Cleary Bros (Bombo) Pty Ltd

Albion Park Quarry

Application to Modify Development Consent

Increased Production Limit

Perram & Partners

Albion Park Quarry

Application to Modify Development Consent

Increased Production Limit

For: Cleary Bros (Bombo) Pty Ltd

Report 129R1
November, 2008

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INTRODUCTION

1.1 BACKGROUND

Cleary Bros (Bombo) Pty Ltd has extracted and processed hard rock from quarries in the Albion Park area since the middle of last century. In May 2005 the Minister for Infrastructure and Planning granted development consent for the company to extend quarrying into a new area, about 400 metres south east from its then operating quarry. The Minister also granted consent for a haul road linking the quarry extension with the existing quarry. The Minister was the consent authority because at the time the proposal was considered State significant development under provisions (since repealed) of the Environmental Planning and Assessment Act 1979.

The haul road consent was not challenged and became operative after 28 days. The quarry consent however, was put aside to allow an appeal to be heard in the Land and Environment Court. In February 2006 the Court granted development consent for the quarry extension, issuing a revised set of conditions (10639 of 2005).

The haul road consent issued by the Minister traversed land owned by Readymix Holdings (now Rinker Australia Pty Ltd). During the period of the court appeal, Rinker revised its quarrying plan and subsequently indicated to Cleary Bros that the approved haul road route would not be available. Cleary Bros then developed a new route for an access road to the quarry and with Rinker's concurrence, submitted a development application to Shellharbour City Council. On 10 May 2007 Council granted development consent for the new access road linking the quarry extension with the existing haul road to Cleary Bros crushing plant. A subsequent development application was submitted to Council at the request of Rinker for approval to construct a short road across the approved quarry access road to maintain access to Rinker property from Dunsters Lane.

The Court issued development consent for the quarry is *Appendix A* and Council's access road consent is *Appendix B* of this document.

In late 2007 Cleary Bros commenced construction works in preparation for the commencement of quarry production. Those preparatory works have almost reached completion.

The location of the quarry, access road and processing plant is shown on *Figure 1.1*.

Base Aerial and Cadastral - LPI and Shellharbour City Council 2003. Aerial Photo date 24/6/2002.

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FIGURE 1.1 Location Plan

1.2 PURPOSE OF THE SEE

This statement of environmental effects has been prepared to accompany an application, submitted in accordance with section 96AA of the EP&A Act, to the Department of Planning seeking modification of the consent granted by the Land and Environment Court in February 2006.

The application requests that condition 8 in Schedule 3 of the development consent (Annexure A of the Court Judgement) be amended to read:

> 8. The production of quarry products from the quarry shall not exceed 800,000 tonnes per annum.

The proposed modification will require a consequent change to condition A1.2 of the Environment Protection Licence. A copy of the current EPL is included as *Appendix C* of this document.

The effect of the modification will be to raise the quarry production limit permitted in the consent from 400,000 tonnes per annum to 800,000 tonnes per annum. The limit permitted in the EPL would increase from 500,000 tonnes per annum to 800,000 tonnes per annum.

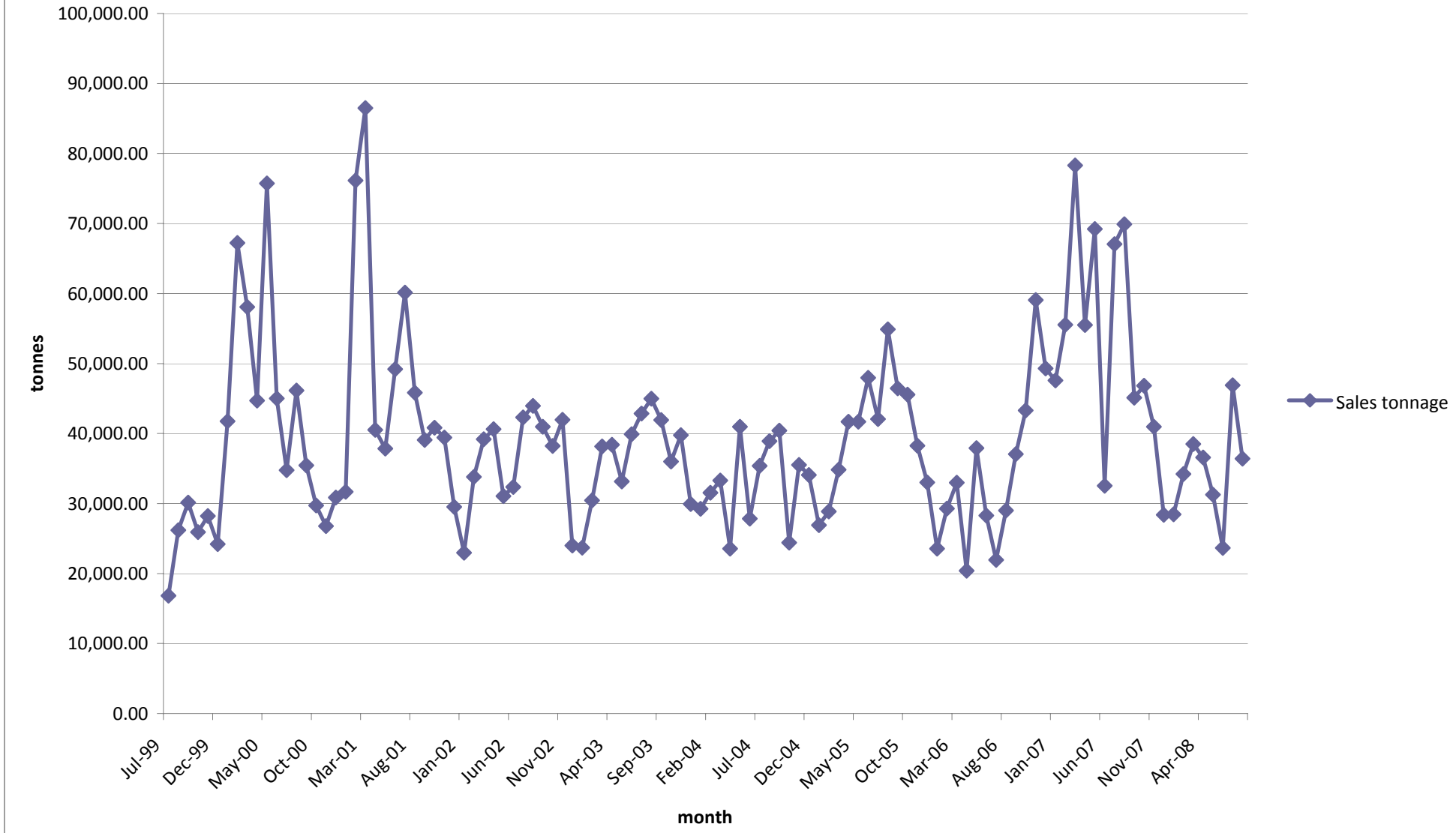
1.3 NEED FOR THE MODIFICATION

The production of hard rock from Albion Park quarry has always fluctuated according to market demand. The current production limit of 400,000 tonnes per annum equates to a monthly average of 33,333 tones. Over the last nine years the actual monthly production has ranged from less than 20,000 tonnes to approximately 86,500 tonnes. *Figure 1.2* shows graphically the monthly production through that period.

After several years of little growth in demand for hard rock when annual production averaged around 400,000 tonnes, Cleary Bros has experienced an increase in demand for quarry products and predicts this will continue for the foreseeable future.

At the time of seeking approval for the quarry extension, it was not the company's intention that production be limited. The environmental impact statement exhibited in 2003 with the application for the quarry extension (Perram & Partners 2003) addressed production capacity in the following terms:

Figure 1.2 Monthly Sales Tonnage



> *The proposed quarry extension will be worked at the same rate as would have occurred had the existing Cleary Bros' quarry had ongoing reserves of hard rock. The rate of extraction will be governed by market conditions, varying up or down from year to year with the level of local construction activity, but with an underlying trend in line with economic growth in the Sydney and Illawarra regions.*
>
> *Accordingly, the application seeks approval for a continuation of market-driven production. Cleary Bros expects the current production rate of up to 400,000 tonnes of hard rock per annum to be maintained for the foreseeable future.*

The 2003 EIS prediction was sustained until 2007 when market demand led to increased quarry sales. Since that time rock has been produced from the need to undertake construction work for the new quarry, which has required significant excavation for the haul road and storage dam.

In order for Cleary Bros to continue to supply rock in response to market demand it has become necessary to vary the production limit included in the development consent.

1.4 APPROVAL PROCESS

1.4.1 Modification of Court Consent

The application for modification of the development approval is submitted pursuant to section 96AA of the Environmental Planning and Assessment Act (EP&A Act). This section enables a consent authority to modify a development consent granted by the Court provided:

- it is satisfied that the development is substantially the same development as that for which consent was originally granted;
- it has notified the application in accordance with the regulations;
- it has made reasonable attempts to notify each person who made a submission to the original development application; and
- it has considered any submissions received and has considered the matters referred to in section 79C (1) of the Act.

The development consent proposed to be modified is for the extension of the Albion Park quarry. The proposed modification is for substantially the same development as there will be no physical alteration to the development other than an increase in the annual limit of quarry production.

1.4.2 Designated Development

A proposal is designated development if it is specified as such in the EP&A Regulation or in an environmental planning instrument applying to the land where the development is proposed to be carried out. The EP&A Act contains provisions for dealing with designated development, including a requirement that an environmental impact statement accompany the development application.

