road for the past fourteen years providing a large selection of high quality construction materials contributing significantly to regional development. The quarry is currently approved to extract up to 50,000 cubic metres per annum under DA0523/2009 issued in 2011.

### ENVIRONMENTAL MANAGEMENT MEASURES

Environmental management measures are in place or will be put in place to address the following potential effects to the local environment –

- dust mitigation measures including the wetting of the internal road network when required and the use of an automatic spraying system for load dampening;
- water management systems including the construction of a new dam lower in the catchment to capture sediment from surface runoff; and
- activity monitoring regimes to regularly check performance of the mitigation measures established and to provide opportunities to improve those systems as required.

### DECOMMISSIONING AND REHABILITATION

‘Progressive rehabilitation’ will continue at the quarrying operation for those areas that have been quarried and are no longer needed or used for the ongoing operations. A Progressive Rehabilitation Plan has been developed for the quarry which includes measures and management actions to stabilise the landform prior to revegetation.

In the event of permanent closure of the proposed development a more detailed Decommissioning and Rehabilitation plan will be developed and submitted to the EPA for approval.

## 1 INTRODUCTION

### 1.1 Location of activity

The Gundagi Quarry is located to the north-west of Lilydale in Tasmania's north-east region (Figure 1-1). Property details for the Gundagi Quarry are provided in Table 1 and Appendix C.

**Table 1. Land Title and Address details for Gundagi Quarry**

Property Address	337 Gundagi Road Bangor TAS
PID	2215427
Land Title Reference	Volume 139706 Folio 1
Property size	13.64 hectares (approx.)
Mining Lease	1676/M
Current LCC Permit	DA0523/2009

### 1.2 Proponent Details

DTK Logging Pty Ltd is a company involved in a number of business activities involving timber harvesting and processing and quarry activities. The quarry branch of the company is known as Bardenhagen Quarries (DTK Logging Pty Ltd trading as Bardenhagen Quarries). The company is based at Lilydale and the principal's details are:

Mr Leigh Bardenhagen  
Owner, DTK Logging Pty Ltd  
PO Box 176  
Lilydale TAS 7268  
ACN: 081 330 547  
Mobile: 0419 119 780  
Phone: 03 6395 1155  
Fax: 03 6395 2058  
[dtklogging@bigpond.com](mailto:dtklogging@bigpond.com)

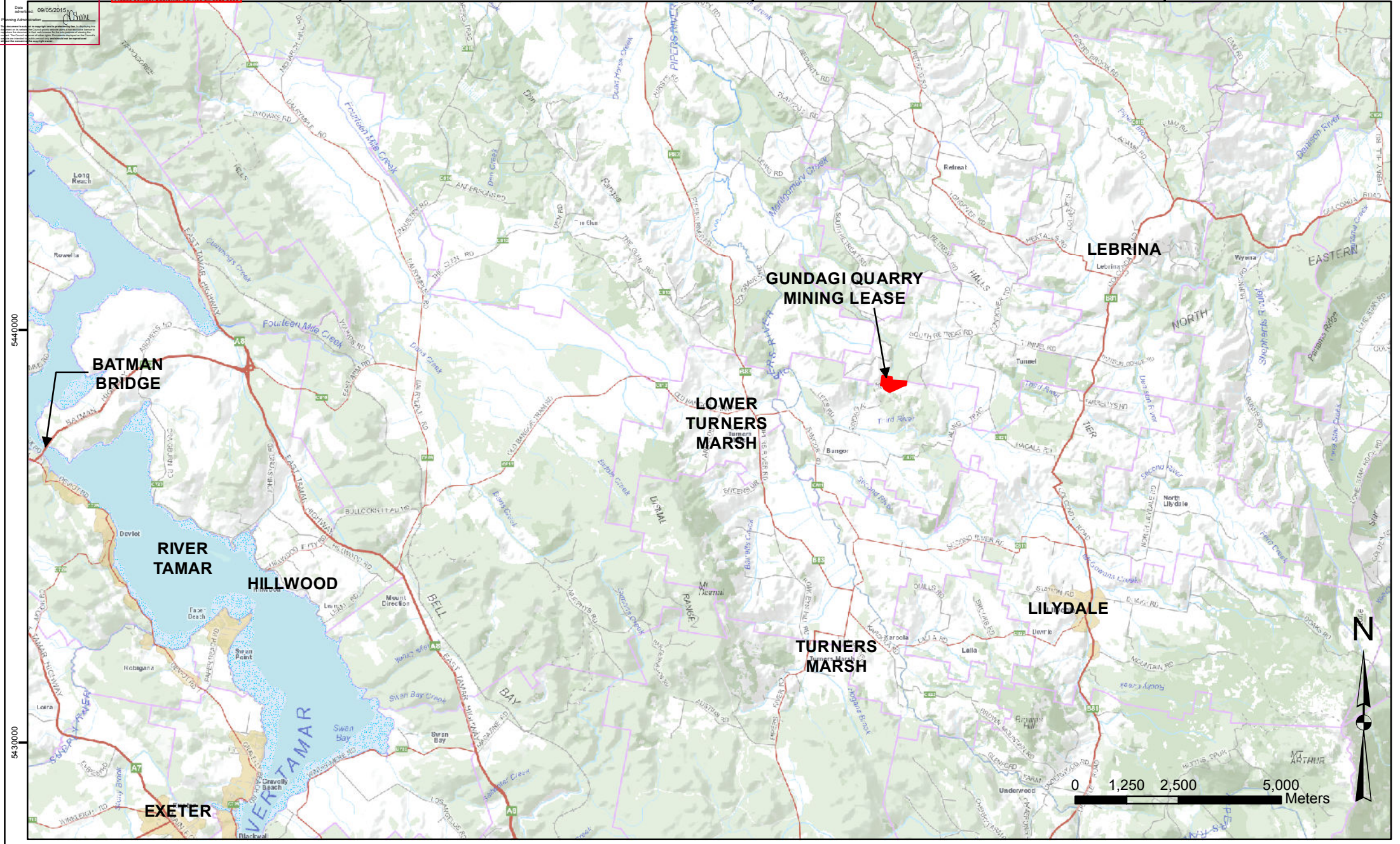
### 1.3 Current quarry operations

DTK Logging Pty Ltd (trading as Bardenhagen Quarries) has operated a quarry at Gundagi Road for the past fourteen years providing a large selection of high quality construction materials contributing significantly to regional development. The quarry was operating under a 10,000 cubic metres per annum license which was increased to 50,000 cubic metres per annum in 2011 (DA0523/2009).

The quarry currently employs four staff, consisting of three people full time and an additional one casual position.

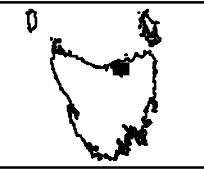
The quarry material complies with the DIER Specification R40 Class A and sub-base 1 and 2 material. The material produced is as follows:

- <7 mm (crusher dust);
- 7-12 mm gravel;
- 12mm gravel;
- 25mm gravel;
- 40mm gravel; and
- spaulds.



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 1-1: Site Location



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014

The main quarrying activities entail the following:

- surface site preparation by soil removal and stockpiling;
- rock drilling and blasting by licensed contractor;
- rock removal by excavator;
- rock crushing and screening using mobile crushers;
- stockpiling of processed material in quarry area;
- loading trucks with wheel loader from stockpile area in quarry and
- transport of materials by trucks ranging from 12 to 28 tonne capacity.

Operating hours are currently 0700 to 1900 hrs Monday to Friday, 0800 to 1600 hrs on Saturday; closed on Sunday and public holidays.

An extension to the operating hours was granted for a period of time by the EPA - to be a 0600 hr start rather than a 0700 hr start for Monday to Friday – to accommodate the need for extra loads to meet high demand for road construction activities in the region.

#### 1.4 Contour-based Assessment Information Source

Information and assessments of landscape features including topography, drainage and topographic profiling was aided by the integration of contours generated by the Department of primary Industries, Parks, Water and Environment (accessible through The LIST, [www.thelist.tas.gov.au](http://www.thelist.tas.gov.au)) LiDAR generated data.

LiDAR is the name of an aircraft mounted remote sensing instrument that is used to create highly detailed three-dimensional images of forest canopies and the terrain beneath them. The term LiDAR stands for Light Detection And Ranging and is sometimes referred to as Laser Scanning. The vertical accuracy of LiDAR derived topographic information is generally +/- 0.2m or better. A major advantage in using LiDAR is that it provide a very detailed terrain model even beneath dense forest canopies. Using LiDAR data enables small surface features to be easily identified.

LiDAR data was purchases from Forestry Tasmania to within a radius of 500m from the edge of the Mining Lease. Topographical information at greater distances was provided from the DPIPWE 10m contour dataset. The two datasets were combined into a single model (where LiDAR data replaced the less accurate 10m contour dataset where it existed) such that profiles to distant sites (i.e. greater than 500m from the ML) could be determined.

Based on the above, topographic profile accuracy can be expected to be very high and uncertainty very low at distances of less than 500m from the ML boundary. At greater distances profile accuracy can be expected to be equal to that of the DPIPWE 10m contour data set. As distance is increased from the Mining Lease the relevance of topographic profiling and identification f minor features becomes less relevant and consequently less important to the assessment process.

The data set used in the assessment process will differ to that available on Google Earth. Google uses a range of digital elevation model data sources to derive the terrain layer. In the US the terrain layer often comes from either 10 or 30 m DEM's. Globally the terrain data is more likely to be derived from either Shuttle Radar Topography Mission (SRTM) data or something like the NOAA Global Land One-km Base Elevation Project (GLOBE) dataset. Google Earth elevation data will be considerably less accurate than LiDAR derived terrain information. In addition, elevation data in Google Earth is not provided in AHD, it is likely ellipsoidal height derived from a global ellipsoid.

## 2. ACTIVITY DESCRIPTION

### 2.1 Proposal outline

The proposal is to increase the volume of gravel material produced and transported from the Gundagi Quarry: volume increase from 50,000 to 200,000 cubic metres material produced per annum.

The location of the land upon which the development is situated, the local climate, site access and methods of rock extraction and processing, are the same as those described in the Development Proposal and Environmental Management Plan (DPEMP 2010) prepared, assessed and approved by the regulatory authorities (EPA and LCC) in 2011.

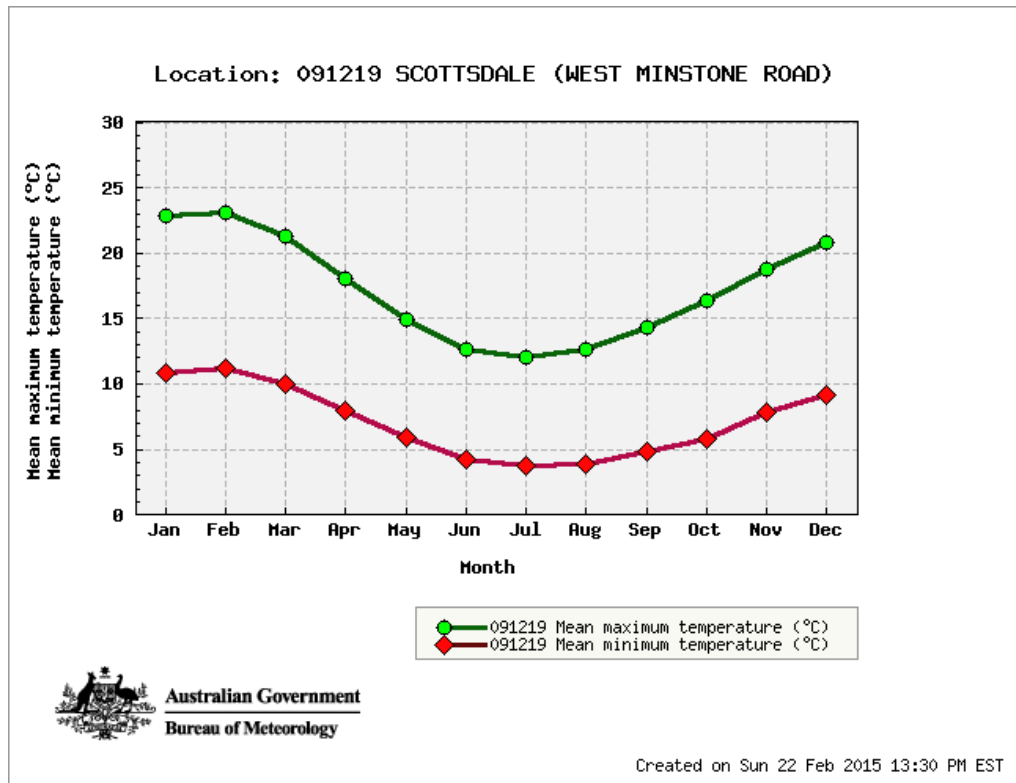
The quarry at the expanded volume at full capacity the quarry will employ up to six people, consisting of four people full time and an additional two casual positions.

#### 2.1.1 Local Climate Conditions

The nearest weather station with temperature data is Scottsdale, on West Minstone Road (station 091219) as shown in the graph below obtained from the Bureau of Meteorology.

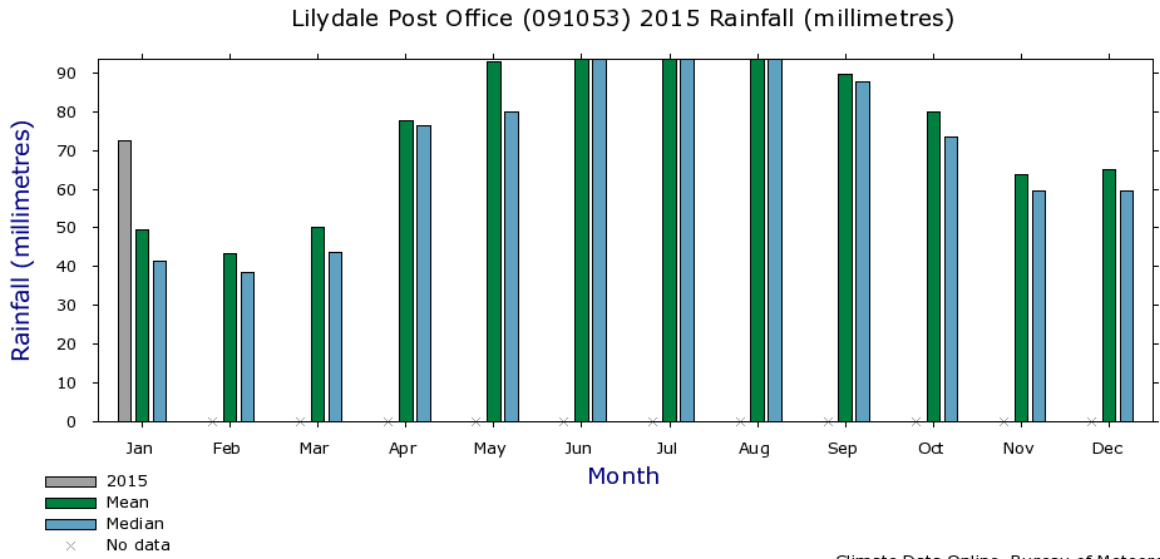
The climatic conditions at Bangor are not dissimilar to Scottsdale as both occur in the north-east of Tasmania, are at similar elevations and are geographically unrelated to the Tamar graben to the west which can generate specific weather patterns like cold air drainage, fogs and temperature inversions.

Summers are mild to warm with cool to cold winters. Frosts, which can be severe, are not uncommon in the winter months and these can occur into the Spring seasonal period.



January to March are the driest months with most rainfall occurring from May to September as recorded at the nearby township of Lilydale, approximately 7kms to the south of Bangor.

**Gundagi Quarry, Bangor - DPEMP**



Note: Data may not have completed quality control

Climate Data Online, Bureau of Meteorology  
Copyright Commonwealth of Australia, 2015

Winds are predominantly from the west and north-west at the nearest wind recording station at Launceston (Ti Tree Bend), approximately 20kms to the south of Bangor.

**Gundagi Quarry, Bangor - DPEMP**

**Rose of Wind direction versus Wind speed in km/h (01 May 1980 to 30 Sep 2010)**

Custom times selected; refer to attached note for details

**LAUNCESTON (TI TREE BEND)**

Site No. 061201 - Opened May 1980 - 269 Days - Latitude -41.4194° - Longitude 147.12221° - Height 5m

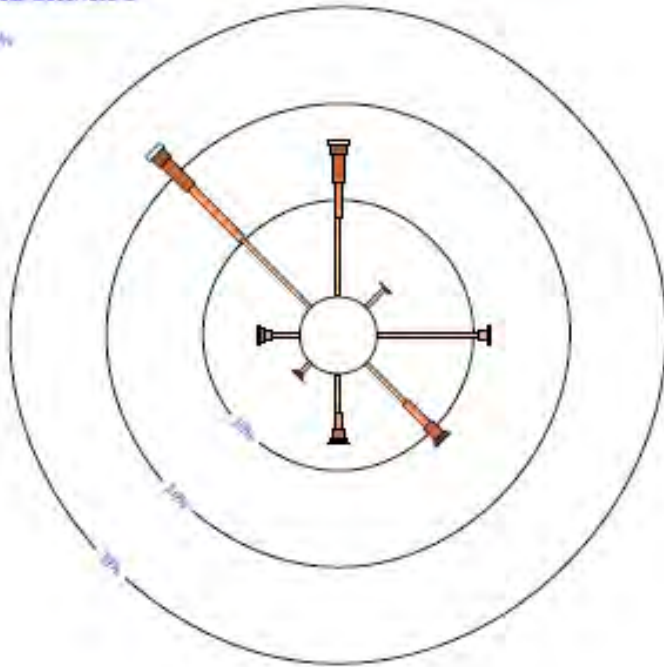
An asterisk (\*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



9 am  
 9982 Total Observations

Calm 20%



**Rose of Wind direction versus Wind speed in km/h (01 May 1980 to 30 Sep 2010)**

Custom times selected; refer to attached note for details

**LAUNCESTON (TI TREE BEND)**

Site No. 061201 - Opened May 1980 - 269 Days - Latitude -41.4194° - Longitude 147.12221° - Height 5m

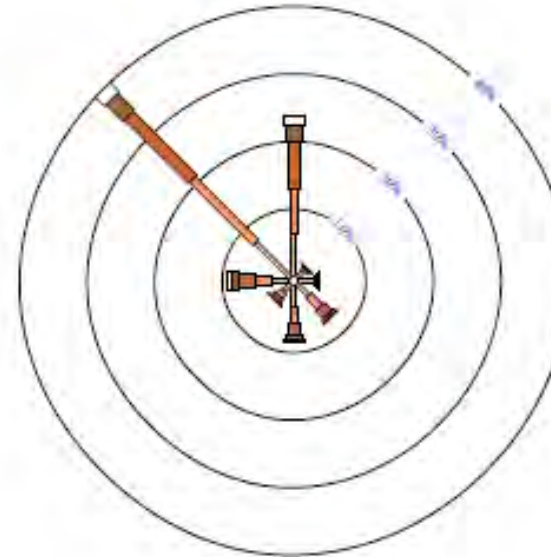
An asterisk (\*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



3 pm  
 9985 Total Observations

Calm 9%



### 2.1.2 Hours of operation

Operating hours for the quarry will be –

- 0600 to 1900 hrs Monday to Friday;
- 0800 to 1600 hrs on Saturday; and
- closed on Sunday and public holidays<sup>1</sup>.

Notwithstanding these operating hours, **blasting** will be limited to between 1000 and 1600 hrs Monday to Friday (as per the Blast Management Plan 2014, Appendix G) and **crushing** will not occur between the operating hours of 0600 and 0700 hrs Monday to Friday.

An extension to the operating hours was granted for a period of time (6 months total) by the EPA to 0600 hrs rather than a 0700 hrs start for Monday to Friday – to accommodate the need for extra loads to meet high demand for road construction activities in the region. No complaints about the 0600 hr start were received by the quarry operator.

A noise assessment conducted by Vipac showed that noise levels for that time period were below the permit conditions (see Appendix H). Specifically the operations at the Gundagi Quarry (on-site activity) didn't generate noise levels in excess of the day and evening noise emission limits, as specified under condition N2 of the Permit, at any noise sensitive location. Furthermore, activity in the quarry was not audible during the night period (0600 – 0700 hrs). Day and evening noise measurements at the nearest residence show that when crushing is occurring the noise level from the quarry is approx. 35 dBA at the nearest residence. This is consistent with the noise level emissions modelled by VIPAC modelling as part of the previous application to expand the quarry activity to 50,000m<sup>3</sup> per annum (see VIPAC report 421057-01, Appendix H).

Noise results collected in December 2013 from extended monitoring by VIPAC at the quarry lip indicate that noise levels from within-quarry activities are 10 to 15 dBA lower when crushing is not occurring (ie. only haul truck loading is conducted). These results led VIPAC to suggest that noise generated by truck loading is well below the night limit of 35 dBA at the nearest residence and therefore VIPAC consider exceedances of the night limit from this activity highly unlikely – hence, the approval provided by the EPA to conduct tuck loading between 0600 and 0700 hrs Monday to Friday. The data collected in 2013 is consistent with the modelled noise levels prepared by VIPAC in 2010 for the 10 DPEMP quarry assessment process (see VIPAC report 421057-01, Appendix H).

Vehicle movements on 19 December 2013 between 0600 – 0700 hrs were 7 log trucks, 13 gravel trucks and 1 4WD vehicle. Pass-by noise from quarry trucks on the haul route is approx. 70 dBA at 20 m measured by VIPAC (Appendix H). All houses along South Retreat Road have a setback of at least 40 m and consequently noise further dissipates across this additional 20m distance. South Retreat Road is fully accessible to trucks (e.g. gravel, timber, sand and livestock) and other vehicles at all hours of the day.

### 2.1.3 Product

The geology of the quarry is metamorphosed mudstone from the group known as the Mathinna group (Figure 3-1-5). MRT (see Appendix M) found that the rock material based on an aggregate analysis is '...a homogeneous, medium grey, medium grained, tough, siliceous sandstone or quartzite, with a little weathering to white and/or limonitic joint surfaces, plus some white, limonitic quartz veining to one centimetre thick – it is typical of the siliceous lithic-rich sandstones from the Mathinna Group'.

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<sup>1</sup> Commitment 1: Operating hours will be – 0600 to 1900 hrs Monday to Friday, 0800 to 1600 hrs on Saturday; closed on Sunday and public holidays. Notwithstanding these operating hours, **blasting** will be limited to between 1000 and 1600 hrs Monday to Friday and **crushing** will not occur between the operating hours of 0600 and 0700 hrs Monday to Friday.



The following products generated from the quarry:

- <7 mm (crusher dust);
- 7-12 mm gravel;
- 12mm gravel;
- 25mm gravel;
- 40mm gravel; and
- spaulds.

#### 2.1.4 Production process

The main quarrying activities are:

- surface site preparation by soil removal and stockpiling;
- rock drilling and blasting by licensed contractor;
- rock removal by excavator;
- rock crushing and screening using mobile crusher;
- stockpiling of processed material in quarry area;
- loading trucks with wheel loader from stockpile area in quarry; and
- transport of materials by trucks ranging from 12 to 30 tonne capacity.

Rock extraction areas are prepared for quarrying by removing and stockpiling the topsoil away from the working quarry near the existing sediment settling dam for later use in progressive rehabilitation works.

Rock is liberated by blasting. Drilling (see image below of drill rig) and blasting is and will continue to be carried out by qualified contractors. The contractors carry out the drilling and blasting operations in consultation with the quarry owner and in accordance with the Blast Management Plan (Appendix G) to ensure the following:

- drilling (see example rig below) is carried out as specified by a blast contractor;
- noise and vibration standards are met and reduced where possible (both drilling and blasting activities);
- blasting is not carried out within 14 days after a rainfall event of greater than 30 mm within a single 24 hour period (Expert evidence given in the RAMPAT appeal in 1998 by Dr O. Ingles recommended this condition to decrease the effect of vibration from blasting at a nearby residence; the Tribunal made this a condition of permit to operate the quarry);
- all close neighbours are notified at least 24 hours in advance of blasting activities;
- blasting activities are safe and meet all workplace health and safety requirements and
- blasting is adequate for rock fragmentation for extraction by excavator and crushing.



The blast fragmented rock is removed by 20 and 30 tonne excavators and loaded into the hopper of the primary crusher. The rock crushers have a number of crushing jaws and screens which are adjusted to achieve the desired gravel size. The crushed and screened material is then moved to the stockpiling area by the wheeled loader for removal as required.

The crushing on site occurs at the rate of up to 1,100 cubic metres of gravel per day. After a sufficient amount of rock is crushed and screened into gravel the quarry operates on a need basis where trucks are loaded by the rubber tyred loader. There are periods when the quarry does not operate due to lack of demand for product.

The equipment used during the process of extracting blasted rock from the quarry to stockpiling of the various grades of gravel in the stockpile area is as follows:

**Excavators**

Komatsu 30 tonne Model 30 T-5 - blasting and loads hoppers of primary and secondary crushers. Loading spaulds into trucks.

Komatsu 20 tonne - Removes fragmented rock from active quarry pit after blasting and loads hoppers into primary and secondary crushers.

**Crushers**

Primary crusher - Komatsu Model BR 380JG - Crushes fragmented rock into suitable size for the secondary crusher.

Secondary crusher/Impactor-Jacques Model: 424 Cummins VTA28-G2 Diesel motor - Secondary rock crusher with in feed hopper, twin deck 14x6 vibrating screens and an elevated delivery conveyor belt system.

**Loader**

Wheel loader - Komatsu Model: 320 - Removal of crushed rock from crusher to stockpile area in quarry. Loading trucks with gravel and also calculating weight of loads.

**Other**

Generator set - Stanford 200 kilowatt generator - Powers secondary crusher.

Diesel engine - Caterpillar Model: CAT 3306 - Runs the 200 kilowatt generator.

### 2.1.5 Existing site infrastructure and services

The quarry when upgraded in 2011 to a higher level of extraction had various infrastructure elements installed or modified to meet both operational and environmental needs at that time. The existing pit accommodates the crusher, excavators (2) and loader (Plate 1B) with trucks entering via a loop-road into and through the pit.

All of the existing services and infrastructure elements will be retained or modified under the new activity to increase annual production levels and include the following -

- Car Parking

A compacted gravel area outside the extraction zone of the pit provides 6 spaces for personnel, service vehicles and visitors (Figure 2-2-3).

- Amenities

No toilet, shower or office/amenities block is located in the quarry.

- Access Road and Gate

The quarry has an all-weather access road (Plate 1A) and boom gate which is securely locked when the quarry is not in operation.

- Site Drainage

The existing drainage in and around the quarry is shown in Figure 2-2-1 with the proposed drainage shown in Figures 2-2-3 and 4-2-1. Drainage is via constructed drains and natural watercourses.

Refer to Section 1.4 Contour-based Assessment Information Source for information on the data sets used to identify catchments and watercourses, with field verification conducted for watercourses.

The existing sediment dam (Plate 1D) will be approximately half filled and a new dam constructed further downstream of the quarry to facilitate extraction at the western end of the land. The modification to the existing dam and construction of the new dam has been approved by EPN 9053/1 issued by the EPA with conditions inserted by the ACDC – the Dam Pre-construction Report is in Appendix I). The drainage channel from the existing pit to the existing sediment dam will be retained but made deeper as the pit becomes deeper (Plate 1C).

- Road Facilities

The quarry is accessed from South Retreat Road (Figures 2-2-3a, 2-2-3b and 4-15-1) which was widened, reconstructed and sealed for a section of its length as part of the permit conditions associated with DA0523/2009. The Land Title upon which the quarry is located is accessed by a right of way covered by Agreement for Easement No. 14091 between DTK Logging Pty Ltd and Forestry Tasmania for Land Title Volume 130238 Folio 1. A Traffic Impact Assessment has been prepared for the proposed expanded operation (Appendix D) which is further discussed in section 4.13 *Traffic Impact Assessment and Management*.

- Water Supply

Water for road/surface dampening can be accessed from the existing (and/or new) sediment settling dam or from a water cart filled at Lilydale.

**Plate 1. Images of the Gundagi Quarry**



**A.** Internal access road in the quarry showing the existing pine plantation



**B.** Existing pit at the western side of Mining Lease showing the quarry machinery



**C.** Road and drainage channel from existing pit to the existing sediment settling dam



**D.** Existing sediment settling dam

- Load Dampening Facility (automated)

The installation of an automated load dampening spray system is close to completion (due to be completed February 2015 when all of the parts have arrived at the site). The solar-powered system is automatically triggered when a truck enters under the sprayers – water is supplied via a tank that is filled with clean water accessed from the dam or water truck from Lilydale. This system will ensure that all gravel loads leaving the quarry are surface dampened (if they are not covered by a tarpaulin) to minimise dust emissions on route to the delivery destination.

- Electrical Power Supply

The site does not have mains power.

- Telecommunications

The site does not have nor need a telephone connection. The site has mobile 3G coverage.

**2.1.6 Proposed additional infrastructure and services**

The only additional or modifications to infrastructure required to service the quarry are –

- New sediment dam; and
- Infilling (approximately half) of the existing sediment dam.

## 2.2 Current site plan and proposed layout

The approximate current layout of the quarry is shown in Figure 2-2-1. The completion of the partial infilling of the existing sediment settling pond is shown in Figure 2-2-2 (post completion of the dam approved by the ACDC – see Appendix I) with the final quarry layout shown in Figure 2-2-3.

### 2.2.1 Quarry Areas and Extraction Plan

The existing quarrying occurs in a pit at the eastern extent of the Mining Lease (Figures 2-2-2 and 2-2-4a). The cross-section of the existing pit is shown in Figure 2-2-4b – indicates existing ground level, proposed base floor level of the quarry etc. The location of the crushers and associated stockpiles in the eastern pit is shown in Figure 2-2-4a however as the quarry floor is deepened and the south-west face extracted the machinery may need to be moved to another location within the pit. This is standard practice for any quarry operation where material is won from various sides of a pit and internal access roads need to be moved to allow this to occur.

The buried and clay capped potentially acid forming rocks are located in the north-eastern corner of the eastern pit (see also 2.2.4 Acid Drainage) and will not be disturbed by current or future quarrying activities – the location is rehabilitated and already growing native grasses and some trees.

Two new areas of extraction are proposed to be progressively opened, with potentially all three areas open at the same time. As noted in section 4.4.5 Blasting, the quarry has complex geology owing to its Mathinna Bed origins. This variability provides flexibility as to the products being made from the different parent rock material across the three quarry areas. The mining extraction plan and water management features of each of the two new areas are shown in Figures 2-2-5a and 2-2-6a respectively. Cross-section diagrams of the two new areas are shown in Figures 2-2-5b and 2-2-6b – each figure indicates the existing natural ground level, benches, proposed base floor level of the quarry, soil bunding, location at which water pumping may be required to fully drain water from the pit etc.

The NW and SW quarry areas (Figures 2-2-5a and 2-2-6a) will not be ‘opened for extraction’ until after the lower sediment settling dam is constructed and operational as explained under section 2.2.2 Water Management.

At full operation the quarry may consist of up to three active faces connected by internal haul roads (Figure 2-2-3) built to a standard that would be comparable to a class 3 road in the forestry industry. Crushing machinery may be moved to one of each of the three areas such that it is closer to the actively quarried face. Stockpiles will be created at the location of the crusher from where the trucks will be loaded.

### 2.2.2 Drilling and Blasting

Rock extraction areas are prepared for quarrying by removing and stockpiling the topsoil away from the working quarry near the existing sediment settling dam for later use in progressive rehabilitation works. Rock is liberated by blasting. Drilling and blasting will continue to be carried out by qualified contractors.

### 2.2.3 Water Management

As the quarry has been developed, careful management of the contours and drainage directions within the pit has enabled most water to be held within the void rather than it flowing into the existing sediment settling dam – only during sustained periods of intense rainfall does water flow out of the current pit into the existing sediment settling dam.

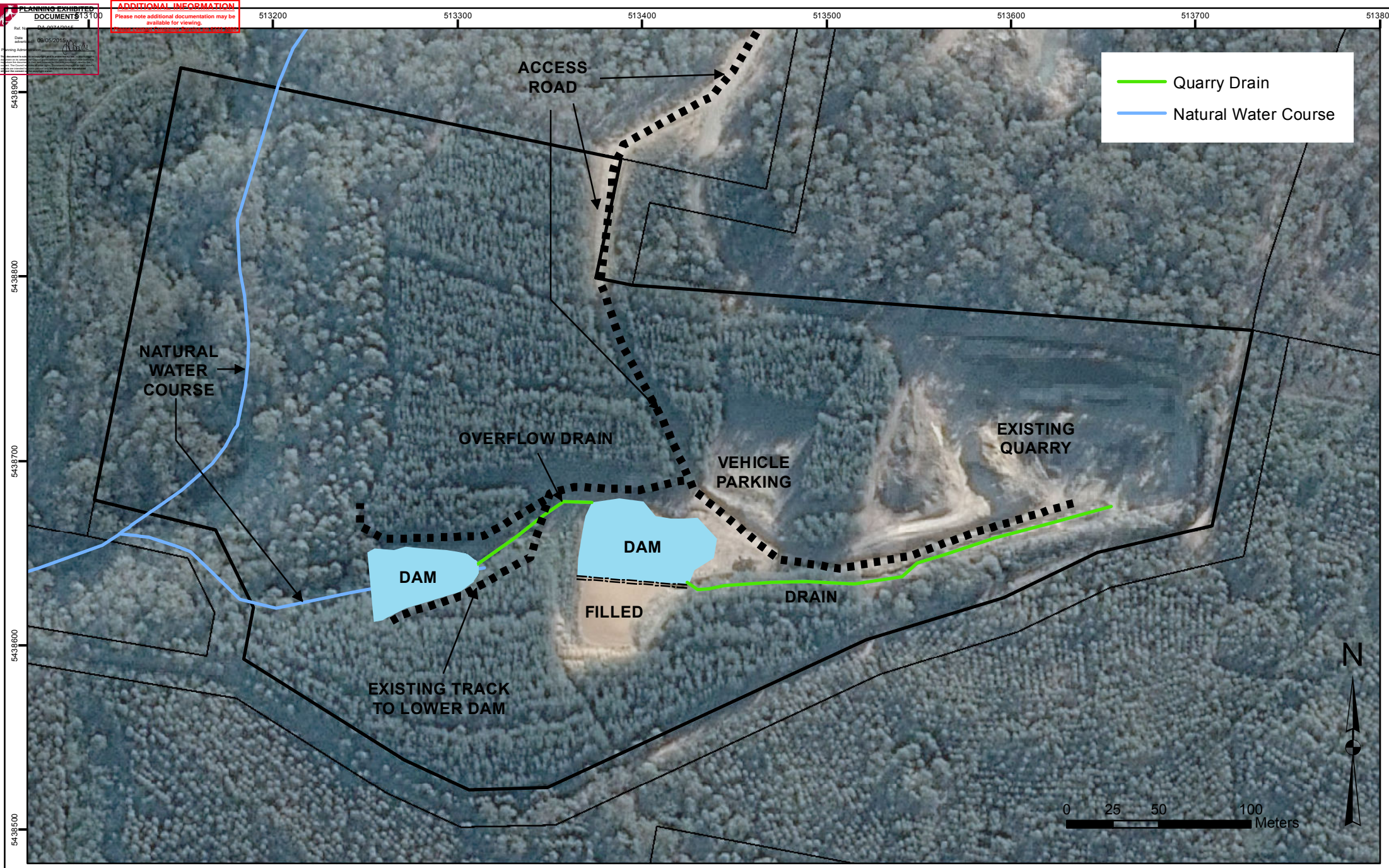


**GUNDAGI QUARRY - PRODUCTION INCREASE  
 DP&EMP**

Figure 2-2-1: Present Site Layout

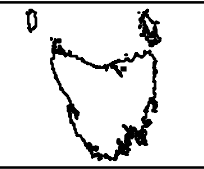


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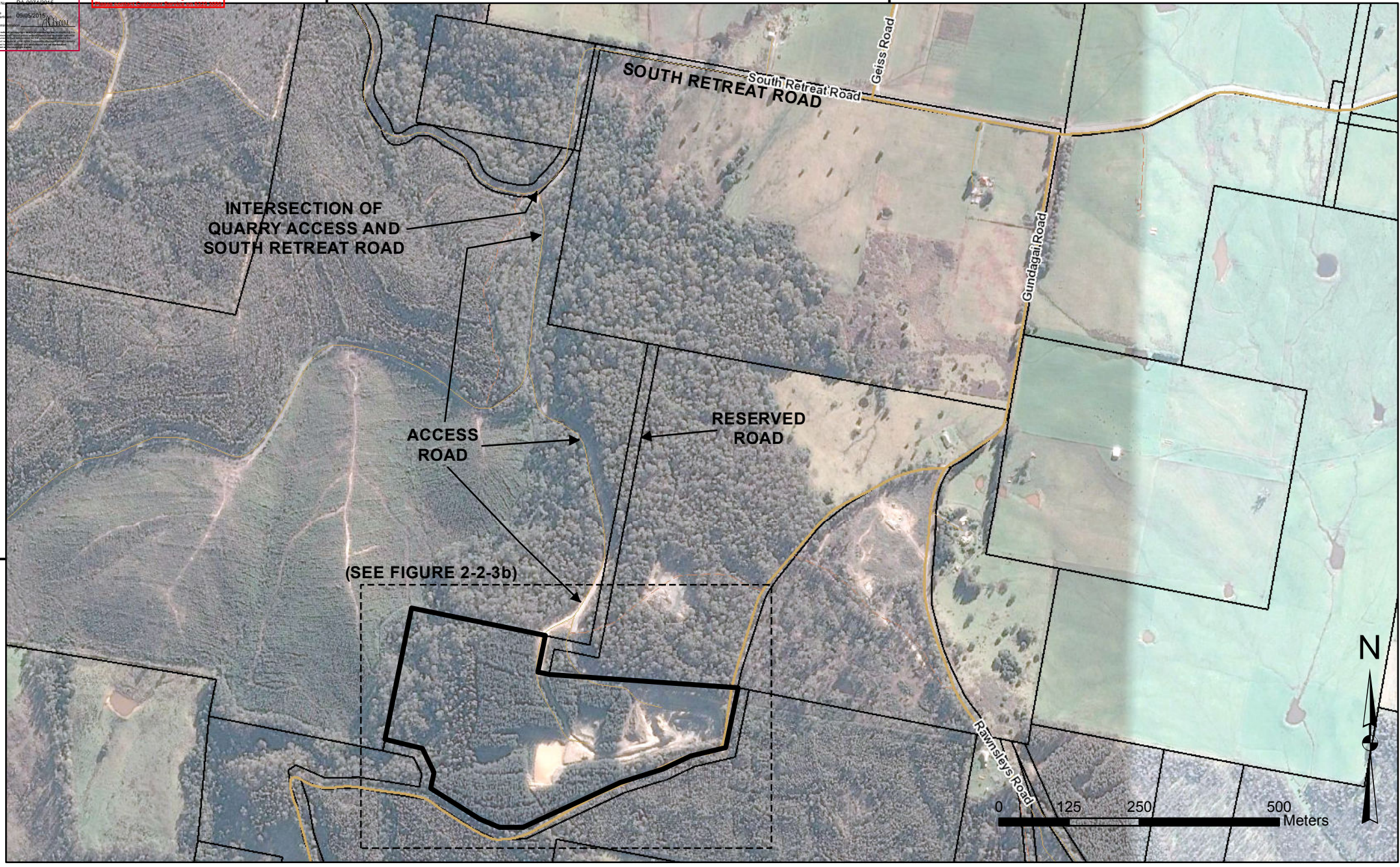


# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 2-2-2: Present Site Layout - Post Dam Construction

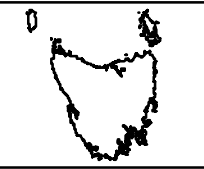


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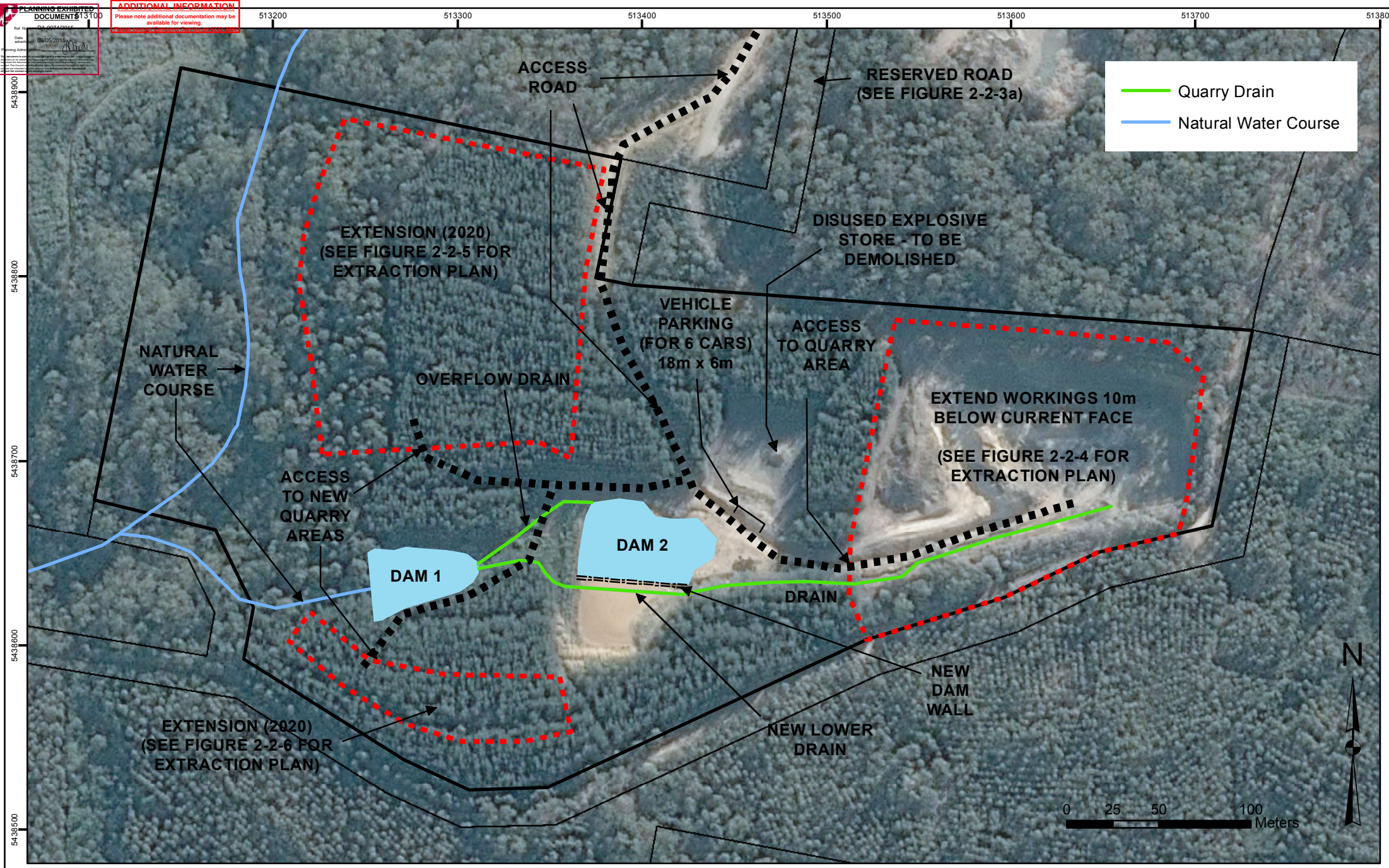
# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 2-2-3a: Proposed Site Layout and Mining Plan (Access)



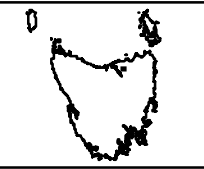
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Figure 2-2-3b: Proposed Site Layout and Mining Plan (Lease)



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The drainage layout however needs to be altered in 2015 as the pit at the eastern end of the ML (the currently used pit) needs to be made deeper to extract additional material. As the pit is made deeper water will not naturally drain into the existing sediment settling dam because the void will be lower than the sediment dam. For water to naturally flow out of the current pit a bypass channel is to be installed to drain this water into a new dam located lower in the catchment to the existing dam.

The upper dam in Figure 4-2-1 (ie. sediment settling dam) will remain to catch and treat water for sediment removal in one section of the quarry catchment. The new lower dam has been approved by the EPA (EPN 9053/1 – Appendix I and J) and its location is shown in Figures 2-2-2 and 4-2-1. The existing dam will be reduced in size by creating a bund wall across it, as shown in Figure 2-2-1.

Beyond 2015 the quarry will extend into areas of pine plantation at the north-west and south-west of the ML (Figure 2-2-3). Water will flow into the upper sediment settling dam for areas upstream of it, and to the lower dam for areas 'below' (in terms of elevation height) the upper dam. Water overflowing from the upper (but now smaller) dam will pass through the lower sediment settling dam before being discharged into a minor tributary of the Third River (Figure 4-2-1).

The lower sediment settling dam is critical for the management of surface water flow from the two new pits. Water flow from the NW Quarry Area will need to be managed by the installation of a soil bund such that water is directed to the lower sediment settling dam, as shown in Figure 2-2-5b (soil bund for bench 1). This soil bund for the first bench can be installed during the vegetation clearance and topsoil stripping phase of the quarrying process.

Water may need to be pumped from the SW pit (as stated in Figure 2-2-6b) once it reaches a depth where water will not flow under gravity to the sediment dam. Water is pumped (using a diesel pump) now from the existing eastern pit to the drain which flows into the upper sediment settling dam if excessive water accumulates in the void – a similar approach will be employed to drain the SW pit as required. Soil bunding, as shown in Figure 2-2-6a and the cross-section in Figure 2-2-6b, will be established around a part of the SW Quarry Area to effectively direct water flow into the drain that flows into the lower sediment settling pond as shown in Figure 2-2-6a. The soil can be obtained from the surface stripping of the new pit, which provides a use for the soil while the pit is being worked. Any accumulation of water in the pit, which may cause it to overflow would enter the drain that leads to the lower sediment settling dam – pumping is only required to fully drain the SW pit for extraction purposes.

The layout has been carefully designed using LiDar and site survey data to locate the lower sediment settling dam such that it does not need to be moved or reconstructed for the remainder of the quarry lifespan - it is effectively the lowest practical point in the landscape on the Mining Lease. Water can be managed in each pit to ensure that it flows to this or the upper dam as shown in Figure 2-2-3. The lower sediment settling dam can be easily accessed from an existing track that is located on the southern side of the drainage line (shown in Figure 2-2-3 as the new access point to the SW quarry area). This existing track will enable easy access to the drainage line to construct the dam and ongoing access to clean it as required.

#### *2.2.4 Acid Drainage*

A small area somewhere in the eastern most section of the quarry was found to exhibit potentially acid forming characteristics in an assessment report prepared in 1998; at that time it was recommended that further disturbance in this area cease, the area be rehabilitated. Unfortunately there seems to have been no location recorded for the area of PAF although the area was rehabilitated and no further conditions were required to manage the issue. No further extraction or rehabilitation works are planned in the 'general area' of the alleged PAF in the existing pit – the quarry is expanding westward and southward, not eastward.

More recent work by MRT in 2013 (Appendix M) indicated that 'XRD mineralogical analysis suggests the primary rock in the aggregate was mostly a siliceous rock, with minor feldspars, especially

plagioclase, and mica. There are probably few or no true secondary minerals. No sulphates, sulphides other deleterious components were found'. If PAF rock is detected in the quarry during works then further petrological testing could be conducted by MRT to confirm this<sup>2</sup>. Petrological testing to ensure compliance with the Department of State Growth road material standard may also detect locations of PAF.

Clay resources are occasionally encountered within the quarry, often in association with poorly metamorphosed sandstone. Future clay seams can be excavated and stored to both facilitate the capping of any PAF material encountered and to also aid rehabilitation works such as lining drainage lines to improve drainage and as a soil medium when mixed with coarse rock (an alternative to topsoil which is in low quantities in the Mining Lease owing to the parent rock and local climate).

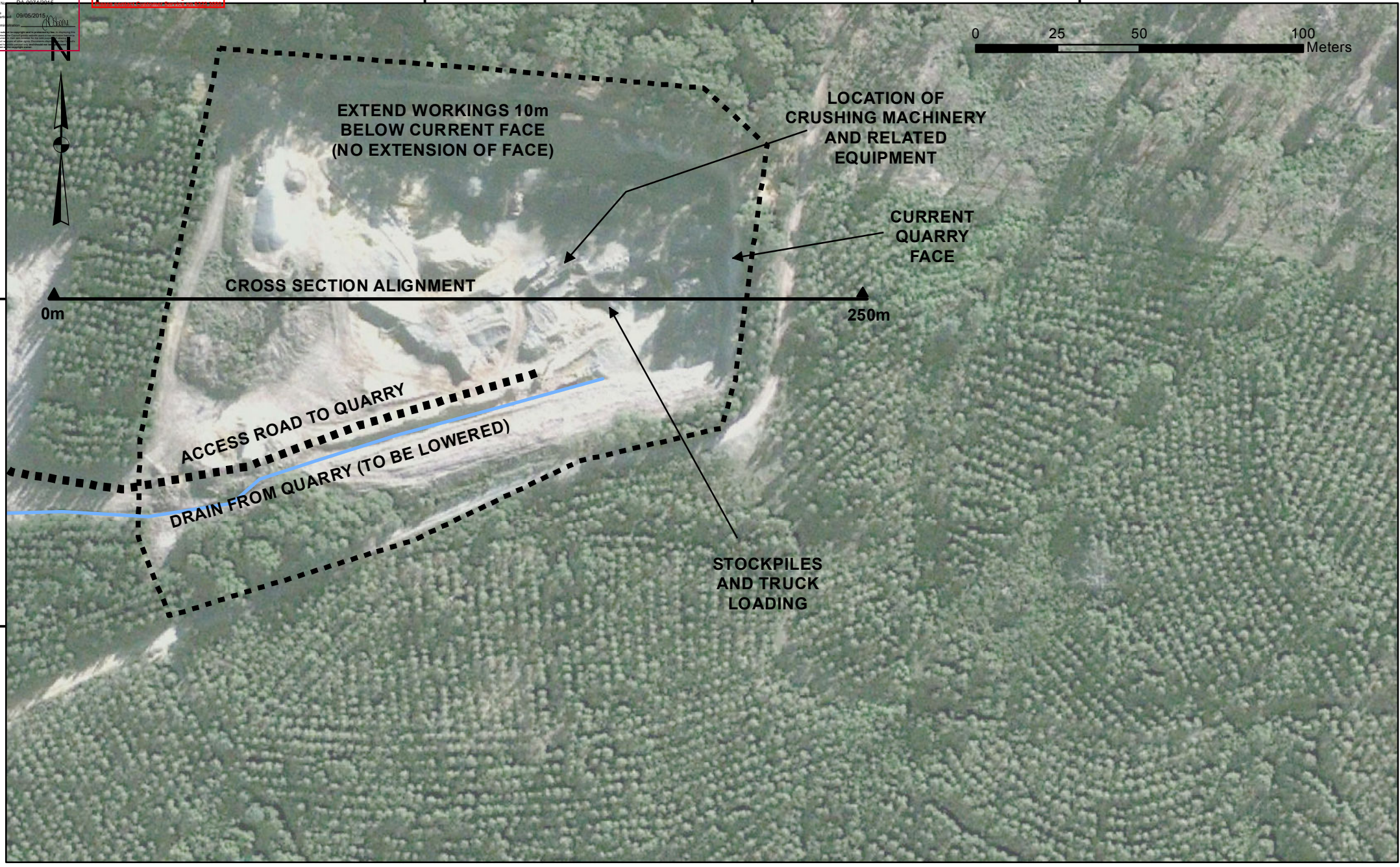
The monitoring of pH (if values decrease below 7.0) can give an indication of acid drainage occurring from the quarry operations. Water samples taken in August 2010 from the Gundagai Quarry sediment settling dam and analysed at the Ben Lomond Water Ti-tree laboratory showed a pH of 7.1 (a reading of pH 7.0 is neutral). More discussion on the water testing regime for the expanded activity is provided in section 5.1.1 Water Quality.

### 2.3 General location map

The quarry is located adjacent to a Permanent Timber Production Zone which is managed by Forestry Tasmania (Figure 2-3) with other adjoining lands being private freehold title. All adjoining land titles support at least some native forest or plantation for silviculture (mainly pine).

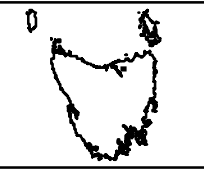
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<sup>2</sup> Commitment 2: If PAF rock is detected in the quarry during works then further petrological testing could be conducted by MRT to confirm this.



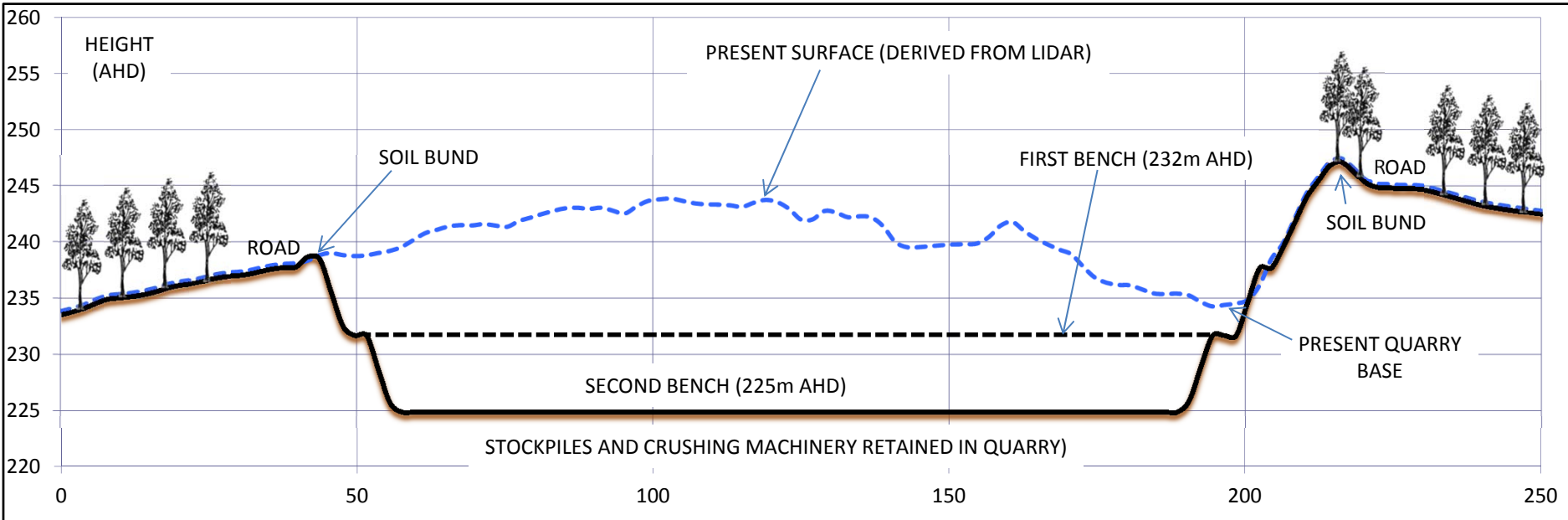
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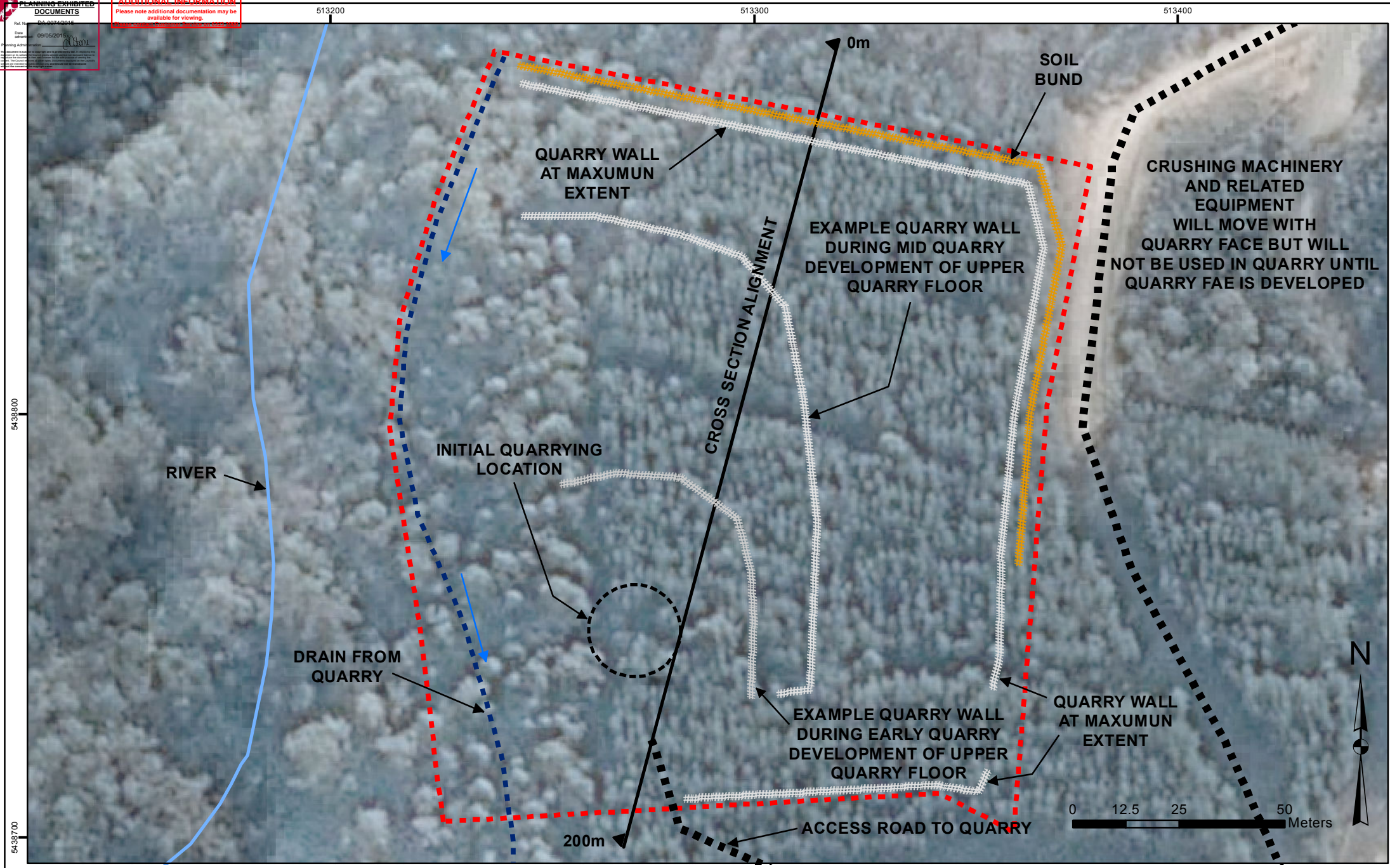
Figure 2-2-4a: Proposed Quarry Plan (Existing Quarry Area)



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FIGURE 2-2-4b: CROSS SECTION OF QUARRY EXTRACTION PLAN FROM FIG 2-2-4a





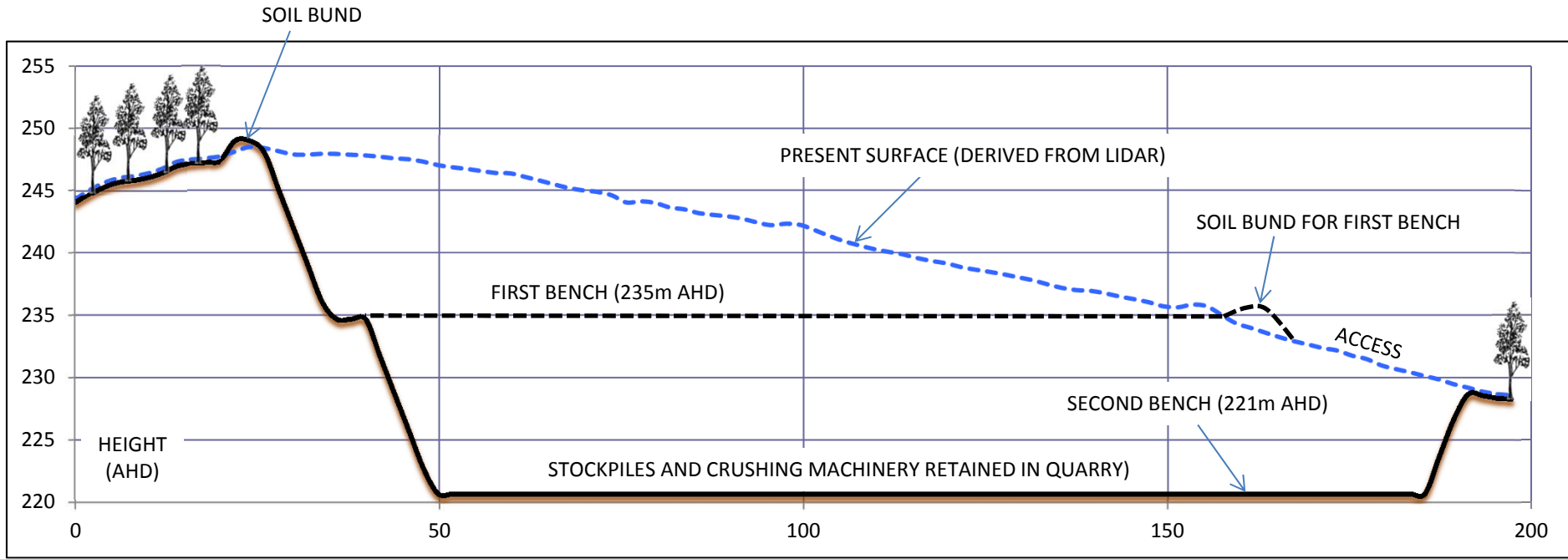
# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 2-2-5a: Proposed Quarry Plan (New NW Quarry Area)



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FIGURE 2-2-5b: CROSS SECTION OF QUARRY EXTRACTION PLAN FROM FIG 2-2-5a



Ref No: DA 0074/2015  
 Date: 09/05/2015  
 Planning Authority: [Signature]

**SOIL BUNDING USED DURING CLEARING BELOW DRAIN TO CONTROL EROSION**

**DRAIN FROM QUARRY DURING INITIAL DEVELOPMENT**

**0m**

**CRUSHING MACHINERY NOT USED IN THIS QUARRY**

**PRODUCT STOCKPILES NOT MAINTAINED IN QUARRY**

**GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP**  
 Figure 2-2-6a: Proposed Quarry Plan (New SW Quarry Area)

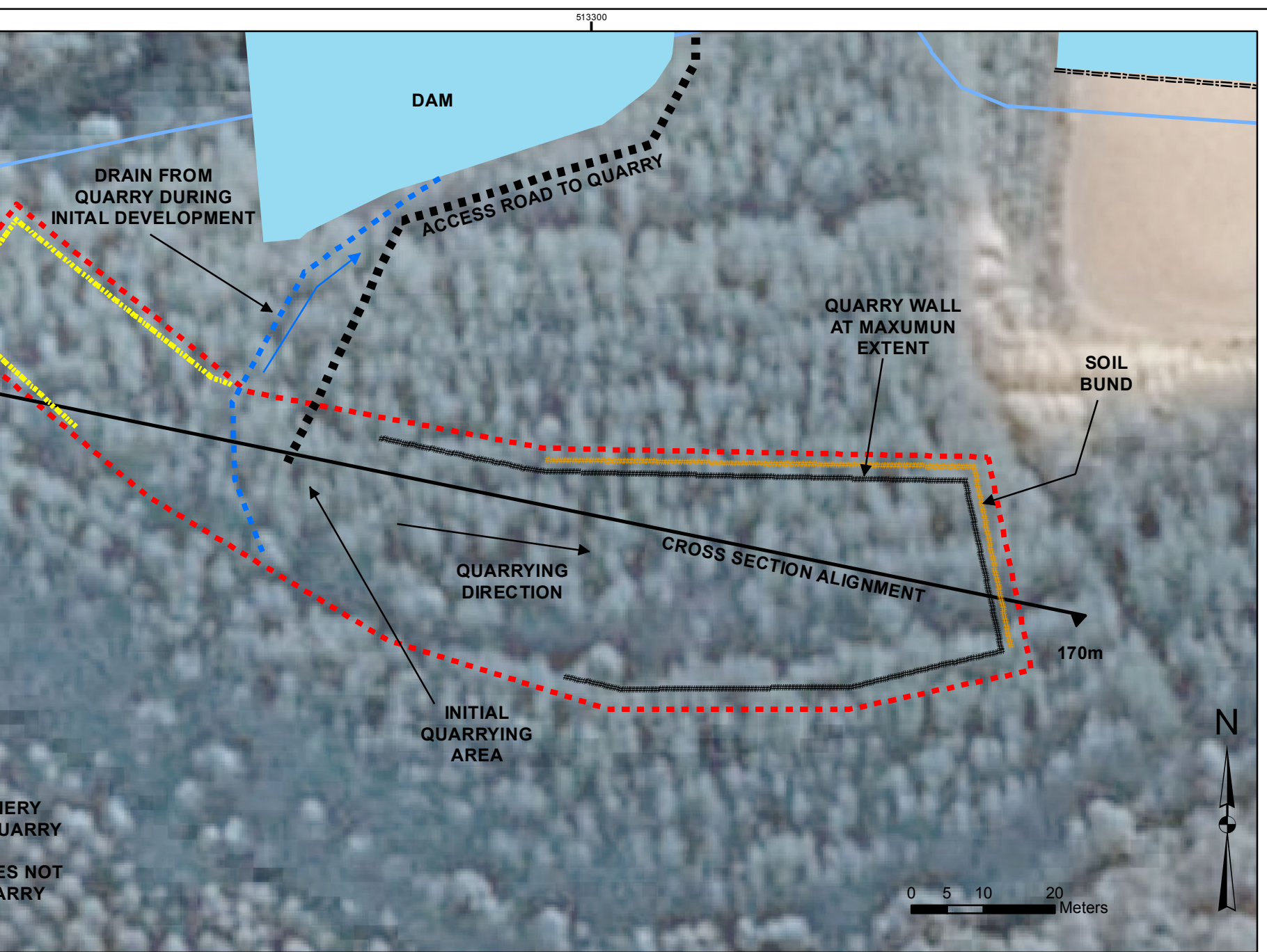
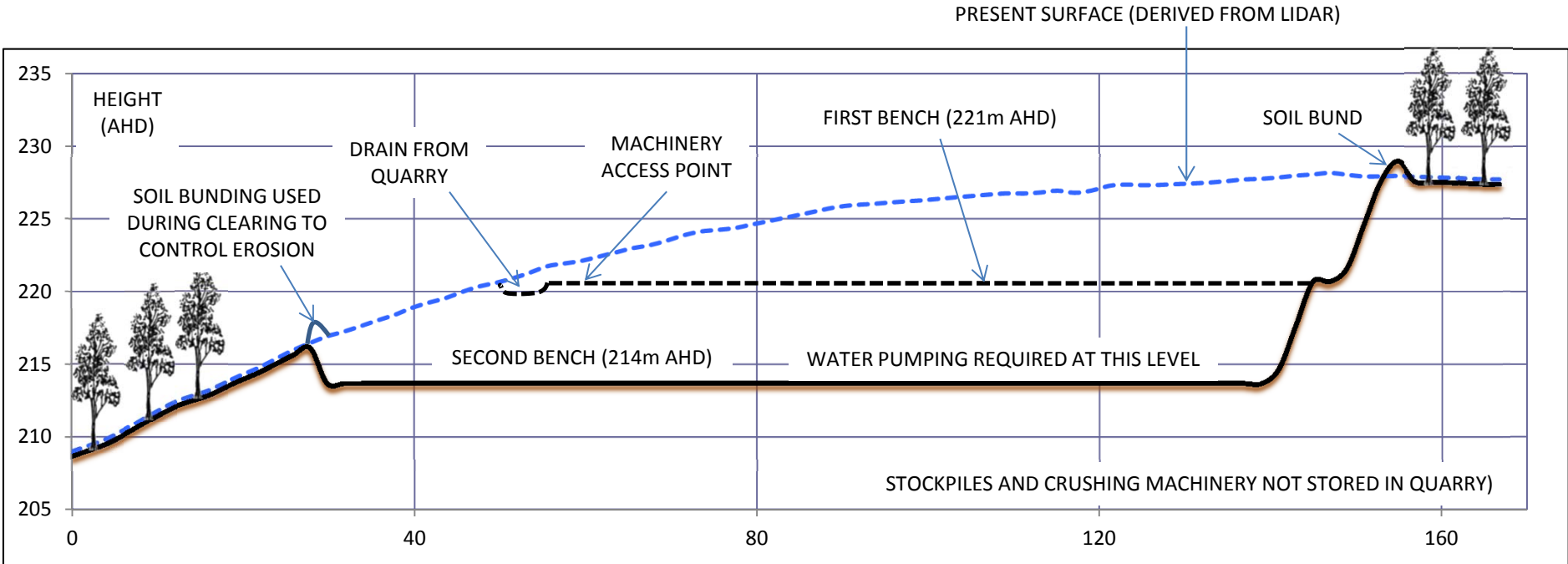
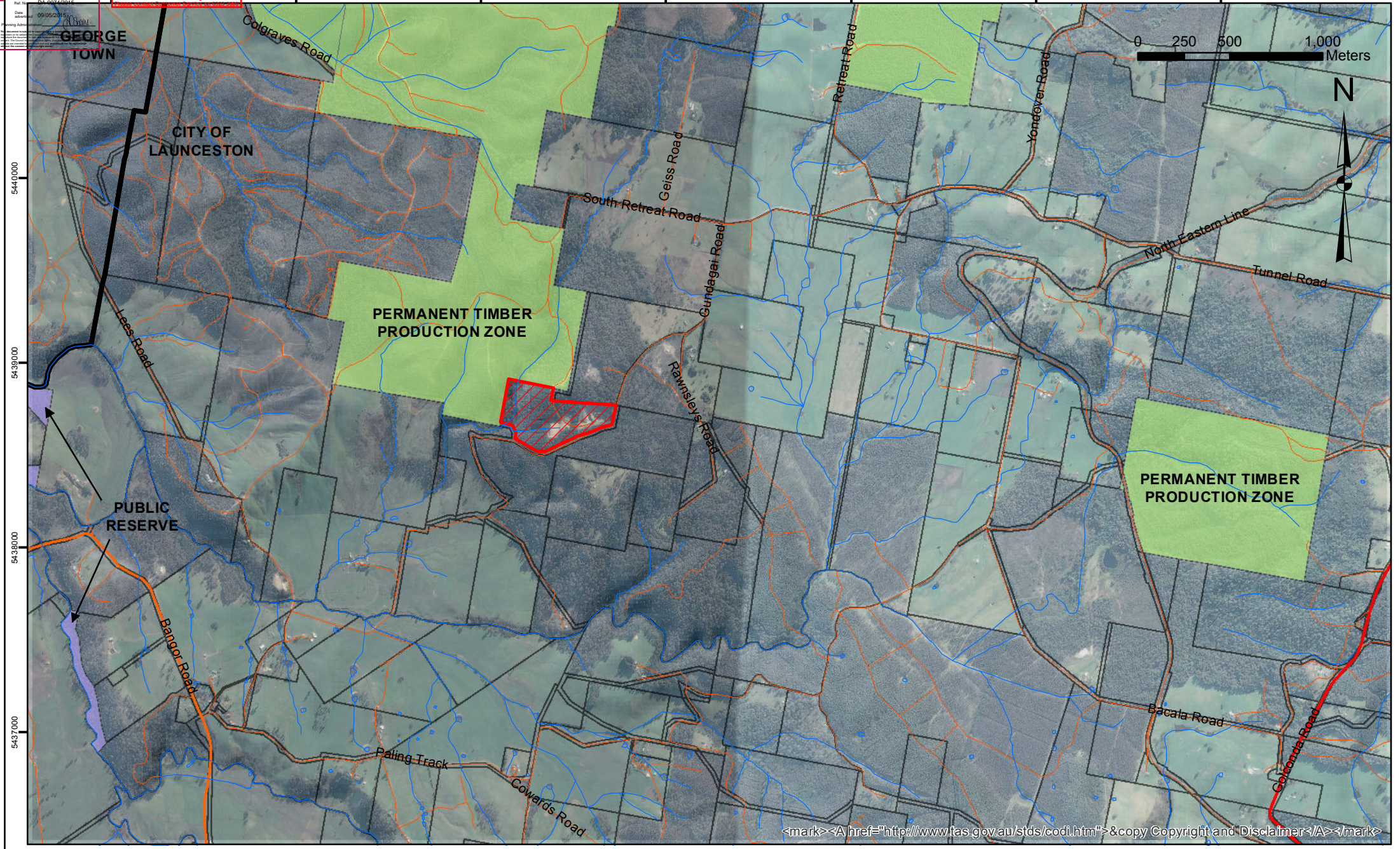






FIGURE 2-2-6b: CROSS SECTION OF QUARRY EXTRACTION PLAN FROM FIG 2-2-6a





# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 2-3: General Site Map (Regional)

-  Gundagi Quarry Site
-  LGA Boundaries

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### 3. THE EXISTING ENVIRONMENT

#### 3.1 Planning aspects

Gundagi Quarry is located within the Launceston Municipality which operates under the Launceston Interim Planning Scheme 2015. The quarry is located on a single Land Title (Volume 139706 Folio 1 - Appendix C, Figure 3-1-3).

The development does not involve the construction or demolition of any buildings.

##### 3.1.1 Scheme Zoning

The land upon which the development will occur is zoned Rural Resource (Figure 3-1-1) and is surrounded by an attenuation overlay (Figure 3-1-2).

The purpose of this zone is –

1. To provide for the sustainable use or development of resources for agriculture, aquaculture, forestry, mining and other primary industries, including opportunities for resource processing.
2. To provide for other use or development that does not constrain or conflict with resource development uses.
3. To provide for uses that add value to primary industries.
4. To provide for uses that support or service rural communities.

There are no Local Area Objectives or Desired Future Characteristics Statements for the Zone.

##### 3.1.2 Development category and Use Standard Assessment

The use is consistent with the definition of *Extractive Industry* which is a Permitted activity within the Rural Resource Zone.

##### Use Standards

Location and Intensity – meets Acceptable Solutions A1 and A2.

##### Development Standards

Building Height, setbacks and siting – not relevant to the development.

##### 3.1.3 Scheme Codes and Overlays

The following notes and comments are made about each Code and Overlay relevant to the development.

- **Bushfire-prone Areas Code**

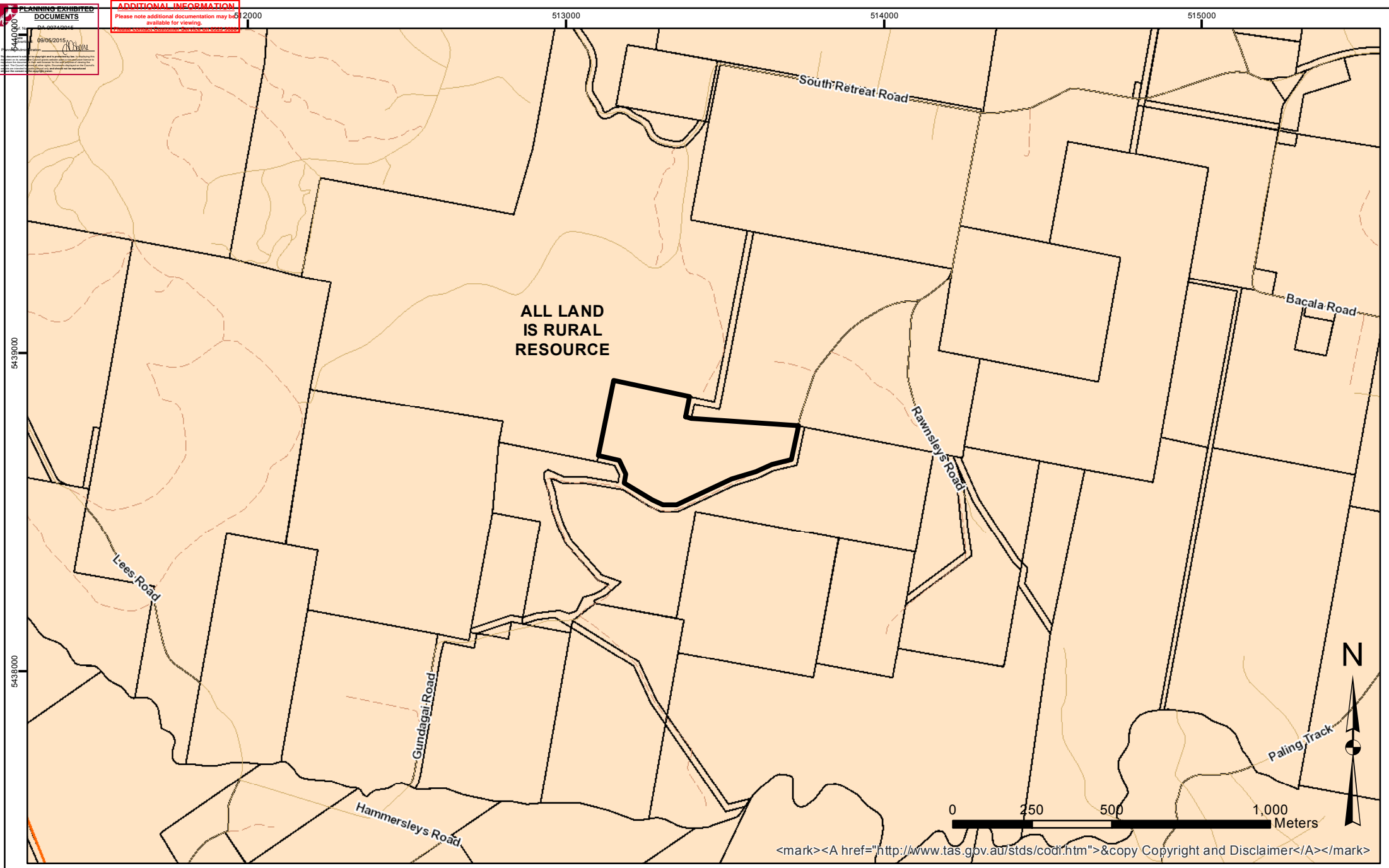
This Code does not apply to the development.

- **Potentially Contaminated Land Code**

The development is to intensify the existing use, which is listed in Table E2.1 Potentially Contaminating Activities of the Scheme, and does not involve sensitive uses. This Code therefore does not apply to the development.

- **Landslip Code**

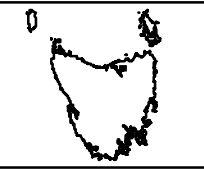
This Code does not apply to the development.



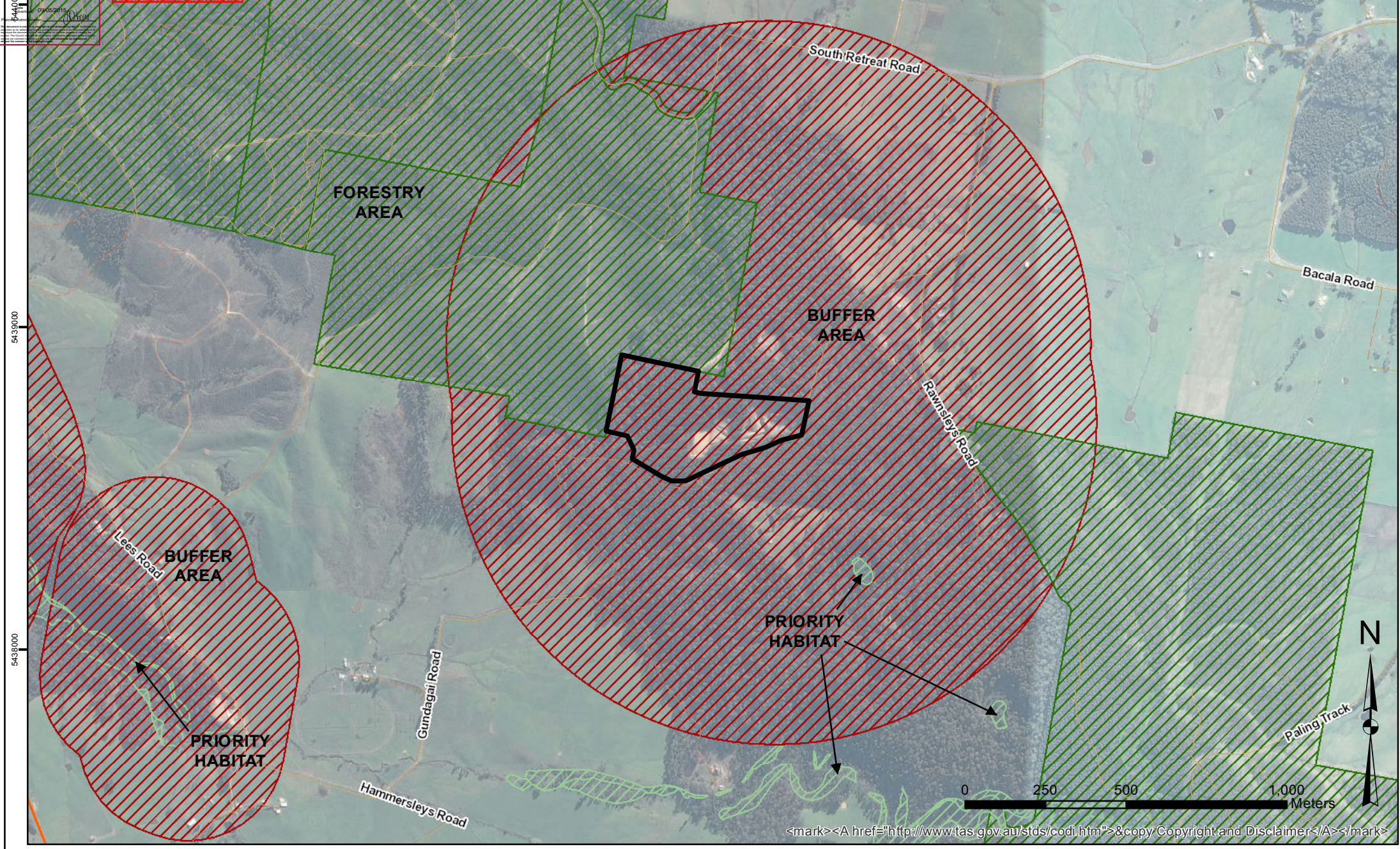
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Figure 3-1-1: City of Launceston Interim Planning Scheme - Zones



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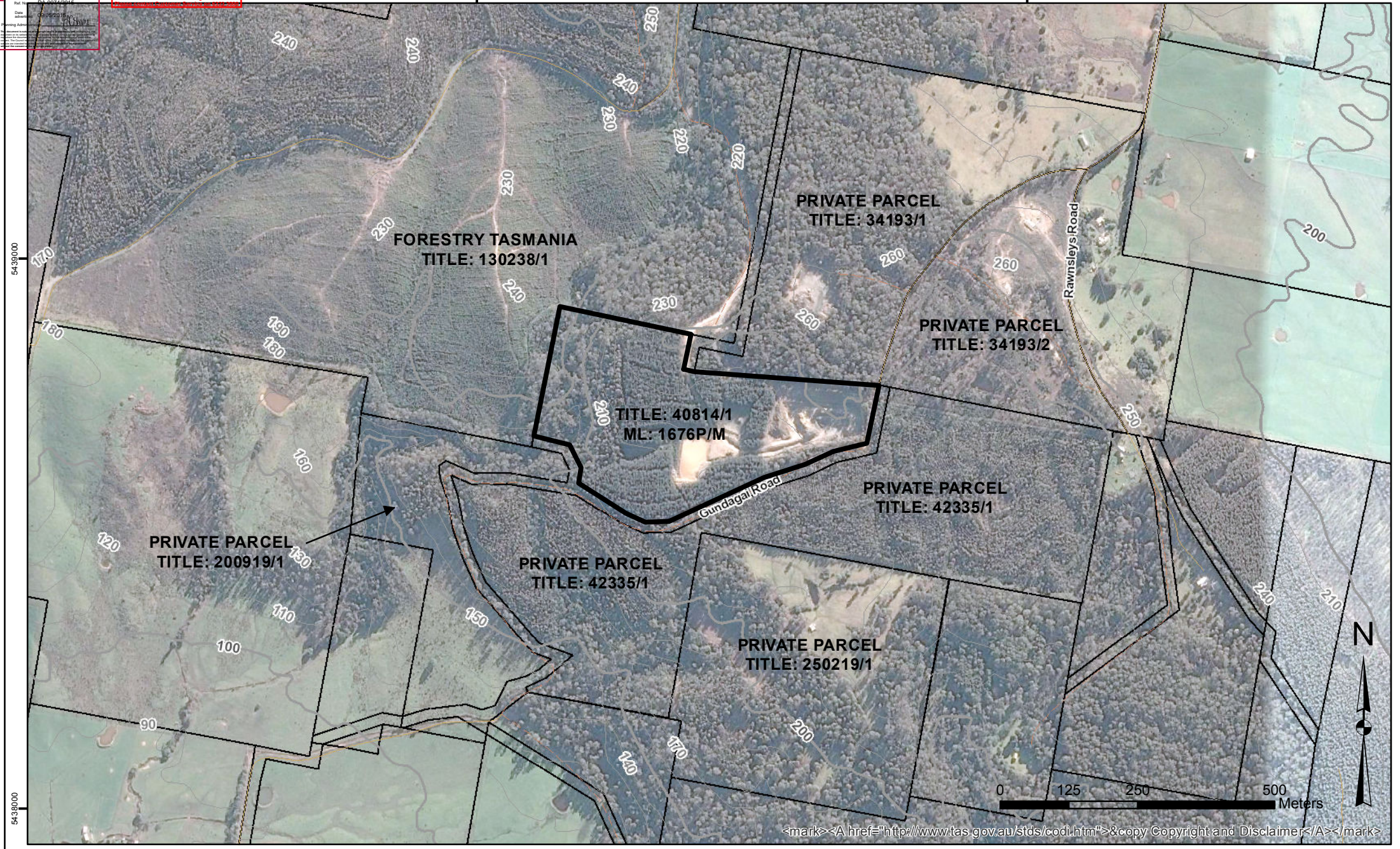
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# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 3-1-2: City of Launceston Interim Planning Scheme - Overlays



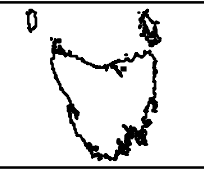
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# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 3-1-3: Site and Surrounding Title References

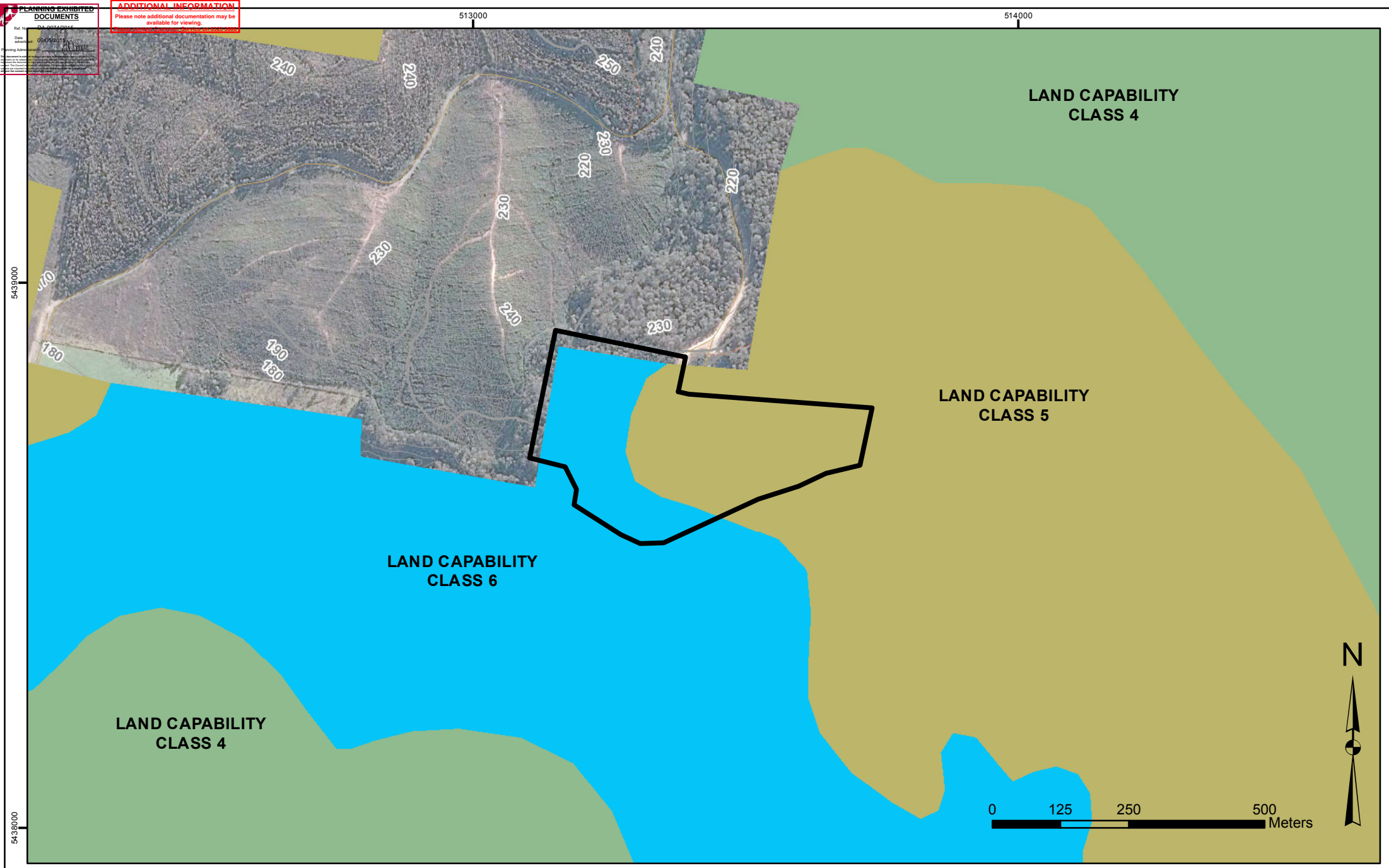


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**PLANNING EXHIBITED DOCUMENTS**

**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.

Ref. No. DA 00740016  
Date 09/09/2015  
Project Address GUNDAGI QUARRY



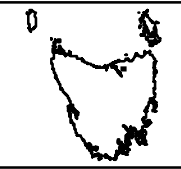
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Figure 3-1-4: Site and Surrounding Land Capability

Site

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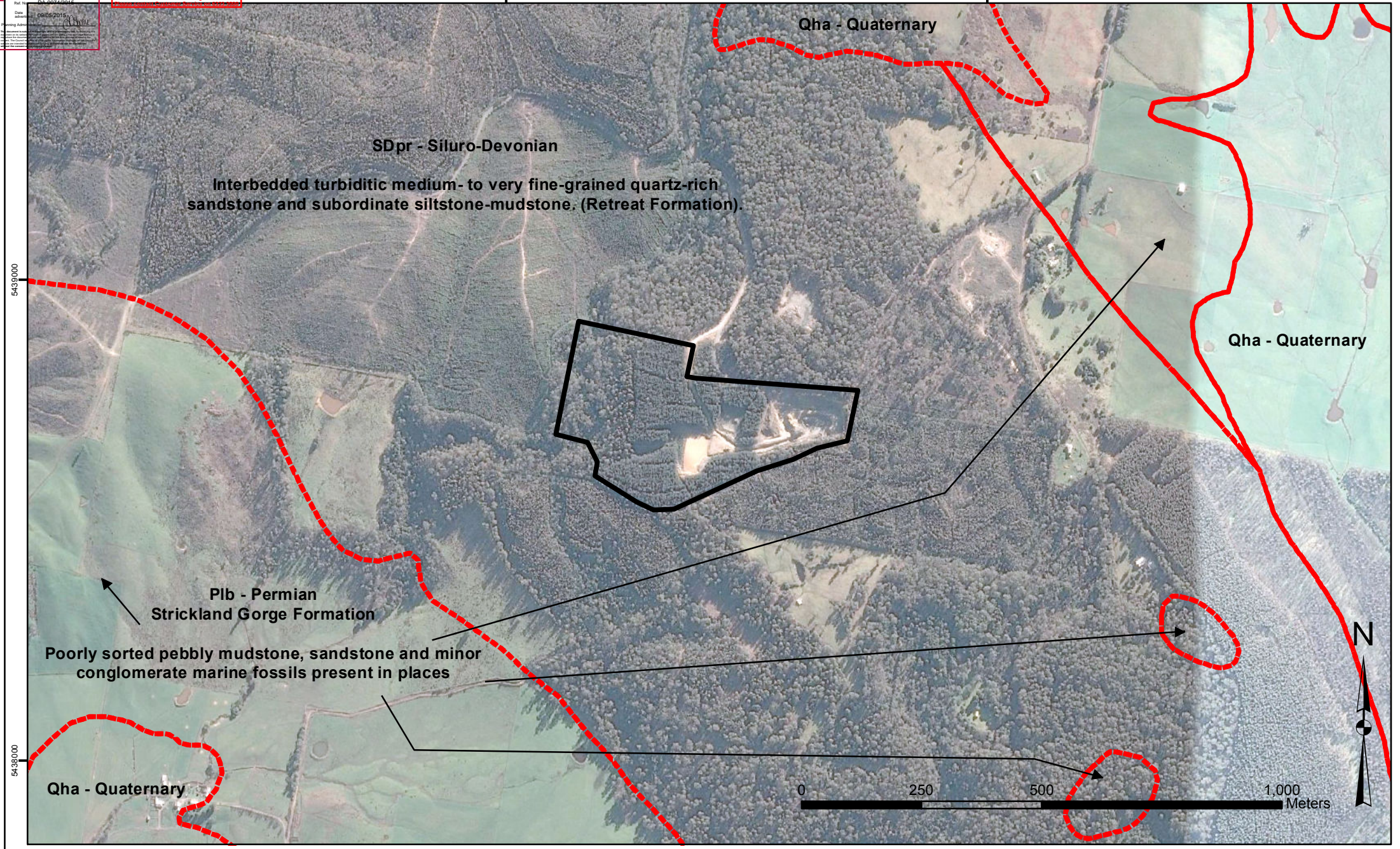
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Figure 3-1-5: Site and Surrounding Geology (1:25000 - MRT)

 Geology  
 Mining Lease

  
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- **Road and Rail Assets Code**

A Traffic Impact Assessment has been prepared for the proposed expanded operation (Appendix D).

The TIA was prepared based on the Launceston Interim Planning Scheme 2012 however its conclusions remain valid except for the proposed use of Tunnel Road which is now load limited and is not available for heavy haulage.

The quarry is accessed from South Retreat Road (Figures 2-2-3a, 2-2-3b and 4-15-1) which was widened, reconstructed and sealed for a section of its length as part of the permit conditions associated with DA0523/2009. The Land Title upon which the quarry is located is accessed by a right of way covered by Agreement for Easement No. 14091 between DTK Logging Pty Ltd and Forestry Tasmania. Figure 4-13-1 shows the transport routes to be used by the expanded activity.

The TIA (Appendix D) indicates that the expanded development complies with the requirements of the Road and Rail Asset Code for the 2012 Interim Planning Scheme, however its conclusions remain valid for the 2015 Interim Planning Scheme except for the proposed use of Tunnel Road which is now load limited and is not available for heavy haulage:

- The development is for an increase of output from the quarry from the currently approved rate of 50,000 cubic metres to 200,000 cubic metres. The quarry services councils and developments in the nearby area with high quality construction materials.
- When operating at maximum capacity, the quarry generates up to 116 vehicles per day. This consists of 95 heavy vehicle trips (two-way movements – consisting of up to 47 one-way laden truck movements). The proposed development will not increase peak daily generation, but will enable the quarry to produce more on a yearly basis. For this reason, the various junctions within the surrounding road network will continue to operate in a safe and efficient manner. The peak hourly generation of the quarry is likely to be in the order of 10 trips per hour, which is well within the surrounding road network’s ability to absorb without any significant loss of level of service.
- Adequate sight distance is provided at the site access, as well as other major road junctions in the surrounding transport network in accordance with the Planning Scheme requirements for the prevailing vehicle speeds.
- The requirements of the Road and Rail Assets Code of the Planning Scheme are met.

No further assessment or upgrades/modifications to any road or junctions was recommended by the comprehensive TIA process.

- **Flood Prone Areas Code**

The site is not prone to flood. This Code therefore does not apply to the development.

- **Parking and Sustainable Transport Code**

A hardstand car park containing 6 spaces exists at the facility for personnel, service vehicles, and visitors. The Code (Table E6.1) does not define the number of car spaces required for the development - a compacted gravel area outside the extraction zone of the quarry itself provides 6 spaces for personnel, service vehicles, and visitors (Figure 2-2-3).

- **Scenic Management Code**

The site is not within a Local Scenic Management Area or Scenic management - tourist road corridor. This Code therefore does not apply to the development.

- **Biodiversity Code**

The development is exempt from this Code because it is a Level 2 activity assessed by the Board of the Environment Protection Authority.

- **Water Quality Code**

The development is exempt from this Code because it is a Level 2 activity assessed by the Board of the Environment Protection Authority.

- **Recreation and Open Space Code**

This Code does not apply to the development because the development is not for subdivision in the residential, low density residential, village and urban mixed use zones.

- **Environmental Impacts and Attenuation Code**

The development is exempt from this Code because it is a Level 2 activity assessed by the Board of the Environment Protection Authority.

- **Airports Impact Management Code**

This Code does not apply to the development.

- **Local Historic Heritage Code**

This Code does not apply to the development.

- **Coastal Code**

This Code does not apply to the development.

- **Telecommunications Code**

This Code does not apply to the development.

- **Invermay/Inveresk flood inundation area Code**

This Code does not apply to the development.

- **Cataract Gorge Management Area Code**

This Code does not apply to the development.

- **Signs Code**

There is no new signage proposed for the site. This Code does not apply to the new development.

- **Development Code**

This Code does not apply to the development.

### **3.2 Environmental aspects**

#### *3.2.1 Geology and Soils*

The geology of the quarry is Ordovician to Devonian age siltstone and sandstone of the Mathinna Beds group (Figure 3-1-5). The Mathinna Beds have been folded and are characterised by dip angles which are variable, ranging from very steep to very shallow depending upon the position within the fold structures. The beds have also been subject to faulting. The rock is a hard dark blue coloured siltstone which is overlain by sandy alluvial deposits. Analysis of rocks from the quarry show that there is one

main rock type in two colour ranges, one grey coloured and the other creamy coloured Graywacke which is a fine grained sedimentary rock with a carbonate free lithology with a mineralogy of 75% quartz, 5% Feldspar, 5% Opaques and 15% matrix.

The rock in the quarry is particularly hard and is utilised as road base and base course materials and complies with the DIER Specification R40 Class A and sub-base 1 and 2 material.

The quarry is situated on the Retreat Land System which is on forested low hills trending north-north-west formed on sandstone and mudstone deposits commonly referred to as the Mathinna Beds. This land system occurs throughout the Lefroy and Brid River areas to Lower Turners Marsh and Nabowla. Other occurrences are St. Helens and south to German Town. Small occurrences are around Gladstone, Branxholm and Mount Horror in the North east. A characteristic of this land system is the sandy soils, which are loose and 'snuffy' when dry, but soft and boggy when wet. A coarse structured gradational soil has developed on the sharp crests and upper slopes and the stony mottled duplex soil on the mid slopes has an iron-organic B-horizon. The mottled gradational soil on the lower slopes and swales is often poorly drained.

### 3.2.2 Surface water

Stormwater runoff calculations (based on a 5-day, 95th-percentile rainfall event and 2-year, 6-hour storm) for the current and expanded operation were completed as part of the ACDC-EPA assessment process for the dam modification and construction at the quarry (see Appendix I).

The current and proposed drainage patterns are explained in section '2.2 Current site plan and proposed layout' and summarised below:

- The drainage layout needs to be altered between 2014 and 2015 as the pit at the eastern end of the ML (the currently used pit) needs to be made deeper to extract additional material. As the pit is made deeper water will not naturally drain into the existing sediment dam ('upper dam') because the void will be lower than the sediment dam. For water to naturally flow out of the current pit a bypass channel is to be installed to drain this water into a new dam located lower in the catchment to the existing dam.
- The upper dam will remain to catch and treat water for sediment removal in one section of the quarry catchment (Figure 4-2-1).
- The lower dam has been approved by the ACDC and EPA (EPN 9053/1) and its location is shown in Figures 2-2-2 and 4-2-1. The existing dam will be reduced in size by creating a bund wall across it, as shown in Figure 2-2-1, and then backfilled and compacted with heavy machinery to achieve a suitable hardstand surface.

Beyond 2015 the quarry will extend into areas of pine plantation at the north-west and south-west of the ML. Water flow will be into the upper sediment dam for areas upstream of it, and to the lower dam for areas 'below' (in terms of height) the upper dam. Water overflowing from the upper (but now smaller) dam will pass through the lower dam before being discharged into a minor tributary of the Third River (Figure 4-2-1).

The lower dam should not need to be moved or reconstructed during the remainder of the quarry lifespan as it will be at the lowest practical point in the landscape on the Mining Lease. The lower dam can be easily accessed from an existing track that is located on the southern side of the drainage line (shown in Figure 2-2-3 as the new access point to the SW quarry area). This existing track will enable easy access to the drainage line to construct the ponds and ongoing access to clean the dam as required. Sediment cleaned from the dam will be removed to the quarry for use in rehabilitation works.

The existing and new sediment dams will be cleaned out either on a six monthly basis or at 15% storage volume. The sediment trapped is reused as a fine material mixed with stockpiled top soil for progressive rehabilitation of used quarry areas<sup>3</sup>.

No chemicals, fuels or oils are stored on site overnight and refuelling is carried out using a mobile bund<sup>4</sup>.

### 3.2.3 Groundwater

The groundwater resources in the region are an important component of the water system that contributes to the environmental flows in the surface water system, especially during the summer months. The aquifers in the region are mainly replenished by infiltration of rainwater into the sedimentary Mathinna Beds (siltstone, sandstone and mudstone) and granites along the eastern, southern and western flanks of a geological structure known as the Scottsdale Basin.

The impacts of the quarry operations and proposed expansion on the groundwater resource will continue to be managed by ensuring pollutants do not enter the water system (surface and ground) and the proper treatment of waters emanating from the site in the inlet zone with a primary sediment settling pond (which also will act as a first flush pollutant trap) and interceptors and water quality control pond.

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<sup>3</sup> Commitment 3: The existing and new sediment dams will be cleaned out either on a six monthly basis or at 15% storage volume. The sediment trapped will be reused as a fine material mixed with stockpiled top soil for progressive rehabilitation of used quarry areas.

<sup>4</sup> Commitment 4: No chemicals, fuels or oils are stored on site overnight and refuelling is carried out using a mobile bund.

## 4. POTENTIAL EFFECTS AND THEIR MANAGEMENT

### 4.1 Dust Emissions

#### 4.1.1 Internal Quarry Emissions

Potential sources of dust within the quarry operation are from:

- The stripping and stockpiling of topsoil;
- The ripping and crushing of rock during dry windy conditions (summer months);
- The movement of rock and gravel within the quarry by machinery;
- Road (gravel) use in and next to the quarry; and
- Stockpiled gravel and fines.

Measures that will be used to suppress dust include the following industry environmental practices for quarries<sup>5</sup>:

- Watering of internal roads as required during dry and windy conditions;
- Installation of automatic load dampening infrastructure (for load dampening within trucks that exist the quarry); and
- Minimising the geographic extent of areas of exposed soil.

#### 4.1.2 External Quarry Emissions

There are many unsealed gravel surfaced roads in rural and regional Tasmania. There is ongoing use of these roads by passenger vehicles and freight trucks for the purpose of moving across the landscape and for the transportation of goods, products and services. The region around Lilydale has several major transport routes for products including Pipers River Road, Golconda Road, Bangor Road and Old Bangor Tram Road. Secondary routes that are frequently used by gravel/rock, log and freight trucks include Retreat Road, Bacala Road and Colgraves Road (see Figure 4-13-1).

South Retreat Road was widened, reconstructed and sealed for a section of its length as part of the permit conditions associated with DA0523/2009 to mitigate dust emissions associated with several houses along that section of road. This process was a significant financial impost on the quarry operator for what is a public asset that should be maintained by the road authority irrespective of the quarry trucks using the road. No additional sealing of any unsealed roads is proposed by the quarry operator, nor is it required based on the results of the Traffic Impact Assessment (see section on Traffic Impacts, and also Appendix D).

It is the legal responsibility of the truck driver (and/or owner of the cartage company) to ensure that their load is secured when they leave the quarry, and to ensure that their vehicle is safe and roadworthy. Loads carted from the quarry can be dampened using the quarry load dampening infrastructure, otherwise the driver may choose to use a tarpaulin or similar to prevent or minimise fugitive emissions from loads being carted from the quarry<sup>6</sup>.

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<sup>5</sup> Commitment 5: Measures that will be used to suppress dust include the following industry environmental practices for quarries:

- Watering of internal roads as required during dry and windy conditions;
- Installation of automatic load dampening infrastructure (for load dampening within trucks that exist the quarry); and
- Minimising the geographic extent of areas of exposed soil.

<sup>6</sup> Commitment 6: Loads carted from the quarry can be dampened using the quarry installed load dampening infrastructure otherwise the driver may choose to use a tarpaulin or similar to prevent or minimise fugitive emissions from loads being carted from the quarry.

## 4.2 Liquid waste

### 4.2.1 Septic waste

There is no toilet or other amenities provided at the quarry, nor are any proposed in this application.

### 4.2.2 Spillage Clean-up Waste

Two hydrocarbon spill kits are stored at the quarry and staff trained in how to use it in the event of a spillage<sup>7</sup>. Once used, the spill it will be disposed of in accordance with *EOP Solid Waste Disposal* (Appendix E).

### 4.2.3 Stormwater

Stormwater may contain sediment and possibly hydrocarbon-based products from machinery working on the site. The construction of a new 'lower' sediment settling dam has been approved by the EPA and ACDC (EPN 9053/1) and also the modification of the existing 'upper' sediment settling dam (Figure 4-2-1). The 'lower' sediment settling dam will be constructed and 'upper' sediment settling dam modified in accordance with EPN9053/1 (Appendix J) and the Pre-Construction Dam Report (Appendix I)<sup>8</sup>.

## 4.3 Land use and development

The increased production of rock/gravel at Gundagi Quarry will not materially affect surrounding land use including the adjacent rural residential properties associated with Gundagi Road.

## 4.4 Noise emissions

### 4.4.2 Existing Permit Conditions - Noise

The relevant permit condition for noise related thresholds is Condition N2 of Permit No. 7907 –

1. Noise emissions from the activity when measured at any noise sensitive premises in other ownership and expressed as the equivalent A-weighted sound pressure level must not exceed:

- 1.1 46 dB(A) between 0700 hours and 1800 hours (Day time); and
- 1.2 40 dB(A) between 1800 hours and 2200 hours (Evening time); and
- 1.3 35 dB(A) between 2200 hours and 0700 hours (Night time).

2. Where the combined level of noise from the activity and the normal ambient noise exceeds the noise levels stated above, this condition will not be considered to be breached unless the noise emissions from the activity are audible and exceed the ambient noise level by at least 5 dB(A).

3. The time interval over which noise levels are averaged must be 10 minutes or an alternative time specified in writing by the Director.

4. Measured noise levels must be adjusted for tonality, impulsiveness, modulation and low frequency in accordance with the *Tasmanian Noise Measurement Procedures Manual*.

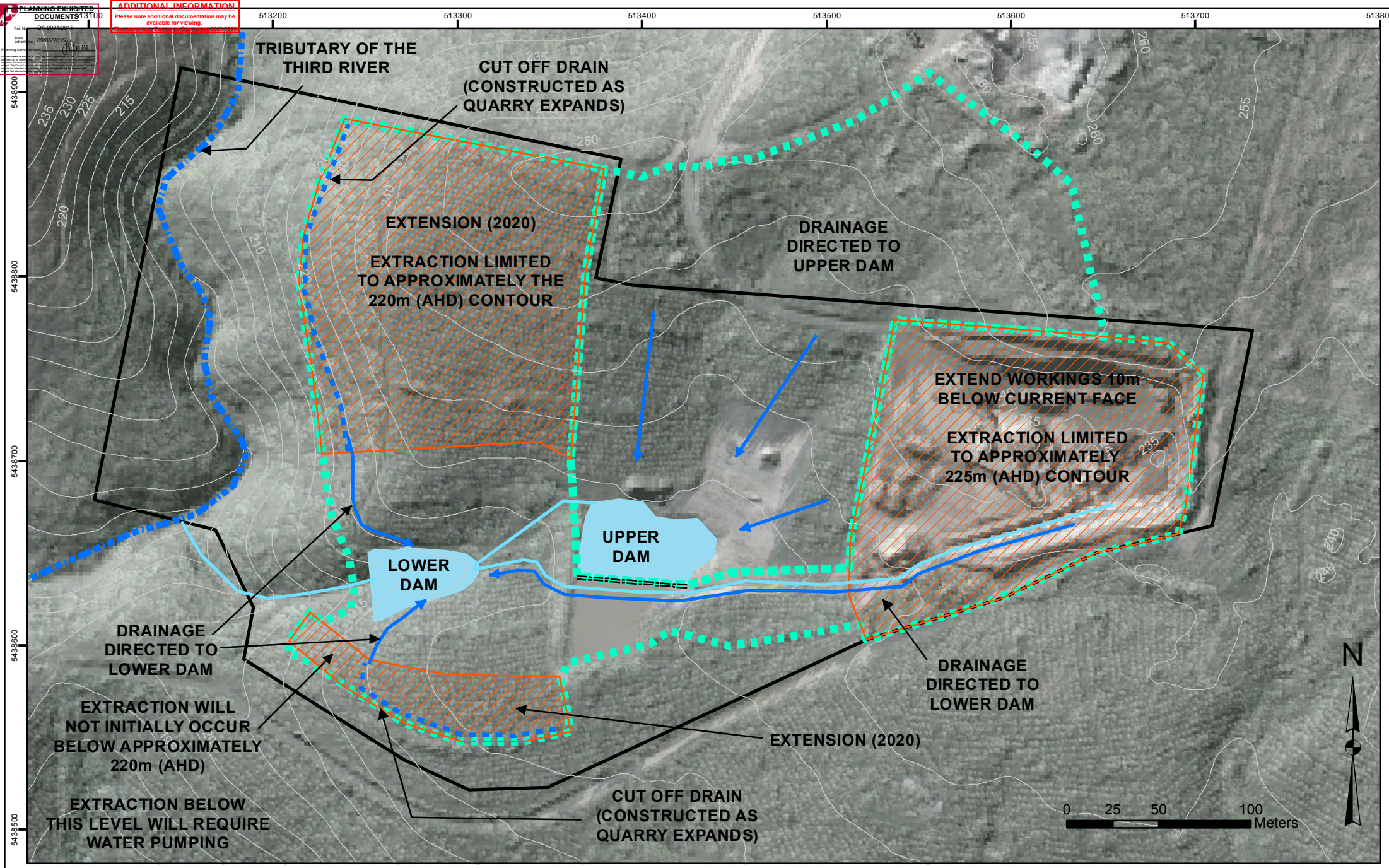
5. All methods of measurement must be in accordance with the *Tasmanian Noise Measurement Procedures Manual*, issued by the director.

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<sup>7</sup> Commitment 7: Two hydrocarbon spill kits are stored at the quarry and staff trained in how to use it in the event of a spillage.




<sup>8</sup> Commitment 8: The 'lower' sediment dam will be constructed and 'upper' sediment dam modified in accordance with EPN9053/1 and the Pre-Construction Dam Report.

PLANNING EXHIBIT DOCUMENTS 13100  
 Ref No: DA 00742016  
 Date: 09/05/2015  
 Planning Authority: *[Signature]*  
 Additional Information: Please note additional documentation may be available for viewing.



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

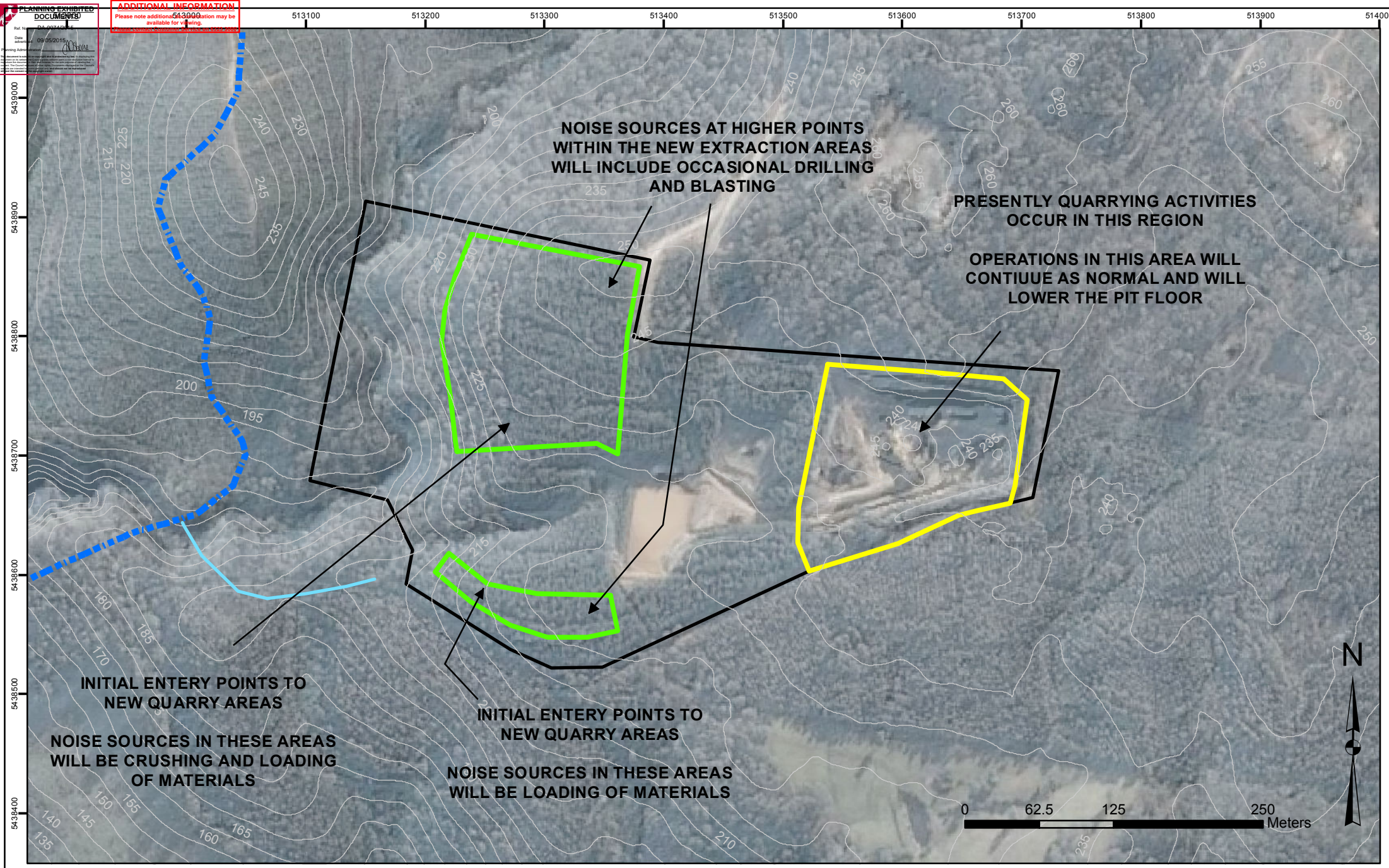
Figure 4-2-1: Proposed Surface Drainage

-  New Quarry Areas
-  Catchment Areas (Approx)
-  Quarry Site

*[Logo]* an Dieman CONSULTING  
 PO Box 1 North Town TAS 7511  
 Base data by TASMAR. © State of Tasmania  
 Base image © Google Earth



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-4-1: New and Existing Noise Sources

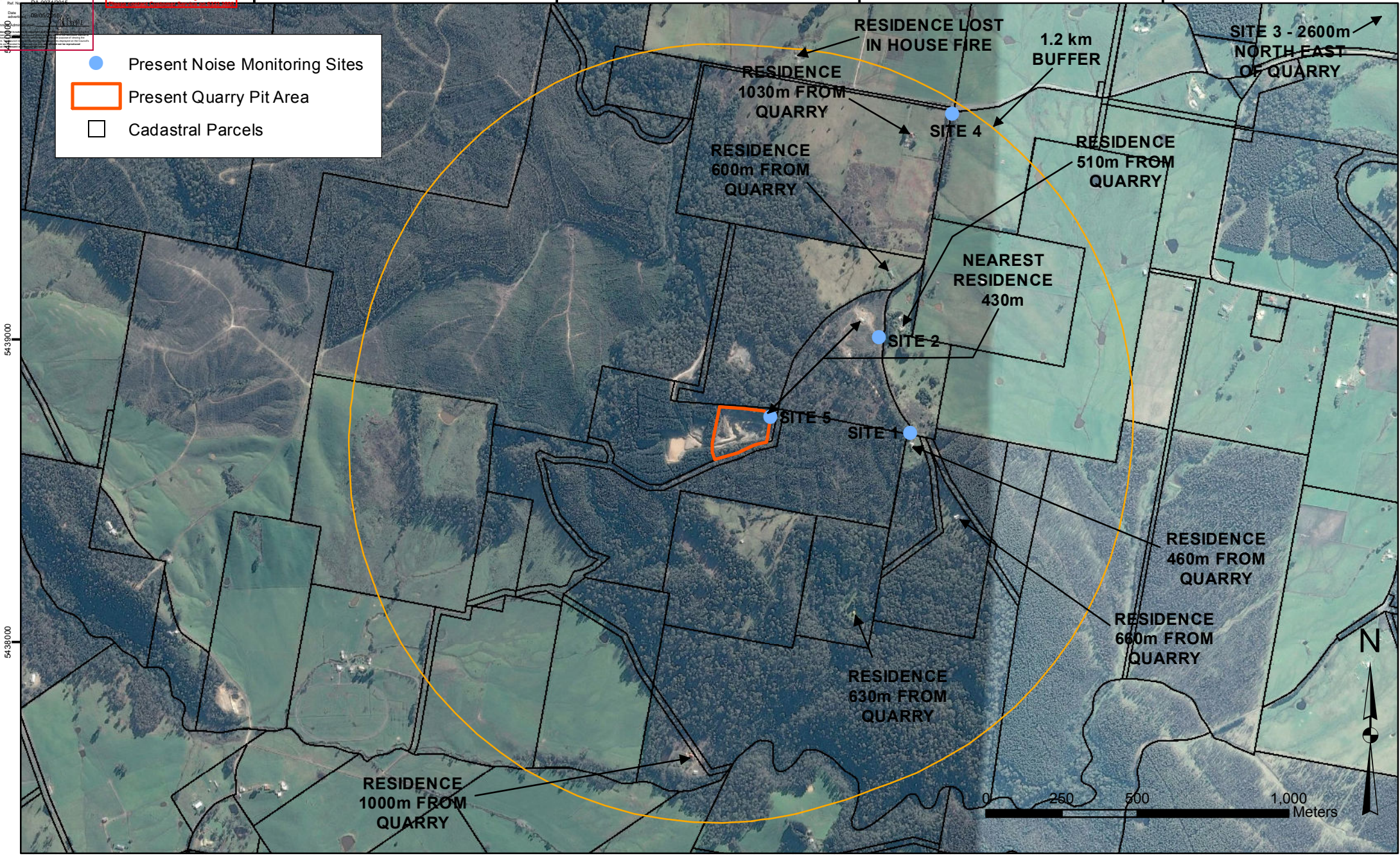
- Existing Pit
- New Quarry Area
- Site



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014



- Present Noise Monitoring Sites
- Present Quarry Pit Area
- Cadastral Parcels



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-4-2: Present Noise Monitoring Locations and Susceptible Sites



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014

#### 4.4.2 Previous Studies

The quarry was subject to a very detailed noise modelling exercise in 2010 conducted by VIPAC (Appendix H). That report considered air blast overpressure (ABO), vibration and environmental noise from drilling, blasting, crushing and general quarry activities on the surrounding environment in relation to the extraction of up to 50,000 cubic metres per annum. The previous quarry expansion (to 50,000 cubic metres per annum) consisted of an establishment blast followed by the deepening of the pit to win material for crushing.

VIPAC made the following summary of findings from their 2010 study (Appendix H) –

- Ground vibration and air blast overpressure measurements at Residence B [the residence 430m from the quarry shown in Figure 4-4-4] are within recommended maximum limits under ANZEC guidelines.
- The air blast overpressure level measured at Residence B (location A) [the residence 430m from the quarry shown in Figure 4-4-4] was 0.2 dB below the recommended limit under ANZEC guidelines.
- Conservative predictions of PPV levels from an establishment blast and face blast are below 5 mm/s at residential locations surrounding the quarry.
- Predictions of air blast overpressure (ABO) slightly under predict the measured level at residence B [the residence 430m from the quarry shown in Figure 4-4-4]. Predicted levels for an establishment blast and face blast are below 115 dBL. An increase in charge mass results in an increase in ABO.
- With the exception of drilling on the current bench at the western end of the quarry, predicted environmental noise modelling has demonstrated that noise emissions from quarry operations, both current and proposed, are highly unlikely to exceed a 46 dBA  $L_{Aeq,10min}$  limit.'

A follow-up survey by VIPAC for environmental noise compliance in 2013 (Appendix H) directly assessed the impact of crushing during night time hours, environmental noise levels from the operating quarry and the noise generated by trucks on the public road network to the north and north-east of the quarry (mainly Gundagi, South Retreat and Tunnel Roads). The key findings of the 2013 report are –

Day Time Measurements - During the day measurements at position 1 (site 1 is a residence 460m from the quarry, shown in Figure 4-4-3 of this DPEMP) the crusher was audible and controlled measured LA90 levels, in combination with local insect activity, at approx. 35 dBA.  $L_{Aeq}$  were controlled by local bird activity. At positions 2 and 3 (site 2 and 3 shown in Figure 4-4-3 of this DPEMP) quarry activity **was not** audible and measured noise levels were controlled by locally generated noise.

Night Time Measurements - Night measurements at position 1 during the control period (0530 – 0600 hrs) and during site activity (0600 – 0700 hrs) were controlled by local bird and insect activity and leaf rustle generated by the moderate easterly breeze. Activity within the quarry was not audible.

Conclusions – Operations at the Gundagi Quarry (on-site activity) didn't generate noise levels in excess of the day and evening noise emission limits, as specified under condition N2 of the site Permit, at any noise sensitive location.

The findings of both reports are of relevance to the expanded quarry activity because both new quarry areas will require establishment blasts, like the 2010 activity proposal, and comparable use of the same machinery as the 2010 noise assessment/modelling.

The nearest residential sensitive receptors remain those to the east of the Mining Lease irrespective of the new quarry areas (ie NW and SW Quarry Areas as shown in Figure 4-4-1) being further to the west – two additional residences fall within the 1.2km ‘assessment’ buffer required by the EPA in the DPEMP Guidelines – to the south-west and south of the two new areas to be quarried (Figure 4-4-3).

#### 4.4.3 Existing Noise Sources

The major noise sources of the existing activity are the same as those for the expanded activity - drilling, blasting and other machinery use associated with quarry operations and truck movements on and off site. The major noise sources from the current and expanded activity have been identified as follows:

- drill rig;
- primary and secondary crushers;
- blasting operations; and
- on-site use of ancillary equipment; excavators, loader and truck movements.

The quarry will expand into two new areas at the western and south-western extents of the Mining Lease as shown in Figure 4-4-1.

#### 4.4.4 New Noise Sources

The quarry will continue to extract gravel and rock material from the existing eastern pit, making it deeper (mainly to the western side of the existing pit, away from the residences on Gundagi Road).

Under the expanded activity quarrying will progressively move into two new areas at the western and south-western extents of the Mining Lease as shown in Figure 4-4-1. Like the original pit (to the eastern side of the ML), these areas will be surface excavated until such time a pit is created within which an establishment blast can occur – the quarrying will then proceed as occurred for the eastern pit, with the pit becoming deeper with each progressive blast and subsequent excavation of blasted rock.

In summary there will be no new noise sources. Rather the noise sources from the existing activity will simply occur between the three quarry areas, subject to the characteristics of the material that needs to be extracted and the location of extraction/crushing machinery.

The crusher will remain in the eastern (existing) pit until such time that a pit with walls is created in the NW Quarry Area – it is only at this time, which may take 3-5 years, the crusher would be moved to this area (see Figure 2-2-5a). The pit would also need to be of sufficient size to accommodate trucks for loading, the stockpiling of crushed material and the placement of load dampening infrastructure. The crusher will not be located in the SW Quarry Area.

#### 4.4.5 Sensitive Receptors – current pit extraction

The closest two residences are on Rawnsleys Road, approximately 430 and 460m to the east of the existing pit (Figure 4-4-2). The topography between the lip of the quarry and these residences is relatively level and lightly wooded, with the existing pit being well below natural surface level. Three other residences exist near the corner of Rawnsleys and Gundagi Roads, approximately 600m from the current quarry extraction area. The latter three residences are on the eastern slope of a ridgeline, causing the line of sight to the quarry lip being blocked by local topography.

As noted above (Section 4.4.2 *Previous Studies*) VIPAC in their assessment of 2013 (Appendix H) found that operations at the Gundagi Quarry (on-site activity) didn’t generate noise levels in excess of the day and evening noise emission limits, as specified under condition N2 of the Permit, at any noise sensitive location.

#### 4.4.6 Sensitive Receptors – expanded pit extraction

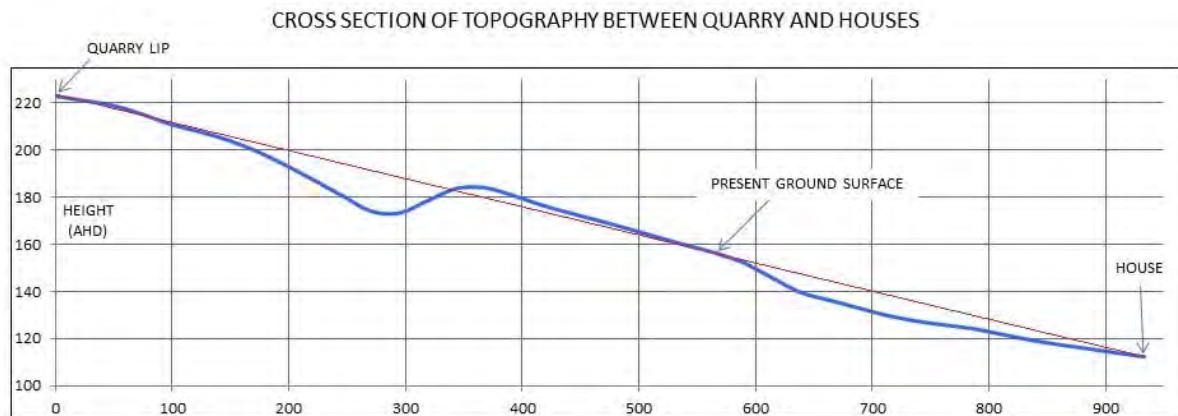
Attenuation assessment distances for the current (Figure 4-4-4) and expanded (Figure 4-4-5) operation follow those of the *Quarry Code of Practice* (QCP):

“It is suggested that planning authorities and operators seek to maintain the following separation distances, measured from the planned maximum extent of the quarry operations to any sensitive use:

- Where regular blasting takes place, 1,000 m;
- Where material is crushed only, 750 m;
- Where vibrating screens alone are utilised, 500 m; and
- Where no blasting, crushing or screening occurs, 300 m”

Two additional residences fall within the 1.2km ‘assessment’ buffer required by the EPA in the DPEMP Guidelines (Appendix A) – to the south-west and south of the two new areas to be quarried (Figure 4-4-3).

The residences to the east of the Mining Lease (ie those on Rawnsleys Road) will become further away from the quarry face/pit related noise emissions and the only residence that enters the 1,000m buffer is to the south (930m away), but this residence is shielded by a hillock such that it provides topographic mitigation of noise emissions. This hillock can be seen in the cross-section below (the red line indicates the straight line from the **quarry lip** to the house) which excludes native forest and plantation vegetation that occurs along the same route.



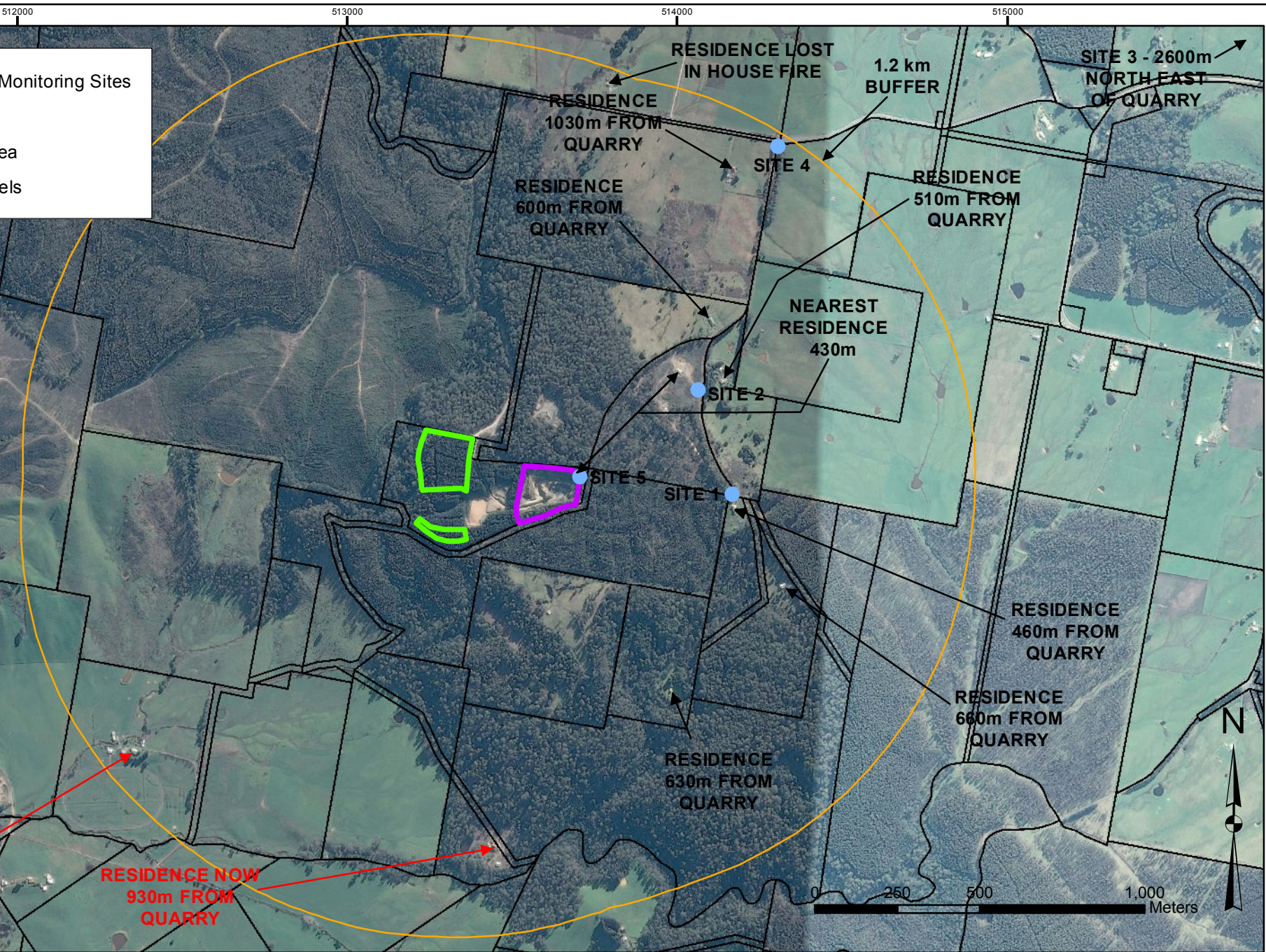
#### 4.4.7 Drill Rig Noise Estimation and Topographic Shielding

VIPAC (2010) noted that the most noise generating activity was drilling – 124 PWL<sub>A</sub> – with crushing the next most noise generating activity – 117.2 PWL<sub>A</sub>. Drilling is expected to be the most intrusive source of noise as it was for the previous assessment process.

To better understand and assess the impact of drilling in the two new areas (NW and SW Quarry Areas) on noise nuisance within the landscape it is appropriate to estimate the likely noise emissions from using the drill rig use in the expanded activity.

Noise contours developed by VIPAC in their report of 2010 provided an environmental noise estimation and mitigation program for the quarry at that time. The VIPAC 2010 report is contained within Appendix H. The findings and modelling contained within the report remains valid for this assessment as comparable machinery and quarrying activities are going to occur in the expanded activity as occurred for the previously assessed activity (see Sections 4.4.4 and 4.4.3 of this document).

**figure 1-1**



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-4-3: New Quarry Extent and Susceptible Sites within 1200m



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014

**House Locations (Distance from Quarry)**

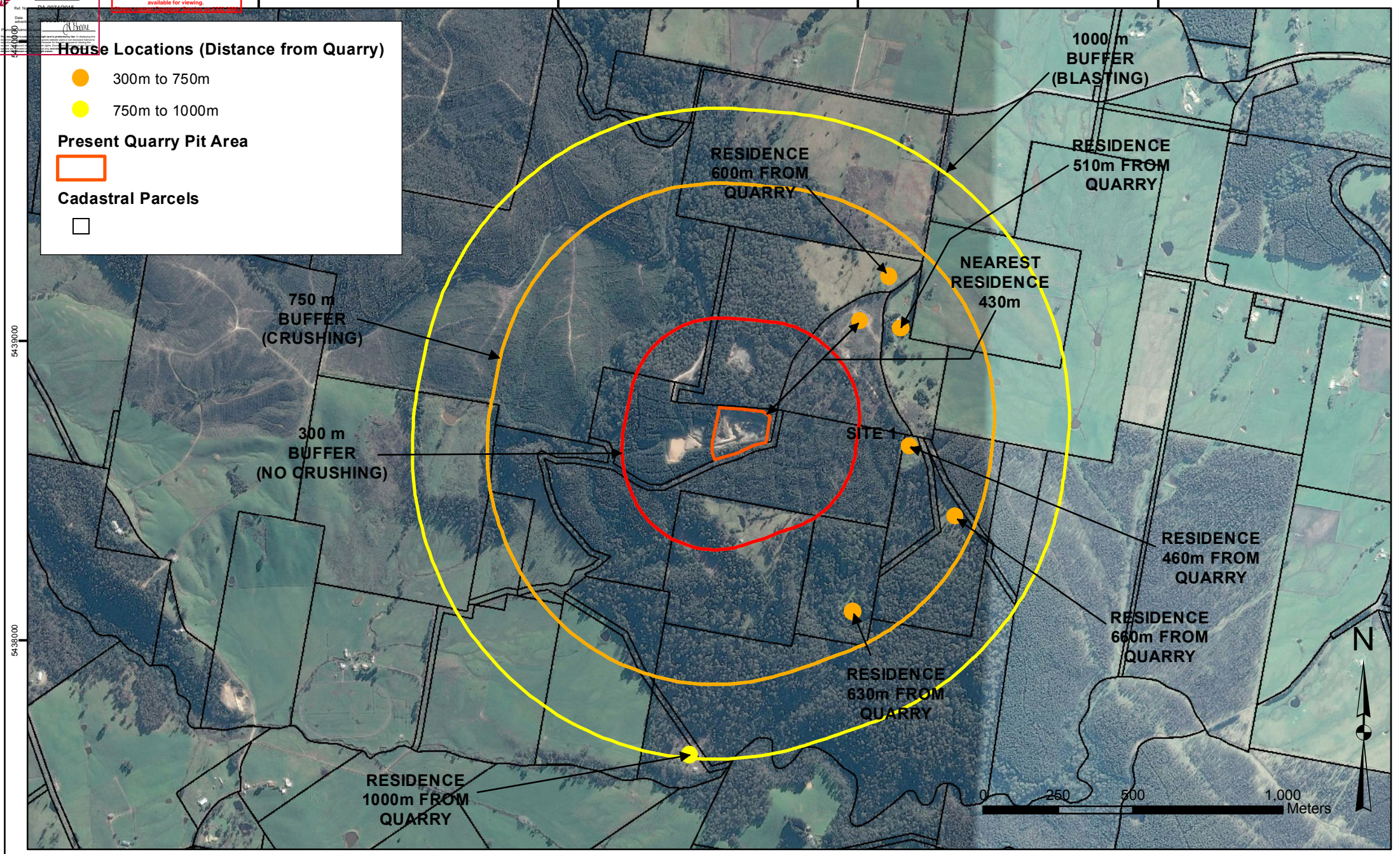
- 300m to 750m
- 750m to 1000m

**Present Quarry Pit Area**

□

**Cadastral Parcels**

□



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-4-4: Quarry Code of Practice Buffer Distances - Existing Layout

**an Dieman CONSULTING**

PO Box 1 North Town TAS 7510  
 Base data by TASMAR, © State of Tasmania  
 Base image by TASMAR, © State of Tasmania



DATUM: GDA94  
 GRID: MGA Zone 55

TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN

DATE: 3th APRIL 2014

**House Locations (Distance from Quarry)**

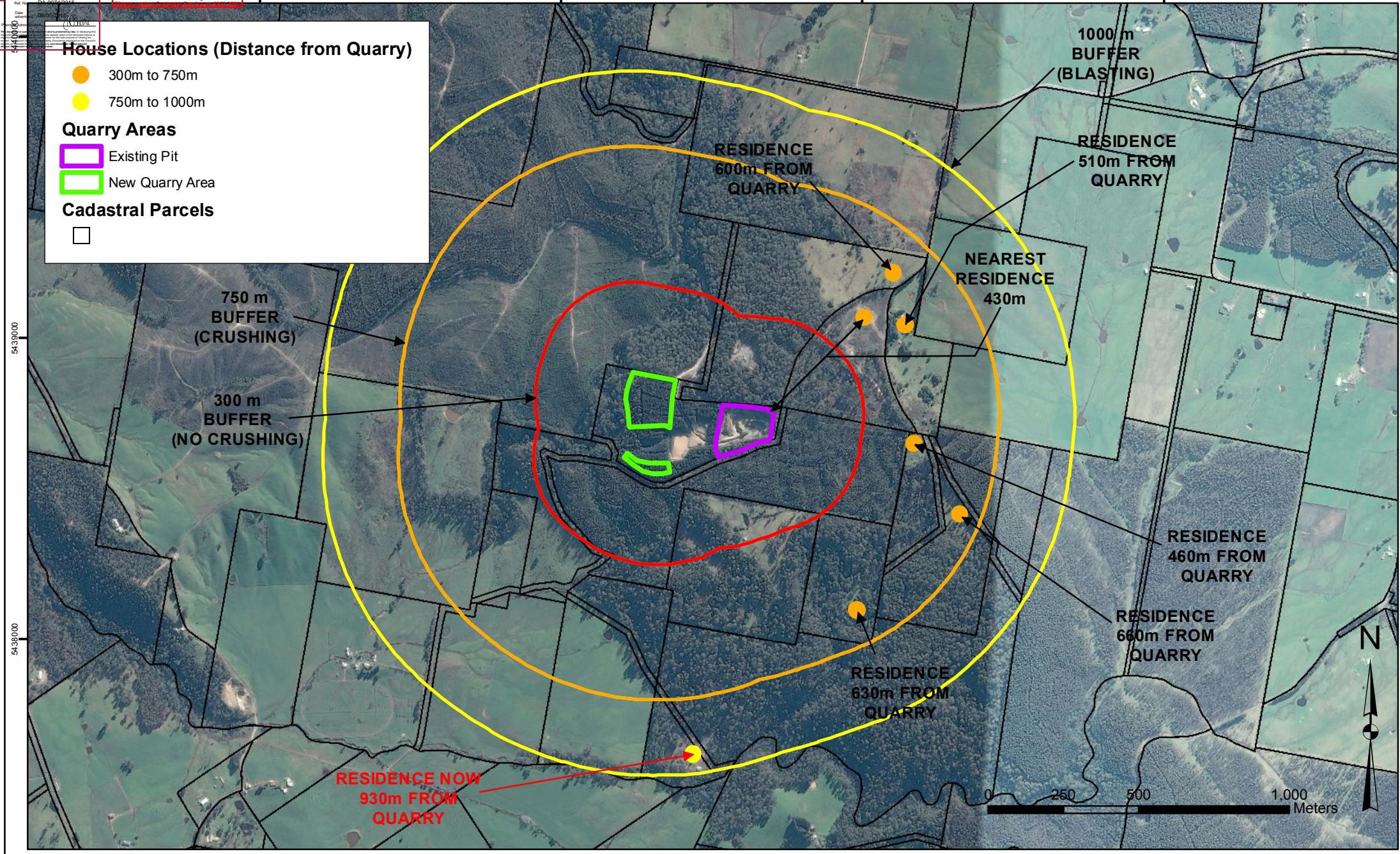
- 300m to 750m
- 750m to 1000m

**Quarry Areas**

- Existing Pit
- New Quarry Area

**Cadastral Parcels**

- 

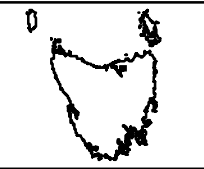


# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-4-5: Quarry Code of Practice Buffer Distances - Proposed Layout

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DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014

To model noise attenuation from a drill rig, VIPAC in their 2010 assessment produced noise contours/bands that radiate out from a point source – in this case the drill rig located on the western bench of the pit. The noise contours dissipate with distance and interference from topographic features – that is, hills provide shielding to noise emissions and over distance noise becomes less by attenuation through air. A good example of the noise contouring conducted by VIPAC in their 2010 report is shown in Figure 4-4-8 of this document. Figure 4-4-8 illustrates the noise contours (the colours represent noise bands as per the legend ‘Noise level’) produced from a sound model based on drilling on the western bench of the then quarry pit. The VIPAC assessment considered drilling on the western bench in the existing pit as the most exposed location from which noise emissions could or would occur for the quarry at that time. Poor weather conditions for noise attenuation would serve to exacerbate the noise generated such that it would travel further from the point source.

Although it was prepared for a previous assessment, the 2010 VIPAC contour based model can be used to provide an estimation of drill rig noise emissions without any topographic attenuation at a specified distance. The contour based model can be used to estimate noise transmission with worst-case weather for noise transmission (ie high noise transmission) and no topographic shielding. The VIPAC model shown in Figure 4-4-8 therefore presents a worst-case scenario of noise transmission (ie. maximum distance of noise travelling through the air from the point source) for the drill rig operating on exposed ground under worst-case climatic conditions for noise attenuation.

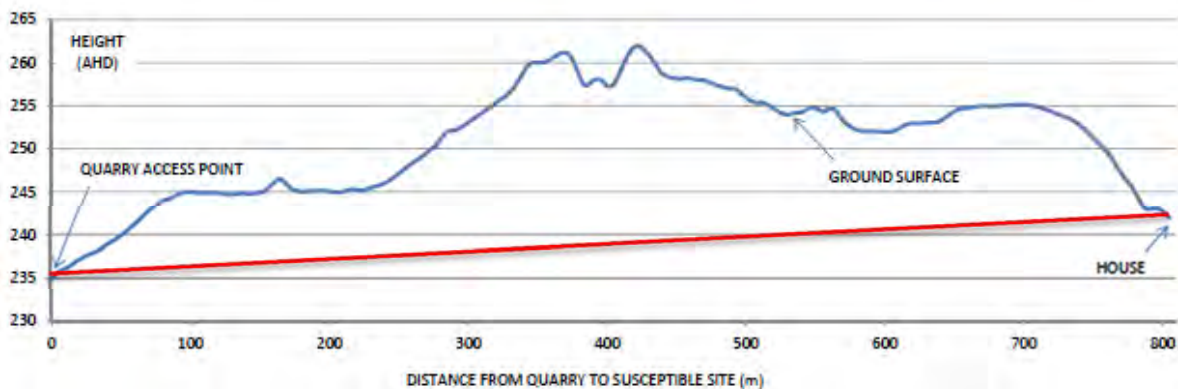
For the expanded activity, the measurement of 805m is the distance from the point source of the drill rig in the NW Quarry Area ‘Initial Quarrying Location’ (see Figure 2-2-5a) to the nearest sensitive receptor, that is, the residence on Alignment 3 shown in Figure 4-4-6a (House site 1 in Figure 4-4-4).

A distance of 805m measured on a topographically unhindered path in Figure 4-4-8 from the point source falls within the 49.5 dBA LA<sub>eq</sub> contour range. This estimation is illustrated in Figure 4-4-8 by the application of an 805m buffer from the point source (drill rig) and tracing of that distance outwards from the point source without intersecting topographic features. The estimate is only 3.5 dBA above the threshold of the current permit of 46 dB(A) between 0700 hours and 1800 hours (Day time). Of note is the topographic shielding provided by features around the quarry, such as those labelled in Figure 4-4-8 – these features dramatically reduce the noise level that transmits beyond their occurrence, such as the ridgeline to the north-east of the point source towards Point Receiver 4.

Refer to Section 1.4 Contour-based Assessment Information Source for information on the data sets used to generate the topographic profiles.

All other residences are further than 805m from the noise point source identified as the ‘Initial Quarrying Location’ in Figure 2-2-5a and are topographically shielded by hills, slopes and valleys as shown for each alignment in Figures 4-4-6b to i.

FIGURE 4-4-6d: ALIGNMENT 3 - CROSS SECTION OF TOPOGRAPHY



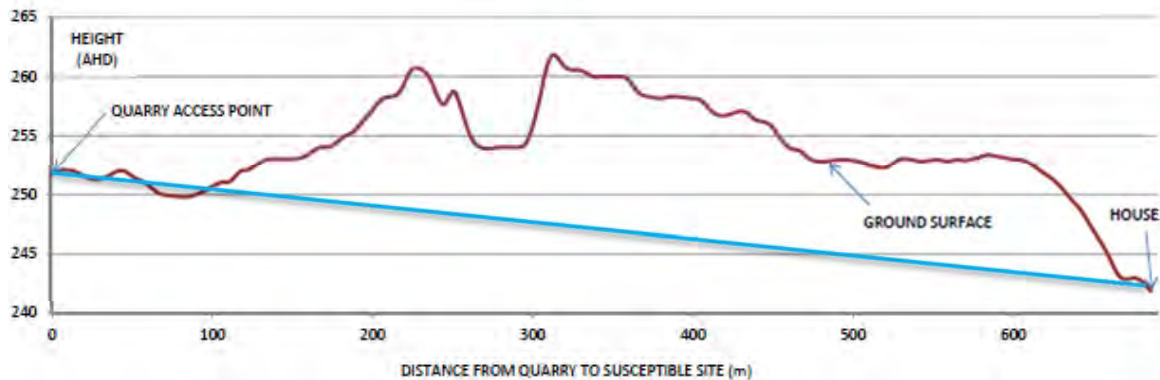


The initial drill and blast in both the NW and SW Quarry Area (Figures 2-2-5a and 2-2-6a) will be on an unexcavated almost natural surface topographic level, comparable to the initial blast in the eastern pit which was only just below natural ground level at that time.

The two new areas (Figures 2-2-5a and 2-2-6a) are further west and hence they are not likely to have any greater noise/vibration impact than blasting in the eastern pit (which will continue under the expanded activity). The face orientations of the NW and SW Quarry Areas are such that blasts will be directed away from the nearest residences on Rawnsleys Road, as described below in Section 4.4.8 *Face Orientation*.

In an extreme scenario, designed purely for illustrative purposes, is the 'placement' of the noise point source (ie drill rig) on the highest topographic location of the NW Quarry Area shown in Figure 4-4-7a. This scenario is fictitious as the drill rig would never be placed in this location. The residence at 805m from the 'Initial Quarrying Location' in Figure 2-2-5a is 685m from the highest topographic location of the NW Quarry Area which is shown in Figure 4-4-7a. Despite becoming closer to the point source of the drill rig and being topographically at the highest point in the quarry area there is substantial topographic shielding provided to the residence from intervening hills and ridgelines as shown in the topographic cross-section in Figure 4-4-7d. Topographic profiling for other residences are shown in Figures 4-4-7b through i.

FIGURE 4-4-7d: ALIGNMENT 11 - CROSS SECTION OF TOPOGRAPHY







#### 4.4.8 Face Orientation

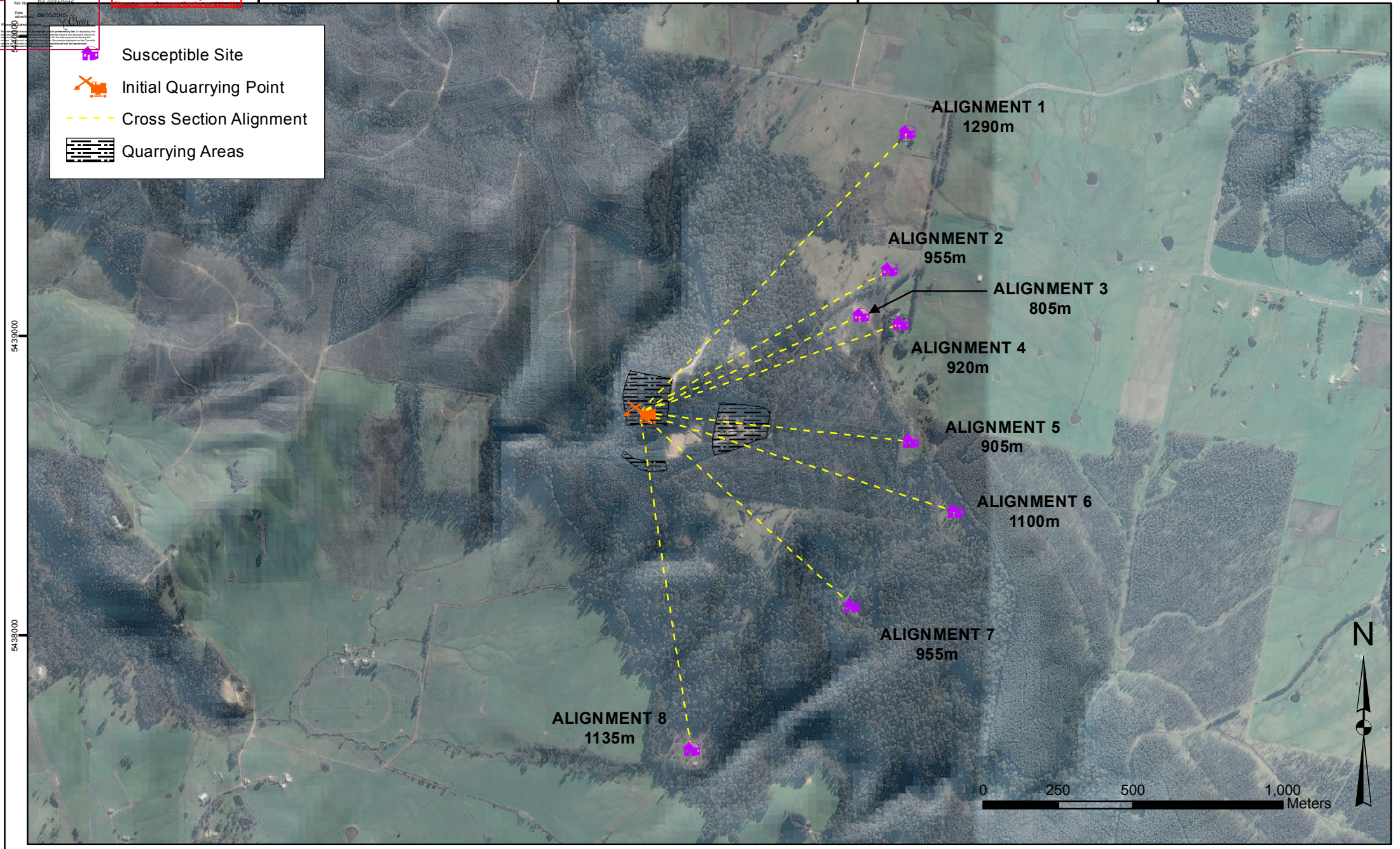
##### EXISTING PIT

Blasting in the existing pit occurs predominantly on the western face (but not western bench), southern face and also on the quarry floor to make it deeper. Blasts therefore have either no orientation (blasts on the quarry floor, they are directed upwards) or have an orientation of northwards or eastwards. The focus of the existing pit is to make it deeper to extract higher quality material at depth and to progressively quarry towards the west.

##### NW QUARRY AREA

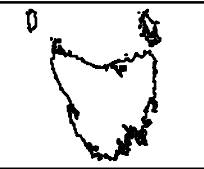
The establishment blast in the NW Quarry Area will be low in the catchment (see 'Initial Quarrying Location' in Figure 2-2-5a) such that it provides maximum noise attenuation from surrounding topography. Further details on this are provided in Section 4.4.6 *Sensitive Receptors – expanded pit extraction*. As the pit gets deeper noise attenuation will be continually aided by the increasing height of the walls of the pit (noting that there will be benching as shown in Figure 2-2-5b. The faces of this quarry section will be oriented to the south, south-west and west as this correlates to the location identified for the establishment blast (see 'Initial Quarrying Location' in Figure 2-2-5a) and is immediately adjacent to the access track into the area (see Figures 2-2-2 and 2-2-5a).

-  Susceptible Site
-  Initial Quarrying Point
-  Cross Section Alignment
-  Quarrying Areas



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-4-6a: Land Profiles to Susceptible Sites (from initial quarrying location)



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014

FIGURE 4-4-6b: ALIGNMENT 1 - CROSS SECTION OF TOPOGRAPHY

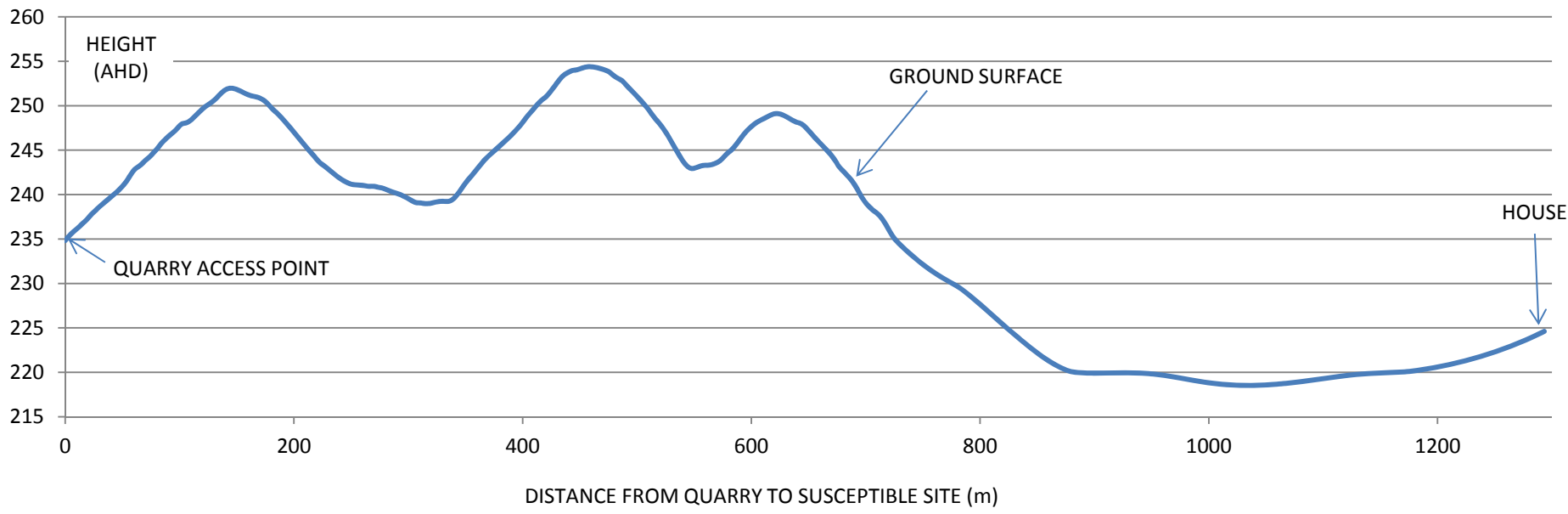


FIGURE 4-4-6c: ALIGNMENT 2 - CROSS SECTION OF TOPOGRAPHY

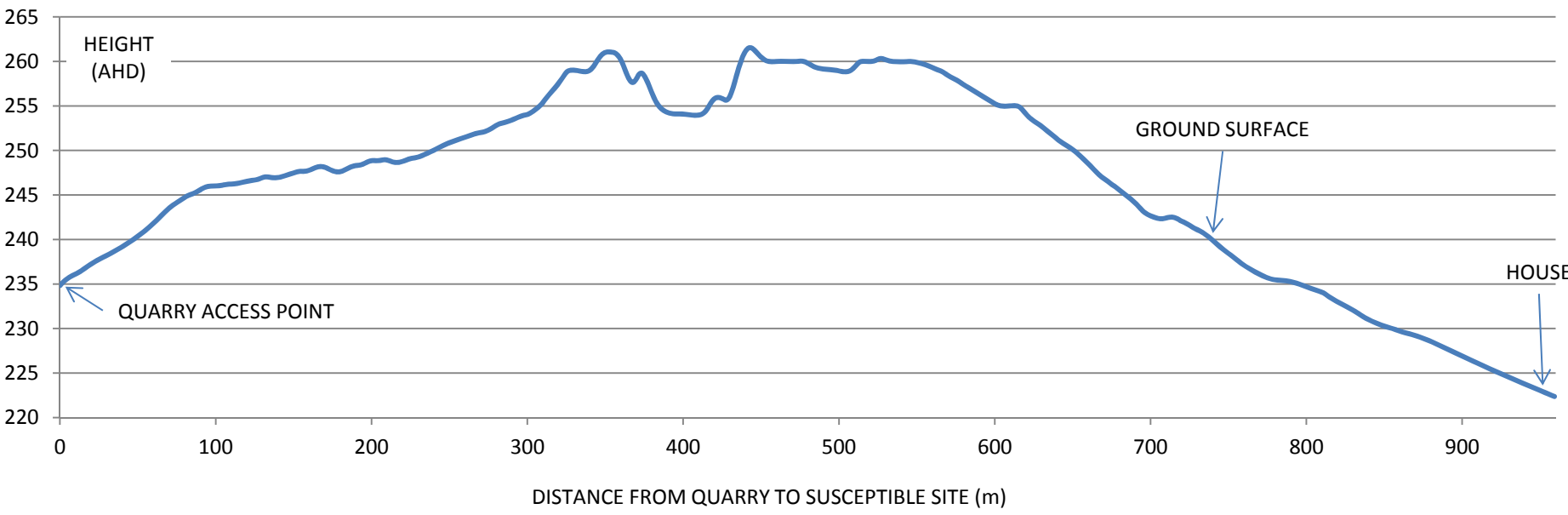


FIGURE 4-4-6d: ALIGNMENT 3 - CROSS SECTION OF TOPOGRAPHY

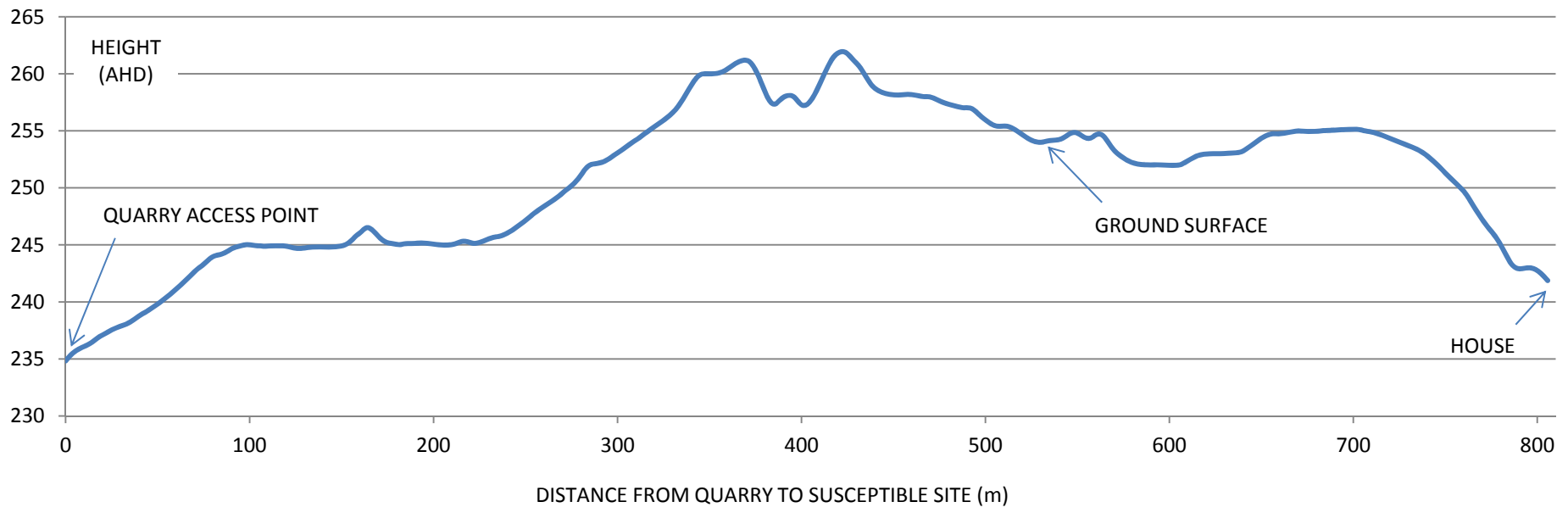


FIGURE 4-4-6e: ALIGNMENT 4 - CROSS SECTION OF TOPOGRAPHY

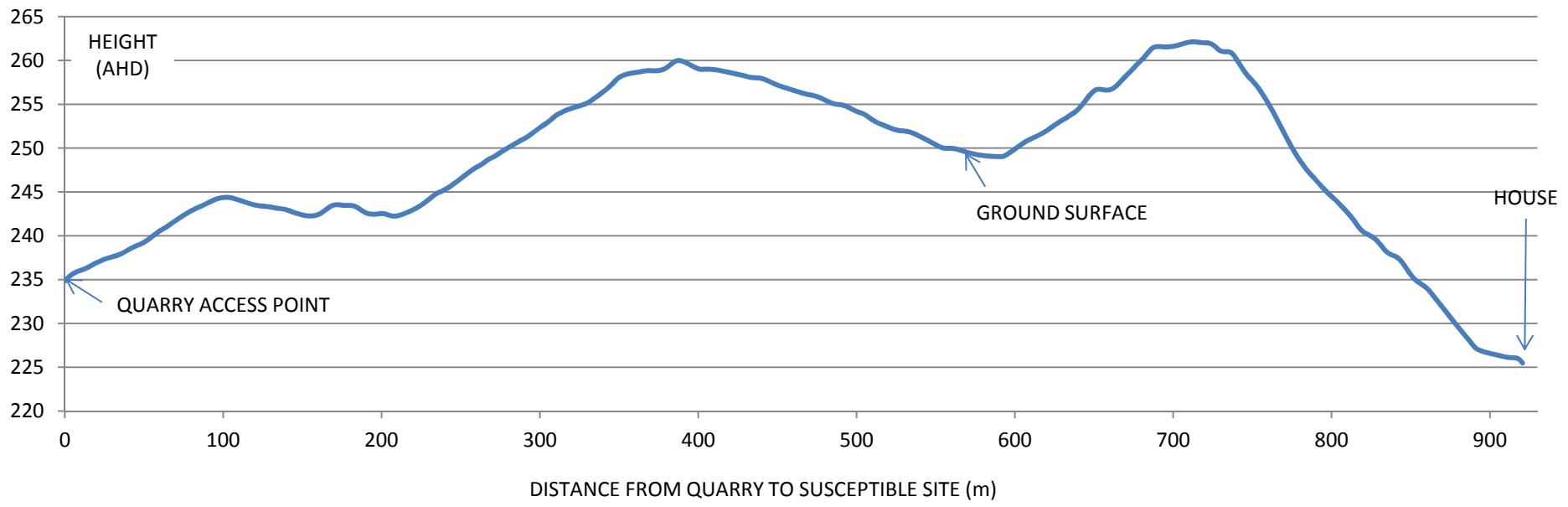


FIGURE 4-4-6f: ALIGNMENT 5 - CROSS SECTION OF TOPOGRAPHY

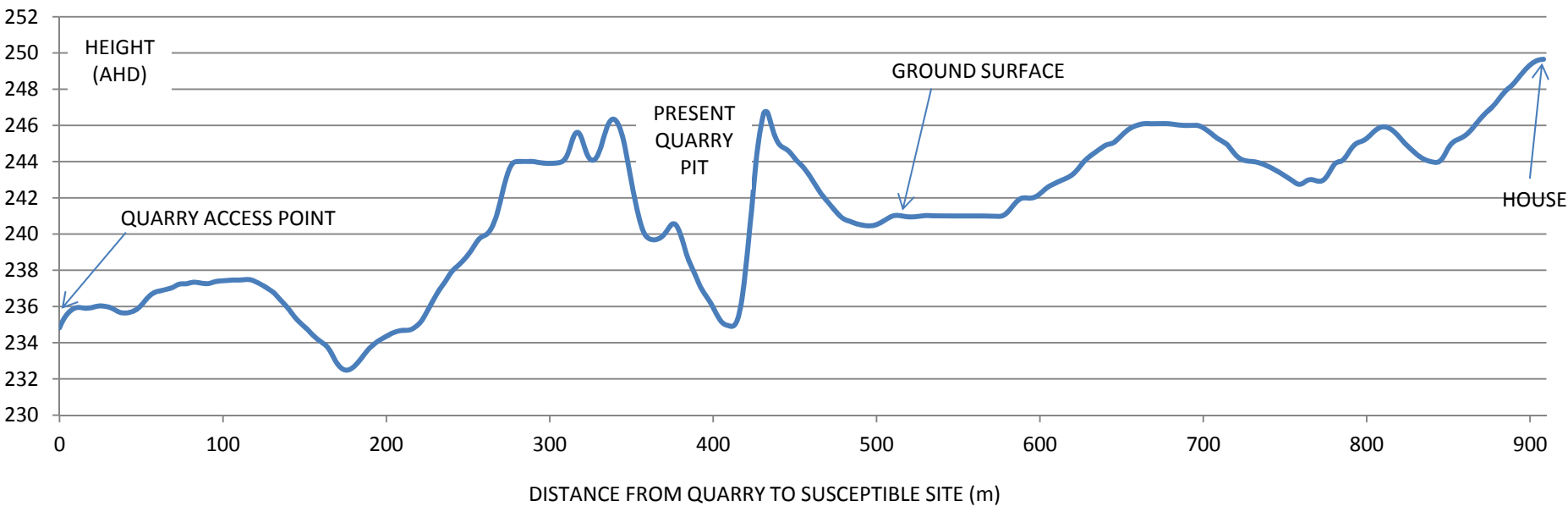


FIGURE 4-4-6g: ALIGNMENT 6 - CROSS SECTION OF TOPOGRAPHY

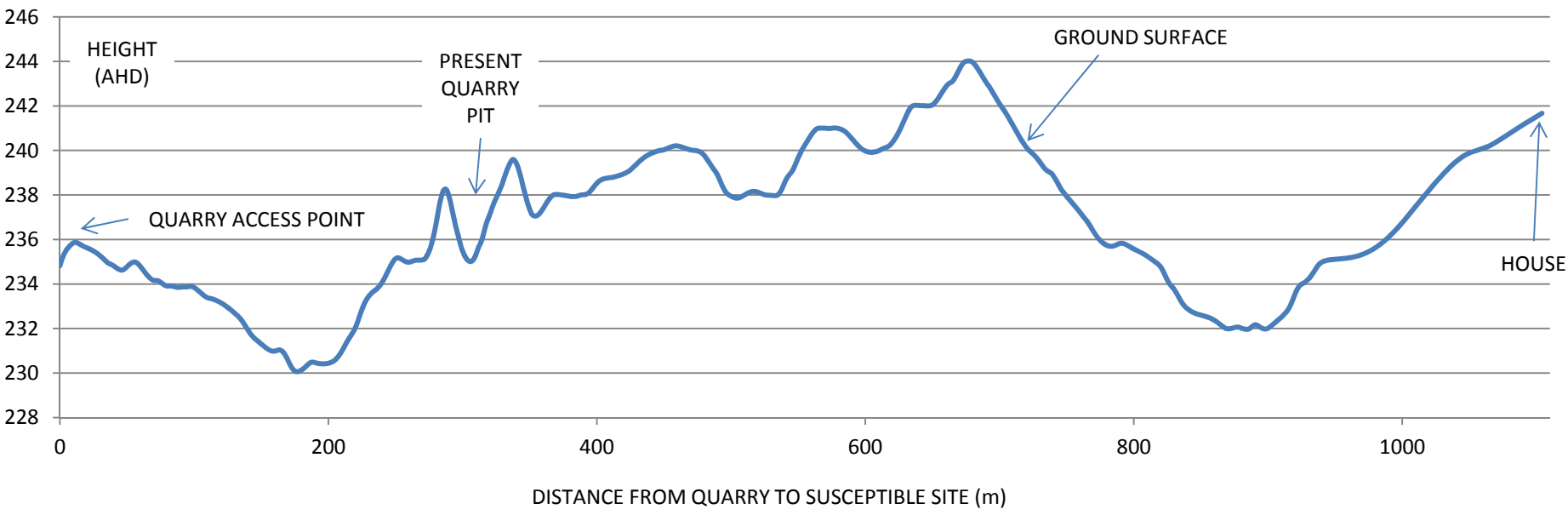




FIGURE 4-4-6h: ALIGNMENT 7 - CROSS SECTION OF TOPOGRAPHY

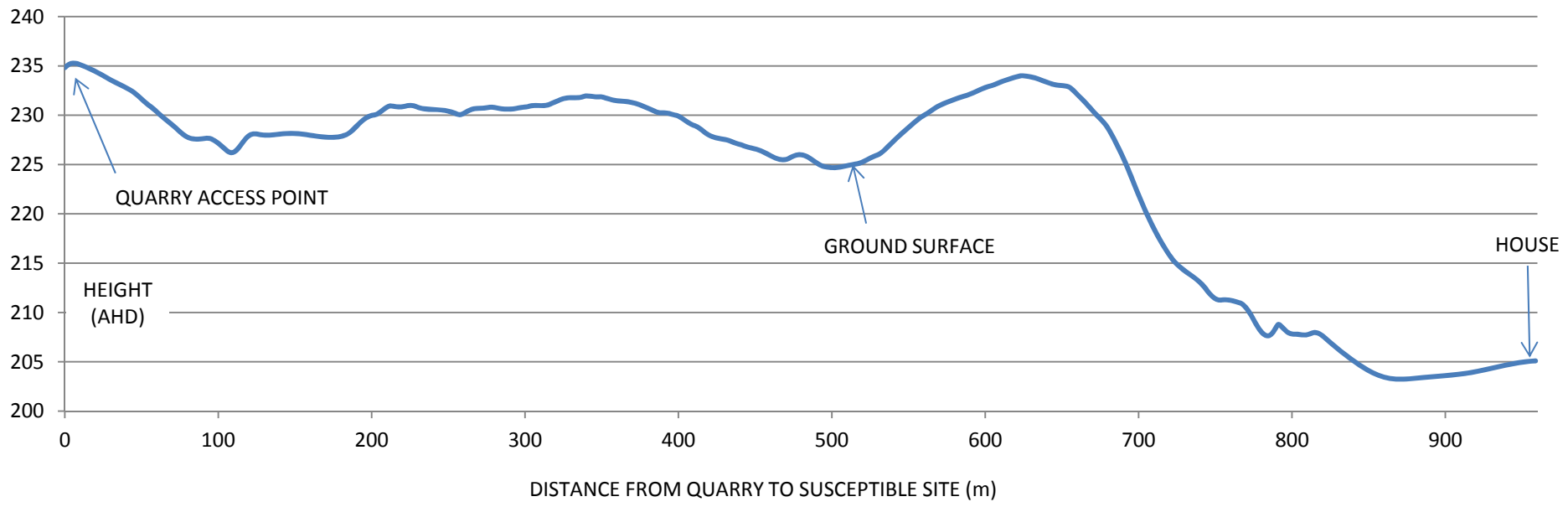
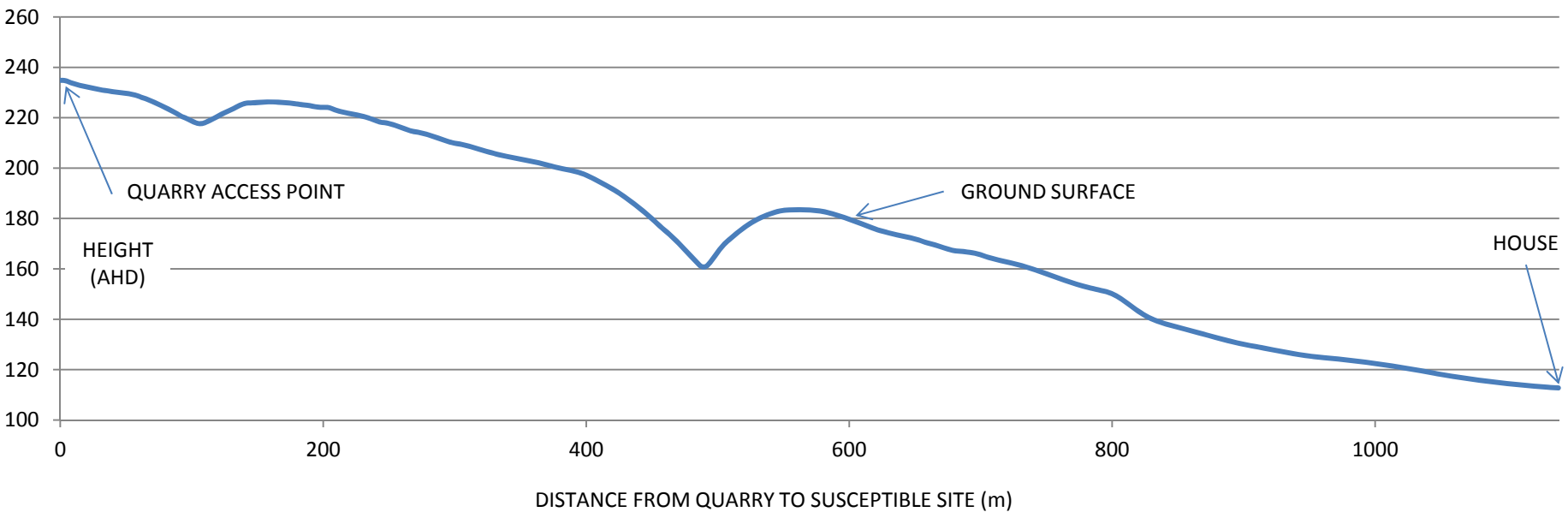




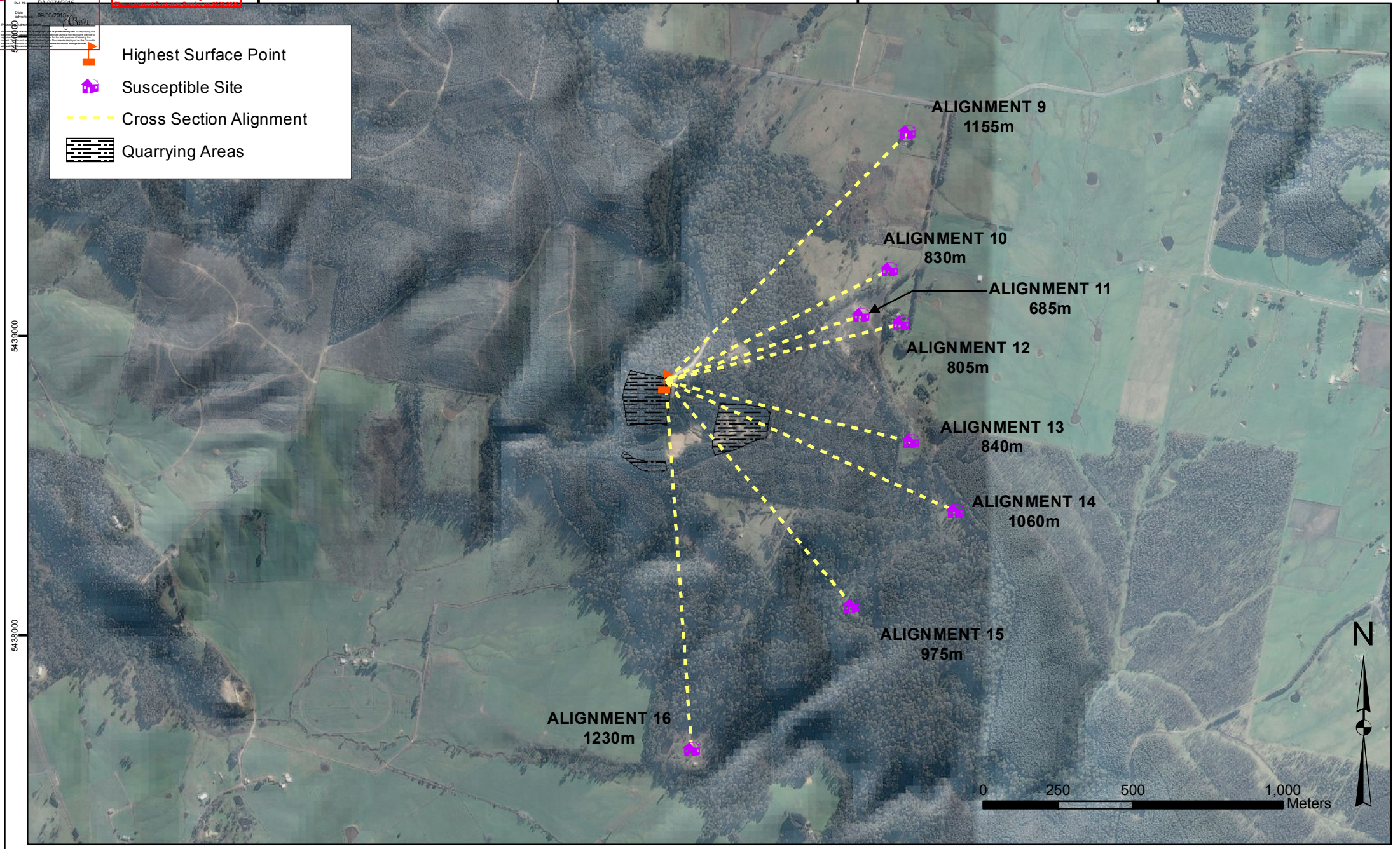


FIGURE 4-4-6i: ALIGNMENT 8 - CROSS SECTION OF TOPOGRAPHY



**Legend**

-  Highest Surface Point
-  Susceptible Site
-  Cross Section Alignment
-  Quarrying Areas



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-4-7a: Land Profiles to Susceptible Sites (from highest point)



an Diemen CONSULTING

PO Box 114 Wilmot TAS 7508  
 Base data by TASMAR. © State of Tasmania  
 Base image by TASMAR. © State of Tasmania



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014

FIGURE 4-4-7b: ALIGNMENT 9 - CROSS SECTION OF TOPOGRAPHY

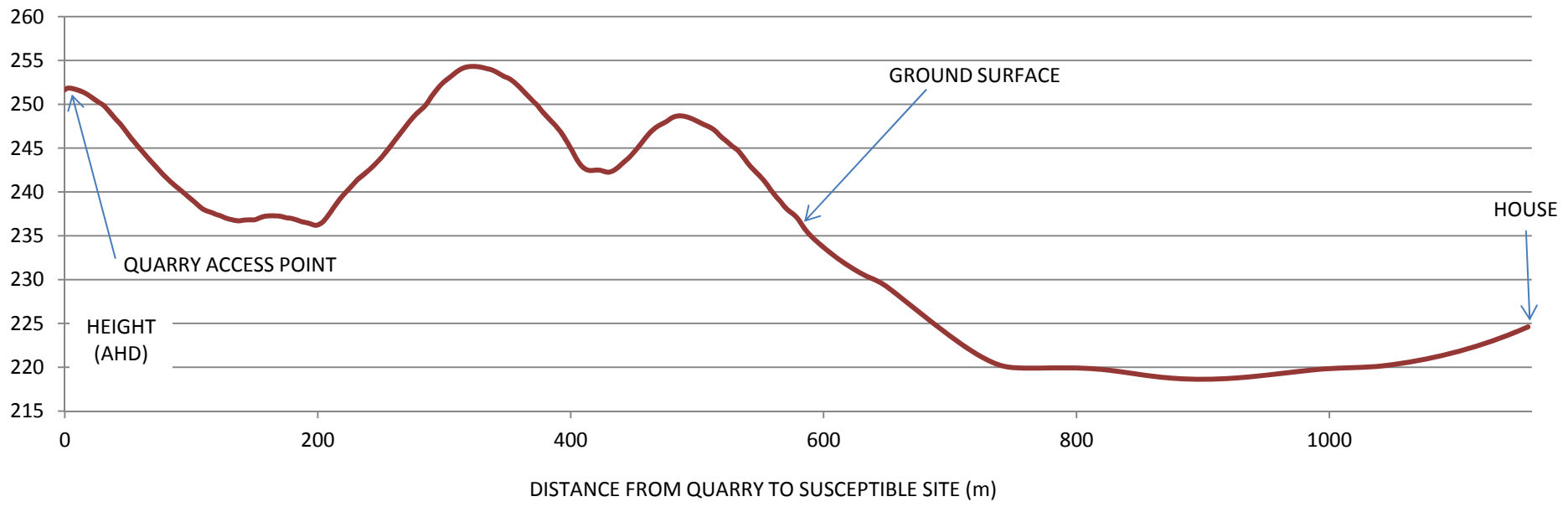


FIGURE 4-4-7c: ALIGNMENT 10 - CROSS SECTION OF TOPOGRAPHY

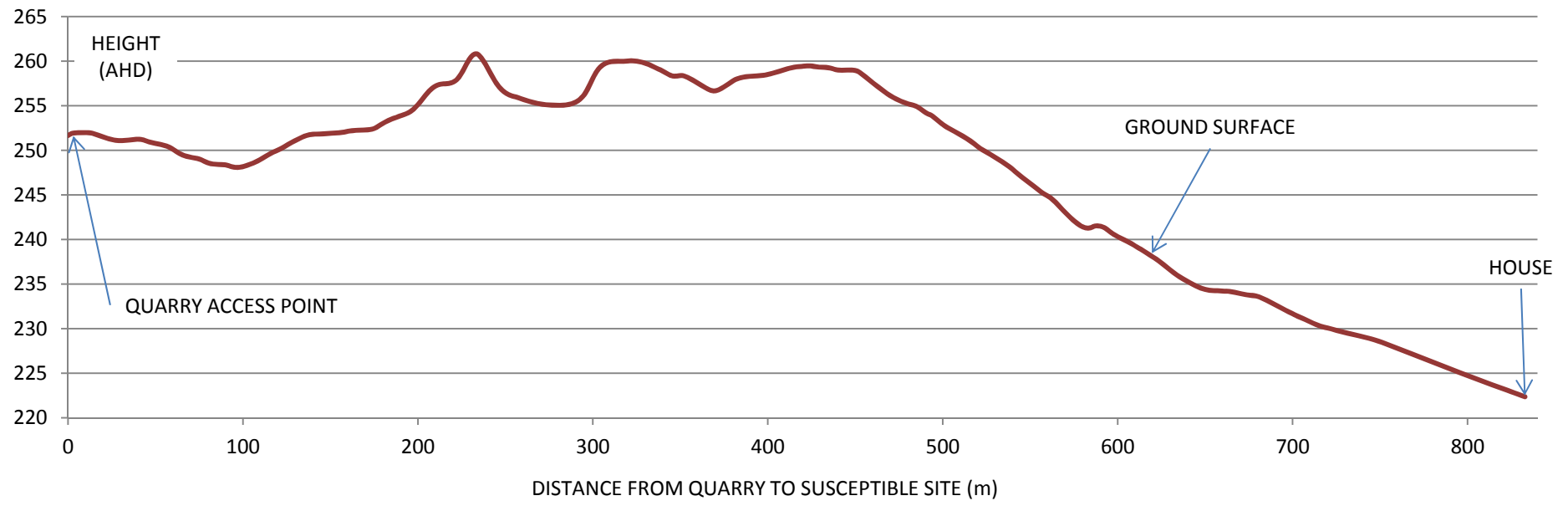


FIGURE 4-4-7d: ALIGNMENT 11 - CROSS SECTION OF TOPOGRAPHY

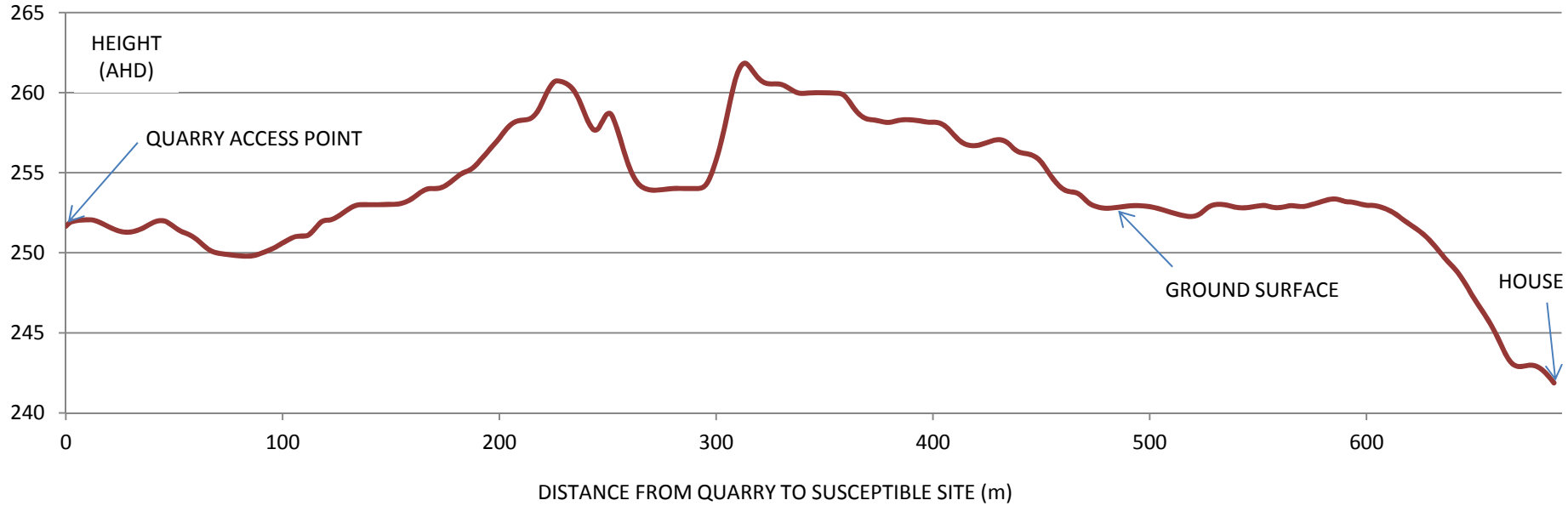


FIGURE 4-4-7e: ALIGNMENT 12 - CROSS SECTION OF TOPOGRAPHY

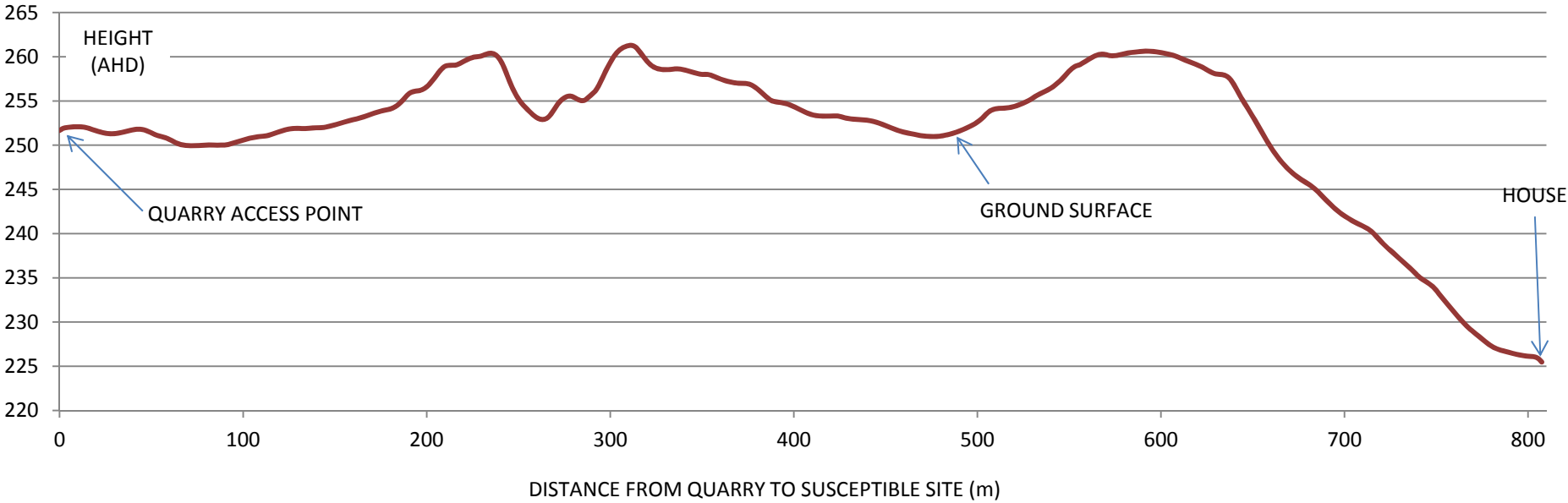


FIGURE 4-4-7f: ALIGNMENT 13 - CROSS SECTION OF TOPOGRAPHY

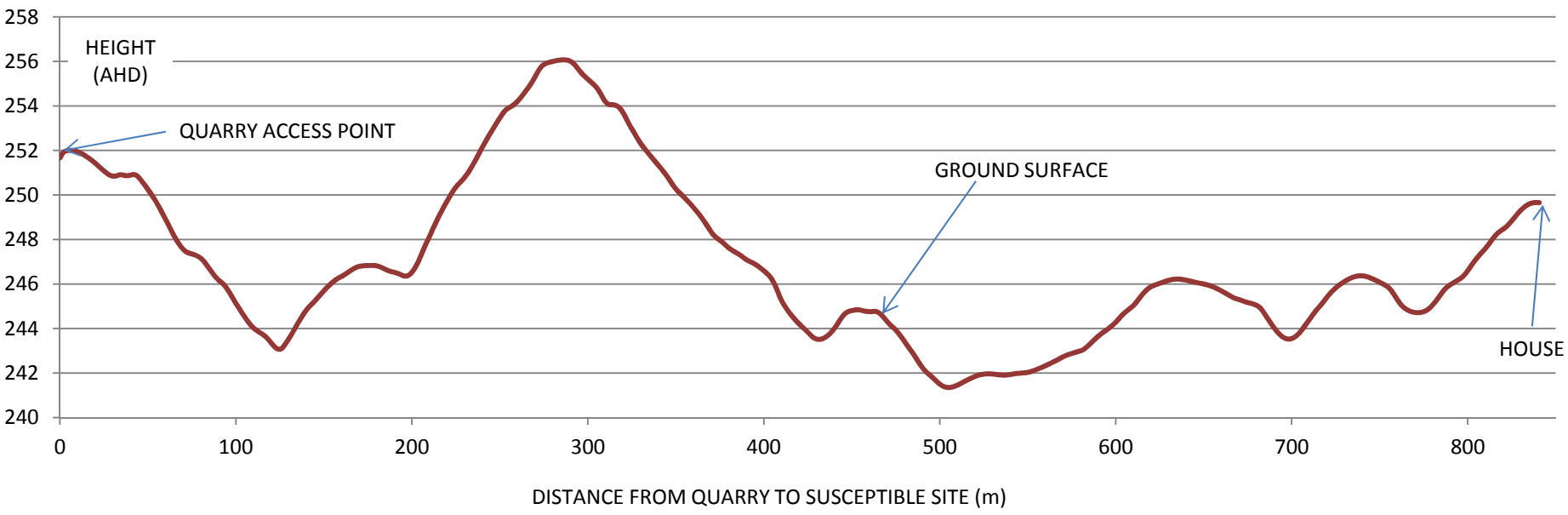




FIGURE 4-4-7g: ALIGNMENT 14 - CROSS SECTION OF TOPOGRAPHY

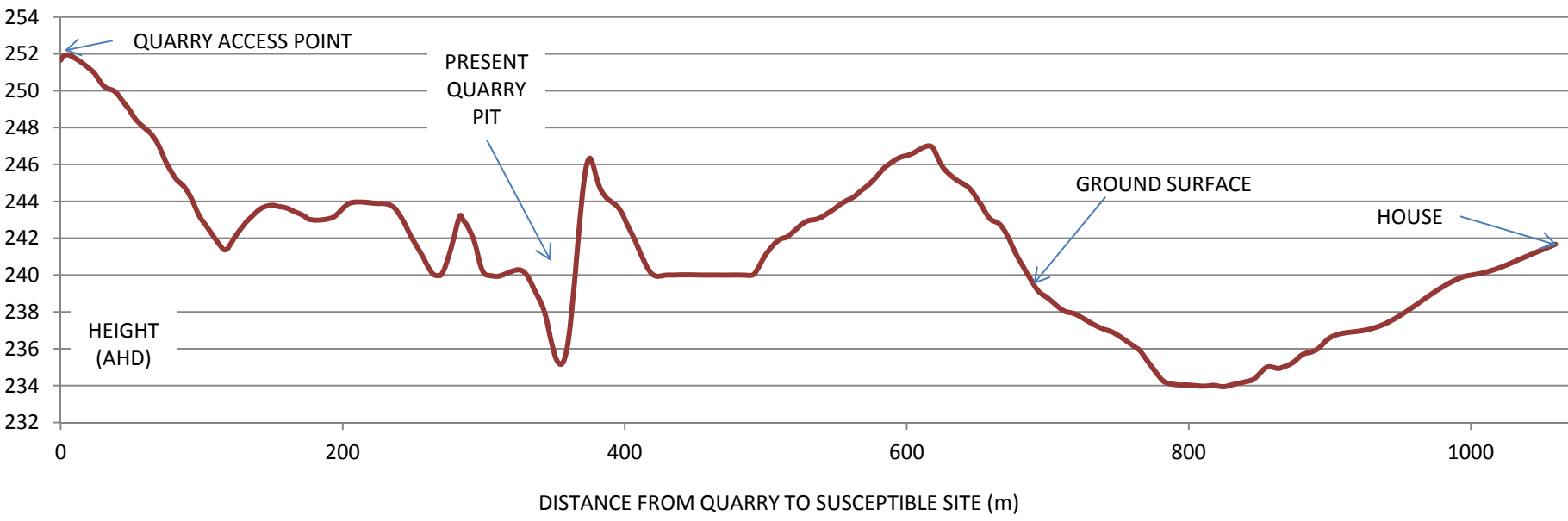


FIGURE 4-4-7h: ALIGNMENT 15 - CROSS SECTION OF TOPOGRAPHY

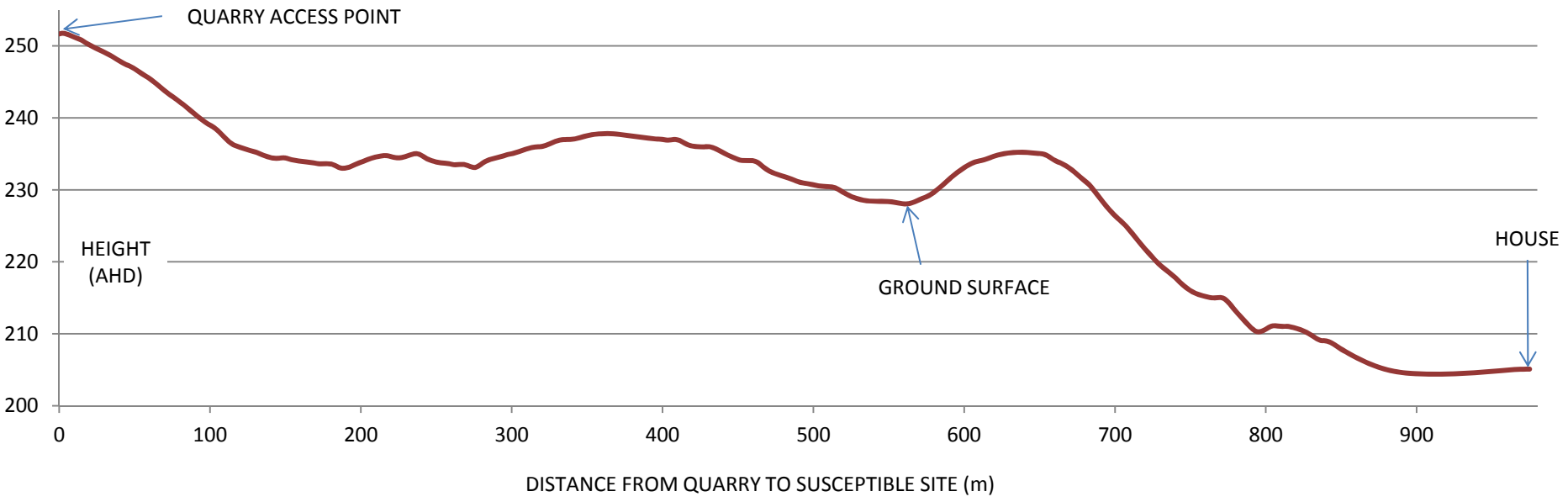
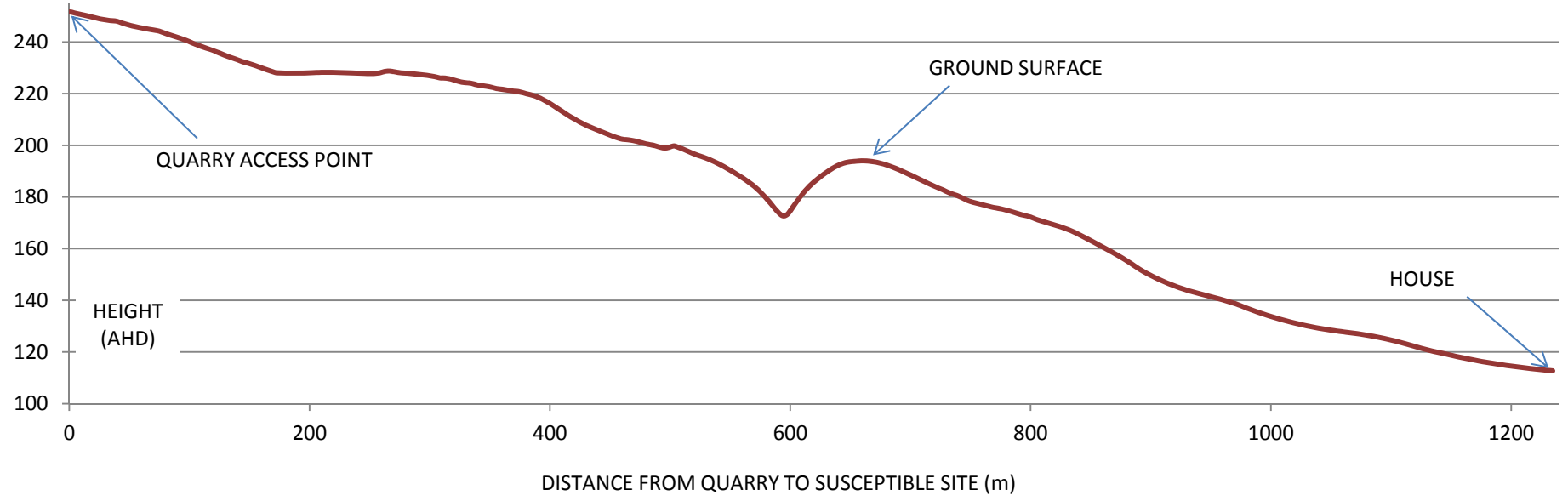


FIGURE 4-4-7i: ALIGNMENT 16 - CROSS SECTION OF TOPOGRAPHY





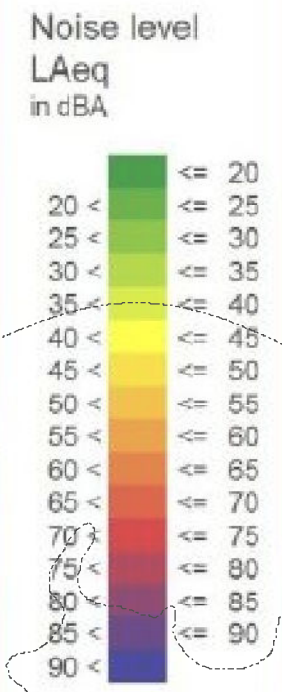
● Point Source from Figure 24 of Vipac (2010)  
 - - - 5m Contours  
 [Dashed Box] 805m Buffer to Bench at Western End of Existing Quarry

5439000

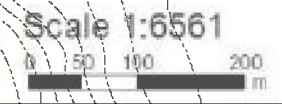
WESTERN BENCH OF EXISTING QUARRY

RIDGE PROVIDING TOPOGRAPHIC SHIELDING

WORST CASE APPROXIMATE dBA OF 49.5 WITH WORST CASE WEATHER AND NO SIGNIFICANT TOPOGRAPHIC SHIELDING AT 805m FROM DRILLING AT 124.1 dBA (TABLE 8 - VIPAC, 2010)



Signs and symbols  
 ● Point source  
 - - - Elevation line  
 ● Point receiver



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-4-8: Drilling Noise Estimation (Fig 24 - VIPAC, 2010)



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014

## SW QUARRY AREA

The establishment blast for the SW Quarry Area will also be low in the catchment (see 'Initial Quarrying Location' in Figure 2-2-6a), but above the location from which water can flow unaided into the new sediment dam. Quarrying will be via one face aligned north-south with quarrying heading in an easterly direction as shown in Figure 2-2-6a. A soil bund at the eastern extent of this area will further aid noise attenuation (earthen bunds are high performance noise attenuation devices in any quarry) and prevent additional and unwanted surface flows from entering the quarry area. A soil bund along the southern area will prevent erosion of soil out of the area to be worked as shown in Figure 2-2-6b.