Part 2 of Schedule 3 of the EP&A Regulation, entitled "*Are alterations or additions designated development?*" applies to the current proposal. Clause 1 of Part 2 defines the basis for determining whether alterations or additions are designated development:

> *Development involving alterations or additions to development (whether existing or approved) is not designated development if, in the opinion of the consent authority, the alterations or additions do not significantly increase the environmental impacts of the total development (that is the development together with the additions or alterations) compared with the existing or approved development.*

Clause 2 of Part 2 sets down a series of factors to be taken into account by the consent authority when forming its opinion. Each listed factor is reproduced in *Appendix D* with an assessment as to its application to the proposal.

Having regard to the assessment in *Appendix D*, it is considered open for the consent authority to form an opinion that the proposed modification to the annual production limit at Cleary Bros' Albion Park quarry will not significantly increase the environmental impact of the approved quarry. In these circumstances the current application to modify the development consent would not be an application for designated development.

An assessment of the environmental aspects of the proposed modification is included in Section 3.

2

THE SITE

2.1 PROPERTY DESCRIPTION

The development consent proposed to be modified refers to the following properties:

Property Description	Owner	Activities
Lot 1 DP 858245	Bridon Pty Ltd (a Cleary Bros company)	Quarry extension and ancillary works
Lot 23 DP 1039967	Cleary Bros (Bombo) Pty Ltd	Processing plant, product storage and sale, site entrance.

The location of these properties is shown on *Figure 1.1*.

Cleary Bros existing quarry is located on Lot 2 DP 1021840. Use of this site together with the contiguous Lot 23 DP 1039967 for quarrying, haul road, processing plant, product storage site entrance and ancillary uses is authorised under earlier development consents that remain current. Similarly the use of Lot 2 DP 858245 (Rinker Australia) for a haul road associated with Cleary Bros quarry is authorised under a separate consent.

2.2 APPROVED EXTRACTION AREA

The proposed modification will not alter the approved extraction area, shown on the quarry survey plan, reproduced as *Figure 2.1*.

2.3 APPROVED ACCESS ROAD

The approved route of the access road is indicated on *Figure 1.1*. A right of way has been established by agreement over land owned by Rinker Australia Pty Ltd to permit construction of the access road and its use in relation to Cleary Bros' quarry.

There is no requirement to amend the associated consent for the access road, granted by Shellharbour City Council.

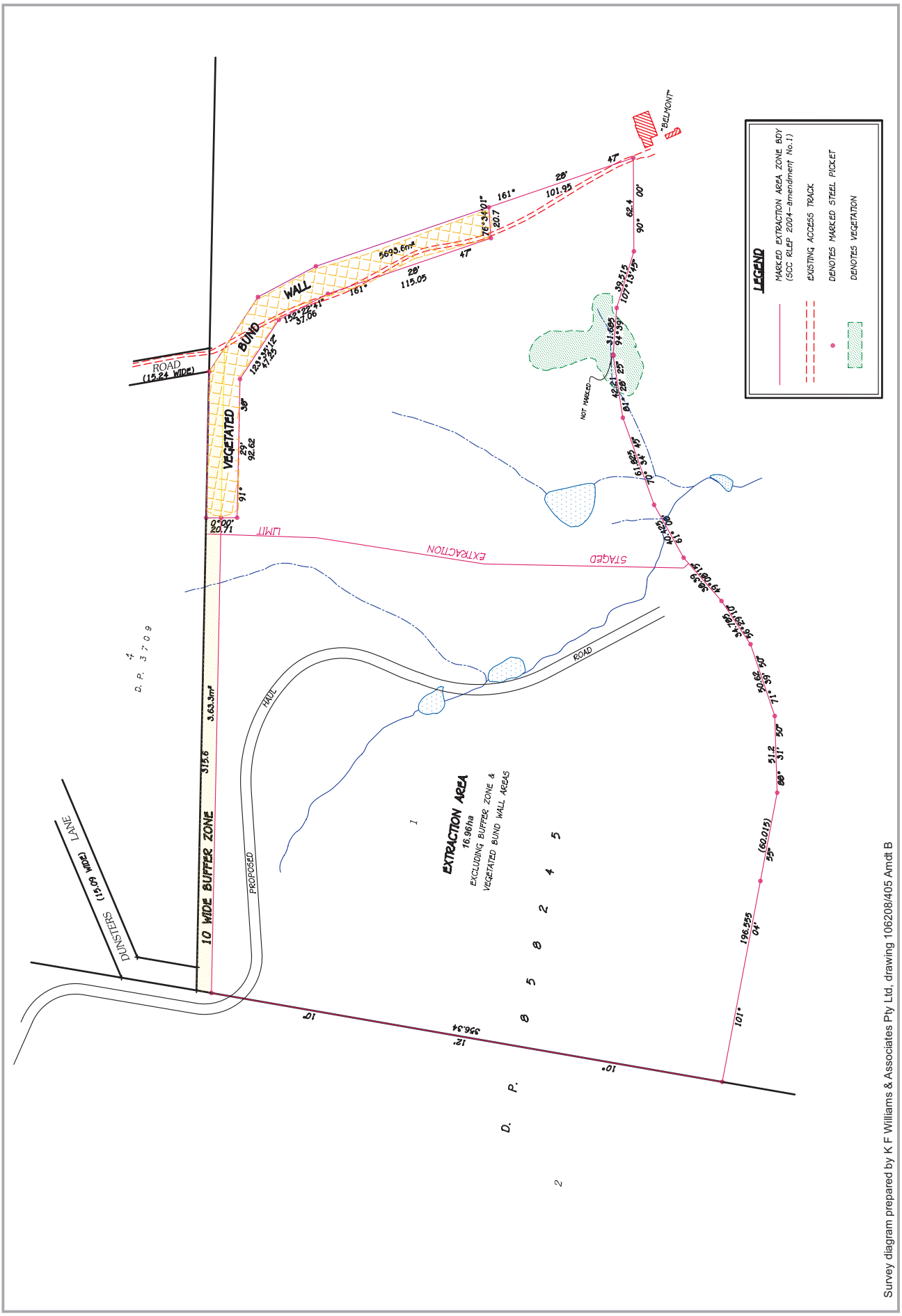


FIGURE 2.1 Approved Extraction Area

N 0 100m

2.4 ZONING AND STATUTORY RESTRICTIONS

The quarry is located in the City of Shellharbour where the following planning instruments apply to the site:

- Shellharbour Rural LEP 2004;
- Illawarra Regional Environmental Plan No 1 – 1986; and
- SEPP (Mining, Petroleum and Extractive Industries) 2007.

Shellharbour Rural LEP 2004 zones most of the quarry site 1(x) Extractive Industrial. A narrow strip along the eastern side of the quarry is zoned 1(rl) Rural Landscape where the Rural LEP permits agriculture but prohibits extractive operations. However, State Environmental Planning Policy (Mining, Petroleum and Extractive Industries) 2007 permits extractive industry to be carried out with development consent on any land where agriculture is permitted.

2.5 ENVIRONMENTAL CHARACTERISTICS

The following information is reproduced from the Quarry Environmental Management Plan for Cleary Bros' Albion Park quarry (Perram & Partners 2008).

2.5.1 Topography and Drainage

The quarry is located near the crest of the Wentworth Hills in the upper catchment of the Minnamurra River. The land has an altitude ranging from 70 metres AHD in the south to 140 metres AHD in the north. The extraction area is a natural amphitheatre with two spurs extending towards the south along its eastern and western boundaries. Steep slopes drop from the spur lines to watercourses draining to an unnamed creek flowing through the 40-hectare property. The creek is outside the extraction area. Two gauges have been installed to measure flow in the watercourse draining the site and in the unnamed creek upstream of the site discharge.

2.5.2 Geology and Soils

RW Corkery & Co Pty Ltd investigated the geology of the site in 1997 drilling 21 boreholes. Rock strata belong to the Bumbo Latite, referred to as basalt, occurring as two distinct flows separated by tuffaceous agglomerate and overlain by weathered latite and soil. Sandstone underlies the lower basalt flow.

Soil terrain mapping shows the dominant soil type to be a friable reddish brown sandy clay loam topsoil over a subsoil comprising a reddish brown sandy clay or light medium clay. The soils are deep, well structured and free draining but with low fertility. They are strongly acidic with a low to moderate cation exchange capacity and exhibit moderate to high erodiblility.

2.5.3 Climate

A weather station was established at the quarry in 2004. While records are being accumulated from this source, the nearest source of climatic information is Kiama Bowling Club, approximately nine kilometres south east of the quarry. Records have been kept from this recording station since 1897. *Table 2.1* presents a summary of significant data from Meteorological Station No 068038, Kiama Bowling Club.

Table 2.1 TEMPERATURE, RAINFALL, HUMIDITY AND WIND SPEED

Item	J	F	M	A	M	J	J	A	S	O	N	D	Year
Temperature Mean Daily Max. Temp. (°C)	25	24.9	24.1	22.1	20.1	17.6	16.8	18.1	19.8	21.7	22.5	23.8	21.1
Mean Daily Min. Temp. (°C)	17.5	17.7	16.4	14.1	12.2	9.3	8.4	8.8	10.6	12.4	14.3	16.3	12.8
Rainfall Mean Monthly Rainfall (mm)	111	119	145	132	121	126	87.6	77.4	75.2	86.7	86.8	94.4	1261
Mean No of Raindays	12.2	11.7	12.7	11.2	10.8	9.8	8.6	8.5	9.2	10.7	11	11.3	127.6
Humidity Mean 9am Rel. Humidity (%)	72	74	71	69	70	65	63	59	60	64	68	70	66
Mean 3pm Rel. Humidity (%)	67	70	67	67	65	58	58	55	58	63	65	66	63
Wind Mean 9am Wind Speed (km/hr)	8.2	8.1	8	8.1	8	10	10.1	9.2	10	9.8	9.1	9.1	9
Mean 3pm Wind Speed (km/hr)	10.8	10.7	10.3	9.1	8.5	9	9.6	11.2	11.7	10.8	11.3	11	10.3

Note: 1. Monthly rainfall entries rounded to three significant figures.

Wind Data

A wind rose from the Albion Park meteorological station included in the quarry EIS shows a predominance for westerlies, occurring some 30 per cent of the time and being more than twice as common as winds from other directions. Northerlies, north-

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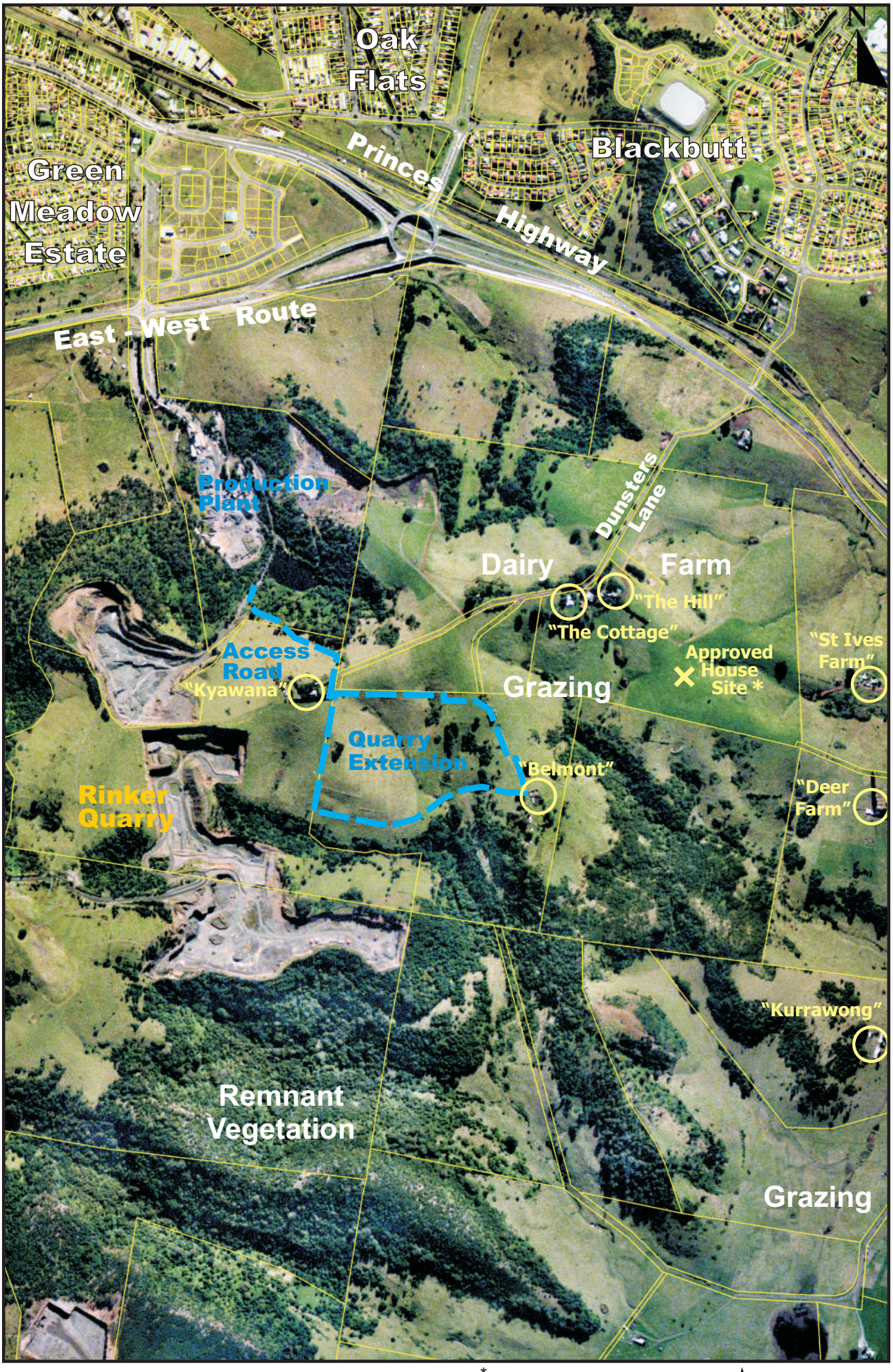

Base Aerial and Cadastral - LPI and Shellharbour City Council 2003. Aerial Photo date 24/6/2002.

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* Source for house site: Connell Wagner, 2003.

FIGURE 2.2 Surrounding Land Use

- Lantana shrubland – occurs mostly on the edges of forested areas;
- Sedgeland/Rushland – small patches in farm dams within the quarry area; and
- Non-native grassland – most of the land to be quarried.

There are several plant species of conservation importance in the area, but no threatened fauna species were recorded in the area. Fig trees are to be included in the revegetation plans to maintain habitat for the Grey-headed Flying-fox.

2.5.7 Archaeology and Heritage

Two surveys of Aboriginal archaeology have found no artefacts in the extractive area. A subsequent survey of the access road route in 2007 also found no artifacts. The Wentworth Hills have a long history of dairy farming and quarrying. The house on the neighbouring dairy farm, "The Hill" is a listed heritage item, but will not be physically affected by the project. A heritage management plan has been prepared for the project with archival recording of the "Kyawana" ruin and "Belmont" house having been undertaken. These structures are not listed heritage items and are not physically affected by the project.

3

ASSESSMENT OF ENVIRONMENTAL IMPACT

3.1 OVERVIEW

The proposal is to increase the annual production limit specified in Condition 8 of Schedule 3 of the development approval granted by the Land and Environment Court. Approval is sought to increase the limit from 400,000 tonnes per annum to 800,000 tonnes per annum. If granted, the modification will not result in a sudden increase in production, but will allow Cleary Bros to respond to growth in market demand including a progressive increase in production with underlying economic growth in the Illawarra and Sydney regions.

The proposed increase in annual production will not alter most parameters associated with the operation. In particular:

- the area of land affected by the quarry will be unchanged;
- the nature and extent of activities on that land will not change;
- the quarry will operate for the same hours as approved in the development consent;
- the same number and types of machinery will be used as indicated in the development application, allowing for renewal of individual items as ordinarily occurs from time to time;
- the normal variation in the size of stockpiles at the processing plant will not change because rock is won and crushed at a rate to match quarry sales, thereby maintaining stockpiles within a fairly small range of movement; and
- the company anticipates no increase in the permanent workforce, although visiting maintenance personnel are likely to be present on the site for an increased number of hours each year.

Aspects of the quarry operation that will progressively change should the application be approved include:

- quarry equipment will operate on average for a greater proportion of the working day;
- there will be on average a greater number of vehicle movements to and from the site, although previous peak numbers considered in the traffic report included in the 2003 EIS are unlikely to be exceeded;
- on average a longer section of quarry terrace will be loosened in each blast.

Cleary Bros does not anticipate that the peak monthly production of approximately 86,500 delivered tonnes that occurred in March 2001 will ever be exceeded. Hence while the proposed increase to production limit will alter average production parameters, the intensity of activity is expected to remain within the range that has already occurred and used as the basis for traffic assessment in the 2003 EIS.

The proposed increase in tonnage may potentially alter the assessed environmental impact of the quarry in relation to operational matters including air quality, noise, traffic, blasting and water consumption. Each of those issues is addressed in following sections.

3.2 AIR QUALITY

As the annual tonnage of material produced at Albion Park quarry grows the existing plant and equipment will operate on average for a greater number of hours per year. Dust generation is associated in part with operating equipment. Hence it is expected that there will be an increase in dust generation as average production grows.

Heggies Pty Ltd was engaged to assess the air quality impact for an annual production level of 800,000 tonnes. The report of the assessment is included as *Appendix E*. Heggies re-modelled the worst case quarry operations for dust generation, occurring during Stage 5, using the AUSPLUME program. Meteorological data and dust monitoring data were obtained from the site and from a DECC monitor in Albion Park.

The results predict that dust deposition and particulate matter concentrations will remain within DECC assessment criteria and hence will be within the limits in the development consent.

3.3 NOISE

Noise created by quarry operations is dependent on the items of machinery, including quarry trucks, operating concurrently. The proposal to permit quarry production to grow to 800,000 tonnes per year will not result in any additional items of equipment being used at the quarry. Instead the equipment already at the quarry will operate for a greater proportion of the available hours. Hence the $L_{Aeq(15\ minute)}$ noise level generated from operating quarry equipment will not change as a result of additional hours of use.

Heggies Pty Ltd was asked to review the company's assessment of noise generation from the quarry incorporated in the environmental impact statement (Perram & Partners 2003). Heggies considered noise from the internal haul road and traffic noise from trucks accessing the site to remove quarry products. The report of the assessment

is included as *Appendix F*, together with a copy of the original noise assessment from the EIS.

Noise from the internal haul road was remodelled because the road has been constructed in a different location to that originally assessed. The modelling considered a worst case where each of the two haul trucks made three movements between the quarry and the processing plant in a 15 minute period. The modelling predicted that the realigned haul road would marginally increase noise contribution *from this source* at nearby residences, but would not alter the predicted total contributed noise from quarry operations, which would remain below limits in the development consent.

With regard to quarry-generated traffic on the public road system, the assessment noted that while average quarry traffic volume would increase with increased annual tonnage, the peak quarry traffic volume considered in the EIS is not expected to change. Hence the conclusion of the EIS assessment, that traffic noise goals on the East-West Link road would not be exceeded when peak quarry traffic was added, is still relevant.

In summary the proposed increase in production level to 800,000 tonnes per annum will not result in noise levels exceeding limits in the development consent or DECC noise goals for road traffic noise.