### 4.4.9 Blast Management Plan

A *Blast Management Plan 2, August 2014* (Appendix G) was prepared and approved by the EPA in 2014. The BMP and future iterations of this Plan will continue to be implemented under the expanded quarry activity to mitigate noise nuisance to surrounding landowners<sup>9</sup>.

Blasting will only take place between the hours of 1000 hours and 1600 hours Monday to Friday. Blasting must not take place on Saturdays, Sundays or public holidays unless prior written approval of the Director has been obtained.

Each blast, subject to the parent rock and loading of charges, is likely to produce about 20,000 to 25,000 cubic metres of rock suitable for ripping and crushing. For the expanded volume of 200,000 of product per annum about 8 to 10 blasts will be required each year. To minimise costs two or three blasts may occur in a short period of time (a week or two) with the blasts occurring in the same or different sections of the quarry. As the quarry has complex geology, owing to its Mathinna Bed origins, there is flexibility as to the products being made from the different parent rock material. For example, within a 2 week period two blasts may occur in the western pit to access better quality 'fine gravel' material while a third occurs in the north-western pit to access harder coarse rock for road top-dressing.

Measures to be applied during the preparation of a blast (ie forward planning, community advisement, etc) and during blasting are outlined in the *Blast Management Plan 2, August 2014* (Appendix G) include –

### NOTIFICATIONS BEFORE BLAST

All residents within a 1 km radius of a blast must be notified prior to that blast. This notification must be given at least 24 hours before such blasting is due to occur. In the event that the blast(s) cannot take place at the time specified, or as a result of blasting misfires, DTK Logging Pty Ltd or their delegated agent will advise all those residents within 1 km of the Quarry of the revised time at which blasting will take place. The EPA Director will be notified on each occasion prior to blasting at the quarry. Notification will be given as early as possible, but at least 24 hours before blasting is due to occur.

### STORAGE AND HANDLING OF EXPLOSIVES

The transportation, storage and handling of explosives is conducted by the Blast Contractor in accordance with the Australian Explosives Code (1999), the Australian Code for the transport of explosives by road and rail (Third edition - 2009) and Australian Standard 2187 Explosives – Transport, storage and Use (parts 1 and 2).

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<sup>9</sup> Commitment 9: The *Blast Management Plan 2, August 2014* and future iterations of this Plan will continue to be implemented under the expanded quarry activity to mitigate noise nuisance to surrounding landowners.

## RISK ASSESSMENT AND AUDITING

The Blast Contractor is responsible for conducting a risk assessment and safety audit of the Quarry as part of each blast. This includes the drilling of the holes for explosives, handling explosives, operation of detonation devices and the safe detonation of the charges. The following safety precautions will be applied -

- Ensure all persons have exited the quarry prior to any blast being conducted with the exception of blast contractor personnel involved in the detonation of charges.
- Ensure all roads surrounding the quarry, specifically Gundagi Road, are free of vehicles and persons.
- Wherever possible avoid blasting when an atmospheric temperature inversion is present and when the prevailing wind direction is from the west.

DTK Logging Pty Ltd receives a copy of the risk assessment and associated documentation that supports the placement of drill holes, levels of explosives used and the detonation devices.

## NOISE/VIBRATION MONITORING PROGRAM

All measurements of air blast overpressure and peak particle velocity must be carried out by the Blast Contractor in accordance with the methods set down in *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration*, Australian and New Zealand Environment Council, September 1990.

The noise/vibration test results collected by the Blast Contractor will be securely held by DTK Logging Pty Ltd for 5 years from the date of the blast. In the event that the blasting noise limits and/or vibrations as specified in the permit are exceeded, the Director will be notified within 48 hours of the blasting event.

## INCIDENT REPORTING

The Blast Contractor is responsible for reporting to Police/Fire any incident that requires their involvement or attendance at the quarry.

DTK Logging Pty Ltd is responsible for reporting any misfires or delayed firings to the EPA Director and surrounding relevant landowners: in the event that the blast(s) cannot take place at the time specified, or as a result of blasting misfires, DTK Logging Pty Ltd or their delegated agent will advise all those residents within 1 km of the activities on the land of the revised time at which blasting will take place.

### *4.4.10 Noise Assessment and Mitigation/Management Summary*

The strategies to mitigate noise pollution emanating from the operation of the quarry have been derived from several tests carried out on major noise producing machinery by VIPAC (2010 and 2013, Appendix H). The VIPAC recommendations took into account the following factors:

1. Source type (point, line, plane).
2. Relative source and receiver height.
3. Topography and barriers.
5. Ground absorption.
6. Distance attenuation.
7. Atmospheric conditions including pasquil stability, temperature, humidity and vector wind speed.
8. Reflecting surfaces.
9. Source directivity.

The below aspects of the site and the quarry operation can be summarised to indicate that noise emissions of the expanded activity are very likely to be acceptable to the local conditions, as they have been for the existing activity:

- a. Most of the noise in the current (eastern) pit is deflected by the quarry face itself and shape of the pit – noise of machinery in the pit is deflected away from any sensitive use as recently shown by the VIPAC noise monitoring of the activities occurring in the eastern most pit (2013 report, Appendix H);
- b. Machinery operating at the new extraction/laydown area will be shielded from direct noise emissions to the house about 930m south of the Mining Lease by the ridgeline/hillock to the south of the Mining Lease (see cross-section above);
- c. Topographic shielding provided by ridgelines, hillocks and slopes (Figures 4-4-6b to i) will attenuate estimated drill rig noise levels of 49.5dBA at 805m from the NW Quarry Area to those less than permitted by the current Permit; and
- d. The retained vegetation to the west of the new pit areas will assist with noise attenuation however no 'new' sensitive receptors enter the 1,000m buffer apart from the residence mentioned in dot point 'b' (see Figure 4-11-4).

Noise and vibration management measures include:

- The monitoring of ground vibration and air blast overpressure will be carried out for all quarry blasting at multiple locations by the blast contractor;
- Charge mass/delay will be capped at 46 kg. Stemming height will be no less than 3 m and burden for face blasts no less than 3 m;
- Blasting will be avoided when atmospheric inversions are present and when the prevailing wind direction is from the west; and
- A shrouded drill rig will be sourced for the drilling in the quarry. If this is not practicable then shrouding of an existing rig used at the site will be explored – an existing product such as Flexshield Sound Stop, a flexible PVC curtain, can provide between 10 to 15 dB transmission loss.

#### **4.5 Solid and controlled waste management**

The quarry has well established and functional waste minimisation and reuse/disposal strategies. No waste bins will be provided on-site for general refuse.

The disposal of solid waste will be in accordance with the Operational Procedure Solid Waste Disposal 2014 (Appendix E) established for the company<sup>10</sup>.

No additional mitigation measures are required to address solid waste management.

#### **4.6 Dangerous goods and environmentally hazardous materials**

Inadequate management of the storage and handling of these dangerous materials could result in direct contamination of soil, groundwater, and/or indirect contamination of surface waters if allowed to enter the wastewater stream and released untreated.

The storage, handling and transport of dangerous goods, explosives and dangerous substances must comply with the requirements of relevant State Acts and any regulations thereunder, including:

- *Work Health and Safety Act 2012* and subordinate regulations;

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<sup>10</sup> Commitment 10: The disposal of solid waste will be in accordance with the Operational Procedure Solid Waste Disposal 2014 established for the company.

- *Explosives Act 2012* und subordinate regulations; and
- *Dangerous Goods (Road and Rail Transport) Act 2010* and subordinate regulations.

Scheduled machinery maintenance works (except emergency situations which may be corrected in the quarry using a mobile bund) are to be conducted at the proponent’s Lilydale workshop<sup>11</sup>. The Hazardous Goods temporarily stored and used at the quarry include those listed in Table 2 – these will be brought to and removed from the quarry each day as required and will be bunded accordingly.

The only ‘chemicals’ that would be used in the quarry are those for weed spraying and these will be handled, used and disposed of in accordance with the manufacturer’s directions and relevant regulations. Weed spraying will comply with the requirements of the Weed Management Plan for the quarry (Appendix F).

Waste management and incident procedures are included within the following EOPs –

- Solid Waste Disposal 2014; and
- Incident Reporting 2014.

No additional mitigation measures are required to address dangerous goods or hazardous materials.

**Table 2. Hazardous Goods Temporarily Stored on Site**

Product	Quantity
Diesel for refuelling on-site machinery	Less than 200L on 4WD ute or truck tray

**4.7 Biodiversity and natural values**

The Mining Lease has been surveyed for its ecological and natural values in 2010 by Trawmana Environmental Consultants. The ML was re-surveyed in August and September 2014 by Van Diemen Consulting Pty Ltd with the findings provided here.

**4.7.1 Native Vegetation**

The native vegetation communities in the Mining Lease include (Figure 4-7-1) –

- a narrow fringe of *Eucalyptus obliqua* dry forest (TASVEG code - DOB) on the north-eastern corner of the existing pit; and
- an area of *Eucalyptus obliqua* dry forest and *E. obliqua* wet forest (TASVEG code - WOB) associated with the hillock and slopes leading into the tributary of the Third River.

Neither native vegetation type is of conservation significance however both will largely be retained under the expanded operation as most of the quarry areas are within pine plantation (Figure 4-7-1). Specifically, native vegetation will be retained at the north-eastern corner of the Mining Lease to provide noise attenuation services and also to the west to provide visibility services (Figure 4-11-4)<sup>12</sup>. The construction of the lower (new) sediment dam will include the removal of native vegetation associated with the creekline however this will be minimal and has already been approved by the

<sup>11</sup> Commitment 11: Scheduled machinery maintenance works (except emergency situations which may be corrected in the quarry using a mobile bund) are to be conducted at the proponent’s Lilydale workshop.

<sup>12</sup> Commitment 12: Native vegetation will be retained at the north-eastern corner of the Mining Lease to provide noise attenuation services and also to the west to provide landscape amenity services.



issuing of a permit under the *Water Management Act 1999*. The remainder of the Mining Lease is pine plantation established for silvicultural use.

Approximately 1.21 hectares of native forest and 3.09 hectares of pine plantation will be progressively cleared to establish new quarry areas and associated haul roads etc. Plantation and native forest will be re-established in the Mining Lease as areas are rehabilitated.

#### 4.7.2 Threatened Species

The Mining Lease does not contain any conservation significant flora species (Figure 4-7-2), including rare and threatened species listed under the relevant Schedules of the *EPBC Act 1999* and *Threatened Species Protection Act 1995 (Tas)*. Furthermore, there will be no significant impact to any fauna/migratory species, vegetation communities and habitats listed under the relevant Schedules of the *EPBC Act 1999* or *Threatened Species Protection Act 1995*.

#### 4.7.3 *Phytophthora cinnamomi* (PC)

Root-rot fungus (*Phytophthora cinnamomi*, PC) is a soil borne pathogen that causes death in a wide range of native plant species often leading to floristic and structural changes in susceptible plant communities. There was no visible evidence of PC infection in the Mining Lease in the 2014 ecological assessments. At this point in time the proposed quarry, based on the evidence, can reasonably be assumed to be free of this pathogen.

#### 4.7.4 Weeds

The management of weeds already on the site and minimising the risk of introducing new weeds to the site will continue to be managed through the Gundagi Quarry Weed and Pathogen Management Plan dated July 2014 and all future updates to that plan (Appendix F)<sup>13</sup>.

Weeds, including those listed as Declared Weeds on the *Weed Management Act 1999 Tas*, recorded in the Mining Lease and Quarry include –

- spear thistle (*Cirsium vulgare* – pasture weed); and
- ragwort (*Senecio jacobea* – Declared Weed).

Weeds, including those listed as Declared Weeds on the *Weed Management Act 1999 Tas*, recorded in the region surrounding the Mining Lease and Quarry include –

- spear thistle (*Cirsium vulgare* – pasture weed);
- ragwort (*Senecio jacobea* – Declared Weed);
- Spanish heath (*Erica lusitanica* - Declared Weed – occurs intermittently along the roadside of South Retreat Road); and
- Gorse (*Ulex europaeus* – Declared Weed – occurs in the disused Rush Quarry).

The objectives of the Weed and Pathogen Management Plan (WPMP) are to:

- record and map the occurrence of weeds within the Lease, with particular focus on the areas actively being quarried;
- identify and implement management measures within the Lease to –
  - minimise the risk of spreading propagules of weeds within the Lease and to locations outside the Lease;
  - control and/or eradicate weeds where practicable;

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<sup>13</sup> Commitment 13: Management of weeds already on the site and minimising the risk of introducing new weeds to the site will continue to be managed through the Weed Management Plan dated July 2014 and all future updates to that plan.

- ensure that rehabilitation works are not compromised by the occurrence or growth of weeds; and to
- minimise the risk of introducing soil-borne pathogens into the Lease.
- monitor and review the results of on-ground actions as required;
- describe a process to enable the periodic importation of clean-fill into the quarry to aid quarry rehabilitation/operation; and to
- establish a mechanism to review the plan, including its objectives and implementation.

### WEED SPRAYING PROGRAM

A targeted Weed Spraying Program has been developed in consultation with a weed spraying contractor whom implement the program. The program is reviewed each year and updated as new information about the occurrence of weeds become available. The DPIPW issued 'Guideline for Safe and Effective Herbicide Use near Water' are to be applied for weed spraying activities.

### HEAVY MACHINERY WASHDOWN

Transport trucks and light vehicles pose less risk to the transportation of weed propagules if they remain on the hard surface of the roads and the coal loading area and that these areas are well managed to exclude weeds.

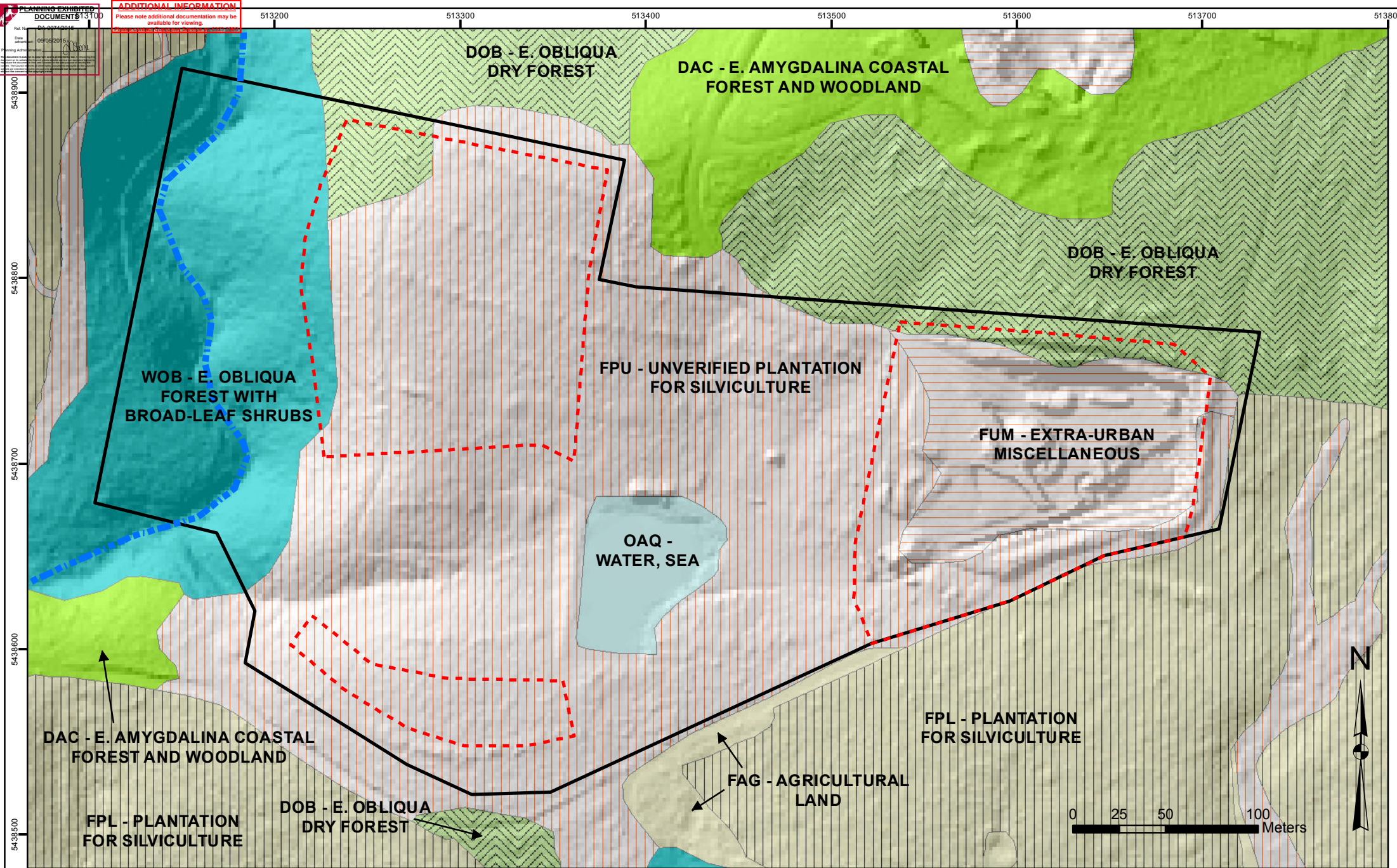
The highest risk of transporting propagules into the quarry is from heavy machinery, such as excavators, as these have the ability to carry large clods of dirt and mud in which seed propagules can be lodged. Heavy machinery is rarely brought to the site as the machinery to operate the quarry is retained at the quarry. Machinery is floated to the workshop at Lilydale for regular servicing and major repairs however when it is returned to the quarry it is clean for dirt and vegetative matter. Wherever possible heavy machinery will be brought into the quarry and surrounds in a clean condition; free of weed propagules, clods of dirt and vegetative matter.

The exact location of any required washdown site in the quarry should be decided by the contractor, or their supervisor, on the following criteria:

- Stormwater settlement ponds or areas designed for the capture of runoff from roads should be preferentially used for washdown **if** they are practical to access;
- If stormwater settlement ponds are not readily accessed, ensure washdown is conducted as close as possible to the source of the material being removed;
- Ensure run-off does not directly enter a watercourse or waterbody, a 30m buffer from any waterway or waterbody is desirable;
- Select a mud-free location (e.g. well grassed, gravel) which is gently sloped to drain effluent away from the washdown area;
- Allow adequate space to safely move tracked vehicles and allow safe vehicle access around the heavy machinery; and
- Pay particular attention to potential hazards near or at the washdown site (e.g. overhead powerlines, powerpoles and fences).

If there will be large quantities of effluent or there is a risk of extensive run-off, the washdown area should be bunded and a sump constructed to safely dispose of the effluent. Take particular care where the effluent is likely to be contaminated with oil or fuel.

For each of the washdown sites the following prescriptions will be applied: Note: Do NOT apply water to equipment that may be damaged by water.



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-7-1: Vegetation Communities (TASVEG 3.0)

- New Quarry Areas
- Quarry Site

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PO Box 1 MOUNTAIN TAS TAS 7250  
 Base data by TASMAR. © State of Tasmania  
 Base image by TASMAR. © State of Tasmania

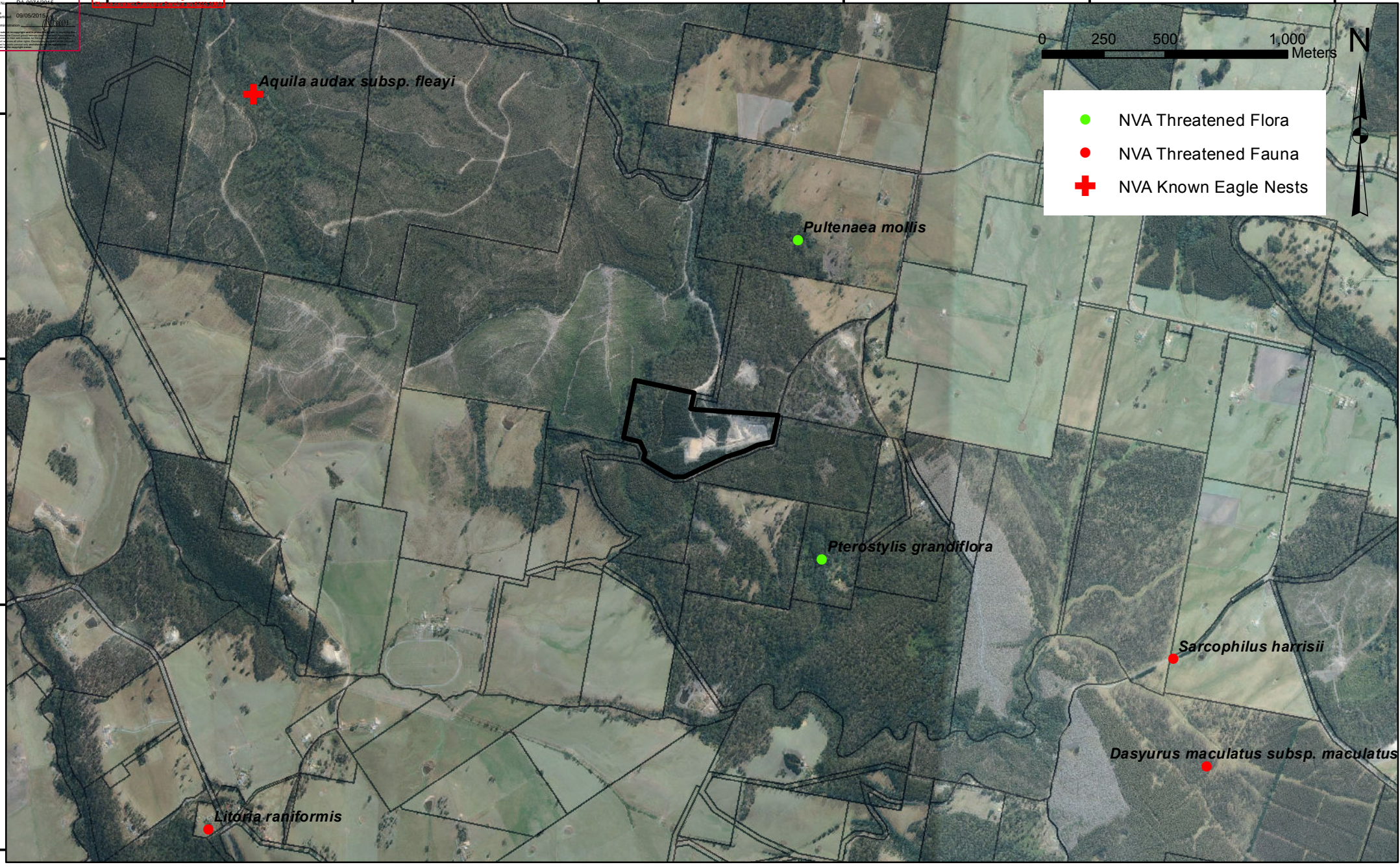


DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014

0 250 500 1,000 Meters

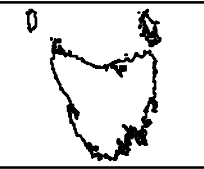
N

- NVA Threatened Flora
- NVA Threatened Fauna
- + NVA Known Eagle Nests



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-7-2: Threatened Species near to the Site (NVA data)



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014

1. Locate washdown site as close as possible to the source of the materials being removed, and prepare the surface or construct bunding as required.
2. Safely park the vehicle free of any hazards (e.g. electrical), ensure the engine is off and the vehicle is immobilised.
3. Look over the vehicle, inside and out, for where dirt, plant material including seeds are lodged. Pay attention to the underside of the vehicle, radiators, spare tyres, foot wells and bumper bars.
4. Remove any guards, covers or plates if required, being careful of any parts that may cause injury.
5. Knock off large clods of mud, use a crow bar if required and sweep out the cabin.
6. Brush off dried plant material like weed seeds and chaff in radiators and other small spaces where this material lodges.
7. Clean down with a high pressure hose (using potable drinking water) and stiff brush/crowbar.
8. Start with the underside of the vehicle, wheel arches, wheels (including spare). Next do the sides, radiator, tray, bumper bars etc and finally upper body.
9. Clean associated implements, e.g. buckets.
10. Check there is no loose soil or plant material that could be readily dislodged or removed.
11. Wash effluent away from the machinery; do not drive through wash effluent.

Contractors should keep a log book of where and when they wash down machinery, and of where they then took the machinery. These data are useful in ensuring that checks are made of the washdown locations in the event that any undesirable plants become established in these locations.

#### WEED MONITORING

The early detection of any weeds that enter the Mining Lease is important to ensure that any control or eradication program has the highest likelihood of success. A survey to identify any new weed species should be conducted at appropriate intervals outlined in the WPMP. This approach should enable early detection of weed species before they reach an extent where control and eradication is very costly and/or difficult to achieve.

#### WEED PLAN REVIEWS

The objectives, responsibilities and management actions of the WPMP will need to adapt to new information about the site as it becomes available. The Plan will be reviewed each year in conjunction with the Annual Environment Report for the quarry activity or as needed (eg. when a significant infestation of a weed on the site is detected). Reviewed versions of the Plan will be provided to the Environment Protection Authority.

#### *4.7.5 Other Values*

There are no sites of geoconservation significance (i.e. those listed on the publicly available Tasmanian Geoconservation Database) or conservation reserves on or within 500 m of the Mining Lease.

The increased production volumes at the quarry will not impact on –

- high quality wilderness areas identified in the *Tasmanian Regional Forest Agreement* (Tasmanian RFA);
- sites/areas of scientific or special conservation significance;
- geoconservation significant sites; or

- Reserves set aside for nature conservation (e.g. conservation covenant reserves, public reserves, Coastal Reserve, State Reserve).

#### 4.8 Marine and coastal

The quarry is not located within an area covered by the State Coastal Policy.

#### 4.9 Greenhouse gases and ozone depleting substances

The proponent does not need to report to the Commonwealth under the *National Greenhouse and Energy Reporting Act 2007*. The activity does not produce ozone depleting substances. Any use of machinery and vehicles will cause greenhouse gas emissions. Machinery owned and operated by the quarry operator is and will continue to be well maintained which ensures maximum fuel/oil efficiency<sup>14</sup>.

#### 4.10 Heritage

The development will not impact on any heritage values, including European and Aboriginal heritage.

The *Aboriginal Relics Act 1975*, provides legislative protection to Aboriginal heritage sites in Tasmania regardless of site type, condition, size or land tenure. Section 14(1) of the Act states that; Except as otherwise provided in this Act, no person shall, otherwise than in accordance with the terms of a permit granted by the Minister on the recommendation of the Director of National Parks and Wildlife:

- destroy, damage, deface, conceal or otherwise interfere with a relic;
- make a copy or replica of a carving or engraving that is a relic by rubbing, tracing, casting or other means that involves direct contact with the carving or engraving;
- remove a relic from the place where it is found or abandoned;
- sell or offer or expose for sale, exchange, or otherwise dispose of a relic or any other object that so nearly resembles a relic as to be likely to deceive or be capable of being mistaken for a relic;
- take a relic, or permit a relic to be taken, out of this State; or
- cause an excavation to be made or any other work to be carried out on Crown land for the purpose of searching for a relic.

If a relic is suspected and/or identified during works then works must cease immediately and the Tasmanian Aboriginal Land and Sea Council and the Aboriginal Heritage Tasmania be contacted for advice before work can continue<sup>15</sup>. In the event that damage to an Aboriginal heritage site is unavoidable a permit under section 14 of the *Aboriginal Relics Act 1975* will be applied for by the quarry operator.

#### 4.11 Visual and landscape effects

##### 4.11.1 Background

The Launceston Interim Planning Scheme requires that the rural character is maintained in the Rural Resource Zone. Specifically, the Scheme requires that the visual appearance of the Use is consistent with the local area having regard to:

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<sup>14</sup> Commitment 14: Machinery owned and operated by the quarry operator is and will continue to be well maintained which ensures maximum fuel/oil efficiency.

<sup>15</sup> Commitment 15: If a relic of Aboriginal or likely Aboriginal origin is suspected and/or identified during works then works must cease immediately and the Tasmanian Aboriginal Land and Sea Council and the Aboriginal Heritage Tasmania be contacted for advice before work can continue.

- a) the impacts on skylines and ridgelines;
- b) visibility from public roads;
- c) the visual impacts of storage of materials or equipment;
- d) the visual impacts of vegetation clearance or retention; and
- e) the desired future character statements.

The Desired Future Characteristics Statements for the Zone is –

The visual impacts of use and development within the rural landscape are to be minimised such that the effect is not obtrusive.

#### 4.11.2 Assessment Process and Findings

A GIS-based analysis utilising contours, topography, slope and vegetation coverage (LiDar data) was conducted to determine the level of ‘visibility’ impact the expanded quarry activity will have on the skyline/ridgeline and when viewed from public roads.

The degree of ‘visibility’ of the quarry location was determined using a bare earth model (land terrain form without tree or vegetation cover) with tree cover incorporated within 500m of the quarry. The tree cover height and impact to preventing visibility of the quarry was determined using LiDar data accessed from Forestry Tasmania – this provided an excellent and accurate digital elevation model of the terrain with and without trees (i.e. vegetation). The approach of applying tree coverage within the 500m radius allowed for localised sheltering to be incorporated into the assessment.

Areas visible at 16 and 6 kms from the quarry based on the bare earth modelling are shown in Figures 4-11-1 and 4-11-2 respectively. Several of these locations were visited to assess the degree to which the quarry (current and expanded quarry areas) could be seen, especially for the main roads in the region – Pipers River Road, Bangor Road and Bangor Old Tram Road (Figure 4-11-3). Although modelling shows it can be seen from Golconda and Lalla Roads, the vegetation and slight hillocks between these roads and the quarry location satisfactorily shield the quarry from these road locations.

#### 4.11.3 Visibility Impact Assessment

Of the objectives from the Scheme, the following can be stated -

- a) the impacts on skylines and ridgelines – there will be no impact to skyline or ridgeline viewfields as trees will be retained to shield the loss of pine plantation further behind the native vegetation.
- b) visibility from public roads – This region is a mosaic of farmland (land is cropped, ploughed, crops harvested etc), plantations (which are harvested and replanted on regular rotations), native forest (some of which is logged, has been logged, is in a natural state or regrowth state post-logging) and . The quarry is barely visible from a very small section of Old Bangor Tram Road (Landscape Image E; Figure 4-11-3) where the angle of the road and driver’s viewfield is to the south-east, not to the east where the quarry is located. Indeed, if the quarry was not pointed out specifically to a person it would not be noticed at all, even if a person was to stand on the crest of the road and specifically scan for it. This situation will not change with the retention of native vegetation along the western perimeter of the Mining Lease as shown in Figure 4-11-4.
- c) the visual impacts of storage of materials or equipment – neither materials or equipment will be visible from public roads.
- d) the visual impacts of vegetation clearance or retention – the retention of native vegetation along the western perimeter of the Mining Lease (see Figure 4-11-4) provides an amenity buffer to the activities of the quarry behind.

- e) the desired future character statements – the retention of native vegetation along the western boundary will mean that the visual impacts of the quarry within the rural landscape will be negligible such that the effect is not obtrusive.

In summary, the expanded operation will not materially impact on the viewfield from any public road nor will it cause any obtrusive impact to the skyline because it is located in an area which will be shielded from view by retained vegetation (see Figure 4-11-4).

**Plate 2. Landscape Images referenced to Figure 4-11-3 with approximate quarry location shown by arrow**



Landscape Image A – quarry location shielded from view by retained native vegetation (see Figure 4-11-4)





Landscape Image B – quarry location behind hillock



Landscape Image C – quarry location behind retained native vegetation and hillock

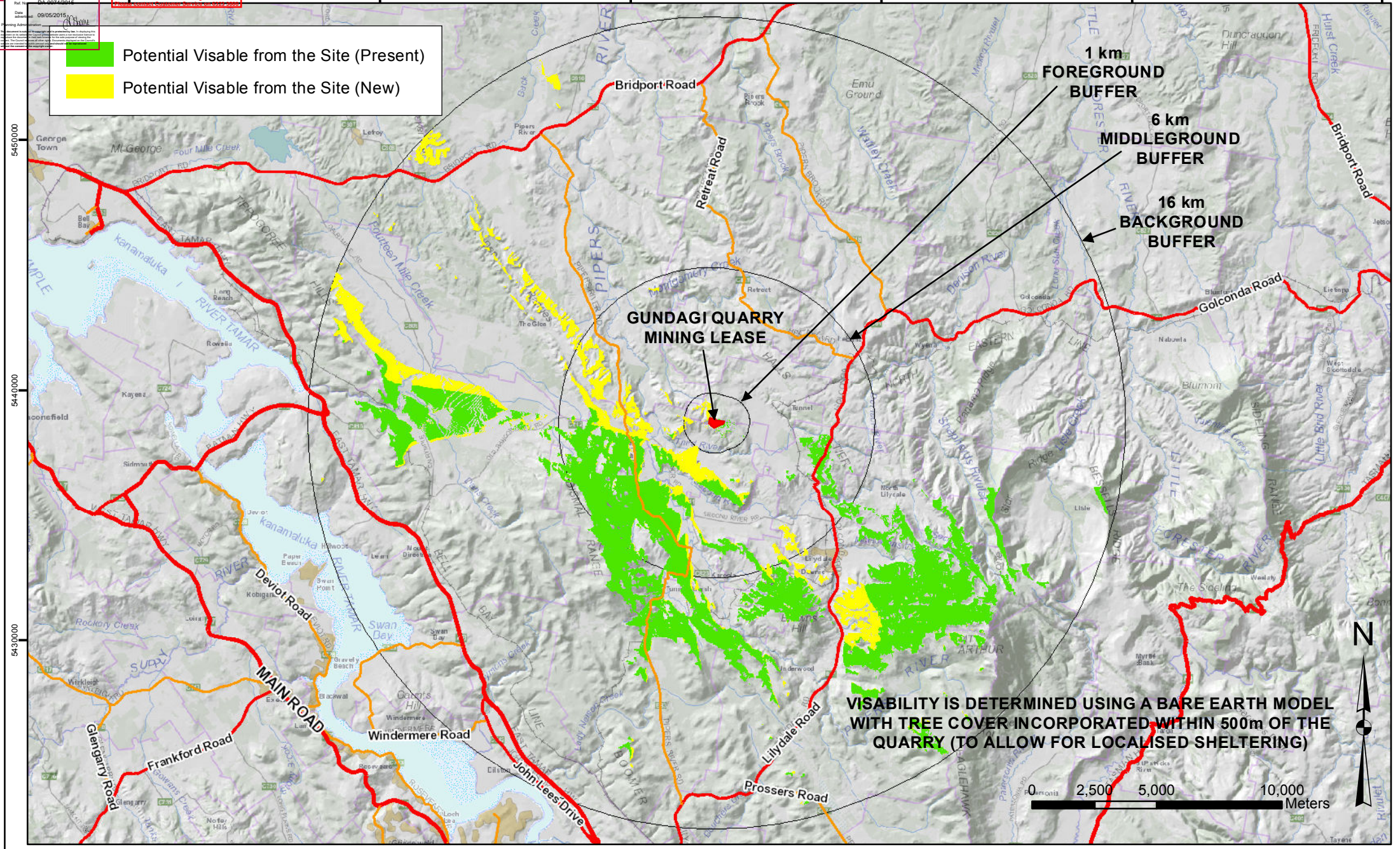


Landscape Image D – skyline near quarry barely visible due to pine shelterbelt




Landscape Image E – quarry location barely visible due to retained vegetation along western boundary (see Figure 4-11-4)

**Potential Visible from the Site (Present)**  
**Potential Visible from the Site (New)**



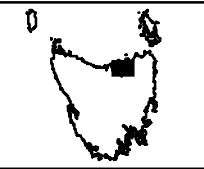
# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-11-1: Potential Visual Impact (visability from the site to 16 km)

 Title 40814/1

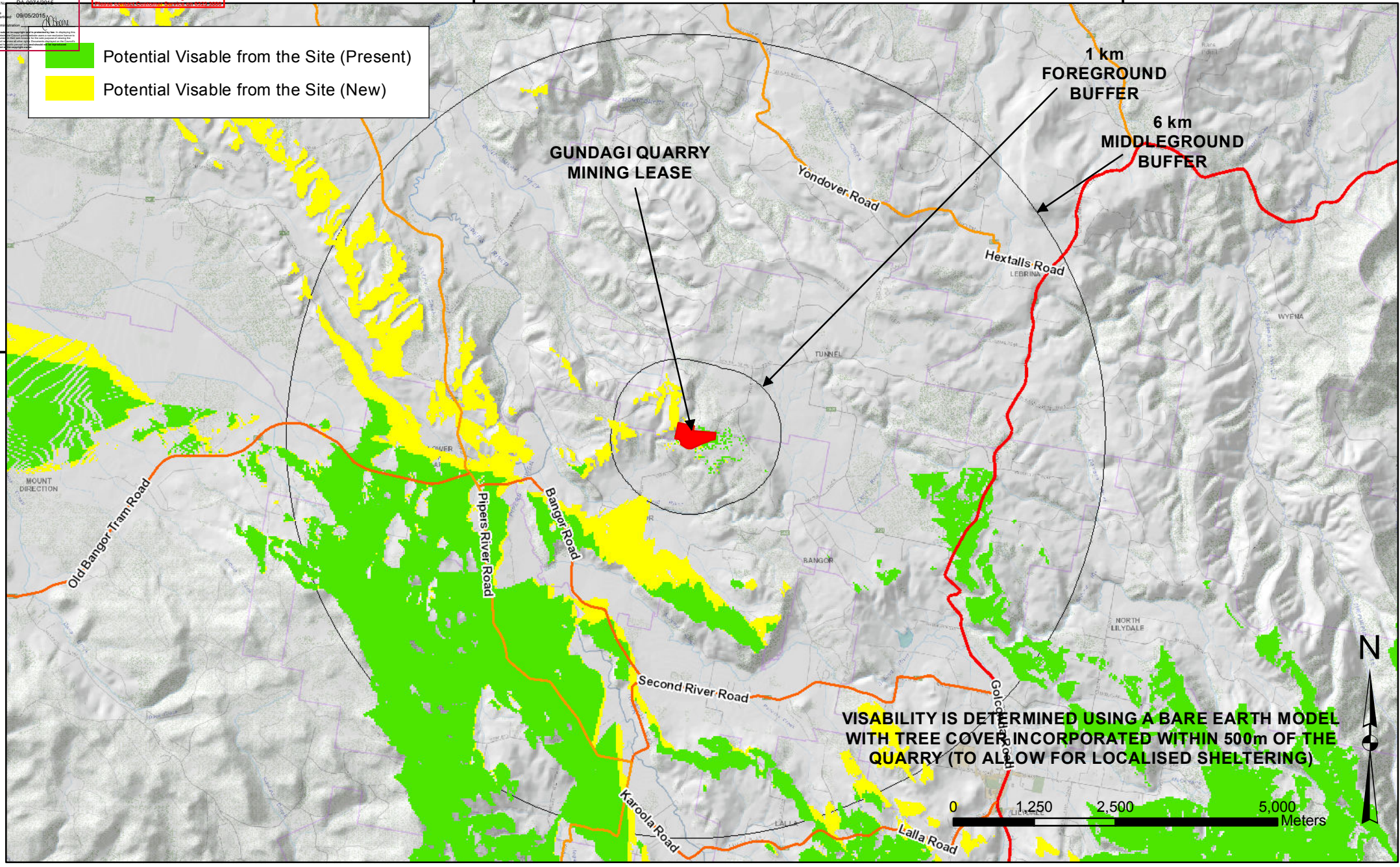
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 Base data by TASMAR, © State of Tasmania  
 Base image by TASMAR, © State of Tasmania



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014


**Potential Visable from the Site (Present)**  
**Potential Visable from the Site (New)**



**VISIBILITY IS DETERMINED USING A BARE EARTH MODEL WITH TREE COVER INCORPORATED WITHIN 500m OF THE QUARRY (TO ALLOW FOR LOCALISED SHELTERING)**

**GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP**

Figure 4-11-2: Potential Visual Impact (visability from the site to 6 km)

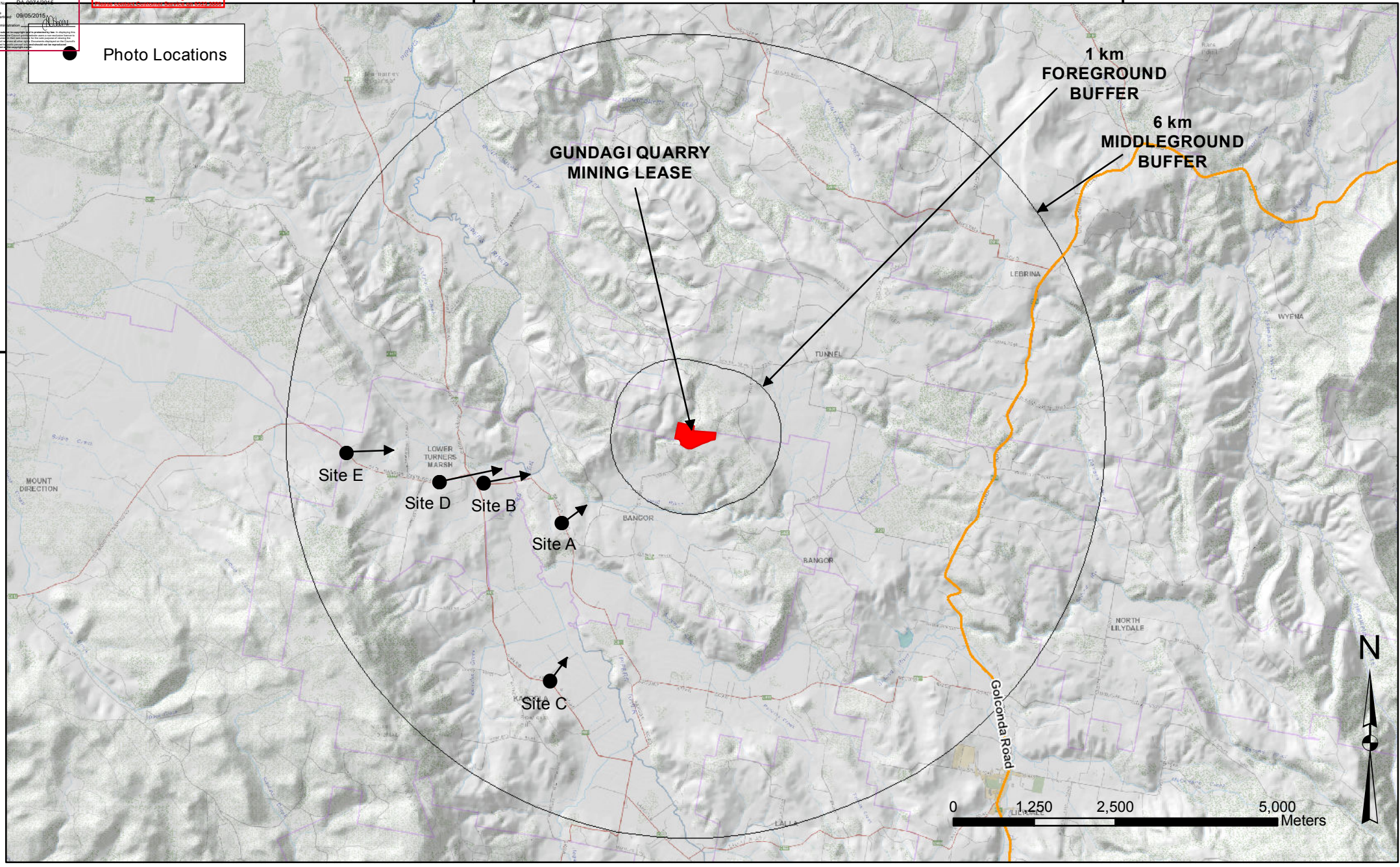
 Title 40814/1

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 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014

● Photo Locations



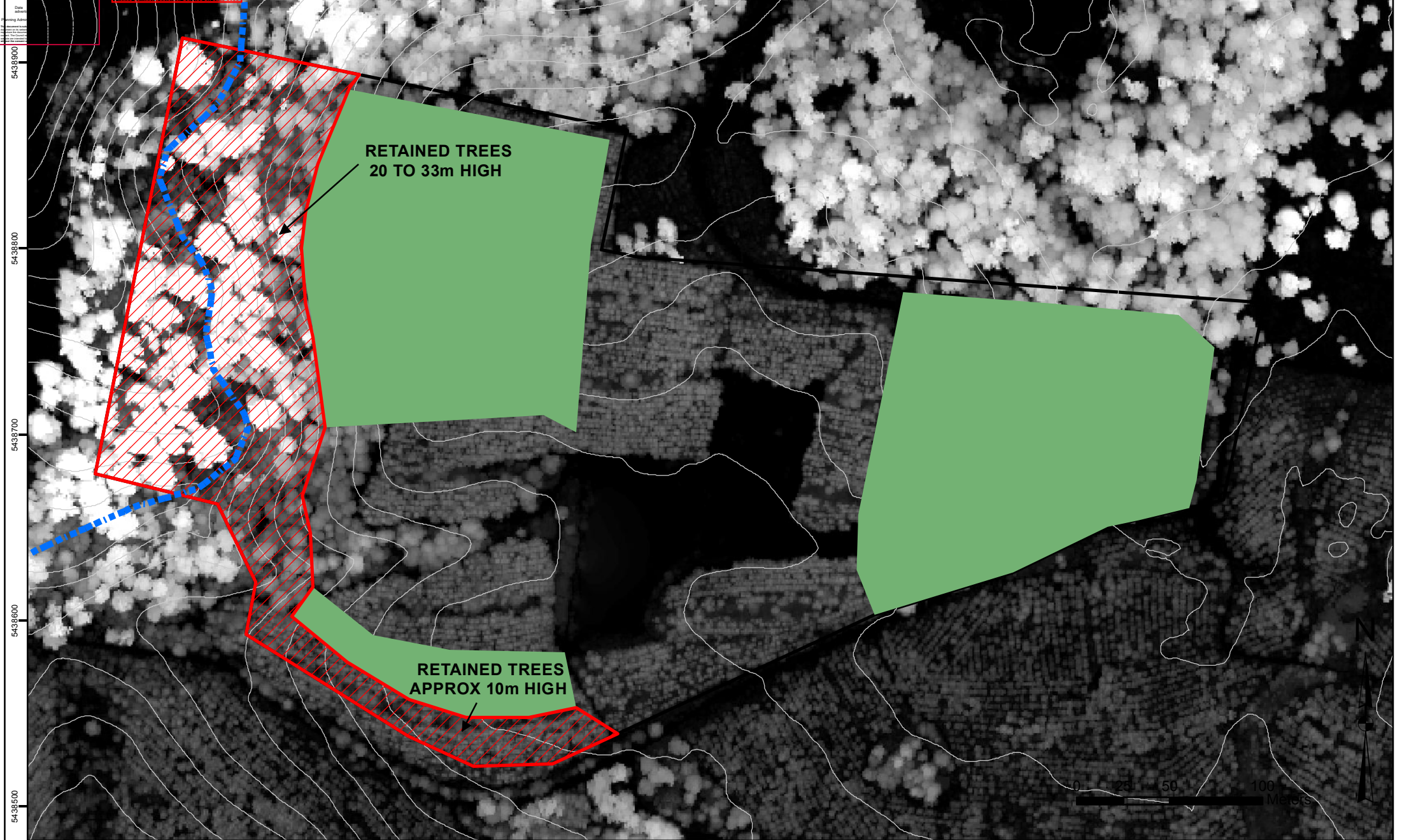
**GUNDAGI QUARRY - PRODUCTION INCREASE  
 DP&EMP**

Figure 4-11-3: Photo Locations (visibility to the site)

■ Title 40814/1



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 411-4: Retained Screening Trees

- Present 5m Contours
- Retained (for Screening)
- New Quarry Areas
- Quarry Site

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PO Box 114 Wilmot TAS 7511  
Base data by TASMAR. © State of Tasmania  
Base image © Google Earth



DATUM: GDA94  
GRID: MGA Zone 55  
TASMAR: LILYDALE  
CLIENT: LEIGH  
BARDENHAGEN  
DATE: 3th APRIL 2014

#### 4.12 Health and safety issues

The site infrastructure to mitigate dust/stormwater will result in minimal risk to public health from this proposal.

Appropriate infrastructure exists for the following:

- stormwater runoff treatment;
- fuel and oil storage and transport; and
- noise management to a safe level both on and off the site area.

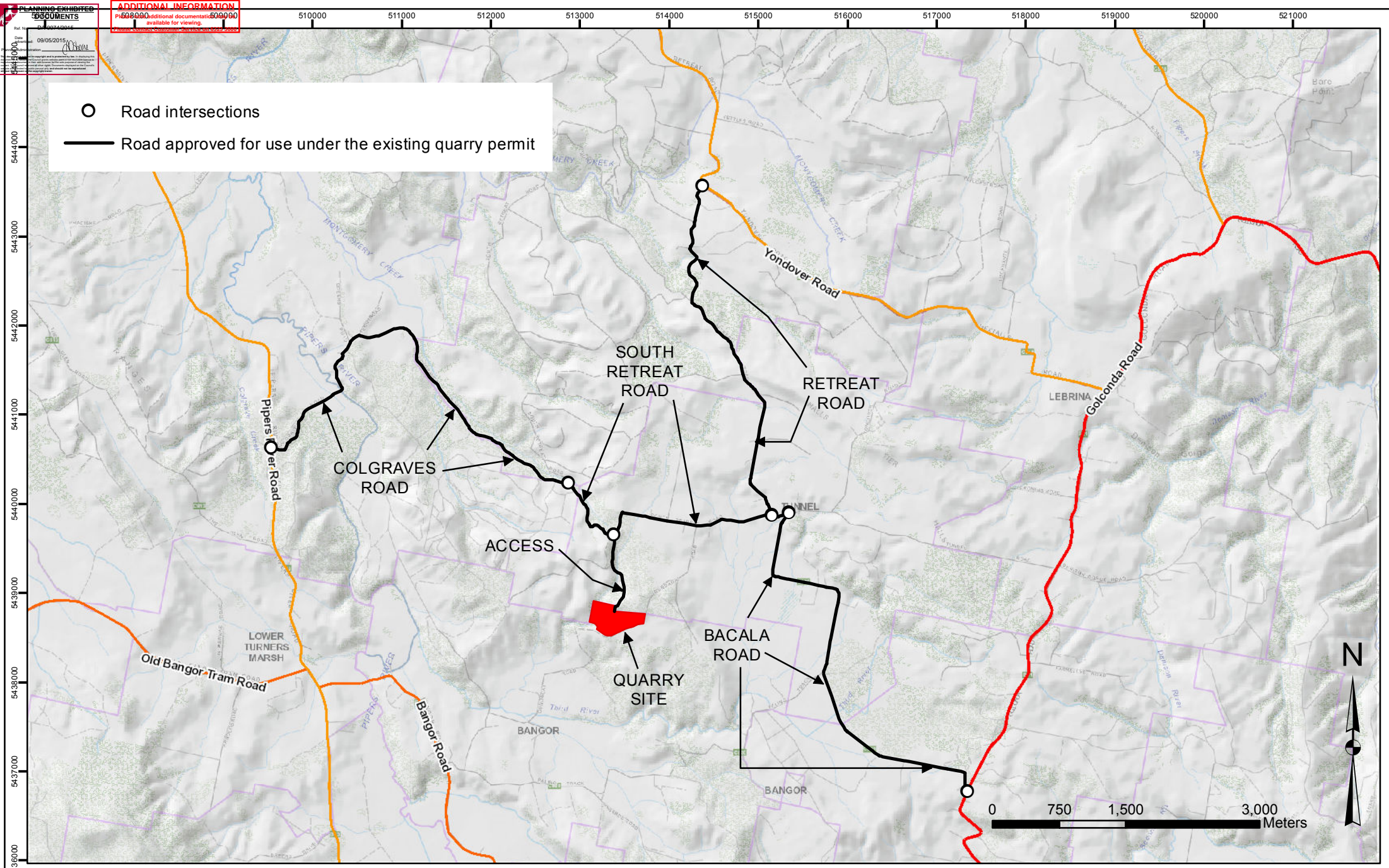
#### 4.13 Traffic Impact Assessment and Management

The road network to be used by the activity, showing the roads already approved for the current activity are identified in Figure 4-13-1.

The TIA (Appendix D) conducted for the expanded development complies with the requirements of the Road and Rail Asset Code for the 2012 Interim Planning Scheme, however its conclusions remain valid for the 2015 Interim Planning Scheme except for the proposed use of Tunnel Road which is now load limited and is not available for heavy haulage:


- The development is for an increase of output from the quarry from the currently approved rate of 50,000 cubic metres to 200,000 cubic metres. The quarry services councils and developments in the nearby area with high quality construction materials.
- When operating at maximum capacity, the quarry generates up to 116 vehicles per day. This consists of 95 heavy vehicle trips (two-way movements – consisting of up to 47 one-way laden truck movements).
- The peak hourly generation of the quarry is likely to be in the order of 10 trips per hour, which is well within the surrounding road network’s ability to absorb without any significant loss of level of service.
- The proposed development will not increase peak daily generation from the quarry, but will enable the quarry to produce more on a yearly basis. For this reason, the various junctions within the surrounding road network will continue to operate in a safe and efficient manner.
- Adequate sight distance is provided at the site access, as well as other major road junctions in the surrounding transport network in accordance with the Planning Scheme requirements for the prevailing vehicle speeds.
- The requirements of the Road and Rail Assets Code of the Planning Scheme are met.

No further assessment or upgrades/modifications to any road or junctions was recommended by the comprehensive TIA assessment and reporting process.



# GUNDAGI QUARRY - PRODUCTION INCREASE DP&EMP

Figure 4-13-1: Site Access / Egress and Intersections

 Title 40814/1

  
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DATUM: GDA94  
 GRID: MGA Zone 55  
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 CLIENT: LEIGH BARDENHAGEN  
 DATE: 3th APRIL 2014



## 5. MONITORING AND REVIEW

### 5.1 Monitoring and Continual Improvement

DTK Logging Pty Ltd already monitors and assesses environmental aspects of its operation to ensure compliance with the existing permit for the quarry (Appendix B) and also specific water monitoring as part of EPN 9053/1 (dam construction and modification).

#### 5.1.1 Pro-active impact identification and correction

The Identifying Environmental Aspects and Potential Impacts procedure (Appendix E) has been developed to ensure all environmentally significant aspects and their effects on the environment are progressively reviewed, evaluated and measures appropriately assessed and reviewed – a process of continual improvement. This procedure is also intended to establish a robust process for the quarry operator to identify significant environmental aspects that should be addressed as a priority on an ongoing basis. The procedure only includes those activities over which the quarry operator has control and influence.

In this context the procedure applies to all aspects which entail:

- a legal requirement, for example compliance with a permit/licence;
- a commitment made in a Bardenhagen Quarries (the quarry operator) policy or corporate document; or
- those activities which are considered to have a potentially significant impact on the environment.

The procedure will lead to the development of a formal **Environmental Aspect and Impact Register** which will include an assessment of major work activities within the chosen work area (e.g. contamination of runoff water). This assessment is to be conducted in conjunction with the appropriate manager and personnel and that work in the area.

The following steps are to be taken when developing the register, using the Likelihood – Consequence matrix provided –

- a. Identify areas to be reviewed.
- b. Describe the activities carried out in the identified area.
- c. List reason why the activity is undertaken.
- d. List the impacts associated with each aspect activity.
- e. Assess the consequences of each impact.
- f. Identify appropriate controls.
- g. Repeat step c. for each cause associated with the identified activity.
- h. If rating is greater than moderate, action is to be taken to further reduce the risk.

The register will be progressively developed as the quarry operations expand into new quarry areas.

**Gundagi Quarry, Bangor - DPEMP**

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A 5 (Almost Certain)	M 5	H 10	E 15	E 20	E 25
B 4 (Likely)	M 4	H 8	H 12	E 16	E 20
C 3 (Moderate)	L 3	M 6	H 9	E 12	E 15
D 2 (Unlikely)	L 2	L 4	M 6	H 8	E 10
E 1 (Rare)	L 1	L 2	L 3	M 4	H 5

**Legend:**

- |    |               |   |
|----|---------------|---|
| E: | extreme risk  | immediate action required                   |
| H: | high risk     | senior management attention needed          |
| M: | moderate risk | management responsibility must be specified |
| L: | low risk      | manage by routine procedures.               |

Level	Descriptor	Environment
1	Insignificant	<ul style="list-style-type: none"> <li>Alteration/disturbance within limits of natural variability.</li> <li>Effects not transmitted or accumulating.</li> <li>Resources not impaired.</li> <li>None to sporadic complaints from community.</li> </ul>
2	Minor	<ul style="list-style-type: none"> <li>On-site release immediately contained medium financial loss.</li> <li>Temporary alteration/disturbance beyond natural variability.</li> <li>Effects confined to site and not accumulating. Resources temporarily affected.</li> <li>Restoration time within 1 – 5 years. Sporadic to widespread complaints.</li> </ul>
3	Moderate	<ul style="list-style-type: none"> <li>On-site release contained with outside assistance,</li> <li>High financial loss.</li> <li>Alteration/disturbance of a component of an ecosystem.</li> <li>Effects not transmitted or accumulating.</li> <li>Potential loss of resource but sustainability unaffected. Restoration time 5-10 years.</li> <li>Clean up confined to site, although potential for groundwater contamination.</li> <li>Widespread complaints or threats of community action eg organised opposition to activity by community – public meetings.</li> </ul>
4	Major	<ul style="list-style-type: none"> <li>Loss of production capability,</li> <li>Off-site release with no detrimental effects, major financial loss.</li> <li>Alteration to one or more ecosystems or component levels, but which is recoverable.</li> <li>Effects transmitted or accumulated.</li> <li>Loss of sustainability of selected resources.</li> <li>Requirements for clean-up of site.</li> </ul>

		<ul style="list-style-type: none"> <li>Restoration time 25-20 years.</li> <li>Threats of community action to vigorous community action eg Organised opposition to activity by community including public meetings, involvement with media, politicians.</li> <li>Threat to continuing operational activity.</li> </ul>
5	Catastrophic	<ul style="list-style-type: none"> <li>Toxic release off-site with detrimental effect, huge financial loss.</li> <li>Irreversible alteration to one or more ecosystems or several component levels.</li> <li>Effects can be transmitted or accumulated.</li> <li>Cannot be restored over time.</li> <li>Vigorous community action may lead to business closure, legislative changes.</li> </ul>

Level	Descriptor	Description
A	Almost certain	Is expected to occur in most circumstances
B	Likely	Will probably occur in most circumstances.
C	Possible	Might occur at some time. Annual frequency
D	Unlikely	Could occur at some time.
E	Rare	May occur only in exceptional circumstances.

To monitor the performance of the existing and DPEMP proposed mitigation measures in place the following monitoring program has been established.

### 5.1.2 Water Quality

The stormwater system (sediment dams and drainage channels) will be checked on a weekly basis to ensure it is operating effectively. The quality of water discharged from the Mining Lease will be monitored in accordance with EOP Water Sampling 2014<sup>16</sup> (Appendix E) which includes –

#### During Sediment Dam Construction and Upper Dam Modification

Samples of discharge will be collected from the discharge point (overflow) of the ‘upper’ sediment dam whilst EPN 9053/1 is in force. When the upper dam is not discharging no samples are taken, however notes are taken to record this such that discharge events can be differentiated from those where no discharge occurred.

Water leaving the Mining Lease must not contain more than 30mg/L total suspended solids.

Samples, if discharge is occurring, are collected weekly and include the following parameters TSS, pH, turbidity and a *visual assessment* for oil and grease. The water quality monitoring regime for dams could be an early indicator of acid mine drainage. The monitoring of the pH value can give an indication of acid mine or acid rock drainage from the quarry operations if values decrease.

Each month a brief report (email, spreadsheet or similar) is lodged with the EPA (required by EPN 9053/1) that outlines the status of discharge (ie no discharge or discharge) and the discharge test results.

<sup>16</sup> Commitment 16: Monitoring will be undertaken in accordance with EOP Water Sampling 2014.

## After Lower Dam Construction and Upper Dam Modification

Once EPN 9053/1 is no longer in force (ie when the 'lower' sediment dam has been completed, is fully functional and 'signed off') the discharge point (overflow) will be the 'lower' sediment dam at which time no further samples of discharge will be required from the 'upper' sediment dam.

Samples, if discharge is occurring, will be collected and tested 6 monthly (or if the intervening time between discharge events exceeds 6 months the sample will be collected at the next discharge event) and include the following parameters TSS, pH and Oil and Grease.

**All** water sampling is subject to the following:

- (a) The sample must be tested in a laboratory accredited by the National Association of Testing Authorities (NATA) for the specified test;
- (b) The sample must be collected and analysed in accordance with the relevant Australian Standards or NATA approved methods;
- (c) Details relating to the collecting and analysis of each sample must be retained for at least three years after the date of measurement and be made available on request by the relevant regulatory authority; and
- (d) The sample must be collected and transported by a person with appropriate training and experience.

## **5.2 Reporting**

### *5.2.1 Environmental Incident Reporting*

An Environmental Incident Reporting System (EOP Environmental Incident Reporting, Appendix E) is in place as part of the quarry operation procedures.

### *5.2.2 Complaints Register*

An on-site complaints response procedure (Complaints Register) already exists for the current activity and this will continue to be used for the expanded activity. All complaints of relevance to the management of the quarry operation are recorded in the established Complaints Register. Details of investigation and actions undertaken in relation to each complaint will also be recorded in the register.

### *5.2.3 Regulatory Authority Reports*

Reports (eg annual reports) will continue to be developed and provided to the relevant regulatory authority as required by the permits under which the quarry operates.

## **5.3 Responsibilities**

The quarry operator is responsible for ensuring that appropriate environmental management measures implemented for the quarry. The quarry operator or their representative will ensure that employees (both staff and contractors) are aware of the EMP and its contents. This includes ensuring that operators are familiar with emergency procedures, incident investigation and incident response procedures and operational practices are conducted in a manner that demonstrates compliance and awareness of environmental issues.

The quarry operator will conduct internal audits of operational practices as required.

## **5.4 Summary of monitoring program**

Monitoring of the activities of the quarry will be carried out as outlined in Table 3.

**Table 3. Summary of monitoring program**

Monitoring Task	Description and frequency
Air blast over pressure noise and ground vibration.	Each and every blast, conducted by blast contractor as per the <i>Blast Management Plan 2, August 2014</i> (Appendix G) and future revisions of the plan
To monitor impact to the social environment a complaint register will be kept by the company	Ongoing use of the already established Complaints Register
Dust emissions to the air from the quarry operation	Ongoing, visual inspections of air leaving the quarry
Monitor the quality of water (see 5.1.1 Water Quality) discharging from either sediment settling dam	As per Water Sampling Protocol 2014 (Appendix E) - TSS, pH and turbidity and a <i>visual assessment</i> for oil and grease
Monitor sediment levels in water quality control pond.	Every month sediment levels in the dam will be checked  Dam(s) are to be cleaned every 6 months or when they have lost 15% or more of their holding capacity

## 6. DECOMMISSIONING AND REHABILITATION

It is the aim of the quarry operator to minimise the area of land 'open' at the quarry to minimise the overall impact the activity has on the local environment.

'Progressive rehabilitation' will continue at the quarrying operation for those areas that have been quarried and are no longer needed or used for the ongoing operation of the quarry<sup>17</sup>. A Progressive Rehabilitation Plan has been developed for the quarry (Appendix K) which includes measures and management actions to stabilise the landform prior to revegetation.

The maximum area open at any one time in the quarry without rehabilitation is to be 4 hectares.

The rehabilitation of quarry areas that are no longer being quarried or used for another purpose (such as a stockpile holding area, truck turning bay etc.) will be based on the following principles:

1. Benches prepared for rehabilitation.
2. Final aim is the re-establishment on an ongoing basis of used quarry areas back to semi-native vegetation.
3. Benches ripped or cracked prior to substrate addition.
4. Stockpiled weathered gravel, topsoil (from quarry site) and sediment from sediment interceptors applied to prepared benches.
5. Application of seed/slash and fertiliser.
6. Monitoring of the following factors:
  - a. weed infestation;
  - b. tree, shrub and grass establishment and growth success; and
  - c. landform stability.

In the event of permanent closure of the facility a detailed Decommissioning and Rehabilitation Plan will be developed and submitted to the EPA for approval<sup>18</sup>.

The plan should include discussion and processes to:

- Facilitate the orderly and safe removal of machinery and other equipment;
- Establish sufficient vegetative ground cover to minimise dust and soil erosion; and
- Establish a monitoring regime that assesses the success or otherwise of the rehabilitation to agreed (MRT, EPA and DTK Logging Pty Ltd) sign-off parameters.

## 7. CONCLUSION AND COMMITMENTS

DTK Logging Pty Ltd has been operating the current quarry operation in an environmentally responsible way. This includes not only meeting the specific regulatory requirements of the relevant agencies, but where possible and appropriate, achieving best practice environmental management.

In the preceding Sections of this DPEMP the potential environmental effects which may arise from the expanded quarry operation have been detailed, and where appropriate, actions documented to prevent and or minimise potential adverse impacts.

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<sup>17</sup> Commitment 17: Progressive rehabilitation, based on the Progressive Rehabilitation Plan 2014, will continue at the quarrying operation for those areas that have been quarried and are no longer needed or used for the ongoing operation of the quarry.

<sup>18</sup> Commitment 18: In the event of permanent closure of the quarry a detailed Decommissioning and Rehabilitation plan will be developed and submitted to the EPA and MRT for approval.

Gundagi Quarry, Bangor - DPEMP

The commitments made by DTK Logging Pty Ltd (trading as Bardenhagen Quarries) throughout this DPEMP are summarised in Table 4.

**Table 4. Commitment Summary**

Number	Commitment	Timeframe
1	Operating hours will be – 0600 to 1900 hrs Monday to Friday, 0800 to 1600 hrs on Saturday; closed on Sunday and public holidays. Notwithstanding these operating hours, <b>blasting</b> will be limited to between 1000 and 1600 hrs Monday to Friday and <b>crushing</b> will not occur on operating days between 0600 and 0700 hrs Monday to Friday.	Within 1 month of full approval being provided for the quarry expansion
2	If PAF rock is detected in the quarry during works then further petrological testing could be conducted by MRT to confirm this.	Ongoing
3	The existing and new sediment dams will be cleaned out either on a six monthly basis or at 15% storage volume. The sediment trapped will be reused as a fine material mixed with stockpiled top soil for progressive rehabilitation of used quarry areas.	Already compliant
4	No chemicals, fuels or oils are stored on site overnight and refuelling is carried out using a mobile bund.	Already compliant
5	Measures that will be used to suppress dust include the following industry environmental practices for quarries: <ul style="list-style-type: none"> <li>• Watering of internal roads as required during dry and windy conditions;</li> <li>• Installation of automatic load dampening infrastructure (for load dampening within trucks that exist the quarry); and</li> <li>• Minimising the geographic extent of areas of exposed soil.</li> </ul>	Within 1 month of full approval being provided for the quarry expansion and then ongoing
6	Loads carted from the quarry can be dampened using the quarry installed load dampening infrastructure otherwise the driver may choose to use a tarpaulin or similar to prevent or minimise fugitive emissions from loads being carted from the quarry.	Ongoing
7	Two hydrocarbon spill kits are stored at the quarry and staff trained in how to use it in the event of a spillage.	Ongoing
8	The ‘lower’ sediment dam will be constructed and ‘upper’ sediment dam modified in accordance with EPN9053/1 and the Pre-Construction Dam Report.	As per EPN9053/1
9	The <i>Blast Management Plan 2 August 2014</i> and future iterations of this Plan will continue to be implemented	Ongoing

Gundagi Quarry, Bangor - DPEMP

	under the expanded quarry activity to mitigate noise and nuisance to surrounding landowners.	
10	The disposal of solid waste will be in accordance with the Operational Procedure Solid Waste Disposal 2014 established for the company.	Ongoing
11	Scheduled machinery maintenance works (except emergency situations which may be corrected in the quarry using a mobile bund) are to be conducted at the proponent's Lilydale workshop.	Ongoing
12	Native vegetation will be retained at the north-eastern corner of the Mining Lease to provide noise attenuation services and also to the west to provide landscape amenity services.	Ongoing
13	Management of weeds already on the site and minimising the risk of introducing new weeds to the site will continue to be managed through the Weed Management Plan dated July 2014 and all future updates to that plan.	Ongoing
14	Machinery owned and operated by the quarry operator is and will continue to be well maintained which ensures maximum fuel/oil efficiency.	Ongoing
15	If a relic of Aboriginal or likely Aboriginal origin is suspected and/or identified during works then works must cease immediately and the Tasmanian Aboriginal Land and Sea Council and the Aboriginal Heritage Tasmania be contacted for advice before work can continue.	Ongoing
16	Monitoring will be undertaken in accordance with EOP Water Sampling 2014.	As per EOP Water Sampling 2014 (Appendix E)
17	Progressive rehabilitation, based on the Progressive Rehabilitation Plan 2014, will continue at the quarrying operation for those areas that have been quarried and are no longer needed or used for the ongoing operation of the quarry.	Ongoing
18	In the event of permanent closure of the quarry a detailed Decommissioning and Rehabilitation plan will be developed and submitted to the EPA and MRT for approval.	DRP prepared and provided to the EPA Director within 30 days of formal written notice to the EPA of permanent quarry closure.



Van Diemen Consulting Pty Ltd  
 PO Box 1  
 New Town, Tasmania

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This document has been prepared in accordance with the scope of services agreed upon between Van Diemen Consulting (VDC) and the Client.

To the best of VDC's knowledge, the report presented herein represents the Client's intentions at the time of completing the document. However, the passage of time, manifestation of latent conditions or impacts of future events may result in changes to matters that are otherwise described in this document. In preparing this document VDC has relied upon data, surveys, analysis, designs, plans and other information provided by the client, and other individuals and organisations referenced herein. Except as otherwise stated in this document, VDC has not verified the accuracy or completeness of such data, surveys, analysis, designs, plans and other information.

No responsibility is accepted for use of any part of this document in any other context or for any other purpose by third parties.

This document does not purport to provide legal advice. Readers should engage professional legal advisers for this purpose.

**Document Status**

Revision	Author	Reviewer and Organisation	Date
1	R Barnes C McCoull	R Barnes	30-7-2014
1	R Barnes C McCoull	D Oldmeadow, EPA	
2	R Barnes C McCoull	R Barnes	10-1-2015
2	R Barnes C McCoull	D Oldmeadow, EPA	29-1-2015
3	R Barnes C McCoull	R Barnes	22-2-2015
Final	R Barnes C McCoull	R Barnes	22-4-2015

## 8. APPENDICES

- Appendix A: EPA issued DPEMP Guidelines
- Appendix B: GTC Planning Permit (DA0523/2009) and Permit Part B 7907
- Appendix C: Land Title Information
- Appendix D: Traffic Impact Assessment (Midson Traffic Pty Ltd)
- Appendix E: Gundagi Quarry Environmental Operational Procedures
- Appendix F: Gundagi Quarry Weed Management Plan 2014
- Appendix G: Blast Management Plan 2014
- Appendix H:
  - 1. VIPAC noise monitoring report – 2013
  - 2. Environmental noise, ground vibration and air blast overpressure impact assessment Gundagai Quarry, May 2010 (VIPAC report 421057-01)
- Appendix I: Gundagi Quarry Pre-Construction Dam Report
- Appendix J: EPN9053/1 (dam modification and construction)
- Appendix K: Gundagi Quarry Progressive Rehabilitation Plan
- Appendix L: Machinery Specifications
- Appendix M: MRT Petrology Report – Aggregate Analysis (Gundagi Quarry)

**PLANNING EXHIBITED DOCUMENTS**  
Ref. No: DA 0074/2015  
Date submitted: 09/05/2015  
Planning Administration:   
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**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

*Gundagi Quarry, Bangor - DPEMP*

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**Appendix A: EPA issued DPEMP Guidelines**

Once a satisfactory DPEMP has been received, the application will be advertised and the DPEMP will be published on the internet. The public will be invited to make representations in relation to the project. The DPEMP will also be referred to relevant State Government agencies for comment.

Close consultation with the EPA Division and Launceston City Council during the preparation of the DPEMP is recommended. A draft of the DPEMP should be submitted to this office for review prior to the submission of a permit application to the local Council. It is recommended that you follow the headings and section numbering in the guidelines in preparing the DPEMP for the proposal.

The DPEMP Project Specific Guidelines were prepared, based on the Notice of Intent, and prescribe additional information requirements over and above the DPEMP General Guidelines. Please note that if the proposal should change from that described in the Notice of Intent the DPEMP Project Specific Guidelines may need to be modified.

The DPEMP General Guidelines provide generic information on the preparation of a DPEMP. A copy of these guidelines can be downloaded from the internet at <http://epa.tas.gov.au/regulation/guidance-documents>.

- *DPEMP Project Specific Guidelines for DTK Logging Pty Ltd Gundagi Quarry.*
- *General Guidelines for the Preparation of a Development Proposal and Environmental Management Plan (DPEMP General Guidelines); and*

The assessment cannot proceed further until you have presented a satisfactory DPEMP prepared in accordance with the following guidelines:

In accordance with section 27D of the EMPC Act, and acting under delegation from the Board, I enclose guidelines for the preparation of a Development Proposal and Environmental Management Plan (DPEMP) to assist you in preparing the case for assessment.

As advised in the Environment Protection Authority's (EPA's) correspondence of 27 September 2013, the environmental impact of the above proposal is being assessed by the Board of the EPA as a class 2B assessment under the *Environmental Management and Pollution Control Act 1994*.

**GUNDAGI QUARRY – GUNDAGI ROAD, BANGOR  
 DPEMP GUIDELINES**

Dear Mr Bardenhagen  
 Mr Leigh Bardenhagen  
 DTK Logging Pty Ltd  
 PO Box 176  
 LILYDALE TAS 7268

23 October 2013

Enquiries: David Oldmeadow  
 Ph: +61 3 6233 2105  
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 Web: www.epa.tas.gov.au  
 Our Ref: EN-EM-EV-DE-238499/H205263/Proponent\_PSG[ars]

Level 6, 134 Macquarie Street, Hobart TAS  
 GPO Box 1550, Hobart, TAS 7001 Australia



7030  
Dr Richard Barnes, Director, Van Dieman Consulting Pty Ltd, 32 Banticks Road, MANGALORE, TAS

**Cc** General Manager, Launceston City Council, PO Box 396, LAUNCESTON TAS 7250

**Encl:** • *DPEMP Project Specific Guidelines for DTK Logging Pty Ltd Gundagi Quarry*

**DEPUTY GENERAL MANAGER, EPA DIVISION**  
John Mollison  
**Acting under delegation from the Board of the Environment Protection Authority**



Yours sincerely

At the end of the public consultation period, you may be requested to provide the Board with additional supporting information, or to modify the proposal, in response to the public and agency comments. The additional information or proposal modifications would take the form of a supplement to the DPEMP.

On completion of its assessment, the Board will notify you and Launceston City Council of the result of the assessment and of any conditions or restrictions which the Board has decided to impose in any permit granted by Council, or will direct Council to refuse to grant a permit.

Section 27F(1) of the EMPC Act requires the DPEMP to be prepared in accordance with the Board's guidelines, and within 12 months of the Board providing that guidance. Failure to provide a satisfactory a DPEMP within 12 months of your receipt of the enclosed guidelines may result in rejection of the application or proposal under section 27F(2) of the EMPC Act.

Please note that the Board is required to publicly disclose all information relating to the environmental impact of the proposal except where there is a legitimate commercial, national security or environmental reason for confidentiality. Please indicate where you would prefer information to remain confidential, and the basis for the request.

If you have any queries regarding the above, please contact the officer nominated at the head of this correspondence.



ENVIRONMENT PROTECTION AUTHORITY

Board of the Environment  
Protection Authority  
23 October 2013

Gundagai Rd, Bangor

DTK Logging Pty Ltd  
Gundagai Quarry

*for*

Development Proposal and  
Environmental Management Plan  
Project Specific Guidelines

Key issue	
1	Noise impacts from activities occurring on the lease land, including crushing & screening, drilling, onsite vehicle movements, and noise from vehicle movements to and from the site.
2	Air blast over pressure and ground vibration effects on surrounding residences associated with blasting activity.
3	Dust emissions from activities onsite and vehicle movements.
4	Quarry closure and rehabilitation.

The key issues that have been identified for consideration in relation to the proposal, and which should be the principal focus of the DPMP, are as follows:

## 2. Key issues

This document has been prepared on the basis of a Notice of Intent. This document should not be interpreted as excluding from consideration other matters deemed to be significant or matters that emerge as significant from environmental studies, public comments or otherwise during the course of the preparation of the DPMP. This document identifies the minimum survey requirements and studies required as part of the DPMP in relation to the key issues. While the DPMP should evaluate all potential effects of the proposal, the DPMP should be principally focused on the key issues identified below. The level of detail provided on other issues should be appropriate to the level of significance of that issue for the proposal.

This document should be read in conjunction with the *General Guidelines for the preparation of a Development Proposal and Environmental Management Plan* ([http://www.epa.tas.gov.au/assessment\\_dpmp\\_guidelines.html](http://www.epa.tas.gov.au/assessment_dpmp_guidelines.html)), which provides general information on preparing a DPMP.

This document identifies the key issues that must be addressed in the Development Proposal and Environmental Management Plan (DPMP) for DTK Logging Pty Ltd proposed Gundagai Quarry expansion.

## 1. General

- In addition to the matters stipulated in Section 2.1 of the DPEMP General Guidelines the DPEMP must contain the following:
- Location and dimension of all dams;
  - A description of the resource and the quantities of materials to be extracted and processed on an annual basis;
  - Assess the potential for acid and metalliferous drainage (AMD) across the site, including a description of the lithology, including mineralogy, with particular reference to the likely presence of sulphide minerals, e.g. pyrite;
  - A description of known AMD on site and current measures to mitigate this drainage;
  - Identify if there are clay resources on site that could be used for encapsulation of potentially acid forming material if required;
  - Expected quarry life;
  - Description of chosen quarrying method(s) and processing of target material, including all major items of equipment to be used (e.g. crushers, screens, rock breakers, dozers, haulage trucks, drill etc);

**2.1 Project Outline**

The following DPEMP requirements are in addition to the requirements of the DPEMP General Guidelines. These additional requirements are grouped under the relevant section number corresponding to the DPEMP General Guidelines. As a quarrying development, the activity should comply with environmental guidelines listed in the *Quarry Code of Practice*.

**4. Detailed requirements for the DPEMP**

Key Issue	Survey requirements for DPEMP	Other studies for DPEMP	Relevant section of DPEMP General Guidelines
1. Noise	Noise from on-site activities	Modelling to determine the 30, 35, 40 and 45 dB(A) noise contours.	4.4
2. Blasting	A ground vibration and air blast overpressure prediction report including modelling of predicted vibration contours	Modelling to determine the 110, 115 and 120dB(Lin Peak) air blast over pressure contours. Modelling to determine the 2.5, 5, 7.5 and 10mm/s peak particle velocity contours.	4.4
3. Rehabilitation	A Rehabilitation Management Plan should be included.		6.0

The following surveys and studies will be required as part of the DPEMP in relation to the key issues. The relevant sections of the DPEMP General Guidelines are also identified.

**3. Survey and study requirements**



In addition to the matters stipulated in Section 3.1 of the DPMP General Guidelines the Launceston City Council has requested that the DPMP must contain the following:

- Any new buildings or structures required for the expansion needs to be documented with justification against the assessment criteria of clause 26.4.1 of the Rural Resource zone of the Launceston Interim Scheme 2012.
- Acceptable documentation would include:
  - Site plan showing title boundaries, north point, slope, vegetation, watercourses and other significant features, accesses, existing buildings and structures and proposed buildings and structures including setbacks from boundaries and extent of earthworks required.
  - Floor Plan - showing indicative internal layout of new buildings
  - Elevation Plans - showing what the new buildings or structures look like from all sides including heights, exterior finish and changes to the ground level.
  - Sections - required where significant level changes are proposed.
  - Planning statement
- To address the Rural Resource zone objectives concerning fettering of agricultural land, details of the land's agricultural capability is required. Specification of what class the land is in accordance with the Land Capability Handbook, Land Capability Survey of Tasmania, Department of Primary Industry, Tasmania is sufficient, where the land is not

**3.1 Planning Aspects**

In addition to the matters stipulated in Section 2.2 of the DPMP General Guidelines the DPMP must contain the following:

- A map showing the location of the mining lease.
- A detailed quarry plan, which includes the current working area and the proposed extensions. The plan should include, but not necessarily be limited to; the direction of quarrying, bench heights, working face(s), location of all major items of equipment (e.g. crushing machinery/rock breakers etc), location of rock dumps, product storage areas, sediment treatment ponds and internal haul roads.
- Plans should be provided for selected periods during the quarry life, and demonstrate the resource will be extracted in a systematic manner that will minimise the area of disturbance and allow for progressive rehabilitation of the site.
- Detailed plans and description of the site drainage, including principle discharge points from the activity to the receiving environment, natural drainage features, overflow paths (i.e. direction of run-off), all drains, proposed stream diversions, new dams, and alterations to existing dams.
- Location of any historical workings which may affect quarry planning.

**2.2 Site Plan**

In addition to the matters stipulated in Section 2.1.2 of the DPMP General Guidelines the DPMP must contain the following:

- Measures to prevent or mitigate impacts from erosion and transport of sediment resulting from removal of vegetation, construction and alteration to dams and drains, and any other works.

**2.1.2 Construction phase**

In addition to the matters stipulated in Section 2.1.2 of the DPMP General Guidelines the DPMP must contain the following:

prime agricultural land. Where the land is classed as prime agricultural land, justification against P2.1 of the clause 26.3.1 of the Launceston Interim Planning Scheme 2012 is required which should detail how the area of land converted for the use has been minimised.

**4.1 Air Emissions**

In addition to the matters stipulated in Section 4.1 of the DPMP General Guidelines the DPMP must contain the following:

- Identify and characterise all potential sources of dust emissions from the site during quarrying activities. This should include dust generated during soil removal and stockpiling, rock crushing and screening, loading trucks and traffic movements on and off site.
- Identify and characterise likely atmospheric emissions from the plant including any diesel generator and any mobile plant equipment associated with the activity.
- Describe potential emissions associated with transport of raw material from the site.
- Provide an assessment of the potential for the identified emissions to cause environmental nuisance and health effects beyond the site boundaries.
- Describe any measures to be implemented to minimise the above impacts, such as watering or sealing roads, covering of truck loads, reduced vehicle speed, road surfacing/maintenance details, enclosures, water sprays, or windbreaks, revegetation/stabilisation. Management of effects caused by adverse weather conditions should also be considered.

**4.2 Liquid Waste**

In addition to the matters stipulated in Section 4.2 of the DPMP General Guidelines the DPMP must contain the following:

- Measures to prevent transport of sediment off site in stormwater runoff, including measures to reduce the potential for surface and gully erosion;
- An estimation of runoff volume, detention capacity/time of all sediment ponds, and proposed sediment pond maintenance. Sediment pond design capacities should be compared to likely storm events.
- Provide a summary of past water quality monitoring data, and possible triggers to warn of potential AMD.
- Provide a description of measures to mitigate and manage possible AMD.
- Confirm whether there are any nearby groundwater uses.

**4.4 Noise emissions**

In addition to the matters stipulated in Section 4.4 of the DPMP General Guidelines the DPMP must contain the following:

- Proposed operating hours.
- Current and future proposed site layout including any attenuating structures and/or topography and the locations of all significant noise sources.
- All major sources of noise on the land must be identified and described. Potential noise sources include: rock drill(s), rock breaker(s), crusher(s), screener(s), and handling of material (e.g. loading and transportation of the material within the land)
- A description of the potential for noise generation resulting from transportation of material off the land must be provided.

- A description of land use and ownership in the vicinity of the site and those areas which may be affected by the proposal. Noise sensitive areas relevant to the project must be identified and documented on a map extending an appropriate distance from the centre of the proposed development (show all houses within 1.2km of the quarry boundary).
- Any proposed measures to mitigate noise impacts should be described.
- Proposed blasting details, including typical blast plan, blast size and intended blast frequency.
- Provide historic blast records for the quarry, including:
  - dates of historic blasts
  - air blast overpressure and ground vibration measurements;
  - blast monitor position;
  - blast hole loading;
  - location of the blast within the quarry;
  - initial records.

**4.7 Biodiversity and nature conservation values**

- In addition to the matters stipulated in Section 4.7 of the DPMP General Guidelines the DPMP must contain the following:
- Measures designed to prevent the introduction or spread of introduced plant species, weeds, pests and diseases (such as *Phytophthora cinnamomi*) during operation.
  - Assess the ecological values in the area proposed for expansion, including all areas that will likely be disturbed. This should include assessment of any impacts to the class 4 stream that has been marked for diversion.
  - A review of the current Weed and Hygiene Plan must be undertaken, and altered accordingly to incorporate the proposed areas for expansion. The Plan should include measures aimed at ensuring that any rehabilitation works are weed free.

**4.12 Visual**

- In addition to the matters stipulated in Section 4.12 of the DPMP General Guidelines the Launceston City Council has requested the DPMP must contain the following:
- Whilst the site is not located within an identified scenic management area, the Rural Resource zone objectives of the Launceston Interim Scheme 2012 (clause 26.1.3 and clause 26.3.1, P1.1) requires that the visual impact of the use be appropriately managed to integrate with the surrounding rural landscape. To address this objective, the proposal's visual impact in the landscape and any mitigation measures to address that visual impact needs to be detailed.

**4.17 Traffic**

- Plans or diagrams depicting the proposed means of access to and from the Gundagai Quarry.
- Proposed or anticipated haulage routes, maximum truck movement numbers and how the noise, dust and other impacts of these will be addressed.
- With the intensification proposed, the proposal will be subject to the Road and Railway Assets Code in the Launceston Interim Planning Scheme 2012. A Traffic Impact Assessment is required and must be prepared in accordance with the Traffic Impact Assessment Guidelines, Department of Infrastructure, Energy and Resources. Australian

guidelines and Australian standards are to be used for any required road or junction upgrades. The documentation should include proposed haulage routes, traffic movements (peak and typical), vehicle size (maximum and typical), and how traffic impacts will be addressed.

**6.0 Quarry closure and rehabilitation**

Due to the finite nature of quarrying operations and their susceptibility to external economic influences, quarry closure planning should commence before the operation commences. The DPEMP should contain sufficient detail to enable a bond to be established to protect the Crown from future liabilities in the event of unforeseen quarry closure or company failure.

In addition to the matters stipulated in Section 6.0 of the DPEMP General Guidelines the DPEMP must contain a conceptual Quarry Rehabilitation Management Plan for end-of-quarry life and/or premature quarry closure.

The plan should include details of the following:

- areas to be rehabilitated, both short term and long term;
- detail of planned program of progressive rehabilitation;
- site preparation including waste removal and topsoil and overburden recovery;
- seed mix and tube stock species to be used, planting density, fertilizer application rate and watering regime;
- revegetation maintenance;
- weed management;
- an implementation timetable for key aspects of the plan; and
- a reporting program to regularly advise the Director of the progress of the plan.

**PLANNING EXHIBITED DOCUMENTS**  
Ref. No: DA 0074/2015  
Date submitted: 09/05/2015  
Planning Administration:   
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**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

*Gundagi Quarry, Bangor - DPEMP*

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**Appendix B: LCC Planning Permit (DA0523/2009) and Permit Part B 7907**

## PLANNING PERMIT

This Is Not A Building Permit

APPLICATION NO: **DA0523/2009**  
PLANNING SCHEME: **LAUNCESTON PLANNING SCHEME 1996**

ADDRESS OF THE LAND:  
**337 GUNDAGAI ROAD, BANGOR**

THIS PERMIT ALLOWS:  
**LEVEL 2 ACTIVITY - EXTRACTIVE INDUSTRY - INCREASE PRODUCTION LIMITS OF EXISTING QUARRY (50,000M<sup>3</sup> PER ANNUM)**

### CONDITIONS:

---

#### 1. **ENDORSED PLANS**

The use and development must be carried out as outlined in the Gundagai Quarry Development Proposal and Environmental Management Plan (DPEMP) 2010, prepared by Trawmana Environmental Consultants, and attached to this permit and marked 'Attachment A' and Gundagai Quarry DPEMP supplement attached to this permit and marked 'Attachment B' to the satisfaction of the Planning Authority.

#### 2. **ENVIRONMENTAL PROTECTION AGENCY REQUIREMENTS**

Notwithstanding any other condition in this permit, the use and development must be carried out in accordance with Appendix 3 the Environmental Protection Agency decision dated 21 January 2011 (EPA reference 110448) and marked as 'Attachment C'.

#### 3. **NO ACCESS ONTO GUNDAGAI ROAD**

There is to be no access to or from the site for the purposes of or connection with an extractive activity, directly from Gundagai Road.

---

I certify that I have checked that the permit conditions for the application referred to as DA0523/2009 for 337 Gundagai Road BANGOR TAS 7267 correspond with the Decision of the Delegated Officer.

SIGNATURE FOR THE COUNCIL

**HARJINDER SINGH**  
**MANAGER PLANNING**

APPLICATION NO: **DA0523/2009**

DATE ISSUED: **21/03/2011**

**PAGE 1 OF 6**

## PLANNING PERMIT

### This Is Not A Building Permit

#### 4. SEALING OF TUNNEL ROAD (REQUIRED BY EPA)

This permit is not effective until the quarry access route has been sealed from the corner located at  $41^{\circ} 11' 31.43''S$   $147^{\circ} 09' 38.08''E$  through to the entrance of residence G as depicted on Plate 2 of the *Development Proposal and Environmental Management Plan, Gundagai Quarry, 2010* and marked 'Attachment D.'

The road shall be upgraded and have a sealed width of 6.0 metres comprising of 2 x 3.09 metre lanes, with 1.0 metre wide gravel shoulders. That section of road falling outside the existing extent of Tunnel Road which is presently maintained by the Council shall be maintained by the operator of the quarry for the duration of the quarry operation unless Council accepts maintenance responsibility for that portion of the road and must be maintained to the satisfaction of the Director Infrastructure Services to ensure that the seal remains intact for the purpose of reducing dust and noise emissions arising from the traffic associated with the quarry operation.

#### 5. UPGRADE AND MAINTENANCE OF PUBLIC ROADS

Prior to the increase in production, Tunnel Road shall be upgraded to a sealed width of 6.0 metres being comprised of 2 x 3.0 metre lanes with 1.0 metre wide shoulders.

- (i) The extent of the upgrade shall be from the intersection with Gundagai Road west for a distance of 630 metres, representing the existing extent of the western most edge of the dust seal associated with the dwelling at 480 Tunnel Road.
- (ii) The section of Tunnel Road between Gundagai Road and Bacala Road shall be reconstructed to a width of 8.0m - this consists of 2 x 3.0 metre trafficable lanes and 1.0 metre wide shoulders. The reconstruction shall be suitable to allow Council to immediately seal the pavement.

---

I certify that I have checked that the permit conditions for the application referred to as DA0523/2009 for 337 Gundagai Road BANGOR TAS 7267 correspond with the Decision of the Delegated Officer.

SIGNATURE FOR THE COUNCIL

**HARJINDER SINGH**  
**MANAGER PLANNING**

APPLICATION NO: **DA0523/2009**

DATE ISSUED: **21/03/2011**

**PAGE 2 OF 6**

## PLANNING PERMIT

### This Is Not A Building Permit

- (iii) The operator of the quarry shall ensure vehicles carrying quarry material shall not use the section of Tunnel Road between Bacala Road and Golconda Road.
- (iv) That the operator agrees in writing and pays as an annual charge a sum of \$6,500 (indexed annually by C.P.I. [Transportation Index]) as a contribution to the cyclic resealing of the trafficable pavement.

### 6. SUBMISSION AND APPROVAL OF PLANS (UPGRADE OF TUNNEL ROAD)

Prior to the commencement of the development of the site, detailed plans and specifications shall be submitted to the Director Infrastructure Services for approval. Such plans and specifications shall:

- (a) Include all infrastructure works required by the permit or shown in the endorsed plans and specifications;
- (b) be prepared strictly in accordance with the Council's Subdivision – Design & Administration Guidelines applicable at the date of approval of the plans
- (c) be prepared by a suitably qualified and experienced engineer or Engineering Consultancy
- (d) be accompanied by:
  - an estimate of the construction cost of the future public works together with a schedule of the major components and their relevant costs; and
  - a fee of 1.5% of the public works estimate (or a minimum of \$250). Such fee covers assessment of the plans and specifications, audit inspections and Practical Completion & Final inspections.

### 7. SOIL AND WATER MANAGEMENT WORKS

Prior to the commencement of the development works a Soil and Water Management Plan, including all works to manage erosion and sediment, must be prepared and submitted to the Director of Infrastructure Services for approval.

---

I certify that I have checked that the permit conditions for the application referred to as DA0523/2009 for 337 Gundagai Road BANGOR TAS 7267 correspond with the Decision of the Delegated Officer.

SIGNATURE FOR THE COUNCIL

**HARJINDER SINGH**  
**MANAGER PLANNING**

APPLICATION NO: **DA0523/2009**

DATE ISSUED: **21/03/2011**

**PAGE 3 OF 6**



## PLANNING PERMIT

### This Is Not A Building Permit

Once approved, implementation of the soil and water management works in accordance with the approved Soil and Water Management Plan must be certified as compliant by a suitably qualified engineer.

The soil and water management works are to be maintained on the site until such time as the site has re-vegetated sufficiently to mitigate erosion and sediment transport. Removal of the soil and water management works must be approved by a suitably qualified engineer.

#### 8. CONSTRUCTION OF WORKS (UPGRADE OF TUNNEL ROAD)

Private and public infrastructure works shall be constructed in accordance with plans and specification approved by the Director Infrastructure Services.

The required infrastructure works are as shown in the application documents and endorsed plans. They include:

##### A. Roads

- (i). Upgrade of the existing construction of Tunnel Road for a length of 630 metres west from the intersection with Gundagai Road to have a sealed width of 6.0 metres being comprised of 2 x 3.0 metre lanes with 1.0 metre wide shoulders.
- (ii). Re-sheeting of upgraded length of Tunnel Road  
*Refer to Clauses 3, 5-13 inclusive & 18 of the document Subdivision – Design & Administration Guidelines.*

All construction works shall be undertaken in accordance with the Council document: *Subdivision – Audit & Construction Guidelines*. These Guidelines specify:

- Construction requirements,
- Appointment of a suitably qualified Supervising Engineer to supervise and certify construction works, arrange Council Audit inspections and other responsibilities,
- Construction Audit inspections,
- Practical Completion and after a 12 months defects liability period the Final Inspection & Hand-Over.

---

I certify that I have checked that the permit conditions for the application referred to as DA0523/2009 for 337 Gundagai Road BANGOR TAS 7267 correspond with the Decision of the Delegated Officer.

SIGNATURE FOR THE COUNCIL

**HARJINDER SINGH**  
**MANAGER PLANNING**

APPLICATION NO: **DA0523/2009**

DATE ISSUED: **21/03/2011**

**PAGE 4 OF 6**

## PLANNING PERMIT

This Is Not A Building Permit

### 9. LAPSING OF PERMIT

This permit lapses after a period of two years from the date of granting of this permit if the use or development has not substantially commenced within that period.

### Notes

#### Guidelines

A. *The Subdivision - Design & Administration Guidelines are available on Council's website [www.launceston.tas.gov.au](http://www.launceston.tas.gov.au)*

#### Restrictive Covenants

B. *Council does not enforce restrictive covenants that contradict the Launceston Planning Scheme 1996. However, if the proposal is non-compliant with any restrictive covenants, those restrictive covenants should be removed from the title prior to construction commencing or the owner will carry the liability of potential legal action in the future.*

#### Other Approvals

C. *This permit does not imply that any other approval required under any other by-law or legislation has been granted. At least the following additional approvals may be required:*

- (a) *building permit*
- (b) *plumbing permit*
- (c) *on-site effluent disposal system*
- (d) *mining lease*
- (e) *EPA conditions*

#### Objections to Proposal

D. *This permit has no effect until the expiry of the period for the lodgement of an appeal against the granting of the permit or, if an appeal is lodged, until ten days after the appeal has been determined by the Resource Management and Planning Appeal Tribunal.*

---

I certify that I have checked that the permit conditions for the application referred to as DA0523/2009 for 337 Gundagai Road BANGOR TAS 7267 correspond with the Decision of the Delegated Officer.

SIGNATURE FOR THE COUNCIL

**HARJINDER SINGH**  
**MANAGER PLANNING**

APPLICATION NO: **DA0523/2009**

DATE ISSUED: **21/03/2011**  
**PAGE 5 OF 6**

## **PLANNING PERMIT**

This Is Not A Building Permit

### Appeal Provisions

*E. Attention is directed to Sections 61 and 62 of the Land Use Planning and Approvals Act 1993 (as amended) which relate to appeals. These provisions should be consulted directly, but the following provides a guide as to their content:*

*A planning appeal shall be instituted by lodging a notice of appeal with the Clerk of the Resource Management and Planning Appeal Tribunal.*

*A planning appeal shall be instituted within 14 days of the date the Corporation serves notice of the decision on the applicant.*

### Permit Commencement

*F. This permit takes effect 14 days after the date of Council's notice of determination or at such time as any appeal to the Resource Management and Planning Appeal Tribunal is abandoned or determined. If an applicant is the only person with a right of appeal pursuant to section 53(1b) of the Land Use Planning and Approvals Act 1993 and wishes to commence the use or development for which the permit has been granted within that 14 day period, the Council must be so notified in writing.*

---

I certify that I have checked that the permit conditions for the application referred to as DA0523/2009 for 337 Gundagai Road BANGOR TAS 7267 correspond with the Decision of the Delegated Officer.

**SIGNATURE FOR THE COUNCIL**

**HARJINDER SINGH  
MANAGER PLANNING**

**APPLICATION NO: DA0523/2009**

**DATE ISSUED: 21/03/2011**

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## PERMIT PART B

### PERMIT CONDITIONS - ENVIRONMENTAL No. 7907

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Issued under the *Environmental Management and Pollution Control Act 1994*

**Applicant:**           **DTK LOGGING PTY LTD**  
                              **ACN 081 330 547**  
                              **14 DOAKS RD**  
                              **LILYDALE TAS 7268**

**Activity:**           **The operation of a quarry and crusher, grinding, milling and separating**  
                              **(ACTIVITY TYPE: Crushing, grinding, milling or separating into different**  
                              **sizes (rocks, ores or minerals))**  
                              **GUNDAGAI ROAD PIT, GUNDAGAI RD**  
                              **TUNNEL TAS 7268**

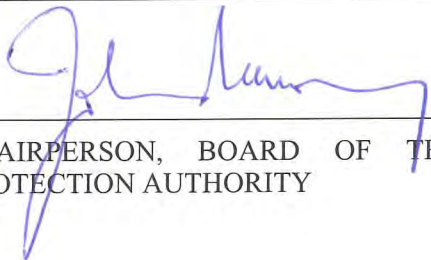
The above activity has been assessed as a level 2 activity under the *Environmental Management and Pollution Control Act 1994*.

Acting under Section 25(5)(a)(i) of the EMPCA, the Board of the Environment Protection Authority has required that this Permit Part B be included in any Permit granted under the *Land Use Planning and Approvals Act 1993* with respect to the above activity.

**Municipality:**                           **LAUNCESTON**  
**Permit Application Reference:**       **0523/2009**  
**EPA file reference:**                   **110448**

21 JAN 2011

Date conditions approved:

\_\_\_\_\_  
  
\_\_\_\_\_  
CHAIRPERSON, BOARD OF THE ENVIRONMENT  
PROTECTION AUTHORITY

Signed:

## DEFINITIONS

Unless the contrary appears, words and expressions used in this Permit Part B have the meaning given to them in **Schedule 1** of this Permit and in the EMPCA. If there is any inconsistency between a definition in the EMPCA and a definition in this Permit Part B, the EMPCA prevails to the extent of the inconsistency.

## ENVIRONMENTAL CONDITIONS

The person responsible for the activity must comply with the conditions contained in **Schedule 2** of this Permit Part B.

## INFORMATION

Attention is drawn to **Schedule 3**, which contains important additional information.



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*Attachments*

- Attachment 1: Attachment 1 - Gundagai Quarry - The Land (modified: 13/01/2011 12:44)..... 1 page  
Attachment 2: Attachment 2 - Gundagai Quarry - Commitments (modified: 13/01/2011 12:45)....3 pages

### Schedule 1: Definitions

In this Permit Part B:-

**Aboriginal Relic** has the meaning described in section 2(3) of the *Aboriginal Relics Act 1975*

**Activity** means any environmentally relevant activity (as defined in Section 3 of EMPCA) to which this document relates, and includes more than one such activity.

**Authorized Officer** means an authorized officer under section 20 of EMPCA

**Control Location (Noise)** means a location chosen to represent the general ambient sound without contribution from noise sources at the activity.

**Director** means the Director, Environment Protection Authority holding office under Section 18 of EMPCA and includes a person authorised in writing by the Director to exercise a power or function on the Director's behalf.

**EMPCA** means the *Environmental Management and Pollution Control Act 1994*

**Environmental Harm and Material Environmental Harm and Serious Environmental Harm** each have the meanings ascribed to them in Section 5 of EMPCA

**Environmental Nuisance and Pollutant** each have the meanings ascribed to them in Section 3 of EMPCA

**Environmentally Hazardous Material** means any substance or mixture of substances of a nature or held in quantities which present a reasonably foreseeable risk of causing serious or material environmental harm if released to the environment and includes fuels, oils, waste and chemicals.

**Noise Sensitive Premises** means residences and residential zones (whether occupied or not), schools, hospitals, caravan parks and similar land uses involving the presence of individual people for extended periods, except in the course of their employment or for recreation.

**Person Responsible** is any person who is or was responsible for the environmentally relevant activity to which this document relates and includes the officers, employees, contractors, joint venture partners and agents of that person, and includes a body corporate.

**Quarry Code Of Practice** means the document of this title published by the Department of Primary Industries, Water and Environment and the Department of Infrastructure, Energy and Resources in June 1999, and includes any subsequent versions of this document.

**Stormwater** means water traversing the surface of the land as a result of rainfall.

**The Land** means the land on which the activity to which this document relates may be carried out, and includes: buildings and other structures permanently fixed to the land, any part of the land covered with water, and any water covering the land. The Land falls within the area defined by:

- 1 Mining Lease 1676/PM, or subsequent variation to the lease or easements, as approved by the Minister of Mines, and
- 2 plan shown as attachment 1.

**Wastewater** means spent or used water (whether from industrial or domestic sources) containing a pollutant and includes stormwater which becomes mixed with wastewater.



PCE 7907 (r1)

6/20

**Weed** means a declared weed as defined in the *Weed Management Act 1999*.



21 JAN 2011

## Schedule 2: Conditions

### Maximum Quantities

#### **Q1 Regulatory limits**

- 1 The activity must not exceed the following limits:
  - 1.1 50,000 cubic metres/year of rocks, ores or minerals processed. (Annual permit and inspection fees are derived from this figure.)

### General

#### **G1 Access to and awareness of conditions and associated documents**

A copy of these conditions and any associated documents referred to in these conditions must be held in a location that is known to and accessible to the person responsible for the activity. The person responsible for the activity must ensure that all persons who are responsible for undertaking work on The Land, including contractors and sub-contractors, are familiar with these conditions to the extent relevant to their work.

#### **G2 Incident response**

If an incident causing or threatening environmental nuisance, serious environmental harm or material environmental harm from pollution occurs in the course of the activity, then the person responsible for the activity must immediately take all reasonable and practicable action to minimise any adverse environmental effects from the incident.

#### **G3 No changes without approval**

- 1 The following changes, if they may cause or increase the emission of a pollutant which may cause material or serious environmental harm or environmental nuisance, must only take place in relation to the activity if such changes have been approved in writing by the EPA Board following its assessment of an application for a permit under the *Land Use Planning and Approvals Act 1993*, or approved in writing by the Director:
  - 1.1 a change to a process used in the course of carrying out the activity; or
  - 1.2 the construction, installation, alteration or removal of any structure or equipment used in the course of carrying out the activity; or
  - 1.3 a change in the quantity or characteristics of materials used in the course of carrying out the activity.

#### **G4 Change of ownership**

If the person responsible for the activity is not the owner of The Land upon which the activity is carried out and the owner of The Land changes or is to change, then, as soon as reasonably practicable but no later than 30 days after becoming aware of the change, the person responsible must notify the Director in writing of the change of ownership.

#### **G5 Environmental Management Plan and review thereof**

- 1 Unless otherwise specified in writing by the Director, an Environmental Management Plan - Operations ('EMP Operations') for the activity must be submitted to the Director by whichever of the following dates occurs first and at five yearly intervals thereafter:
  - 1.1 In the case of the Director having approved a previous Environmental Management Plan, the fifth anniversary of the date of that approval;
  - 1.2 The fifth anniversary of the date on which these conditions take effect; or
  - 1.3 A date specified in writing by the Director.

- 2 The EMP Operations must include a statement by the General Manager, Chief Executive Officer or equivalent for the activity acknowledging the contents of the EMP Operations.
- 3 The EMP Operations must detail the potential environmental impacts arising from the ongoing operation of the activity over the next 5 years, including a strategic consideration of potential changes to the activity during that period and consideration of opportunities to implement continuous improvement.
- 4 The EMP Operations must separately identify specific commitments, with actions and timeframes, to mitigate or prevent the identified potential environmental impacts. In preparing the EMP Operations the person responsible must take into account the contents of any previous annual environmental reviews including complaints, incidents and monitoring data.
- 5 If the Director issues guidelines for preparation of the EMP Operations, the EMP Operations must address the matters listed in those guidelines.

**G6 Quarry Code of Practice**

Unless otherwise required by these conditions or required in writing by the Director, the activity (or activities) undertaken on The Land must comply with the Acceptable Standards provisions of the *Quarry Code of Practice*.

**G7 Commitments**

The activity must be carried out in accordance with the commitments contained in Attachment 2 unless otherwise specified in these conditions or unless otherwise approved in writing by the Director.

**G8 Management of Acid Drainage**

The previously rehabilitated area to the east of the quarry is not to be disturbed.

**G9 Complaints register**

- 1 A public complaints register must be maintained and made available for inspection by an Authorized Officer upon request. The public complaints register must, as a minimum, record the following detail in relation to each complaint received in which it is alleged that environmental harm (including an environmental nuisance) has been caused by the activity:
  - 1.1 the time at which the complaint was received;
  - 1.2 contact details for the complainant;
  - 1.3 the subject-matter of the complaint;
  - 1.4 any investigations undertaken with regard to the complaint; and
  - 1.5 the manner in which the complaint was resolved, including any mitigation measures implemented.
- 2 Complaint records must be maintained for a period of at least 3 years.

**Atmospheric**

**A1 Control of dust emissions**

Dust emissions from The Land must be controlled to the extent necessary to prevent environmental nuisance.

**A2 Control of dust emissions from plant**

- 1 Dust produced by the operation of all crushing and screening plant must be controlled by the use of one or more of the following methods to the extent necessary to prevent environmental nuisance:

- 1.1 the installation of fixed water sprays at all fixed crushers and at all points where crushed material changes direction due to belt transfer;
- 1.2 the installation of dust extraction equipment at all fixed crushers and at all points where crushed material changes direction due to belt transfer, and the incorporation of such equipment with all vibrating screens;
- 1.3 the enclosure of the crushing and screening plant and the treatment of atmospheric emissions by dust extraction equipment; and
- 1.4 any other method that has been approved in writing by the Director.

### A3 Covering of vehicles

Vehicles carrying loads containing material which may blow or spill must be equipped with effective control measures to prevent the escape of the materials from the vehicles when they leave The Land or travel on public roads. Effective control measures may include tarpaulins and load dampening.

## Blasting

### B1 Blasting times

Blasting on The Land must take place only between the hours of 1000 hours and 1600 hours Monday to Friday. Blasting must not take place on Saturdays, Sundays or public holidays unless prior written approval of the Director has been obtained.

### B2 Blasting - noise and vibration limits

- 1 Blasting on The Land must be carried out in accordance with blasting best practice environmental management (BPEM) principles, and must be carried out such that, when measured at the curtilage of any residence (or other noise sensitive premises) in other occupation or ownership, air blast and ground vibration comply with the following:
  - 1.1 for 95% of blasts, air blast over pressure must not exceed 115dB (Lin Peak);
  - 1.2 air blast over pressure must not exceed 120dB (Lin Peak);
  - 1.3 for 95% of blasts ground vibration must not exceed 5mm/sec peak particle velocity; and
  - 1.4 ground vibration must not exceed 10mm/sec peak particle velocity.
- 2 All measurements of airblast overpressure and peak particle velocity must be carried out in accordance with the methods set down in *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration*, Australian and New Zealand Environment Council, September 1990.

### B3 Notification of blasting

- 1 All residents within a 1 km radius of a blast must be notified prior to that blast. This notification must be given at least 24 hours before such blasting is due to occur. In the event that the blast(s) cannot take place at the time specified, or as a result of blasting misfires, the responsible person must advise all those residents within 1 km of the activities on the land of the revised time at which blasting will take place.
- 2 The Director must be notified on each occasion prior to blasting on The Land. This notification must be given as early as possible, but at least 24 hours before blasting is due to occur.
- 3 In the event that the blasting noise limits and vibration specified above are exceeded, the Director must be notified within 48 hours of the blasting event.

#### **B4 Blast Management Plan**

- 1 A Blast Management Plan must be submitted to the Director for approval prior to any blasting on The Land. The Blast Management Plan must be in a format approved by the Director and must include, without limitation, the following
  - 1.1 Location and schedule of Blasting;
  - 1.2 Potential Impacts;
  - 1.3 Details of customer contact liaison officer, blast controller, notification list and Insurance details;
  - 1.4 Preparation and purpose of plan;
  - 1.5 Blasting procedure, types of explosives, initiation systems;
  - 1.6 Storage and handling of dangerous Goods;
  - 1.7 Risk Assessment and Auditing;
  - 1.8 A monitoring program including the frequency and parameters to be measured and a blast monitoring location map;
  - 1.9 Incident Reporting
- 2 In the event that the Director, by notice in writing to the person responsible, either approves a minor variation to the approved plan or approves a new plan in substitution for the plan originally approved, the person responsible must implement and act in accordance with the varied plan or the new plan, as the case may be.

#### **Decommissioning And Rehabilitation**

##### **DC1 Notification of cessation**

Within 30 days of becoming aware of any event or decision which is likely to give rise to the permanent cessation of the activity, the person responsible for the activity must notify the Director in writing of that event or decision. The notice must specify the date upon which the activity is expected to cease or has ceased.

##### **DC2 Stockpiling of surface soil**

Prior to commencement of extractive activities on any portion of The Land all surface soils must be removed and stockpiled for later use in rehabilitation of The Land. Topsoil must be kept separate from other overburden and protected from erosion or other disturbance.

##### **DC3 Progressive rehabilitation**

Worked out or disused sections of The Land must be rehabilitated concurrently with extractive activities on other sections of The Land. Progressive rehabilitation must be carried out in accordance with the relevant provisions of the *Quarry Code of Practice*, unless otherwise approved in writing by the Director. The maximum disturbed area of land which may remain, at any time, without rehabilitation is two hectares.

##### **DC4 Rehabilitation on cessation**

- 1 Unless otherwise approved in writing by the Director, rehabilitation upon permanent cessation of the activity must be undertaken in accordance with relevant provisions of the *Quarry Code of Practice* and in accordance with the following:
  - 1.1 rehabilitation earthworks must be substantially completed within 12 months of cessation of the activity; and
  - 1.2 rehabilitated areas must be monitored and maintained for a period of at least three years after rehabilitation works have been substantially completed, after which time the person responsible for the activity may apply in writing to the Director for a written statement that rehabilitation has been successfully completed.

## DC5 Suspension of activity

- 1 During temporary suspension of the activity:
  - 1.1 The Land must be managed and monitored by the person responsible for the activity to ensure that emissions from The Land do not cause serious environmental harm, material environmental harm or environmental nuisance; and
  - 1.2 If required by the Director, the person responsible must prepare and implement a Care and Maintenance Plan to the satisfaction of the Director.
- 2 Unless otherwise approved in writing by the Director, if the activity on The Land has substantially ceased for 2 years or more, rehabilitation of The Land must be carried out in accordance with the requirements of these conditions as if the activity has permanently ceased.

## Effluent

### Effluent Disposal

#### E1 Perimeter drains

- 1 Perimeter cut-off drains must be constructed at strategic locations on The Land to prevent surface run-off from entering the area used or disturbed in carrying out the activity. All reasonable measures must be implemented to ensure that sediment transported along these drains remains on The Land. Such measures may include provision of strategically located sediment fences, appropriately sized and maintained sediment settling ponds, vegetated swales, detention basins and other measures designed and operated in accordance with the principles of Water Sensitive Urban Design.
- 2 Drains must have sufficient capacity to contain run-off that could reasonably be expected to arise during a 1 in 20 year rainfall event. Maintenance activities must be undertaken regularly to ensure that this capacity does not diminish.

#### E2 Stormwater

- 1 Polluted stormwater that will be discharged from The Land must be collected and treated prior to discharge to the extent necessary to prevent serious or material environmental harm, or environmental nuisance.
- 2 Notwithstanding the above, all stormwater that is discharged from The Land must not carry pollutants such as sediment, oil and grease in quantities or concentrations that are likely to degrade the visual quality of any receiving waters outside the Land.
- 3 All reasonable measures must be implemented to ensure that solids entrained in stormwater are retained on The Land. Such measures may include appropriately sized and maintained sediment settling ponds or detention basins.

## Hazardous Substances

### H1 Spill kits

Spill kits appropriate for the types and volumes of materials handled on The Land, and which may include relocatable (temporary) bunds, must be kept in appropriate locations to assist with the containment of spilt environmentally hazardous materials.

### H2 Storage and handling of hazardous materials

Unless otherwise approved in writing by the Director, each environmentally hazardous material held on The Land, including chemicals, fuels and oils, must, as far as practical and to the satisfaction of the Director, be located within impervious bunded areas or spill trays which are designed to contain at least 110% of the volume of the largest container.

## Legal Obligations

### Noise Control

#### **N1 Operating hours**

- 1 Unless otherwise approved by the Director, activities associated with the extraction of rock, gravel, sand, clay or minerals, and loading of product, and screening/crushing must not be undertaken outside the hours of 0700 hours to 1900 hours on weekdays and 0800 hours to 1600 hours on Saturdays.
- 2 Notwithstanding the above paragraph, activities must not be carried out on Sundays and public holidays that are observed Statewide (Easter Tuesday excepted).

#### **N2 Noise emission limits**

- 1 Noise emissions from the activity when measured at any noise sensitive premises in other ownership and expressed as the equivalent continuous A-weighted sound pressure level must not exceed:
  - 1.1 46 dB(A) between 0700 hours and 1800 hours (Day time); and
  - 1.2 40 dB(A) between 1800 hours and 2200 hours (Evening time); and
  - 1.3 35 dB(A) between 2200 hours and 0700 hours (Night time).
- 2 Where the combined level of noise from the activity and the normal ambient noise exceeds the noise levels stated above, this condition will not be considered to be breached unless the noise emissions from the activity are audible and exceed the ambient noise levels by at least 5 dB(A).
- 3 The time interval over which noise levels are averaged must be 10 minutes or an alternative time interval specified by the Director.
- 4 Measured noise levels must be adjusted for tonality, impulsiveness, modulation and low frequency in accordance with the Tasmanian *Noise Measurement Procedures Manual*.
- 5 All methods of measurement must be in accordance with the Tasmanian *Noise Measurement Procedures Manual*, issued by the Director.

#### **N3 Noise survey requirements**

- 1 Unless otherwise approved by the Director, a noise survey must be carried out:
  - 1.1 within 90 days from the date on which these conditions take effect; and
  - 1.2 within six (6) months from the date of any notification under these conditions of a change to the activity which is likely to substantially alter the character or increase the volume of the noise emitted from The Land; and
  - 1.3 At such other times as may reasonably be required by the Director.

#### **N4 Noise survey methodology and reporting requirements**

- 1 Prior to undertaking a noise survey as required by these conditions, a proposed noise survey methodology must be submitted to the Director for approval.
- 2 Without limitation, the survey methodology must address the following:
  - 2.1 measurements must be carried out at day, evening and night times (where applicable) at each location; and
  - 2.2 measurement locations, and the number thereof, must be specified, with one location established as a control location (noise).
- 3 Measurements and data recorded during the survey must include:
  - 3.1 subjective descriptions of the sound at each location.
  - 3.2 details of meteorological conditions relevant to the propagation of noise.

- 3.3 the equivalent continuous ( $L_{eq}$ ) and  $L_{1,1}$ ,  $L_{10,10}$ ,  $L_{50,50}$ ,  $L_{90,90}$  and  $L_{99}$  A-weighted sound pressure levels measured over a period of 10 minutes or an alternative time interval specified by the Director;
- 3.4 one-third octave spectra over suitably representative periods of not less than 1 minute; and
- 3.5 narrow-band spectra over suitably representative periods of not less than 1 minute.
- 4 A noise survey report must be forwarded to the Director within 30 days from the date on which the noise survey is completed
- 5 The noise survey report must include the following:
  - 5.1 the results and interpretation of the measurements required by these conditions;
  - 5.2 a map of the area surrounding the activity with the boundary of The Land, measurement locations, and noise sensitive premises clearly marked on the map;
  - 5.3 any other information that will assist with interpreting the results and whether the activity is in compliance with these conditions and EMPCA; and
  - 5.4 recommendations of appropriate mitigation measures to manage any noise problems identified by the noise survey.

**N5 Drilling Noise Plan - Upper Western Bench**

- 1 Unless otherwise approved in writing by the Director, a technical report is to be submitted to the Director for approval prior to drilling of the upper western bench. The report must include:
  - 1.1 Proposed noise management measures;
  - 1.2 Modelling to demonstrate that the above noise limits can be achieved; and
  - 1.3 Details of measures to inform the community at least 1 week prior to commencement of drilling.
- 2 The person responsible must implement and act in accordance with the approved report.
- 3 In the event that the Director, by notice in writing to the person responsible, either approves a minor variation to the approved report or approves a new report in substitution for the report originally approved, the person responsible must implement and act in accordance with the varied report or the new report, as the case may be.

**Operations**

**OP1 Fire management**

- 1 Any fire occurring on The Land must immediately be reported to the Director.
- 2 Fires occurring on The Land must be extinguished as soon as practicable using all practicable means available.
- 3 The lighting of fires on The Land is not permitted.

**OP2 Weed management**

The Land must be kept substantially free of weeds to minimise the risk of weeds being spread through the transport of products from The Land.

**OP3 Weed and Pathogen Management Plan**

- 1 Unless otherwise approved in writing by the Director, within three months of commencement of the operations, or prior to clearing any vegetation, whichever is the sooner, a Weed and Plant Pathogen Management Plan must be submitted to the Director for approval. the Plan must include:
  - 1.1 measures to control the spread of *Phytophthora cinnamomi*; and
  - 1.2 measures to control weeds on the Land



2 The approved Plan must be implemented to the satisfaction of the Director.

### Schedule 3: Information

#### Legal Obligations

##### **LO1 Notification of incidents under section 32 of EMPCA**

- 1 A person responsible for an activity that is not a level 2 activity or a level 3 activity must notify the relevant Council, as soon as reasonably practicable but not later than 24 hours, after becoming aware of the release of a pollutant occurring as the result of any incident in relation to that activity, including an emergency, accident or malfunction, if this release causes or may cause an environmental nuisance.
- 2 A person responsible for an activity that is a level 2 activity or a level 3 activity must notify the Director, as soon as reasonably practicable but not later than 24 hours, after becoming aware of the release of a pollutant occurring as a result of any incident in relation to that activity, including an emergency, accident or malfunction, if this release causes or may cause an environmental nuisance.
- 3 A person responsible for an environmentally relevant activity must notify the Director, as soon as reasonably practicable but not later than 24 hours, after becoming aware of the release of a pollutant occurring as a result of any incident in relation to that activity, including an emergency, accident or malfunction, if this release causes or may cause serious or material environmental harm.
- 4 The Director can be notified by telephoning 1800 005 171 (a 24-hour emergency telephone number).
- 5 This notification can be faxed to the Director on 62 333 800, or delivered by hand.
- 6 Any notification given by a person in compliance with this section is not admissible in evidence against the person in proceedings for an offence or for the imposition of a penalty (other than proceedings in respect of the making of a false or misleading statement).
- 7 a person is required to notify the relevant Council or the Director of an incident despite the fact that to do so might incriminate the person or make the person liable to a penalty.
- 8 Any notification referred to in subsection (1), (2) or (3) must include details of the incident, its nature, the circumstances in which it occurred and any action that has been taken to deal with it.
- 9 For the purposes of subsections (1), (2) and (3):
  - 9.1 a person is not required to notify the relevant Council of an incident if the person has reasonable grounds for believing that the incident has already come to the notice of the Council
  - 9.2 a person is not required to notify the Director of an incident if the person has reasonable grounds for believing that the incident has already come to the notice of the Director;

##### **LO2 EMPCA**

The activity must be conducted in accordance with the requirements of the *Environmental Management and Pollution Control Act 1994* and Regulations thereunder. The conditions of this document must not be construed as an exemption from any of those requirements.

##### **LO3 Storage and handling of Dangerous Goods and Dangerous Substances**

- 1 The storage, handling and transport of dangerous goods and dangerous substances must comply with the requirements of relevant State Acts any regulations thereunder, including:

- 1.1 *Dangerous Goods (Safe Transport) Act 1998;*
- 1.2 *Dangerous Substances (Safe Handling) Act 2005;*
- 1.3 *Dangerous Goods (Road and Rail Transport) Regulations 1998;*
- 1.4 *Workplace Health and Safety Act 1995;* and
- 1.5 *Workplace Health and Safety Regulations 1998*

**LO4 Aboriginal relics requirements**

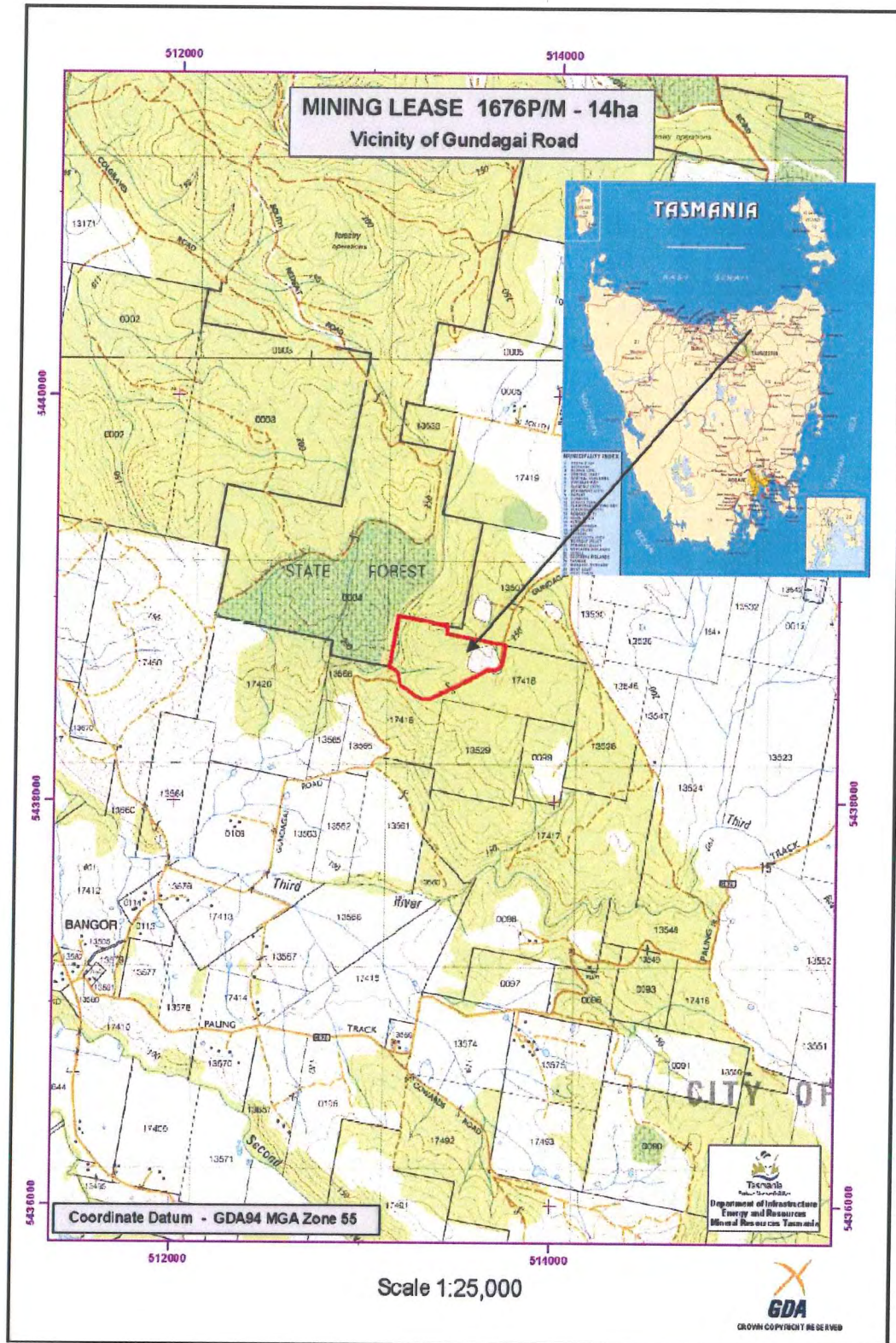
- 1 The *Aboriginal Relics Act 1975*, provides legislative protection to Aboriginal heritage sites in Tasmania regardless of site type, condition, size or land tenure. Section 14(1) of the Act states that; Except as otherwise provided in this Act, no person shall, otherwise than in accordance with the terms of a permit granted by the Minister on the recommendation of the Director:
  - 1.1 destroy, damage, deface, conceal or otherwise interfere with a relic;
  - 1.2 make a copy or replica of a carving or engraving that is a relic by rubbing, tracing, casting or other means that involve direct contact with the carving or engraving;
  - 1.3 remove a relic from the place where it is found or abandoned;
  - 1.4 sell or offer or expose for sale, exchange, or otherwise dispose of a relic or any other object that so nearly resembles a relic as to be likely to deceive or be capable of being mistaken for a relic;
  - 1.5 take a relic, or permit a relic to be taken, out of this State; or
  - 1.6 cause an excavation to be made or any other work to be carried out on Crown land for the purpose of searching for a relic.
- 2 If a relic is suspected and/or identified during works then works must cease immediately and the Tasmanian Aboriginal Land and Sea Council and the Aboriginal Heritage Office be contacted for advice before work can continue. In the event that damage to an Aboriginal heritage site is unavoidable a permit under section 14 of the *Aboriginal Relics Act 1975* must be applied for. The Minister may refuse an application for a permit, where the characteristics of the relics are considered to warrant their preservation.
- 3 Anyone finding an Aboriginal relic is required under section 10 of the Act to report that finding as soon as practicable to the Director of National Parks and Wildlife or an authorized officer under the *Aboriginal Relics Act 1975*. It is sufficient to report the finding of a relic to the Aboriginal Heritage Office to fulfil the requirements of section 10 of the Act.

**LO5 Change of responsibility**

If the person who is or was responsible for the activity ceases to be responsible for the activity, they must notify the Director in accordance with Section 45 of the EMPCA.

# ATTACHMENT 1

The Land – mining lease boundary 1676PM as shown below



*[Handwritten Signature]* 21 JAN 2011

## ATTACHMENT 2

### COMMITMENTS

(From Table 14 of supplement)

#### Dust emissions from quarry operations at the quarry

1. Operate water sprays on crushing equipment in dry and windy conditions. Water available from water quality control pond and primary sediment settling pond and transported using portable petrol motor powered water pump.
2. Progressive rehabilitation of quarry.
3. Minimal disturbance to landform surrounding quarry lease area.
4. Dampen gravel loads or tarpaulin covered.

The installation of appropriate spraying infrastructure (existing fire pump with hose and nozzle replaced with an overhead spray boom) will be carried out to ensure that this commitment to either cover or dampen every load is totally adhered to. Presently the existing water pump is sufficient to dampen every uncovered load and the boom has been designed and the company has the personnel, materials and infrastructure to build the boom; the boom will be connected to the existing pump and we have a reliable water supply at the quarry.

5. Trucks travelling east to travel on Bacala road to Golconda road.
6. Construction of bridge and gravelling on Colgraves road to enable truck access east from the quarry.
7. Dampening of internal access roads.
8. Improved road conditions to minimise dust emissions.

In addition to past mitigating measures the company further commits upon approval of a production increase to sealing the 220 metres from the last corner on Tunnel road5 (41° 11' 31.43"S 147° 09' 38.08"E) to the first residence (residence H) from the quarry existing western sealed dust sill (41° 11' 32.68"S 147° 09' 47.35"E) to minimise dust from truck movements in this area. This will be completed in conjunction with the sealing between the dust sills between residences G and H as shown on Plate 2 on page 21 of the DPEMP, as committed to by the company in the DPEMP.

#### Noise and vibration

9. No blasting within 14 days after a rainfall event >30 mm within a single 24 hour period.
10. Advise all residents within a one kilometre radius 24 hours prior to blasting activities.
11. Monitor blasting activities/respond to any complaints from nearby residences.
12. Minimise noise emissions from quarry processing activities by placing processing equipment in lower quarry pit areas and by frequent and appropriate maintenance of equipment.
13. Maintain vegetation barriers to the east and progressively rehabilitate eastern benches.
14. Plantation harvesting will be progressive to ensure an effective noise/dust and visual barrier in that direction.
15. Monitor environmental noise emissions quarterly for the first year and annually after that.
16. Blasting will be avoided when atmospheric inversions are present and when the prevailing wind direction is from the west.
17. Any significant changes to quarry operations will result in noise modelling to ensure noise emissions remain within limits.
18. During drilling on the upper western bench (current quarry level), noise emissions are likely to exceed any specified emission limit. A minimum of 8 dBA reduction in predicted noise emissions from the drill rig would be required to meet a noise limit of 46 dBA. Such a reduction is possible by shrouding the drill head. Shrouded drill rigs are currently available and such a unit will be sort for this phase of the quarry's development. If not practicable then shrouding of an existing rig will be explored.
19. Charge mass/delay will be capped at 46 kg. Stemming height will be no less than 3 m and burden for face blasts no less than 3 m.



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20. Adherence to Noise and Blasting Management Plans.

**Quarry closure and rehabilitation**

21. Ongoing progressive rehabilitation of used quarry areas.

22. Decommissioning of quarry upon closure.

**Erosion**

23. Implement Plan of Works in Progressive Rehabilitation Plan upon quarry closure.

**POTENTIAL PHYSICAL ENVIRONMENTAL IMPACT**

**Erosion**

24. Rehabilitate and revegetate any areas disturbed during the quarry expansion and associated infrastructure by re-using top soil stock piled during operations and monthly monitoring of these areas for the first twelve months.

25. Direct stormwater runoff into the water quality control pond on the site to slow the water flow rate to prevent erosion of the landform.

26. Construction of sediment barriers on drainage line from quarry to water quality control pond to slow water flow velocity and to trap sediment.

**Noise**

27. Adherence to the Noise and Blasting Management Plans.

28. On site machinery will be fitted with high performance environmental noise control of fully enclosed engines, double muffled exhausts and engine cooling air inlet silencers.

29. Telephone sirens or claxons will not be used or installed on site.

**Flood**

30. Stormwater from the impacted sites at the quarry area will be directed to the water quality control pond on the site which will slow water movement and retain a percentage of runoff volume.

**Fire**

31. A fire break will be left on the outer edge of the quarry area consisting of bare ground and rehabilitation work will be carried out inside this fire break area.

32. Actively suppress fires on site to protect life and property on the quarry site and also to protect life and property on neighbouring properties.

33. No fires will be lit on the quarry site by staff or contractors.

34. Water quality control pond available as a source of fire fighting water and

35. Fire pump will be available and regularly maintained and operated.

**Water emissions**

36. Parameters Ph; suspended solids; turbidity; conductivity; visible oil and grease and water level will be monitored on a six monthly basis. The company will also carry out visual checks of the water quality control pond on a weekly basis and act upon any water quality issues observed.

37. Treatment of stormwater runoff to the standard necessary to enable safe and environmentally sustainable use and discharge to inland waterways.

**Soil contamination**

38. Capture of pollutants by primary sediment settling pond and interceptors prior to redirection to water quality control pond.

39. Removal of sediments from primary sediment settling pond and interceptors when the accumulation reaches 15% of the storage volume.

**Surface water contamination**

40. Drainage at the site will be directed through and primary sediment settling pond and interceptors to collect contaminants and sediments.

41. Surface runoff will be directed to a water quality control pond.

**Groundwater contamination**

42. No hazardous chemicals will be used or stored on the site.

43. Treatment of surface water by water quality control pond.



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**Biodiversity and nature conservation values**

- 44. Minimum disturbance to remnant riparian corridors.
- 45. Escape routes and speed limit on quarry roads.
- 46. Escape routes constructed out of quarry pits after material extraction.
- 47. Wash down procedures followed and implemented for management of *Phytophthora cinnamomi*.
- 48. Structured and vigilant weed monitoring schedule coupled with active management.

**Litter**

- 49. Provision of bins with lids, removed on a weekly basis and disposed of at the Council refuse site.

**Site contamination**

- 50. Interceptors in the form of a primary sediment settling pond and a separate barrier of sediment "bales" will be installed on the drainage line between the quarry and the water quality control pond that will capture contaminants and sediments from the hard surfaced quarry, loading and unloading and access areas prior to the runoff being directed to a water quality control pond.
- 51. Spill kit available on site at all times.

**Air emissions**

- 52. Crusher operation will be carried out with water sprays when dust may escape the property boundary (for example during dry periods and whilst crushing rock type that produces significant dust).
- 53. Loaded trucks leaving the site will have their load either covered or moistened to prevent dust loss during transportation.
- 54. Speed limit on right of way road of 65 km/h.

**POTENTIAL SOCIAL AND ECONOMIC IMPACT**

**Noise and vibration**

- 55. Independent monitoring of ground vibration and air blast overpressure will be carried out for all quarry blasting.
- 56. Blasting will be avoided when atmospheric inversions are present and when the prevailing wind direction is from the west.
- 57. Environmental noise emissions will be monitored on a quarterly basis for the first year following approval of the quarry's expansion and annually thereafter. This is to verify the predicted noise levels presented in this report and demonstrate compliance with noise emissions limits.
- 58. Any significant changes to the quarry's operations will be modelled to allow prediction of likely noise emissions resulting from the change.

**Visual considerations**

- 59. Retaining the native vegetation on the site to provide a backdrop to the quarry from the surrounding residences.
- 60. Progressive harvesting of plantation on property to keep a visual barrier to the west.
- 61. Landscaping and tree planting on the northern and eastern sides of the site area.
- 62. Progressive rehabilitation of the used quarry areas with native vegetation.

**Disturbance to sites of scientific or cultural value**

- 63. An assessment was made by Heritage Tasmania that an Aboriginal Heritage investigation was not required for the quarry expansion proposal. Any sites of Aboriginal heritage seen or suspected during operations will result in an immediate cessation of works and Aboriginal Heritage Tasmania will be contacted.
- 64. The quarry is not entered on the Tasmanian Heritage Register and Heritage Tasmania has confirmed that the quarry expansion proposal will not require approval from the Tasmanian Heritage Council. Any site of archaeological significance will be treated in the same way as Aboriginal heritage and any unexpected archaeological features and/or deposits revealed during works, works will cease and the incident will be reported immediately to the Heritage Council.

 21 JAN 2011

**PLANNING EXHIBITED DOCUMENTS**  
Ref. No: DA 0074/2015  
Date submitted: 09/05/2015  
Planning Administration:   
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**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

## Gundagi Quarry, Bangor - DPEMP

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### Appendix C: Land Title Information



# PROPERTY INFORMATION REPORT

VALUER GENERAL, TASMANIA

Issued pursuant to the Valuation of Land Act 2001



**PROPERTY ID:** 7528545  
**MUNICIPALITY:** LAUNCESTON

**PROPERTY ADDRESS:** 337 GUNDAGAI RD  
 BANGOR TAS 7267

**TITLE OWNER:** 40814/1 : D.T.K. LOGGING PTY. LTD.

**RATE PAYERS:** D T K LOGGING PTY LTD

**POSTAL ADDRESS:** PO BOX 102  
 HADSPEN TAS 7290

## MAIN IMPROVEMENTS SUMMARY

**Improvements:** WATER  
**Improvement Sizes (Top 3 by Size):** **Area:** 1.0 square metres **Improvement:** WATER  
**Number of Bedrooms:**  
**Construction Year of Main Building:**  
**Roof Material:**  
**Wall Material:**  
**Land Area:** 13.64 hectares

## LAST SALES

Contract Date	Settlement Date	Sale Price
15/05/1998	15/05/1998	\$30,000

## LAST VALUATIONS

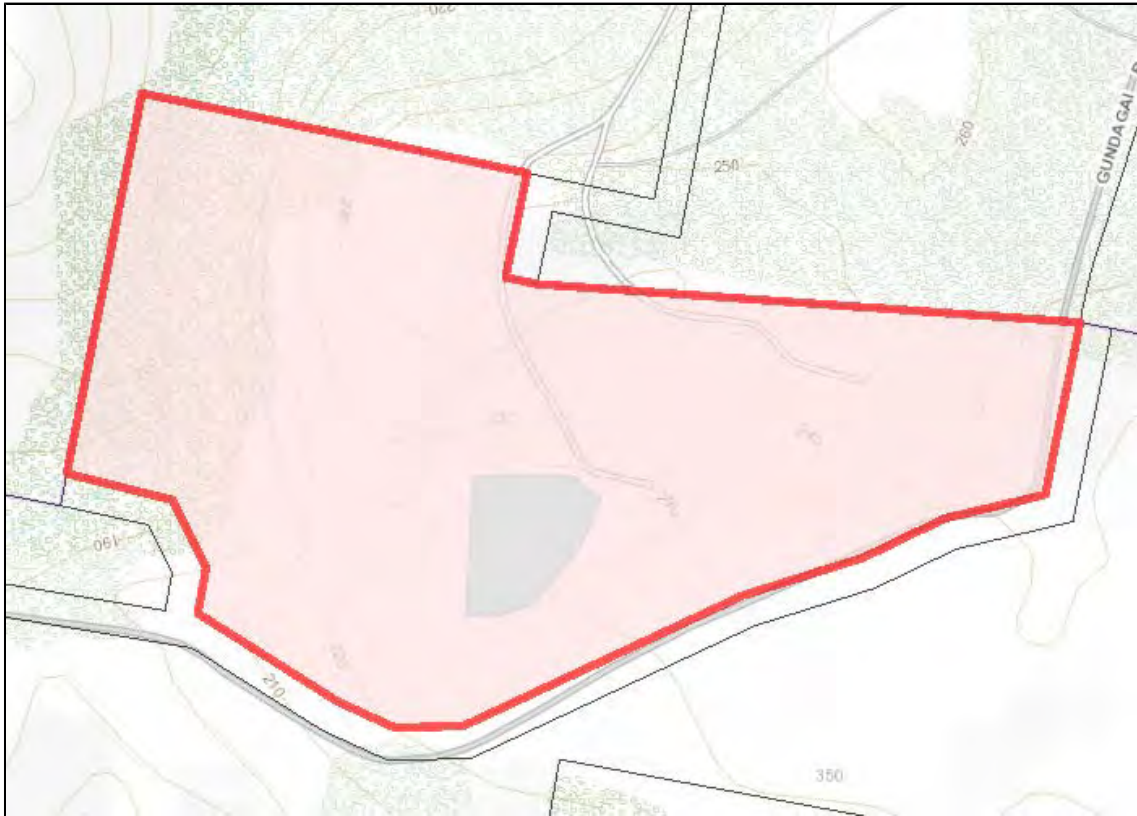
Date Inspected	Levels At	Land	Capital	A.A.V.	Reason
13/10/2010	01/07/2010	\$70,000	\$72,500	\$2,900	Revaluation
22/05/2007	01/10/2004	\$35,000	\$38,000	\$1,520	amend description for adjustment factor project

**No information obtained from the LIST may be used for direct marketing purposes.**

This data is derived from the Valuation List prepared by the Valuer General under the provisions of the Valuation of Land Act 2001. These values relate to the level of values prevailing at the dates of valuation shown.

While all reasonable care has been taken in collecting and recording the information shown above, this Department assumes no liability resulting from any errors or omissions in this information or from its use in any way.

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## Explanation of Terms

**Property ID** - A unique number used for Valuation purposes.

**Date Inspected** - The date the property was inspected for the valuation.

**Levels At** - The date at which values of properties are set to determine revaluations and any supplementary valuations in the revaluation cycle.

**Land Value** - The value of the property excluding all visible improvements such as buildings, structures, fixtures, roads, standings, dams, channels, artificially established trees, artificially established pastures and other like improvements but does include draining, excavation, filling, reclamation, clearing and any other such like invisible improvements make to the land.

**Capital Value** - The total value of the property, excluding plant and machinery, and includes the land value.

**A.A.V.** - The gross annual rental value of the property, excluding GST, municipal rates and land tax, but is not to be less than 4% (percent) of the capital value.

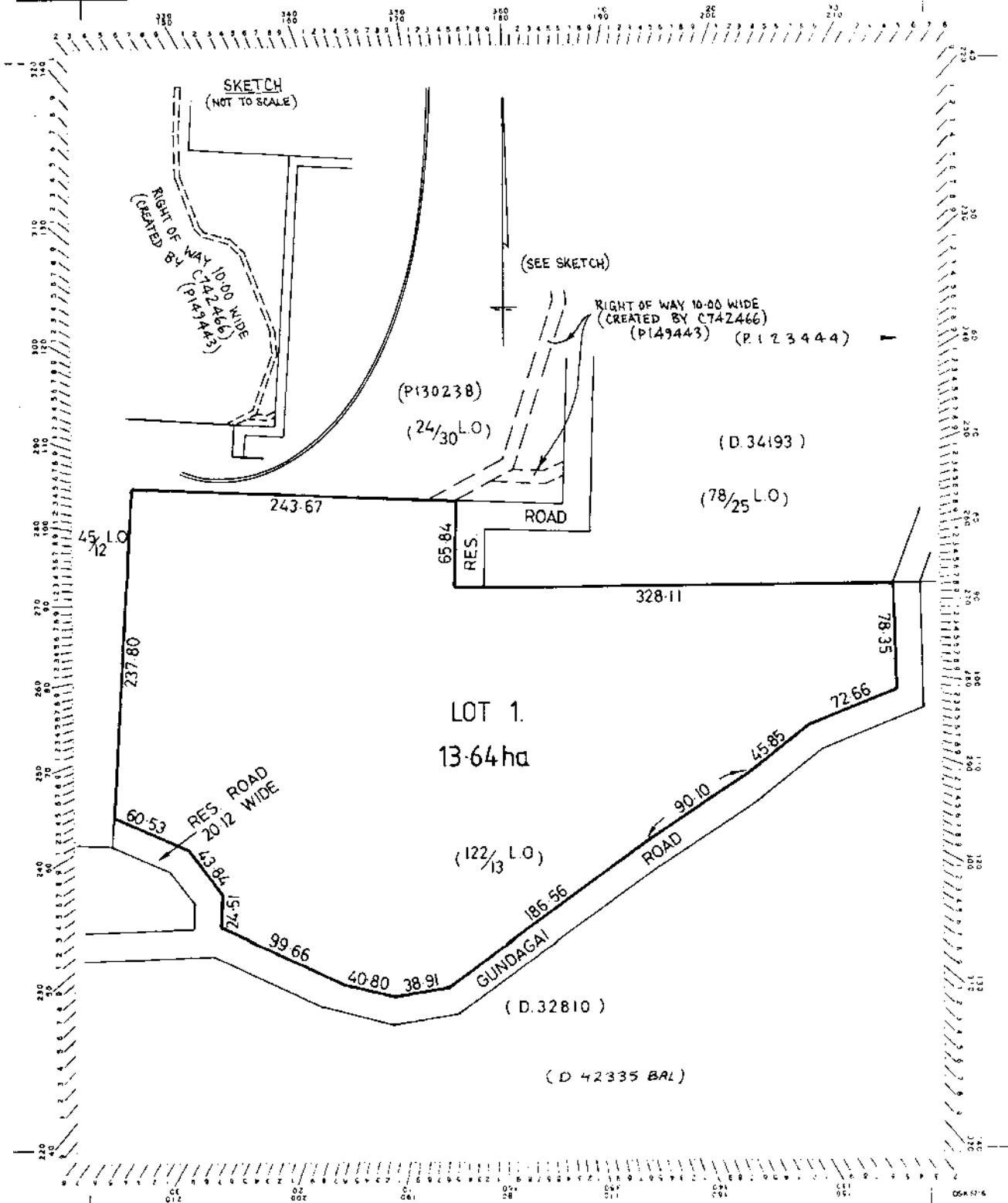
**Multiple Tenancies** - Properties that have multiple tenants are assessed for separate A.A.V's. e.g. a house and flat.

# FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Owner <b>F. C. BARDENHAGEN</b>	<b>PLAN OF SURVEY</b> of land situated in the <b>CITY of LAUNCESTON</b>	Registered Number <b>D. 40814</b>
Title Reference <b>C.T. 4333 - 69</b>	COMPILED FROM <b>122/13 L.O</b>	Approved
Grantee <b>PART OF LOT 27395, 134° 0' 13", GTD. TO ROBERT ALBERT WALLACE</b>	SCALE 1 3000 MEASUREMENTS IN METRES	Recorder of Titles



### SEARCH OF TORRENS TITLE

VOLUME 40814	FOLIO 1
EDITION 5	DATE OF ISSUE 11-Oct-2013

SEARCH DATE : 16-Feb-2015

SEARCH TIME : 05.49 PM

### DESCRIPTION OF LAND

City of LAUNCESTON  
 Lot 1 on Diagram 40814  
 Derivation : Part of Lot 27395 Gtd. to R A Wallace  
 Prior CT 4333/69

### SCHEDULE 1

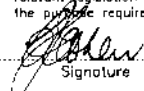
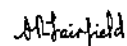
C95797 TRANSFER to D.T.K. LOGGING PTY. LTD. Registered  
 09-Jun-1998 at noon (MF:2526o/131)

### SCHEDULE 2

Reservations and conditions in the Crown Grant if any  
 C742466 BENEFITING EASEMENT: a right of carriageway over the  
 Right of Way 10.00 wide on Diagram 40814 Registered  
 09-Oct-2007 at 12.01 PM  
 D99013 MORTGAGE to DG & WN Pty Ltd Registered 02-Sep-2013  
 at noon  
 D103374 MORTGAGE to DG & WN PTY LTD Registered 11-Oct-2013  
 at noon

### UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

COHEN & ASSOCIATES 103 CAMERON STREET LAUNCESTON  <div style="text-align: right; font-size: 1.2em; font-weight: bold;">R 40814/1</div>	LAST SURVEY PLAN No. P 40814 & (TO BE FILED WITH) (D 32810)
<div style="text-align: center; font-size: 1.5em; font-weight: bold;">RE-MARK PLAN</div> LOCATION CITY OF LAUNCESTON OWNER O.T.K. LOGGING PTY LTD FOLIO REFERENCE 40814/1 GRANTEE PART OF LOT 27395 134a-Dr-13p ROBERT ALBERT WALLACE, PUR. <div style="text-align: right; font-size: 0.8em;">LENGTHS IN METRES</div>	<div style="text-align: center; font-weight: bold;">SURVEY CERTIFICATE</div> I, CHRISTOPHER JOHN COHEN of LAUNCESTON in Tasmania a registered surveyor HEREBY CERTIFY that: (a) this survey is based upon the best evidence that the nature of the case admits (b) the survey notes have been truly compiled from surveys made by me or made under my supervision; and (c) this survey and accompanying survey notes comply with the relevant legislation affecting surveys and are correct for the purposes required.  <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">             Signature         </div> <div style="text-align: center;">           Date: <u>27</u> / <u>7</u> / <u>2004</u> </div> </div>
SURVEYORS REF No: <span style="background-color: black; color: white; padding: 2px;">30/30</span> <span style="background-color: black; color: white; padding: 2px;">4847</span> ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN	Survey Commenced & Completed: 26/07/04 Graduate Surveyor:  Adrian R Fairfield

### REPORT

- Bearing datum is AMG per P 5874 LO.
- Traverse closed by re-observing stations 6-5-4-3-2-1 in reverse.
- Difference noted in bearing comparison to D 32810  
 +10°26'45" between OSpikes and +10°29'40" OCP to Stn (2).  
 The difference cannot be explained.

(D 32810)  
 (122/13 LO)

Unless otherwise stated, the apparent age of all old marks found is consistent with their attributed origin.  
 All boundaries are open.

# PROPERTY INFORMATION REPORT

VALUER GENERAL, TASMANIA

Issued pursuant to the Valuation of Land Act 2001



**PROPERTY ID:** 1781064  
**MUNICIPALITY:** LAUNCESTON

**PROPERTY ADDRESS:** RETREAT RD  
 RETREAT TAS 7254

**TITLE OWNER:** 130238/1 : FORESTRY TASMANIA

**INTERESTED PARTIES:** FORESTRY TASMANIA

**POSTAL ADDRESS:** 79-83 MELVILLE ST  
**(Interested Parties)** HOBART TAS 7000

## MAIN IMPROVEMENTS SUMMARY

<b>Improvements:</b>	Plantation & roads	
Improvement Sizes (Top 3 by Size):	Improvement:	Area:
	ROAD	3.67 square metres
	ROAD	2.92 square metres
	ROAD	2.46 square metres

**Number of Bedrooms:**

**Construction Year of Main Building:**

**Roof Material:**

**Wall Material:**

**Land Area:** 1,929.795 hectares

## LAST VALUATIONS

Date Inspected	Levels At	Land	Capital	A.A.V.	Reason
12/09/2011	01/07/2010	\$3,200,000	\$3,700,000	\$148,000	M252879 Objection Allowed Values remain and Tenancy details amended
01/12/2010	01/07/2010	\$3,200,000	\$3,700,000	\$148,000	Revaluation

## MULTIPLE TENANCIES

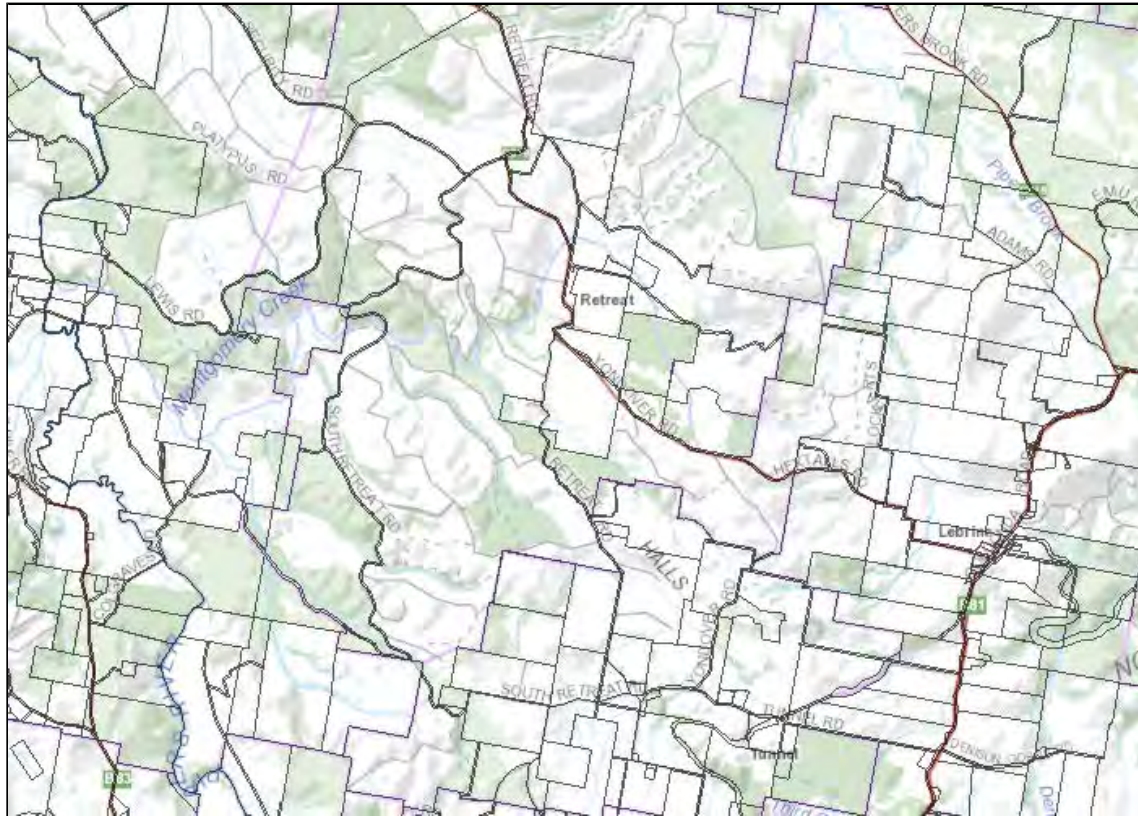
Property ID	Part Occupied	AAV
2579888	Roads	\$32,720
2579896	Roads	\$9,040
2579909	Roads	\$11,900
2579925	Roads	\$85,890
2579933	Roads	\$8,450

**No information obtained from the LIST may be used for direct marketing purposes.**

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## Explanation of Terms

**Property ID** - A unique number used for Valuation purposes.

**Date Inspected** - The date the property was inspected for the valuation.

**Levels At** - Levels At - or Levels of Valuation Date means the date at which values of properties are determined for all valuations in a Municipal Area.

**Land Value** - Land Value is the value of the property including drainage, excavation, filling, reclamation, clearing and any other invisible improvements made to the land. It excludes all visible improvements such as buildings, structures, fixtures, roads, standings, dams, channels, artificially established trees and pastures and other like improvements.

**Capital Value** - Capital Value is the total value of the property (including the land value), excluding plant and machinery.

**AAV** - Assessed Annual Value. AAV is the gross annual rental value of the property excluding GST, municipal rates, land tax and fixed water and sewerage, but cannot be less than 4% of the capital value.

**Interested Parties** - This is a list of persons who have been recorded by the Value-General as having interest in the property (ie owner or Government agency).

**Postal Address** - This is the last advised postal address for the interested parties.

**Multiple Tenancies** - Properties that have multiple tenants are assessed for separate AAV's. e.g. a house and flat.

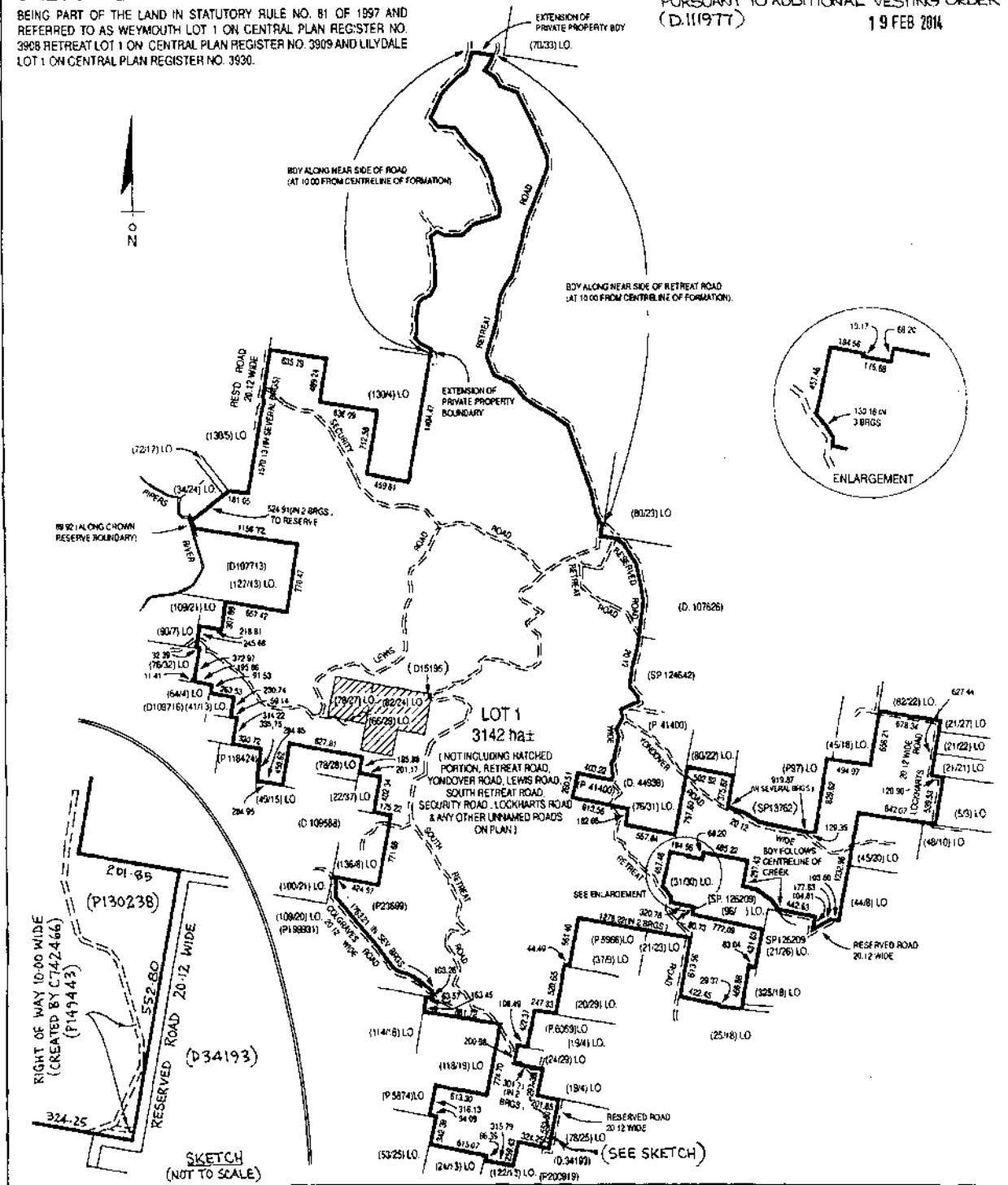
OWNER <b>FORESTRY TASMANIA</b>	<b>PLAN OF TITLE</b>	Registered Number <b>P 130238</b>
FOLIO REFERENCE (A.17298) F.R. 23599/1, F.R. 228897/1 F.R. 225305/1 F.R. 16727/1	LOCATION <b>LAND DISTRICT DORSET PARISHES OF HALL AND SALTWOOD &amp; CITY OF LAUNCESTON</b>	APPROVED <b>16 JUL 1998</b> [Signature] Recorder of Titles
GRANTEE <b>LOT 1 (3142 ha±) VESTED IN FORESTRY TASMANIA</b>	COMPILED BY <b>FORESTRY TASMANIA</b>	
NOT TO SCALE 1:40 000± LENGTHS IN METRES		

MAPSHEET MUNICIPAL CODE No. 111,120 (5043,5044,5045)	LAST UPI No. <b>FLR 60</b>	LAST PLAN No. <b>CPR No. 3908,3909,3930</b>	ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN
---	----------------------------	---	---

**SKETCH BY WAY OF ILLUSTRATION ONLY**

BEING PART OF THE LAND IN STATUTORY RULE NO. 81 OF 1997 AND REFERRED TO AS WEYMOUTH LOT 1 ON CENTRAL PLAN REGISTER NO. 3908 RETREAT LOT 1 ON CENTRAL PLAN REGISTER NO. 3909 AND LILYDALE LOT 1 ON CENTRAL PLAN REGISTER NO. 3930.

THIS VERSION REPLACES VERSION 16 PURSUANT TO ADDITIONAL VESTING ORDER (D.111977) 19 FEB 2014





### SEARCH OF TORRENS TITLE

VOLUME 130238	FOLIO 1
EDITION 7	DATE OF ISSUE 20-Feb-2014

SEARCH DATE : 24-Apr-2015

SEARCH TIME : 12.26 PM

### DESCRIPTION OF LAND

Parish of HALL, Land District of DORSET  
 City of LAUNCESTON  
 Parish of SALTWOOD, Land District of DORSET  
 Lot 1 on Plan 130238  
 Being part of the land described in Statutory Rule No. 81 of 1997 and referred to as Weymouth Lot 1 on Central Plan Register No.3908, Retreat Lot 1 on Central Plan Register No. 3909 and Lilydale Lot 1 on Central Plan Register No.3930  
 Derivation : Lot 1 vested in Forestry Tasmania  
 Derived from A.17298  
 Prior CTs 225305/1, 23599/1 and 18727/1

### SCHEDULE 1

D111977 FORESTRY TASMANIA Registered 20-Feb-2014 at 12.02 PM

### SCHEDULE 2

Reservations and conditions in the Crown Grant if any  
 C742466 BURDENING EASEMENT: a right of carriageway (appurtenant to Lot 1 on Diagram 40814) over the Right of Way 10.00 wide on Plan 130238 Registered 09-Oct-2007 at 12.01 PM  
 C446472 Instrument Creating Forestry Right for Gunns Plantations Limited for the term of fifteen years from the 1st day of July 2002 and ending on the 30th day of June 2017 or the date of completion of harvest whichever is the later over the lands shown hatched on the Forestry Right Diagrams filed in "Plan-Related Documents" against the titleplan to the within land (together with ancillary rights) Registered 11-Oct-2004 at noon  
 C483838 INSTRUMENT Creating forestry rights for Gunns Plantations Limited for the term of 15 years from the 1-Jul-2003 and ending on the 30-Jun-2018 or the date of completion of harvest whichever is the later over the lands shown hatched on the Forestry Right Diagrams filed in "Plan-Related Documents" against

- the titleplan to the within land.(together with ancillary rights) Registered 06-Feb-2006 at noon
- C407575 Instrument creating Forestry Right for Gunns Plantations Limited for the term of fifteen years from 30th June 2002 and ending on the 29th June 2017 or the date of completion of harvest whichever is the later over the lands shown hatched on the Forestry Right Diagrams filed in "Plan-Related Documents" against the titleplan to the within land (together with ancillary rights) Registered 03-Jan-2008 at noon
- C407556 Instrument creating Forestry Right for Plantation Platform of Tasmania Pty Ltd, Gunns Limited and Forestry Tasmania for the term of fifteen years from 30th June 2004 and ending on the 29th June 2019 or the date of completion of harvest whichever is the later over the lands shown hatched on the Forestry Right Diagrams filed in "Plan-Related Documents" against the titleplan to the within land (together with ancillary rights) Registered 03-Mar-2009 at 12.01 PM
- C789362 Instrument creating Forestry Right for Wesley Vale Engineering Pty Ltd and Forestry Tasmania for the term of fifteen years from 6th May 1999 and ending on the 5th May 2014 or the date of completion of harvest whichever is the later over the lands shown hatched on the Forestry Right Diagrams filed in "Plan-Related Documents" against the titleplan to the within land (together with ancillary rights) Registered 03-Mar-2009 at 12.04 PM
- C789367 Instrument creating a Forestry Right for Wesley Vale Engineering Pty Ltd and Forestry Tasmania for the term of fifteen years from 12th December 2007 and ending on the 11th December 2022 or the date of completion of harvest whichever is the later over the lands shown hatched on the Forestry Right Diagrams filed in "Plan-Related Documents" against the titleplan to the within land (together with ancillary rights) Registered 03-Mar-2009 at 12.08 PM
- C407569 Instrument Creating Forestry Right for The Trust Company (Australia) Ltd for a term of 57 years, 8 months and 21 days from 30th January 2012 and ending on the 20th October 2069 over the lands shown shaded on the Forestry Right Diagrams filed in "Plan-Related Documents" against the titleplan to the within land (together with ancillary rights) Registered 16-Jul-2012 at 12.01 PM
- D57124 Instrument creating Forestry Right for The Trust Company (Australia) Limited for the term of seven years from 11th December 2013 and ending on the 10th December 2020 or the date of completion of harvest whichever is the later over the lands shown hatched

on the Forestry Right Diagrams filed in "Plan-Related Documents" against the titleplan to the within land (together with ancillary rights) Registered 18-Dec-2013 at noon

D147454 CAVEAT by The Trust Company (Australia) Limited (against part of the land therein described) Registered 17-Nov-2014 at noon

### UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

**PLANNING EXHIBITED DOCUMENTS**  
Ref. No: DA 0074/2015  
Date submitted: 09/05/2015  
Planning Administration:   
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Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

*Gundagi Quarry, Bangor - DPEMP*

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**Appendix D: Traffic Impact Assessment (Midson Traffic Pty Ltd)**



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traffic engineering transport planning road safety

[www.midsontraffic.com.au](http://www.midsontraffic.com.au)

Keith Midson  
Midson Traffic Pty Ltd  
18 Earl Street  
Sandy Bay TAS 7005  
0437 366 040

28 April 2015

Dr Richard Barnes  
Principal  
Van Diemen Consulting Pty Ltd  
Via email

Dear Richard,

### **Gundagi Quarry TIA – Launceston Interim Planning Scheme 2015**

Further to our recent discussions, I am pleased to provide an update on the TIA prepared for the Gundagi Quarry and its compatibility with the new Launceston Interim Planning Scheme 2015. The original TIA was prepared in January 2014 using the Launceston Interim Planning Scheme, 2012.

Schedule E4, Road and Railway Assets Code, is the relevant section of the 2015 Interim Planning Scheme for the assessment of traffic and transport infrastructure. The TIA was assessed against the relevant requirements of Schedule E4, with the results summarised in the following sections (noting that no new road junctions are proposed, and no rail is located near the subject site).

#### **E4.5.1 – Existing Road Accesses and Junctions**

Acceptable Solution A1: "The annual average daily traffic (AADT) of vehicle movements, to and from a site, onto a category 1 or category 2 road, in an area subject to a speed limit of more than 60km/h, must not increase by more than 10% or 10 vehicle movements per day, whichever is the greater".

In this case, the quarry expansion does not directly generate traffic onto Category 1 or 2 roads. Therefore assessment under E4.5.1 is not relevant to the proposal.

Acceptable Solution A2: "The annual average daily traffic (AADT) of vehicle movements, to and from a site, using an existing access or junction, in an area subject to a speed limit of more than 60km/h, must not increase by more than 10% or 10 vehicle movements per day, whichever is greater".

In this case, the quarry expansion generates traffic that accesses Golconda Road and Pipers River Road, both of which have posted speed limits greater than 60-km/h. Therefore the TIA is required to meet the requirements of the Performance Criteria, P2, which is outlined as follows:

*"Any increase in vehicle traffic at an existing access or junction in an area subject to a speed limit of more than 60km.h must be safe and not unreasonably impact on the efficiency of the road, having regard to:*

- (a) The increase in traffic caused by the use;*
- (b) The nature of the traffic generated by the use;*
- (c) The nature and efficiency of the access or the junction;*
- (d) The nature and category of the road;*
- (e) The speed limit and traffic flow of the road;*
- (f) Any alternative access to a road;*
- (g) The need for the use;*
- (h) Any traffic impact assessment; and*
- (i) Any written advice received from the road authority".*

In this case, the TIA investigated the impacts of the proposed development in terms of road safety and traffic efficiency on the surrounding road network. Particular attention was made on the junctions in the transport network that were impacted by increased traffic generation. Section 4.3 of the TIA deals with junction impacts in the surrounding road network. The TIA investigated sight distance, capacity and road safety. No issues were identified for all junctions investigated. The Performance Criteria P2 of E4.5.1 is therefore met.

#### **E4.6.4 – Sight Distances at Accesses and Junctions**

No new accesses or road junctions are proposed with the proposed quarry expansion. It is noted that the sight distance requirements in the 2015 Interim Planning Scheme are identical to the requirements of the 2012 Interim Planning scheme. The Planning Scheme requirements are similar to the Austroads Safe Intersection Sight Distance Requirements.

Table 2 on page 23 of the TIA summarises the sight distances at each junction investigated. Two junctions were found to have deficient sight distance in one direction (South Retreat Road/ Quarry Access and South Retreat Road/ Yondover Road).

The TIA concluded: *"The quarry access junction with South Retreat Road falls short of the Planning Scheme SISD requirements by approximately 10 metres (shortfall of approximately 17 metres in accordance with Austroads requirements). The layout of the junction is such that the measurements vary depending on the location that the vehicle props to give way – increased sight distance is available from a location back from the junction (due to the curves in the road – available sight distance increases to approximately 90 metres). It is further noted that the junction has very few vehicle movements during peak periods, and that most of these movements are associated with the Quarry itself. The dominant turning movements are left-in/ right out, with few vehicles approaching from the quarry access. For these reasons, the junction is considered safe and efficient".*

The proposed development therefore complies with the requirements of Performance Criteria P1, specifically, (a) 'the nature and frequency of the traffic generated by the use'; (b) the frequency of use of the road network; (d) the need for the junction; (e) traffic impact assessment.

The TIA therefore complies with the requirements of the Launceston Interim Planning Scheme 2015.

Please contact me on 0437 366 040 if you require any further information.

Regards,



Keith Midson BE MTraffic MTransport FIEAust CPEng

**DIRECTOR**  
**Midson Traffic Pty Ltd**

**PLANNING EXHIBITED DOCUMENTS**  
30/04/2015  
Ref. No. 100-100-100-100  
Date submitted: 09/05/2015  
Planning Administration: *[Signature]*

**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000



Richard Barnes <rwbarnes73@gmail.com>

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## Gundagi Quarry and Tunnel Road

---

Keith Midson <keith@midsontraffic.com.au>  
To: Richard Barnes <rwbarnes73@gmail.com>

Thu, Apr 30, 2015 at 12:41 PM

Dear Richard,

Further to our discussions, I am pleased to provide further information on the traffic impacts of the proposed quarry expansion on the road network in light of Council's recent load limit imposed on Tunnel Road.

The load limit will prevent trucks from using Tunnel Road, therefore trips accessing Golconda Road will be required to utilise Bacala Road.

The TIA prepared in 2014 estimated that 10% of the traffic generated by the quarry would utilise Tunnel Road. This equates to a total of 9 trucks per day, and 2 trucks per hour during peak periods.

The newly imposed load limit would therefore effectively increase Bacala Road to 80 trucks per day, with a peak of 12 trucks per hour. This relatively minor increase in heavy vehicle traffic can readily be absorbed by Bacala Road (which has minimal adjacent land use activity along its length). The change in flow in the surrounding road network will not have any significant adverse impacts in terms of capacity.

The load limit will require laden trucks to turn left at the Bacala Road/ Golconda Road junction (for those trucks travelling to areas such as Scottsdale and Bridport). This junction is located on a relatively steep slope and will result in vehicles northbound approaching on Golconda Road having to slow on the uphill section of Golconda Road. Available forward sight distance on Golconda Road is considered acceptable for this manoeuvre.

Please let me know if you require any further information or clarification.

Kind regards,

Keith

Keith Midson

**Director**

**MIDSON Traffic Pty Ltd**

traffic engineering | transport planning | road safety



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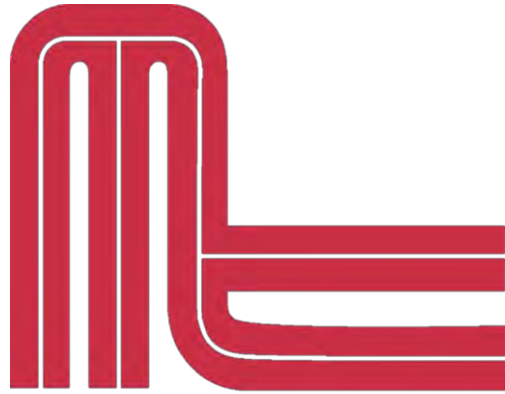
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Please contact Customer Service on 6323 3000

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0437 366 040

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**MIDSON**  
traffic  
pty ltd

**Van Diemen Consulting**  
**Bardenhagen Quarry Expansion**  
**Traffic Impact Assessment**  
**January 2014**

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# 1. Introduction

## 1.1 Background

Midson Traffic Pty Ltd were engaged by Van Diemen Consulting to prepare a traffic impact assessment for a proposed quarry expansion at the Bardenhagen Quarry at Bangor, north-west of Lilydale.

Bardenhagen Quarries have been in operation for approximately thirteen years, providing a large variety of construction materials to the regional area. The quarry currently has a licence for the operation of 50,000 cubic metres per annum. The quarry proposes to increase production to 200,000 cubic metres per annum.

This report is intended to accompany Development Proposal and Environmental Management Plan (DPEMP) for the proposed quarry expansion.

## 1.2 Traffic Impact Assessment (TIA)

A traffic impact assessment (TIA) is a process of compiling and analysing information on the impacts that a specific development proposal is likely to have on the operation of roads and transport networks. A TIA should not only include general impacts relating to traffic management, but should also consider specific impacts on all road users, including on-road public transport, pedestrians, cyclists and heavy vehicles.

This TIA has been prepared in accordance with the Department of Infrastructure, Energy and Resources (DIER) publication, *A Framework for Undertaking Traffic Impact Assessments*, 2007. This TIA has also been prepared with reference to the Austroads publication, *Guide to Traffic Management*, Part 12: *Traffic Impacts of Developments*, 2009.

DIER recognises that most land use developments generate traffic, and generally attract more private transport movements rather than trips utilising public transport. DIER seeks to move towards a more sustainable transport system through improved transport considerations at a development level. It is, therefore, necessary to address the impact of motor vehicles and road traffic effects on the environment.

The effects of development proposals should be responsibly assessed, giving consideration to expected future traffic movements. DIER relies on the preparation of a TIA in order to adequately assess traffic impacts on the surrounding transport network for each development.

A TIA is not a promotional exercise undertaken on behalf of a developer; a TIA must provide an impartial and objective description of the impacts and traffic effects of a proposed development. A full and detailed assessment of how vehicle and person movements to and from a development site might affect existing road and pedestrian networks is required. An objective consideration of the traffic impact of a proposal is vital to enable planning decisions to be based upon the principles of sustainable development.

The Environment Protection Authority (EPA) and Launceston City Council requires a TIA to be prepared to investigate the potential traffic impacts associated with the proposed quarry expansion.

### 1.3 Project Scope

Preparation of a TIA examining the traffic impacts associated with the proposed development in accordance with DIER and Council requirements as follows:

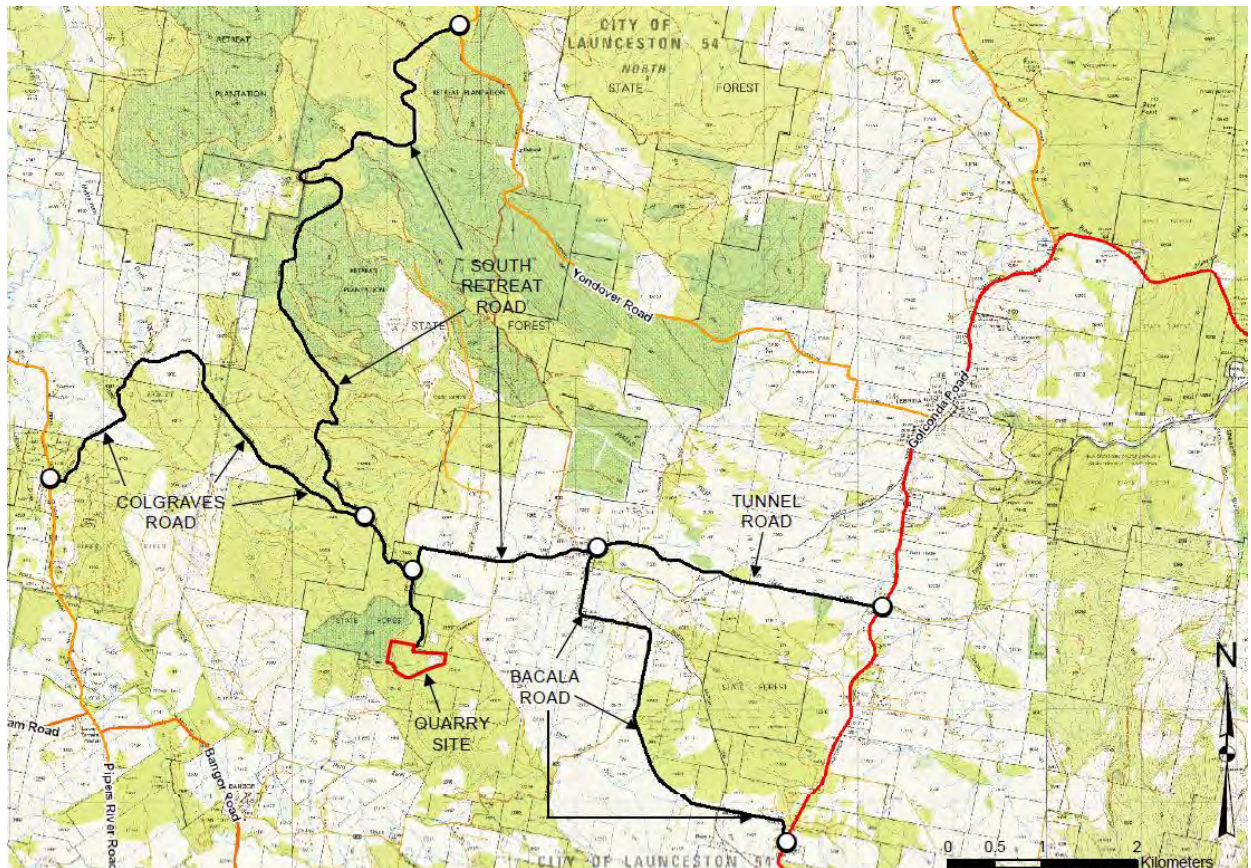
- Review of the existing road environment in the vicinity of the site and the traffic conditions on the road network;
- Provision of information on the proposed development with regards to traffic movements and activity;
- Consultation with DIER and Council;
- Identification of the traffic generation potential of the proposal with respect to the surrounding road network in terms of road network capacity; and
- Traffic implications of the proposal with respect to the external road network in terms of traffic efficiency and road safety.

### 1.4 Subject Site

The subject site is the Bardenhagen Quarry which is located in Bangor, north-west of Lilydale. The site area is approximately 14 hectares. The quarry has been in operation for approximately 13 years.

The subject site and surrounding road network is shown in Figure 1.

**Figure 1 Subject Site (Source: Van Diemen Consulting)**



## 1.5 Information and Data Sources

The following organisations were contacted during the preparation of this report:

- **Department of Infrastructure, Energy and Resources (DIER)** – Crash and traffic data
- **Launceston City Council** – Planning Scheme and traffic data and network information
- **Van Diemen Consulting** – General project information

## 1.6 Planning Scheme

The *Interim Launceston Planning Scheme 2012* outlines the traffic, access and parking requirements for developments in the Launceston municipality and is referred to as the 'Planning Scheme' throughout this report.

## 2. Existing Conditions

### 2.1 Transport Network

For the purpose of this assessment, the transport network consists of the following roads:

- Golconda Road
- Tunnel Road
- Bacala Road
- South Retreat Road
- Colgraves Road
- Pipers River Road
- Yonderover Road
- Gundagai Road

Each of these roads are examined in detail in the following sections.

#### 2.1.1 Golconda Road

The full length of Golconda Road is 40-km and connects between Lilydale Road and William Street in Scottsdale. It plays an important role in providing regional connectivity between Launceston and Scottsdale and surrounding areas. It is sealed along its full length and is a major rural arterial road. It provides access to rural farming land along its length, and has numerous junctions that connect to **various regions in Tasmania's northeast. As well as providing an important regional access function**, it plays an important role in providing access to many wineries in the region, as well as a lavender farm.

**Golconda Road provides an important role for tourist traffic in the State's northeast region, as well as an important Forestry and agricultural freight tasks.**

The default rural speed limit of 100-km/h applies to the majority of Golconda Road. Traffic data was obtained from a location approximately 200 metres on the Launceston side of Gillespies Road in February 2013. From the data, the average weekday daily traffic volume on Golconda Road is approximately 860 vehicles per day.

Golconda Road viewed from the Bacala Road junction is shown in Figure 2.