3.4 TRAFFIC

The traffic assessment for the Albion Park quarry extension included in the environmental impact statement (Perram & Partners 2003) was undertaken by Masson Wilson Twiney. The traffic consultant was asked to review the assessment in consideration of the proposed increase in production capacity from 400,000 to 800,000 tonnes per annum. The review is included as *Appendix G*, together with a copy of the traffic assessment from the EIS.

The previous traffic assessment considered the quarry traffic counts collected during the peak production month of March 2001. Quarry production during that month was approximately 86,500 tonnes, a peak figure that has not been exceeded in the seven years to the present. The previous study examined the performance of the roundabout at the intersection of the quarry access road and East-West Link using peak quarry traffic and RTA forecast traffic on the main road for 2018. It found that the intersection would operate with ample capacity and minimal delays.

The current review of the earlier assessment concluded that as the proposed tonnage increase is not expected to result in the previous peak quarry traffic being exceeded, the findings of the previous assessment remain relevant and valid for a production level of 800,000 tonnes.

3.5 BLASTING

The environmental impact statement for the quarry extension (Perram & Partners 2003) stated that blasts had been carried out at the Albion Park quarry approximately 30 to 40 times per year (section 3.3.5). The EIS indicated that a similar frequency of blasts was anticipated for the quarry extension.

The development consent for the quarry requires that blasting be carried out in accordance with the blast management plan and meet specified criteria for airblast overpressure and ground vibration. The blast management plan specifies that the requirements will be met by a combination of blast design and limiting the maximum instantaneous charge. The requirements of the blast management plan have been incorporated in the Quarry Environmental Management Plan (Perram & Partners 2008) approved by the Director-General of Planning.

Increasing the annual production limit to 800,000 tonnes will not affect compliance with the requirements of the development consent or the QEMP. As production increases, Cleary Bros plans to lengthen the section of quarry terrace loosened with each blast. This will produce a greater amount of rock for collection without increasing the frequency of blasting or the maximum instantaneous charge. Instead, there will be more blast holes drilled for each blast over a greater linear section of terrace for sequential firing.

3.6 WATER CONSUMPTION

There will be a small increase in water consumption associated with an increase in annual quarry production. The QEMP reports that in the quarry working area water is primarily consumed for dust suppression on the haul road and irrigation of rehabilitated land. The quantity of water consumed for these purposes in the quarry will not change as a result of the proposed increase in annual production. Dust suppression water on the haul road for example, is based on a fixed areal application rate, regardless of vehicle passage.

Water is also consumed at the processing plant for spraying on conveyors, stockpiles and the loading area. Water consumption for spraying stockpiles and the loading area will not change significantly because there will be no change to these areas. The stockpiles sprays operate based on wind strength and the loading surface has a fixed areal application rate. Running the crushing plant, screens and conveyors for a greater number of hours per day will result in some increase in water consumption. Fixed sprays on the machinery are controlled by the operator and used as required.

The QEMP reported Cleary Bros' estimate of water consumption at the processing plant to be approximately 45 kilolitres per day, less than one third of the quarry's total

consumption. Cleary Bros is confident that adequate water will be available from existing storages to supply the requirements of the processing plant.

3.7 OTHER ISSUES

The footprint of quarrying activities will not change with an increase in the production limit. The effects of the quarry on aspects of the environment not directly related to daily operations will be unaffected. Such environmental aspects include rehabilitation, flora and fauna, Aboriginal and European heritage, visual characteristics and water quality and hazard.

Increased production will shorten the life of the quarry allowing the land to be rehabilitated sooner than would occur with the current production limit.

An increase in the quarry production limit will enable Cleary Bros to supply more hard rock, with economic advantages to the company, its employees and contractors. In a period where infrastructure projects are expected to increase, it will be of economic benefit to the community at large for Cleary Bros to be able to compete within the market for hard rock.

4

CONCLUSIONS

This statement of environmental effects has considered the environmental issues associated with modifying the development consent for Cleary Bros Albion Park quarry to increase the approved production limit from 400,000 tonnes per annum to 800,000 tonnes per annum. The company is seeking approval for this increase so that it can continue to respond to growth in the market for hard rock in the Illawarra and Sydney regions.

The assessment has noted that the highest monthly production at the quarry occurred in March 2001, a peak month for production that has not been exceeded in the last seven years and is considered unlikely to ever be exceeded. The effect of an increase in the approved production limit will be an increase in the average monthly production. There will be no additional machinery utilised on the site and the hours of operation will remain as currently approved. Increased production means that existing operations will continue for a greater period within the normal working day.

The authors of the original specialist studies into air quality, noise and traffic have reviewed the previous assessments and where necessary undertaken additional modelling to assess the impact of operating within an 800,000 tonne annual production limit. In all cases the conclusion has been that the proposed modification to the approved tonnage limit will not significantly increase the impacts of the operation.

The area of land affected by quarry activities will not change as a result of increased production. There will be no significant change to environmental aspects of the quarry relating to flora and fauna, Aboriginal and European heritage, visual characteristics, water quality and hazard.

It is considered that should the application be approved there will be no significant change in the environmental impact of the quarry. Economic benefits will accrue for the company, the region and the quarry's customers if quarry production can grow with market demand.

REFERENCES

Department of Urban Affairs and Planning (2000)
Is an EIS required for Alterations and Additions?

Perram & Partners (2003)
Proposed Quarry Extension, Albion Park, Environmental Impact Statement;

Perram & Partners (2008)
Albion Park Quarry, Quarry Environmental Management Plan;

Richard Heggie Associates (2005)
Dust Management Plan, Albion Park Quarry Extension;

Richard Heggie Associates (2006)
Noise Monitoring Program/Blast Management Plan, Albion Park Quarry Extension.

APPENDICES

Appendix A

QUARRY DEVELOPMENT CONSENT

Land and Environment Court of New South Wales

CITATION :	**Figtree Hill v Cleary Bros and others (No 2) [2006] NSWLEC 63**
PARTIES :	APPLICANT Figtree Hill Pty Limited FIRST RESPONDENT Cleary Bros (Bombo) Pty Limited SECOND RESPONDENT Minister for Infrastructure and Planning
FILE NUMBER(S) :	10639 of 2005
CORAM:	Hussey C; Brown C
KEY ISSUES:	Development Application :- the extension to an existing hard rock quarry - written submissions on conditions
DATES OF HEARING:	Written submissions 27/01/06
DATE OF JUDGMENT :	21/02/2006
LEGAL REPRESENTATIVES:	APPLICANT Ms J Reid, solicitor SOLICITORS Pike, Pike and Fenwick FIRST RESPONDENT Ms A Penklis, solicitor SOLICITORS Sparke Helmore SECOND RESPONDENT No submissions

THE LAND AND ENVIRONMENT COURT OF NEW SOUTH WALES

Hussey C with Brown C

21 February 2006

10639 of 2005 **Figtree Hill Pty Limited (Applicant) v**

Cleary Bros (Bombo) Pty Limited (First Respondent) and

Minister for Infrastructure and Planning (No.2) (Second Respondent)

JUDGMENT

1 **COMMISSIONERS**: The appeal is made pursuant to s 98 of the *Environmental Planning and Assessment Act 1979* (the EPA Act) where an objector who is dissatisfied with the determination of a consent authority to a development application for designated development may appeal to the Court.

2 The appeal relates to the granting of development consent by the then, Minister for Infrastructure and Planning (the Minister) of DA No. 466-11-2003 on 27 May 2005 for the extension to an existing hard rock quarry at Croom, approximately 2.5 kilometres east of Albion Park and 4 kilometres west of Shellharbour (the site).

3 The appeal was heard on 8, 9, and 12 December 2005. On 13 January 2006 the findings on the merits were provided to the parties (*Figtree Hill v Cleary Bros and others* [2006] NSWLEC 9) and required the parties to

amend the conditions based on the findings in the judgement. The Directions (at pars 94 and 95) stated:

> *The conditions of consent require amendment to those provided to the Court based on the findings in the preceding paragraphs and the need for further discussions between the parties. We propose to make directions for the parties to confer and produce amended conditions of consent within 14 days based on the findings in the judgment .i.e., by 27 January 2006. If the amended conditions are not received by this date the Court will make final Orders without further reference to the parties.*
>
> *Leave is also granted for the parties to restore the matter on 48 hours notice if no agreement can be reached on the conditions. Any leave to restore the matter must be within a time to allow final Orders to be made immediately after 27 January 2006.*

4 Notwithstanding the Direction to confer, it appears that little if any discussion has taken place between the parties so we have addressed the areas still in dispute based on the submissions and evidence provided by the parties.

Schedule 2 Definitions

5 We accept the amendment to the definition of "Fig Tree Hill Land" proposed by the Applicant as it is less ambiguous and reflects the findings in the judgement.

Schedule 4 - Condition 2:

6 We accept the amendment proposed by the Applicant as the total requirements for the buffer on the northern boundary are more appropriately contained within the condition rather than as a separate note to the condition.

Schedule 4 - Condition 14(d)(iv)

7 This condition relates to the Blast Management Plan and the Respondents seek to limit the operation of this plan to the "rural use" of land whereas the Applicant submits that the condition should relate to the land in general. We accept the Applicants submission on this condition as it

provides appropriate protection for the future use of the Applicants land. We however, accept the Respondents submission that there should be "general" compliance with the Blast Management Plan as this provides a limited amount of flexibility in its operation.

Schedule 4 - Condition 20

8 This condition relates to management and monitoring of air quality and the Respondents seek to retain the word "generally" when considering the Dust Management Plan. For the reasons mentioned in the preceding paragraph we accept this submission.