**Figure 2 Golconda Road/ Bacala Road Junction**



### **2.1.2 Tunnel Road**

Tunnel Road connects between Golconda Road and Colgraves Road. It provides connectivity to various Forestry roads near the subject site. Tunnel Road between Golconda Road and Bacala Road has varying road surface, with short sections of sealed surface near property accesses, and unsealed along its balance. Tunnel Road from its junction with Bacala Road through to South Retreat Road has a sealed surface.

Tunnel Road is owned and maintained by Launceston City Council. It carries approximately 110 vehicles per day (based on Council traffic data, October 2011), with a peak volume of approximately 10 to 20 vehicles per hour (peak volume is highly variable, due to the relatively low volumes overall – Council’s traffic data recorded an absolute peak was 19 vehicles per on Monday 10 October, 12:00-13:00). The existing Bardenhagen quarry traffic generation is contained within this traffic data.

### **2.1.3 Bacala Road**

Bacala Road connects between Golconda Road and Tunnel Road and provides access to residential and rural property along its length. Bacala Road is sealed along its full length.

Bacala Road is owned and maintained by Launceston City Council. It carries approximately 130 vehicles per day (based on Council traffic data, October 2011), with a peak volume of approximately 20 to 30 vehicles per hour (peak volume is highly variable, due to the relatively low volumes overall – Council’s traffic data recorded an absolute peak was 23 vehicles per on Monday 10 October, 11:00-12:00). The existing Bardenhagen quarry traffic generation is contained within this traffic data.



**2.1.4 South Retreat Road**

South Retreat Road is owned and maintained by Forestry Tasmania. It provides access to a number of logging catchments and service roads. It is gravel construction, with approximately 5 metres width.

South Retreat Road connects to Tunnel Road at a T-junction at its eastern end (refer to Section 4.3.2 for more details of this junction), and extends to Yonderover Road at its northern end. It provides connectivity to the quarry site’s access, as well as Colgraves Road along its length.

Between Tunnel Road and the quarry site’s access, South Retreat Road is unsealed along most of its length. Some small sections of South Retreat Road are sealed immediately to the east of Colgraves Road, presumably to reduce dust emissions for an adjacent residential property.

Traffic volumes are not known for South Retreat Road, but would be highly variable depending on logging operations in the surrounding area. Site observations indicated that volumes are very low (in the order of 50 vehicles per day).

**2.1.5 Colgraves Road**

Colgraves Road connects between Tunnel Road and Pipers River Road. It provides connectivity to various Forestry roads and rural properties along its length. It is unsealed with a road width of approximately 5 metres.

Whilst no traffic data was available for Colgraves Road, it is likely to carry in the order of 50 – 100 vehicles per day, based on it’s connectivity with Pipers River Road.

**2.1.6 Pipers River Road**

Pipers River Road provides regional connectivity between Lilydale and Pipers River. Pipers River Road is owned and maintained by DIER. It is sealed, with a width of approximately 5.5 metres. Pipers River Road carries approximately 900 vehicles per day (DIER traffic data, 2011).

Pipers River Road looking north from the Colgraves Road junction is shown in Figure 3.

**Figure 3 Pipers River Road junction with Colgraves Road**



### **2.1.7 Yondover Road**

Yondover Road connects between Tunnel Road and Retreat Road. It is narrow and unsealed and provides access to Forestry reserves and various properties along its length.

### **2.1.8 Gundagai Road**

Gundagai Road is a local access road that connects between Paling Track and Tunnel Road. It is gravel construction and approximately 5.0 to 5.5 metres in width along most of its length. Whilst Gundagai Road passes the southern boundary of the Bardenhagen Quarry, it does not provide direct access to the site, and is not used as an access road to the quarry.

The intersection of Gundagai Road and Tunnel Road is located approximately 1.1 kilometres east of the turnoff to the Quarry on South Retreat Road.

## **2.2 Road Safety Performance**

Crash data can provide valuable information on the road safety performance of a road network. This information can be utilised as a tool to assist in identification of possible road safety deficiencies associated with a network.

Crash data was obtained from DIER for the most recent 5.9 year time period (January 2008 to November 2013 inclusive) for all roads listed in Section 2.1.

The crash data is summarised as follows:

- No crashes were reported on Tunnel Road, Bacala Road, South Retreat Road, Colgraves Road or Yonderover Road.
- No crashes were reported at the intersection of Pipers River Road and Colgraves Road.
- No crashes were reported in the surrounding network that involved trucks.
- A total of 18 crashes were reported on Golconda Road. Of these crashes, 10 were reported in Lilydale, and 8 in Lebrina.
- One fatal crash was reported at the intersection of Golconda Road/ North Lilydale Road and Second River Road. **This crash occurred in January 2012 and involved a 'cross-traffic' collision between light vehicles.**
- The dominant crash type on Golconda Road was loss of control on a bend on the carriageway (14 crashes). Two crashes were reported at intersections (North Lilydale Road/ Second River Road as noted above and Doaks Road/ Golconda Road).

The crash history does not suggest that the existing quarry operations are contributing to any road safety performance issues within the surrounding road network. The crash history also does not indicate that there are any specific existing road safety deficiencies in the surrounding road network that are likely to be exacerbated by the proposed quarry expansion.

## 2.3 Existing Quarry Operations

The existing quarry supplies crushed aggregate for local road works and small developments in **Tasmania's north east**.

Production varies depending on demand. In 2012, crushed rock was supplied for three road upgrade projects. None of these campaigns overlapped in terms of timing, and there was a period of approximately 5 months over autumn and into winter where very little production was undertaken at the quarry (hence very low traffic generation).

During campaigns, there may be upwards of 20 trucks accessing the quarry during a typical day. This corresponds to the maximum daily production of the quarry (approximately 1,400 tonnes per day).

Current production (as at January 2014) consists the following:

- Approximately 1,000 tonnes to the current road works in Bridport.
- Small local deliveries – approximately 1 truck per day (10 to 30 tonne loads). These typically supply small subdivisions and developments, etc.
- Council trucks for road works in the local area – approximately 10 yarders x 2 loads per day.

### 3. Proposed Development

#### 3.1 Development Proposal

It is proposed to increase the level of production of the Bardenhagen Quarry from its current permitted output of 50,000 tonnes per year to 1,000,000 tonnes per year in line with the current operating conditions.

Whilst the overall annual production is proposed to increase, the peak daily and peak hour activity will remain the same. This is due to the constraints of daily production – the size of the quarry and the production techniques utilised results in a physical limit to the daily output of the quarry. The increased annual production is a result of more frequent higher outputs when demands increase.

The operating hours of the proposed development are **6:00am to 7:00pm Mon to Fri for October through to March and 7:00am to 7:00pm for the remainder of the year (earlier start during daylight savings hours).**

#### 3.2 Traffic Generation

Traffic generation from the site will vary depending on demand for crushed rock material in the surrounding area. Peak production is 1,400 tonnes per day (corresponding with physical limit of production). Assuming an average load of 30 tonnes per truck during peak activity (typical for peak production that usually involves road works), then the peak truck generation is 47 laden movements per day (94 two-way truck movements).

Note that peak activity would only occur few times per year. During non-peak periods (typically winter months), there would be very little production associated with the quarry.

Traffic distribution will also vary depending on where material from the quarry is being supplied to. The following provides a typical breakdown of roads typically utilised to access the quarry (inward and outward movements):

- Bacala Road                    75%
- Tunnel Road                    10%
- South Retreat Road            10%
- Colgraves Road                5%

Assuming this distribution, then the traffic generation on each of these roads is as shown in Table 1.

**Table 1 Truck Traffic Distribution**

Road	Daily Traffic Generation	Estimated Peak Hour Traffic Generation	Comments
Bacala Road	71 trucks per day	10 trucks per hour	The majority of truck traffic accesses the quarry via Golconda Road/ Bacala Road. Typically services the Lilydale/ Launceston regions.
Tunnel Road	9 trucks per day	2 trucks per hour	Typically services Dorset region
South Retreat Road	9 trucks per day	2 trucks per hour	
Colgraves Road	5 trucks per day	2 trucks per hour	Colgraves Road provides access between the site and Pipers River Road

In terms of light vehicle traffic generation, the quarry generates very low vehicle movements. There are three vehicles for staff, who may make 2 to 3 trips to the site on a daily basis. This equates to approximately 15 two-way staff vehicle movements per day. The majority of light vehicle traffic is likely to utilise Golconda Road via Bacala and Tunnel Roads to access the site.

Visitors to the site may also account for an additional 6 two-way vehicle trips per day.

Quarry machinery is serviced off-site, so every 2-3 months a truck will take machinery to Lilydale for servicing (accounting for 1 additional truck movement per day, once a month).

The total traffic generation of the site, assuming all of the associated movements occur on one day, is approximately 116 vehicles per day (two-way).

## 4. Traffic Impacts

### 4.1 Surrounding Road Network Impacts

In terms of capacity, the road network impacts relate to the peak hour traffic generation of the site on the surrounding road network. As outlined in Section 3.1, the peak hour traffic generation are not proposed to alter due to the constraints of daily production levels. The daily network impacts will therefore not alter to current daily peak production periods. Increased production on a yearly basis will simply result in more frequent daily peak periods.

From a network operational efficiency perspective, the surrounding road network has the capacity to absorb the traffic generated by the proposed quarry operations.

### 4.2 Pavement Impacts

The proposed increase in quarry production will generate an increased amount of truck activity on the surrounding road network when the quarry is operating at this capacity. Generally, the effect of light vehicles on road pavement is negligible and pavement fatigue results from heavy vehicle traffic.

The general method for determining the impact of heavy vehicles on road pavements is by using the Equivalent Standard Axle (ESA) to standardise truck loads. The majority of traffic generated by the quarry is Austroads Class 4, Three Axle Truck, with or without attached trailer.

According to the Austroads Vehicle Classification System (2004), Class 4 vehicles have 3 axles in 2 axle groups, resulting in the following axle configurations:

- Class 4 vehicle
  - 1x SADT      0.6 ESA
  - 1x TADT      1.0 ESA
- Class 4 vehicle with trailer
  - 1x SADT      0.6 ESA
  - 2x TADT      2.0 ESA

Assuming that approximately one quarter of the trucks have trailers attached, the additional average pavement load due to the proposed increase in operations is 1.0 ESA per vehicle. This results in a total pavement loading of 4,400 ESA per year.

Assuming the traffic distribution provided in Section 3.2 applies on an annual basis, then the greatest increase in ESA loading on a single road in the surrounding road network is on Bacala Road. The increased ESA loading on Bacala Road would be in the order of 3,300 ESA per year. This increase is relatively minor in terms of the design life of the road overall, which already carries a moderate proportion of heavy vehicle traffic (forestry and quarry movements).

No information was available regarding the construction date or maintenance regime for the Council or Forestry owned roads in the surrounding road network. It is therefore difficult to determine the impact of the relatively low increase in ESA loading on the surrounding road network.

### 4.3 Junction Impacts

A relatively large area of the surrounding road network was investigated during the preparation of the TIA. The following road junctions were assessed in detail:

- Golconda Road/ Bacala Road
- Golconda Road/ Tunnel Road
- Tunnel Road/ Bacala Road/ South Retreat Road
- Pipers River Road/ Colgraves Road
- South Retreat Road/ quarry access road
- South Retreat Road/ Colgraves Road
- South Retreat Road/ Yonderover Road

These findings of the assessment of these junctions are provided in the following sections.

#### 4.3.1 Golconda Road/ Bacala Road Junction

The Golconda Road/ Bacala Road junction is a T-junction with Golconda Road having priority. The junction is sealed with appropriate line marking. The width of Bacala Road at the junction is approximately 20 metres, enabling manoeuvring of large vehicles.

Sight distance is very good in either direction along Golconda Road, exceeding the Austroads SISD requirements for 100-km/h design speed.

No specific issues were identified at this junction.

#### 4.3.2 Golconda Road/ Tunnel Road Junction

The Golconda Road/ Tunnel Road junction is a T-junction with Golconda Road having priority. The junction is sealed with faded line marking. The width of Tunnel Road at the junction is approximately 18 metres, enabling manoeuvring of large vehicles. The junction, as viewed from Tunnel Road is shown in Figure 4 (looking to the north and south along Golconda Road).

The Tunnel Road junction is located opposite to and approximately 40 metres south of the Dennison Gorge Road junction.

No specific issues were identified at this junction.



**Figure 4 Golconda Road/ Tunnel Road Junction**



**4.3.3 Tunnel Road/ Bacala Road Junction/ South Retreat Road**

Tunnel Road, South Retreat Road and Bacala Road connect at a Y-junction, with the South Retreat Road approach having priority over Bacala Road – Tunnel Road (which connect to form the major road at the junction). A gravel slip road is provided for left turning traffic from Bacala Road to the western approach of Tunnel Road. The junction layout is shown in Figure 5. The junction from the Bacala Road junction is shown in Figure 6.

The junction appears to have been recently upgraded to provide improve safety by providing a clear priority at the intersection. The slip lane enables heavy vehicles to manoeuvre at the junction due to the tight radius at the intersection of the two roads.

No specific issues were identified at this junction. Some restricted sight distance was noted from the western approach of Tunnel Road, however the vehicle speeds and low traffic volume on all approaches results in a safe operating environment for this junction.

**Figure 5 Tunnel Road/ Bacala Road Junction/ South Retreat Road**



**Figure 6 Bacala Road Approach**



#### **4.3.4 Pipers River Road/ Colgraves Road Junction**

The Pipers River Road/ Colgraves Road junction is a T-junction with Pipers River Road having priority. Colgraves Road is unsealed to Pipers River Road. No line marking is present at the junction. The width of Colgraves Road at the junction is approximately 22 metres, enabling adequate manoeuvring of large vehicles.

The lack of a sealed surface on Colgraves Road in the vicinity of Pipers River Road is not considered ideal. A sealed surface a small distance back from the junction would enable line marking to be installed, as well as prevent gravel from being transferred onto the Pipers Road road surface.

It is noted that the existing use of the Pipers River Road junction is relatively low by the existing quarry operations, with the majority of traffic utilising Golconda Road to access areas such as Lilydale, Launceston and Scottsdale.

Sight distance is very good in either direction along Pipers River Road, exceeding the Austroads SISD requirements for 100-km/h design speed. The junction looking in both directions along Pipers River Road from Colgraves Road is shown in Figure 7.

**Figure 7 Pipers River Road/ Colgraves Road Junction**

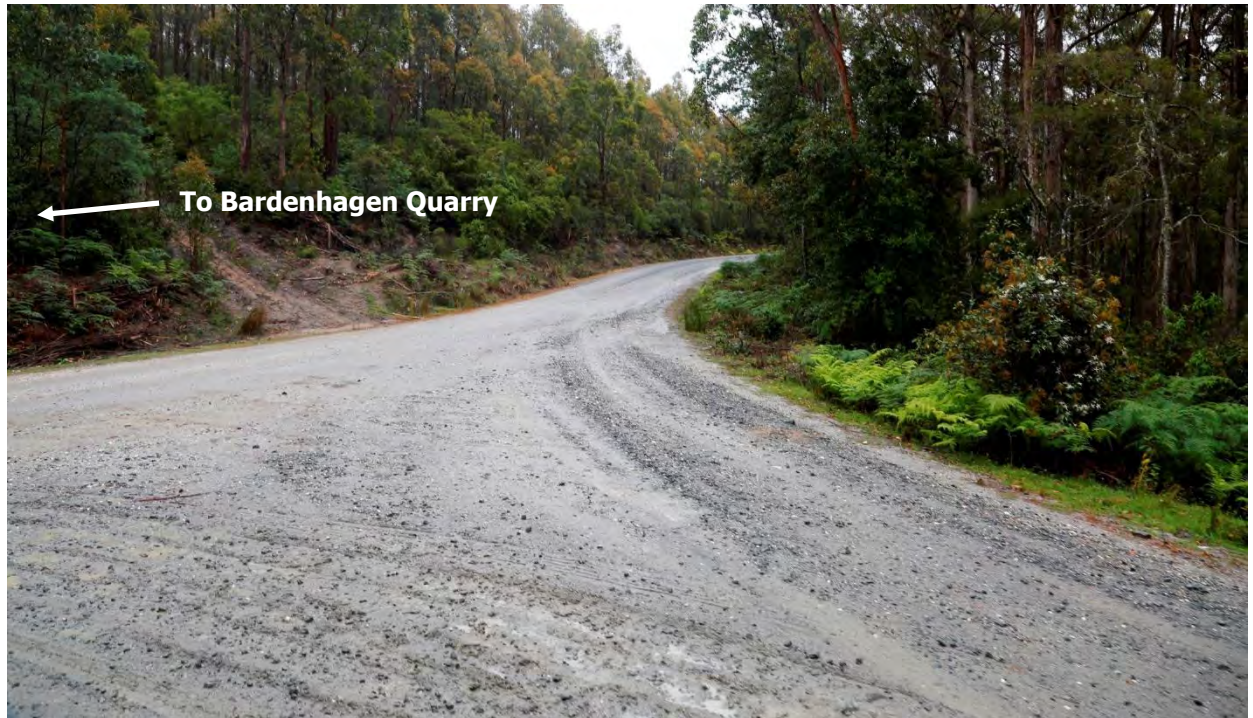


#### **4.3.5 Colgraves Road/ Quarry Access Junction**

The access to Bardenhagen Quarry is a gravel road that connects to Colgraves Road at a wide T-junction with Colgraves Road having priority (in accordance with the T-junction rule). The junction is not defined by signage or line marking, and the through component of Colgraves Road is a sweeping bend.

No specific road safety issues were identified at this junction. Detailed discussion on sight distance at this junction are provided in Section 4.4. The intersection is shown in Figure 8.

**Figure 8 Quarry Access Junction**



#### **4.3.6 South Retreat Road/ Colgraves Road Junction**

The junction of South Retreat Road/ Colgraves Road is an unsealed T-junction. No line marking or signage is in place to indicate which road has priority, therefore the T-junction rule applies. The junction is shown in Figure 9. The primary movement appears to be South Retreat Road south-eastern approach to Colgraves Road and vice versa (noted by existing tyre tracks and varying pavement construction).

**Figure 9 South Retreat Road/ Colgraves Road**



#### **4.3.7 South Retreat Road/ Yonderover Road**

Yonderover Road connects to South Retreat Road (Retreat Road) at a T-junction with South Retreat Road having priority. The intersection is unsealed with no line marking or signage to indicate priority. Yonderover Road is owned by Council and South Retreat Road is owned by Forestry Tasmania.

Sight distance is adequate for the design speeds at the junction on all approaches.

#### **4.4 Sight Distance Assessment**

The Austroads publication, *Guide to Road Design, Part 4A: 'Unsignalised and Signalised Intersections'*, 2009 (Austroads Guide) defines Safe Intersection Sight Distance as follows:

*SISD is the minimum distance which should be provided on the major road at any intersection.*

*SISD:*

- *provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle on a minor road approach moving into a collision situation (e.g. in the worst case, stalling across the traffic lanes) and to decelerate to a stop before reaching the collision point*
- *is viewed between two points to provide inter-visibility between drivers and vehicles on the major road and minor road approaches. It is measured from a driver eye height of 1.1 m above the road to points 1.25 m above the road which represents drivers seeing the upper part of cars.*
- *assumes that the driver on the minor road is situated at a distance of 5.0 m (minimum of 3.0 m) from the lip of the channel or edge line projection of the major road. SISD allows for a 3 s*

*observation time for a driver on the priority legs of the intersection to detect the problem ahead (e.g. car from minor road stalling in through lane) plus the SSD*

- provides sufficient distance for a vehicle to cross the non-terminating movement on two-lane two-way roads, or undertake two-stage crossings of dual carriageways, including those with design speeds of 80 km/h or more*
- should also be provided for drivers of vehicles stored in the centre of the road when undertaking a crossing or right-turning movement*
- enables approaching drivers to see an articulated vehicle, which has properly commenced a manoeuvre from a leg without priority, but its length creates an obstruction*
- is measured along the carriageway from the approaching vehicle to the conflict point, the line of sight having to be clear to a point 5.0 m (3.0 m minimum) back from the holding line or stop line on the side road.*

Each of the road junctions listed in Section 4.3 were assessed for available SISD for the design speed (which equates to the 85<sup>th</sup> percentile speed, which a small sample of vehicle speeds were recorded using a small hand-held radar device at each of the junctions). In locations where traffic volume was very low (with few or no vehicles passing during inspections), the 85<sup>th</sup> percentile speed was estimated using drive-through techniques.

The summary of sight distance findings is provided in Table 2. Note that measurements were taken along the major road from the appropriate location back from the holding line (or location where a holding line would have been in the absence of line marking). Where it is stated that the sight distance is "**>250m**", it refers to the fact that more than the maximum requirement of 250 metres is available.

All junctions were found to have adequate SISD in accordance with Austroads requirements, with the exception of the quarry access junction. Note that the numerical values for SISD are similar for the Planning Scheme requirements. The available SISD measured on site meets the Planning Scheme requirements (Table E4.7.4) for the prevailing 85<sup>th</sup> percentile speeds on the major road of each of the intersections investigated.

The quarry access junction with South Retreat Road falls short of the Planning Scheme SISD requirements by approximately 10 metres (shortfall of approximately 17 metres in accordance with Austroads requirements). The layout of the junction is such that the measurements vary depending on the location that the vehicle props to give way – increased sight distance is available from a location back from the junction (due to the curves in the road – available sight distance increases to approximately 90 metres). It is further noted that the junction has very few vehicle movements during peak periods, and that most of these movements are associated with the Quarry itself. The dominant turning movements are left-in/ right out, with few vehicles approaching from the quarry access. For these reasons, the junction is considered safe and efficient.

**Table 2 Sight Distance Assessment Summary**

Junction	Sight Distance Left	Sight Distance Right	85 <sup>th</sup> Percentile Speed	Required SISD (Planning Scheme/ Austroads)	Comments
Golconda Rd/ Bacala Rd	>250m	250m	100-km/h	250m 248m	More than adequate SISD
Golconda Rd/ Tunnel Rd	>250m	>250m	100-km/h	250m 248m	More than adequate SISD
Tunnel Rd/ Bacala/ South Retreat Rd	155m	175m	60-km/h	115m 123m	More than adequate SISD
Pipers River Rd/ Colgraves Rd	>250m	220m	90-km/h	210m 214m	More than adequate SISD
South Retreat Rd/ Quarry access	100m	80m	50-km/h	90m 97m	SISD to right falls short of Scheme requirements by 10m (17m Austroads)
South Retreat Rd/ Colgraves Rd	85m	130m	40-km/h	- 73m	More than adequate SISD
South Retreat Rd/ Yonderover Rd	>250m	100m	60-km/h	115m 123m	Vision to the right is partly obscured by an embankment

#### 4.5 Road Safety Impacts

No significant detrimental road safety impacts are foreseen for the proposed development based on the following:

- There is sufficient capacity in the surrounding network to safely absorb the annual increase in heavy vehicle traffic in the surrounding road network. The maximum daily output of the quarry is not proposed to alter, therefore the peak hourly capacity of any of the junctions in the surrounding network will not be impacted.



- There is sufficient sight distance available at all road intersections in the surrounding transport network for the prevailing vehicle speeds in accordance with the Planning Scheme requirements.
- There is no crash history to suggest that there are any existing road safety deficiencies in the vicinity of the subject site.
- The proposed development is not a new development but an expansion of existing long-term activity and as such, heavy vehicle movements into and out of the site will not be seen as an unusual event by other motorists.

## 4.6 Planning Scheme Requirements

The Planning Scheme requires the following with respect to a TIA:

*E4.5.1 A TIA is required to demonstrate compliance with performance criteria.*

*E4.5.2 A TIA for roads must be undertaken in accordance with Traffic Impact Assessment Guidelines, Department of Infrastructure, Energy and Resources September 2007. Australian Guidelines and Australian Standards are to be used as the basis for any required road or junction design.*

*E4.5.3 A TIA must be accompanied by written advice as to the adequacy of the TIA from the:*  
*a) road authority in respect of a road; and*

*rail authority in respect of a railway.*

*E4.5.4 The Council must consider the written advice of the relevant authority when assessing an application which relies on performance criteria to meet an applicable standard*

The Road or Rail Infrastructure Use Standards that are relevant for the proposed development are provided in Table 3.

**Table 3 Planning Scheme Road & Rail Assets Code**

Acceptable Solution	Performance Criteria
<p>E4.6.1 – Use of road or rail infrastructure, A3: For roads with a speed limit of more than 60km/h the use must not increase the annual average daily traffic (AADT) movements at the existing access or junction by more than 10%.</p>	<p>P3: For limited access roads and roads with a speed limit of more than 60km/h:</p> <ul style="list-style-type: none"> <li>a) access to a category 1 road or limited access road must only be via an existing access or junction or the use or development must provide a significant social and economic benefit to the State or region; and</li> <li>b) any increase in use of an existing access or junction or development of a new access or junction to a limited access road or a category 1, 2 or 3 road must be for a use that is dependent on the site for its unique resources, characteristics or locational attributes and an alternate site or access to a category 4 or 5 road is not practicable; and</li> <li>c) an access or junction which is increased in use or is a new access or junction must be designed and located to maintain an adequate level of safety and efficiency for all road users.</li> </ul>
<p>E4.7.2 – Management of Road Accesses and Junctions, A2: For roads with a speed limit of more than 60km/h the development must not include a new access or junction.</p>	<p>P2: For limited access roads and roads with a speed limit of more than 60km/h:</p> <ul style="list-style-type: none"> <li>d) access to a category 1 road or limited access road must only be via an existing access or junction or the development must provide a significant social and economic benefit to the State or region; and</li> <li>e) any increase in use of an existing access or junction or development of a new access or junction to a limited access road or a category 1, 2 or 3 road must be dependent on the site for its unique resources, characteristics or locational attributes and an alternate site or access to a category 4 or 5 road is not practicable; and</li> <li>f) an access or junction which is increased in use or is a new access or junction must be designed and located to maintain an adequate level of safety and efficiency for all road users.</li> </ul>

<p>E4.7.4 – Sight Distance at Accesses, Junctions and Level Crossings.</p> <p>A1: Sight distances at</p> <ul style="list-style-type: none"> <li>a) an access or junction must comply with the Safe Intersection Sight Distance shown in Table E4.7.4; and</li> <li>b) rail level crossings must comply with AS1742.7 Manual of uniform traffic control devices - Railway crossings, Standards Association of Australia; or</li> <li>c) If the access is a temporary access, the written consent of the relevant authority has been obtained.</li> </ul>	<p>P1: The design, layout and location of an access, junction or rail level crossing must provide adequate sight distances to ensure the safe movement of vehicles.</p>
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The response to the requirements of the Road and Rail Assets Code are provided in Table 4.

**Table 4 Response to Road and Rail Assets Code Requirements**

Road and Rail Assets Code Requirement	Response
E4.6.1 – Use of road or rail infrastructure, A3	<p>The speed limit on the various roads surrounding the proposed development is 100-km/h. The proposed development does not generate peak hour traffic volumes beyond what is currently experienced, and therefore on this basis the junction volumes will not be exceeded by more than 10%.</p> <p>The yearly traffic volume will increase however, therefore the AADT (Annual Average Daily Traffic) will increase by more than 10%. In this case, the site utilises access roads that are not category 1. The site and development provide unique resources (and has done for decades), and alternative access to the site is not available.</p> <p>The existing access junctions are suitable for the proposed increase use and provide an adequate level of safety and efficiency. Noting that the peak hour use of the surrounding road network intersections does not increase from existing use.</p>
E4.7.2 – Management of Road Accesses and Junctions, A2	<p>No new junctions are proposed as part of the development – therefore the Acceptable Solution is met.</p>
E4.7.4 – Sight Distance at Accesses, Junctions and Level Crossings, A1	<p>All junctions utilised by vehicles associated with the quarry meet SISD requirements in accordance with Planning Scheme and Austroads requirements with the exception of the quarry access road junction. Note that the design speed relates to the 85<sup>th</sup> percentile speed of the major road at each intersection, and in most cases, this was found to be less than the posted speed limit (100-km/h).</p> <p>A review of the quarry access road reveals that increased sight distance is available from further back in the junction. Traffic volumes are low at this junction, thus reducing the risk profile of the junction.</p>

The requirements of the Road and Rail Assets Code are therefore met in accordance with the Planning Scheme requirements.

## 5. Conclusions

This traffic impact assessment (TIA) investigated the road and traffic impacts of the proposed expansion of operations at the Bardenhagen quarry. Access to the site is via a number of Council and Forestry roads connecting the site between Golconda Road and Pipers River Road.

This TIA has been conducted following a review of available traffic data and information, Austroads Guidelines, Australian Standards, Planning Scheme and other supplementary traffic data and information.

The key findings of the report are as follows:

- The proposed development is for an increase of output from the quarry from the currently approved rate of 50,000 cubic metres to 200,000 cubic metres. The quarry services councils and developments in the nearby area with high quality construction materials. The majority of truck movements connect to Golconda Road via Tunnel Road and Bacala Road.
- When operating at maximum capacity, the quarry generates up to 116 vehicles per day. This consists of 95 heavy vehicle trips (two-way movements – consisting of up to 47 one-way laden truck movements). The proposed development will not increase peak daily generation, but will enable the quarry to produce more on a yearly basis. For this reason, the various junctions within the surrounding road network will continue to operate in a safe and efficient manner. The peak hourly generation of the quarry is likely to be in the order of 10 trips per hour, which is well within the surrounding road network's ability to absorb without any significant loss of level of service.
- Adequate sight distance is provided at the site access, as well as other major road junctions in the surrounding transport network in accordance with the Planning Scheme requirements for the prevailing vehicle speeds.
- The requirements of the Road and Rail Assets Code of the Planning Scheme are met (refer to Section 4.6).

Based on the findings of this report, and subject to the recommendations above, the proposed development is supported on traffic grounds.

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Revision	Author	Review	Date
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Please contact Customer Service on 6323 3000

*Gundagi Quarry, Bangor - DPEMP*

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**Appendix E: Quarry Environmental Operational Procedures**

## Bardenhagen Quarries - Environmental Operating Procedure

# EOP Water Sampling – Sediment Dams

### 1. Background

The maintenance of good water quality of the surface flows exiting the Mining Lease is an important component of the environmental goals of the quarry operator. This procedure outlines the measures to sample water from the sediment dam to determine water quality for the purposes of compliance with environmental regulation requirements.

### 2. Definitions

- **TSS** - Total Suspended Solids measured as mg/L or parts per million (ppm).
- **pH** - is a measure of the alkalinity/acidity of the water. It is measured on a scale of 1-14. Distilled water has a pH of 7.0.
- **Conductivity** - is the salinity or total dissolved solids in water. It is measured in mg/L or uS/cm (microsiemens).
- **Oil and grease** - is the oil/grease content of the water. It is measured in mg/L.

### 3. Procedures

#### During Sediment Dam Construction and Modification – Sample Site 1

Samples of discharge will be collected from the discharge point (overflow) of the 'upper' sediment dam whilst EPN 9053/1 is in force. This is Site 1 on Map 1. When the upper dam is not discharging then no samples are required to be taken, however notes need to be taken to record this such that discharge events can be differentiated from those where no discharge occurred.

Water leaving the Mining Lease must not contain more than 30mg/L total suspended solids.

Samples need to be collected weekly and include the following parameters –

- TSS, pH, turbidity and a *visual assessment* for oil and grease.

Each month a brief report (email, spreadsheet or similar) must be lodged with the EPA that outlines the status of discharge (ie no discharge or discharge) and any results for the discharge tested.

#### After Sediment Dam Construction and Modification – Sample Site 2

Once EPN 9053/1 is no longer in force (ie when the 'lower' sediment dam has been completed, is fully functional and 'signed off') the discharge point (overflow) will shift to the 'lower' sediment dam at which time no further samples of discharge are required from the 'upper' sediment dam.

Samples need to be collected and tested 6 monthly (or if the intervening time between discharge events exceeds 6 months the sample will be collected at the next discharge event) and include the following parameters –

- TSS, pH and Oil and Grease.

**All** water sampling is subject to the following:



## Bardenhagen Quarries - Environmental Operating Procedure

- (a) The sample must be tested in a laboratory accredited by the National Association of Testing Authorities (NATA) for the specified test;
- (b) The sample must be collected and analysed in accordance with the relevant Australian Standards or NATA approved methods;
- (c) Details relating to the collecting and analysis of each sample must be retained for at least three years after the date of measurement and be made available on request by the relevant regulatory authority; and
- (d) The sample must be collected and transported by a person with appropriate training and experience.

### 4. Responsibilities

The Site Manager is to ensure that water sampling is conducted regularly and within the timeframe required by the regulatory authorities and permits. They are also to ensure that the sampling records are retained for at least three years after the date of measurement and be made available on request by the relevant regulatory authority.

### Document Revision History

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Author: Richard Barnes

Authorisation: Leigh Bardenhagen

Signature: Original stored at Lilydale Office

## Bardenhagen Quarries - Environmental Operating Procedure

### EOP - Environmental Incident Reporting

If an incident causing or threatening to cause environmental nuisance, serious or material environmental harm from pollution occurs in the course of an activity, then the Site Manager responsible for the activity must:-

- (a) Immediately take all responsible and practicable action to minimise any adverse environmental effects from the incident;
- (b) As soon as reasonably practicable, but not later than 24 hours, after becoming aware of the incident, notify the Director EPA of the incident by a telephone call to the 24 hour emergency telephone number 1800 005 171: and
- (c) Not later than 48 hours after becoming aware of the incident, provide details of the incident to the Director by facsimile to 03 6233 3800, or by hand delivery, outlining the nature of the incident, the circumstances in which it occurred and the action taken to deal with the incident.

#### 1. Background

With any Level 2 activity approved under EMPCA there is the possibility that an accident or mistake may lead to or increase the likelihood of environmental harm. It is therefore necessary to have in place this procedure to report and record all environmental incidents. The aim of this EOP is also to outline the procedure to identify the real cause of any environmental incident. This needs to be approached in a logical and methodical way. Importantly, the incident investigation process is not about apportioning blame, rather it is about finding the real cause(s).

#### 2. Definitions

- Incident – an event that has caused or is likely to cause environmental harm or nuisance, such as an oil spillage or fuel leak from machinery.
- Essential factors – factors which if they had not occurred, the incident would not have happened. If you take any one essential factor out, the incident sequence is broken. An essential factor may be likened to taking a link out of a chain.
- Contributory factors – if not present the incident could still have happened, but the probability of the incident occurring increases if this factor is present.

#### 3. Incident Reporting Objectives

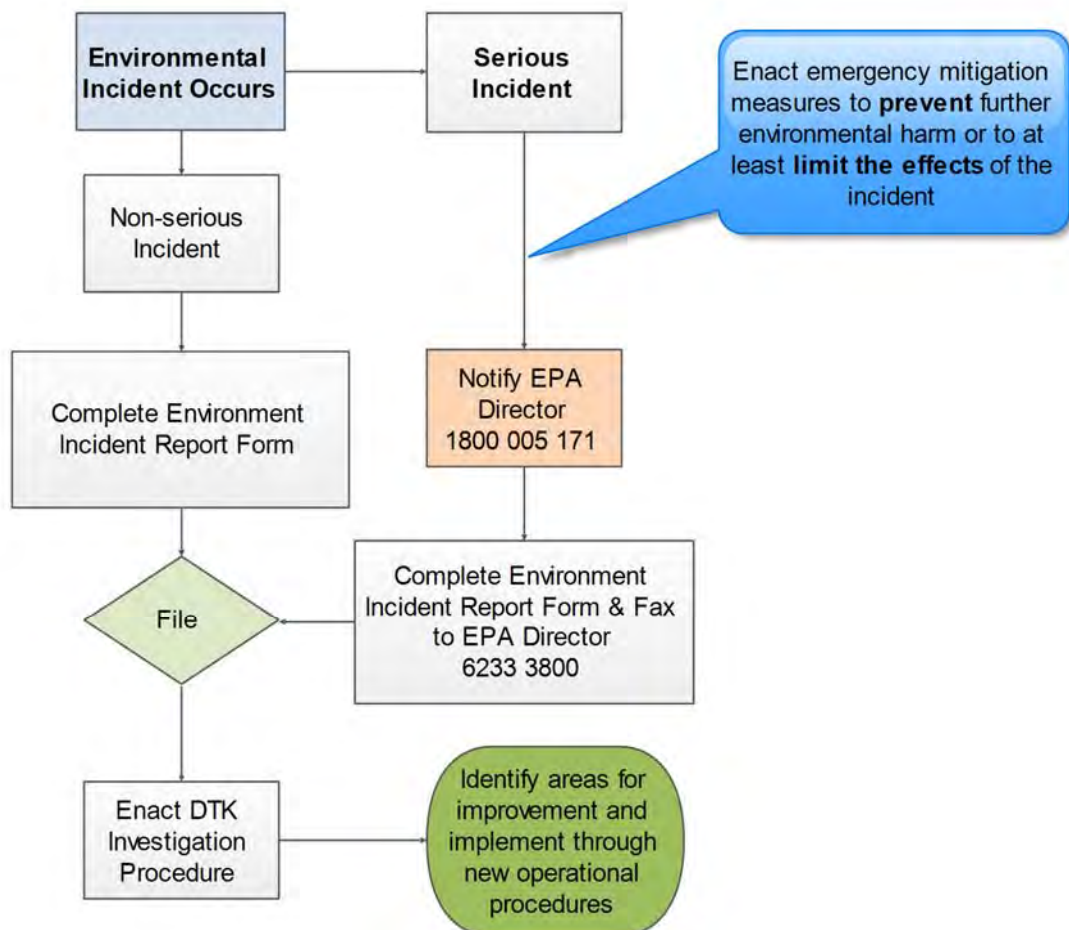
The procedure shown in the below flowchart will be applied as soon as possible after the detection of an environmental incident or increased likelihood of an environmental incident.

- a. To determine the causes of an environmental incident or loss so that appropriate action can be taken to prevent a recurrence.
- b. To maintain comprehensive records of property loss and other unplanned incidents so that through analysis, trouble areas can be pinpointed and remedial action taken.

## Bardenhagen Quarries - Environmental Operating Procedure

- c. The process of collecting the information raises the awareness of those concerned and fellow employees about the hazards and environmental conditions involved.
- d. To provide management with a system for monitoring the effectiveness of control actions developed following environmental incidents.
- e. The investigation must try to answer –
  - i. Who was involved?
  - ii. What happened, what were the essential and contributing factors?
  - iii. When did the incident occur?
  - iv. Where did the incident occur?
  - v. How can a similar incident be prevented from happening again?

### Incident Reporting Flowchart



## Bardenhagen Quarries - Environmental Operating Procedure

### 4. DTK Environmental Investigation Procedure

- The Site Manager is to be involved in the investigation process.
- Interview witnesses and those who were directly involved in the incident or reported the incident.
- Take account of the three main elements –
  - ▶ *People*    ▶ *Equipment and/or machines*    ▶ *Environmental factors*
- Clearly describe the incident sequence in dot point form from prior to the sequence commencing until after it ended. Place each event in a time frame sequence so that no important point or event is overlooked.
- List the essential factors in dot point form. Establish and record the contributory factors.
- Identify areas for improvement in the operational and planning aspects of the quarry activity and implement through for example –
  - Training;
  - Additional site environmental control measures;
  - Modifications to site infrastructure such as the sediment dams, drains or roads; and/or
  - Other measures, processes or procedures as identified through the investigation process.

### 5. Responsibilities

The responsibility to ensure the preceding environmental incident reporting and investigation procedure is carried out is vested in the Site Manager.

### Document Revision History

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Author: Richard Barnes

Authorisation: Leigh Bardenhagen

Signature: \_\_\_\_\_



**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

# Bardenhagen Quarries - Environmental Operating Procedure

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Original stored at Lilydale  
Office

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Bardenhagen Quarries - Environmental Operating Procedure

**EOP – Solid Waste Disposal**

**1. Background**

Bardenhagen Quarries is committed to minimising waste and to reuse and recover products rather than dispose of waste at a landfill. This procedure outlines the types and fate of wastes generated at the Gundagi Quarry.

**2. Classes of Waste**

**Sediment from dams**

- The sediment extracted from the two sediment dams will be reused in the rehabilitation process to enhance the amount of grave/soil in the topsoil mix.

**Other Solid wastes**

- General domestic wastes are to be removed from the quarry each and every day by staff and contractors. No bins are provided on-site to ensure they do not attract native animals.
- Scrap metal is to be placed in the scrap skip where it can be sold as scrap to scrap steel merchants.

**3. Responsibilities**

All operators on becoming aware of an environmental incident in relation to solid waste activities are required to:

- (1) take all reasonable actions to mitigate the environmental nuisance occurring with due consideration to safety; and
- (2) notify the Site Manager as a soon as practicable.

All staff and contractors are to be trained in this procedure and are required to implement it to ensure that solid wastes are managed effectively to prevent environmental harm or nuisance.

The responsibility to ensure the preceding procedure is carried out is vested in the Site Manager, which includes the delivery of training and compliance auditing of the quarry activity.

Document Revision History

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**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

## Bardenhagen Quarries - Environmental Operating Procedure

Author: Richard Barnes

Authorisation: Leigh Bardenhagen

Signature: Original stored at Lilydale Office

## Bardenhagen Quarries - Environmental Operating Procedure

# EOP - Identifying Environmental Aspects & Potential Impacts

### 1. Background

This procedure is to ensure all environmentally significant aspects and their effects on the environment are identified, evaluated and appropriately managed. This procedure is also intended to provide a process for Bardenhagen Quarries to identify significant environmental aspects that should be addressed as a priority. The areas identified by this procedure are those activities over which Bardenhagen Quarries has control and influence.

In this context this procedure applies to all aspects which entail:

- a legal requirement, for example compliance with a permit/licence;
- a commitment made in a Bardenhagen Quarries policy or corporate document; or
- those activities which are considered to have a potentially significant impact on the environment.

### 2. Development of Environmental Aspect and Impact Register

Conduct an assessment of major work activities within the chosen work area e.g. contamination of runoff water. This assessment is to be conducted in conjunction with appropriate manager and personnel and that work area.

The following steps are to be taken when developing the hazard register –

- a. Identify areas to be reviewed
- b. Describe the activities carried out in the identified area.
- c. List reason why undertaken activities eg store logs.
- d. List the impacts associated with each aspect activity eg leachate.
- e. Assess the consequences of each impact see table below.
- f. Identify appropriate controls.
- g. Repeat step c. for each cause associated with the identified.
- h. If rating is greater than moderate, action is to be taken to further reduce the risk.



## Bardenhagen Quarries - Environmental Operating Procedure

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A 5 (Almost Certain)	M 5	H 10	E 15	E 20	E 25
B 4 (Likely)	M 4	H 8	H 12	E 16	E 20
C 3 (Moderate)	L 3	M 6	H 9	E 12	E 15
D 2 (Unlikely)	L 2	L 4	M 6	H 8	E 10
E 1 (Rare)	L 1	L 2	L 3	M 4	H 5

### Legend:

E:	extreme risk	immediate action required
H:	high risk	senior management attention needed
M:	moderate risk	management responsibility must be specified
L:	low risk	manage by routine procedures.

## Definitions of Legends

Level	Descriptor	Environment
1	Insignificant	<ul style="list-style-type: none"> <li>Alteration/disturbance within limits of natural variability.</li> <li>Effects not transmitted or accumulating.</li> <li>Resources not impaired.</li> <li>None to sporadic complaints from community.</li> </ul>
2	Minor	<ul style="list-style-type: none"> <li>On-site release immediately contained medium financial loss.</li> <li>Temporary alteration/disturbance beyond natural variability.</li> <li>Effects confined to site and not accumulating. Resources temporarily affected.</li> <li>Restoration time within 1 – 5 years. Sporadic to widespread complaints.</li> </ul>
3	Moderate	<ul style="list-style-type: none"> <li>On-site release contained with outside assistance,</li> <li>High financial loss.</li> <li>Alteration/disturbance of a component of an ecosystem.</li> <li>Effects not transmitted or accumulating.</li> <li>Potential loss of resource but sustainability unaffected. Restoration time 5-10 years.</li> <li>Clean up confined to site, although potential for groundwater contamination.</li> <li>Widespread complaints or threats of community action eg organised opposition to activity by community – public meetings.</li> </ul>

## Bardenhagen Quarries - Environmental Operating Procedure

4	Major	<ul style="list-style-type: none"> <li>Loss of production capability,</li> <li>Off-site release with no detrimental effects, major financial loss.</li> <li>Alteration to one or more ecosystems or component levels, but which is recoverable.</li> <li>Effects transmitted or accumulated.</li> <li>Loss of sustainability of selected resources.</li> <li>Requirements for clean-up of site.</li> <li>Restoration time 25-20 years.</li> <li>Threats of community action to vigorous community action eg Organised opposition to activity by community including public meetings, involvement with media, politicians.</li> <li>Threat to continuing operational activity.</li> </ul>
5	Catastrophic	<ul style="list-style-type: none"> <li>Toxic release off-site with detrimental effect, huge financial loss.</li> <li>Irreversible alteration to one or more ecosystems or several component levels.</li> <li>Effects can be transmitted or accumulated.</li> <li>Cannot be restored over time.</li> <li>Vigorous community action may lead to business closure, legislative changes.</li> </ul>

Level	Descriptor	Description
A	Almost certain	Is expected to occur in most circumstances
B	Likely	Will probably occur in most circumstances.
C	Possible	Might occur at some time. Annual frequency
D	Unlikely	Could occur at some time.
E	Rare	May occur only in exceptional circumstances.

### 3. Responsibilities

It is the responsibility of the Site Manager to oversee the process that enables Bardenhagen Quarries to identify, examine and evaluate any environmental aspects caused by or likely to be caused by its Gundagi Quarry operation. It is also the responsibility of the Site Manager to ensure that the application and control of work procedures address significant aspects are identified.

### Document Revision History

Version	Released	Date
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## Bardenhagen Quarries - Environmental Operating Procedure

V 1.0	Yes	22-7-14

Author: Richard Barnes

Authorisation: Leigh Bardenhagen

Signature: Original stored at Lilydale Office

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*Gundagi Quarry, Bangor - DPEMP*

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**Appendix F: Weed and Pathogen Management Plan**



# GUNDAGI QUARRY

# WEED AND PATHOGEN MANAGEMENT PLAN

July 2014

 **Final**  
an Diemen CONSULTING

PO Box 1 NEW TOWN 17008

**PREFACE**

**PROJECT:** Gundagi Quarry  
 Weed and Pathogen Management Plan

**AUTHORS:** Dr Richard Barnes (RWB) and Dr Colin M<sup>c</sup>Coull (CMc)

Date	Purpose of Issue/Revision	Rev	Reviewed by	Issue Authorised by
10-6-14	Internal Review	1.0	RWB/CMc	RWB
23-7-14	Client Review	1.0		
23-7-14	Review	1.0	EPA	

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**INTRODUCTION**

The meaning of weed(s) in this Plan has the same meaning as a declared weed in the *Weed Management Act* 1999.

**OBJECTIVES OF PLAN**

The objectives of the Weed Management Plan (the Plan) are to:

- record and map the occurrence of weeds within the Lease, with particular focus on the Quarry Operational Area;
- identify and implement management measures within the Quarry Operational Area in the Mining Lease to -
  - minimise the risk of spreading propagules of weeds within the Lease and to locations outside the Mining Lease;
  - control and/or eradicate weeds within the Quarry Operational Area where practicable;
  - ensure that rehabilitation works are not compromised by the occurrence or growth of weeds; and to
  - minimise the risk of introducing soil-borne pathogens into the Lease.
- monitor and review the results of on-ground actions as required;
- describe a process to enable the periodic importation of clean-fill into the quarry to aid quarry rehabilitation/operation; and to
- establish a mechanism to review the Plan, including its objectives and implementation.



## **WEED PLANNING AND MANAGEMENT FRAMEWORK**

The Plan operates within an existing framework of legislative and planning requirements for the management and control of weeds.

### ***Weed Management Act 1999***

The objectives of the Act further the objectives of the Resource Management and Planning System (RMPS) of Tasmania.

In particular the Act provides for the control and eradication of weeds having regard to the need to -

- (a) minimise negative effects of weeds on the sustainability of Tasmania's productive capacity and natural ecosystems; and
- (b) promote a strategic and sustainable approach to weed management; and
- (c) encourage community involvement in weed management; and
- (d) promote the sharing of responsibility for weed management between government, natural resource managers, the community and industry in Tasmania.

### ***Weed Management Regulations 2000***

The Regulations are the statutory rules that underpin the Act itself. They detail the requirements and measures referred to in the Act, including:

- Tolerance Level Requirements (in relation to seed contamination levels within grain imported into the State);
- Livestock Importation Prescribed Measures; and
- Infringement Notices and Penalties.

### **Weed Management Plans**

Once a species has been listed as a Declared Weed a Weed Management Plan (WMP) is developed for it.

A WMP should include the:

- name of the target weed (including details of how to identify the species and how it is spread through the environment);
- objectives and methods of the Plan;
- comments on the effect on the environment if strategy is implemented;
- cost of strategy and proposed funding method to implement;
- monitoring /Evaluation methods;
- time period within which the Plan operates and milestones for review; and the
- region or area of operation for the Plan.

### **Quarry Code of Practice 1999**

The Code of Practice provides guidance and advice in Section 6.8 on the prevention of weed spread within and from quarry/mine sites.

## **ROLE AND RESPONSIBILITIES**

### **DTK Logging Ltd**

Responsible for ensuring that:

- the Site Manager is briefed on the requirements of the Plan and its importance to the overall success of operating the mining operation;
- this Plan is complied with through regular assessments of the Quarry Operational Area and Lease and liaison with the SM;
- any variations to this Plan are developed and provided to the Environment Protection Authority prior to their implementation; and
- an implementation report is lodged every 12 months through the Annual Environmental Report (AER) process to the Environment Protection Authority.

### **Site Manager**

The Site Manager (SM) for the Quarry Operational Area and Lease is directly responsible for ensuring that:

- this Plan is complied with, appropriately implemented and reviewed from time to time as required;
- reporting to DTK Logging Pty Ltd or their representative on the implementation of this Plan including any breaches and how they were recorded and addressed; and
- staff and contractors are trained in weed hygiene measures, with emphasis on those relevant to their appointed tasks.

### **Staff and Contractors**

All staff and contractors that work within the Quarry Operational Area and Lease are responsible for:

- Applying weed hygiene measures for which they have received training;
- Reporting to the SM any breaches of this Plan as soon as practical, providing written details of the breach, and any measures that were immediately taken to reduce the likelihood of any environmental harm; and
- Reporting new occurrences of weeds to the SM within a reasonable timeframe of detection.

**MINING LEASE AND QUARRY OPERATIONAL AREA**

**LOCATION**

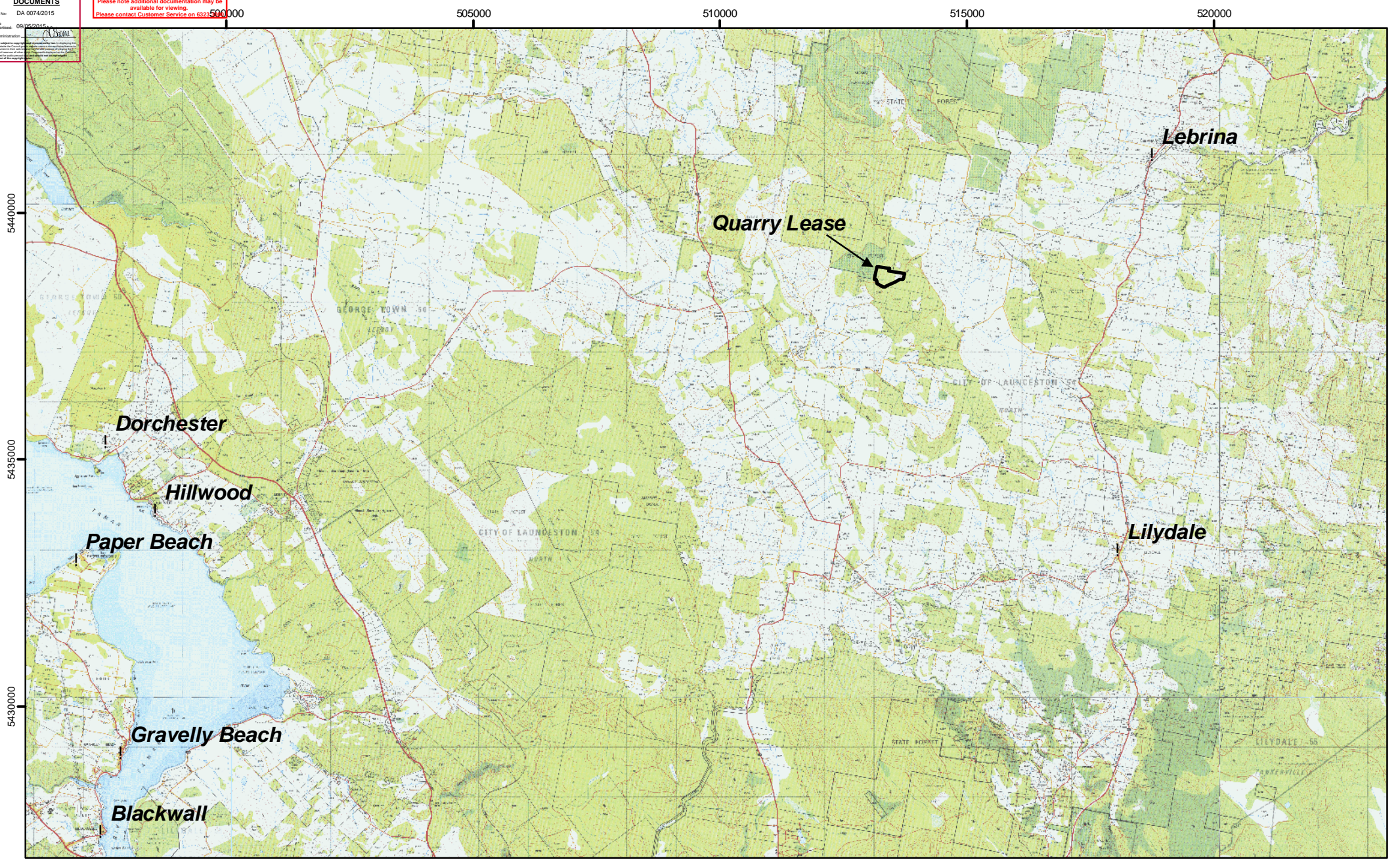
Figure 1 illustrates the Mining Lease within which the Gundagi Quarry operates. The quarry is located on a 13.64 hectare area of land on Gundagai road at Tunnel (Figure 1 and 3). The nearest main township is Lilydale which is seven kilometres to the north-west of the quarry. The Mining Lease is predominantly plantation forest and the existing and proposed quarry expansion area is located in the north east corner of the property; the area permitted to be utilised unrehabilitated for quarrying is 1.5 hectares. The quarry and associated infrastructure occupies a relatively small area in the Mining Lease. There will be gradual expansion and progressive rehabilitation of the ‘active’ open cut area as quarrying in the Lease progresses. Quarried areas have been and will continue to be rehabilitated with the topsoil and overburden that was removed during the rock extraction process.

**CLIMATE**

The average annual rainfall for the quarries closest meteorological record station is 991.6 mm (Scottsdale-West Minstone road observation station, 39 years of records). The maritime influence on temperatures is less pronounced than more coastal regions (eg Pipers River) which results in more severe and frequent frosts in winter and lower temperature averages in winter and higher summer temperatures. The mean maximum temperature is 17.3 oC and the mean minimum is 7.1 oC (35 years of records). The highest daily maximum temperature recorded is 37.7oC and occurred in January. The lowest daily minimum temperature recorded is -4.7 oC and occurred in August (35 years of records).

**GEOLOGY**

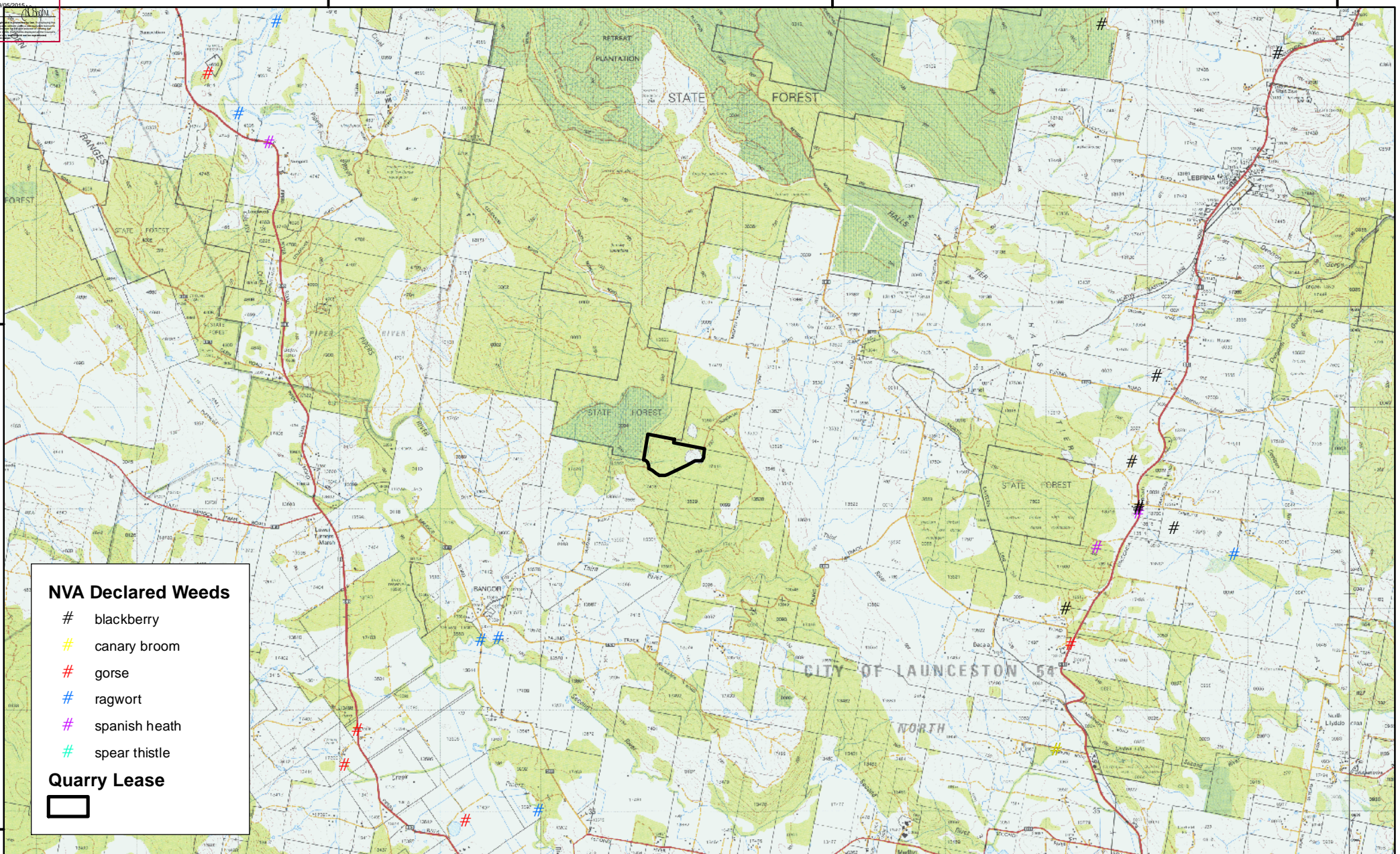
The area is located on a low north-north-west trending hill formed by sandstone and mudstone deposits; these deposits are known as the Mathinna Beds. The area utilised for the existing quarry and the proposed expansion area is on the southern side of a crest which then falls to the south west of the site.



**Gundagi Quarry  
 Weed Management Plan**  
 Figure 1: Quarry lease 1676P/M location map



Datum: GDA94 Grid: MGA Zone 54  
 Date: 25th June 2012  
 Prepared by: Van Diemen Consulting  
 Mapsheets: Lilydale 5043  
 Client: Lee Bardenhagen



**NVA Declared Weeds**

- # blackberry
- # canary broom
- # gorse
- # ragwort
- # spanish heath
- # spear thistle

**Quarry Lease**

□



**Gundagi Quarry  
 Weed Management Plan**  
 Figure 2: Regional weed locations (NVA)



Datum: GDA94 Grid: MGA Zone 54  
 Date: 25th June 2012  
 Prepared by: Van Diemen Consulting  
 Mapsheets: Lilydale 5043  
 Client: Lee Bardenhagen



**Observed Weeds**

- # gorse
- # ragwort
- # spanish heath
- # spear thistle

**Quarry Lease**

□



## Gundagi Quarry Weed Management Plan

Figure 3: Adjacent and within lease weed locations



Datum: GDA94 Grid: MGA Zone 54  
 Date: 25th June 2012  
 Prepared by: Van Diemen Consulting  
 Mapsheets: Lilydale 5043  
 Client: Lee Bardenhagen

## MANAGEMENT ZONES IN THE QUARRY AND SURROUNDS

For management purposes it is prudent to identify *zones* within and around the Lease which can be the focus of specific weed control and monitoring activities.

Six zones have been identified in Figure 4 and are described below. A summary of each zone is provided in Table 1.

### Weed Management Zone 1 – South Retreat Road

Zone 1 includes both sides of South Retreat Road from its junction with Gundagi Road to the junction with the quarry entrance road.

### Weed Management Zone 2 – Retreat Road (west)

Zone 2 includes both sides of Retreat Road between its junction with the quarry entrance road and 50 m to the west.

### Weed Management Zone 3 – Quarry Entrance Road

Zone 3 includes the gravel road and areas adjacent to it for the access road into the Lease.

### Weed Management Zone 4 – Main Quarry ('Quarry Operational Area')

Zone 4 includes the area used for blasting, extracting and processing gravel. This Zone should be given the highest priority for weed monitoring and control works (if required) as it is the area within which most truck and vehicle movements occur.

### Weed Management Zone 5 – Adjacent Quarry

Zone 5 includes the 'Rush Quarry' and associated access track which has not been used since 2005. This zone has been identified for monitoring and some weed control works as gorse is already present in the quarry and therefore it poses an operational weed risk to the Gundagi Quarry.

There is however no obligation on DTK Logging Pty Ltd to manage or eradicate weeds within Zone 5 because (i) it is land not owned or managed DTK Logging Pty Ltd and (ii) the land is not directly associated with the Gundagi Quarry operation.

### Weed Management Zone 6 – Quarry Lease

Zone 6 includes most of the Lease that is currently not used or accessed by for the purposes of extracting gravel or associated activities. This area will be used for the construction of a new dam (lower in the catchment than the existing dam) and will also be used to extract rock/gravel under the 200,000 cubic metre per annum application process. As areas become utilised for the purpose of extracting gravel, including the development of tracks and roads, drainage channels and the stripping and stockpiling of topsoil, they will be included within the Quarry Operational Area and managed accordingly.





**Gundagi Quarry – Weed and Pathogen Management Plan**

**Table 1. Weed Management Zones associated with the gravel extraction operation at Gundagi Quarry**

<b>Zone Number</b>	<b>Zone Name</b>	<b>Zone Description</b>	<b>Known Weed Infestations</b>	<b>Priority Actions</b>	<b>Monitor for weeds</b>
<b>1</b>	South Retreat Road	The section of South Retreat Road from its junction with Gundagi Road and the quarry access road	Spanish heath	Spray to control Spanish heath	12 monthly
<b>2</b>	Retreat Road (west)	A 350m section of Retreat Road commencing from its junction with the quarry access road	Nil	Nil	12 monthly
<b>3</b>	Quarry Access Road	The gravel road that accesses the quarry from South Retreat Road	Ragwort	Spray to eradicate ragwort	3 monthly
<b>4</b>	Main Quarry ('Quarry Operational Area')	The area where blasting and gravel extraction is occurring	Ragwort	Spray to eradicate ragwort	3 monthly
<b>5</b>	Adjacent Quarry	The quarry known as 'Rush quarry'	Gorse	Spray eradicate gorse bushes	6 monthly
<b>6</b>	Quarry Lease	The Mining Lease 1676P/M	Nil	Nil	3 monthly

## **WEEDS IN QUARRY OPERATIONAL AREA (WMZ 4)**

One weed species has been identified within the Mine Operational Area (Figure 2 and Table 1).

### **RAGWORT**

Ragwort is widely distributed throughout the grazing areas of Tasmania, with the exception of the Midlands where it occurs only in small patches. Ragwort also occurs on the shores of several lakes on the Central Plateau, and along roadsides in many areas of the state. The heaviest infestations occur on poorly managed pastures.

Ragwort is a serious pasture weed in Tasmania. Ragwort plants are extremely competitive, and competition from ragwort causes a significant reduction in pasture production. Ragwort is also poisonous to most types of livestock.

Ragwort lives for two years if left undisturbed with most seed germination occurring in autumn. The plant forms a rosette (in its first year a cluster of leaves close to the ground), and in its second year it becomes an erect plant up to 1.5 m in height with convoluted dark green leaves and bright yellow flowers. The flowers are formed at the end of small branchlets resulting in a characteristic flat-topped flower arrangement.

When growing in pasture, ragwort often lives for more than 2 years due to damage to the plant from stock hooves, grazing and cutting. When plants are damaged, new shoots are produced from the original stem or from larger roots left in the ground. These damaged plants can produce large bushes of many flowering stems, and flower multiple times over several years.

Ragwort is spread by seed. The majority of seeds are deposited within 20 m of the parent plant but may be dispersed up to a kilometre or more by strong winds. Seeds can also be spread on the coats of animals, on farm machinery, logging equipment, trucks and other vehicles, and in contaminated hay.

## PLAN IMPLEMENTATION

### SPRAYING PROGRAM

A targeted Weed Spraying Program should be developed in consultation with a weed spraying contractor whom would implement the program on-site. The program should be reviewed each year, when the Annual Report is completed, and updated as new information about the occurrence of weeds within the Mine Operational Area become available.

The Rivercare 'Guideline for Safe and Effective Herbicide Use near Water' (Appendix A) should be applied for any spraying activity in the Mine Operational Area.

The Weed Spraying Program will form part of this Plan and carry with it the same responsibilities of implementation outlined in 'Roles and responsibilities'.

### HEAVY MACHINERY WASHDOWN

The highest risk of transporting propagules is from heavy machinery, such as excavators, as these have the ability to carry large clods of dirt and mud in which seed propagules can be lodged. Transport trucks pose little risk to the transportation of weed propagules if they remain on the hard surface of the roads and the coal loading area and that these areas are well managed to exclude weeds.

Wherever possible machinery will be brought into the quarry and surrounds in a lean condition; free of weed propagules, clods of dirt and vegetative matter.

Machinery can be washed down in Lilydale prior to floating it to the quarry operational area.

#### Site Selection

The exact location of any required washdown site in the quarry should be decided by the contractor, or their supervisor, on the following criteria:

- Stormwater settlement ponds or areas designed for the capture of runoff from roads should be preferentially used for washdown **if** they are practical to access;
- If stormwater settlement ponds are not readily accessed, ensure washdown is conducted as close as possible to the source of the material being removed;
- Ensure run-off does not directly enter a watercourse or waterbody, a 30m buffer from any waterway or waterbody is desirable;
- Select a mud-free location (e.g. well grassed, gravel) which is gently sloped to drain effluent away from the washdown area;
- Allow adequate space to safely move tracked vehicles and allow safe vehicle access around the heavy machinery; and
- Pay particular attention to potential hazards near or at the washdown site (e.g. overhead powerlines, powerpoles, fences).

If there will be large quantities of effluent or there is a risk of extensive run-off, the washdown area should be bunded and a sump constructed to safely dispose of the effluent. Take particular care where the effluent is likely to be contaminated with oil or fuel.

#### Washdown prescriptions

For each of the washdown sites the following prescriptions will be applied: Note: Do NOT apply water to equipment that may be damaged by water.

1. Locate washdown site as close as possible to the source of the materials being removed, and prepare the surface or construct bunding as required.

2. Safely park the vehicle free of any hazards (e.g. electrical), ensure the engine is off and the vehicle is immobilised.
3. Look over the vehicle, inside and out, for where dirt, plant material including seeds are lodged. Pay attention to the underside of the vehicle, radiators, spare tyres, foot wells and bumper bars.
4. Remove any guards, covers or plates if required, being careful of any parts that may cause injury.
5. Knock off large clods of mud, use a crow bar if required and sweep out the cabin.
6. Brush off dried plant material like weed seeds and chaff in radiators and other small spaces where this material lodges.
7. Clean down with a high pressure hose (using potable drinking water) and stiff brush/crowbar.
8. Start with the underside of the vehicle, wheel arches, wheels (including spare). Next do the sides, radiator, tray, bumper bars etc and finally upper body.
9. Clean associated implements, e.g. buckets.
10. Check there is no loose soil or plant material that could be readily dislodged or removed.
11. Wash effluent away from the machinery; do not drive through wash effluent.

Contractors should keep a log book of where and when they wash down machinery, and of where they then took the machinery. These data are useful in ensuring that checks are made of the washdown locations in the event that any undesirable plants become established in these locations.

## MONITORING AND REVIEW

The Plan is intended to be flexible and allow change to the focus of management actions, especially the weed spraying program, as the occurrence, extent and severity of weed infestations change across the site.

The Figures attached to this Plan may be reviewed and modified from time to time as new data become available for the site, especially following field surveys to identify, record and map new and current weed occurrences in the Quarry Operational Area.

## MONITORING

The early detection of any weeds that enter the Weed Management Zones is important to ensure that any control or eradication program has the highest likelihood of success.

A survey to identify any new weed species within the Weed Management Zones should be conducted at the intervals outlined in Table 1. This approach should enable early detection of weed species before they reach an extent where control and eradication is very costly and/or difficult to achieve.

Key weed species of concern are listed in Table 2.

The following monitoring regime will be applied during the life of the quarry operation:

1. Surveys and assessments by a suitably qualified person will be made at intervals outlined in Table 1 to –
  - a. identify, record and map any new weed species not previously recorded;
  - b. assess and map the extent of known weed infestations to determine if they are becoming larger and/or more significant such that control measures can be modified; and
  - c. review/assess the weed control works that have been conducted and to provide advice, where necessary, on the management of weeds.
2. Areas where weed control/eradication works have occurred (eg spraying) will be assessed no more 12 months after the treatment occurred to determine if the measures implemented were successful.

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Where measures have proved unsuccessful, repetition and/or modification of the weed control technique(s) will be employed.

**REVIEW OF PLAN**

The objectives, responsibilities and management actions within this Plan will need to adapt to new information about the site as it becomes available.

The Plan will be reviewed each year in conjunction with the Annual Environment Report for the Quarry Operation or as needed (eg. when a significant infestation of a weed on the site is detected).

Reviewed versions of the Plan will be provided to the Environment Protection Authority.

**Table 2** Weeds of concern that may enter the Weed Management Zones

Weed Name	Significance if it was detected in Weed Management Zones 1 -2	Significance if it was detected in Weed Management Zones 3-6
English broom <i>Cytisus scoparius</i>	High	Very High
Montpelier broom <i>Genista monspessulana</i>	High	Very High
Californian thistle <i>Cirsium arvense</i>	High	Very High
slender thistle <i>Carduus pycnocephalus</i>	Moderate	High
boneseed <i>Chrysanthemoides monilifera</i>	Moderate	High
White Spanish broom <i>Cytisus multiflorus</i>	Low	Moderate
fennel <i>Foeniculum vulgare</i>	Low	Moderate
Onopordum thistles <i>Onopordum species</i>	Low	Moderate
saffron thistle <i>Carthamus lanatus</i>	Low	Moderate
nodding thistle <i>Carduus nutans</i>	Low	Moderate

## FIGURES

Figure 1 – Location of Lease 1679 P/M and Study Area

Figure 2 – Regional weed locations (NVA derived data)

Figure 3 – Adjacent and within Lease weed locations

Figure 4 – Weed Management Zones

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**APPENDIX A**

‘Guideline for Safe and Effective Herbicide Use near Water’





Photograph: Lynn Broos

# Guidelines for Safe and Effective Herbicide Use Near Waterways

The control and management of weeds near waterbodies is a challenge faced by many landholders across Tasmania. Waterbodies are particularly sensitive to herbicide contamination, so the decision to apply herbicides in the vicinity must be taken with great care.

Weed control near waterbodies requires a long-term commitment to eradication, perhaps 5–10 years or more, as the seed banks of many 'woody' weed species (eg blackberries, gorse) may remain viable for decades. Weeds can also spread along watercourses, making their control difficult. A staged, planned approach to weed control, alongside a program to re-establish native riparian species, is necessary to ensure the safe restoration of riparian areas. Restoring native vegetation helps to reduce the presence of weed species, ensures the stability of banks, shades the waterway (which helps prevent future weed invasion), and provides habitat for local fauna.

## Definitions

For the purposes of this guideline, the following definitions apply:

<b>Riparian land</b>	Any land that adjoins, directly influences, or is influenced by a body of water at any time of the year.
<b>Waterbody</b>	Includes natural watercourses (streams, creeks, rivers), natural wetlands, ponds, lagoons, constructed drainage channels, dams and ponds, reservoirs and lakes.
<b>Permanently inundated/perennial</b>	These areas have water all year round.
<b>Occasionally inundated/intermittent</b>	These areas have water some time of the year.
<b>Rarely inundated/ephemeral</b>	These are areas that rarely contain water (eg areas that flood on rare occasions).
<b>Toxicity</b>	The inherent poisonous quality/qualities of a substance, measured by what size dose is likely to cause harm (acute toxicity is measured by the amount of active ingredient - mg/kg live body weight - required to kill 50% of a test group of animals - this is called LD50).

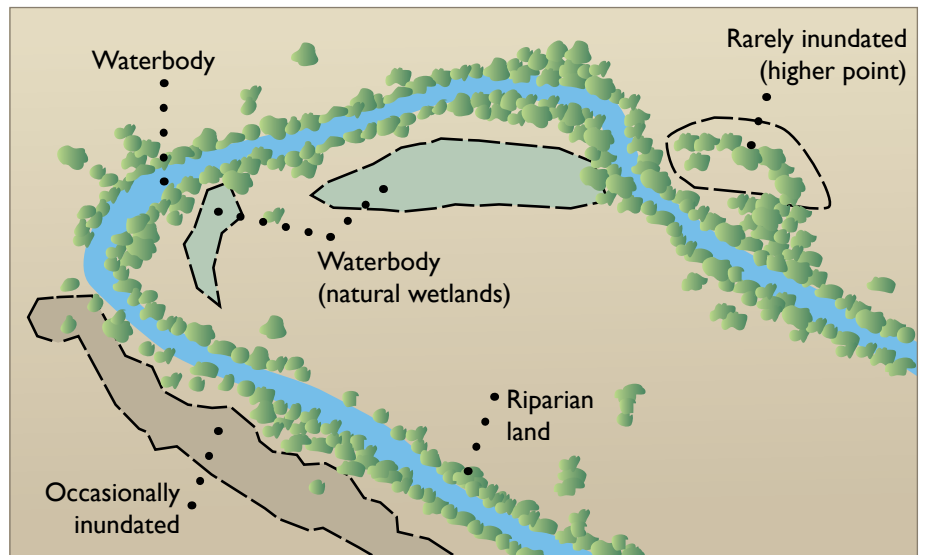


Figure 1: Appropriate and effective herbicide usage near water requires consideration of specific situations

## A Planned Approach

### Assess your site

#### What type of waterbody is it?

If your site is permanently inundated, you need to consider very carefully the choice of herbicide, recognising the risk to your aquatic ecosystem and the danger that the herbicide may pose to the surrounding environment. You also need to identify points of access to the site.

If your site is occasionally or rarely inundated, choose a time when the chance of rainfall is low and therefore the risk of runoff contaminated with herbicide is likely to be low. Figure 1 illustrates the different zones found in aquatic situations which may affect herbicide use.

#### What types of weeds are present?

Identify the species of weed and the extent of the infestation. Table 2 details the recommended herbicide control for a number of riparian weeds, the method and time of year for application. It also suggests alternatives to the use of chemicals.

#### Do the weeds have value at the site?

Consider whether the weeds are serving a useful purpose at the site. They may be acting as a buffer to control erosion, or as a filter to promote water quality. They may have a value to animal species as a source of food or shelter.

If you believe that you have native plants or animals that might be adversely affected by your proposed weed control, seek professional advice.

You may be able to stage the removal of weeds to minimise any impact on erosion or on animal life. You will almost certainly need to restore the habitat once weeds have been eradicated.

#### Are native species present at the site?

Identify any native plant species at your site. You may need to protect these species from overspray or mark them to prevent accidental spraying. These native plants will be the starting point to restoring the riparian zone.

### Choose your control method

Landholders should always consider non-chemical solutions as a preferred option before deciding to use herbicides. These include biological control (eg by introduction of gorse mite, see photo below), slashing, mulching, controlled grazing (controlling timing, intensity and frequency), or hand removal. Often a combination of chemical and non-chemical methods is most appropriate. Whichever method or combination of methods is used, it is important to consider the potential negative impacts on the environment and limit these as much as possible.



*Biological agents such as Gorse spider mite may be options for use near waterways, courtesy of Tasmanian Institute of Agriculture.*

#### Understanding herbicides

Herbicides are designed to control and eradicate pest plants ('weeds'). However, it is important to realise that many herbicides have toxic effects in aquatic ecosystems. Native plants, invertebrates, frogs and fish may be harmed by herbicides. The inappropriate use of herbicides may also cause significant risks to human health where water is pumped from a bore for domestic use, or flows to reservoirs.

Herbicides can enter waterbodies either directly through spray or spray drift, or they can move into waterbodies via surface water run-off or leaching and sub-surface draining.

Herbicides can be broadly classified according to their chemical structures and modes of action. Table 1 shows the three major types of herbicide.

**Table 1: Herbicide classification**

<b>Pre-emergent (residual)</b>	These herbicides are designed to inhibit the germination of pest plants. They are therefore applied before the pest plant germinates and are often residual in the soil for long periods. They are generally not considered to be safe for use near waterbodies and are not recommended for use due to their persistence in the environment.
<b>Knockdown non-selective</b>	These herbicides are designed to be applied directly to the target pest plant, either through being sprayed onto foliage or applied directly to the cambium layer using any of the direct application methods described in Table 3. They may vary in mode of action and some may persist as residues in the environment.
<b>Selective</b>	Selective herbicides are designed to act on only one type of pest plant. Generally, selective herbicides will control either broadleaf (eg capeweed), grasses (eg phalaris) or woody weeds (eg broom). These herbicides are useful when the focus may be on controlling a particular weed species (eg phalaris amongst native shrubs). These herbicides may persist as residues in the environment.

Herbicides applied to the edge of a waterbody, or in wetted areas around its edge, must be registered for use in aquatic environments by the Australian Pesticides & Veterinary Medicines Authority (APVMA).

## Consider the tools available to mitigate against offsite movement of your pesticide

### PIRI-Tas

PIRI-Tas is a simple screen tool that predicts the off-site migration potential of pesticides into surface or ground-water. PIRI-Tas assesses both the likelihood of off-site-migration and the risk to different species based on the toxicity of the pesticide to a range of aquatic organisms. PIRI-Tas is a risk indicator and uses a risk-based approach to decision making by taking into consideration a range of factors associated with site conditions, soil and environmental scenarios, pesticide properties, application rates and time of spraying as well as considering impacts on target species being protected by receiving environments. PIRI-Tas outputs can also be used to construct annual spray schedules to assist with future planning.

PIRI was first developed by CSIRO and is being used both nationally and internationally by a number of organisations. PIRI-Tas CD's and onsite training are available for free through the DPIPWE to key users of chemical pesticides, including those in the agriculture, forestry, amenity, glasshouse and municipal sectors.

Further information is available at <http://www.dpipwe.tas.gov.au/inter.nsf/WebPages/SSKA-7JA3N4?open>

### Consider integrated pest management (IPM)

Integrated pest management (IPM) is a planned approach that coordinates environmentally acceptable methods of pest control with careful and minimal use of toxic pesticides. IPM programs are based on a comprehensive assessment of local conditions, including factors such as climate, season, the biology of the pest species, and government regulations.

Strategies employed may include the staged removal of weeds, biological control and re-planting of riparian areas with native species to discourage the regeneration of weeds.

## Consult and plan

Draw up a calendar for action. The time of year when herbicides will be most effective on the weed should be a major influence on the make-up of this calendar. Herbicides are generally most effective during the growing season of the weed rather than when it is dormant or approaching dormancy. The staged removal of weeds over several seasons may be less disturbing to your aquatic environment and minimise any adverse impact on fauna.

Consult with neighbours who may be affected by your weed control operation, especially if you think there is any risk of spray drift to adjoining properties or downstream. You may also decide to seek advice from experts before taking further action, or approach commercial spray contractors to assess your particular situation.

If the work involves a significant length of river or multiple properties it is advisable to develop a plan that covers all aspects of the weed control work and restoration, including potential risks. You should also be mindful of:

- feasibility/practicability of the work
- physical characteristics of the job site
- optimal pest control method, including alternatives to herbicides
- characteristics of the herbicide (physical, chemical and environmental)
- buffer zones
- the possibility of spray drift and other off-target migration
- weather conditions.

## Do you need to spray?

It is recommended that only trained, licensed contractors carry out spraying operations near waterbodies because of the sensitivity of these environments. Check that they have experience and an understanding of the issues around using herbicides near aquatic environments.

The following points are critical to the application of herbicides near waterbodies:

- Always follow the label
- When you are working near the edge of a waterbody, direct the spray away from the waterbody where possible.
- Spray only to the extent of covering foliage with droplets.
- Spray when weather is calm; strong winds may carry herbicide drift into waterbodies.
- Use a flat fan nozzle and a low pump/spray pressure to reduce the likelihood of spray drift.
- Do not spray when rainfall is forecast within four hours as herbicide can be washed off the pest plant and run off into aquatic ecosystems.

## Appropriate herbicides and application

The type of weed problem will determine both the type of herbicide and its application method. Table 2 shows recommended herbicide and application methods for some common weeds, along with alternatives to herbicide use. Table 3 illustrates application techniques and equipment need to undertake control works.

Uses described in this table are either covered by the respective product label or Off-label Permit No. 13160 issued by the Australian Pesticides and Veterinary Medicines Authority.

Table 2. Common weeds and recommended treatment and herbicides

Area	Weed	Permitted Herbicide (active ingredient)	Example of commercial product (concentration of active ingredient)	Recommended Herbicide Control Technique	Non-chemical Alternatives
Permanently inundated/perennial	<b>Submerged and partially submerged plants</b>				
	Parrot's feather ( <i>Myriophyllum aquaticum</i> )	Glyphosate (registered for aquatic use only) <b>Don't add surfactants!</b>	Roundup Biactive® or Weedmaster Duo®	Foliar spray	Hand removal and excavation (with roots/rhizomes) can be used as part of a well planned approach. Care must be taken to avoid losing fragments
	Egeria ( <i>Egeria densa</i> )				
	Canadian Pondweed ( <i>Elodea canadensis</i> )				
	Cumbungi ( <i>Typha</i> spp)				
	Glyceria (syn. Poa aquatica or reed sweet grass) ( <i>Glyceria maxima</i> ) NB Take extreme caution not to spread Glyceria seed through soil transport (eg on machinery)			Foliar spray (combine with dense local native species revegetation for long-term results through stream shading) Wiper	Clearance or drainage of growth area (combine with dense re-vegetation of local native species for long-term results through stream shading)
	<b>Woody weeds</b>				
	Blackberry ( <i>Rubus fruticosus</i> )	Glyphosate (registered for aquatic use only) <b>Don't add surfactants!</b>	Roundup Biactive® or Weedmaster Duo®	Cut and paint with Roundup Biactive® or Weedmaster Duo®	Hand removal (small plants) Controlled grazing (goats or sheep only) can be effective Bio-control (eg gorse mite, blackberry rust) where other techniques are not suitable Gorse mulching combined with follow-up grazing and revegetation on mulched sites
	Gorse ( <i>Ulex europaeus</i> )				
	<b>Trees</b>				
Hawthorn ( <i>Crataegus monogyna</i> )	Glyphosate (registered for aquatic use only) <b>Don't add surfactants!</b>	Roundup Biactive® or Weedmaster Duo®	Cut and paint Drill or stem injection Axe or frill and paint Foliar spray hawthorn and crack willow (only spray to a height of 2m)	Hand removal (small plants) Controlled grazing can assist in limiting Hawthorn regrowth and thicket density	
Crack Willow ( <i>Salix fragilis</i> )					
Sycamore ( <i>Acer pseudoplatanus</i> )					

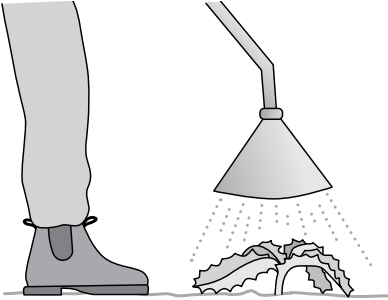
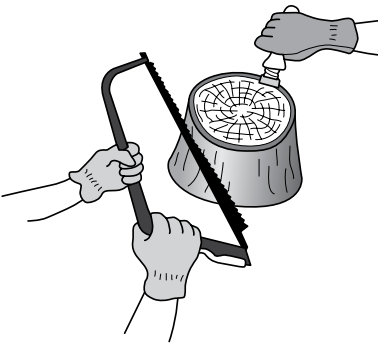
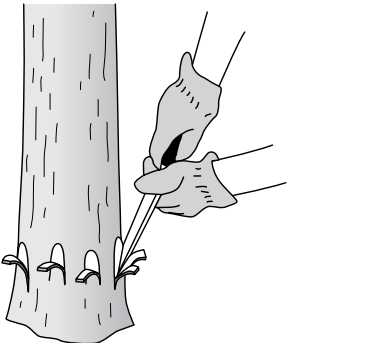
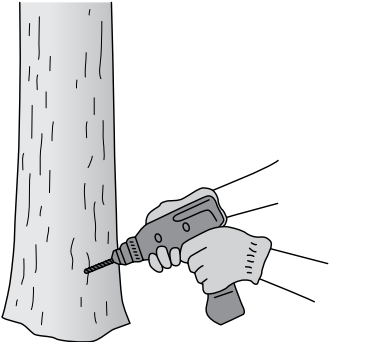
The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product does not imply endorsement by DPIPWE over any other equivalent product from another manufacturer.

Table 2. Common weeds and recommended treatment and herbicides continued

Area	Weed	Permitted Herbicide (active ingredient)	Example of commercial product (concentration of active ingredient)	Recommended Herbicide Control Technique	Non-chemical Alternatives
Occasionally or rarely inundated sites	<b>Woody weeds</b>				
	Blackberry ( <i>Rubus fruticosus</i> )	Metsulfuron-methyl	eg Associate or Brush-Off®	Foliar spray	Hand removal (small infestations) Controlled grazing by goats can be effective Bulldoze and deep cultivate (in suitable circumstances) Bio-control (a rust with limited impact)
		Triclopyr	eg Garlon 600®		
		Triclopyr + Picloram	eg Grass-up™ or Grazon Extra®)		
	Gorse ( <i>Ulex europaeus</i> )	Glyphosate (registered for aquatic use only)	eg Roundup Biactive® or Weedmaster Duo®	Cut and paint Foliar spray, preferably Garlon 600®	Mulching/bulldozing/slashing combined with follow-up grazing and revegetate on mulched sites Bio-control (e.g gorse mite) where other techniques are not suitable
		Triclopyr Triclopyr + Picloram	eg Garlon 600® eg Grass-up™ or Grazon Extra®)		
	English Broom ( <i>Cytisus scoparius</i> )	Glyphosate (registered for aquatic use only). Metsulfuron-methyl Triclopyr herbicide Triclopyr + Picloram	eg Roundup Biactive® or Weedmaster Duo® eg Associate or Brush-Off® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Cut and paint. Foliar spray, preferably Garlon 600® (only if under 2m in height)	Hand removal. Mechanical removal (eg rip or bulldoze) Mulching/bulldozing/slashing of hawthorn combined with follow-up grazing and revegetate on mulched sites
	Montpellier Broom ( <i>Genista monspessulana</i> )				
	<b>Trees</b>				
	Hawthorn ( <i>Crataegus monogyna</i> )	Glyphosate (registered for aquatic use only). Metsulfuron-methyl Triclopyr herbicide Triclopyr + Picloram	eg Roundup Biactive® or Weedmaster Duo® eg Associate or Brush-Off® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Cut and paint Foliar spray, preferably Garlon 600® (only if under 2m in height)	Hand removal Mechanical removal (eg rip or bulldoze) Mulching/bulldozing/slashing of hawthorn combined with follow-up grazing and revegetate on mulched sites
Sycamore ( <i>Acer pseudoplatanus</i> )	Glyphosate (registered for aquatic use only)	eg Roundup Biactive® or Weedmaster Duo®	Stem injection, cut and paint (plus foliar spray for young plants)	Hand removal Bulldoze and revegetate Plough-in small plants	
<b>Herbaceous plants</b>					
Ragwort ( <i>Senecio jacobaea</i> )	MCPA Metsulfuron-methyl	eg MCPA 500 or L.V.E Agritone eg Associate or Brush-Off®	Foliar spray	Hand removal Controlled grazing (sheep) Ploughing/cultivation (combine with dense revegetation of local native plants for long-term results through shading)	
Paterson's curse ( <i>Echium plantagineum</i> )					
Thistles (eg <i>Cirsium arvense</i> )					

More information on weed identification and weed control can be found at [www.dpipwe.tas.gov.au/weeds](http://www.dpipwe.tas.gov.au/weeds)

Table 3. Herbicide application techniques

Illustration	Method	Type of weed	Equipment Required	Notes
	Foliar Spray	Herbaceous plants, Woody weeds	Knapsack Vehicle mounted tank Herbicide mix Personal protective equipment (see product label)	Ensure herbicide is being applied at right concentration and rate to cover the foliage of the pest plant with fine droplets and avoid run-off. A flat fan nozzle and low pump pressure will assist in reducing spray drift
	Cut and paint	Woody weeds, shrubs and trees	Saw, chainsaw, loppers Herbicide mix Personal protective equipment (goggles and gloves as a minimum) Brush/sponge for herbicide application	Ensure herbicide is applied quickly to cut stump (within 15 seconds in most cases) Apply during active growth period of plant for best results Do not apply herbicide to the point of run-off
	Frilling	Shrubs and trees	Axe, hatchet Herbicide mix Personal protective equipment (goggles and gloves as a minimum) Brush for herbicide application	Frill trunk thoroughly, also treat major surface roots where visible Expose sapwood and apply herbicide to it immediately For deciduous species, apply during active growth period
	Drill and poison	Shrubs and trees	Drill Application bottle, injection gun Herbicide Personal protective equipment (goggles and gloves as a minimum)	Drill to sapwood only and apply herbicide to drill hole immediately Drill and fill major surface roots where appropriate For deciduous species, apply during active growth period

Illustrations: Brett Littleton ILS Design Unit

## After Spraying

### Clean up

Equipment should always be cleaned in a safe location where spills can be contained and will not result in environmental harm. Using water to clean equipment will further dilute any residual herbicide to low levels, and the resulting solution is best sprayed onto a lawned area or bare ground taking the following precautions:

- Do not apply wash-water to the point of saturation so that run-off occurs.
- Do not apply wash-water along boundary fence lines as this will increase the chance of herbicides escaping from your property.
- Do not dispose of wastewater into areas where children play, or pets have access, as low levels of herbicide are still likely to be present.
- Do not deposit wastewater where it will run into waterways, drainage lines or stormwater systems.

### Disposal

If you do happen to have surplus spray mix or herbicide waste, label it with the herbicide name, including any risk and safety information displayed on the original label. Store it safely until it can be disposed of appropriately. Contact a chemical collection organisation eg Chem Clear.

You must follow label directions for the disposal of wastes and herbicide containers. Only dispose of waste herbicides at authorised collection centres, such as licensed waste disposal centres.

Do not dispose herbicide waste:

- through sewerage systems, where it can interfere with the sewage treatment process
- down the drain or gutter; where it can pass through the stormwater system and into waterways
- to landfill via dumping or domestic waste, as it can contaminate soil and leach into groundwater and stormwater.

## Monitor, evaluate and follow up

### Monitor

Observe and keep records of your weed problems and the impact of any measures you take to control them. This could involve:

- the use of visual records, including property maps, aerial and other photography
- the use of a calendar or diary to record when actions were taken.

### Evaluate

Evaluate the success of any weed control program by considering the current extent of the weed problem and reviewing your control measures. Important questions might include:

- Is my weed control work going to plan, or do my goals need reviewing?
- What is the appropriate weed control measure now?
- Is there a need for external (expert) assistance?

### Follow up

Re-implement weed control actions following the results of your monitoring and evaluation. Continue to monitor this follow-up work, and so begin an ongoing cycle of weed management.

These guidelines have been updated by Kiowa Fenner and are based on guidelines prepared by Michael Noble and Janice Miller.

### Important disclaimer

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**CONTACT DETAILS**

Invasive Species Branch

1300 668 550

[www.dpipwe.tas.gov.au/weeds](http://www.dpipwe.tas.gov.au/weeds)



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Planning Administration:   
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**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

*Gundagi Quarry, Bangor - DPEMP*

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**Appendix G: Blast Management Plan 2, August 2014**

# GUNDAGI QUARRY BLAST MANAGEMENT PLAN 2

August 2014



**PLANNING EXHIBITED DOCUMENTS**  
 Ref. No: DA 0074/2015  
 Date submitted: 09/05/2015  
 Planning Administration

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## OBJECTIVES OF PLAN

The objectives of this Blast Management (the Plan) are to:

- Achieve compliance with the blasting related requirements of Permit Conditions – Environmental No. 7907; and
- Monitor and record each blast for environmental attributes relevant to the permit requirements.

## PERMIT CONDITIONS

The Permit Conditions – Environmental No. 7907 relevant to blasting are below:

### Blasting

#### B1 Blasting times

Blasting on The Land must take place only between the hours of 1000 hours and 1600 hours Monday to Friday. Blasting must not take place on Saturdays, Sundays or public holidays unless prior written approval of the Director has been obtained.

#### B2 Blasting - noise and vibration limits

- 1 Blasting on The Land must be carried out in accordance with blasting best practice environmental management (BPEM) principles, and must be carried out such that, when measured at the curtilage of any residence (or other noise sensitive premises) in other occupation or ownership, air blast and ground vibration comply with the following:
  - 1.1 for 95% of blasts, air blast over pressure must not exceed 115dB (Lin Peak);
  - 1.2 air blast over pressure must not exceed 120dB (Lin Peak);
  - 1.3 for 95% of blasts ground vibration must not exceed 5mm/sec peak particle velocity; and
  - 1.4 ground vibration must not exceed 10mm/sec peak particle velocity.
- 2 All measurements of airblast overpressure and peak particle velocity must be carried out in accordance with the methods set down in *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration*, Australian and New Zealand Environment Council, September 1990.

#### B3 Notification of blasting

- 1 All residents within a 1 km radius of a blast must be notified prior to that blast. This notification must be given at least 24 hours before such blasting is due to occur. In the event that the blast(s) cannot take place at the time specified, or as a result of blasting misfires, the responsible person must advise all those residents within 1 km of the activities on the land of the revised time at which blasting will take place.
- 2 The Director must be notified on each occasion prior to blasting on The Land. This notification must be given as early as possible, but at least 24 hours before blasting is due to occur.
- 3 In the event that the blasting noise limits and vibration specified above are exceeded, the Director must be notified within 48 hours of the blasting event.