Schedule 4 - Conditions 46 and 47

9 These conditions relate to site access and the previous findings specifically required discussion between parties to addresses the conflict. Despite this direction no discussion appears to have taken place. Based on the site view, the evidence and submissions we accept the Applicants submission. In our view Dunsters Lane is inappropriate for traffic associated with the quarry (except in an emergency) because of its construction, alignment and proximity to dwellings on the Fig Tree Hill Land.

Schedule 4 – Condition 52

10 This condition relates to the requirement for dilapidation surveys. While not raised by either party, the condition requires the owners of the Fig Tree Hill Land to supply to the Second Respondent, three nominees to undertake this work within a "reasonable" period of time. Due to the uncertainty associated with this requirement the nominees should be provided to the Second Respondent within three months.

Schedule 4 – Condition 56

11 This condition requires that the trees required by the landscaping plans to be replaced if they die. The condition required these trees to be replaced within a " reasonable" time whereas the Applicant requires this to be more

specific and nominates a period of 28 days. We accept the Applicants submission.

Schedule 5 - Environmental Management, Monitoring, auditing and Reporting Condition 8(e)

12 The inclusion of this condition is consistent with the findings in par 88 of the Courts previous judgement.

13 The Orders of the Court are:

1. The appeal is dismissed.

2. The extension to an existing hard rock quarry at Lot 1 in DP 858245 and Lot 23 in DP 1039967, Dunsters Lane, Croom, is approved subject to the conditions in Annexure A.

3. The exhibits are returned with the exception of Exhibits C, L, 3 and 101.

R R Hussey
Commissioner of the Court

G T Brown
Commissioner of the Court

In the Land and Environment Court of New South Wales

No.10639 of 2005

Figtree Hill Pty Limited

Applicant

Cleary Bros (Bombo) Pty Limited

First Respondent

Minister for Infrastructure and Planning

Second Respondent

Order

The orders of the Court are:

1. The appeal is dismissed.

2. The extension to an existing hard rock quarry at Lot 1 in DP 858245 and Lot 23 in DP 1039967, Dunsters Lane, Croom, is approved subject to the conditions in Annexure A.

3. The exhibits are returned with the exception of Exhibits C, L, 3 and 101.

Ordered: 21 February 2006

By the Court

SEAL OF THE LAND AND ENVIRONMENT COURT NEW SOUTH WALES

Susan Dixon
Registrar

ANNEXURE A

Figtree Hill Pty Limited v Cleary Bros (Bombo) Pty Limited & Minister for Planning

Land and Environment Court Proceedings No. 10639 of 2005

CONDITIONS OF CONSENT

SCHEDULE 1

Application made by:	Cleary Bros (Bombo) Pty Ltd.
To:	Minister for Infrastructure and Planning
Land:	Lot 1 DP 858245 and Lot 23 DP 1039967, Dunsters Lane, Croom.
Proposed Development:	Extension of hard rock quarry
Development Application:	DA 466-11-2003, lodged with the Department of Infrastructure, Planning and Natural Resources on 10 November 2003
State Significant Development:	The proposal is classified as State significant development under section 76A(7) of the *Environmental Planning and Assessment Act 1979*, as it meets the criteria specified in a declaration made by the Minister for Planning on 3 September 1999
Integrated Development:	The proposal is classified as integrated development under section 91 of the *Environmental Planning and Assessment Act 1979*, because it requires additional approvals under the: • *Protection of the Environment Operations Act, 1997;* and • *Rivers and Foreshores Improvement Act, 1948.*
Designated Development:	The proposal is classified as designated development under section 77A of the *Environmental Planning and Assessment Act 1979* because it meets the extractive industry criteria in schedule 3 of the *Environmental Planning and Assessment Regulation 2000.*
Commencement of Consent:	Pursuant to section 83(2) of the *Environmental Planning and Assessment Act 1979*, this consent operates from the date of determination.
Lapse of Consent:	Pursuant to section 95 of the *Environmental Planning and Assessment Act 1979*, this development consent is liable to lapse five years after the date from which it operates unless the use of any land, building or work the subject of the consent is actually commenced before the date on which the consent would otherwise lapse.

SCHEDULE 2
DEFINITIONS

AEMR	Annual Environmental Management Report
Applicant	Cleary Bros (Bombo) Pty Ltd
BCA	Building Code of Australia
Council	Shellharbour City Council
DA	Development Application
DEC	Department of Environment and Conservation
Department	Department of Planning
Design Event	90 percentile, 5 day rain event
Director-General	Director-General of the Department Planning, or delegate
DPI	Department of Primary Industries
Dust	Any solid material that may become suspended in air or deposited
EIS	Environmental Impact Statement
EMS	Environmental Management Strategy
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPL	Environment Protection Licence issued under the *Protection of the Environment Operations Act, 1997*
Fig Tree Hill Land	Lots 4 and 5 in deposited plan 3709 in their present or succeeding titles]
GTA	General Terms of Approval
Heavy vehicle	Any vehicle with a gross vehicle mass of 5 tonnes or more
Land	Land means the whole of a lot in a current plan registered at the Land Titles Office at the date of this development consent
Minister	Minister for Planning, or delegate
POEO Act	*Protection of the Environment Operations Act 1997*
Privately owned land	Land not owned by the Applicant or its related companies or where a private agreement does not exist between the Applicant and the land owner
Regulation	*Environmental Planning and Assessment Regulation 2000*
RTA	The Roads and Traffic Authority
Site	Land to which the DA applies
Stage	The quarry development stages as described in the EIS

THE SEAL OF THE LAND AND ENVIRONMENT COURT NEW SOUTH WALES

SCHEDULE 3
ADMINISTRATIVE CONDITIONS

Obligation to Minimise Harm to the Environment

1. The Applicant shall implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.

Scope of Development

2. The Applicant shall carry out the development in accordance with:
   a) DA No. 466–11-2003;
   b) The EIS titled *Proposed Quarry Extension Albion Park*, dated October 2003, and prepared by Perram & Partners; and
   c) Conditions of this consent.

3. If there is any inconsistency between the above, the conditions of this consent shall prevail to the extent of the inconsistency.

4. The Applicant shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
   a) Any reports, plans or correspondence that are submitted in accordance with this consent; and
   b) The implementation of any actions or measures contained in these reports, plans or correspondence.

   Note: Amendment of any environmental management plan, strategy or monitoring program required under this consent shall be prepared and approved in accordance with the consultation and approval requirements of the original environmental management plan, strategy or monitoring program, unless otherwise authorised by the Director-General.

Staged Development

5. Under section 80(4) of the Act, this consent is issued for Stages 1 to 4 of the development only.

6. Under section 80(5) of the Act, Stages 5 and 6 must be the subject of another development consent.

   A consent granted in accordance with condition 6 does not require a further development application under section 78A of the Act. However, in seeking consent for Stages 5 and 6, the Applicant shall submit a report to the Minister that has been prepared in consultation with the CCC, the landowner(s) of 'The Fig Tree Hill Land', and relevant government authorities. The report shall be consistent with the original development application (DA 466-11-2003) and shall include:
   a) details of the proposed quarrying operations for Stages 5 and 6;
   b) results of consultation conducted during preparation of the report;
   c) assessment of the environmental, social, agricultural and economic impacts of Stages 5 and 6, based on the environmental performance of Stages 1 to 4 and consultation referred to in subclause (b) above;
   d) assessment of the consistency of Stages 5 and 6 with relevant environmental planning instruments and strategies; and
   e) justification for the extraction of Stages 5 and 6.

   Notes: Within 4 weeks of receiving this report, the Minister will endeavour to:
   - *make the report public and notify the objectors to the original proposal by letter;*
   - *seek independent expert advice on the report if deemed to be warranted;*
   - *seek advice from relevant government authorities on the report;*
   - *determine the proposal; and*
   - *make this determination public.*

Period of Approval

7. This consent lapses 30 years after the date it commences.

   Note: Conditions of this consent may require activities to be carried out by the Applicant beyond the period of approval for hard rock extraction, processing, and rehabilitation on the project site.

Limits on Production

8. The production of quarry products from the quarry shall not exceed 400,000 tonnes per annum.

9. The Applicant shall:
   a) Provide annual production data to the DPI using the standard form for that purpose; and
   b) Include a copy of this data in the AEMR.

Protection of Public Infrastructure

10. The Applicant shall:
    a) Repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the development; and
    b) Relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development.

Operation of Plant and Equipment

11. The Applicant shall ensure that all plant and equipment at the site, or used in connection with the development, are:
    a) Maintained in a proper and efficient condition; and
    b) Operated in a proper and efficient manner.

Demolition

12. The Applicant shall ensure that all demolition work is carried out in accordance with *AS 2601-2001: The Demolition of Structures*, or its latest version.

Compliance

13. Prior to commencement of operations, the Applicant shall commission an independent person(s) or organisation(s), approved by the Director-General, to certify in writing to the satisfaction of the Director-General, that the Applicant has complied with all conditions of this consent applicable prior to that event.

14. At least two weeks prior to the commencement of any works, the Applicant shall notify the owners of the Fig Tree Hill Land, in writing, of the date of commencement of works authorised by this consent.

THE SEAL OF THE LAND AND ENVIRONMENT COURT NEW SOUTH WALES

SCHEDULE 4
SPECIFIC ENVIRONMENTAL CONDITIONS

IDENTIFICATION OF BOUNDARIES

1. Prior to the commencement of works, the Applicant shall:
   a) engage a registered surveyor to mark out the boundaries of the approved limits of extraction;
   b) submit a survey plan of these boundaries to the Director-General; and
   c) ensure that these boundaries are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits.

Note: The limit of extraction includes the area described in the EIS, as amended by the 'Quarry Area' shown on the plan in Appendix 1 (southern boundary), and as amended by the conditions below.

BUFFER

2. A minimum buffer of 10 metres must be maintained between the common northern boundary of Lot 1, DP 858245 and the southern boundary of Lot 4, DP 3709. No extraction is permitted within this 10 metre buffer area. The buffer may be used for landscaping, minor drainage works, noise/visual bunds alignment of the haul road (including batters), as depicted on the plan in Appendix 3.

NOISE

Construction of Noise/Visual Bunds

3. The Applicant shall complete construction of the noise/visual bunds prior to commencing extraction of production material, and shall make all reasonable efforts to complete construction of the bunds within 26 weeks of commencement.

Noise Limits

4. [1]The Applicant shall ensure that noise generated by the development does not exceed the criteria specified in Table 1.

Receiver Locations	Noise Limits dB(A) $L_{Aeq\ (15minute)}$		
	Stages 1-2	Stages 3-4	Stages 5-6
'The Hill' residence (Dunster premises)	35	38	35
'The Cottage' residence (Dunster premises)	35	38	35
Approved rural workers dwelling (Dunster premises)	35	38	35
Greenmeadows Residential Estate	41	41	41

Table 1: Noise Criteria for the Development

Notes:

1. *Staging as depicted in Figure 3.5 of the EIS prepared by Perram and Partners, dated October 2003.*
2. *Receiver locations nominated in Table 5.12 of the report prepared by Richard Heggie and Associates Report No. 30-1079R1 titled 'Noise and Blasting Impact Assessment – Cleary Bros Albion Park Quarry' (13 December 2002). At the time of the DA the above were the nearest affected residences.*
3. *The receiver locations and noise limits in the above table may be varied in the instance that negotiated agreements are entered into by the licensee and affected residents/occupiers or if existing agreements become void, or the nearest receiver location changes due to urban encroachment. These limits may be subject to change with an EPL variation.*
4. *Noise from the premises is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise level limits in Table 1. Where it can be demonstrated that direct measurement of noise from the premises is impractical, the EPA may accept alternative means of determining compliance. See Chapter 11 of the NSW Industrial Noise Policy. The modification factors presented in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise level where applicable.*
5. *The noise emission limits in Table 1 apply under meteorological conditions of:*
   - *Wind speeds up to 0.5m/s in any direction at 10 metres above ground level; or*
   - *Temperature gradient (environmental lapse rate) conditions of less than or equal to 0°C/100m (lapse).*

[1] Incorporates DEC GTA

Operating Hours

5. [2]The Applicant shall comply with the operating hours in Table 2.

Activity	Days of the Week	Time
Drilling, rock breaking, loading and haulage of material from quarry to processing plant, processing and stockpiling, overburden stripping and other stage preparatory works, all site construction activities, rehabilitation works, general plant and maintenance, Processing, crushing and screening and product transfer to stockpiles	Monday – Friday Saturday	7.00 am – 5.30 pm 7.00 am – 1.00 pm

Table 2: Operating Hours for the Development

6. [3]The following activities may be carried out at the premises outside the hours specified in Table 2:
   a) the delivery of materials as requested by Police or other authorities for safety reasons;
   b) emergency work to avoid the loss of lives, property and/or to prevent environmental harm;
   c) workshop activities and other maintenance work inaudible at the nearest affected receiver.

Noise Monitoring Program

7. Within 3 months of the date of this consent, the Applicant shall prepare, and subsequently implement, a Noise Monitoring Program for the development, in consultation with the DEC, and to the satisfaction of the Director-General. The Program shall include:
   a) noise impact assessment criteria and approved hours of operation;
   b) provision for a combination of attended and unattended noise monitoring;
   c) a noise monitoring protocol for evaluating compliance with the noise impact assessment criteria in this consent; and
   d) a protocol for the investigation, notification and mitigation of identified exceedances of the noise impact assessment criteria.

   Note: The program shall be generally in accordance with the draft plan titled 'Albion Park Quarry Extension, Noise Monitoring Programme/Blast Management Plan' dated 10 February 2006 and prepared by Heggies Australia Pty Ltd.

Noise Compliance Assessment Report

8. [4]Within 8 weeks of the date of commencement of extraction of production rock, and annually thereafter, the Applicant shall:
   a) commission a suitably qualified person to assess whether the development is complying with the noise criteria in Table 1 (or as modified), in general accordance with the NSW Industrial Noise Policy and AS 1055-1997: Description and Measurement of Environmental Noise; and
   b) provide the results of this assessment to the DEC and Director-General within 3 months of commissioning the assessment.

Noise Limit Exceedance Report

9. Within 7 days of detecting any exceedance of the noise limits in Table 1, the Applicant shall report the exceedance to the DEC and Director-General and to the owner of the property at which there is an exceedance. This report must include details of the date and time of the exceedance, the operational cause of the exceedance, the response initiated, and the measures proposed to ensure ongoing compliance with the noise limits.

BLASTING AND VIBRATION

Airblast Overpressure Criteria

10. [5]The Applicant shall ensure that the airblast overpressure level from blasting at the development does not exceed the criteria in Table 3 at any point that is located at least 3.5m from any residence or other sensitive receiver on privately owned land.

Airblast overpressure level [dB(Lin Peak)]	Allowable exceedance

[2] Incorporates DEC GTA
[3] Incorporates DEC GTA
[4] Incorporates DEC GTA
[5] Incorporates DEC GTA

115	5% of the total number of blasts over any 12 month reporting period
120	0%

Table 3: Airblast Overpressure Limits

Ground Vibration Criteria

11. [6]The Applicant shall ensure that the peak particle velocity from blasting at the development does not exceed the criteria in Table 4 at any point that is located at least 3.5m from any residence or other sensitive receiver on privately-owned land.

Peak particle velocity (mm/s)	Allowable exceedance
5	5% of the total number of blasts over any 12 month reporting period
10	0%

Table 4: Ground Vibration Limits

Blasting Restrictions

12. [7]Blasting operations on the premises may only take place:
    a) between 9.00am and 5.00pm Monday to Friday inclusive;
    b) are limited to 1 blast each day; and
    c) at such other times as may be approved by the DEC (EPA).

Public Notice

13. During the life of the development, the Applicant shall:
    a) operate a blasting hotline, to enable the public to get up-to-date information on blasting operations at the development. The hotline shall be manned during operational hours with an answering service outside of operational hours, unless otherwise approved by the Director-General; and
    b) notify landowners within 2 kilometres of the site about this hotline on an annual basis, using methods agreed to by the Director-General. Notification shall include, as a minimum:
        (i) signage at the entrance to the site;
        (ii) written notification on an annual basis; and
        (iii) publication on the Applicant's website.

Blast Management Plan

14. [8]Prior to the commencement of operations in each stage of the development after Stage 1, the Applicant shall prepare, and subsequently implement, a Blast Management Plan for the development in consultation with the landowner(s) of The Fig Tree Hill Land and to the satisfaction of the Director-General and DEC. This plan must:
    a) Include a summary of monitoring results for the previous quarry stage;
    b) Describe the objectives for noise and blasting for that stage;
    c) Describe the proposed blasting design for that stage, and demonstrate that the design will meet the blast criteria listed in Tables 3 and 4; and
    d) Describe the measures that would be implemented to:
        (i) meet the blast criteria referred to in this consent, and additional blast criteria at the boundary of the site;
        (ii) avoid and/or minimise any blasting impacts, including flyrock, of the development on The Fig Tree Hill Land, or the continued rural use of that land,;
        (iii) monitor the blasting impacts of the development on The Fig Tree Hill Land; and
        (iv) mitigate, remediate or compensate for any blasting impacts of the development on the residences on The Fig Tree Hill Land' or the use of that land.

Note: The plan shall be generally in accordance with the draft Blast Management Plan titled 'Albion Park Quarry Extension, Noise Monitoring Program/Blast Management Plan' dated 10 February 2006 and prepared by Heggies Australia Pty Ltd.

[6] Incorporates DEC GTA
[7] Incorporates DEC GTA
[8] Incorporates DEC GTA

Blast Monitoring

15. [9]To determine compliance with the blast criteria listed in Tables 3 and 4, the Applicant shall prepare, and subsequently implement, a Blast Monitoring Program for the development to the satisfaction of DEC and the Director-General. This program must address:
    a) monitoring the airblast overpressure and ground vibration levels for all production blasts carried out on the site;
    b) the undertaking of monitoring in accordance with *AS 2187.2:1993*, or as updated; and
    c) maintenance of a written record which includes:
        (i) the time and date of each blast;
        (ii) the station(s) at which the blast was measured;
        (iii) the ground vibration for each blast;
        (iv) the airblast overpressure for each blast;
        (v) evidence that during the past 12 month period, a calibration check had been carried out on each blast monitor to ensure accuracy of the reported data; and
        (vi) the waveform for the ground vibration and overpressure for each blast that exceeds a ground vibration of 5mm/s (peak particle velocity) or an air blast overpressure of 115dB(L).

AIR QUALITY

Air Quality Criteria

16. The Applicant shall ensure that the air pollution generated by the development does not cause exceedances of the ambient air quality standards and goals listed in Tables 5, 6, and 7 at any sensitive receiver or residence on privately-owned land.

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	30 µg/m^3

Table 5: Long Term Impact Assessment Criteria for Particulate Matter

Pollutant	Averaging period	Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3

Table 6: Short Term Impact Assessment Criterion for Particulate Matter

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

Table 7: Long Term Impact Assessment Criteria for Deposited Dust

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, 2003, AS 3580.10.1-1991: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

Management and Monitoring

17. [10] The site must be maintained in a condition that minimises or prevents the emission of dust from the site, including the prompt and effective rehabilitation of all disturbed areas.