## B4 Blast Management Plan

- 1 A Blast Management Plan must be submitted to the Director for approval prior to any blasting on The Land. The Blast Management Plan must be in a format approved by the Director and must include, without limitation, the following
  - 1.1 Location and schedule of Blasting;
  - 1.2 Potential Impacts;
  - 1.3 Details of customer contact liaison officer, blast controller, notification list and Insurance details;
  - 1.4 Preparation and purpose of plan;
  - 1.5 Blasting procedure, types of explosives, initiation systems;
  - 1.6 Storage and handling of dangerous Goods;
  - 1.7 Risk Assessment and Auditing;
  - 1.8 A monitoring program including the frequency and parameters to be measured and a blast monitoring location map;
  - 1.9 Incident Reporting
- 2 In the event that the Director, by notice in writing to the person responsible, either approves a minor variation to the approved plan or approves a new plan in substitution for the plan originally approved, the person responsible must implement and act in accordance with the varied plan or the new plan, as the case may be.

## ROLES AND RESPONSIBILITIES

The Quarry Operator (DTK Logging Pty Ltd) is to ensure that:

- the Blast Contractor (BM) is briefed on the requirements of the Plan and its importance to the worker/landowner safety and production success of the blast; and
- this Plan is complied with through assessments of the quarry and liaison with the BC;
- monitor operational performance to ensure compliance with license conditions;
- implement and update the Blast Management Plan as required;
- variations to this Plan are developed and provided to the Environment Protection Authority for approval; and
- that noise/vibration test results are collected by the Contractor and securely held for 5 years from the date of the blast.

The Blast Contractor (BC) is to ensure:

- this Plan is complied with and appropriately implemented;
- coordination of the work of staff and contractors;
- establishment of appropriate noise/vibration monitoring sites to collect data consistent with the requirements of the EPA for blast monitoring;
- timely and effective delivery of noise/vibration test results to the Quarry Operator.

Quarry Operator staff are to ensure that they:

- apply safety measures consistent with this Plan; and
- take reasonable direction from the Contractor during site preparation works for the blast and immediately during and after the blast.

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**Gundagi Quarry – Blast Management Plan 2**

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## BACKGROUND

### ADMINISTRATIVE DETAILS

The blast contractor for the two planned blasts is:

Explosive Engineering Australia

PO Box 196, Sorell TAS 7172

Contact – Wayne Newitt (0409 652 737).

Only Blast Contractors with a valid Category 2 shot-firing permit (surface shot-firing - above-ground quarrying, road construction and open cut mining) issued under the Explosives Regulations 2012 will be used.

### POTENTIAL BLAST IMPACTS

There are several potential impacts from blasting, all of which have been mitigated through on-ground planning and careful use of explosives:

#### Noise and Vibration

- Drill rig noise – limited in operation to a few days prior to each blast
- Blast noise – the blast noise is expected to be less than the permitted threshold, notification process in place to advise residents of impending blasts, monitoring stations will be used for each blast to record information for future improvements in blast management when required
- Blast vibration – minimised by the use of appropriate explosives, expected to be within permit threshold, monitoring stations will be used for each blast to record information for future improvements in blast management when required

#### Rock Debris

- The quarry is located well away from housing and there is a steep embankment in place, as well as tall forest, between the blast zone and the residential area

## **PLAN IMPLEMENTATION**

### **LOCATION AND BLAST SCHEDULING**

The blasts will occur in Gundagi Quarry and are scheduled for:

1. 22 January 2014;
2. 6 February 2014; and
3. 27 August 2014 – minor blast for rock recovery and bench creation (safety and rehab).

### **NOTIFICATIONS BEFORE BLAST**

All residents within a 1 km radius of a blast must be notified prior to that blast. This notification must be given at least 24 hours before such blasting is due to occur.

In the event that the blast(s) cannot take place at the time specified, or as a result of blasting misfires, DTK Logging Pty Ltd or their delegated agent will advise all those residents within 1 km of the Quarry of the revised time at which blasting will take place.

The Director will be notified on each occasion prior to blasting at the Quarry. Notification will be given as early as possible, but at least 24 hours before blasting is due to occur.

### **BLASTING PROCEDURE, TYPES OF EXPLOSIVES, INITIATION SYSTEMS**

The explosives used are ANFO (dry) and Rioflex 80-20 wet emulsion.

ANFO (or AN/FO, for ammonium nitrate/fuel oil) is a widely used bulk industrial explosive mixture. It consists of 94 percent porous prilled ammonium nitrate ( $\text{NH}_4\text{NO}_3$ ), (AN) that acts as the oxidizing agent and absorbent for the fuel – six percent number 2 fuel oil (FO). ANFO has found wide use in coal mining, quarrying, metal mining, and civil construction in undemanding applications where the advantages of ANFO's low cost and ease of use matter more than the benefits offered by conventional industrial explosives, such as water resistance, oxygen balance, high detonation velocity, and performance in small diameters.

Detonation is by a Nonel system -

- trunkline delays at surface 17 ms, 25 ms, 32 ms and 65 ms; and
- trunkline delays down hole of 450 and 500 ms.

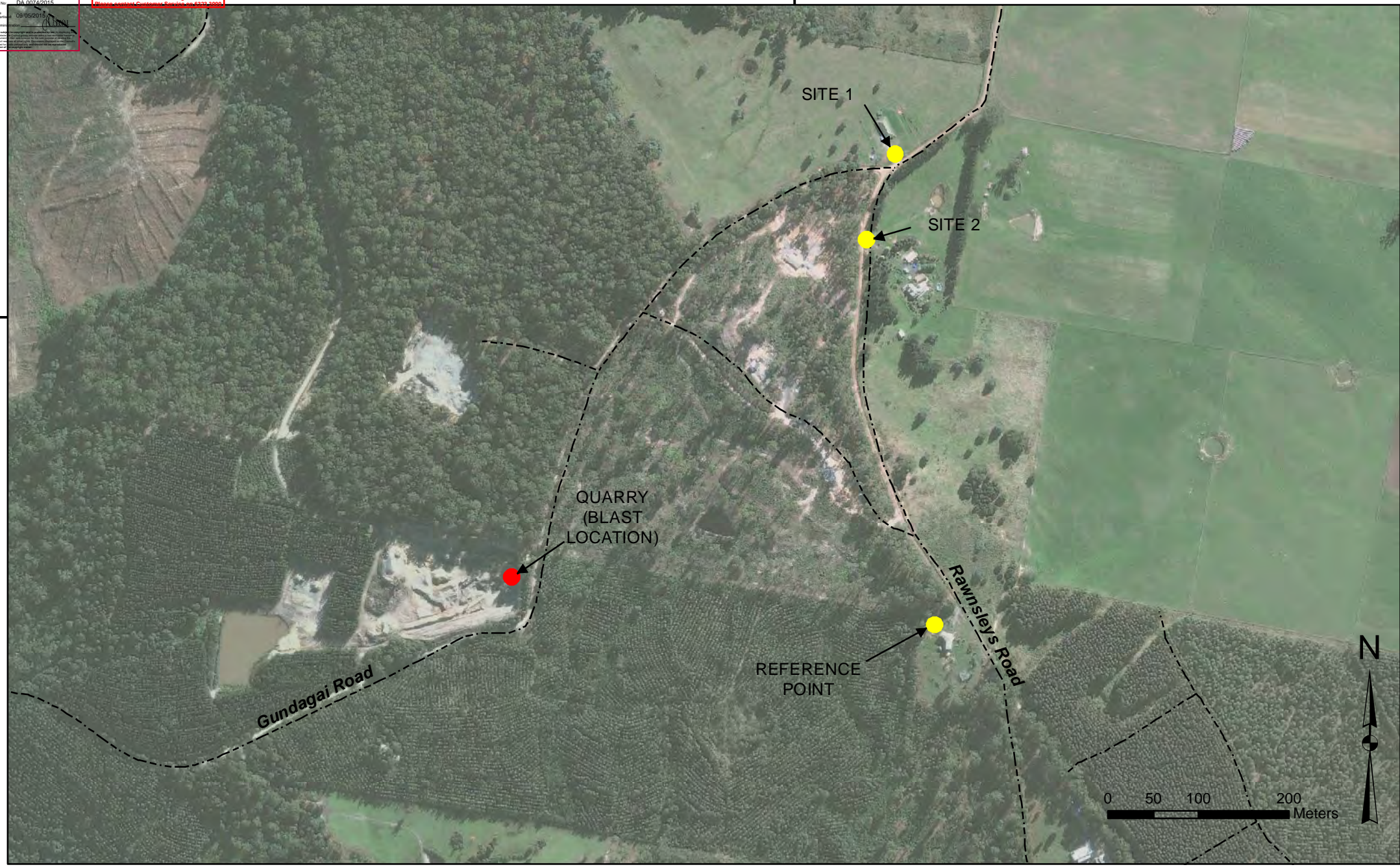
Hole depth is 6-15 m of holes, with an average depth of 10 m.

Explosives are loaded into the drilled hole with stemming to nominally 2.5 depth with 20 mm clean crushed rock. The depth of stemming is dependent on rock type, 80-120% of burden subject to rock type. Typical blast pattern is 2.2 m burden and 2.7m spacing.

### **STORAGE AND HANDLING OF EXPLOSIVES**

The transportation, storage and handling of explosives is conducted by the Blast Contractor in accordance with the Australian Explosives Code (1999), the Australian Code for the transport of explosives by road and rail (Third edition - 2009) and Australian Standard 2187 Explosives – Transport, storage and Use (parts 1 and 2).





# Gundagi Quarry Blast Management Plan

Blast Monitoring Locations



DATUM: GDA94  
 GRID: MGA Zone 55  
 TASMAR: LILYDALE  
 CLIENT: LEIGH BARDENHAGEN  
 DATE: 10th November 2013

**MONITORING AND REVIEW**

**RISK ASSESSMENT AND AUDITING**

The Blast Contractor is responsible for conducting a risk assessment and safety audit of the Quarry as part of the blast activity. This includes the drilling of the holes for explosives, handling explosives, operation of detonation devices and the safe detonation of the charges.

The following safety precautions will be applied -

- Ensure all persons have exited the quarry prior to any blast being conducted with the exception of blast contractor personnel involved in the detonation of charges.
- Ensure all roads surrounding the quarry, specifically Gundagi Road, are free of vehicles and persons.
- Wherever possible avoid blasting when an atmospheric temperature inversion is present and when the prevailing wind direction is from the west.

DTK Logging Pty Ltd receives a copy of the risk assessment and associated documentation that supports the placement of drill holes, levels of explosives used and the detonation devices.

**NOISE/VIBRATION MONITORING PROGRAM**

Consistent with Permit Condition B2(2), all measurements of air blast overpressure and peak particle velocity must be carried out in accordance with the methods set down in *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration*, Australian and New Zealand Environment Council, September 1990.

The noise/vibration test results collected by the Blast Contractor will be securely held by DTK Logging Pty Ltd for 5 years from the date of the blast.

In the event that the blasting noise limits and/or vibrations as specified in the permit are exceeded, the Director will be notified within 48 hours of the blasting event.

**INCIDENT REPORTING**

The Blast Contractor is responsible for reporting to Police/Fire any incidents that require their involvement or attendance to the Quarry.

DTK Logging Pty Ltd is responsible for reporting any misfires or delayed firings to the EPA Director and surrounding relevant landowners: in the event that the blast(s) cannot take place at the time specified, or as a result of blasting misfires, the DTK Logging Pty Ltd or their delegated agent will advise all those residents within 1 km of the activities on the land of the revised time at which blasting will take place.

**REVIEW OF PLAN**

This Plan will be reviewed in the event of an incident, change to the timing/location of the blast within the Quarry or other significant event.

Any variations to this Plan will be made available to the Director EPA for approval before the alteration is made to the Plan. In the event that the Director, by notice in writing to DTK Logging Pty Ltd, either approves a minor variation to the approved plan or approves a new plan in substitution for the plan originally approved, DTK Logging Pty Ltd and its agents will implement and act in accordance with the varied plan or the new plan, as the case may be.

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This document has been prepared in accordance with the scope of services agreed upon between Van Diemen Consulting (VDC) and the Client.

To the best of VDC’s knowledge, the report presented herein represents the Client’s intentions at the time of completing the document. However, the passage of time, manifestation of latent conditions or impacts of future events may result in changes to matters that are otherwise described in this document. In preparing this document VDC has relied upon data, surveys, analysis, designs, plans and other information provided by the client, and other individuals and organisations referenced herein. Except as otherwise stated in this document, VDC has not verified the accuracy or completeness of such data, surveys, analysis, designs, plans and other information.

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**Document Status**

Revision	Author	Review	Date
1	R Barnes L Bardenhagen	1	19-8-14
Final	R Barnes L Bardenhagen	Final	21-8-14

**PLANNING EXHIBITED DOCUMENTS**  
Ref. No: DA 0074/2015  
Date submitted: 09/05/2015  
Planning Administration:   
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**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

*Gundagai Quarry, Bangor - DPEMP*

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- Appendix H:**
- 1. VIPAC noise monitoring report – 2013**
  - 2. Environmental noise, ground vibration and air blast overpressure impact assessment Gundagai Quarry, May 2010 (VIPAC report 421057-01)**

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14 January 2014

Van Diemen Consulting

421057-05  
 AJM

Attn: Dr Richard Barnes

Dear Sir,

RE: Gundagi Quarry environmental noise survey 2013.

## 1. INTRODUCTION

VIPAC was commissioned by Van Diemen Consulting on behalf of DTK Logging Pty Ltd to undertake an environmental noise survey of operations at Gundagi Quarry to meet condition N4 of Environmental Protection Notice (EPN) No. 7907(r1).

A survey methodology was submitted to the Tasmanian EPA (see VIPAC document 421057-04) and was approved with an additional requirement for the monitoring of vehicle pass-by noise on the South Retreat Rd & Tunnel Rd haul route.

## 2. SITE DESCRIPTION

Gundagi Quarry is located near Tunnel, approximately 7 km north-west of the township of Lilydale in north-eastern Tasmania. The quarry is on a north-west to south-east trending ridgeline of Ordovician to Devonian rock above river valleys of Quaternary alluvium.

The closest residence is on Rawnsleys Rd approximately 460 m to the east of the quarry. The topography between the quarry and this residence is relatively level and lightly wooded. A group of three residences also exist near the corner of Rawnsleys Rd and Gundagi Rd. These residences are approximately 550 m from the quarry and are on the eastern slope of the ridgeline, therefore line of site to the quarry lip is blocked by the local topography.

Table 1 provides location information for each of the five environmental noise survey positions and figure 1 presents an aerial view of the quarry and its surrounds with the survey positions marked.

Measurement positions			
Number	Location	Coordinates (MGA)	Comments
1	Nearest residence	514165 / 5438685	Rawnsleys Rd
2	Residence	514055 / 5439010	Rawnsleys Rd
3	Control	515959 / 5440078	Day measurement only
4	Vehicle pass-by	514300 / 5439732	Approx. 20 m from Tunnel Rd
5	Quarry lip	513699 / 5438737	Noise levels controlled by activity on site

Table 1 – Measurement positions.

Van Diemen Consulting – Gundagi Quarry environmental noise survey 2013

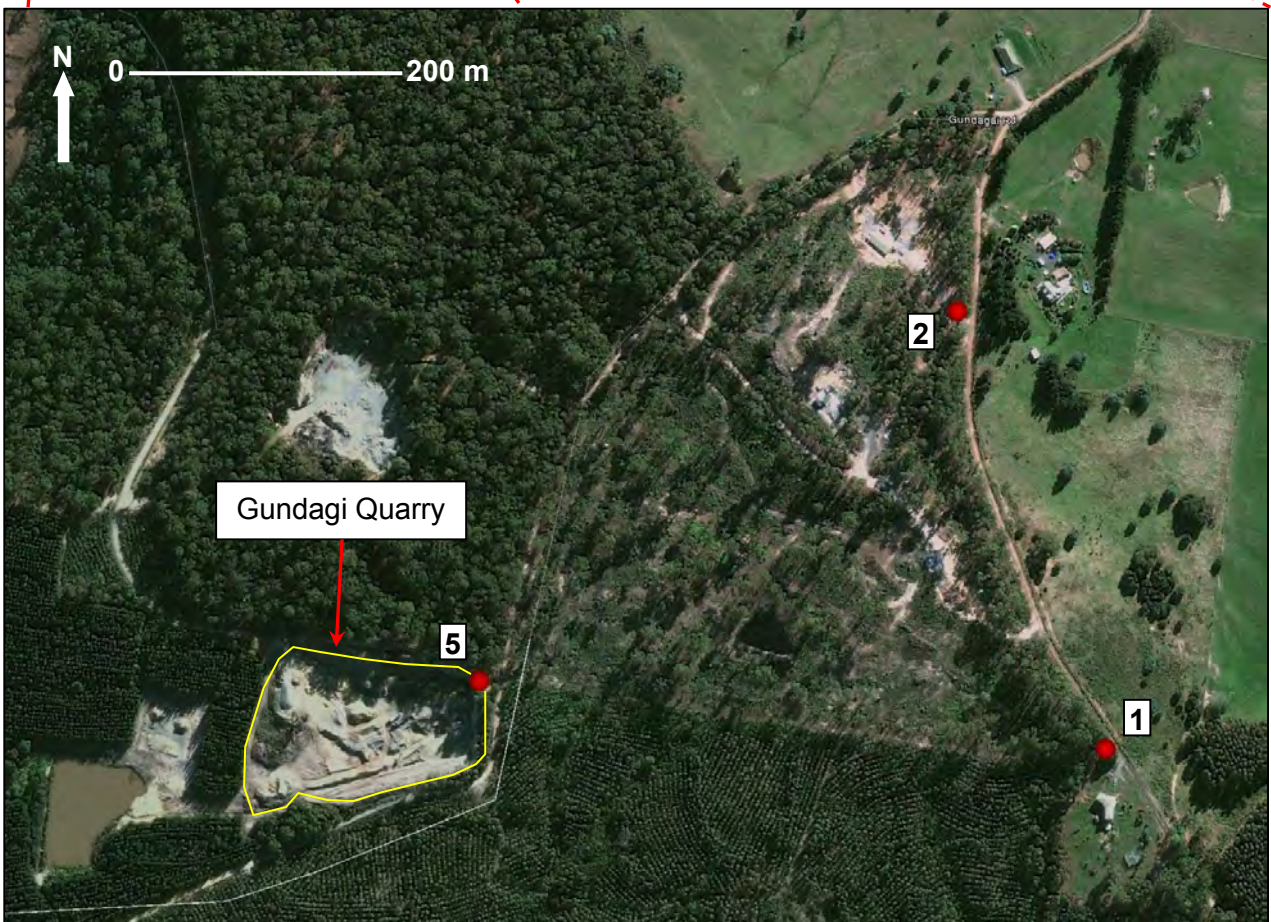


Figure 1 – Aerial view with measurement positions marked.

### 3. EPN CONDITIONS

Condition N2 of EPN No. 7907(r1)

1. Noise emissions from the activity when measured at any noise sensitive premises in other ownership and expressed as the equivalent A-weighted sound pressure level must not exceed:
  - 1.1 46 dB(A) between 0700 hours and 1800 hours (Day time); and
  - 1.2 40 dB(A) between 1800 hours and 2200 hours (Evening time); and
  - 1.3 35 dB(A) between 2200 hours and 0700 hours (Night time).
- 2 Where the combined level of noise from the activity and the normal ambient noise exceeds the noise levels stated above, this condition will not be considered to be breached unless the noise emissions from the activity are audible and exceed the ambient noise level by at least 5 dB(A).
- 3 The time interval over which noise levels are averaged must be 10 minutes or an alternative time specified in writing by the Director.
- 4 Measured noise levels must be adjusted for tonality, impulsiveness, modulation and low frequency in accordance with the *Tasmanian Noise Measurement Procedures Manual*.
- 5 All methods of measurement must be in accordance with the *Tasmanian Noise Measurement Procedures Manual*, issued by the director.

### 4. INSTRUMENTATION

The following instrumentation was used during the survey:-

- Spectrum analyser Larson Davis 2900 s/n 2900A0343
- Environmental noise analyser Larson Davis 870B s/n 1189
- Environmental noise analyser Larson Davis 870B s/n 1364
- Environmental noise analyser Larson Davis 824 s/n 824A1537
- Acoustic Calibrator CA250 s/n 2706

All instruments were field calibrated prior to use.

Wind socks were used at all times on microphones.

### 5. NOISE MEASUREMENTS

All noise measurements were made in general accordance the *Tasmanian Noise Measurements Procedures Manual*.

A 10-minute time interval was selected for measurement of all statistical noise data and observed measurements were obtained over a 30-minute periods. Observed measurements were conducted as follows:-

- **Position 1:** Day  
Evening (including control measurement following cessation of site activity)  
Night (including control measurement prior to commencement of site activity)
- **Position 2:** Day
- **Position 3:** Day (control measurement)

The observed 10-minute data has been averaged for the measurement period and summarised in table format for each location. Relevant observations are also noted in these tables. All observed data is presented in Appendix 1.

Spectral data for each observed measurement is shown graphically in 3 data sets as follows:-

- 1/3-octave band spectra
- Narrow band 0 - 600 Hz (0.78 Hz resolution).
- Narrow band 0 - 1200 Hz (1.56 Hz resolution).

Where appropriate, significant tones have been marked in these spectra and potential sources noted.

Unobserved extended measurements were conducted at position 4 and 5 and a graph of selected 10-minute Ln statistical data is provided as follows:-

- LAeq
- LA1
- LA90

For sake of clarity the other 5 data sets are not shown in these graphs. The LA1 statistic was selected to represent truck pass-by noise levels at position 4. Maximum levels are not presented due to uncertainty in relation to the source/sources that generated the recorded maximum levels while the frequency of vehicle movements on the haul route meant that LA10 (typical traffic statistic) levels were likely to under represent pass-by noise.

## 5.1. Measurement results

### 5.1.1. Position 1



Figure 2 – Position 1.

1 – Nearest residence											
Period	Time	LAeq	LAmx	LAmn	LA1	LA10	LA50	LA90	LA99	Weather	Comments
Day	1730 - 1800	40.3	60.5	33.0	47.2	42.1	38.6	35.5	34.0	Fine NW Mod	Insects, birds, distant traffic (Tunnel and Bacala Rd), leaf rustle, aircraft, voices, fauna, crusher (quarry)
	1820 - 1850	39.5	55.5	32.8	46.3	41.9	38.0	35.2	33.6		
Evening	1900 - 1930	44.9	65.0	27.1	58.0	44.3	33.6	30.2	28.3	Overcast E Mod	Insects, birds, distant traffic (Tunnel and Bacala Rd), leaf rustle, voices, fauna
	0530 - 0600	45.4	70.1	28.4	56.5	45.6	37.7	33.2	30.7		
Night	0600 - 0630	45.7	64.2	31.6	59.6	43.8	38.5	35.4	33.1	Overcast E Mod	Birds, insects, leaf rustle, distant (Tunnel Rd)
	0630 - 0700	43.5	60.1	31.3	53.3	45.3	39.8	35.4	32.5		

Control measurement (prior to and following activity at the quarry).

Truck loading only.

Truck loading and crushing and screening.

Table 2 – Position 1, observed data.



Van Diemen Consulting – Gundagi Quarry environmental noise survey 2013

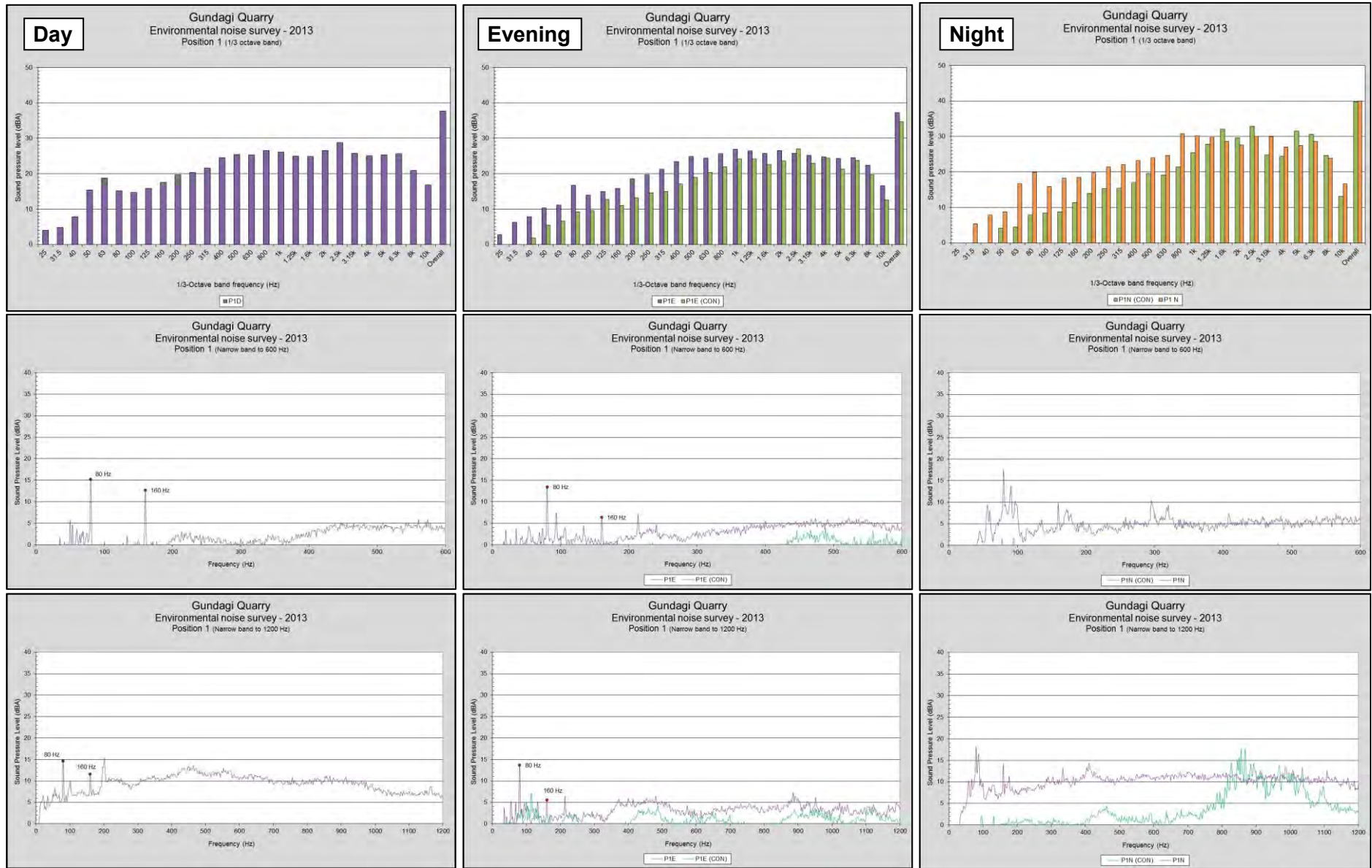


Figure 3 – Position 1, observed spectra; 1/3-octave band; narrow band 0-600 Hz; and narrow band 0-1200 Hz.

5.1.2. Position 2



Figure 4 – Position 2.

2 – Residence

Period	Time	LAeq	LAmaz	LAMin	LA1	LA10	LA50	LA90	LA99	Weather	Comments
Day	1650 - 1720	34.7	52.7	27.5	41.9	37.2	32.9	29.9	28.2	Fine W Mod	Birds, insects, leaf rustle, distant traffic (Tunnel and Bacala Rd), aircraft, voices (distant), fauna.

Table 3 – Position 2, observed data.

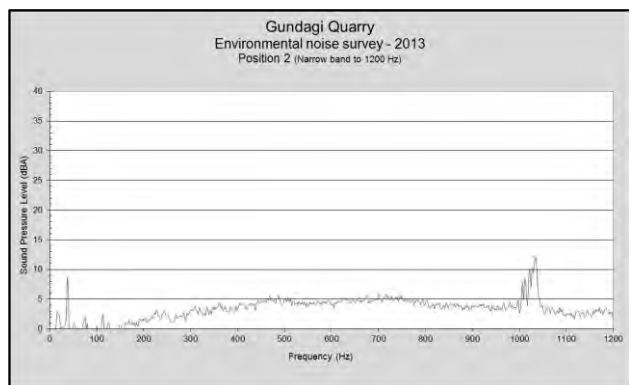
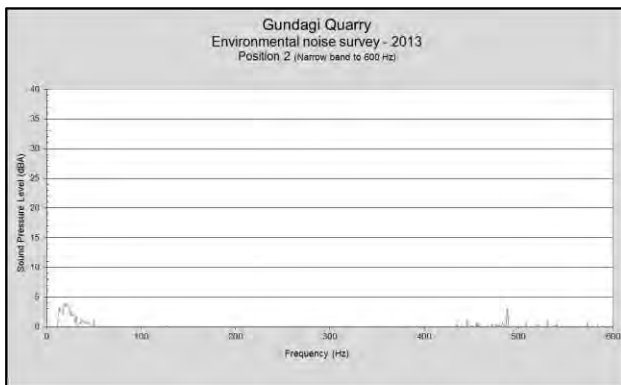
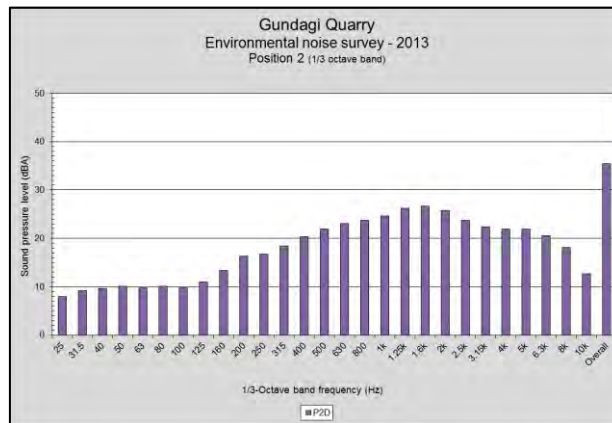


Figure 5 - Position 1, observed spectra; 1/3-octave band; narrow band 0-600 Hz; and narrow band 0-1200 Hz.

5.1.3. Position 3



Figure 6 – Position 3.

3 – Control

Period	Time	LAeq	LAmaz	LAMin	LA1	LA10	LA50	LA90	LA99	Weather	Comments
Day	1610 - 1630	52.5	75.0	26.5	66.3	47.2	38.0	29.7	27.5	Fine W Mod	Traffic (local/distant), birds, insects, aircraft, voices, radio, backing alarm, LF rumble, leaf rustle.

Table 4 – Position 3, observed data.

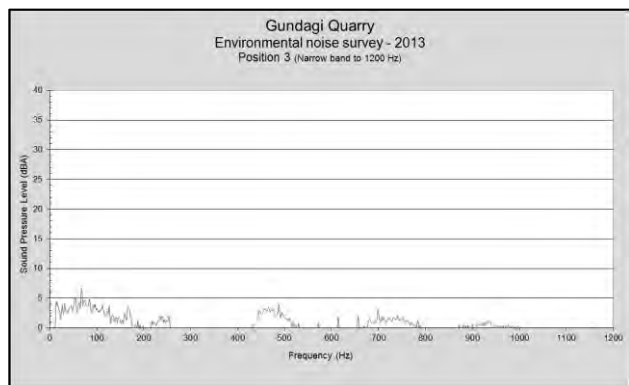
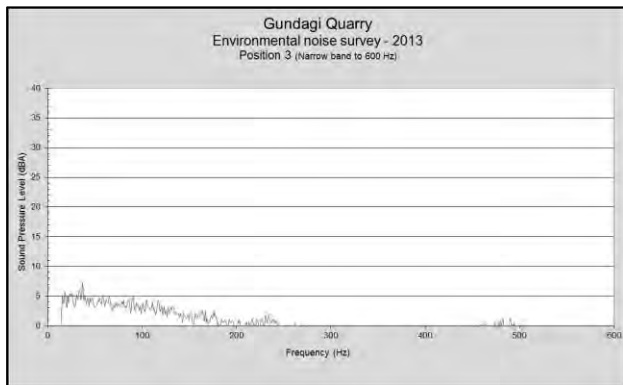
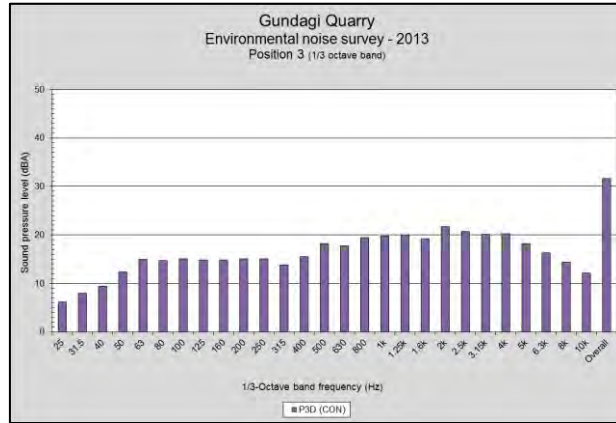


Figure 7 - Position 1, observed spectra; 1/3-octave band; narrow band 0-600 Hz; and narrow band 0-1200 Hz.

5.1.4. Position 4 (haul route)



Figure 8 – Position 4.

Vehicle movements (Tunnel Rd) 0600 – 0700 hrs

- Gravel Truck
- Gravel Truck
- Gravel Truck
- Log Truck
- Gravel Truck
- 4WD
- Log Truck
- Gravel Truck
- Gravel Truck
- Log Truck
- Log Truck
- Gravel Truck
- Gravel Truck
- Log Truck
- Log Truck
- Gravel Truck
- Gravel Truck
- Log Truck
- Gravel Truck
- Gravel Truck
- Gravel Truck

Table 5 – Vehicle movements (Tunnel Rd) 19 December 2013, 0600 – 0700 hrs (data provided by Van Diemen Consulting).

Van Diemen Consulting – Gundagi Quarry environmental noise survey 2013

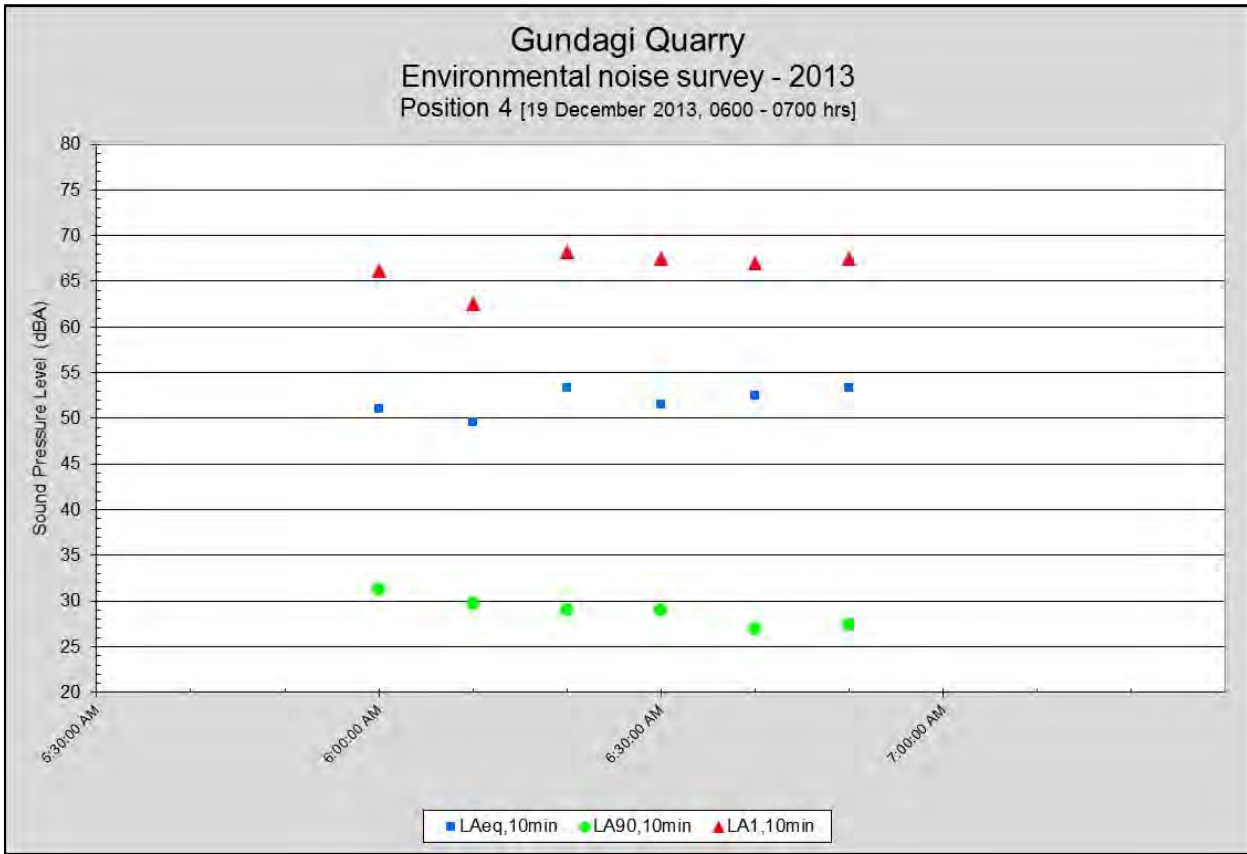


Figure 9 – Position 4 logged Ln-statistics (19 December 2013, 0600 – 0700 hrs).

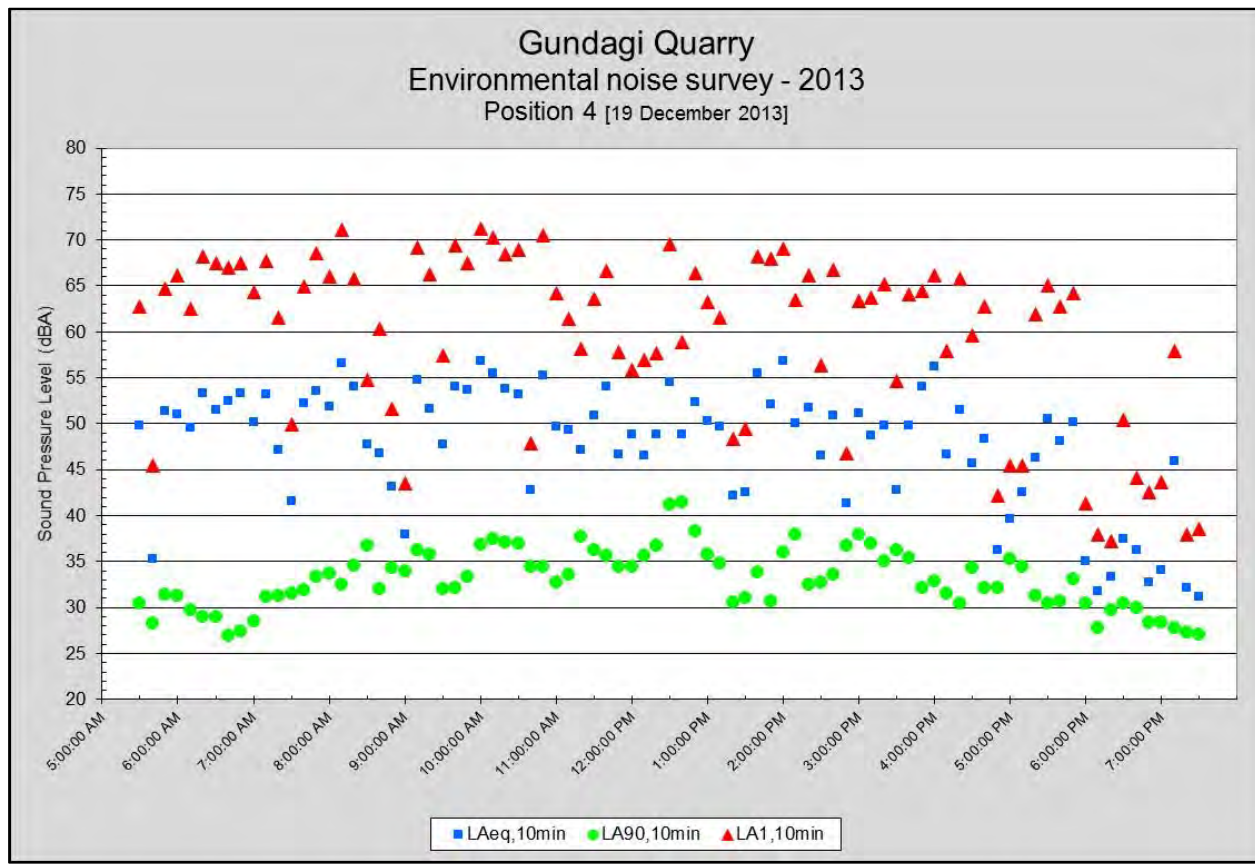


Figure 10 – Position 4 logged Ln-statistics (19 December 2013).

5.1.5. Position 5 (Quarry lip)



Figure 11 – Position 5.

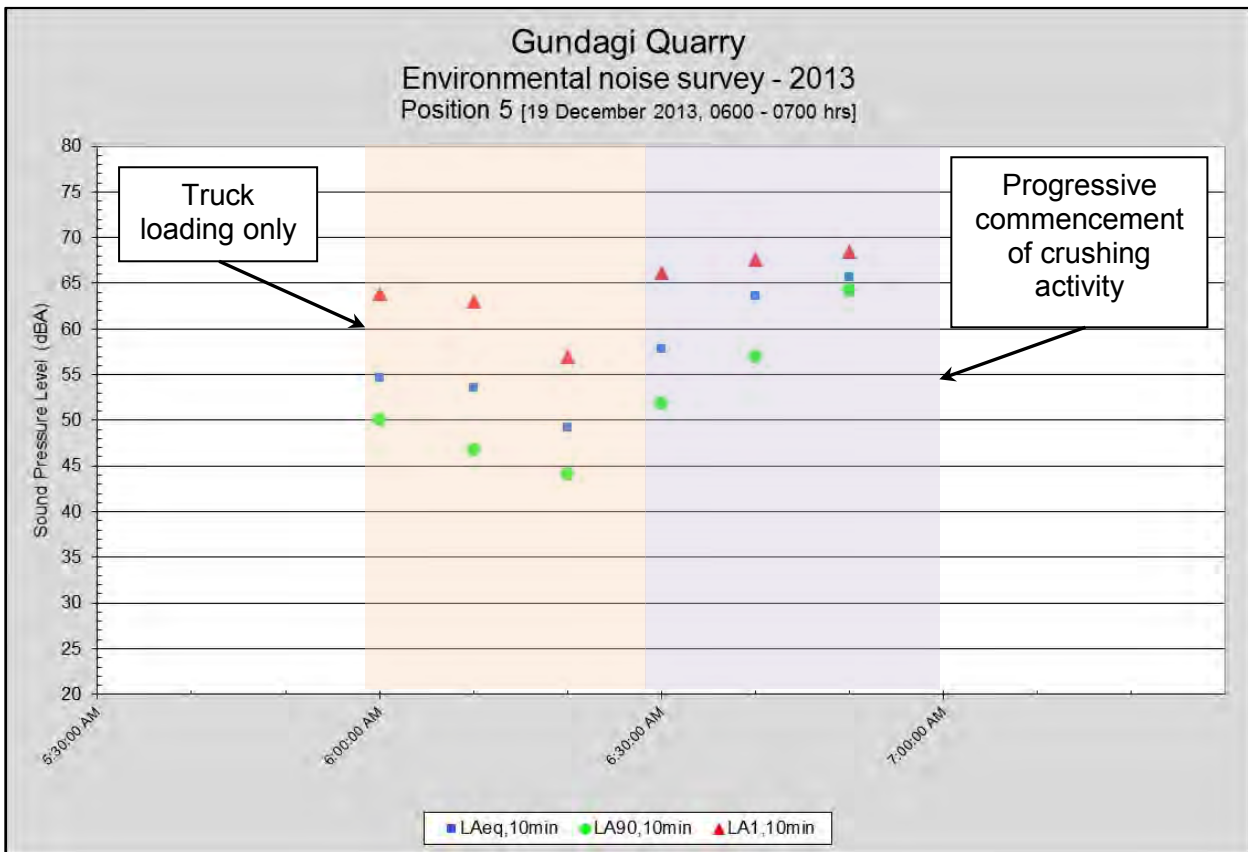


Figure 12 – Position 5 logged Ln-statistics (19 December 2013, 0600 – 0700 hrs).

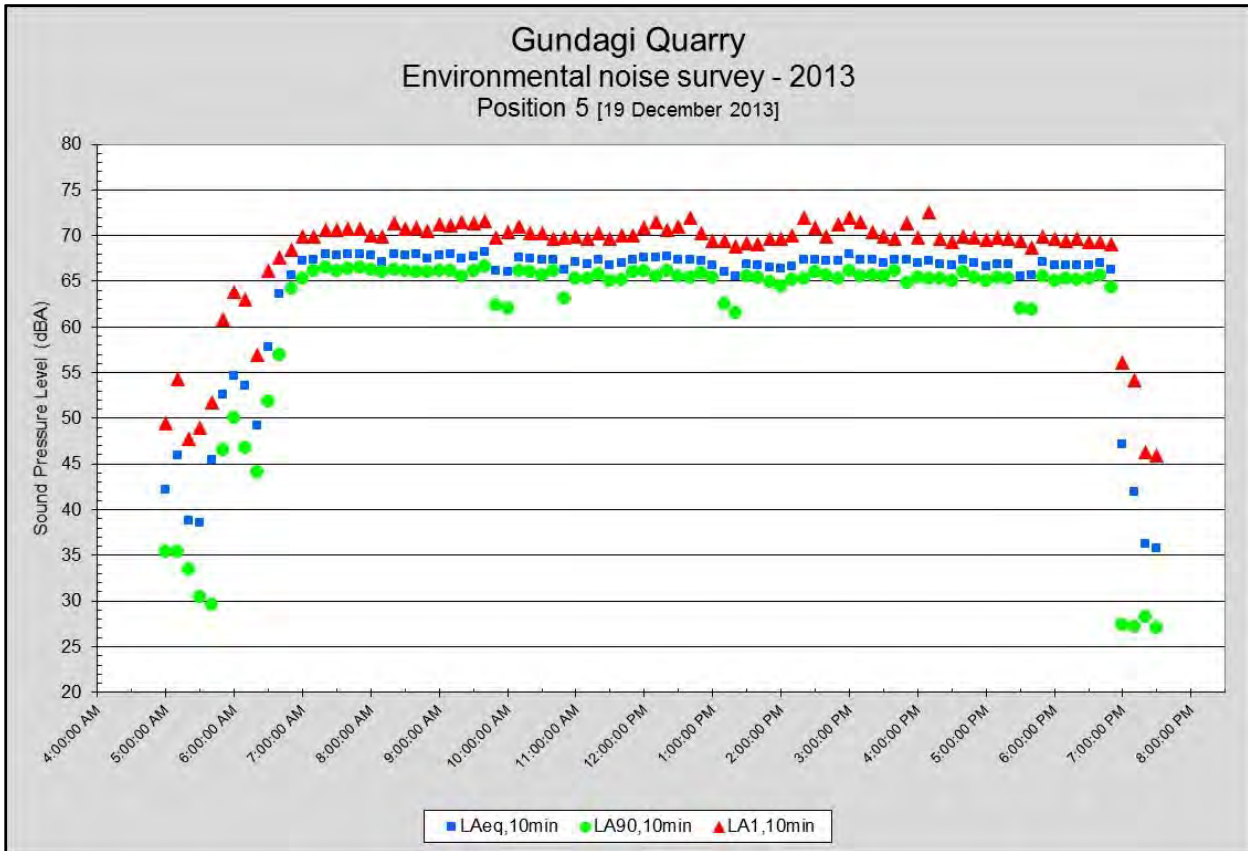


Figure 13 – Position 5 logged Ln-statistics (19 December 2013).

## 6. DISCUSSION

### 6.1. Observed measurements

#### 6.1.1. Day

- During the day measurements at position 1 the crusher was audible and controlled measured  $L_{A90}$  levels, in combination with local insect activity, at approx. 35 dBA. Narrow band tones at 80 Hz and 160 Hz from the crusher are apparent in the narrow band spectra.  $L_{Aeq}$  were controlled by local bird activity.
- At positions 2 and 3 quarry activity was not audible and measured noise levels were controlled by locally generated noise.

#### 6.1.2. Evening

- During the evening period at position 1 the primary crusher was again audible and continued to control  $L_{A90}$  levels in combination with insect activity.
- Following cessation of activity at the quarry  $L_{A90}$  levels dropped by approx. 5 dBA as a result of the crusher no longer operating and a lull in insect activity.  $L_{Aeq}$  levels were elevated during this period as the result of a dog barking at a nearby property.

#### 6.1.3. Night

- Night measurements at position 1 during the control period (0530 – 0600 hrs) and during site activity (0600 – 0700 hrs) were controlled by local bird and insect activity and leaf rustle generated by the moderate easterly breeze.
- Activity within the quarry was not audible.

- Vehicle movements on Tunnel Rd were audible during site activity and this is evidenced in the measured spectra with higher mid to low frequency sound pressure levels (below 800 Hz) during site activity than during the control period.

## 6.2. Haul route

- $L_{A1}$  levels were consistently around 70 dBA at position 4 during hauling operations from the quarry.

## 6.3. Quarry lip

- During the period from 0600 – 0630 hrs when only haul truck loading was occurring in the quarry  $L_{Aeq}$  levels were between 50 and 55 dBA. Levels then increased through 0630 – 0700 hrs as crushing activity was progressively commenced, reaching 65 dBA in the last 10-minute period. Throughout the day  $L_{Aeq}$  levels were consistently around 68 dBA while crushing was occurring on site.

## 7. CONCLUSIONS

- Operations at the Gundagi Quarry (on-site activity) didn't generate noise levels in excess of the day and evening noise emission limits, as specified under condition N2 of the sites EPN, at any noise sensitive location.
- Activity in the quarry was not audible during the night period (0600 – 0700 hrs), however, local wind conditions were optimal for the attenuation of noise emission from the quarry (to the nearest residence) and for generating local noise. Day and evening noise measurements at position 1 (nearest residence) suggest that when crushing is occurring the noise level from the quarry is approx. 35 dBA at the nearest residence (weather conditions were not 'worst case\*'). This is consistent with results from modelling of site activity conducted for the DPEMP assessment of the site quarry (see VIPAC report 421057-01). 35 dBA is the night time noise emission limit for the quarry and given this VIPAC recommends that crushing does not occur during the night period. Results from extended monitoring at the quarry lip indicate that noise levels from activity on-site are 10 to 15 dBA lower when crushing is not occurring and only haul truck loading is conducted. This suggests that noise generated by haul truck loading is well below the night limit of 35 dBA at the nearest residence and VIPAC consider exceedances of the night limit from this activity highly unlikely. This is also consistent with results from modelling of site activity conducted for the DPEMP assessment of the quarry (see VIPAC report 421057-01).
- Pass-by noise from quarry trucks on the haul route is approx. 70 dBA at 20 m.

\* 'Worst case' denotes weather conditions that are optimal for the transmission of noise.





**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

Van Diemen Consulting – Gundagi Quarry environmental noise survey 2013

I hope this information meets your immediate requirements.

Please contact me directly if you have any questions concerning this work.

Yours faithfully,  
VIPAC ENGINEERS & SCIENTISTS LTD

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## 8. APPENDIX

Observed environmental noise data.

Site	Period	Time	Duration	LAeq,10min	LAmx,10min	LAmn,10min	LA1,10min	LA10,10min	LA50,10min	LA90,10min	LA99,10min
1	Day	17:30	0:10:00	39.0	58.8	32.3	48.3	41.4	36.8	34.1	33.0
1	Day	17:40	0:10:00	41.1	59.6	32.4	46.0	43.3	40.4	36.0	34.0
1	Day	17:50	0:10:00	40.7	63.2	34.3	47.2	41.7	38.8	36.4	35.1
			<b>Average</b>	40.3	60.5	33.0	47.2	42.1	38.6	35.5	34.0
1	Evening	18:20	0:10:00	39.6	60.0	31.6	47.3	41.6	37.6	34.3	32.9
1	Evening	18:30	0:10:00	40.0	52.6	34.6	45.7	42.4	39.1	36.8	35.1
1	Evening	18:40	0:10:00	38.9	53.9	32.1	46.0	41.7	37.3	34.5	32.9
			<b>Average</b>	39.5	55.5	32.8	46.3	41.9	38.0	35.2	33.6
1	Evening	19:00	0:10:00	40.1	61.6	27.3	51.3	43.7	33.3	30.0	28.2
1	Evening	19:10	0:10:00	46.1	64.6	26.7	60.2	45.0	34.1	30.4	28.3
1	Evening	19:20	0:10:00	48.4	68.9	27.4	62.6	44.2	33.3	30.1	28.3
			<b>Average</b>	44.9	65.0	27.1	58.0	44.3	33.6	30.2	28.3
1	Night	5:30	0:10:00	49.5	81.1	27.6	60.6	46.4	37.3	32.3	30.0
1	Night	5:40	0:10:00	40.8	59.9	26.8	51.7	44.1	35.4	31.1	28.9
1	Night	5:50	0:10:00	45.8	69.4	30.8	57.3	46.5	40.3	36.2	33.1
			<b>Average</b>	45.4	70.1	28.4	56.5	45.6	37.7	33.2	30.7
1	Night	6:00	0:10:00	46.5	65.6	31.1	60.6	44.6	39.1	35.6	33.2
1	Night	6:10	0:10:00	45.8	62.8	31.1	59.6	43.0	37.4	34.2	32.1
1	Night	6:20	0:10:00	44.8	64.2	32.6	58.7	43.7	39.1	36.2	34.1
			<b>Average</b>	45.7	64.2	31.6	59.6	43.8	38.5	35.4	33.1
1	Night	6:30	0:10:00	40.5	55.5	30.5	47.7	43.2	39.1	35.0	32.1
1	Night	6:40	0:10:00	48.1	66.2	31.6	61.1	48.8	39.9	35.2	32.9
1	Night	6:50	0:10:00	41.9	58.7	31.7	51.1	43.9	40.3	36.0	32.5
			<b>Average</b>	43.5	60.1	31.3	53.3	45.3	39.8	35.4	32.5

- Control measurement (prior to and following activity at the quarry).
- Truck loading only.
- Truck loading and crushing and screening.

Table A1 – Position 1 observed environmental noise measurements.

Van Diemen Consulting – Gundagi Quarry environmental noise survey 2013

Site	Period	Time	Duration	L <sub>Aeq,10min</sub>	L <sub>Amax,10min</sub>	L <sub>Amin,10min</sub>	L <sub>A1,10min</sub>	L <sub>A10,10min</sub>	L <sub>A50,10min</sub>	L <sub>A90,10min</sub>	L <sub>A99,10min</sub>
2	Day	16:50	0:10:00	34.9	54.6	26.6	43.6	37.8	32.7	29.6	27.5
2	Day	17:00	0:10:00	34.9	52.3	29.2	40.0	37.1	33.7	30.8	29.5
2	Day	17:10	0:10:00	34.4	51.3	26.6	42.2	36.7	32.3	29.2	27.7
<b>Average</b>				34.7	52.7	27.5	41.9	37.2	32.9	29.9	28.2

Table A2 – Position 2 observed environmental noise measurements.

Site	Period	Time	Duration	L <sub>Aeq,10min</sub>	L <sub>Amax,10min</sub>	L <sub>Amin,10min</sub>	L <sub>A1,10min</sub>	L <sub>A10,10min</sub>	L <sub>A50,10min</sub>	L <sub>A90,10min</sub>	L <sub>A99,10min</sub>
3	Day	16:10	0:10:00	49.9	71.7	25.6	63.9	45.4	33.9	28.4	26.3
3	Day	16:20	0:10:00	54.3	76.6	27.3	69.0	48.4	39.1	30.6	28.6
3	Day	16:30	0:10:00	53.2	76.7	26.7	66.1	47.9	40.8	30.2	27.5
<b>Average</b>				52.5	75.0	26.5	66.3	47.2	38.0	29.7	27.5

Table A3 – Position 3 observed environmental noise measurements.

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# Environmental noise, ground vibration and air blast overpressure impact assessment

## Gundagai Quarry, May 2010



Report No. 421057-01

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Vipac Engineers & Scientists Ltd  
PO Box 506  
Kings Meadows TAS 7249  
May 2010



DOCUMENT CONTROL

**GUNDAGAI QUARRY  
 ENVIRONMENTAL NOISE, GROUND VIBRATION AND BLAST  
 OVERPRESSURE IMPACT ASSESSMENT  
 MAY 2010**

<b>Report No.</b> 421057 - 01	<b>Library Code</b> ACS
<b>Prepared for</b> Trawmana Environmental Consultants 234 Frankford Rd Exeter Tasmania 7275	<b>Prepared by</b> Vipac Engineers & Scientists Ltd PO Box 506 Kings Meadows Tasmania 7249
<b>Contact Director</b> ☎ +61 3 6394 3350 <b>Mobile</b> +61418 133 827 Email <a href="mailto:tecenvironmentalconsultants@gmail.com">tecenvironmentalconsultants@gmail.com</a>	<b>Contact</b> Dr. A. McLeod ☎ +61 3 6343 2077 <b>Fax</b> +61 3 6343 4849 Email <a href="mailto:alex.mcleod@tarkarri.com">alex.mcleod@tarkarri.com</a>

<b>Author</b>	Alex Mc Leod Environmental consultant Tasmanian Office	Date: 10 August 2010
<b>Reviewed by</b>		
<b>Authorised by</b>	Peter Bunker Manager Tasmanian Office	Date: 10 August 2010
<b>Approved by</b>		Date:
<b>Revision History</b>		
<b>Revision No.</b>	<b>Date Issued</b>	<b>Reason/Comments</b>
	11 August 2010	PPV and dBL prediction
<b>Distribution</b>		
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1	2	Original - Project/Client File
2	2	Original - Client
3	2	Vipac Library
<b>Keywords</b>	Environmental noise, ground vibration, blast overpressure impact assessment.	

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# 1 Introduction

Vipac was commissioned by Trawmana Environmental Consultants (TEC) to conduct an impact assessment of environmental noise; ground vibration; and air blast overpressure emissions from operations at Gundagai Quarry, north-west of Lilydale in the north-east of Tasmania. This impact assessment is part of a Development Proposal and Environmental Management Plan (DPEMP) for the expansion of the quarry's operations.

Under TEC's „Request for Quote“ the following information was requested:-

- Noise modelling to determine the 30, 35, 40 and 45 dBA noise contours.
- Prediction to determine the 110, 115 and 120 dB (Linear Peak) air blast overpressure contours.
- Prediction to determine the 2.5, 5, 7.5 and 10 mm/s peak particle velocity contours.

Data is presented from a single establishment blast with air blast overpressure (ABO) and peak particle velocity (PPV) measured at a residence on Rawnsleys Rd. ABO was also measured at a second location close to a group of residences on the north-eastern side of the quarry. Prediction of PPV and ABO was conducted using scaled regression equations developed by the *Office of Surface Mining Reclamation and Enforcement*<sup>[1]</sup> (OSM), a bureau of the United States Department of the Interior.

Full acoustic modelling of the quarry's operations, using SoundPLAN<sup>[2]</sup> acoustic modelling software, was carried out to provide the noise contour information requested by TEC.

This report presents the results of the environmental noise modelling and measurement and prediction of ABO and PPV carried out by Vipac. An assessment of the impact of these environmental emissions is also presented with recommendations for mitigation where appropriate.

## 2 Site description

Gundagai Quarry is located at Tunnel, approximately 7 km north-west of the township of Lilydale in north-eastern Tasmania. The quarry is on a north-west to south-east trending ridgeline of Ordovician to Devonian rock above river valleys of Quaternary alluvium.

The residence on Rawnsleys Rd at which ground vibration and blast overpressure measurements were conducted is approximately 460 m to the east of the quarry (530 m from the measured establishment blast). The topography between the quarry and this residence is relatively level and lightly wooded. A group of three residences also exist near the corner of Rawnsleys Rd and Gundagai Rd. These residences are approximately 550 m from the quarry (630 m from the measured establishment blast). Line of site to the quarry lip is blocked by the local topography.

Figure 1 shows an aerial view of the quarry and its surrounds with the location of residences marked.



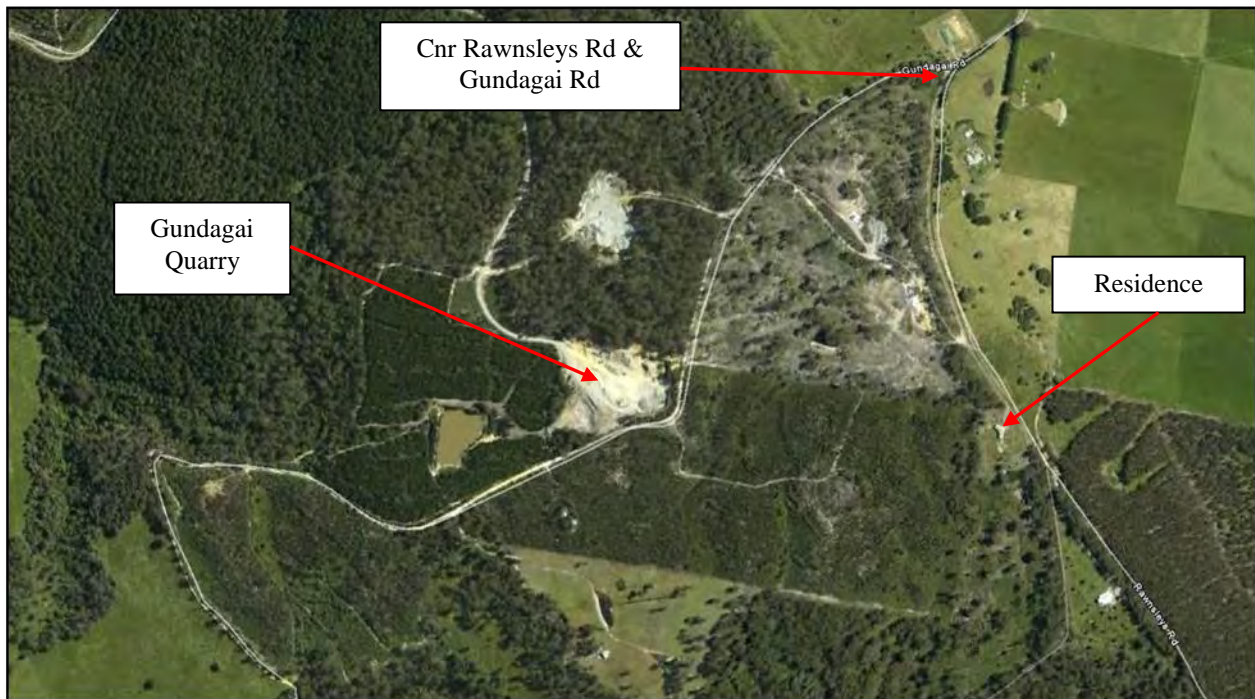


Figure 1 – Aerial view of Gundagai Quarry and surrounds.

### 3 Ground vibration and air blast overpressure

#### 3.1 Measurement

Ground vibration (PPV) and ABO measurements were conducted during an establishment blast at Gundagai Quarry on 22 March 2010 at 1310 hrs (see table 1 for details). All measured data is assessed against Australian and New Zealand Environment Council (ANZEC) guidelines on the minimisation of annoyance due to blast overpressure and ground vibration<sup>[3]</sup>. The blast details are presented in Table 1.

Blast details	
Number of holes	130
Hole depth	7.9 m
Burdon	2.5 m
Spacing	3.0 m
Stemming	2.5 m
Charge length	5.9 m
ANFO / hole	N/A
Emulsion / hole	46 kg (0.78 kg/m <sup>3</sup> )

Table 1 – Establishment blast details.

Two measurement locations were selected and the following data recorded at each as follows:-

- **Location A – Residence B:** A small concrete pad was cast and levelled at a location adjacent to the residence. An InstanTel Minimate Plus ground vibration and ABO meter was used to monitor the blast at this location.
- **Location B – Cnr Rawsleys Rd & Gundagai Rd:** An integrating sound level meter (Larson Davis 870B) was used to monitor the linear peak ABO from the blast at this location.

Figure 2 and 3 show measurement locations A and B respectively. Table 2 presents the measured PPV and linear peak ABO levels along with the recommended limits under the ANZEC guidelines<sup>[1]</sup>. The measured data is also presented on an aerial view of the quarry and its surrounds in figure 4.



Figure 2 – Measurement location A.



Figure 3 – Measurement location B.

Ground vibration and air blast overpressure					
Location	Ground vibration			Air blast overpressure	
	Vector sum peak particle velocity (mm/s)	Maximum wave peak particle velocity (mm/s)	ANZEC recommended maximum level (mm/s)	Linear peak sound pressure level (dB)	ANZEC recommended maximum level (dB)
Location A	1.95	1.94 (Longitudinal) <sup>⊥</sup>	5*	114.8	115**
Location B	-	-		108.8	

\*Level must not be exceeded for 95 % of blasts over a 12 month period. 10 mm/s must never be exceeded.

\*\* Level must not be exceeded for 95 % of blasts over a 12 month period. 120 dB must never be exceeded.

⊥ Longitudinal – line between quarry and residence.

Table 2 – Ground vibration and ABO data.



Figure 4 – Aerial view of Gundagai Quarry and surrounds with ground vibration and air blast overpressure data presented at the measurement locations.

From the above Vipac notes the following:-

- All measured data is below the recommended limits under the ANZEC guidelines.
- The linear peak ABO measured at location A was within 0.2 dB of the recommended limit under the ANZEC guidelines.
- Under the ANZEC guidelines a PPV of 2 mm/s is recommended as a long term regulatory goal for the control of ground vibration. The measured peak particle velocity level at location A was below 2 mm/s.

### 3.2 Prediction

Ground vibration and ABO prediction is typically conducted using site specific scaled regression equations developed from monitored data from multiple blasts at multiple locations. Such data is not available for Gundagai Quarry. The only monitored data for the site is from the establishment blast monitored by Vipac on 22 March 2010. Given this Vipac has sourced regression equations developed by OSM from their extensive data sets.

Table 3 presents the details of the establishment blast measured on 22 March 2010 and future face blasts at Gundagai Quarry. The latter was obtained following discussions with the blast contractor. For the purposes of prediction the details of the establishment blast measured by Vipac will be considered typical of future establishment blasts.

Blast details		
Specification	Measured establishment blast	Future face blast
Number of holes	130	-
Hole depth	7.9 m	10.5 m
Burdon	2.5 m	3.0 m
Spacing	3.0 m	3.0 m
Stemming	2.5 m	3.0 m
Charge length	5.9 m	-
ANFO / hole (delay)	N/A	N/A
Emulsion / hole (delay)	46 kg (0.78 kg/m <sup>3</sup> )	57 kg (0.65 kg/m <sup>3</sup> )
Distance to Location A	530 m	-
Distance to Location B	630 m	-

Table 3 – Details of the measured establishment blast and proposed future face blasts.

#### 3.2.1 Ground vibration prediction

Prediction of ground vibration was conducted using the following regression equation from OSM with a square root scaled distance:-

$$PPV = k \left( \frac{\sqrt{m}}{D} \right)^a$$

PPV = peak particle velocity (in/s)

k = constant

m = charge mass / delay (lb)

D = distance to receiver (ft)

a = exponent

The constant (k) and exponent (a) used were developed by OSM from quarry production blast data. A constant of 52 is given as the average for quarry production blasts with 138 an upper bound. The exponent for quarry production blasts is given as 1.38. The equation above and the constants and exponent are for imperial data and as such all relevant data from Gundagai Quarry was first converted to imperial before PPV predictions were made. The subsequent answers were then converted back to metric and are presented in tables below.

Table 4 presents predicted PPV levels for an establishment blast and face blast at location A (residence B) under average and upper bound OSM constants for quarry production blasts.

Predicted and measured PPV at Location A (Residence B)				
Location	OSM constant (quarry production blasts)		Predicted PPV (mm/s)	Measured PPV (mm/s)
Establishment Blast	Upper bound	138	2.87	1.94
	Average	52	1.08	
Face Blast	Upper bound	138	3.32	-
	Average	52	1.25	

Table 4 – Predicted and measured PPV levels at location A.

The upper bound constant of 138 given by OSM for quarry production blasts provides a conservative estimate of PPV at location A (residence B). Prediction of critical PPV contours was conducted using the 138 constant. Table 5 presents the predicted distances to critical PPV levels for an establishment blast and a face blast and figures 5 and 6 present these distances graphically as contours.

Distances (m) to critical PPV levels		
PPV (mm/s)	Establishment blast	Face blast
2.5	585	651
5	354	394
7.5	264	294
10	214	239

Table 5 – Predicted distances to critical PPV levels.

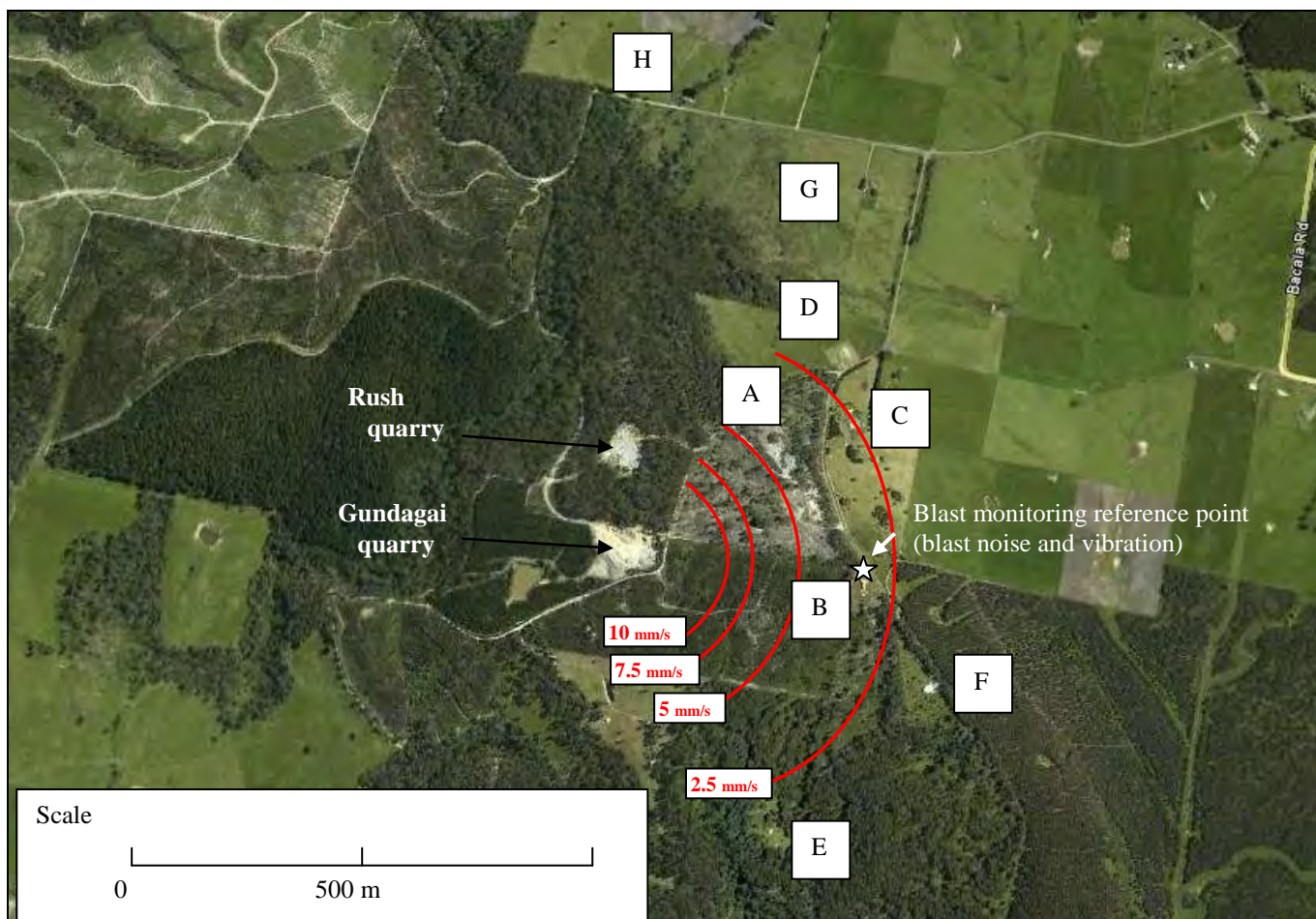


Figure 5 – Predicted critical PPV contours for an establishment blast (base map supplied by TEC).

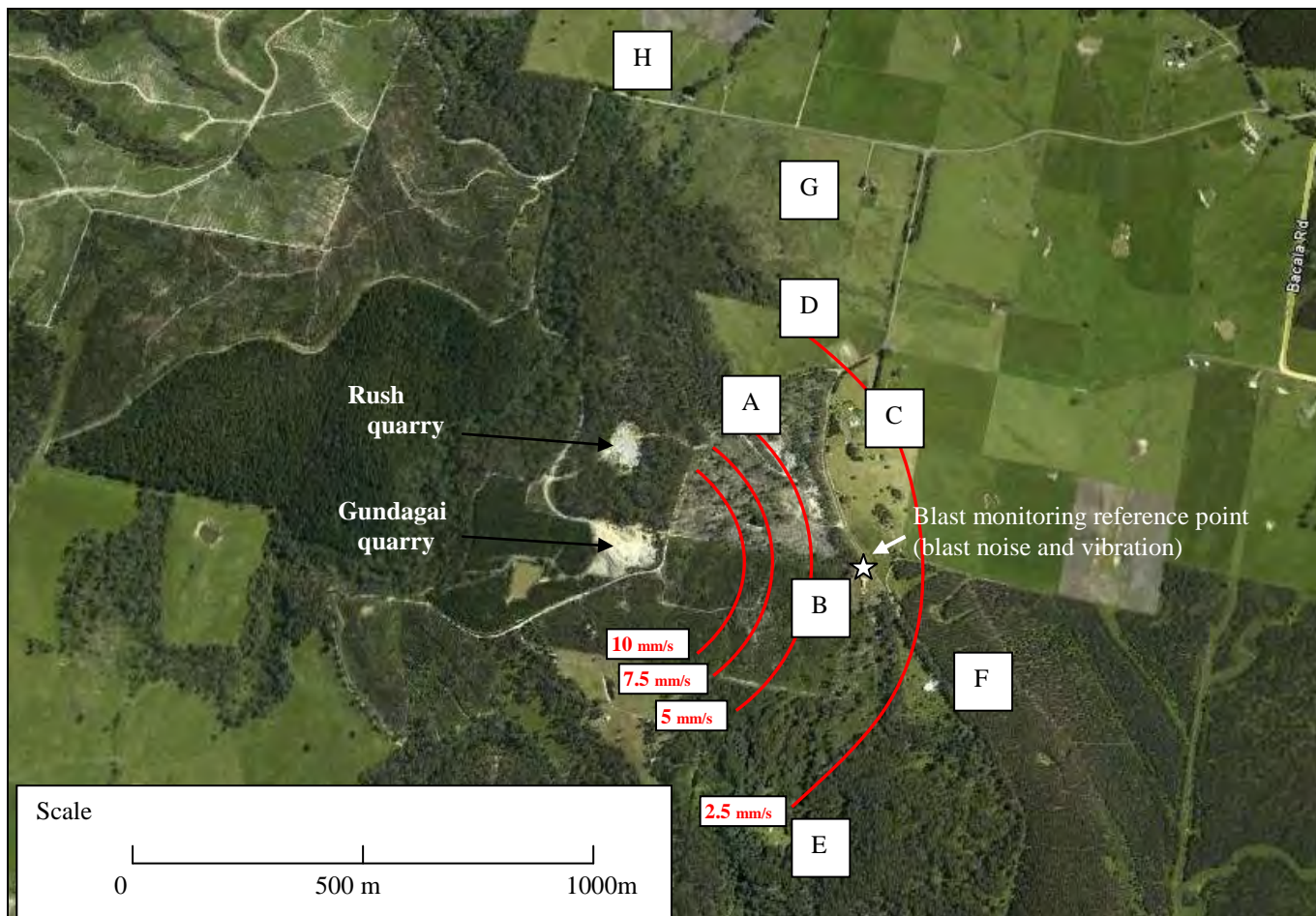


Figure 6 – Predicted critical PPV contours for a face blast (base map supplied by TEC).

From the above Vipac notes the following:-

- PPV levels predicted levels give a conservative estimate of ground vibrations levels generated by blasting at Gundagai quarry.
- Predicted PPV contours suggest that blasting operations at Gundagai Quarry are highly unlikely to generate PPV levels at or above the ANZEC recommended maximum of 5 mm/s at any residence near the quarry. The highest predicted PPV level at the nearest residence (residence B) was 3.3 mm/s for a face blast.

### 3.2.2 Air blast overpressure prediction

Air blast overpressure prediction was conducted using the following regression equation from OSM with a cube root scaled distance:-

$$PSI = k \left( \frac{\sqrt[3]{m}}{D} \right)^a$$

PSI = pounds per square inch

k = constant

m = charge mass / delay (lb)

D = distance to receiver (ft)

a = exponent

Subsequent predictions of PSI are converted to dBL via the following equation:-

$$dBL = 20 \log_{10} \left( \frac{PSI}{2.9 \times 10^{-9}} \right)$$

These equations are for imperial data and all relevant data from Gundagai Quarry was converted to imperial format prior to predictions being made.

Cube root scaled distances based on data from the measured establishment blast to location A and B (locations where ABO was measured) were plotted on OSM's Airblast Plotter of comparison with OSM data (see figure 7). The Airblast Plotter presents the scaled distance in relation to pressure (PSI) and decibels (dB). The scaled distances from the establishment blast at Gundagai Quarry show reasonable correlation with highwall blasting in coal mines. This is also considered by OSM to be typical of quarry blasting.

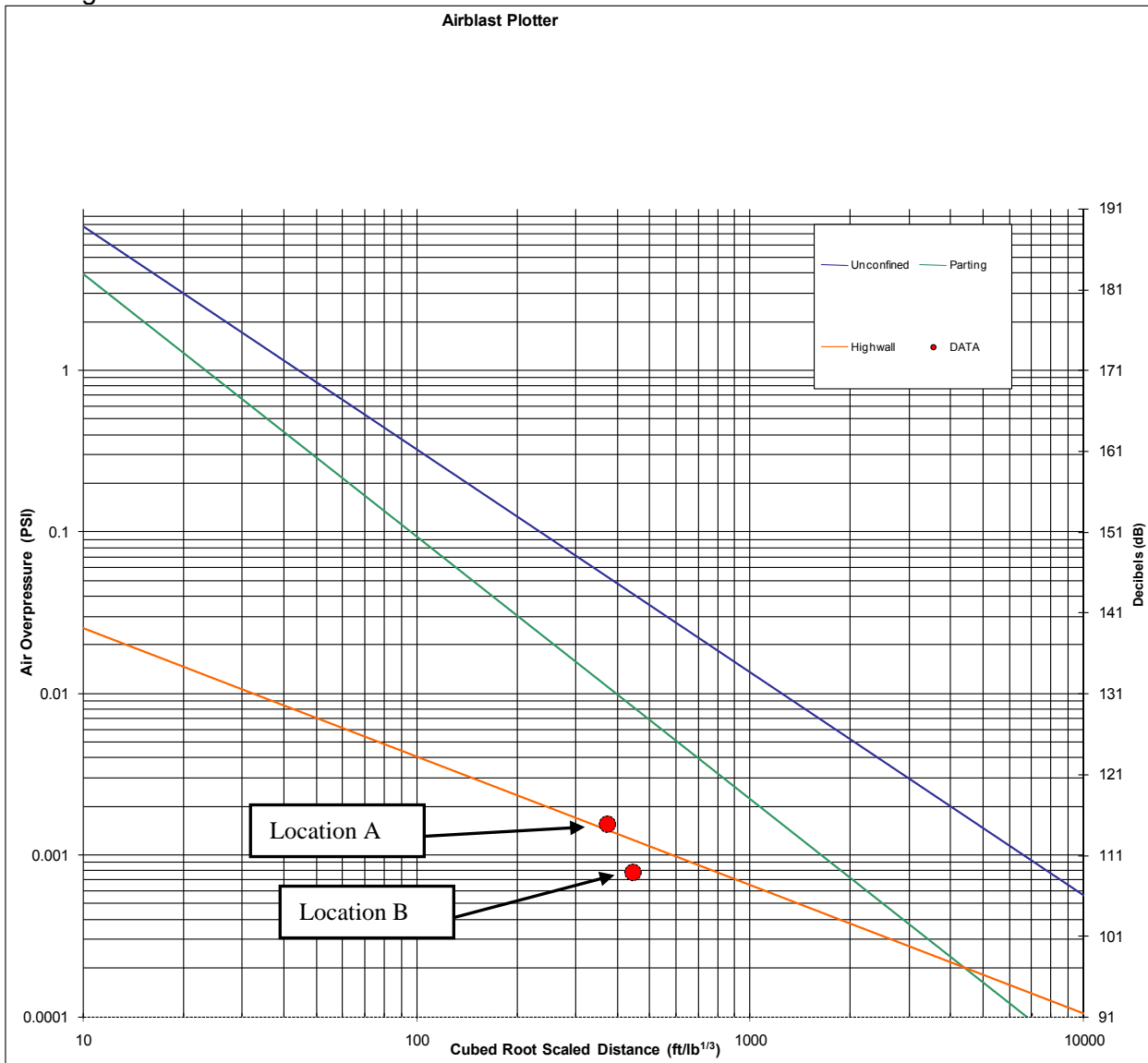


Figure 7 – Cube root scaled distances for the Gundagai Quarry establishment blast plotted on the OSM Airblast Plotter.

Table 6 presents predicted and measured ABO levels at locations A and B for an establishment blast and face blast. Predicted levels are calculated from the equations presented above with the OSM constant ( $k=0.162$ ) and exponent ( $a=0.794$ ) for highwall blasting.

Predicted and measured air blast overpressure (dBL)			
Location	Blast type	Predicted overpressure	Measured overpressure
A (Residence B)	Establishment	114.1	114.8
	Face	114.6	-
B (Cnr Rawnsley Rd and Gundagai Rd)	Establishment	112.9	108.8
	Face	113.4	-

Table 6 – Predicted and measured ABO at locations A and B.

Table 7 presents the predicted distances to critical dBL levels for an establishment blast and a face blast at Gundagai Quarry. Figures 8 and 9 present these distances graphically in the form of contours.

Distances (m) to critical dBL levels		
ABO (dBL)	Establishment blast	Face blasts
110	960	1036
115	463	500
120	226	241

Table 7 – Predicted distances to critical ABO levels.

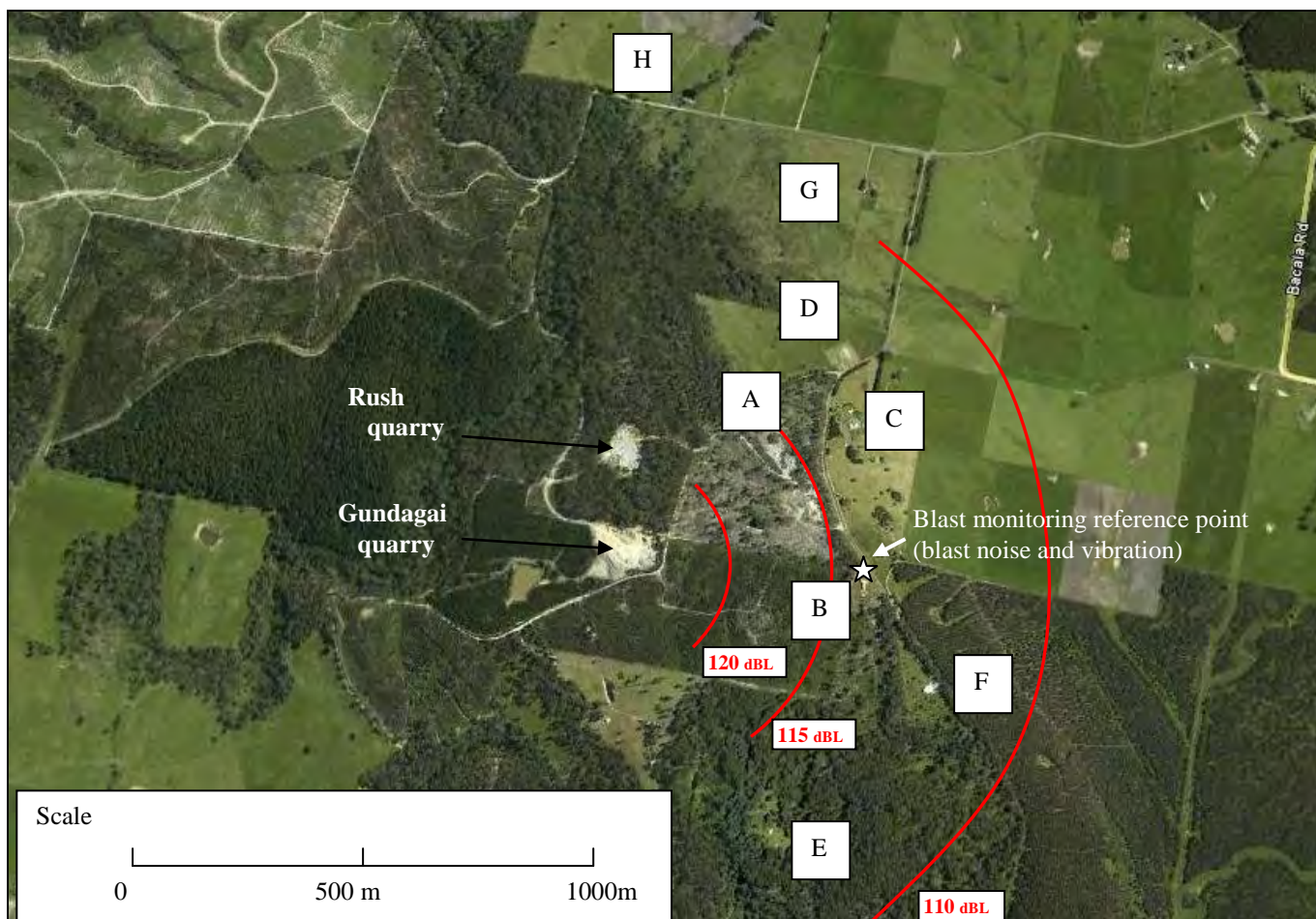


Figure 8 – Predicted critical ABO contours for an establishment blast (base map supplied by TEC).



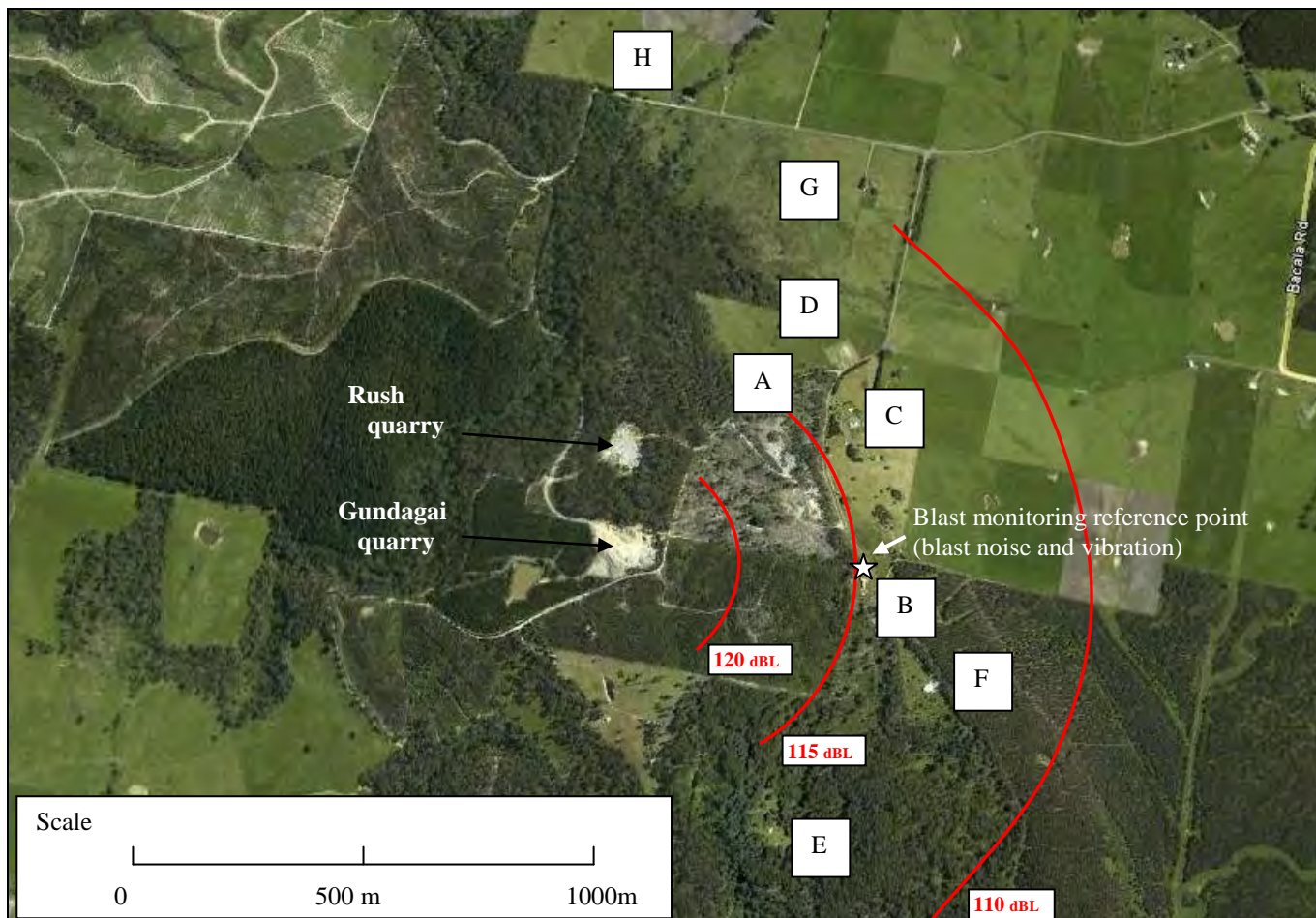


Figure 9 – Predicted critical ABO contours for a face blast (base map supplied by TEC).

From the above Vipac notes the following:-

- The OSM cube root scaled regression used to predict ABO slightly under predicts the level at location A measured during an establishment blast on 22 March 2010. The level at location B is over predicted by 4 dB and is likely to be due to topographic shielding from a low rise between the quarry and location B resulting in a lower measured than predicted level.
- The increased charge mass proposed for a face blasts results in a predicted ABO 0.5 dB greater than was predicted for an establishment blast. In turn the distance to critical ABO levels is also greater.

### 3.3 Recommendations

- Predicted ground vibration levels are below the critical 5 mm/s ANZEC recommended limit by  $\geq 1.7$  mm/s at residences surrounding Gundagai Quarry. Given this and the conservative nature of the predictions Vipac has no recommendations for mitigation of ground vibration. However, Vipac recommends that all future blasts are monitored for PPV at multiple locations, including location A, surrounding the quarry. This would provide further verification that predicted PPV levels are suitably conservative and also data for the development of a site specific square root scaled regression equation for more accurate prediction of PPV. Additionally, Vipac recommends that should the charge mass/delay used for blasting at the quarry be increased in the future that prediction of the resulting PPV levels surrounding the quarry be undertaken.

- The measured ABO level at the nearest residence (residence B) was within 0.2 dB of the ANZEC recommended limit of 115 dBL. Given this and the slight under prediction of ABO to the same location Vipac recommends the following mitigation measures:-
  - Vipac recommends that the charge mass/delay used at the quarry be capped at the amount used for an establishment blast, i.e. 46 kg, and not be increased to 57 kg for face blasts. A reduction in charge mass below 46 kg doesn't provide a significant reduction in ABO levels without a considerable decrease in charge mass, so much so that blasting would become ineffective. This is exemplified by the insensitive nature of the cube root scaling employed in the prediction of ABO to changes in charge mass.
  - Stemming height for both establishment and face blasts should be a minimum of 3 m, while the burden employed for face blasts should also be a minimum of 3 m.
  - All future blasts should be monitored for ABO at residence B to determine that the above measures are controlling ABO emissions to levels below 115 dBL. Should future monitoring demonstrate that ABO levels are significantly below 115 dBL then an increase in charge mass/delay could be considered following predictive studies. ABO should also be monitored at other locations surrounding the quarry. The measurement of ABO at multiple locations would provide data for the development of a site specific cube root scaled regression equation for more accurate prediction of ABO in the future.
  - Should emissions exceed 115 dBL then further mitigation measures such as deck loading the front row of holes for face blasts and backfill covering of the blast area for both establishment and face blasts may need to be explored.
  - Blasting should be avoided when atmospheric inversions are present and when the prevailing wind direction is from the west. These atmospheric conditions have the potential to increase ABO levels at residences surrounding the quarry.

## 4 Environmental noise

A noise emission limit has not been set for the Gundagai Quarry at present. A noise emission limit specified by the EPA for daytime activity when measured at any noise sensitive premises in other ownership is likely to be as follows under the *Tasmanian Quarry Code of Practice*<sup>[4]</sup>:-

- 10 dBA above normal daytime ambient noise levels.  
(0700 to 1800 hrs weekdays)  
(0800 to 1600 hrs Saturdays).

On two occasions Vipac logged 10-minute noise statistics at the closest residence to the quarry (residence B). The lowest ambient noise level ( $L_{Aeq,10min}$ ) measured in the absence of noise emissions from the quarry was 36 dBA. This results in a potential limit of 46 dBA under the *Tasmanian Quarry Code of Practice*. All noise emission predictions in this report are based on  $L_{Aeq,10min}$  levels and will be assessed against a potential emission limit of 46 dBA at any noise sensitive premises.

### 4.1 Environmental noise model

SoundPLAN<sup>[2]</sup> software was used for carrying out detailed noise emission spectra and contour modelling of the quarry operations. This program allows the use of the CONCAWE<sup>[5]</sup> calculation method for modelling atmospheric attenuation of noise. Parameters influencing sound propagation and attenuation include:

- Source type (point, line, plane).
- Relative source and receiver height.
- Topography and barriers.
- Industrial buildings as sources and/or barriers.
- Ground absorption.
- Distance attenuation.
- Atmospheric conditions including pasquill stability, temperature, humidity and vector wind speed.
- Reflecting surfaces.
- Source directivity.

As all propagation and attenuation parameters are frequency dependent, all input source data has been based on 1/3-octave band sound power spectra.

Geodata for the area surrounding the quarry was obtained from TASMALP 1:25000 "Lilydale 5043". This provided contours at 10-metre intervals; residential locations; road layouts; and river and stream courses for the area.

Spatial maps of the quarry's projected development were provided by Trawmana Environmental Consultants and were used as a guide in the construction of digital ground models.

All source data is referenced to the Map Grid of Australia (MGA) reference coordinate system.

#### 4.2 Model input data

Sound power spectra for the equipment used during the quarry's operations were calculated from measurements taken during site testing conducted on 18 & 30 March 2010. Where measurement of equipment was not possible Vipac library data was utilised. The overall sound power level for each source is summarised in table 8 below.

Overall sound power Levels			
Source	Source Type	PWL <sub>A</sub>	Comment
Drill Rig (Roc F7 Atlas Copco) - engine noise	Point	111.8	Measured data
" - drilling	Point	124.1	"
" - rattling drill rods	Point	109.6	"
Crusher (Gara-Pagos BR 380 JG)	Point	117.2	"
Impactor	Point	109.8	"
Impactor screen	Point	115.3	"
Sizing screen	Point	109.0	"
Generator - enclosure	Point	99.6	"
" - exhaust	Point	106.1	"
Excavator (Komatsu PC300-5)	Point	103.2	Vipac library data
Front End Loader (Komatsu WA300)	Point	108.0	Measured data
Road truck	Line	90.6	Vipac library data

Table 8 – Sound power levels for quarry equipment.

All sound power data has been scaled to represent the typical operation of each piece of equipment within a 10-minute period.

#### 4.3 Modelled operating scenario

Scenarios were modelled based on projected quarry development and mapping of the current quarry topography. Three operational modes were modelled to represent the following:-

- drilling for blast preparation (Sources: drill rig)
- crushing and screening of material (Sources: excavator; crusher; impactor; impactor screen; sizing screen; and generator)
- loading screened material for transport (Sources: front end loader and road truck).

The quarry development stages modelled for each operational scenario are as follows:-

Stage 1 - Current depth (at measured locations on 18 & 30 March 2010)

- drilling;
- crushing and screening;
- truck loading.

Stage 2 - Expansion of current depth (expansion of 230 m a.s.l area)

- drilling (on upper bench western end);
- crushing and screening.

**Stage 3 - Projected Year 2 to 4**

- drilling;
- crushing and screening.

**Stage 4 - Projected Year 3 to 11**

- drilling;
- crushing and screening

**Stage 5 - Projected Year 4 to 20**

- crushing and screening.

For each development stage, all noise sources were modelled at the western end of the quarry, as these represented worst-case positions for propagation of noise to the residential receiver locations.

**4.4 Modelled weather**

Both neutral and worst case weather conditions were modelled for each scenario.

Situations where the atmospheric conditions are considered to be neutral occur with a Pasquill stability class D and no wind. These conditions can typically occur in the hour before and after sunrise and sunset; as well as during calm, cloudy conditions.

Worst case weather propagation considers all receiver points to be downwind of all sources with a Pasquill stability class F and a vector wind speed of 2 m/s. Under these conditions the highest predicted noise levels are generated

**4.5 Wire frame model**

To aid in the visualization of the modelled scenarios, a series of plan view and wire frame images are presented in figures 10 to 19 below. The height (m a.s.l) at the maximum depth of the quarry is also noted on the plan view for each stage of development. These heights may not correspond to heights presented elsewhere in the DPEMP as they are only relative to the 10-metre contour geodata used in the model.

**4.5.1 Stage 1 – Current depth**

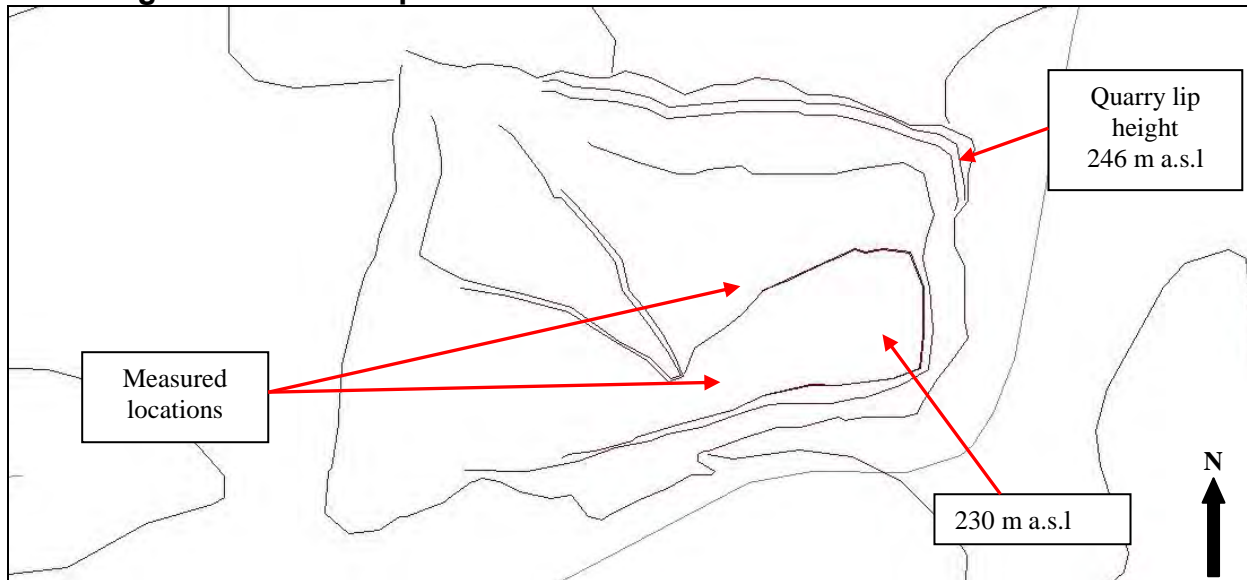


Figure 10 – Plan view of quarry at current depth.



Figure 11 – Wire frame view of quarry at current depth, view to north-east.

**4.5.2 Stage 2 – Expansion of current depth**

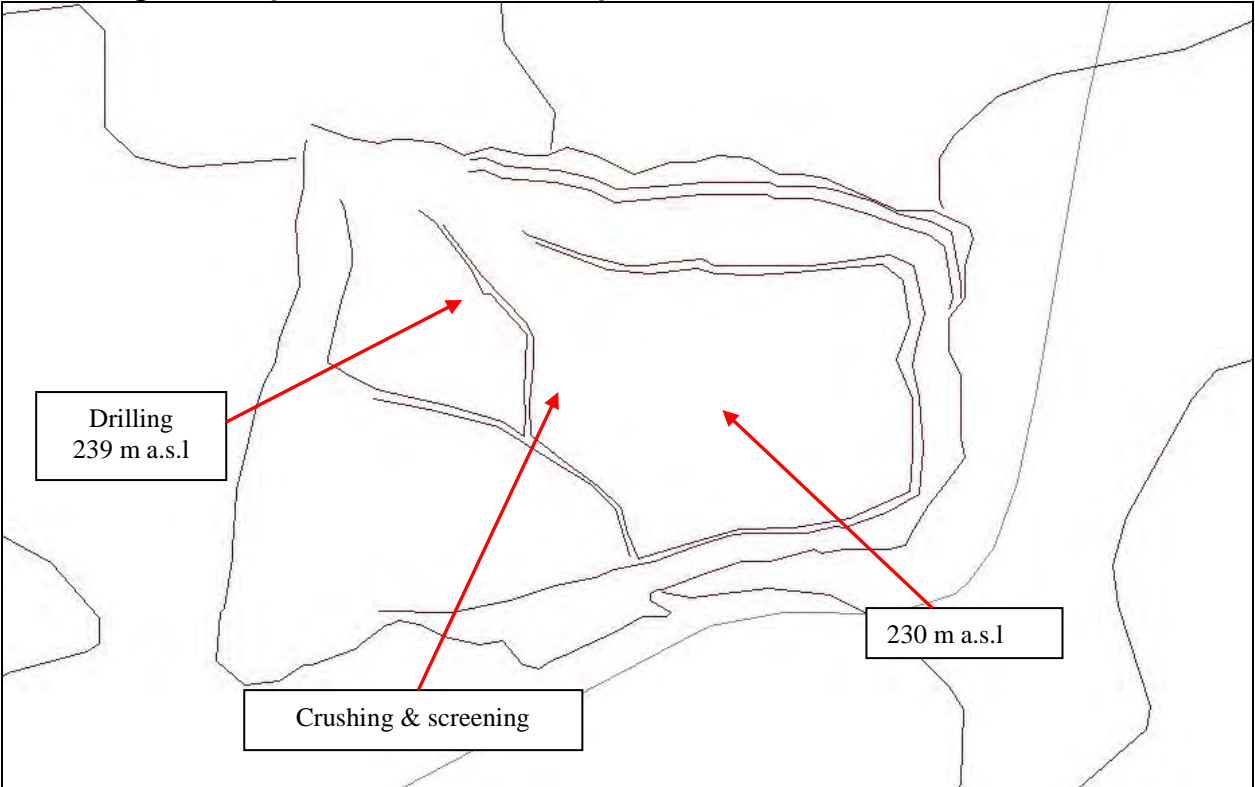


Figure 12 - Plan view of quarry following expansion of current depth.

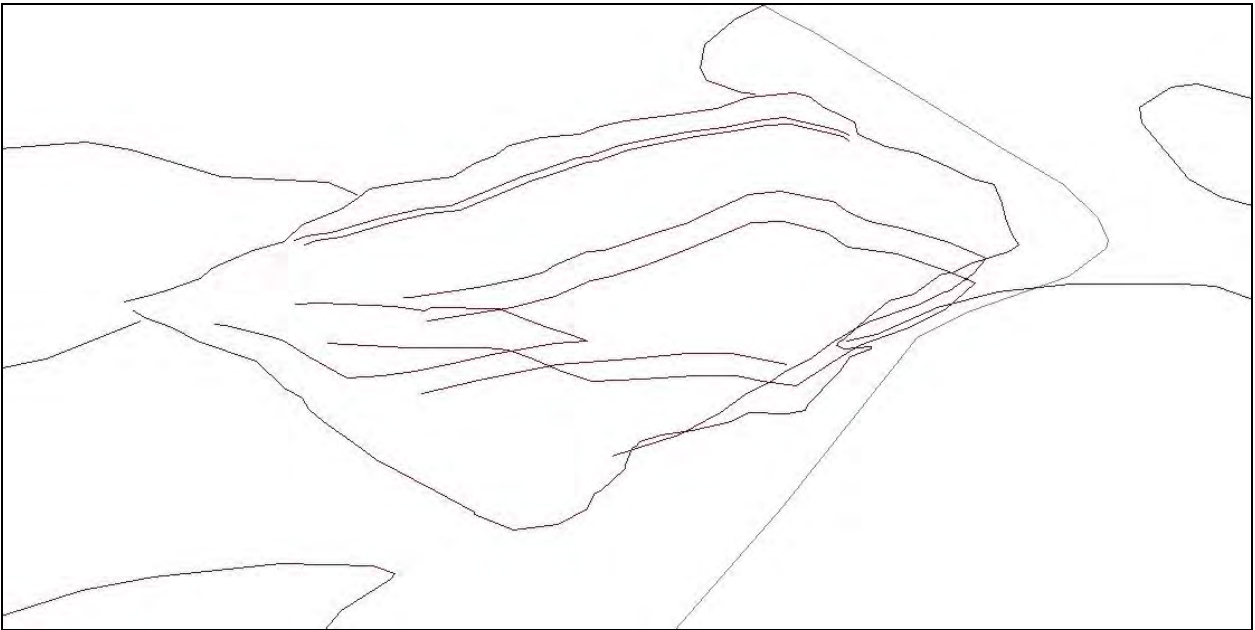


Figure 13 – Wire frame view of quarry following expansion of current depth, view to north-east.

**4.5.3 Stage 3 – Year 2 to 4**

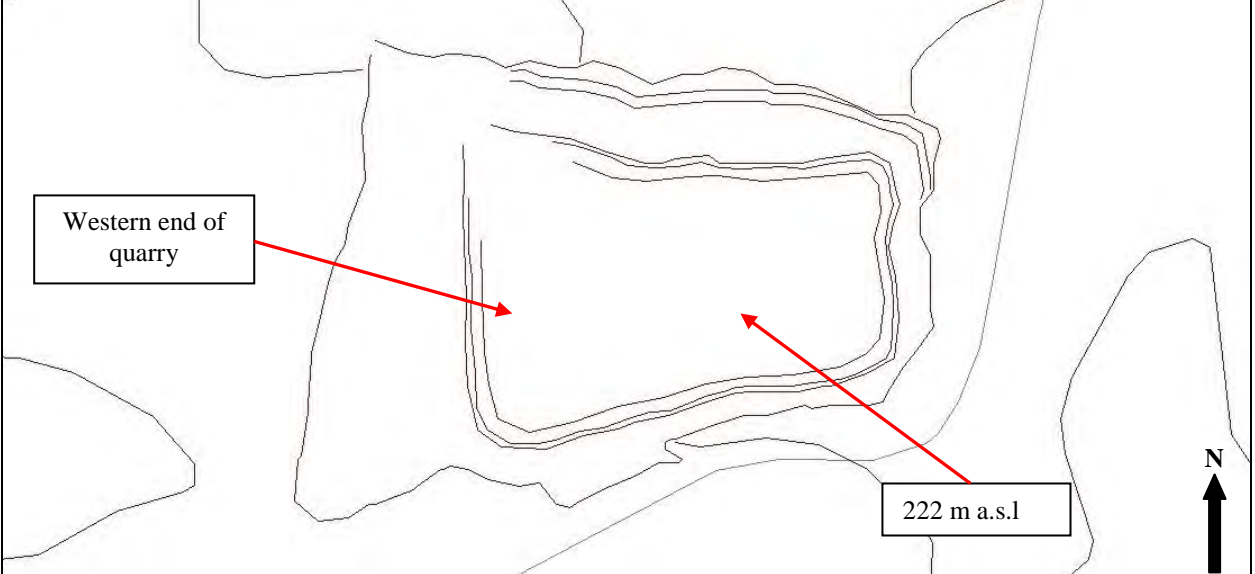


Figure 14 – Plan view of quarry at projected 2 to 4 year depth.

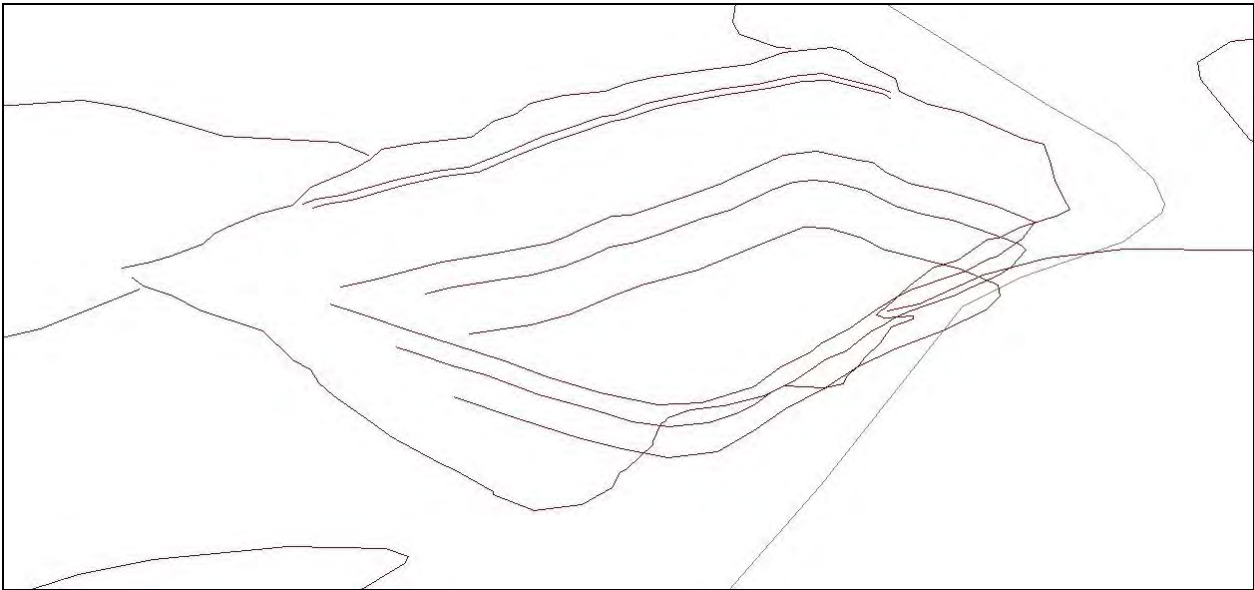


Figure 15 – Wire frame view of quarry at projected 2 to 4 year depth, view to north-east.

#### 4.5.4 Stage 4 – Year 3 to 11



Figure 16 – Plan view of quarry at projected 3 to 11 year depth.

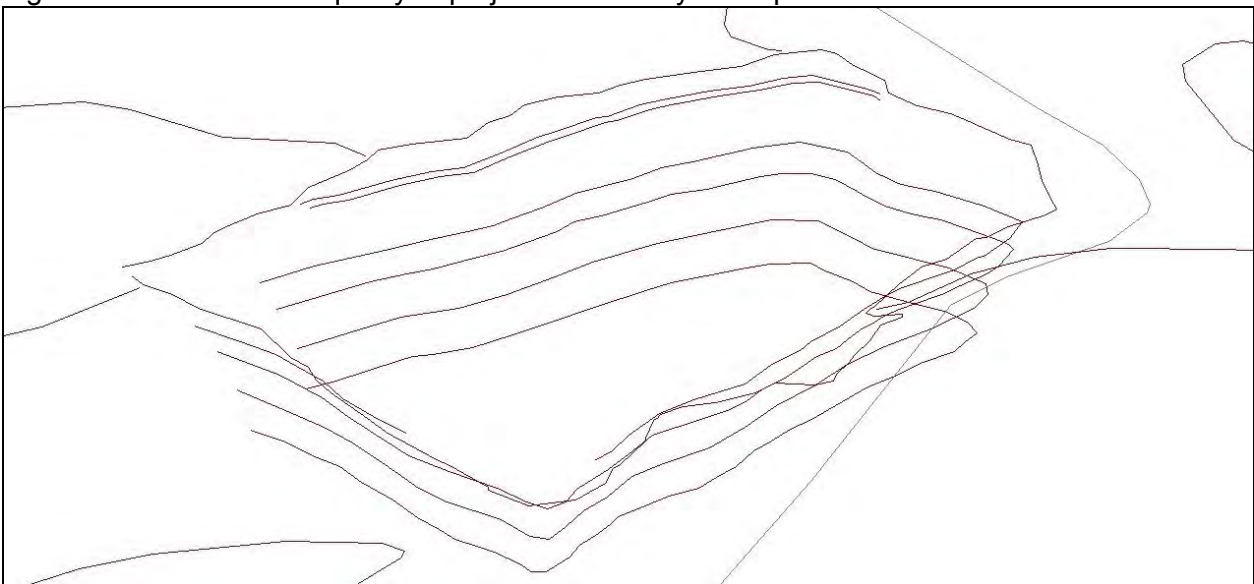


Figure 17 – Wire frame view of quarry at projected 3 to 11 year depth, view to north-east.

#### 4.5.5 Stage 5 – Year 4 to 20



Figure 18 – Plan view of quarry at projected 4 to 20 year depth.



Figure 19 – Wire frame view of quarry at projected 4 to 20 year depth, view to north-east.

#### 4.6 Noise sensitive receivers

Four receiver locations were selected for modelling as follows:-

**Model calibration**

Quarry Lip (eastern lip of the quarry).  
Gundagai Rd.

**Noise sensitive locations**

Residence B.  
Cnr of Rawnsleys Rd and Gundagai Rd.

Figure 20 shows the receiver locations in relation to Gundagai Quarry.



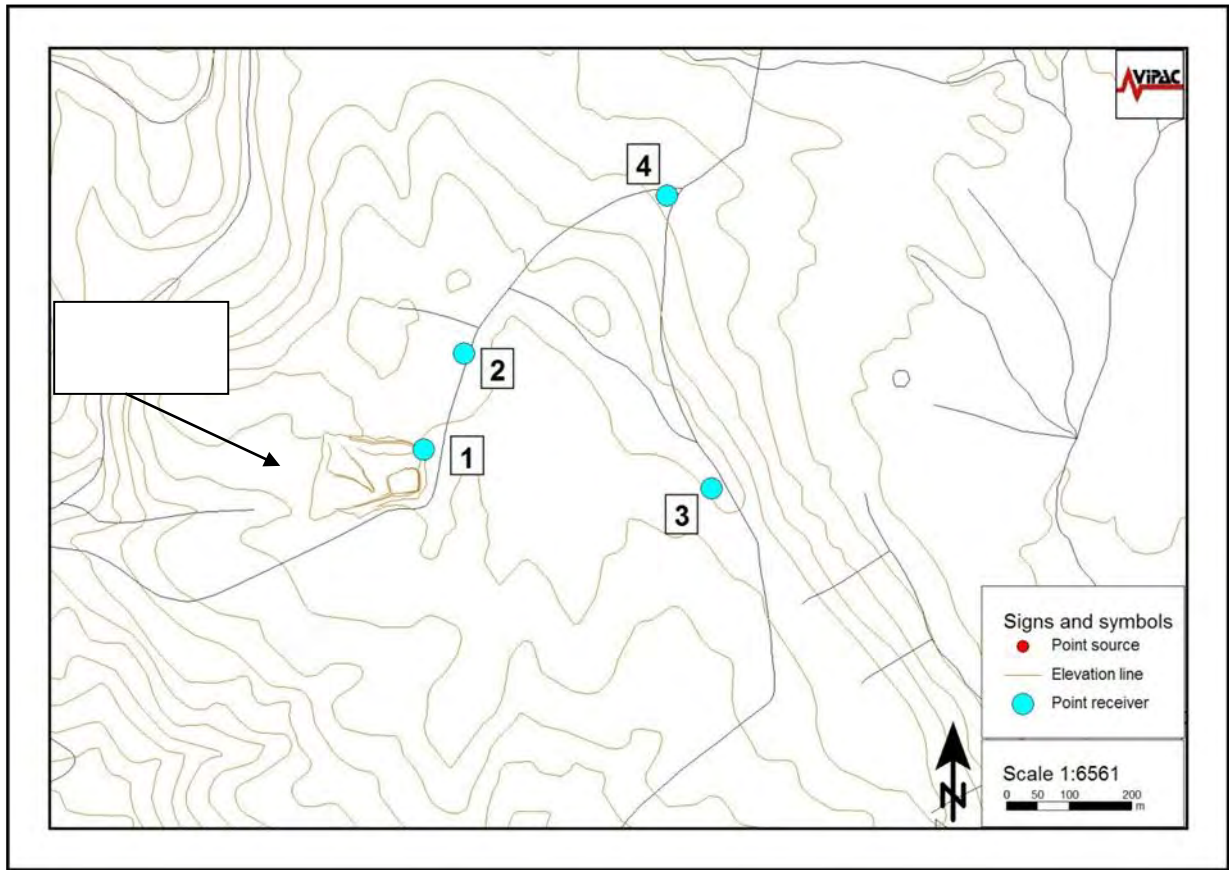


Figure 20 – Calibration and noise sensitive receiver locations.

#### 4.7 Model calibration

A series of measurements were taken at receiver locations to the east of the quarry during testing on 18 & 30 March 2010 to verify the predicted noise emission levels from the model.

At receiver positions 1 and 2 (see figure 20 above), where noise emissions from the quarry were dominant, short duration  $L_{Aeq}$  measurements were taken.

At receiver position 3 (see figure 20 above) a logging sound level meter (Larson Davis 870B) was used to record 10-minute  $L_n$  statistics during current quarry operations. Local noise sources were a dominant feature of immissions at receiver 3. Given this, and the fact that noise sources within the quarry largely operated on a constant basis, measured  $L_{A90,10min}$  levels are presented for comparison at this location.

Table 9 presents measured and predicted noise levels at receivers 1, 2 and 3 for the calibration runs of the existing operations (Stage 1 – current depth).

Calibration measurements							
Current depth	Calibration receivers (neutral weather)				Noise sensitive receivers (neutral and worst case weather)		
	Receiver 1		Receiver 2		Receiver 3		
	Measured (L <sub>Aeq</sub> )	Predicted (L <sub>Aeq,10min</sub> )	Measured (L <sub>Aeq</sub> )	Predicted (L <sub>Aeq,10min</sub> )	Measured (L <sub>A90,10min</sub> )	Predicted (L <sub>Aeq,10min</sub> )	
						Neutral weather	Worst case weather
Drilling	-	-	44.4	44.2	38	35.1	40.0
Crushing & screening	73.5	74.4	-	-	38	36.1	39.8

Table 9 – Measured and predicted noise levels at calibration receivers (1 & 2) and receiver 3.

The predicted noise levels at receivers 1 and 2 are within 1 dBA of the measured levels under neutral atmospheric conditions. At receiver 3 under neutral weather conditions predicted levels are 2 to 3 dBA lower than measured L<sub>A90,10min</sub> levels while worst case weather predicted noise levels are 2 dBA greater. These results demonstrate a good correlation between measured and predicted levels and therefore no off set in predicted levels has been applied.

## 4.8 Summary of environmental noise modelling results

### 4.8.1 Predicted noise contours

Using the environmental noise model, a series of noise contour maps have been generated as follows: -

#### Stage 1 – Current depth

- Drilling at measured location with worst-case weather.
- Crushing & screening at measured location with worst-case weather.
- Truck loading at measured location with worst-case weather.

#### Stage 2 – Expansion of current depth

- Drilling on upper bench at western end of quarry with worst-case weather.
- Crushing & screening at western end of quarry with worst-case weather.

#### Stage 3 – Year 2 to 4

- Drilling at western end of quarry with worst-case weather.
- Crushing & screening at western end of quarry with worst-case weather.

#### Stage 4 – Year 3 to 11

- Drilling at western end of quarry with worst-case weather.
- Crushing & screening at western end of quarry with worst-case weather.

#### Stage 5 – Year 4 to 20

- Crushing & screening at western end of quarry with worst-case weather.

**Stage 1 – Current depth**

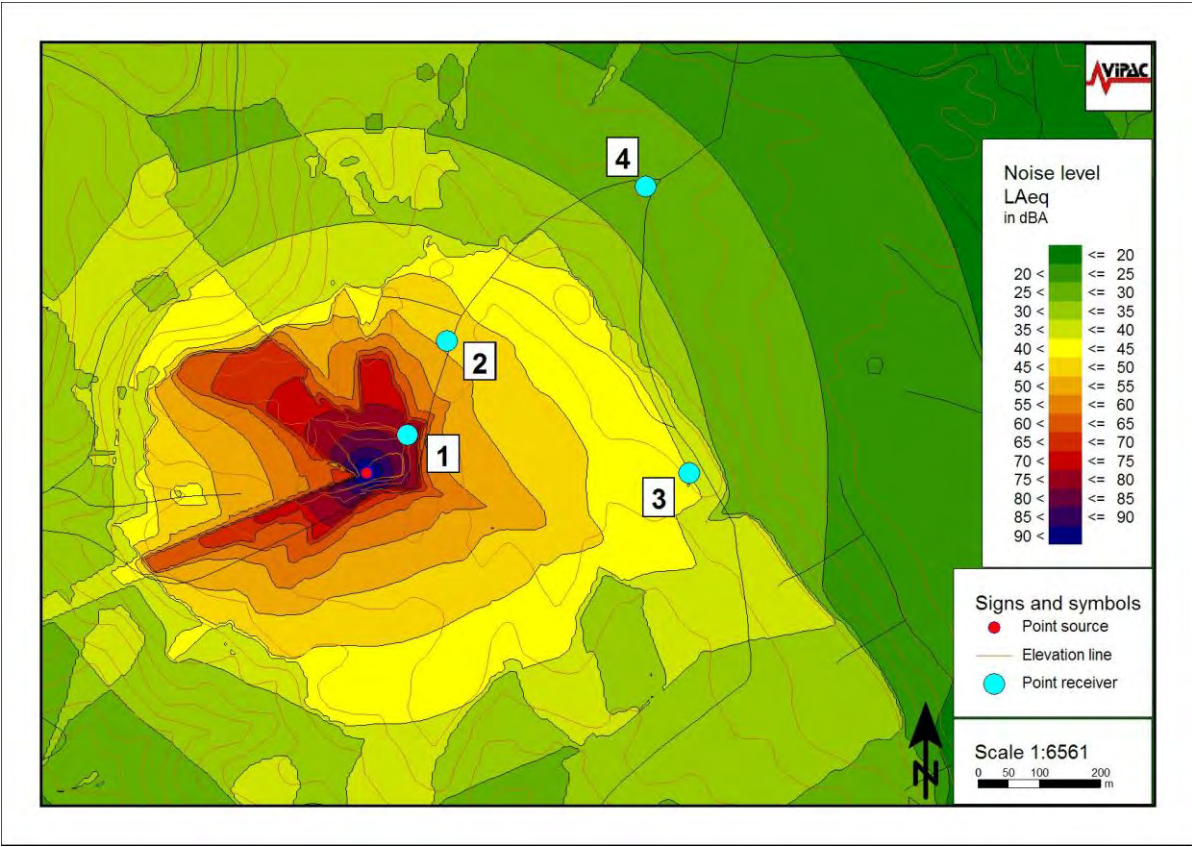


Figure 21 – Drilling at measured location with worst-case weather

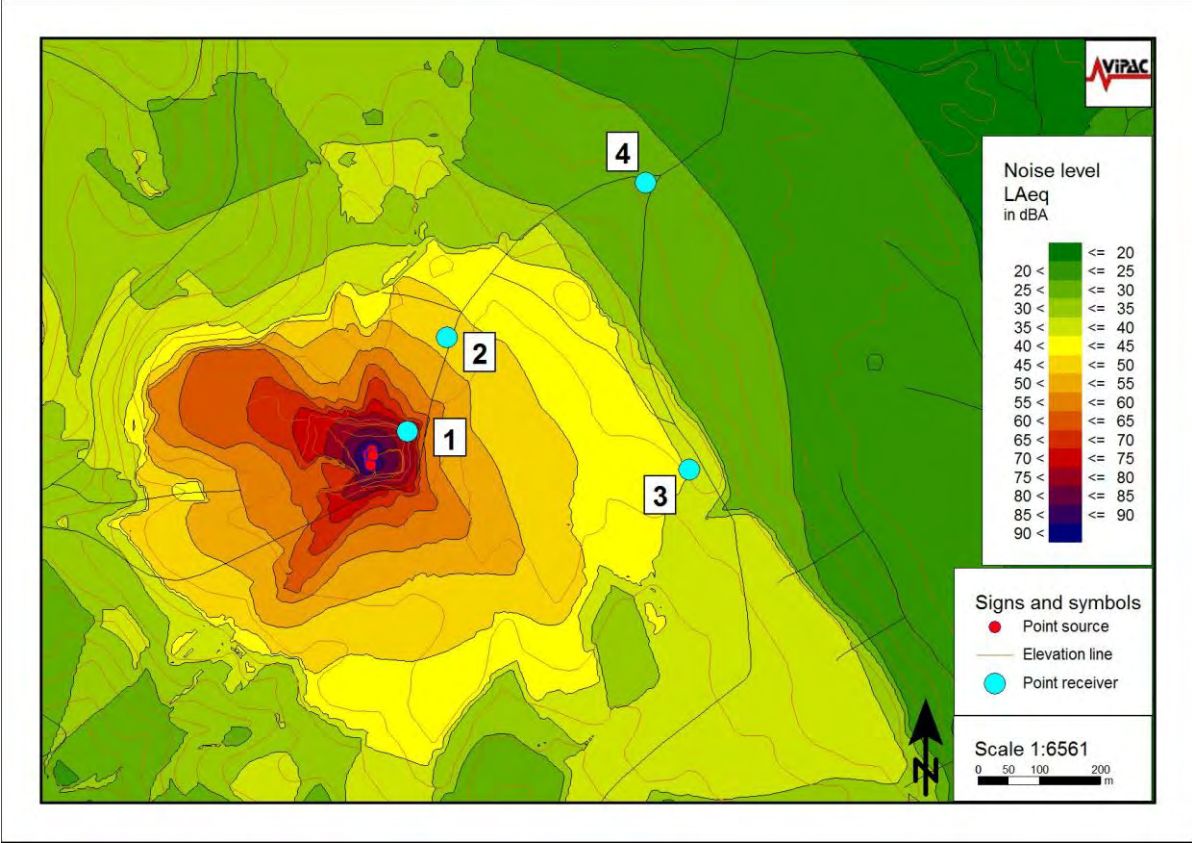


Figure 22 – Crushing & screening at measured location with worst-case weather.

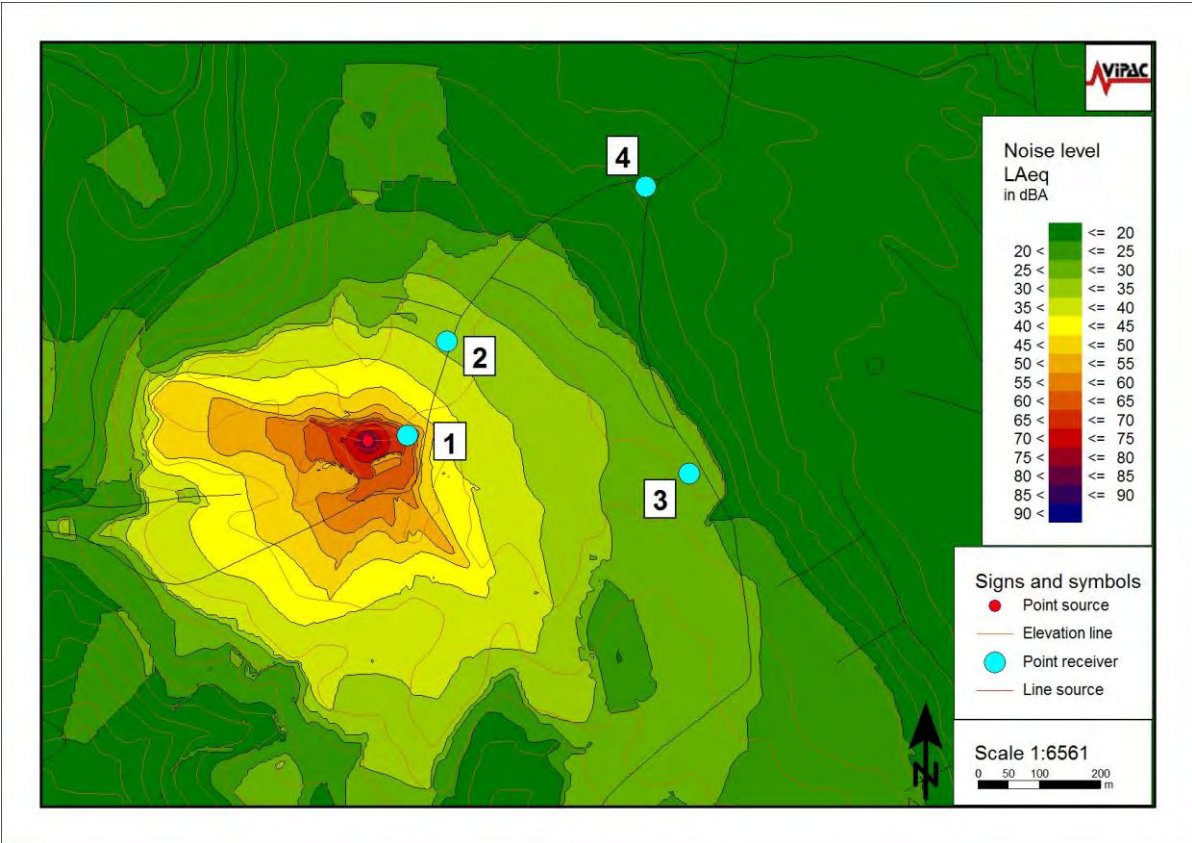


Figure 23 – Truck loading at measured location with worst-case weather.

**Stage 2 – Expansion of current depth**

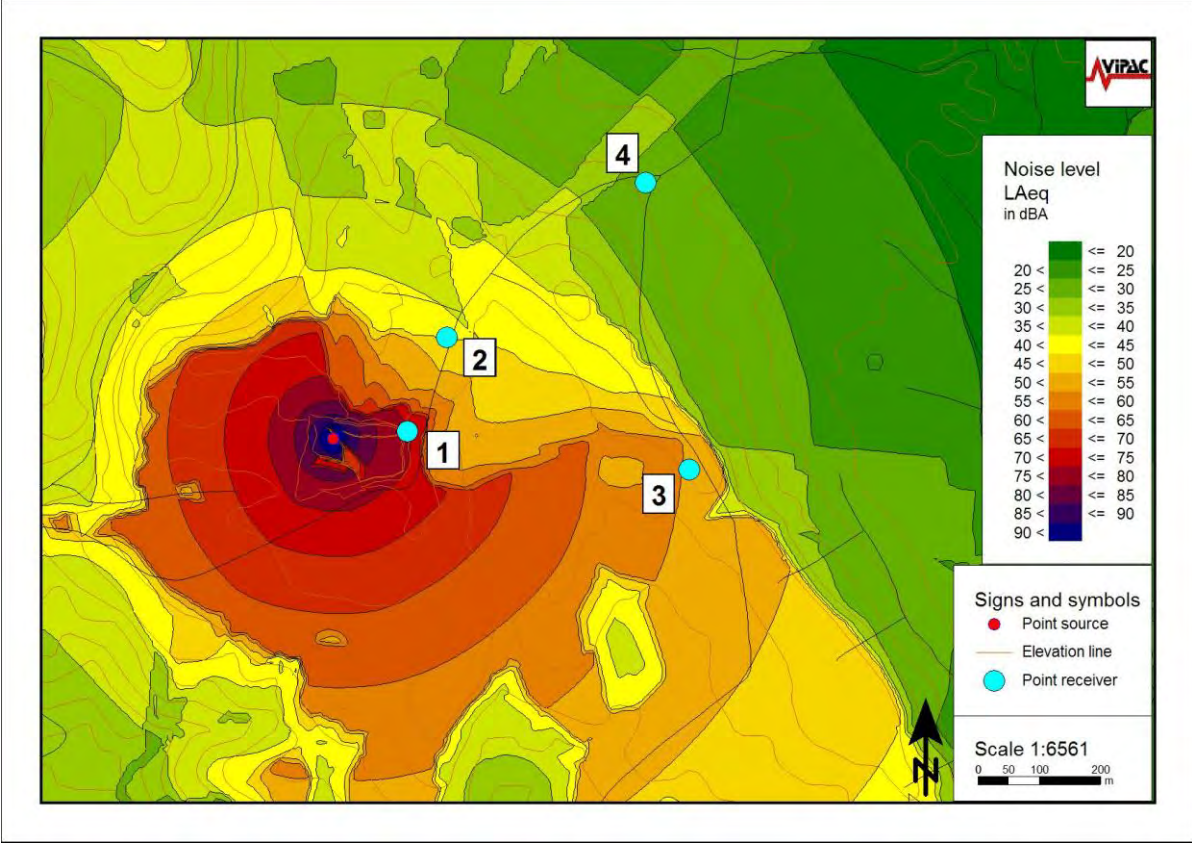


Figure 24 – Drilling on bench at western end of quarry with worst-case weather.

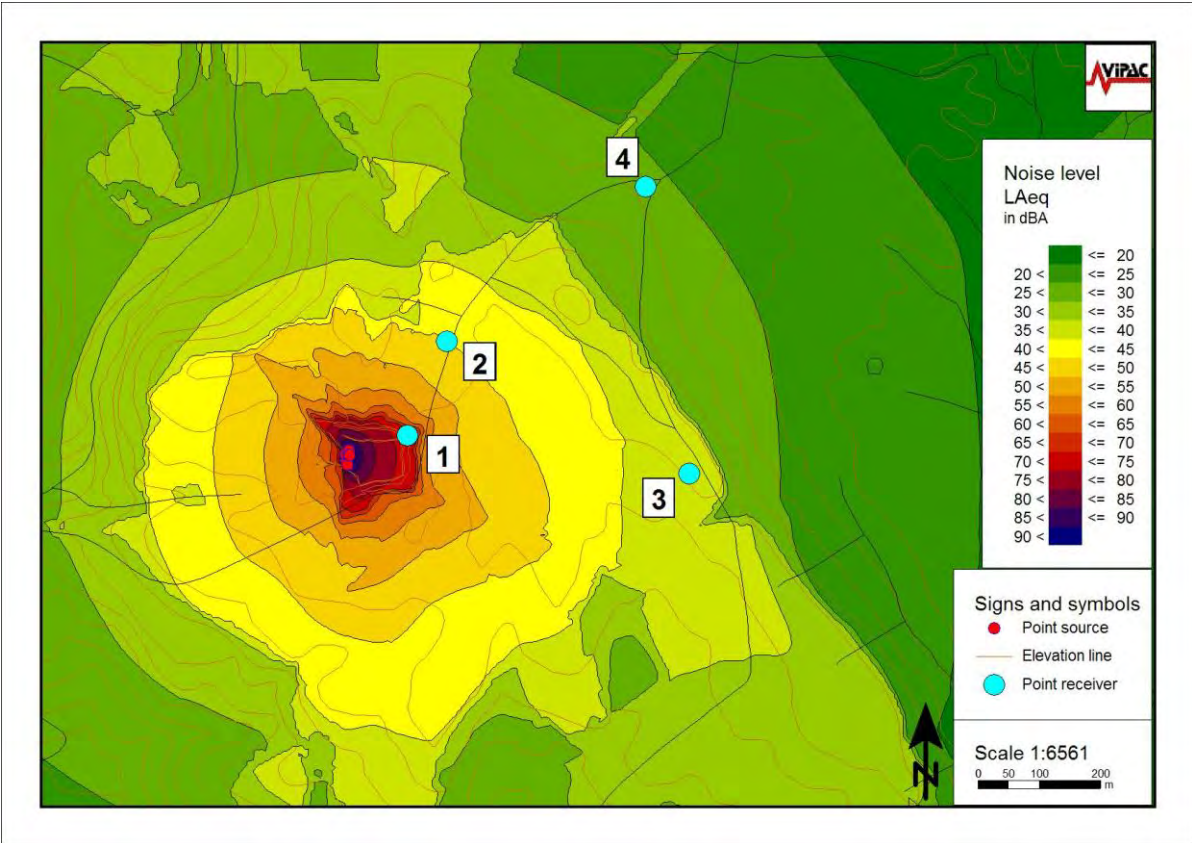


Figure 25 – Crushing & screening at western end of quarry with worst-case weather.

**Stage 3 – Year 2 to 4**

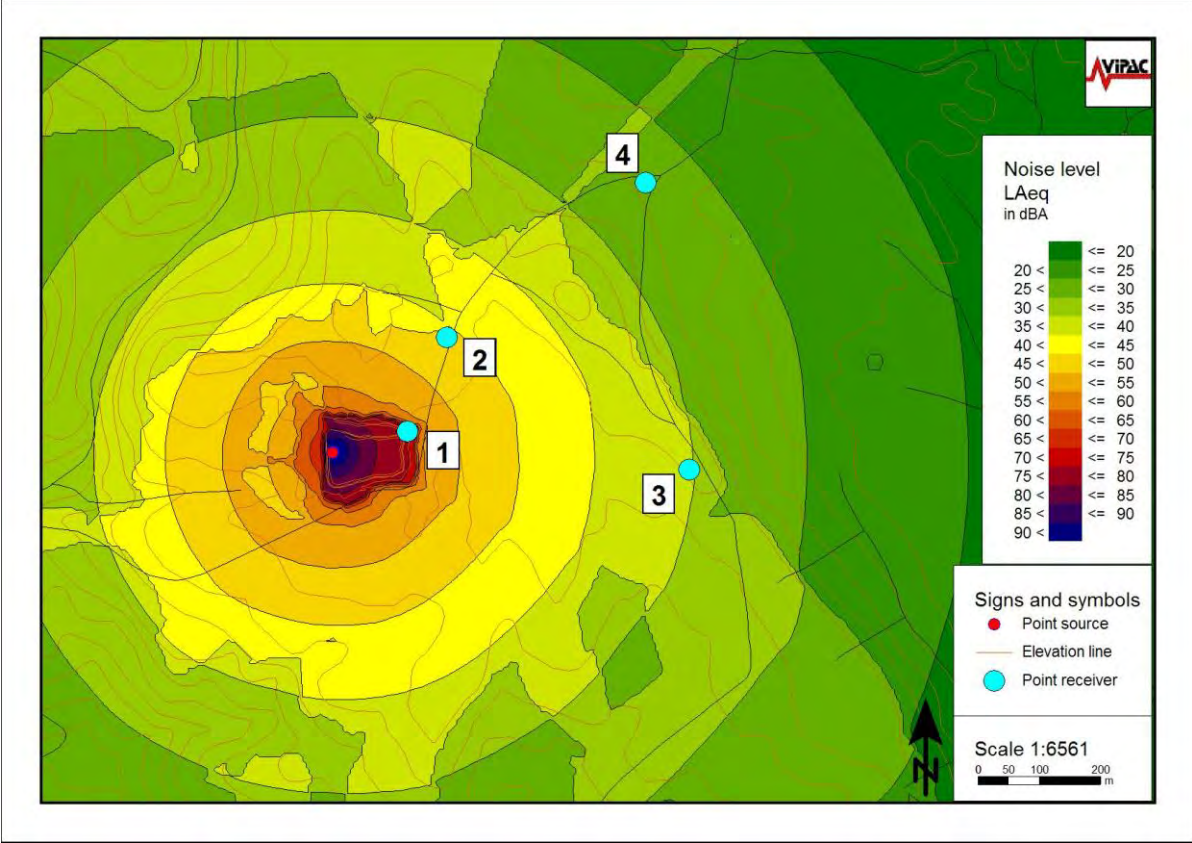


Figure 26 – Drilling at western end of quarry with worst-case weather.

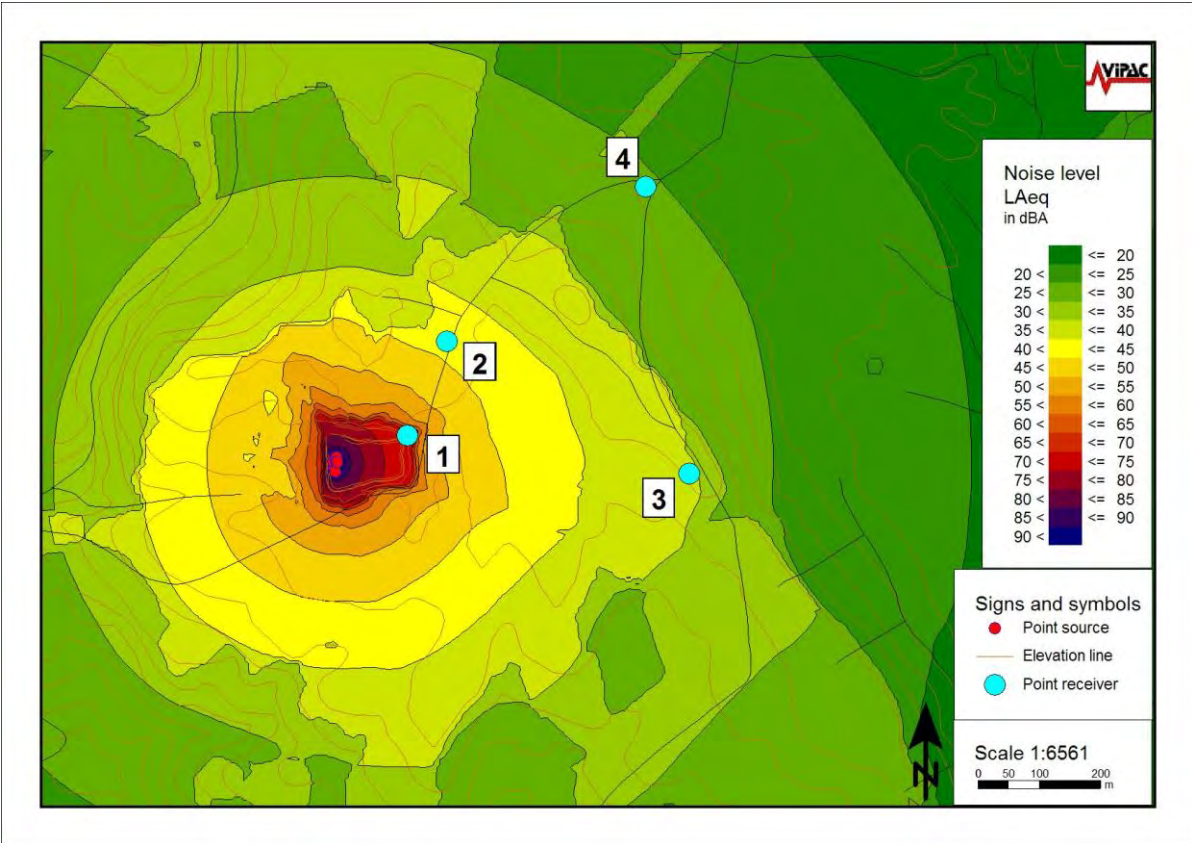


Figure 27 – Crushing & screening at western end of quarry with worst-case weather.

**Stage 4 – Year 3 to 11**

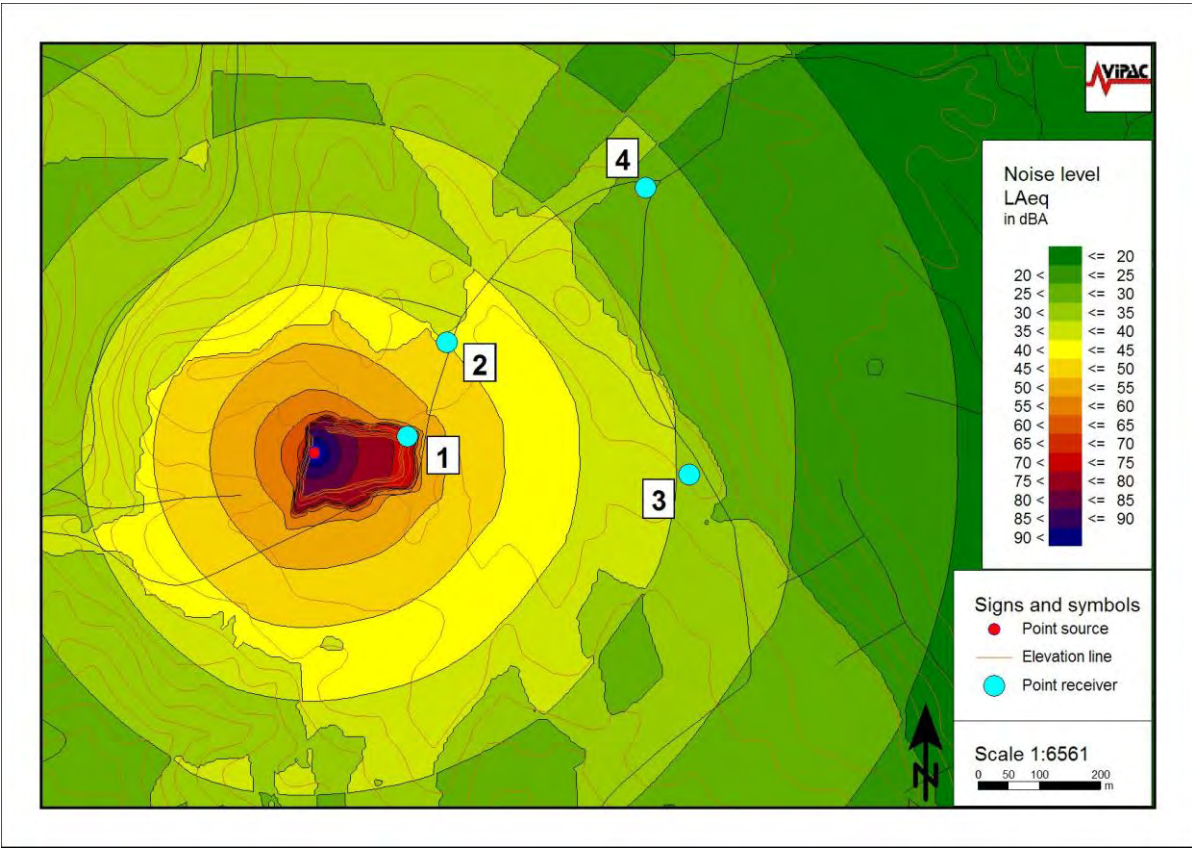


Figure 28 – Drilling at western end of quarry with worst case weather.

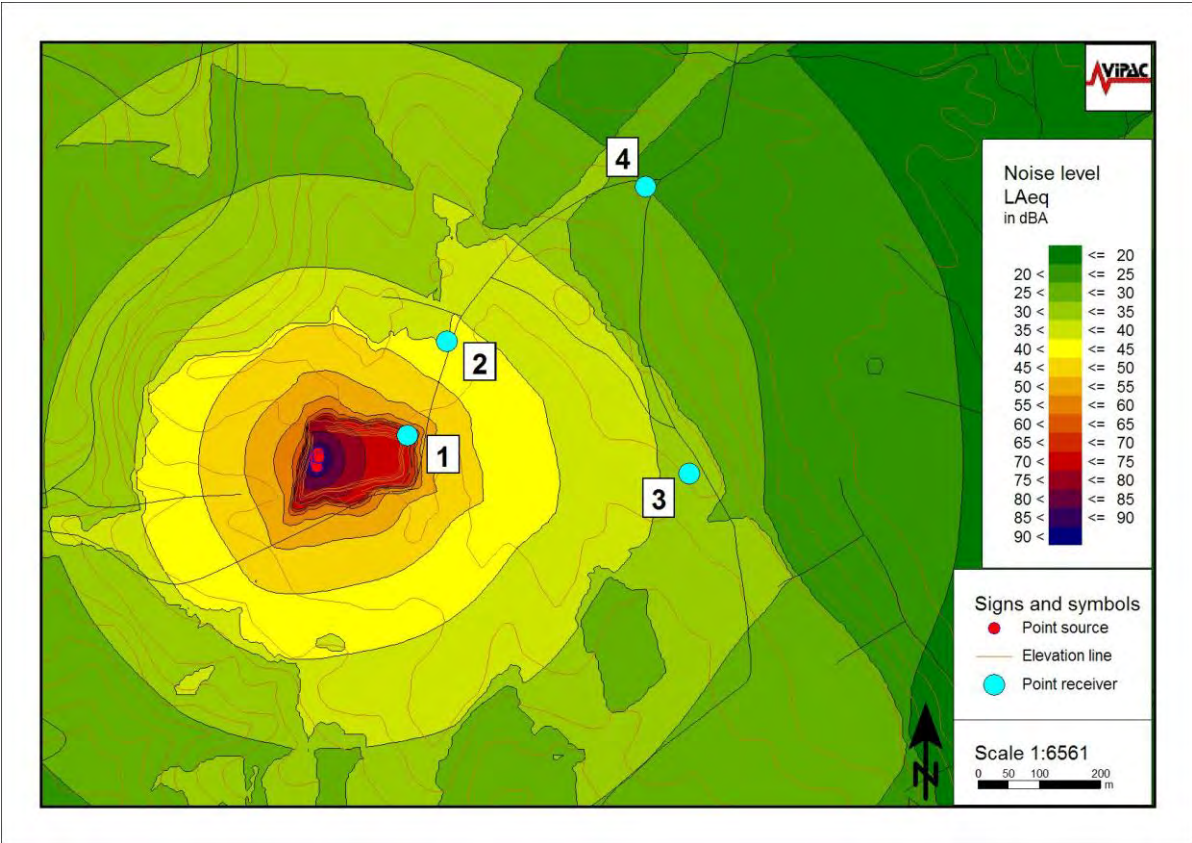


Figure 29 – Crushing & screening at western end of quarry with worst case weather.

**Stage 5 – Year 4 to 20**

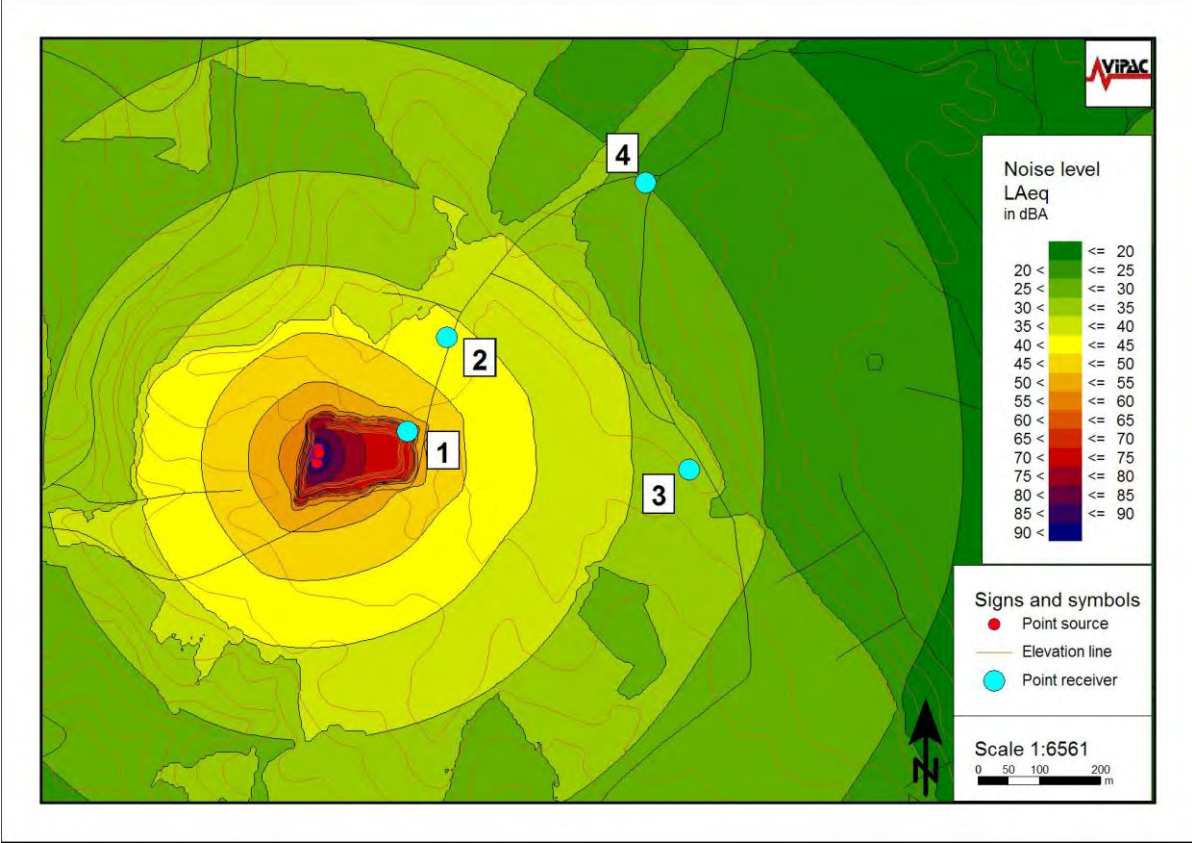


Figure 30 – Crushing & screening at western end of quarry with worst case weather.

### 4.8.2 Received levels

Predicted received levels at the four receiver location under worst case weather for each of the modelled scenarios are presented in table 4 below.

Received levels, $L_{Aeq,10min}$ (dBA)					
Model scenario		Model calibration receivers		Noise sensitive receivers	
		1	2	3	4
Stage 1 Current depth (measured location)	drilling	77.6	48.5	40.0	27.6
	crushing & screening	75.7	47.7	39.8	26.2
	truck loading	64.3	33.7	27.0	14.4
Stage 2 Expansion of current depth	drilling	75.4	41.4	54.7	27.1
	crushing & screening	72.6	45.1	37.8	25.7
Stage 3 Year 2 to 4 (projected depth)	drilling	75.0	45.8	35.1	26.9
	crushing & screening	71.5	43.3	35.4	25.4
Stage 4 Year 3 to 11 (projected depth)	drilling	73.5	44.9	34.4	26.4
	crushing & screening	70.2	40.0	34.0	25.0
Stage 5 Year 4 to 20 (projected depth)	crushing & screening	70.0	41.3	32.8	25.0

Received level greater than 46 dBA at noise sensitive receiver.

Table 10 – Received levels for all modelled scenario under worst-case weather conditions.

From the above Vipac notes the following:-

- Predicted noise levels at the noise sensitive receivers are well below the potential noise emission limit of 46 dBA under all scenarios with the exception of Stage 2 (expansion of current depth) - drilling on the upper bench at the western end of the quarry.
- During drilling on the upper bench at the western end of the quarry noise immissions at receiver 3 are predicted to exceed 46 dBA by 8 dBA under worst-case weather conditions. The high noise levels predicted from this phase of the operations are due to lack of shielding from the eastern face of the quarry.
- While truck loading activity would continue through the quarry's life, this activity has only been modelled for Stage 1. Stage 1 represents the worst case operational conditions where shielding from the eastern quarry face is at its minimum. Stage 1 modelling shows that truck loading is well below the 46 dBA potential limit.

### 4.9 Recommendations

- During drilling on the upper western bench (current quarry level), noise emissions are likely to exceed any specified emission limit. A minimum of 8 dBA reduction in predicted noise emissions from the drill rig would be required to meet a noise limit of 46 dBA. Such a reduction is possible by shrouding the drill head. Shrouded drill rigs are currently available and such a unit should be sort for this phase of the quarry's development. If this is not practicable then shrouding of an existing rig used at the site would need to be explored. This may be achieved using a product such as Flexshield Sound Stop, a flexible PVC curtain, that can provide between 10 to 15 dB transmission loss.



## 5 Summary

- An impact assessment of environmental noise, ground vibration and air blast overpressure emissions from operations at Gundagai Quarry has been carried out as part of a DPEMP for the expansion of the quarry's operations.
- Ground vibration and air blast overpressure measurements at Residence B are within recommended maximum limits under ANZEC guidelines.
- The air blast overpressure level measured at Residence B (location A) was 0.2 dB below the recommended limit under ANZEC guidelines.
- Conservative predictions of PPV levels from an establishment blast and face blast are below 5 mm/s at residential locations surrounding the quarry.
- Predictions of ABO slightly under predict the measured level at residence B. Predicted levels for an establishment blast and face blast are below 115 dBL. An increase in charge mass results in an increase in ABO.
- With the exception of drilling on the current bench at the western end of the quarry, predicted environmental noise modelling has demonstrated that noise emissions from quarry operations, both current and proposed, are highly unlikely to exceed a 46 dBA  $L_{Aeq,10min}$  limit.
- Vipac makes the following recommendation in relation to environmental noise, ground vibration and air blast overpressure emissions from operations at Gundagai Quarry:-
  - Independent monitoring of ground vibration and air blast overpressure should be carried out for all quarry blasting at multiple locations including at location A (residence B). This would allow for the development of site specific scaled regression equations for more accurate prediction of ground vibration and ABO.
  - Charge mass/delay should be capped at 46 kg. Stemming height should be no less than 3 m and burden for face blasts no less than 3 m.
  - Blasting should be avoided when atmospheric inversions are present and when the prevailing wind direction is from the west.
  - Further PPV and ABO prediction should be undertaken if any significant change to blasting design is proposed.
  - Environmental noise emissions should be monitored on a quarterly basis for the first year following approval of the quarry's expansion and annually thereafter. This is to verify the predicted noise levels presented in this report and demonstrate compliance with noise emissions limits.
  - Any significant changes to the quarry's operations should be modelled to allow prediction of likely noise emissions resulting from the change.
  - A shrouded drill rig should be sourced for the drilling on the upper western bench of the quarry. If this is not practicable then shrouding of an existing rig used at the site would need to be explored.

## 6 References

- [1] Office of Surface Mining Reclamation and Enforcement (<http://www.osmre.gov/>).
- [2] SoundPLAN Acoustic modeling software - Braunstein & Berndt GmbH.
- [3] ANZEC (1990) Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration.
- [4] DPIWE/DIER Environmental Protection, Planning and Analytical Services Division (1999) Quarry Code of Practice.
- [5] CONCAWE The oil companies" international study group for conservation of clean air and water – Europe (est. 1963) report no. 4/81.

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## Gundagi Quarry, Bangor - DPEMP

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### Appendix I: Gundagi Quarry Pre-Construction Dam Report

# GUNDAGI QUARRY, BANGOR

## DAM CONSTRUCTION AND MODIFICATION PRE-CONSTRUCTION REPORT



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  - 2. Existing Dam
- Appendix B Catchment Hydrology Assessment
- Appendix C Spillway volume calculations

## INTRODUCTION

Gundagai Quarry is located on a 13.64 hectare area of land at Tunnel in north-eastern Tasmania (Figure 1). Bardenhagen Quarries have operated the quarry for the past fifteen years providing a large selection of high quality construction materials contributing significantly to regional development.

The quarry was operating under a 10,000 cubic metres per annum license which was increased to 50,000 cubic metres per annum in 2011 (DA0523/2009). This production level will increase again to a maximum of 200,000 cubic metres of quarry material per annum at full capacity when the assessment process is complete and new permits issued (subject to the statutory planning process).

This Report is for two dam related activities on the property which supports the quarry (Figure 2):

1. Construction of a new earth embankment dam on a gully that drains west of the existing quarry; and
2. Reduction in volume of an existing settling dam to the west of the quarry.

The existing dam and proposed new dam will provide water treatment functions (settling ponds) for the quarry. The water from the dams will not be used for any agricultural or domestic purpose.

## RATIONALE FOR DAM CONSTRUCTION (NEW) AND MODIFICATION (EXISTING)

The current layout of the quarry will need to be altered in 2014-15 as the pit at the eastern end of the property needs to be made deeper to extract additional material.

To ensure water flows out of the eastern pit rather than accumulate within it, the existing east-west drainage channel needs to be made both deeper and realigned to bypass the existing dam where it will connect to the drainage line at the western side of the property where a new settling dam will be constructed (Figure 3).

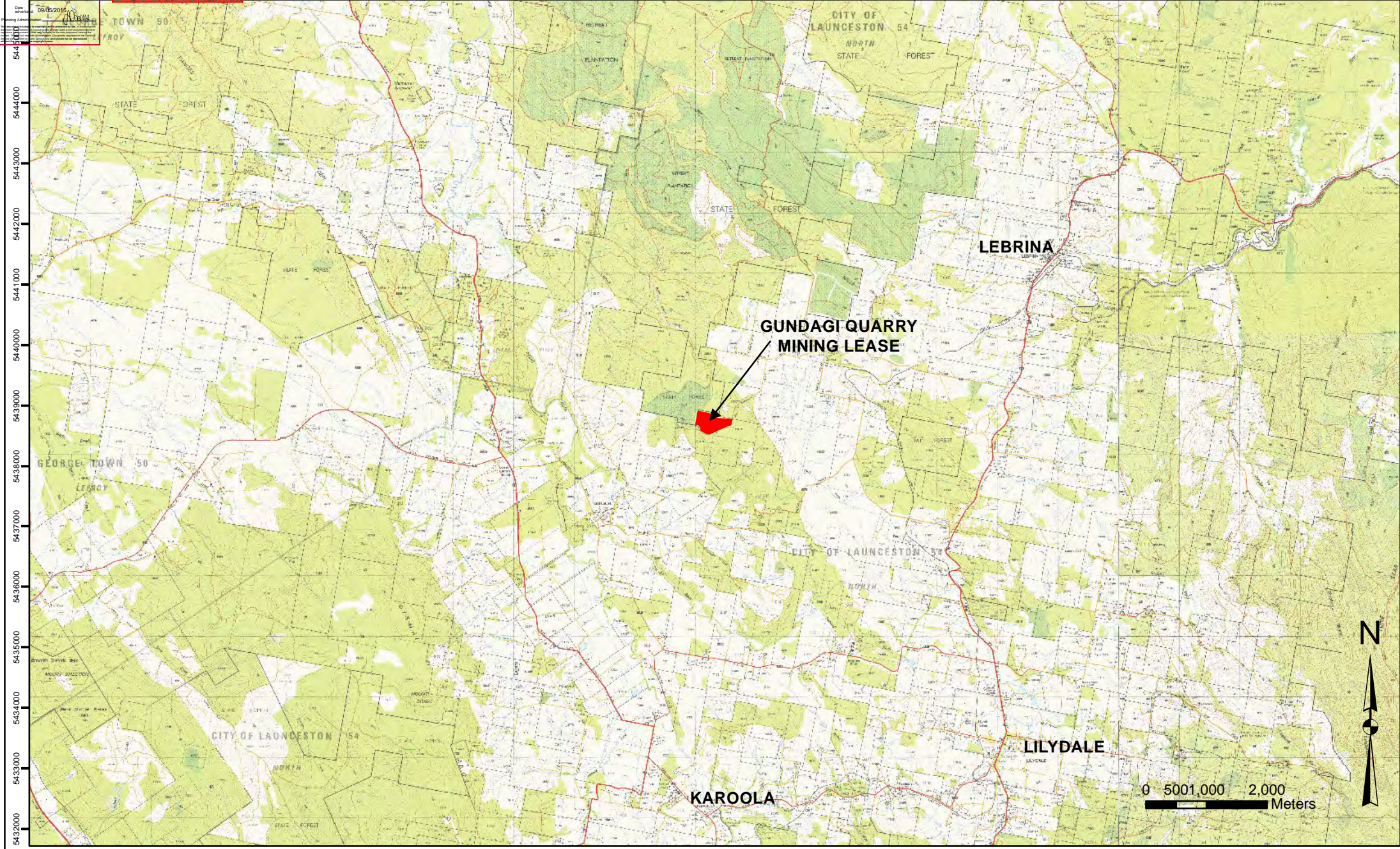
The existing dam (Dam 1) will be reduced in size by progressive infilling of the dam starting at the southern and southern-eastern edges with earth and compacted to existing ground level of the adjacent pine plantation and hardstand (Figure 3). The existing dam wall and spillway will remain undisturbed by the works.

The new dam (Dam 2) on the main drainage line at the western end of the property will be constructed prior to the existing large dam being bypassed or made smaller. The location of Dam 2 can be easily accessed from an existing track that is located on the southern side of the drainage line. This existing track will enable easy access to the drainage line to construct the ponds and ongoing access to clean the ponds as required.

Beyond 2015 the quarry will extend (subject to EPA – GTC approvals) into areas of pine plantation in the north-west and south-west of the property. The location of the dams and their sizes have been calculated on the water management requirements for when the quarry is at full operation (Figure 4, Appendix B). This approach avoids the future need to enlarge or reconstruct the proposed new dam (Dam 2).


Sediment cleaned from both dams will be removed to the quarry for use in rehabilitation works.

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# Gundagi Quarry Pre Construction Report

Figure 1: Location of Gundagi Quarry Mining Lease

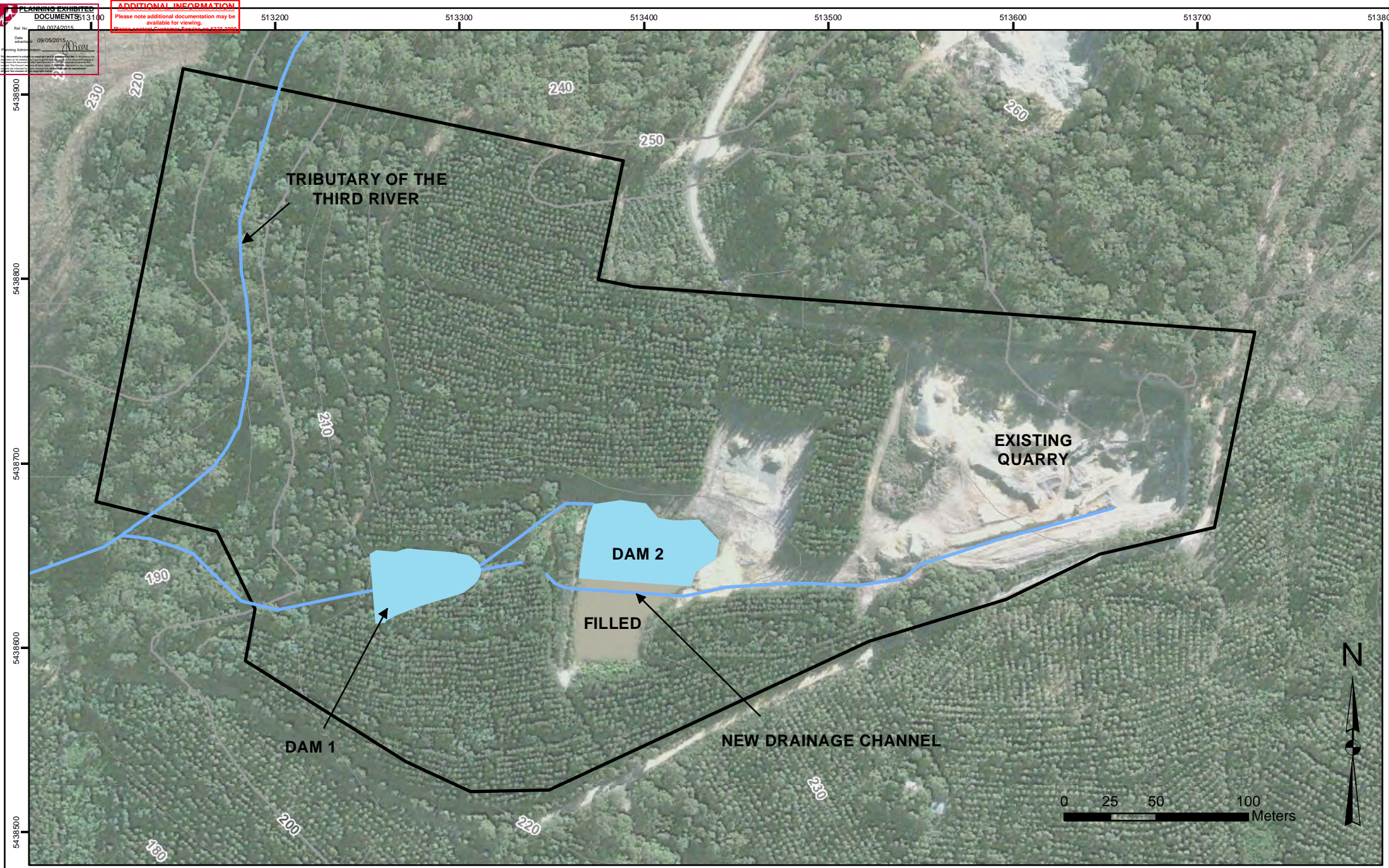
  
an Dieman CONSULTING  
PO Box 1 North Town TAS 7500  
Base data by TASMAR. © State of Tasmania  
Base image by TASMAR. © State of Tasmania



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GRID: MGA Zone 55  
TASMAR: LILYDALE  
CLIENT: LEIGH BARDENHAGEN  
DATE: 6th FEBRUARY 2014



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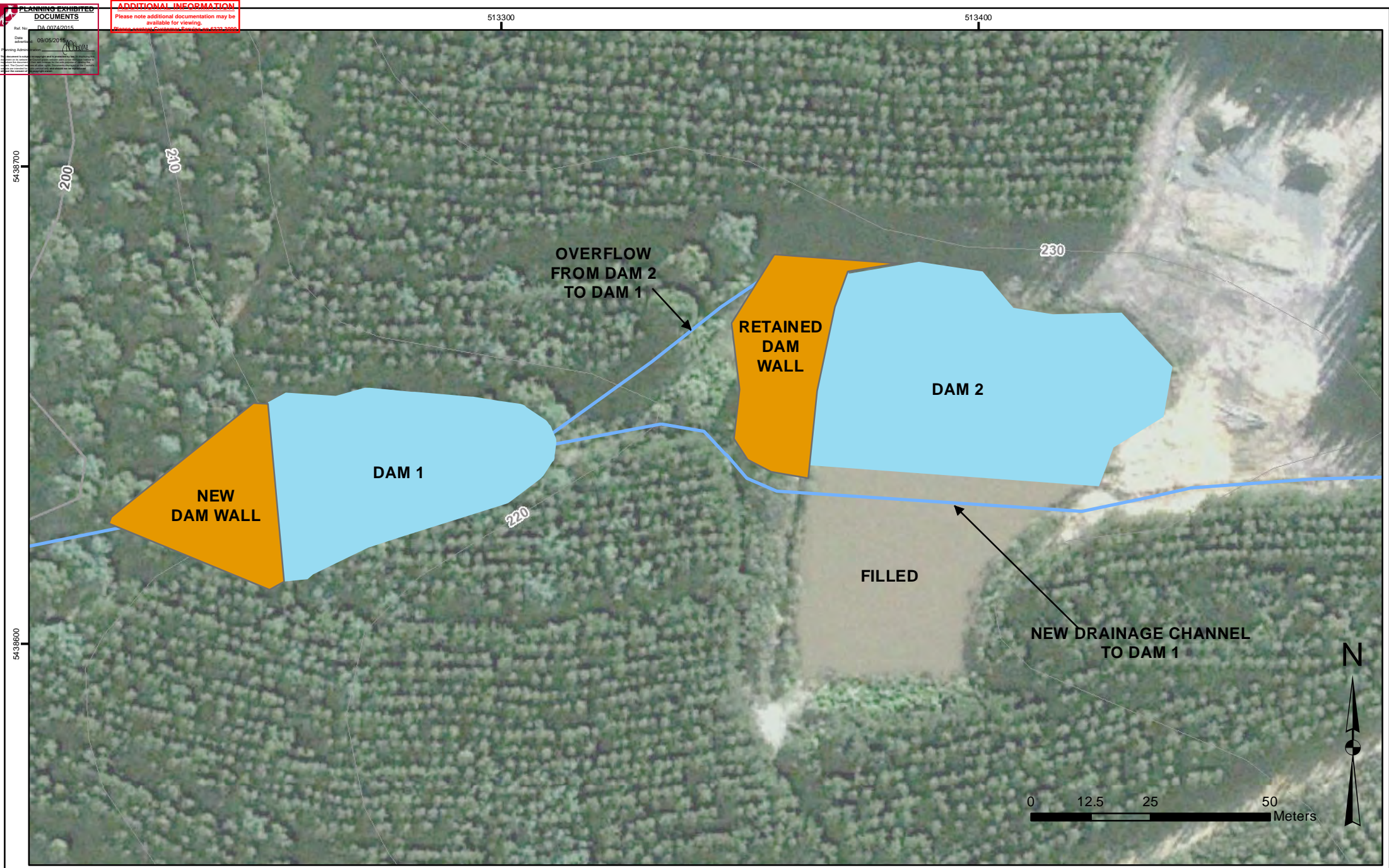
# Gundagi Quarry Pre Construction Report

Figure 2: Gundagi Quarry Mining Lease

  
 Van Diemen CONSTRUCTION  
 PO Box 1 NEW TOWN TAS 7508  
 Base data by TASMAR. © State of Tasmania  
 Base image © GoogleEarth

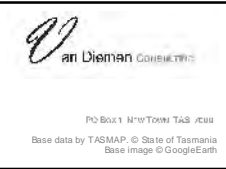


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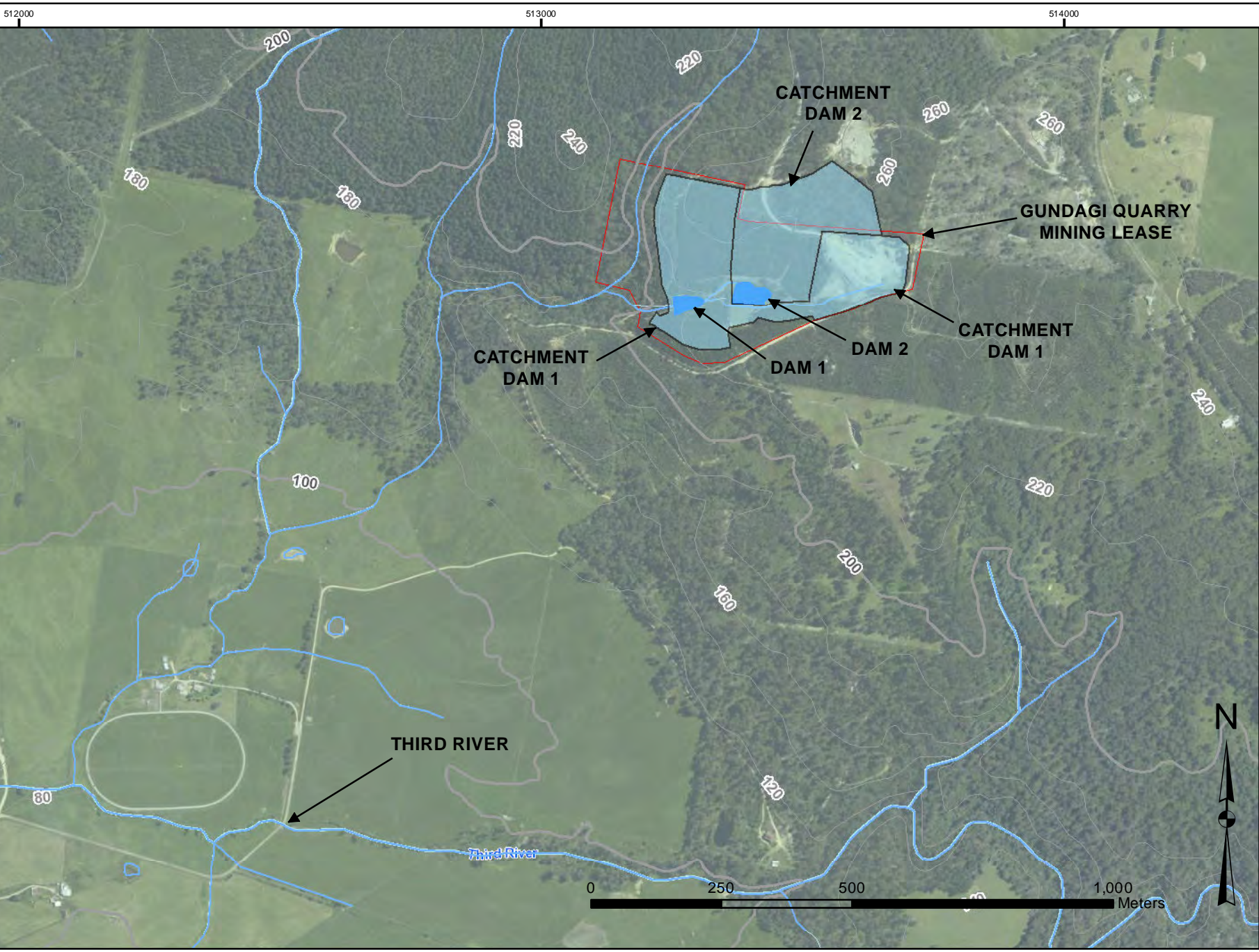


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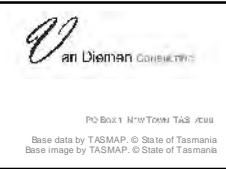
Figure 3: Gundagi Quarry New and Modified Dam Locations



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**Gundagi Quarry Pre Construction Report**  
 Figure 4: Gundagi Quarry Mining Lease Catchments and Regional Drainage



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**NEW DAM**

The Hazard Category for the dam is assessed as Very Low, in accordance with ANCOLD 2012 - Guideline on Assessment of the Consequences of Dam Failure.

Table 1 below gives details of the embankment.

**Table 1. Embankment Section and Geometry of New Dam (Dam 2)**

Crest RL (AHD)	217.0
Maximum Height (m)	6
Storage Volume – water (ML)	4.47
Clay Core	Yes
Spillway Depth+ FB	1
Spillway Width (m)	2
Type of Dam	Zoned Earthfill
Keyway	2m base width x 1m deep

**EXISTING DAM**

The Hazard Category for the dam is assessed as Very Low, in accordance with ANCOLD 2012 - Guideline on Assessment of the Consequences of Dam Failure.

**PROPONENT INFORMATION**

DTK Logging Pty Ltd is a company involved in a number of business activities involving timber harvesting and processing and quarry activities. The quarry branch of the company is known as Bardenhagen Quarries (DTK Logging Pty Ltd trading as Bardenhagen quarries).

The company is based at Lilydale and the principal’s details are:

Leigh Bardenhagen  
 Director, DTK Logging Pty Ltd  
 PO Box 176  
 Lilydale TAS 7268  
 Mobile: 0419119780  
 Phone: 0363951155  
 Fax: 0363952058  
[dtklogging@bigpond.com](mailto:dtklogging@bigpond.com)

## **NEW DAM (DAM 2) CONSTRUCTION SPECIFICATION**

### **PRELIMINARIES**

The works mainly involve bulk earthworks, with some minor trimming for keying to the existing bench faces. Construction materials will be overburden soils, clay and rock sourced from internal quarry borrow areas and current material stockpiles onsite.

### **SITE INSPECTION**

The Contractor shall inspect the site and must allow for the following factors in their price:

- Mobilisation of personnel and equipment to the Gundagi Quarry near Bangor;
- All conditions on and adjacent to the site, including existing soil and vegetation;
- Site access and the nature and requirements of the work to be done;
- The sources of suitable fill material which complies with this Specification; and
- The source of water for construction purposes.

The Contractor shall be responsible for arranging and providing accommodation for all his employees and the cost of such accommodation shall be deemed to be included in the rates and lump sum prices applicable to the Contract.

### **DRAWINGS**

The following drawings form part of this Specification:

- Leigh Bardenhagen – Gundagi Quarry, Drawn by:HJM

### **CODES OF PRACTICE**

Unless otherwise specified, or shown on the drawings, the Contractor is to provide all materials and carry out all the work in accordance with the latest revisions of the relevant Australian Standard Codes.

All work under this Contract shall be performed strictly in accordance with the following Specifications, Drawings and other documents, which by this reference forms part of this Contract, unless expressly noted otherwise.

- AS 1289 Methods of testing soils for engineering purposes.
- AS 1726 Geotechnical site investigations.
- AS 3798 Guidelines on earthworks for commercial and residential developments.
- DIER R22 Earthworks
- DIER R23 Subgrade Zone

The Works shall be carried out to comply with the latest revision of the Drawings, Codes and Tasmania DIER Standards specified except where varied in this document, or where no standards are specified, to Australian Standards, or to the appropriate British or other recognised Standards.

### **WATER**

Water for construction shall be sourced from the existing dam on the site. The Contractor shall make his own arrangements for pumping, loading and hauling.

## **ENVIRONMENTAL MANAGEMENT PLAN**

As a part of the Gundagi Quarry DPEMP all works shall be undertaken in accordance with the existing quarry environmental management plan (approved as part of the quarry assessment and approval process of the EPA and George Town Council), including but not limited to waste disposal (Including hydrocarbons), storage of on-site oils and fuels, silt management and control and clean-up of spills.

The Owner is responsible for and will undertake all environmental measuring and monitoring activities on the Site at the Owner's expense.

## **SAFETY**

The Contractor shall:

- Carry out the works in a safe manner.
- Conform to all relevant Acts or Statutes of Parliament, Regulations, By-Laws or Orders relating to the safety of persons and property on or about the site.

## **SURVEY**

Survey controls exist adjacent to the Lease Area (which is also the property boundary), and the Contractor shall set out all lines and levels, and calculate excavated volumes using the survey marks provided.

The Contractor shall:

- Perform all ground surveys using conventional and agreed surveying techniques.
- Be responsible for the protection of all permanent and temporary beacons or bench marks.
- Be wholly responsible for the setting out of his works in accordance with the terms of the specification.
- Ensure final surveys are undertaken and approved by the Owners Representative. All survey checks or quantity measurements must be supplied to the Owners Representative, suitable time must be given to the Owners Representative to allow such calculations to be checked and approved prior to the works being covered or removed.

The Owners Representative may undertake his own survey of any item, either in conjunction with the Contractor, or separately. The Contractor and Owners Representative shall agree on the results of measurement surveys that are carried out prior to any works being covered up or within seven (7) days of a survey being undertaken. Should agreement not be reached, the difference shall be documented such that the matter can be later decided without disruption to the Contractor's programme.

## **AS-BUILT DRAWINGS**

The Contractor shall carry out a post construction survey of the works by an engineering surveyor to verify that the works were constructed within the specified tolerances and submit to the Owners Representative.

The Contractor shall supply as built drawings within 14 days of the issue of a Certificate of Practical Completion. Electronic Drawings (CAD) shall be supplied on files compatible with version 2012 of AutoCAD.

## DESCRIPTION OF WORK

The Scope of Work shall include, but is not necessarily limited to the following:

### *Survey*

- Survey and setting out the works based on datum points.

### *Vegetation Removal*

- Trees will be felled by a suitably qualified person.
- Felled trees will be removed from the gully to an area within the Lease for future disposal. Undergrowth and other vegetation will be removed including tree stumps.

### *Earthworks*

- Clearing, grubbing and stripping of topsoil from the footprint of the embankment, spillway, and borrow areas;
- Excavating in, safely managing, and maintaining, the borrow areas;
- Establishing and maintaining stockpiles of different excavated materials at locations approved by the Owners Representative;
- Foundation preparation for all earthworks structures;
- Additional cutting and filling works associated with:
  - cutting and benching of the embankments into the walls of the existing pit, to achieve keyed construction the base of fill into the abutment;
- Construction of a zoned embankment as per drawings using clay and rock;
- Construction of a spillway in the natural ground at the dam abutments as shown on the drawings;

### *Water Control and Temporary Works*

- All dewatering and temporary works to allow construction to proceed and disposal of water clear of the works.

### *Quality Assurance*

- Prepare a quality assurance and quality control programme to cover all aspects of work included within this Specification for approval of the Owners Representative.
- Provide all things necessary to implement the approved QA/QC programme.
- All construction shall be to the minimum lines and grades shown on the drawings or as required by the Owners Representative as work progresses.

During the progress of the works, the Owners Representative may find it necessary to revise the lines, levels and grades of any part of the works because of the conditions revealed by the works, such as loose abutment materials.

The Contractor shall accept reasonable delays due to inspection and checking of any part of the works to determine grades and levels.

Measurement for payment of all embankment fill material shall be made for the compacted material, measured in place and only to the lines and grades required.

The Scope of Work shall include the provision of all material, construction plant, equipment, labour, supervision, tools, services, warehousing if required, testing equipment, and each and every item of expense necessary for the construction, acceptance testing and preparing of "as built" drawings and documents for work shown in the Drawings schedules and Specification.

### **CLEARING AND ESTABLISHMENT WORKS**

The Contractor shall, as appropriate:

- Fell the trees and remove from the gully to an area within the Lease for future disposal. Undergrowth and other vegetation will be removed including tree stumps.
- Remove loose surface material from the footprint of the embankment, spillway and the borrow areas. The area to be cleared shall extend approximately 5 m past the downstream toe of the embankment. Topsoil should be stockpiled for later use on the downstream slopes of the embankments and for use in rehabilitation works at the quarry.
- The sides of all holes and depressions caused by trimming and grubbing operations should be flattened before backfilling and compacting with similar material to the surrounding soil.
- Maintain existing access roads and other haul roads within the mining lease necessary for the works and which are approved by the Owners Representative.
- Keep all haul roads sprayed and wetted as necessary to minimise the generation of airborne dust during the course of usage.
- Disturbed areas shall be rehabilitated under separate works by the Owner as part of the EMP.

### **FOUNDATION PREPARATION**

#### **Subsurface Conditions**

The foundation for the dam comprises bedrock of Silurian – Devonian siltstone, mudstone and shale – specifically, interbedded turbiditic medium - to very fine-grained quartz-rich sandstone and subordinate siltstone-mudstone (Retreat Formation of the Mathinna Supergroup). There is a silty clay loam A1 horizon. The B horizon is formed by yellowish brown silty clay and brownish yellow silty clay with yellowish red mottles at depth.





Areas where the A horizon have been disturbed (plantation and road development) show no clear soil profile or humic layer.

A distinctive moist yellow clay sequence without pebbles occurs at the base of the test pit.



Silty dark grey clay loam with minor humic layer over pale yellow silty clay loam (forming the A horizon).

Bedrock occurs at depth, overlain by a B horizon of yellowish to brownish silty clay to clay sequences with interbedded quartzite pebbles.



Bedrock near the wall is shallow in places, overlain by a thin B horizon of grey silty clay to clay sequences with interbedded quartzite pebbles and coarse gravels.

**Foundation Preparation**

The foundation shall be prepared as follows:

- Strip existing topsoil from the embankment footprint and stockpile in areas nominated by the Owners Representative;
- Where the foundation does not comprise rock, proof roll with 3 passes of a 7- 10 tonne vibrating roller, or as directed by the Owners Representative. All soft zones identified during the proof rolling shall be over- excavated and replaced with compacted fill, to the satisfaction of the Owners Representative;
- Prepare the foundation for the cu-toff trench under the embankment by excavating to a nominal depth of 1.0m. Side batters shall have a minimum slope of 1:1;
- The surface of the foundation should be scarified to a depth of not less than 150 mm prior to placement of the first lift of fill;
- All areas to receive fill shall be left in a clean and suitable condition to allow an uninterrupted placement of fill;
- No fill shall be placed in the footprint or cut-off until the base of all foundations and excavations have been inspected and approved by the Owners Representative; and
- If springs or groundwater are encountered in the cut-off trenches, the Contractor shall design, construct and maintain de-watering works as required to maintain the trench and foundation free of water during excavation and fill placement.

## Abutments

The walls of the existing pit abutments should be trimmed back to allow the embankments to bench into the abutment at an average slope not steeper than 1V:2 H. The trimmed spoil may be used as embankment construction material. Horizontal benches should be not more than 2m wide and vertical faces should not exceed 1m in height. Align the benching (in plan) at around 45° to the upstream direction.

## Key Trenches

The depth of the key (or cut off) trench is notional, and should be finalized on site after inspection by the Owners Representative. The trench should penetrate loose materials and compact soils to the depth nominated, unless highly weathered rock, impenetrable to normal earthmoving machinery is encountered, in which case the key trenches may be terminated in such rock. Key trenches should have cut slopes that are not greater than 1V:1H.

## BORROW AREAS, EXCAVATION AND STOCKPILING

### Operating Plan

Within fourteen (14) days of the date on which the Contractor has been given possession of the site, the Contractor shall furnish a description including drawings of his proposed method of operating in the borrow areas. The description and drawings shall include details of drainage, de-watering, and excavation operations and the proposed sequences of the excavation operations. The Contractor shall not commence operations in any borrow area until his proposed operating plan has been approved by the Owners Representative.

### Borrow Preparation and Operation

The Contractor shall strip the borrow areas of all material which is unsuitable for use in construction of the dam embankment. Unsuitable materials to be removed from borrow area sites shall include all topsoil, rubbish and vegetable matter of every kind, including roots, stumps etc. Materials shall be windrowed to the outer edges of the borrow.

The Contractor shall ensure the borrow areas are suitably drained. The Contractor shall prevent surface runoff from higher ground entering the borrow areas and shall construct all necessary channels, drainage ditches and the like to divert such water away from the area.

The Contractor shall selectively excavate suitable material for use in embankment construction. If materials unsuitable for embankment construction are found in the borrow areas, such materials shall be left in place, or if directed by the Owners Representative, shall be excavated and disposed of in waste piles.

All excavation shall be classified as ordinary excavation. Ordinary excavation shall comprise excavation in all materials, inclusive of rock. The Contract Sum shall include excavation in all materials. No extra payment shall be made for excavation irrespective of the materials or conditions encountered.

### Stockpiles

Separate stockpiles of material to be used in the embankment should be established, sorted principally according to grain size, ie;

- Zone 1 – General Fill - clayey sands to clay;

- Zone 2 – Protective Face Zone - clean gravels, and gravely sands; and
- Riprap – Cobbles and boulders for erosion protection.

Suitable material shall be placed in the designated final locations, or shall be placed in stockpiles in such a manner as to allow future treatment where necessary and later recovery for use in the permanent construction of the dam embankments.

The Contractor shall locate all temporary stockpiles with due regard to erosion and sediment control practices and to the approval of the Owners Representative. The Contractor shall be required to maintain and operate all stockpiles in a neat compact manner and ensures that they are at all times adequately sealed and graded to shed rainfall without erosion.

## **WATER CONTROL**

### **General**

The Contractor shall design, construct and maintain all temporary diversion and all protective works which are necessary for the prevention of surface drainage and groundwater entering the various parts of the Works.

Temporary diversion and protective works shall comprise levee banks and channels. The location of these works shall be such that there is no encroachment on any area required for construction of the Works.

On completion of the Works, all temporary diversion and protection Works shall be removed or levelled as approved by the Owners Representative to give a slightly appearance, and so as not to interfere in any way with the operation or usefulness of the Works.

### **Dewatering**

The Contractor shall design dewatering systems and shall furnish, install, maintain and operate all necessary temporary structures for dewatering and maintaining the various parts of the Works free from water during construction.

### **Responsibility for Works**

The Contractor shall be fully responsible for any damage or delay to the Works caused by failure of the diversion and protective works and/or dewatering installations constructed by him and shall indemnify the Principal against claims by other contractors employed by the Principal working on the Site or by landholders or other persons, arising out of any such failure.

The Contractor shall be responsible for, and shall repair or reinstate at his expense, any damage to foundations, excavated slopes or any other parts of the Works caused by the failure of the diversion and protective works and/or dewatering installations.