18. Internal unsealed roadways, quarry floor and stockpiles are to be watered as required to minimise dust generation impacting on the natural or built environment.

19. [11]The Applicant shall monitor (by sampling and obtaining results by analysis) the concentration of each pollutant in Table 8 to the satisfaction of the DEC and the Director-General, using the specified unit of measure, averaging period, frequency, sampling method and minimum number of locations.

[9] Incorporates DEC GTA
[10] Incorporates DEC GTA
[11] Incorporates DEC GTA

Pollutant	Unit of Measure	Averaging Period	Frequency	Sampling Method	Locations
Dust deposition	g/m2/month	Month, annual	Continuous	AM-15	4
PM_{10}	$\mu g/m^3$	24 hour, annual	Every 6 days	AM-18	1

Table 8: Sampling of Air Pollutants

20. Within 3 months of the date of this consent, the Applicant shall prepare, and subsequently implement, a Dust Management Plan for the development, in consultation with the DEC, and to the satisfaction of the Director-General. The plan shall include:
    a) baseline data on existing air quality in the locality;
    b) air quality impact assessment criteria;
    c) details of the measures that would be undertaken to minimise dust emissions associated with the development;
    d) an air quality monitoring program; and
    e) a protocol for the investigation, notification and mitigation of identified exceedances of the air quality impact assessment criteria.

Note: The plan shall be generally in accordance with the draft Dust Management Plan titled 'Albion Park Quarry Extension Dust Management Plan', dated 22 November 2005 and prepared by Heggies Australia Pty Limited.

METEOROLOGICAL MONITORING

21. The Applicant shall establish a permanent meteorological station at a location approved by the DEC, and to the satisfaction of the Director-General, to monitor the parameters specified in Table 9, using the specified units of measure, averaging period, frequency and sampling method.

Parameter	Units of measure	Averaging period	Frequency	Sampling method
Rainfall	mm/hr	1 hr	Continuous	AM-4
Temperature @ 2 m	K	1 hr	Continuous	AM-4
Temperature @ 10 m	K	1 hr	Continuous	AM-4
Wind direction @ 10 m	Compass points	1 hr	Continuous	AM-2
Wind speed @ 10 m	m/s	1 hr	Continuous	AM-2
Sigma Theta @ 10m	°	1hr	Continuous	AM-2
Total Solar Radiation @ 10m	W/m2	1hr	Continuous	AM-4
Siting	-	-	-	AM-1

Table 9: Meteorological Monitoring

[1] *NSW EPA, 2001, Approved Methods for the Sampling and Analysis of Air Pollutants in NSW.*

SURFACE & GROUND WATER

Note: The Applicant is required to obtain licences and permits for the development under the Protection of the Environment Operations Act 1997, Water Management Act 2000, and the Rivers & Foreshores Improvement Act 1948.

Pollution of Waters

22. [12]Except as may be expressly provided by a Environment Protection Licence, the Applicant shall comply with section 120 of the *Protection of the Environment Operations Act 1997* during the carrying out of the development.

Water Discharge Limit

23. Except as may be expressly provided by an Environmental Protection Licence, the Applicant shall ensure that the discharges from any licensed discharge point/s comply with the limit in Table 10:

[12] Incorporates DEC GTA

Pollutant	Units of Measure	Maximum Limit
TSS	mg/L	50
pH	pH	6.5 - 8.5

Table 10: Water Discharge Pollution Limits

Storm Water Management System

24. [13]The Applicant shall ensure that the stormwater management system for the development is designed, constructed and operated to capture and treat polluted waters from storm event(s) of less than, and including a 1:10 year, 24 hour duration, average recurrence interval (that is 225 mm of total rainfall within the 24 hour period).

25. [14]Within 5 days of a rainfall event, the Applicant shall ensure that the basins in the storm water management system are treated and emptied to maintain the required storage volume.

Flocculant Management

26. [15]The Applicant shall not use a flocculant, other than gypsum, without the written approval of the DEC.

Monitoring and Management

27. Within 12 months of the date of this consent, the Applicant shall prepare, and subsequently implement, a Water Management Plan for the development, in consultation with the DEC and DIPNR (Natural Resources) and to the satisfaction of the Director-General. This plan must be prepared by a qualified hydrogeologist and include:
    a) a Water Balance;
    b) an Erosion and Sediment Control Plan;
    c) a Surface Water Monitoring Program;
    d) a Ground Water Monitoring Program; and
    e) an Integrated Water Management Strategy, if the water balance shows a potential demand for water above that which can be collected from rainfall.

28. [16] The Water Balance shall include:
    a) consideration of the existing quarry and processing site, existing water storage dam and the proposed quarry and haul road;
    b) the source of all water collected or stored on the site, including rainfall, stormwater and groundwater;
    c) the estimated water use demand in wet, average and drought years.

29. [17]The Erosion and Sediment Control Plan shall:
    a) be consistent with the requirements of the Department of Housing's Managing Urban Stormwater: Soils and Construction manual;
    b) identify activities that could cause soil erosion and generate sediment;
    c) describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters
    d) describe the location, function, and capacity of erosion and sediment control structures; and
    e) describe what measures would be implemented to maintain the structures over time.

30. The Surface Water Monitoring Program shall include:
    a) detailed baseline data on surface water flows and quality;
    b) surface water impact assessment criteria;
    c) a program to monitor surface water flows and quality;
    d) a program to manage water releases from the site;
    e) a program to monitor bank and bed stability;
    f) a protocol for the investigation, notification and mitigation of identified exceedances of the surface water impact assessment criteria; and
    g) a program to monitor the effectiveness of the Erosion and Sediment Control Plan.

[13] Incorporates DEC GTA
[14] Incorporates DEC GTA
[15] Incorporates DEC GTA
[16] Incorporates DEC GTA
[17] Incorporates DIPNR GTA

31. The Ground Water Monitoring Program shall include:
    a) detailed baseline data on ground water levels and quality, based on statistical analysis;
    b) ground water impact assessment criteria;
    c) a program to monitor regional ground water levels and quality;
    d) a program to monitor ground water level effects on vegetation, and on ground water supply to adjoining properties; and
    e) a protocol for the investigation, notification and mitigation of identified exceedances of the groundwater impact assessment criteria.

32. [18]The Integrated Water Management Strategy shall include:
    a) exploration of a range of options for a sustainable resource alternative for water supply to the site;
    b) identification of all possible and available sources of water;
    c) consistency with Government Water Reform Initiatives and policies;
    d) quality of water to meet usage requirements including any possible effects on product;
    e) costs of supply;
    f) health and environmental impacts;
    g) legislative requirements;
    h) assessment of the feasibility, benefits and costs of options;
    i) a process to identify and evaluate preferred options for implementation; and
    j) the identification of a timetable for implementation of the selected options.

Reporting

33. Each year, the Applicant shall:
    a) review the Water Management Plan;
    b) update each sub-plan; and
    c) report the results of this review in the AEMR, including:
    d) the results of monitoring;
    e) details of the review for each sub-plan;
    f) amendments to the sub-plans; and
    g) details of the measures undertaken/proposed to address any identified issues.

FLORA & FAUNA

Vegetation Clearing Protocol

34. Prior to the commencement of works, the Applicant shall prepare a Vegetation Clearing Protocol for the development in consultation with Shellharbour City Council and the DEC (NPWS), and to the satisfaction of the Director-General. This plan shall:
    a) delineate the areas of remnant vegetation to be cleared; and
    b) describe the procedures that would be implemented for:
        - pre-clearance surveys;
        - progressive clearing;
        - fauna management;
        - conserving and reusing topsoil;
        - collecting seed from the site;
        - salvaging and reusing material from the site; and
        - controlling weeds.

Southern Remnant Vegetation and Revegetation Area

35. The Applicant shall conserve and maintain the southern areas of remnant vegetation marked on the map in Appendix 1.

36. The Applicant shall revegetate/rehabilitate and maintain the areas marked 'Area to be Planted' and 'Weed Control to Promote Natural Vegetation' on the map in Appendix 1. Revegetation shall be in accordance with the Vegetation Management Plan described in Condition 37.

    Note: Other revegetation areas shall be covered in the Vegetation Management Plan referred to in Condition 37 below.

Vegetation Management Plan

37. Within 6 months of the date of this consent, the Applicant shall prepare, and subsequently implement, a Vegetation Management Plan for the development in consultation with Shellharbour City Council and the DEC (NPWS), and to the satisfaction of the Director-

[18] Incorporates DEC GTA

General. The plan shall be prepared by a suitably qualified ecologist / bush regenerator, and shall address:

a) establishment of baseline data for existing vegetation and habitat in the area;
b) vegetation management on all areas of the site outside the working area of the quarry;
c) conservation, maintenance and enhancement of threatened communities, including 'Illawarra Subtropical Rainforest' and 'Illawarra Lowlands Grassy Woodlands';
d) conservation, maintenance and enhancement of threatened plant species, including *Cynanchum elegans* (White Cynachum), *Daphnandra sp.aff micrantha* (Illawarra Socketwood), and *Zieria granulata* (Illawarra Zieria);
e) establishment and maintenance of vegetation/habitat for threatened fauna species, including the Grey-headed flying fox;
f) ongoing weed control and maintenance;
g) a program for how the performance of the measures described in (b) to (f) above would be monitored over time;
h) a program for monitoring the effect of quarrying, including water management, on vegetation communities.