### **Water Control Plan**

At least fourteen (14) days before commencing any work on the project site the Contractor shall submit to the Superintendent a Water Control Plan describing the sequence of work.

## **MATERIALS**

Specifications for the embankment zones are given below.

**Zone 1 – General Fill**

Silty clay or clay, free from organic matter, clods or other deleterious material, shall be used in upstream clay zones and shall meet with the following broad requirements:

- Maximum particle size 50 mm;
- Minimum 30% passing 75 µm after compaction;
- Plasticity Index (PI) > 15.
- Emerson Class number of 5 or 6

**Zone 2 –Protective Face Zone**

Sandy Gravel general fill, free from organic matter, clods or other deleterious material, shall be used in all embankments and shall meet with the following broad requirements:

- Maximum particle size of 100 mm;
- 30% - 60% by weight passing 4.75 mm;
- 15% - 30% by weight passing 600 µm; and
- 10% - 30% weight passing 75 µm.
- Plasticity Index (PI) >5
- Emerson Class number of 5 or 6

**Rip Rap**

Rock used as rip rap or for erosion protection on spillways shall meet with the following requirements:

- It shall be free from overburden, spoil, organic matter and clods.
- Fresh to slightly weathered rock (in accordance with AS 1726 – 1993) that is hard, dense and durable rock.
- Riprap rocks shall be angular or approximately spherical in shape. Flat slab-like stones shall not be used.
- Grading requirements as per the table below:

Rock Size (m)	Rock Mass (kg)	Minimum Percentage of Rock Larger Than:
0.40	100	0%
0.30	35	40-60%
0.10	2.5	80 -90%

## CONSTRUCTION OF EMBANKMENTS

### General

The Contractor shall maintain haul roads and access roads as required between the borrow areas and the Works at the embankment site.

The Contractor shall construct the embankment using approved materials sourced from the borrow areas. Ensure all materials shall be stockpiled, transported and placed in such a manner as to minimise segregation.

The crests of the completed embankment shall be graded to the inside (upstream) of the storage at a 2% crossfall.

The Contractor shall carry out testing to comply with the Specification and QA/QC procedures.

Vertical deviation shall be -0 m to +0.2 m, provided no abrupt changes in slope or level are present on any finished surface.

### Embankment

The embankments should be constructed in accordance with the Tasmania DIER specifications for roadworks and the following broad guidelines:

1. Earthfill should be compacted to a density ratio of not less than 98% of standard maximum dry density, at optimum moisture content OMC – 1% to OMC + 2%;
2. Earthfill may be placed by dumping from a truck and spreading with a grader, excavator or bulldozer. Oversized material should be removed before compaction;
3. Clayey sand and clay layers (Zone 1) should be constructed to 200 to 250 mm loose thickness and then compacted with a 10 t pad foot vibratory roller or similar;
4. Gravel/sand (Zone 2) layers may be 300 mm loose thickness and compacted with 10 t vibratory rollers or similar;
5. The surface of the previously placed layer should be scarified prior to placing the next layer of fill to ensure good bond between the layers;
6. To achieve adequate compaction of the entire embankment including the edges, the embankment should be constructed 1 to 1.5 m oversized and batters trimmed back after completion of compaction.

When sources or stockpiles of different materials have been approved for the different zones, the earthworks contractor should develop a method specification that will achieve the specified dry density ratio and moisture content with the equipment he plans to use.

A quality control plan should be developed that involves both inspection and testing, and includes the maintaining of a complete record of all construction operations.

### SPILLWAY

Spillway shall be excavated to the line and levels shown on the drawings, without any over-excavation. Excavation is expected to be in weathered bedrock. No blasting shall be conducted without the approval of the Owners Representative.

The spillway shall comprise a rock lined trapezoidal drain with top of rock placement RL 293m. Grade the spillway out to daylight with the drainage channel nominal grade of 1 in 100.

## QUALITY CONTROL AND QUALITY ASSURANCE

The required quality standards for implementation of this Scope of Work are the AS/NZS ISO 9001:2001 Standard Series and the Contractor shall comply with the requirements of these standards.

The Contractor shall provide not later than seven (7) days after Award of Contract fully documented details of the Quality systems and procedures to be utilised together with reference details for implementation of the stated system and procedures on previous similar projects.

## INSPECTION AND TESTING

### Inspection Requirements

The Owners Representative will be entitled, at all times to inspect, examine and test the materials and workmanship be provided under the Contract. Such inspection, examination or testing, if made, shall not release the Contractor from any obligation under the Contract.

The Contractor shall co-operate with and provide full opportunity to the Owners Representative to monitor regularly the progress of the Works of the Contractor and his subcontractors to the detailed extent necessary to satisfy progress relative to the Construction Program.

### Testing

Compliance tests shall be carried out to such a degree as to satisfy the Owners Representative that the criteria on moisture content and compaction are met. Compliance tests shall be carried out by a qualified technician from a NATA registered laboratory employed by the Contractor.

Compliance testing of compaction shall be at the rate of not less than:

- 1 test per layer per material type per 2,500 m<sup>2</sup>; or
- 1 test per 500 m<sup>3</sup> distributed reasonably evenly throughout full depth and area; or
- 3 tests per site visit;

whichever is the greater.

Testing of placed construction materials for compliance with particle size distribution and properties of fines shall be carried out on a lot basis. The maximum size of lots for in situ testing shall not exceed 5,000 m<sup>2</sup>. The frequency of sampling and testing shall be 3 tests per lot, or 1 test per 1000 tonnes.

The Contractor shall, at his own expense, rework or replace materials which do not meet the compaction requirements.

## COMPLETION

The Contractor shall:

- Batter down the sides of the borrow pits, as appropriate, for stability on completion of the work. Materials not considered suitable for use in the works shall be evenly spread over the borrow pit surface.
- Clean up all rubbish, remove all plant and supply materials, trim all banks neatly, spread all excavated material not specified to be removed from the site and leave the site in a clean and tidy condition.
- Topsoil and some vegetative matter removed from the embankment footprint prior to embankment construction shall be respread on the downstream faces of the dams. Topsoil shall be redeployed in a thickness similar to that removed from the embankment footprint and any excess used for rehabilitation works in the quarry.



## **EXISTING DAM (DAM 1) CONSTRUCTION SPECIFICATION**

### **PRELIMINARIES**

The works mainly involve bulk earthworks. Construction materials will be overburden clay and rock sourced from the quarry.

### **SITE INSPECTION**

The Contractor shall inspect the site and must allow for the following factors in their price:

- Mobilisation of personnel and equipment to the Gundagi Quarry near Bangor;
- Site access and the nature and requirements of the work to be done; and
- The management of fill material which complies with this Specification.

The Contractor shall be responsible for arranging and providing accommodation for all his employees and the cost of such accommodation shall be deemed to be included in the rates and lump sum prices applicable to the Contract.

### **CODES OF PRACTICE**

Unless otherwise specified, or shown on the drawings, the Contractor is to provide all materials and carry out all the work in accordance with the latest revisions of the relevant Australian Standard Codes.

All work under this Contract shall be performed strictly in accordance with the following Specifications, Drawings and other documents, which by this reference forms part of this Contract, unless expressly noted otherwise.

- AS 3798 Guidelines on earthworks for commercial and residential developments.
- DIER R22 Earthworks.

The Works shall be carried out to comply with the latest revision of the Drawings, Codes and Tasmania DIER Standards specified except where varied in this document, or where no standards are specified, to Australian Standards, or to the appropriate British or other recognised Standards.

### **WATER**

Water for construction shall be sourced from the existing dam on the site. The Contractor shall make his own arrangements for pumping, loading and hauling.

### **ENVIRONMENTAL MANAGEMENT PLAN**

As a part of the Gundagi Quarry DPEMP all works shall be undertaken in accordance with the quarry environmental management plan, including but not limited to waste disposal (Including hydrocarbons), storage of on-site oils and fuels, silt management and control and clean-up of spills. The Owner will be responsible for and will undertake all environmental measuring and monitoring activities on the Site at the Owner's expense.

### **SAFETY**

The Contractor shall:

- Carry out the works in a safe manner.
- Conform to all relevant Acts or Statutes of Parliament, Regulations, By-Laws or Orders relating to the safety of persons and property on or about the site.

## **SURVEY**

As the existing dam is to be partially in-filled there is no requirement to survey the dam wall or perimeter.

## **DESCRIPTION OF WORK**

The Scope of Work shall include, but is not necessarily limited to the following:

### *Earthworks*

- Excavating in, safely managing, and maintaining, the stockpiles of overburden sourced from the existing quarry; and
- In-filling and compaction works associated with reducing the size of the dam.

### *Water Control and Temporary Works*

- All dewatering and temporary works to allow in-filling to proceed and disposal of water clear of the works.

### *Quality Assurance*

- Prepare a quality assurance and quality control programme to cover all aspects of work included within this Specification for approval of the Owners Representative.
- Provide all things necessary to implement the approved QA/QC programme.
- Measurement for payment of all embankment fill material shall be made for the compacted material, measured in place and only to the lines and grades required.

## **STOCKPILING**

There is no existing topsoil, vegetation or surface stripping required.

The Contractor shall locate all temporary stockpiles with due regard to erosion and sediment control practices and to the approval of the Owners Representative. The Contractor shall be required to maintain and operate all stockpiles in a neat compact manner and ensure that they are at all times adequately graded to shed rainfall without erosion. The Contractor shall prevent surface runoff from higher ground entering stockpile areas and shall construct all necessary channels, drainage ditches and the like to divert such water away from the area.

All excavation shall be classified as ordinary excavation and comprises excavation in all materials, inclusive of rock.

## **WATER CONTROL**

### **General**

The Contractor shall design, construct and maintain all temporary diversion and all protective works which are necessary for the prevention of surface drainage and groundwater entering the various parts of the Works.

Temporary diversion and protective works shall comprise levee banks and channels. The location of these works shall be such that there is no encroachment on any area required for construction of the Works.

On completion of the Works, all temporary diversion and protection Works shall be removed or levelled as approved by the Owners Representative to give a sightly appearance, and so as not to interfere in any way with the operation or usefulness of the Works.

### **Dewatering**

The Contractor shall design dewatering systems and shall furnish, install, maintain and operate all necessary temporary structures for dewatering and maintaining the various parts of the Works free from water during construction.

### **Responsibility for Works**

The Contractor shall be fully responsible for any damage or delay to the Works caused by failure of the diversion and protective works and/or dewatering installations constructed by him and shall indemnify the Principal against claims by other contractors employed by the Principal working on the Site or by landholders or other persons, arising out of any such failure.

The Contractor shall be responsible for, and shall repair or reinstate at his expense, any damage to foundations, excavated slopes or any other parts of the Works caused by the failure of the diversion and protective works and/or dewatering installations.

### **Water Control Plan**

At least fourteen (14) days before commencing any work on the project site the Contractor shall submit to the Superintendent a Water Control Plan describing the sequence of work.

## **IN-FILL MATERIAL**

Coarse rock, gravels, clay and clayey sands, free from organic matter, clods or other deleterious material, shall be used in the in-fill process.

## **QUALITY CONTROL AND QUALITY ASSURANCE**

The required quality standards for implementation of this Scope of Work are the AS/NZS ISO 9001:2001 Standard Series and the Contractor shall comply with the requirements of these standards.

The Contractor shall provide not later than seven (7) days after Award of Contract fully documented details of the Quality systems and procedures to be utilised together with reference details for implementation of the stated system and procedures on previous similar projects.

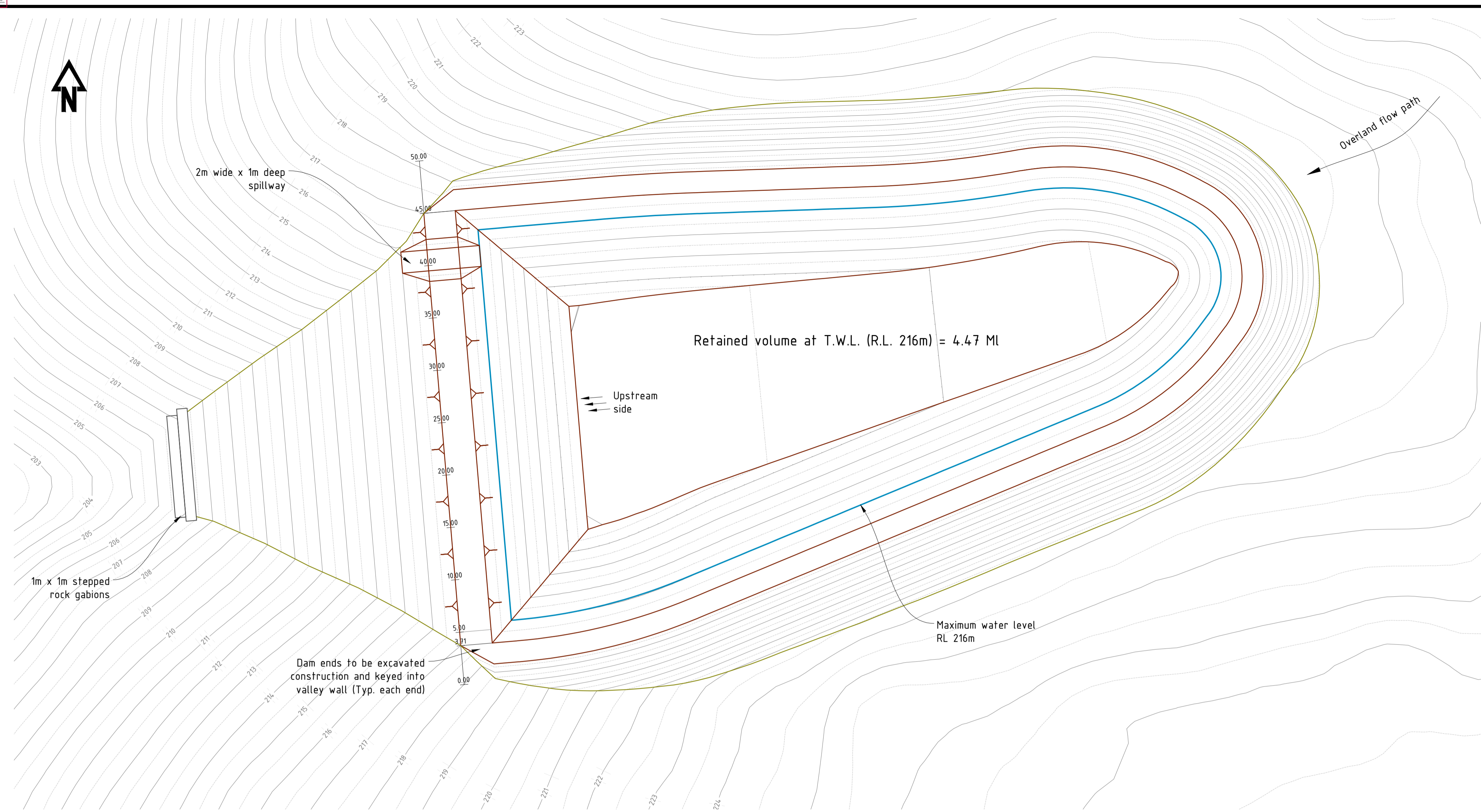
## **INSPECTION**

The Owners Representative will be entitled, at all times to inspect, examine and test the materials and workmanship be provided under the Contract. Such inspection, examination or testing, if made, shall not release the Contractor from any obligation under the Contract.

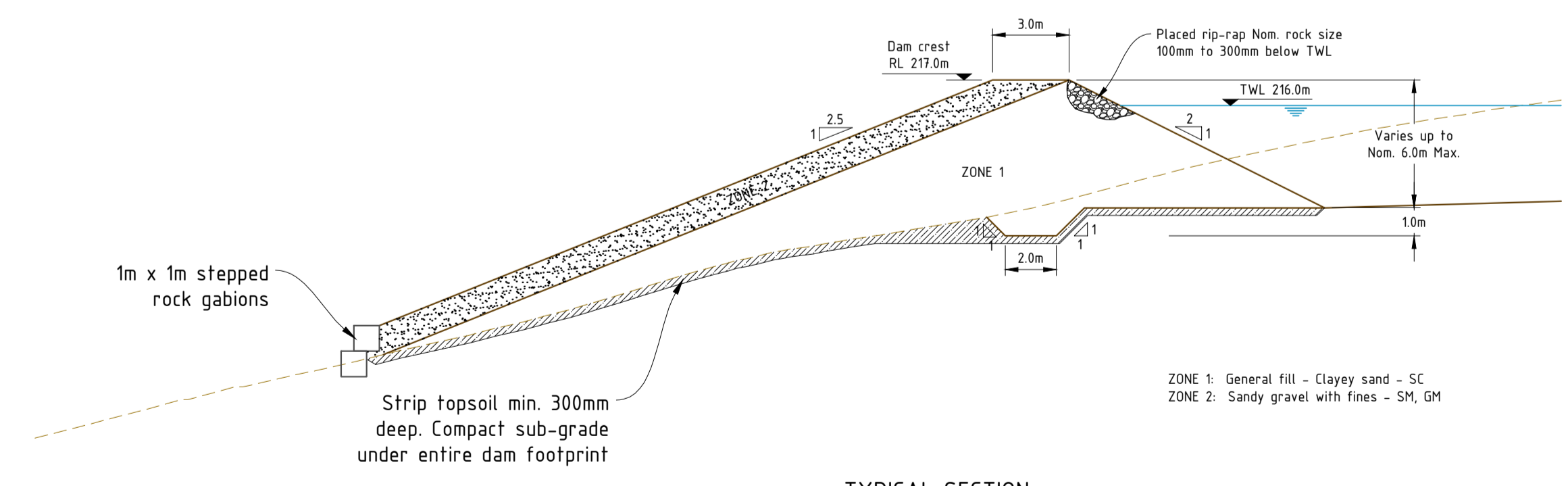
The Contractor shall co-operate with and provide full opportunity to the Owners Representative to monitor regularly the progress of the Works of the Contractor and his subcontractors to the detailed extent necessary to satisfy progress relative to the Construction Program.

**COMPLETION**

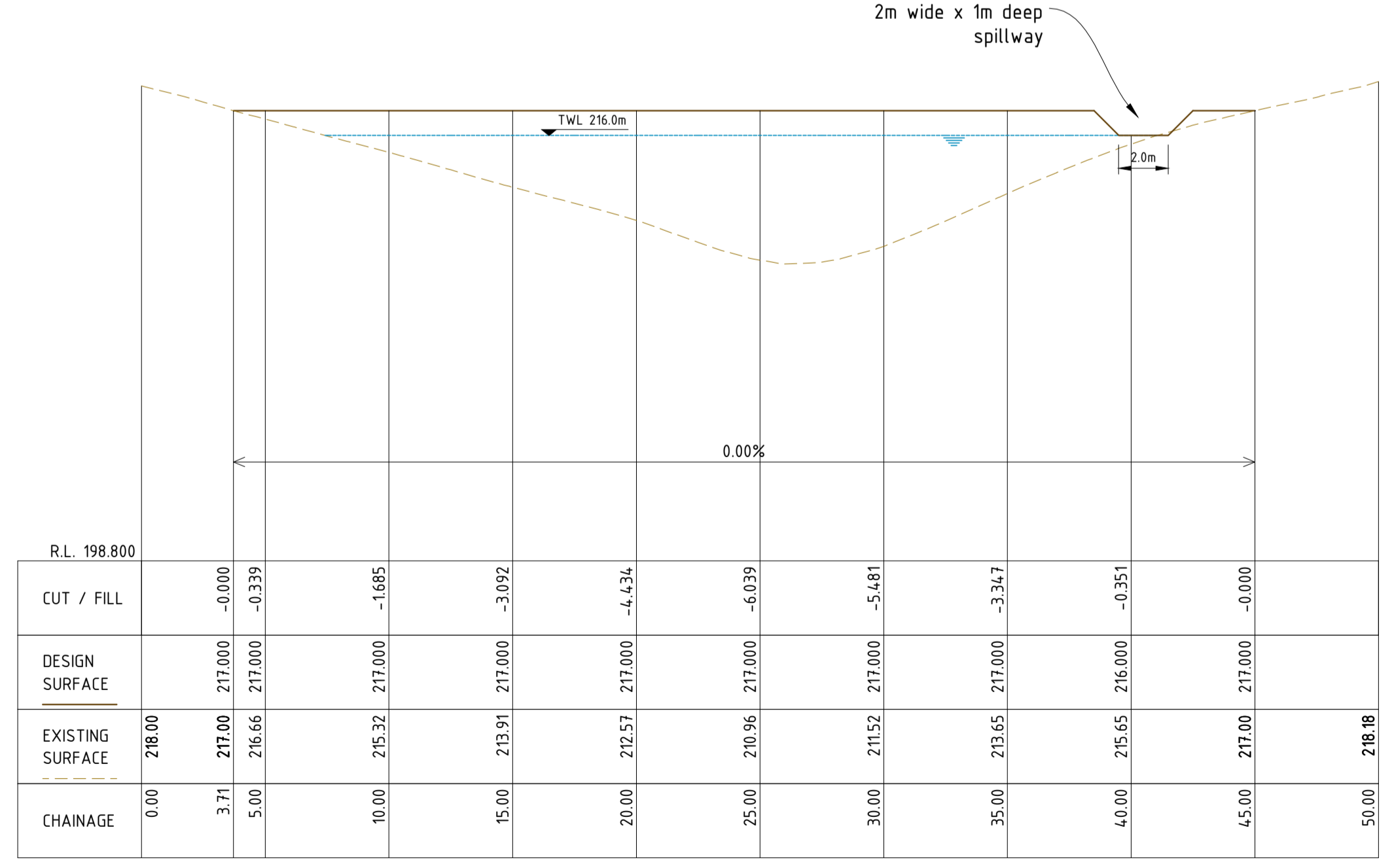
The Contractor shall clean up all rubbish, remove all plant and supply materials, trim all banks neatly, spread all excavated material not specified to be removed from the site and leave the site in a clean and tidy condition.



SITE PLAN  
 Scale 1 : 250



TYPICAL SECTION  
 Through Dam Wall  
 Scale 1 : 200



LONGITUDINAL SECTION  
 Along Dam Wall  
 Scale 1: 200 Horiz. | 1: 200 Vert.



CLIENT: LEIGH BARDENHAGEN  
 JOB TITLE: Gundagai Quarry Proposed Development  
 DESCRIPTION: Proposed Dam Site & Details  
 STATUS: Final

DRAWN BY: HJM  
 CHECKED BY: R.B.  
 SCALE: As Shown  
 DATE: 19/03/2014  
 DRAWING NUMBER: 1  
 SHEET: 1 of 1  
 Size: A1

**PLANNING EXHIBITED DOCUMENTS**  
Ref. No: DA 0074/2015  
Date submitted: 09/05/2015  
Planning Administration: 

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**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

**APPENDIX A**  
**Information for Assessments of Hazard Category**

- 1. Existing Dam**
- 2. New Dam**

<b>Applicant Name</b>	DTK Logging Pty Ltd		
<b>Stream Name</b>	No name, flows into Third River		
<b>Estimated Capacity at FSL</b>	0.8 MI		
<b>Dam ID. No. (If existing dam)</b>			
<b>Dam Height (metres)</b>	4	M	
<b>Location</b>	Bangor, north-east Tasmania		

<b>Damage and Loss</b>	<b>Estimate</b>	<b>Severity</b>		
		Minor	Medium	High

<b>B1 TOTAL INFRASTRUCTURE COSTS</b>			
Residential	<\$10M	▼ YES	. .
Commercial	<\$10M	▼ YES	. .
Community Infrastructure	<\$10M	▼ YES	. .
Dam repair or replacement cost	<\$10M	▼ YES	. .
<b>Total Infrastructure cost severity level</b>			<b>MINOR</b>

<b>B2 IMPACT ON DAM OWNER'S BUSINESS</b>			
Importance of the system, need to replace the dam	Restrictions needed during dry periods	▼ YES	. .
Effect on services provided by owner	Minor difficulties in replacing services	▼ YES	. .
Effect on continuing credibility	Some reaction but short lived	▼ YES	. .
Community reaction and political implications	Some reaction but short lived	▼ YES	. .
Impact on financial viability	Able to absorb in one financial year	▼ YES	. .
Value of water in the storage	Can be absorbed in one financial year	▼ YES	. .
<b>Impact on dam owner's business severity level</b>			<b>MINOR</b>

<b>B3 HEALTH AND SOCIAL IMPACTS</b>			
Human health	<100 people affected	▼ YES	. .
Loss of services to the community	<100 people affected	▼ YES	. .
Cost of emergency management	<1,000 person days	▼ YES	. .
Dislocation of people	<100 person months	▼ YES	. .
Dislocation of businesses	<20 business months	▼ YES	. .
Employment affected	<100 jobs lost	▼ YES	. .
Loss of heritage	Local facility	▼ YES	. .
Loss of recreational facility	Local facility	▼ YES	. .
<b>Health and Social severity level</b>			<b>MINOR</b>

<b>B4 ENVIRONMENTAL IMPACTS</b>			
Area of impact	< 1 km2	▼ YES	. .
Duration of impact	< 1 year	▼ YES	. .
Stock and fauna	Discharge from dambreak would not contaminate water supplies used by stock and fauna.	▼ YES	. .
Ecosystems	Discharge from dambreak is not expected to impact on ecosystems. Remediation possible.	▼ YES	. .
Rare and endangered species	Species exist but minimal damage expected. Recovery within one year.	▼ YES	. .
<b>Environmental impacts severity level</b>			<b>MINOR</b>

<b>Highest severity level</b>	<b>MINOR</b>
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Reasons for recommending a consequence category (refer ANCOLD Guidelines On The Consequence Categories For Dams October 2012) MUST include comment on the PAR (both permanent and itinerant), buildings, roads, other infrastructure and the natural environment downstream of the dam and the potential impact arising from a dam break: (\*\* Note\*\* Provide photographs to support reasons for recommending consequence category)

*[Empty space for providing reasons for recommending a consequence category]*

Population at Risk (PAR)	<1	▼	<b>CONSEQUENCE CATEGORY =</b>	<b>Very Low</b>
--------------------------	----	---	-------------------------------	-----------------

PAR includes all those persons who would be directly exposed to flood waters within the dam break affected zone if they took no action to evacuate  
 Note 1: With a PAR in excess of 100, it is unlikely damage will be minor, similarly with a PAR in excess of 1,000 it is unlikely damage will be classified as medium  
 Note 2: Change to 'High C' where there is a potential of one or more lives being lost

<b>Completed By</b>	Glenn Allen
<b>Date</b>	03/02/2014

<b>Applicant Name</b>	DTK Logging Pty Ltd		
<b>Stream Name</b>	No name, flows into Third River		
<b>Estimated Capacity at FSL</b>	4.2MI		
<b>Dam ID. No. (If existing dam)</b>			
<b>Dam Height (metres)</b>	6	M	
<b>Location</b>	Bangor, north-east Tasmania		

<b>Damage and Loss</b>	<b>Estimate</b>	<b>Severity</b>		
		Minor	Medium	High

<b>B1 TOTAL INFRASTRUCTURE COSTS</b>			
Residential	<\$10M	▼ YES	. .
Commercial	<\$10M	▼ YES	. .
Community Infrastructure	<\$10M	▼ YES	. .
Dam repair or replacement cost	<\$10M	▼ YES	. .
<b>Total Infrastructure cost severity level</b>			<b>MINOR</b>

<b>B2 IMPACT ON DAM OWNER'S BUSINESS</b>			
Importance of the system, need to replace the dam	Restrictions needed during dry periods	▼ YES	. .
Effect on services provided by owner	Minor difficulties in replacing services	▼ YES	. .
Effect on continuing credibility	Some reaction but short lived	▼ YES	. .
Community reaction and political implications	Some reaction but short lived	▼ YES	. .
Impact on financial viability	Able to absorb in one financial year	▼ YES	. .
Value of water in the storage	Can be absorbed in one financial year	▼ YES	. .
<b>Impact on dam owner's business severity level</b>			<b>MINOR</b>

<b>B3 HEALTH AND SOCIAL IMPACTS</b>			
Human health	<100 people affected	▼ YES	. .
Loss of services to the community	<100 people affected	▼ YES	. .
Cost of emergency management	<1,000 person days	▼ YES	. .
Dislocation of people	<100 person months	▼ YES	. .
Dislocation of businesses	<20 business months	▼ YES	. .
Employment affected	<100 jobs lost	▼ YES	. .
Loss of heritage	Local facility	▼ YES	. .
Loss of recreational facility	Local facility	▼ YES	. .
<b>Health and Social severity level</b>			<b>MINOR</b>

<b>B4 ENVIRONMENTAL IMPACTS</b>			
Area of impact	< 1 km2	▼ YES	. .
Duration of impact	< 1 year	▼ YES	. .
Stock and fauna	Discharge from dambreak would not contaminate water supplies used by stock and fauna.	▼ YES	. .
Ecosystems	Discharge from dambreak is not expected to impact on ecosystems. Remediation possible.	▼ YES	. .
Rare and endangered species	Species exist but minimal damage expected. Recovery within one year.	▼ YES	. .
<b>Environmental impacts severity level</b>			<b>MINOR</b>

<b>Highest severity level</b>	<b>MINOR</b>
-------------------------------	--------------

Reasons for recommending a consequence category (refer ANCOLD Guidelines On The Consequence Categories For Dams October 2012) MUST include comment on the PAR (both permanent and itinerant), buildings, roads, other infrastructure and the natural environment downstream of the dam and the potential impact arising from a dam break: (\*\* Note\*\* Provide photographs to support reasons for recommending consequence category)

*[Empty space for providing reasons for recommending a consequence category]*

Population at Risk (PAR)	<1	▼	<b>CONSEQUENCE CATEGORY =</b>	<b>Very Low</b>
--------------------------	----	---	-------------------------------	-----------------

PAR includes all those persons who would be directly exposed to flood waters within the dam break affected zone if they took no action to evacuate

Note 1: With a PAR in excess of 100, it is unlikely damage will be minor, similarly with a PAR in excess of 1,000 it is unlikely damage will be classified as medium  
 Note 2: Change to 'High C' where there is a potential of one or more lives being lost

<b>Completed By</b>	Glenn Allen
<b>Date</b>	03/02/2014



**APPENDIX B**

**Catchment Hydrology Assessment based on catchments shown in Figure 4**

## SWMP Commentary, Detailed Calculations

### Gundagai Quarry Sediment Dam Sizing Calculations

#### Basin Volume = Sediment Zone Volume + Settling Zone Volume

##### 1. Sediment Zone Volume

Blue Book Vol.1 Appendix J Sheet J-5

Sediment Zone Management is for a 12 Month Period, So Volume Calculated by RUSLE

Site area	Area B Only	Area A1	Area A2	Remarks
Total catchment area (ha)	4.89	3.99	3.40	
Disturbed catchment area (ha)	1.03	3.22	2.46	

##### Rainfall data

Design rainfall depth (days)	5	5	5	Ref Vol.2E Table 6.1
Design rainfall depth (percentile)	95	95	95	Assumed 'sensitive' receiving environment and operations for > 3 years
5-day, 95th-percentile rainfall event (mm)	56.3	56.3	56.3	Lilydale rainfall record, BOM station 91053
Rainfall intensity: 2-year, 6-hour storm (mm/hr)	5.88	5.88	5.88	See IFD data for the site

##### RUSLE Factors

Rainfall erosivity (R-factor)	1000	1000	1000	Automatic calculation from above data
Soil erodibility (K-factor)	0.05	0.05	0.05	RUSLE data can be obtained from Vol 1, Appendixes A, B and C
Slope length (m)	280	440	220	
Slope gradient (%)	11.75	10.9	26.9	
Length/gradient (LS-factor)	8.62	10.12	17	Vol. 1 Table A 1
Erosion control practice (P-factor)	1.3	1.3	1.3	Default
Ground cover (C-factor)	1	1	1	Default

##### Calculations

Soil loss (t/ha/yr)	560	658	1105	
Soil Loss Class	5	5	5	See Section 4.4.2(b)
Soil loss (m <sup>3</sup> /ha/yr)	431	506	850	
Soil Loss Volume (Sediment Zone Volume) (m <sup>3</sup> )	222	815	1046	Based on an 6 monthly management (cleanout)

##### 2. Settling Zone Volume (for Type D & F Soils)

Blue Book Vol.1 Appendix J Page J-4

Site area	Area B	Area A1	Area A2	Remarks
Flows to	Existing Dam	Upper or lower dam		
Disturbed catchment area, A (ha)	1.03	3.22	2.46	
Volumetric runoff coefficient, C <sub>v</sub>	0.63	0.63	0.63	Vol.1 F-3, assume Soil Hydrologic Group C
5-day, 95th-percentile rainfall event	56.3	56.3	56.3	Lilydale rainfall record
Settling Zone Volume (m <sup>3</sup> )	365	1142	873	

##### Key

Assumes 'Hardstand' = disturbed. Otherwise NO volume necessary for Area B sedimentation

Estimated - no experimental data exists

2.77 Ha existing mine + 0.45 Ha 2020 mine

2.46 Ha 2020 mine

##### IFD Data for Site (from www.bom.gov.au)

Coordinates: -41.202778,147.161563

DURATION,1 Year,2 years,5 years,10 years,20 years,50 years,100 years

5Mins,40.1,54.1,75.6,91.4,113,145,173

6Mins,37.6,50.7,70.6,85.2,105,135,161

10Mins,31.1,41.7,56.8,67.8,82.6,105,124

20Mins,23.2,30.5,40.1,46.8,55.9,69.3,80.6

30Mins,19.1,24.9,32.0,36.9,43.6,53.3,61.4

1Hr,13.2,17.0,21.3,24.1,28.1,33.8,38.4

2Hrs,8.85,11.3,14.0,15.7,18.1,21.5,24.3

3Hrs,6.97,8.91,10.9,12.2,14.1,16.7,18.8

6Hrs,4.62,5.88,7.16,7.98,9.17,10.8,12.2

12Hrs,3.04,3.86,4.67,5.19,5.95,7.00,7.85

24Hrs,1.96,2.49,2.99,3.30,3.76,4.41,4.93

48Hrs,1.22,1.55,1.84,2.02,2.29,2.67,2.97

72Hrs,1.14,1.35,1.48,1.68,1.95,2.18

## SWMP Commentary, Detailed Calculations

### 3. Total Basin Volume = Settling Zone Volume + Sediment Zone Volume

Sediment Zone Volume (m <sup>3</sup> )	222	815	1046
Settling Zone Volume (m <sup>3</sup> )	365	1142	873
<b>Total Required Capacity (m<sup>3</sup>)</b>	<b>587</b>	<b>1957</b>	<b>1918</b>

## Gundagai Quarry New Dam Spillway Hydrology

### Modelled using RORB

Assumptions:

New dam has 1465m<sup>3</sup> of storage between spillway level (216m RL) and top of dam wall level (217m RL)

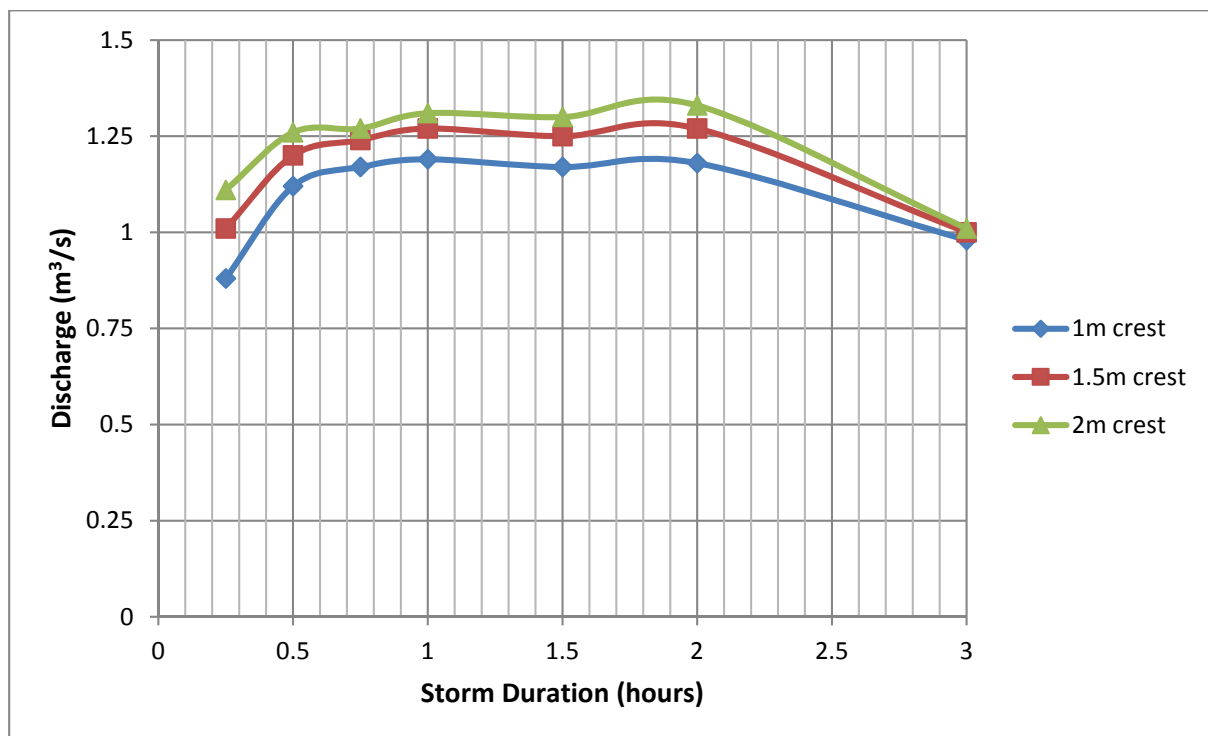
Existing Dam has 4040 m<sup>3</sup> of storage between TWL/spillway level (227 m RL) and dam wall level (228m RL)

Effecting crest of spillway for existing dam = 1m

Catchment parameter Kc = 0.27 parameter (derived by HEC for west coast of Tasmania) used. Assumes short delay times in reaches and gives larger peak flows.

Value of m exponent value= 0.8 (default RORB value)

Kc = 0.27 (HEC)			1 m crest breadth			1.5m crest breadth			2m crest breadth		
Duration (hr)	100 YR ARI Inflow (m <sup>3</sup> /s)	T to peak Inflow (hr)	T to peak			T to peak			T to peak		
			Q (m <sup>3</sup> /s)	TWL (m)	Outflow (hrs)	Q (m <sup>3</sup> /s)	TWL (m)	Outflow (hrs)	Q (m <sup>3</sup> /s)	TWL (m)	Outflow (hrs)
0.25	1.53	0.21	0.88	216.58	0.42	1.01	216.48	0.38	1.11	216.43	0.33
0.5	1.47	0.33	1.12	216.68	0.58	1.2	216.54	0.58	1.26	216.46	0.50
0.75	1.33	0.58	1.17	216.70	0.75	1.24	216.55	0.67	1.27	216.46	0.67
1	1.46	0.50	1.19	216.71	0.75	1.27	216.56	0.75	1.31	216.47	0.67
1.5	1.51	0.58	1.17	216.70	0.83	1.25	216.56	0.75	1.3	216.47	0.67
2	1.49	0.75	1.18	216.70	0.92	1.27	216.56	0.83	1.33	216.48	0.83
3	1.08	1.00	0.98	216.62	1.25	1.00	216.48	1.25	1.01	216.40	1.00



Van Diemen Consulting Pty Ltd

PO Box 1  
 New Town, Tasmania

T: 0438 588 695 E: [rwbarnes73@gmail.com](mailto:rwbarnes73@gmail.com)

This document has been prepared in accordance with the scope of services agreed upon between Van Diemen Consulting (VDC) and the Client.

To the best of VDC’s knowledge, the report presented herein represents the Client’s intentions at the time of completing the document. However, the passage of time, manifestation of latent conditions or impacts of future events may result in changes to matters that are otherwise described in this document. In preparing this document VDC has relied upon data, surveys, analysis, designs, plans and other information provided by the client, and other individuals and organisations referenced herein. Except as otherwise stated in this document, VDC has not verified the accuracy or completeness of such data, surveys, analysis, designs, plans and other information.

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**Document Status**

Revision	Author	Review	Date
1	G Allen, C Oakley, R Barnes, C McCoull	1	20-03-14

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Please contact Customer Service on 6323 3000

*Gundagi Quarry, Bangor - DPEMP*

---

**Appendix J: EPN9053/1 (dam modification and construction)**

COPY

Environment Protection Notice 9053/1 (r2)

1/10



## ENVIRONMENT PROTECTION NOTICE No. 9053/1

Issued under the *Environmental Management and Pollution Control Act 1994*

Issued to: **D.T.K. LOGGING PTY LTD**  
**ACN 081 330 547**  
**46 CAMERON ST**  
**LAUNCESTON TAS 7250**

Environmentally Relevant Activity: **The undertaking of dam works (ACTIVITY TYPE: Inert Waste Depots)**  
**GUNDAGAI ROAD PIT, GUNDAGAI RD**  
**TUNNEL TAS 7254**

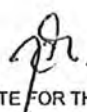
### GROUNDS

I, John Mollison Delegate for the Director, Environment Protection Authority, being satisfied in accordance with section 44(1)(a) of the *Environmental Management and Pollution Control Act 1994* (the EMPCA) and in relation to the above-mentioned environmentally relevant activity that serious or material environmental harm or environmental nuisance is being, or is likely to be, caused hereby issue this environment protection notice to the above-mentioned person as the person responsible for the activity.

### PARTICULARS

The particulars of the grounds upon which this notice is issued are:

- 1 D.T.K. Logging Pty Ltd is the person responsible for quarrying activities and has proposed to undertake dam works associated settling ponds on Mining Lease 1676P/M.
- 2 Failure to ensure appropriate engineering oversight of the proposed dam works could result in environmental risks associated with erosion and potential dam failure.
- 3 It is necessary to ensure that there are adequate safeguards against environmental harm or nuisance being caused by the activity.
- 4 It is desirable to ensure that the proposed dam works at the Gundagai Quarry are carried out in accordance with the document titled 'Gundagai Quarry, Bangor Dam Construction and Modification Pre-Construction Report' dated 20 March 2014 and prepared by Van Diemen Consulting Pty Ltd; and
- 5 It is desirable to impose conditions required by the Assessment Committee for Dam Construction's report dated 11 April 2014, in respect of Gundagai Quarry, proposed Water Dam Storage Facility.

  
DELEGATE FOR THE DIRECTOR, ENVIRONMENT PROTECTION AUTHORITY

Date of issue: **07 JUL 2014**

Environment Protection Notice 9053/1 (r2)

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**DEFINITIONS**

Unless the contrary appears, words and expressions used in this Notice have the meaning given to them in Schedule 1 of this Notice and in the EMPCA. If there is any inconsistency between a definition in the EMPCA and a definition in this Notice, the EMPCA prevails to the extent of the inconsistency.

**REQUIREMENTS**

In accordance with s.44(3) of the EMPCA, the person responsible for the activity is required to comply with the conditions contained in Schedule 2 of this Notice.

**INFORMATION**

Attention is drawn to **Schedule 3**, which contains important additional information.

**PENALTIES**

If a person bound by an environment protection notice contravenes a requirement of the notice, that person is guilty of an offence and is liable on summary conviction to a penalty not exceeding 1000 penalty units in the case of a body corporate or 500 penalty units in any other case (at the time of issuance of this Notice one penalty unit is equal to \$130.00).


**NOTICE TAKES EFFECT**

This notice takes effect on the date on which it is served upon you.

**APPEAL RIGHTS**

You may appeal to the Appeal Tribunal against this notice, or against any requirement contained in the notice, within 14 days from the date on which the notice is served, by writing to:

The Chairperson  
Resource Management and Planning Appeal Tribunal  
GPO Box 2036  
Hobart TAS 7001

Signed:   
DELEGATE FOR THE DIRECTOR, ENVIRONMENT PROTECTION AUTHORITY

Date: 07 JUL 2014



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**Attachments**

- Attachment 1: ACDC Conditions (modified: 07/07/2014 09:01)..... 2 pages
- Attachment 2: The Land (modified: 07/07/2014 09:02)..... 1 page



**Schedule 1: Definitions**

**Aboriginal Relic** has the meaning described in section 2(3) of the *Aboriginal Relics Act 1975*.

**Activity** means any environmentally relevant activity (as defined in Section 3 of EMPCA) to which this document relates, and includes more than one such activity.

**EMPCA** means the *Environmental Management and Pollution Control Act 1994*.

**Environmental Harm** and **Material Environmental Harm** and **Serious Environmental Harm** each have the meanings ascribed to them in Section 5 of EMPCA.

**Environmental Nuisance** and **Pollutant** each have the meanings ascribed to them in Section 3 of EMPCA.

**Person Responsible** is any person who is or was responsible for the environmentally relevant activity to which this document relates and includes the officers, employees, contractors, joint venture partners and agents of that person, and includes a body corporate.

**The Land** means the land on which the activity to which this document relates may be carried out, and includes: buildings and other structures permanently fixed to the land, any part of the land covered with water, and any water covering the land. The Land falls within the area defined by 1. Mining Lease 1676/PM as shown at Attachment 2.



DELEGATE FOR THE DIRECTOR, ENVIRONMENT PROTECTION AUTHORITY

Date of Issue: 07 JUL 2014

**Schedule 2: Conditions**

**General**

- G1 Access to and awareness of conditions and associated documents**  
A copy of these conditions and any associated documents referred to in these conditions must be held in a location that is known to and accessible to the person responsible for the activity. The person responsible for the activity must ensure that all persons who are responsible for undertaking work on The Land, including contractors and sub-contractors, are familiar with these conditions to the extent relevant to their work.
  
- G2 Incident response**  
If an incident causing or threatening environmental nuisance, serious environmental harm or material environmental harm from pollution occurs in the course of the activity, then the person responsible for the activity must immediately take all reasonable and practicable action to minimise any adverse environmental effects from the incident.

**Construction**

- CN1 Construction of the Wastewater Dam**  
The person responsible must comply with the conditions 1 to 6 inclusive required by the Assessment Committee for Dam Construction and listed in the letter dated 11 April 2014, as shown in Attachment 1 of this Notice.

**Effluent**

- EF1 Discharge of waste water from The Land during construction**
  - 1 Unless otherwise approved in writing by the Director, on the commencement of construction, the amount of total suspended solids contained within water discharged from The Land must not exceed 30 mg/l.
  - 2 Unless otherwise approved in writing by the Director, monthly progress reports must be provided to the Director effective from the date of issue of this Notice until dam works have been completed and submitted within 7 days of each monthly period. Monthly progress reports must include as a minimum weekly pH, turbidity and total suspended solids results and other parameters as requested by the Director at the discharge point of the existing wastewater dam.

*[Signature]*  
DELEGATE FOR THE DIRECTOR, ENVIRONMENT PROTECTION AUTHORITY

Date of Issue: 07 JUL 2014

### Schedule 3: Information

#### Legal Obligations

##### **LO1 EMPCA**

The activity must be conducted in accordance with the requirements of the *Environmental Management and Pollution Control Act 1994* and Regulations thereunder. The conditions of this document must not be construed as an exemption from any of those requirements.

##### **LO2 Storage and handling of Dangerous Goods, Explosives and dangerous substances**

- 1 The storage, handling and transport of dangerous goods, explosives and dangerous substances must comply with the requirements of relevant State Acts and any regulations thereunder, including:
  - 1.1 *Work Health and Safety Act 2012* and subordinate regulations;
  - 1.2 *Explosives Act 2012* and subordinate regulations; and
  - 1.3 *Dangerous Goods (Road and Rail Transport) Act 2010* and subordinate regulations.

##### **LO3 Aboriginal relics requirements**

- 1 The *Aboriginal Relics Act 1975*, provides legislative protection to Aboriginal heritage sites in Tasmania regardless of site type, condition, size or land tenure. Section 14(1) of the Act states that; Except as otherwise provided in this Act, no person shall, otherwise than in accordance with the terms of a permit granted by the Minister on the recommendation of the Director of National Parks and Wildlife:
  - 1.1 destroy, damage, deface, conceal or otherwise interfere with a relic;
  - 1.2 make a copy or replica of a carving or engraving that is a relic by rubbing, tracing, casting or other means that involve direct contact with the carving or engraving;
  - 1.3 remove a relic from the place where it is found or abandoned;
  - 1.4 sell or offer or expose for sale, exchange, or otherwise dispose of a relic or any other object that so nearly resembles a relic as to be likely to deceive or be capable of being mistaken for a relic;
  - 1.5 take a relic, or permit a relic to be taken, out of this State; or
  - 1.6 cause an excavation to be made or any other work to be carried out on Crown land for the purpose of searching for a relic.
- 2 If a relic is suspected and/or identified during works then works must cease immediately and the Tasmanian Aboriginal Land and Sea Council and the Aboriginal Heritage Tasmania be contacted for advice before work can continue. In the event that damage to an Aboriginal heritage site is unavoidable a permit under section 14 of the *Aboriginal Relics Act 1975* must be applied for. The Minister may refuse an application for a permit, where the characteristics of the relics are considered to warrant their preservation.
- 3 Anyone finding an Aboriginal relic is required under section 10 of the Act to report that finding as soon as practicable to the Director of National Parks and Wildlife or an authorized officer under the *Aboriginal Relics Act 1975*. It is sufficient to report the finding of a relic to Aboriginal Heritage Tasmania to fulfil the requirements of section 10 of the Act.

##### **LO4 Change of responsibility**

If the person responsible for the activity ceases to be responsible for the activity, they must notify the Director in accordance with Section 45 of the EMPCA.

Environment Protection Notice 9053/1 (r2)

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**Other Information**

- O11 Notification of incidents under section 32 of EMPCA**  
Where a person is required by section 32 of EMPCA to notify the Director of the release of a pollutant, the Director can be notified by telephoning 1800 005 171 (a 24-hour emergency telephone number).

*[Signature]*  
DELEGATE FOR THE DIRECTOR, ENVIRONMENT PROTECTION AUTHORITY

Date of issue: 07 JUL 2014

Environment Protection Notice 9053/1

ATTACHMENT 1  
ACDC Conditions

ASSESSMENT COMMITTEE FOR DAM CONSTRUCTION

Inquiries: Bill Shackcloth  
Phone: 03- 6165 3001  
Fax: 03- 6233 7781

Date: 11 April 2014

Mr Alex Schaap  
Director Environment Protection Authority  
GPO Box 1550  
HOBART TAS 7001

Dear Mr Schaap

**RE: Bangor Quarries - Wastewater Dams at Bangor (Ref H253252)**

In accordance with section 165F of the *Water Management Act 1999*, as approval authority for the project, your referral of the above proposal has been considered by the Assessment Committee for Dam Construction (ACDC) on 11 April 2014.

The ACDC assessment was restricted to the dam engineering and safety aspects of the project pursuant to the Act. It included a review by assessment staff of relevant investigation, design, and construction reports submitted by Van Dieman Consulting Pty Ltd. It also involved assessing the consistency of the proposal with the *Water Management (Safety of Dams) Regulations 2011* and the relevant guidelines for dam safety published by the Australian National Committee on Large Dams Inc (ANCOLD).

Section 165F of the *Water Management Act 1999* stipulates that where a person who proposes to undertake dam works is required under any other enactment to apply for any approval or a permit before those works are undertaken, the relevant authority must refer the application to the ACDC before granting approval or issuing a permit. The ACDC may require such terms and conditions necessary or desirable to ensure safety of the dam works, and the relevant approval authority must include them on the permit or approval. Accordingly the following Conditions and the associated Notes to the conditions are to be included on any such permit or approval should one be granted.

Conditions

1. The permit holder must submit a Notice of Intent (Attachment 1) to commence dam works (see Note 2) to the Department (see Note 1) before dam works commence. Dam works must not commence prior to the nominated start date on this notice, unless otherwise authorised by the Department.
2. The Notice of Intent to commence dam works must be signed by the permit holder, the person constructing the dam (the contractor) and the site supervising engineer, confirming that these persons have read and understand the permit and conditions.
3. Dam works must be carried out in accordance with the *Water Management (Safety of Dams) Regulations 2011* and the *Water Management Act 1999*.
4. The works must be carried out in accordance with the "*Gundagai Quarry, Bangor Dam Construction and Modification Pre-construction Report*" dated March

GPO Box 44 Hobart, Tasmania. 7001

  
07 JUL 2014

Environment Protection Notice 9053/1

ASSESSMENT COMMITTEE FOR DAM CONSTRUCTION

2014 prepared by Van Diemens Consulting, (Departmental reference H254305).

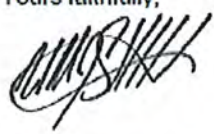
- 5. A person with Class 1 competence (the "site engineer") (see Note 3) must be in charge of all earth works and be responsible for:
  - I. Supervision of the construction;
  - II. Conducting quality control tests and sampling in the field;
  - III. Verification of all quality control testing; and
  - IV. Completion of documentation of all relevant activities including engineering design, construction and quality assurance activities.
- 6. Within 14 days of the completion of dam works the permit holder must submit to the Department a "Work-as-Executed" report, prepared by the site engineer, setting out as-constructed details of compliance with conditions including all items required to be supervised by the site engineer at Condition 5.

Notes to Conditions:

- Note 1 References to the "Department" mean the Department of Primary Industries, Parks, Water and Environment or its successor responsible for administration of the Water Management Act 1999. Where a permit condition requires a submission to, or authorisation from, the Department, the relevant contact officer is the Coordinator (Water Licence and Dam Administration) unless otherwise specified.
- Note 2 "dam works" includes clearing, scraping and excavations at the dam site, other than test pits.
- Note 3 Site Engineer means a person with Class 1 competence, eligible for membership of the Institution of Engineers Australia, as a chartered professional engineer, with relevant experience in the investigation, design and construction of dams of a height, type and Hazard Category similar to the proposed dam works [see Regulation 6(2) of the Water Management (Safety of Dams) Regulations 2011].

If you have any questions in relation to any matters in regards to the above, please do not hesitate to contact myself in the first instance.

Yours faithfully,



Bill Shackcloth  
for and on behalf of the Assessment Committee for Dam Construction.

GPO Box 44 Hobart, Tasmania. 7001

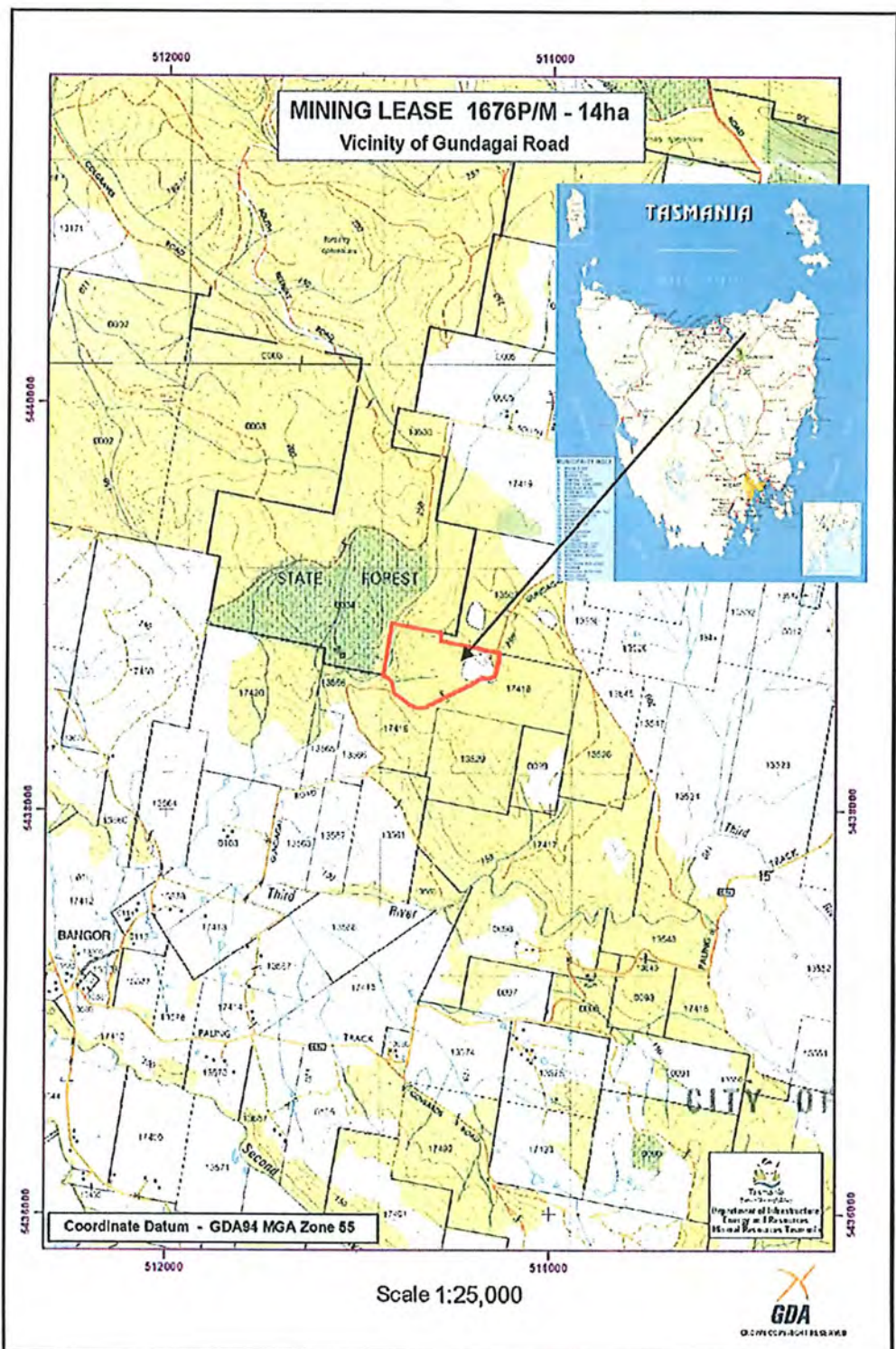


07 JUL 2014

Environment Protection Notice 9053/1

## ATTACHMENT 2

The Land – mining lease boundary 1676PM as shown below



*[Signature]*  
 07 JUL 2014



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Please contact Customer Service on 6323 3000

## Gundagi Quarry, Bangor - DPEMP

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### Appendix K: Gundagi Quarry Progressive Rehabilitation Plan

# GUNDAGI QUARRY, BANGOR PROGRESSIVE REHABILITATION PLAN JULY 2014



**PLANNING EXHIBITED DOCUMENTS**  
 Ref. No: DA 0074/2015  
 Date submitted: 09/05/2015  
 Planning Administration: *[Signature]*

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## OBJECTIVES OF PLAN

The objectives of this Progressive Rehabilitation Plan (the Plan) are to:

- Apply practical and reasonable on-ground measures to revegetate and rehabilitate the no longer used sections of Gundagi Quarry;
- Minimise the likelihood of erosion, slumping and sedimentation of exposed surfaces during revegetation works;
- Control and where reasonably practicable, eradicate Declared Weeds within rehabilitated areas; and
- Monitor and conduct remedial works where necessary to minimise erosion, control weed growth and maximise native vegetation cover in the rehabilitation area over time.

## ROLES AND RESPONSIBILITIES

DTK Logging Pty Ltd is to ensure that:

- the Site Manager (SM) is briefed on the requirements of the Plan and its importance to the overall success of progressive rehabilitation works at Gundagi Quarry; and
- this Plan is complied with through assessments of the quarry and liaison with the SM;
- variations to this Plan are developed and provided to key stakeholders (Environment Protection Authority, Mineral Resources Tasmania) prior to their implementation; and
- the EPA and MRT are provided with an implementation report from time to time through normal permit reporting processes.

The Site Manager (SM) is to ensure:

- this Plan is complied with and appropriately implemented;
- coordination of the work of staff and contractors;
- timely and effective coordination of staff/contractor training in weed hygiene measures, with emphasis on those relevant to their appointed tasks; and that
- expert revegetation – rehabilitation technique advice is sought when required.

Staff and Contractors are to ensure that they:

- apply revegetation, rehabilitation and weed control measures consistent with this plan;
- apply weed hygiene measures for which they have received training; and to
- report any breaches of this Plan to the SM as soon as practical, providing written details of the breach, and any measures that were immediately taken to reduce the likelihood of any environmental harm.

## BACKGROUND

### PREVIOUS WORKS

Since 2009, topsoil has been effectively removed and stockpiled for rehabilitation purposes. Additional weathered gravels that are deemed suitable as a substrate will also be stockpiled separately and utilised as a first base resource in the substrate application. Sediment from the primary sediment settling pond and the sediment interceptors will be cleared on a regular basis and used as a growth substrate addition.

Stockpiled growth substrate will not exceed 2.5 metres in height to reduce/prevent soil movement by wind; the location where the topsoil is stored is in a very sheltered area which is surrounded by vegetation on the north and western sides.

If other materials are required to obtain a substrate depth of 300mm organic materials will be utilised that are weed free. The quarry operator has successfully used waste wood and bark from forestry operations as the substrate base as this is a weed free resource and provides a re-use option for this timber processing by-product.

### STAGED WORKS

Essentially the rehabilitation of used quarry areas will be based on the following principles:

1. Benches prepared for rehabilitation no less than 3 metres wide.
2. Final aim is the re-establishment on an ongoing basis of used quarry areas back to the local native vegetation species and community type.
3. Benches ripped or cracked (through blasting activities) prior to substrate addition.
4. Stockpiled weathered gravel, topsoil (from quarry site) and sediment from sediment interceptors applied to prepared benches at a minimum depth of 300mm.
5. Application of local provenance native seed by tea tree slash method.
6. Monitoring of the following factors:
  - a. Weed infestation;
  - b. regrowth success; and
  - c. landform stability (especially following blasting activities).

**PLAN IMPLEMENTATION**

**Site Preparation**

The following tasks will be conducted to prepare areas for rehabilitation works and to then assess the success of the rehabilitation works over time.

Task No.	Task Description	Purpose
1	Washdown all equipment to be used for quarry rehabilitation works	To prevent the spread of weeds and soil pathogens
2	Form benches to minimum three metre platforms and maximum eight metre faces	Stabilising landform and width adequate for equipment movement
3	Shape the quarry area to blend with the surrounding landscape and generally level off piles and depressions	Assist with blending landform in with surrounds
4	Rip any surfaces that would be too hard to allow vegetation and/or moisture to penetrate	Allows moisture and plant roots to penetrate into rock surface
5	Where possible native vegetation that has regenerated naturally will be left undisturbed	Also gives an indication of what local native species are likely to regenerate in the quarry area
6	Spread substrate mix over prepared bench platforms to a depth of about 200 to 300mm	Provides a growing medium for native seeds
7	Tea tree slash collection and placement on substrate	Provides seed resource, provides cover for emerging seedlings
8	Monitor the parameters identified in this Plan during the works and after completion of works	Essential for ongoing success of revegetation and for weed and disease identification for management

**Benching**

The height of benches will not exceed 8 metres in height and the bench width will be no less than 3 metres when preparing for rehabilitation. The bench platforms will be ripped or cracked (from blasting activities) prior to the application of a substrate derived from local materials.

The growing substrate will consist of:

- stockpiled topsoil from quarry site;
- weathered gravels and soil from quarry; and/or
- sediment collected from the sediment dams and drainage network (channels etc).

**Species Selection**

The aim of the progressive revegetation of old quarry areas is to establish a variety of local provenance native species that represent as much as possible the local vegetation species mix and community type. The key ‘rehabilitation’ species are those that are seed “holders”; that is, species that have a seed resource that is generally contained in a hard capsule that opens long after the flowering

## Gundagi Quarry – Progressive Rehabilitation Plan

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period that led to the seed being set (could be months or years). Other species that will be utilised on a less frequent basis will be local species that have a shorter seed viability period but that can be collected by frequent observation and timely collection/application.

The main species that occur locally and are suitable for revegetation on prepared sites are listed below –

- *Leptospermum scoparium*
- *Melaleuca squarrosa*;
- *Eucalyptus obliqua* and *E. amygdalina*;
- *Allocasuarina littoralis*;
- *Banksia marginata*;
- *Acacia* species (*A. dealbata*, *A. melanoxylon*, *A. mucronata*, *A. terminalis*, *A. verticillata*);
- *Cassinea aculeata*;
- *Gahnia grandis*;
- *Lepidosperma concavum*;
- *Lomandra longifolia*;
- *Olearia lirata* and *O. phlogopappa*;
- *Pultenaea daphnoides* and
- *Solanum laciniatum*.

After substrate application branches are cut from suitable species and placed on the substrate. Past experience shows that it is often necessary to weigh down some branches to prevent wind blowing them away from the area required. The mixing of different species is important to allow a variety of species to establish which allows not only a mix of species but also more chance of species that are suitable for an area and/or microclimate to establish.

The branches used create an excellent shelter for the seedlings and prevent browsing by native animals. Past experience at the quarry suggests that browsing by native animals can be a major limiting factor especially during the early years of plant establishment. Like a lot of native vegetation re-establishment after a number of years-normally three-the vegetation will quickly establish a viable and sustainable structure.

The slash from the long seed holding species will form the main base for the establishment of other shorter seed viability species that tend to be smaller branch size and more susceptible to movement from wind and water.

### **Timing of seed collection and sowing**

Most native species in the area produce viable seed from January onwards. The long seed holding species will be viable for up to twelve months whereas the shorter seed viability species will need to be watched for seed production timing (which can vary according to the season). Most native species prefer to seed in late summer/autumn for winter germination and therefore if the majority of tea tree slash and other species are applied from January through to June as the main seeding period; this will provide the best opportunity for plant germination and growth success.

### **Weed management**

The progressively rehabilitated areas will be managed for weed control works under the Weed Management Plan for the quarry.

## MONITORING AND REVIEW

### BACKGROUND

This Plan is flexible to allow changes in the focus of management, especially the weed spraying program, because the presence, extent and severity of weed infestations may change across the site as rehabilitation occurs. Remedial works such as the installation of additional erosion control measures (eg. netting, jute mesh, fibre cord rolls or drainage rock linings) may also be required subject to weather conditions, native plant growth rates and level of weed growth-infestation.

The focus of the rehabilitation efforts will be reviewed and may be modified from time to time as new data become available for the site, especially following field surveys –

- to identify, record and map new and current weed occurrences in the rehabilitation area; and
- to identify areas in need of remedial works; and
- to assess the extent and health of native species regrowth and establishment in the rehabilitation area.

### ON-GROUND MONITORING

#### *Vegetative Cover*

The health and extent of revegetation efforts will be assessed no less than once every 12 months. Remedial works may include supplementary seed sowing (broad-cast application) or the application of fertiliser to promote native plant growth.

#### *Weeds*

A survey to identify any new weed species (especially Declared Weeds) within the rehabilitation works area will be conducted at least once every 12 months until the completion of the rehabilitation/revegetation process. This approach should enable the early detection of weed species before they reach an extent where control and eradication is very costly and/or difficult to achieve.

The following monitoring regime will be applied during the life of the rehabilitation works:

- 1) Annual assessments by a suitably qualified person will be made at an appropriate time of the year to -
  - a. identify, record and map any new weed species not previously recorded in the rehabilitation area;
  - b. assess and map the extent of known weed infestations, particularly those of Declared Weeds, to determine if they are becoming larger and/or more significant; and
  - c. review/assess the weed control works that have been conducted in the previous 12 month period and to provide advice, where necessary, on the management of weeds in the rehabilitation area.
- 2) Areas where weed control/eradication works have occurred (eg spraying) will be assessed no more 12 months after the treatment occurred to determine if the measures implemented were successful. Where measures have proved unsuccessful, repetition and/or modification of the weed control technique(s) will be employed.



## COMPLETION OF WORKS

### *Assessment of completion*

The completion of the works will be determined using the following subjective criteria -

- Stable landforms;
- Minimal weed incursions (eg weed occurrences that are of little to no consequence, the patch/patches are unlikely to ever be eradicated due to other factors operating at the location, the weed is unlikely to persist in the location or surrounding native vegetation given enough time for the native vegetation to recover);
- Soil surfaces that are not highly erosive, or are eroding at a rate that would be expected in a natural setting; and
- Natural processes are occurring without the need for intervention, such as the colonisation of areas by natural seedfall and unassisted growth of native plants in rehabilitated areas.

## REVIEW OF PLAN

The objectives, responsibilities and management actions within this Plan will need to adapt to new information about the site as it becomes available. The Plan will be reviewed each year as required.

Reviewed versions of the Plan (or addendums to minimise major reprints of the whole Plan) will be provided to the Environment Protection Authority for approval prior to on-ground implementation.

**PLANNING EXHIBITED DOCUMENTS**  
Ref. No: DA 0074/2015  
Date submitted: 09/05/2015  
Planning Administration:   
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**ADDITIONAL INFORMATION**  
Please note additional documentation may be available for viewing.  
Please contact Customer Service on 6323 3000

*Gundagi Quarry – Progressive Rehabilitation Plan*

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**APPENDIX 1. RIVERCARE ‘GUIDELINES FOR SAFE AND EFFECTIVE HERBICIDE USE NEAR WATER’**



Photograph: Lynn Broos

# Guidelines for Safe and Effective Herbicide Use Near Waterways

The control and management of weeds near waterbodies is a challenge faced by many landholders across Tasmania. Waterbodies are particularly sensitive to herbicide contamination, so the decision to apply herbicides in the vicinity must be taken with great care.

Weed control near waterbodies requires a long-term commitment to eradication, perhaps 5–10 years or more, as the seed banks of many 'woody' weed species (eg blackberries, gorse) may remain viable for decades. Weeds can also spread along watercourses, making their control difficult. A staged, planned approach to weed control, alongside a program to re-establish native riparian species, is necessary to ensure the safe restoration of riparian areas. Restoring native vegetation helps to reduce the presence of weed species, ensures the stability of banks, shades the waterway (which helps prevent future weed invasion), and provides habitat for local fauna.

## Definitions

For the purposes of this guideline, the following definitions apply:

<b>Riparian land</b>	Any land that adjoins, directly influences, or is influenced by a body of water at any time of the year.
<b>Waterbody</b>	Includes natural watercourses (streams, creeks, rivers), natural wetlands, ponds, lagoons, constructed drainage channels, dams and ponds, reservoirs and lakes.
<b>Permanently inundated/perennial</b>	These areas have water all year round.
<b>Occasionally inundated/intermittent</b>	These areas have water some time of the year.
<b>Rarely inundated/ephemeral</b>	These are areas that rarely contain water (eg areas that flood on rare occasions).
<b>Toxicity</b>	The inherent poisonous quality/qualities of a substance, measured by what size dose is likely to cause harm (acute toxicity is measured by the amount of active ingredient - mg/kg live body weight - required to kill 50% of a test group of animals - this is called LD50).

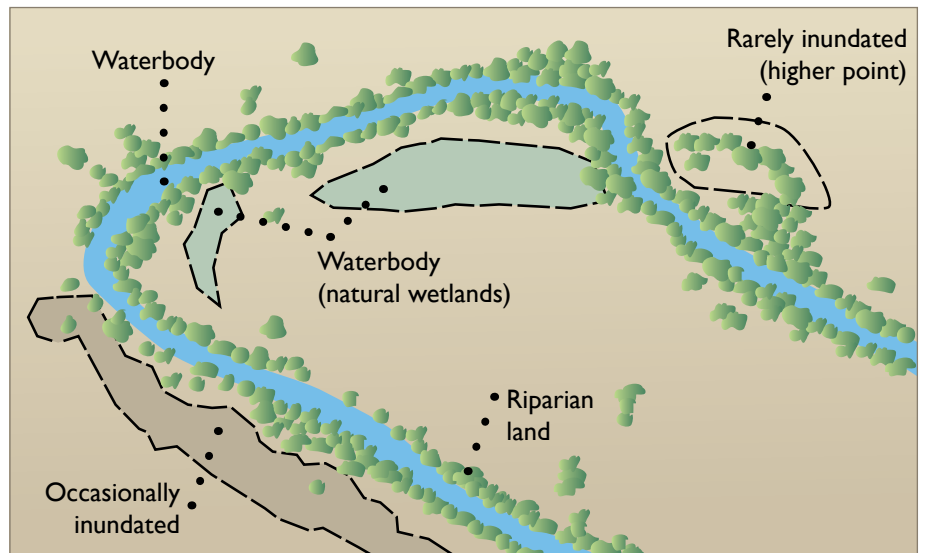


Figure 1: Appropriate and effective herbicide usage near water requires consideration of specific situations

## A Planned Approach

### Assess your site

#### What type of waterbody is it?

If your site is permanently inundated, you need to consider very carefully the choice of herbicide, recognising the risk to your aquatic ecosystem and the danger that the herbicide may pose to the surrounding environment. You also need to identify points of access to the site.

If your site is occasionally or rarely inundated, choose a time when the chance of rainfall is low and therefore the risk of runoff contaminated with herbicide is likely to be low. Figure 1 illustrates the different zones found in aquatic situations which may affect herbicide use.

#### What types of weeds are present?

Identify the species of weed and the extent of the infestation. Table 2 details the recommended herbicide control for a number of riparian weeds, the method and time of year for application. It also suggests alternatives to the use of chemicals.

#### Do the weeds have value at the site?

Consider whether the weeds are serving a useful purpose at the site. They may be acting as a buffer to control erosion, or as a filter to promote water quality. They may have a value to animal species as a source of food or shelter.

If you believe that you have native plants or animals that might be adversely affected by your proposed weed control, seek professional advice.

You may be able to stage the removal of weeds to minimise any impact on erosion or on animal life. You will almost certainly need to restore the habitat once weeds have been eradicated.

#### Are native species present at the site?

Identify any native plant species at your site. You may need to protect these species from overspray or mark them to prevent accidental spraying. These native plants will be the starting point to restoring the riparian zone.

### Choose your control method

Landholders should always consider non-chemical solutions as a preferred option before deciding to use herbicides. These include biological control (eg by introduction of gorse mite, see photo below), slashing, mulching, controlled grazing (controlling timing, intensity and frequency), or hand removal. Often a combination of chemical and non-chemical methods is most appropriate. Whichever method or combination of methods is used, it is important to consider the potential negative impacts on the environment and limit these as much as possible.



*Biological agents such as Gorse spider mite may be options for use near waterways, courtesy of Tasmanian Institute of Agriculture.*

#### Understanding herbicides

Herbicides are designed to control and eradicate pest plants ('weeds'). However, it is important to realise that many herbicides have toxic effects in aquatic ecosystems. Native plants, invertebrates, frogs and fish may be harmed by herbicides. The inappropriate use of herbicides may also cause significant risks to human health where water is pumped from a bore for domestic use, or flows to reservoirs.

Herbicides can enter waterbodies either directly through spray or spray drift, or they can move into waterbodies via surface water run-off or leaching and sub-surface draining.

Herbicides can be broadly classified according to their chemical structures and modes of action. Table 1 shows the three major types of herbicide.

**Table 1: Herbicide classification**

<b>Pre-emergent (residual)</b>	These herbicides are designed to inhibit the germination of pest plants. They are therefore applied before the pest plant germinates and are often residual in the soil for long periods. They are generally not considered to be safe for use near waterbodies and are not recommended for use due to their persistence in the environment.
<b>Knockdown non-selective</b>	These herbicides are designed to be applied directly to the target pest plant, either through being sprayed onto foliage or applied directly to the cambium layer using any of the direct application methods described in Table 3. They may vary in mode of action and some may persist as residues in the environment.
<b>Selective</b>	Selective herbicides are designed to act on only one type of pest plant. Generally, selective herbicides will control either broadleaf (eg capeweed), grasses (eg phalaris) or woody weeds (eg broom). These herbicides are useful when the focus may be on controlling a particular weed species (eg phalaris amongst native shrubs). These herbicides may persist as residues in the environment.

Herbicides applied to the edge of a waterbody, or in wetted areas around its edge, must be registered for use in aquatic environments by the Australian Pesticides & Veterinary Medicines Authority (APVMA).

## Consider the tools available to mitigate against offsite movement of your pesticide

### PIRI-Tas

PIRI-Tas is a simple screen tool that predicts the off-site migration potential of pesticides into surface or ground-water. PIRI-Tas assesses both the likelihood of off-site-migration and the risk to different species based on the toxicity of the pesticide to a range of aquatic organisms. PIRI-Tas is a risk indicator and uses a risk-based approach to decision making by taking into consideration a range of factors associated with site conditions, soil and environmental scenarios, pesticide properties, application rates and time of spraying as well as considering impacts on target species being protected by receiving environments. PIRI-Tas outputs can also be used to construct annual spray schedules to assist with future planning.

PIRI was first developed by CSIRO and is being used both nationally and internationally by a number of organisations. PIRI-Tas CD's and onsite training are available for free through the DPIPWE to key users of chemical pesticides, including those in the agriculture, forestry, amenity, glasshouse and municipal sectors.

Further information is available at <http://www.dpipwe.tas.gov.au/inter.nsf/WebPages/SSKA-7JA3N4?open>

### Consider integrated pest management (IPM)

Integrated pest management (IPM) is a planned approach that coordinates environmentally acceptable methods of pest control with careful and minimal use of toxic pesticides. IPM programs are based on a comprehensive assessment of local conditions, including factors such as climate, season, the biology of the pest species, and government regulations.

Strategies employed may include the staged removal of weeds, biological control and re-planting of riparian areas with native species to discourage the regeneration of weeds.

## Consult and plan

Draw up a calendar for action. The time of year when herbicides will be most effective on the weed should be a major influence on the make-up of this calendar. Herbicides are generally most effective during the growing season of the weed rather than when it is dormant or approaching dormancy. The staged removal of weeds over several seasons may be less disturbing to your aquatic environment and minimise any adverse impact on fauna.

Consult with neighbours who may be affected by your weed control operation, especially if you think there is any risk of spray drift to adjoining properties or downstream. You may also decide to seek advice from experts before taking further action, or approach commercial spray contractors to assess your particular situation.

If the work involves a significant length of river or multiple properties it is advisable to develop a plan that covers all aspects of the weed control work and restoration, including potential risks. You should also be mindful of:

- feasibility/practicability of the work
- physical characteristics of the job site
- optimal pest control method, including alternatives to herbicides
- characteristics of the herbicide (physical, chemical and environmental)
- buffer zones
- the possibility of spray drift and other off-target migration
- weather conditions.

## Do you need to spray?

It is recommended that only trained, licensed contractors carry out spraying operations near waterbodies because of the sensitivity of these environments. Check that they have experience and an understanding of the issues around using herbicides near aquatic environments.

The following points are critical to the application of herbicides near waterbodies:

- Always follow the label
- When you are working near the edge of a waterbody, direct the spray away from the waterbody where possible.
- Spray only to the extent of covering foliage with droplets.
- Spray when weather is calm; strong winds may carry herbicide drift into waterbodies.
- Use a flat fan nozzle and a low pump/spray pressure to reduce the likelihood of spray drift.
- Do not spray when rainfall is forecast within four hours as herbicide can be washed off the pest plant and run off into aquatic ecosystems.

## Appropriate herbicides and application

The type of weed problem will determine both the type of herbicide and its application method. Table 2 shows recommended herbicide and application methods for some common weeds, along with alternatives to herbicide use. Table 3 illustrates application techniques and equipment need to undertake control works.

Uses described in this table are either covered by the respective product label or Off-label Permit No. 13160 issued by the Australian Pesticides and Veterinary Medicines Authority.

Table 2. Common weeds and recommended treatment and herbicides

Area	Weed	Permitted Herbicide (active ingredient)	Example of commercial product (concentration of active ingredient)	Recommended Herbicide Control Technique	Non-chemical Alternatives
Permanently inundated/perennial	<b>Submerged and partially submerged plants</b>				
	Parrot's feather ( <i>Myriophyllum aquaticum</i> )	Glyphosate (registered for aquatic use only) <b>Don't add surfactants!</b>	Roundup Biactive® or Weedmaster Duo®	Foliar spray	Hand removal and excavation (with roots/rhizomes) can be used as part of a well planned approach. Care must be taken to avoid losing fragments
	Egeria ( <i>Egeria densa</i> )				
	Canadian Pondweed ( <i>Elodea canadensis</i> )				
	Cumbungi ( <i>Typha</i> spp)				
	Glyceria (syn. Poa aquatica or reed sweet grass) ( <i>Glyceria maxima</i> ) NB Take extreme caution not to spread Glyceria seed through soil transport (eg on machinery)			Foliar spray (combine with dense local native species revegetation for long-term results through stream shading) Wiper	Clearance or drainage of growth area (combine with dense re-vegetation of local native species for long-term results through stream shading)
	<b>Woody weeds</b>				
	Blackberry ( <i>Rubus fruticosus</i> )	Glyphosate (registered for aquatic use only) <b>Don't add surfactants!</b>	Roundup Biactive® or Weedmaster Duo®	Cut and paint with Roundup Biactive® or Weedmaster Duo®	Hand removal (small plants) Controlled grazing (goats or sheep only) can be effective Bio-control (eg gorse mite, blackberry rust) where other techniques are not suitable Gorse mulching combined with follow-up grazing and revegetation on mulched sites
	Gorse ( <i>Ulex europaeus</i> )				
	<b>Trees</b>				
Hawthorn ( <i>Crataegus monogyna</i> )	Glyphosate (registered for aquatic use only) <b>Don't add surfactants!</b>	Roundup Biactive® or Weedmaster Duo®	Cut and paint Drill or stem injection Axe or frill and paint Foliar spray hawthorn and crack willow (only spray to a height of 2m)	Hand removal (small plants) Controlled grazing can assist in limiting Hawthorn regrowth and thicket density	
Crack Willow ( <i>Salix fragilis</i> )					
Sycamore ( <i>Acer pseudoplatanus</i> )					



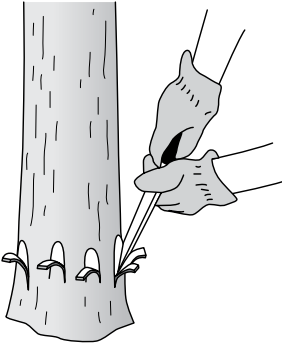
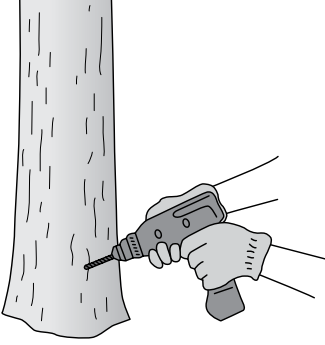
The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product does not imply endorsement by DPIPWE over any other equivalent product from another manufacturer.

Table 2. Common weeds and recommended treatment and herbicides continued

Area	Weed	Permitted Herbicide (active ingredient)	Example of commercial product (concentration of active ingredient)	Recommended Herbicide Control Technique	Non-chemical Alternatives
Occasionally or rarely inundated sites	<b>Woody weeds</b>				
	Blackberry ( <i>Rubus fruticosus</i> )	Metsulfuron-methyl	eg Associate or Brush-Off®	Foliar spray	Hand removal (small infestations) Controlled grazing by goats can be effective Bulldoze and deep cultivate (in suitable circumstances) Bio-control (a rust with limited impact)
		Triclopyr	eg Garlon 600®		
		Triclopyr + Picloram	eg Grass-up™ or Grazon Extra®)		
	Gorse ( <i>Ulex europaeus</i> )	Glyphosate (registered for aquatic use only) Triclopyr Triclopyr + Picloram	eg Roundup Biactive® or Weedmaster Duo® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Cut and paint Foliar spray, preferably Garlon 600®	Mulching/bulldozing/slashing combined with follow-up grazing and revegetate on mulched sites Bio-control (e.g gorse mite) where other techniques are not suitable
	English Broom ( <i>Cytisus scoparius</i> )	Glyphosate (registered for aquatic use only). Metsulfuron-methyl Triclopyr herbicide Triclopyr + Picloram	eg Roundup Biactive® or Weedmaster Duo® eg Associate or Brush-Off® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Cut and paint. Foliar spray, preferably Garlon 600® (only if under 2m in height)	Hand removal. Mechanical removal (eg rip or bulldoze) Mulching/bulldozing/slashing of hawthorn combined with follow-up grazing and revegetate on mulched sites
	Montpellier Broom ( <i>Genista monspessulana</i> )				
	<b>Trees</b>				
	Hawthorn ( <i>Crataegus monogyna</i> )	Glyphosate (registered for aquatic use only). Metsulfuron-methyl Triclopyr herbicide Triclopyr + Picloram	eg Roundup Biactive® or Weedmaster Duo® eg Associate or Brush-Off® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Cut and paint Foliar spray, preferably Garlon 600® (only if under 2m in height)	Hand removal Mechanical removal (eg rip or bulldoze) Mulching/bulldozing/slashing of hawthorn combined with follow-up grazing and revegetate on mulched sites
	Sycamore ( <i>Acer pseudoplatanus</i> )	Glyphosate (registered for aquatic use only)	eg Roundup Biactive® or Weedmaster Duo®	Stem injection, cut and paint (plus foliar spray for young plants)	Hand removal Bulldoze and revegetate Plough-in small plants
<b>Herbaceous plants</b>					
Ragwort ( <i>Senecio jacobaea</i> )	MCPA Metsulfuron-methyl	eg MCPA 500 or L.V.E Agritone eg Associate or Brush-Off®	Foliar spray	Hand removal Controlled grazing (sheep) Ploughing/cultivation (combine with dense revegetation of local native plants for long-term results through shading)	
Paterson's curse ( <i>Echium plantagineum</i> )					
Thistles (eg <i>Cirsium arvense</i> )					

More information on weed identification and weed control can be found at [www.dpipwe.tas.gov.au/weeds](http://www.dpipwe.tas.gov.au/weeds)

Table 3. Herbicide application techniques

Illustration	Method	Type of weed	Equipment Required	Notes
	Foliar Spray	Herbaceous plants, Woody weeds	Knapsack Vehicle mounted tank Herbicide mix Personal protective equipment (see product label)	Ensure herbicide is being applied at right concentration and rate to cover the foliage of the pest plant with fine droplets and avoid run-off. A flat fan nozzle and low pump pressure will assist in reducing spray drift
	Cut and paint	Woody weeds, shrubs and trees	Saw, chainsaw, loppers Herbicide mix Personal protective equipment (goggles and gloves as a minimum) Brush/sponge for herbicide application	Ensure herbicide is applied quickly to cut stump (within 15 seconds in most cases) Apply during active growth period of plant for best results Do not apply herbicide to the point of run-off
	Frilling	Shrubs and trees	Axe, hatchet Herbicide mix Personal protective equipment (goggles and gloves as a minimum) Brush for herbicide application	Frill trunk thoroughly, also treat major surface roots where visible Expose sapwood and apply herbicide to it immediately For deciduous species, apply during active growth period
	Drill and poison	Shrubs and trees	Drill Application bottle, injection gun Herbicide Personal protective equipment (goggles and gloves as a minimum)	Drill to sapwood only and apply herbicide to drill hole immediately Drill and fill major surface roots where appropriate For deciduous species, apply during active growth period

Illustrations: Brett Littleton ILS Design Unit



## After Spraying

### Clean up

Equipment should always be cleaned in a safe location where spills can be contained and will not result in environmental harm. Using water to clean equipment will further dilute any residual herbicide to low levels, and the resulting solution is best sprayed onto a lawned area or bare ground taking the following precautions:

- Do not apply wash-water to the point of saturation so that run-off occurs.
- Do not apply wash-water along boundary fence lines as this will increase the chance of herbicides escaping from your property.
- Do not dispose of wastewater into areas where children play, or pets have access, as low levels of herbicide are still likely to be present.
- Do not deposit wastewater where it will run into waterways, drainage lines or stormwater systems.

### Disposal

If you do happen to have surplus spray mix or herbicide waste, label it with the herbicide name, including any risk and safety information displayed on the original label. Store it safely until it can be disposed of appropriately. Contact a chemical collection organisation eg Chem Clear.

You must follow label directions for the disposal of wastes and herbicide containers. Only dispose of waste herbicides at authorised collection centres, such as licensed waste disposal centres.

Do not dispose herbicide waste:

- through sewerage systems, where it can interfere with the sewage treatment process
- down the drain or gutter; where it can pass through the stormwater system and into waterways
- to landfill via dumping or domestic waste, as it can contaminate soil and leach into groundwater and stormwater.

## Monitor, evaluate and follow up

### Monitor

Observe and keep records of your weed problems and the impact of any measures you take to control them. This could involve:

- the use of visual records, including property maps, aerial and other photography
- the use of a calendar or diary to record when actions were taken.

### Evaluate

Evaluate the success of any weed control program by considering the current extent of the weed problem and reviewing your control measures. Important questions might include:

- Is my weed control work going to plan, or do my goals need reviewing?
- What is the appropriate weed control measure now?
- Is there a need for external (expert) assistance?

### Follow up

Re-implement weed control actions following the results of your monitoring and evaluation. Continue to monitor this follow-up work, and so begin an ongoing cycle of weed management.

These guidelines have been updated by Kiowa Fenner and are based on guidelines prepared by Michael Noble and Janice Miller.

### Important disclaimer

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**Document Status**

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Please contact Customer Service on 6323 3000

*Gundagi Quarry, Bangor - DPEMP*

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**Appendix L: Machinery Specifications**

**PRIMARY CRUSHER**



**BR380JG-1EO**



Price: POA  
 Operating Weight (kg): 34,000

**Crusher**

Description  
 Crusher Type : Jaw  
 Jaw Size (inches x inches): 42 x 22  
 Discharge Setting (mm): 50-150  
 Hourly throughput (tonne/hour): 50-240

**Hopper**

Description  
 Hopper Capacity (cu m): -  
 Hopper loading height (mm): 3,200

**Grizzly**

Description  
 Size (mm x mm): 1,000 x 3,070  
 Frequency (cpm): 1100  
 Amplitude (mm): 0.8

**Conveyor**

Description  
 Discharge height (mm): 2,800  
 Conveyor Width (mm): 1.050

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## Engine

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Description	
Engine make & model:	Komatsu SAA6D107E-1
Engine power (kW@rpm):	140@2050
Engine displacement (lit):	6.69
Number of cylinders:	6

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## Hydraulics

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Description	
Type	HydrauMind
Main pump flow(lit/min):	2 x 230
Maximum Pressure (bar):	380

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## Dimensions

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Description	
Length (mm):	12,500
Width (mm):	2,870
Height (mm):	3,200
Track length on ground (mm):	3,275

### **SECONDARY CRUSHER**



- Rapid set-up time and ease of transportation.
- Well proven high performance 1067mm x 711mm (28" x 42") impact crusher with manganese hammers.
- Heavy duty fabricated chassis and track frame.
- 2 step self cleaning Grizzly with under screen.
- Remote control operation.
- Two way dirt chute.
- 11' x 5' Double Deck Product screen beneath main conveyor.
- Re-circulating facility.
- Caterpillar powerpack
- Fully skirted conveyors
- 'Rip stop' belt on main delivery conveyor.
- Dust suppression sprays.
- Magnetic separator.
- Available with or without grinding path for quarry or recycling (specify when ordering).
- Optional blow bars for quarry or recycling (specify when ordering).
- Facility for making 1, 2 or 3 products.
- Optional mesh sizes for product screen.
- Reversible cross conveyor allowing use of receiving deck to maximise effective screen area.
- Simple access system for screen maintenance (patent pending).
- Power take off for additional stockpile conveyor.

**WHEEL LOADER**



Model	Komatsu SAA6D107E-1		
Type	Water-cooled, 4-cycle		
Aspiration	Turbocharged, aftercooled		
Number of cylinders	6		
Bore x stroke	4.21" x 4.88"	107 mm x 124 mm	
Piston displacement	408 in <sup>3</sup>	6.69 ltr	
Governor	All-speed, electronic		
Horsepower:			
SAE J1995	171 HP	127.3 kW	
ISO 9249/SAE J1349	167 HP	125 kW	
Hydraulic fan at maximum speed	156 HP	117 kW	
Rated rpm	2000 rpm		
Fan drive method for radiator cooling	Hydraulic		
Fuel system	Direct injection		
Lubrication system:			
Method	Gear pump, force-lubrication		
Filter	Full-flow type		
Air cleaner	Dry type with double elements and dust evacuator, plus dust indicator		

EPA Tier 3 and EU Stage 3A emissions certified.

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**Appendix M: MRT Petrology Report – Aggregate Analysis**



# Mineral Resources Tasmania

## Mineralogical/Petrology Report

LJN2013/098

# AGGREGATE ANALYSIS: BARDENHAGEN QUARRY, BANGOR

An unpublished Mineral Resources Tasmania report for  
**ADG Laboratories**

by R.S. Bottrill & R.N. Woolley

18 September 2013

# Mineral Resources Tasmania

## SUMMARY

*Mineralogical analysis indicates the aggregate is a siliceous sandstone or quartzite, dominated by quartz, plagioclase and mica with lesser chlorite and possible trace K-feldspar and amphiboles. Secondary minerals are probably absent, although some of the mica may be secondary. The rock probably contains trace pyrite, suggesting there is potential for forming acid drainage and secondary sulphates, but no other deleterious components were found.*

## INTRODUCTION

One sample of crushed aggregate was submitted for mineralogical analysis; the sample details are:

Registration No.	Field No.	Location	Sample Description
G404742	Base/sub-base, August 2013	Bardenhagens Glen Quarry, Bangor	Unsorted aggregate

## DESCRIPTIONS

Under the stereomicroscope the sample was found to be a homogeneous, medium grey, medium grained, tough, siliceous sandstone or quartzite, with a little weathering to white and/or limonitic joint surfaces, plus some white, limonitic quartz veining to one centimetre thick. It is typical of the siliceous lithic-rich sandstones from the Mathinna Group.

No sulphides or sulphates were visible but the limonitic quartz veining and jointing is a good indication that the rock is likely to locally contain some minor pyrite and this may be a source of some secondary sulphates, acid drainage and discolouration, especially where it is exposed. More detailed petrology would be required to confirm this.

## XRD ANALYSES

Representative samples of the aggregate were examined by low power microscopy and analysed by X-ray Diffraction (XRD) in the MRT laboratories, Rosny Park.

The samples are prepared, examined and analysed on an automated Philips X-Ray diffractometer system: PW 1729 generator, PW 1050 goniometer and PW 1710 microprocessor with nickel-filtered copper radiation at 40kV/30mA, a graphite monochromator (PW1752), sample spinner and a proportional detector (sealed gas filled

# Mineral Resources Tasmania

PW1711). The PW1710 system is presently driven by the CSIRO XRD software: "PW1710 for Windows" and "XPLOT for Windows". The results are calculated semi-quantitatively using numerous standards comprising mixtures of natural minerals to indicate the approximate percentages of the individual mineral components.

XRD mineralogical analysis suggests the primary rock in the aggregate was mostly a siliceous rock, with minor feldspars, especially plagioclase, and mica. There are probably few or no true secondary minerals. No sulphates, sulphides other deleterious components were found.

R.S. Bottrill

**MINERALOGIST/PETROLOGIST**

R.N. Woolley

**TECHNICAL OFFICER**

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*These analyses collected in the MRT laboratories, along with some other data on the samples submitted, may enter the MRT databases but every attempt will be made to ensure the data remains closed file and not be available externally, except at your request.*

# Mineral Resources Tasmania

## Appendix 1: XRD analyses

### MRT Laboratory report

**Client:** D. Maundrill, ADG

**Sample Source:** Bardenhagen Quarry

**MRT Job Number:** LJN2013/098

**Analysis:** Approximate Mineralogy

**Method:** X-Ray Diffraction

#### Results (approx wt %)

<i>Sample</i>	Bangor
<i>MRT Reg. No.</i>	G404742
<i>Quartz</i>	75
<i>Plagioclase</i>	10
<i>Mica</i>	10
<i>Chlorite</i>	5
<i>K-Feldspar</i>	*
<i>Amphibole</i>	*

\* possible trace

Peak overlap may interfere with identifications and quantitative calculations  
Amorphous material and minerals present in trace amounts may not be detected

**Analyst:** R.N. Woolley

**Date:** 26 August 2013