Reporting

38. The Applicant shall include a progress report on the implementation of the Vegetation Management Plan in the AEMR.

REHABILITATION

Rehabilitation

39. The Applicant shall progressively rehabilitate the site to the satisfaction of the Director-General.

Rehabilitation Management Plan

40. Within 6 months of the date of this consent, the Applicant shall prepare, and subsequently implement, a Rehabilitation Management Plan for the site in consultation with Shellharbour City Council and the DEC (NPWS), and to the satisfaction of the Director-General: This plan must:
    a) identify the disturbed area at the site;
    b) describe in general the short, medium, and long-term measures that would be implemented to rehabilitate the site;
    c) describe in detail the measures that would be implemented over the next 5 years to rehabilitate the site; and
    d) describe how the performance of these measures would be monitored over time.

41. Within 5 years of providing the Rehabilitation Management Plan to the Director-General, and every 5 years thereafter, the Applicant shall review and update the plan to the satisfaction of the Director-General.

Rehabilitation Bond

42. Within 6 months of the date of this consent, the Applicant shall lodge a suitable rehabilitation and conservation bond for the development with the Director-General. The sum of the bond shall be calculated at:
    a) $\$2.50/m^2$ for the total area of disturbance at the development; and
    b) $\$3.00/m^2$ for the total area of the revegetation area,
    to the satisfaction of the Director-General.

    Notes:
    - *If the rehabilitation and revegetation area is completed to the satisfaction of the Director-General, the Director-General will release the rehabilitation and conservation bond.*
    - *If the rehabilitation and revegetation area is not completed to the satisfaction of the Director-General, the Director-General will call in all or part of the rehabilitation and conservation bond, and arrange for the satisfactory completion of these works.*

43. Within 3 years of lodging the rehabilitation and conservation bond with the Director-General, and every 3 years thereafter, unless the Director-General directs otherwise, the Applicant shall review, and if necessary revise, the sum of the rehabilitation bond to the satisfaction of the Director-General. The review must consider:
    a) the effects of inflation;
    b) any changes to the total area of disturbance; and
    c) the performance of the revegetation area.

Reporting

44. The Applicant shall include a progress report on the Rehabilitation Management Plan in the AEMR.

TRAFFIC AND TRANSPORT

Right of Way

45. Prior to the commencement of works, the Applicant shall formalise the Right of Way for the haulage road, to the satisfaction of the Director-General.

Site Access

46. All access to the site is to be via the roundabout at East-West Link Road, except in an emergency, as agreed by the Director General in consultation with the Council.

47. Deleted

Parking

48. The Applicant shall provide sufficient parking on-site for all quarry-related traffic to the satisfaction of the Director-General.

Road Haulage

49. The Applicant shall ensure that all loaded vehicles entering or leaving the site are covered.

50. The Applicant shall ensure all loaded vehicles leaving the site are cleaned of materials that may fall on the road before they are allowed to leave the site.

HERITAGE

51. Within 3 months of the date of this consent, and prior to the disturbance of any relic, the Applicant shall prepare and subsequently implement a Heritage Management Plan for the development, in consultation with NSW Heritage Office and Shellharbour City Council, and to the satisfaction of the Director-General. The plan shall be prepared by a suitably qualified heritage consultant and must include:

a) a program for baseline dilapidation surveys of residences on The Fig Tree Hill Land and the 'Belmont' property (with the consent of the landowners). Surveys shall be undertaken at least prior to the commencement of each quarrying stage;

b) archival recording of 'Kyawana' and 'Belmont' properties, the dry stone walls and other heritage elements affected by the development;

c) a plan for the salvage and on-site reconstruction of the dry stone walls affected by the proposal, in accordance with a conservation and interpretation strategy;

d) a plan for the conservation and maintenance of the dry stone wall on the eastern boundary of the allotment;

e) a plan for providing Council the opportunity to salvage any relic proposed to be destroyed by the development, including 'Kyawana';

f) a procedure for obtaining permits under the Heritage Act prior to disturbance of any relic, and permits under the National Parks and Wildlife Act prior to disturbance of any Aboriginal objects or archaeological remains.

52. The dilapidation surveys required under Condition 51 shall be conducted by a suitably qualified, experienced and independent engineer, whose appointment has been approved by the Director-General. The owners of the Fig Tree Hill land are to supply the applicant with three suggested nominees within 3 months from the grant of this consent. The applicant will submit one engineer from that list to be put forward by the applicant for approval by the Director General.

Reporting

53. The Applicant shall include a progress report on the Heritage Management Plan in the AEM

VISUAL IMPACT

Visual Amenity

54. The Applicant shall minimise the visual impacts of the development to the satisfaction of the Director-General.

55. The visual/noise bunds and screen plantings shall be designed and established in accordance with a Landscape Plan prepared in consultation with Shellharbour City Council, and to the satisfaction of the Director-General. The Landscape Plan shall be prepared by a suitably qualified landscape architect with heritage experience, and shall have regard to the cultural landscape of Wentworth Hills. The plantings shall be commenced prior to the commencement of extraction and completed within six months of the date of this consent.

56. The Applicant shall ensure that the trees in the bund are maintained, and that in the event that trees die that they are replaced within 28 days to the satisfaction of the Director- General.

57. Following construction of the visual/noise bunds, the Applicant shall undertake an independent review of their effectiveness, and undertake any improvements to the satisfaction of the Director-General.

WASTE MANAGEMENT

Waste Minimisation

58. The Applicant shall minimise the amount of waste generated by the development to the satisfaction of the Director-General.

Waste Classification

59. [19]All liquid and non liquid wastes resulting from activities and processes at the site must be assessed, classified and managed in accordance with the EPA's Environmental Guidelines: *Assessment, Classification and Management of Liquid and Non-liquid Wastes (1999)*, or any other EPA document superseding this guideline.

Reporting

60. The Applicant shall describe what measures have been implemented to minimise the amount of waste generated by the development in the AEMR.

EMERGENCY AND HAZARDS MANAGEMENT

Dangerous Goods

61. The Applicant shall ensure that the storage, handling, and transport of dangerous goods is done in accordance with the relevant Australian Standards, particularly AS1940 and AS1596, and the Dangerous Goods Code.

Safety

62. The Applicant shall secure the development to ensure public safety to the satisfaction of the Director-General.

Emergency Management

63. Within 6 months of the date of this consent, the Applicant shall document, and subsequently implement, measures to minimise the environmental impacts of any emergency situations that could arise as a result of the operation of the quarry to the satisfaction of the DEC and the Director-General. This documentation must:
    a) identify any significant threats to the environment and/or public health that could arise from activities associated with the operation of the quarry or construction works associated with the production increase. These threats may include excessive rainfall, pump failures, excess flocculation, power or other utility failure, natural disaster, landslip, accidental spills and discharges, spillage from trucks, fire etc;
    b) identify any subsequent direct or indirect environmental effects as a result of the threats;
    c) identify the pollution that would result due to these threats and impacts on operations and what impact the pollution would have on the health of the community and the environment;
    d) develop actions to effectively respond to the disruption of operations so the risk of pollution is minimised;
    e) develop a communications strategy for alerting relevant agencies and the potentially affected community in the event of the disruption to operations leading to significant pollution;
    f) ensure that all relevant employees are familiar with the documentation; and

[19]. Incorporates DEC GTA

g) when developing this documentation, identify any opportunities to integrate with Cleary Bros Emergency plans.

BUSHFIRE MANAGEMENT

64. The Applicant shall:
    a) ensure that the development is suitably equipped to respond to any fires on-site;
    b) assist the Rural Fire Service and emergency services as much as possible if there is a fire on-site.

65. Within 6 months of the date of this consent, the Applicant shall prepare a Bushfire Management Plan for the development, to the satisfaction of Council and the Rural Fire Service. The plan must have regard to the management of fire regimes and hazard reduction activities so as to avoid negative impacts to threatened species and habitat, endangered communities and populations as well as any cultural assets that may be present.

THE SEAL OF THE LAND AND ENVIRONMENT COURT NEW SOUTH WALES

SCHEDULE 5
ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. If the results of monitoring required in schedule 4 identify that emissions generated by the development are greater than the criteria in schedule 4, then the Applicant shall notify the Director-General and the affected landowners and/or existing or future tenants (including tenants of quarry owned properties) accordingly, and provide quarterly monitoring results to each of these parties until the results show that the development is complying with the criteria in schedule 4.

INDEPENDENT REVIEW

2. If a landowner (excluding quarry owned properties) considers that the operations of the quarry are exceeding the criteria in schedule 4, then he/she may ask the Director-General in writing for an independent review of the impacts of the development on his/her land.

   If the Director-General is satisfied that an independent review is warranted, the Applicant shall within 3 months of the Director-General advising that an independent review is warranted:
   a) consult with the landowner to determine his/her concerns;
   b) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to conduct monitoring on the land, to determine whether the development is complying with the relevant criteria in schedule 4, and identify the source(s) and scale of any impact on the land, and the development's contribution to this impact; and
   c) give the Director-General and landowner a copy of the independent review.

3. If the independent review determines that the quarrying operations are complying with the relevant criteria in schedule 4, then the Applicant may discontinue the independent review with the approval of the Director-General.

4. If the independent review determines that the quarrying operations are not complying with the relevant criteria in schedule 4, then the Applicant shall:
   a) take all practicable measures, in consultation with the landowner, to ensure that the development complies with the relevant criteria; and
   b) conduct further monitoring to determine whether these measures ensure compliance; or
   c) secure a written agreement with the landowner to allow exceedances of the relevant criteria in schedule 4,

   to the satisfaction of the Director-General.

   If the additional monitoring referred to above subsequently determines that the quarrying operations are complying with the relevant criteria in schedule 4, then the Applicant may discontinue the independent review with the approval of the Director-General.

   If the Applicant is unable to finalise an agreement with the landowner, then the Applicant or landowner may refer the matter to the Director-General for resolution.

   If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 2).

5. If the independent review determines that the quarrying operations are not complying with the relevant criteria in schedule 4, but that several quarries are responsible for this non-compliance, then the Applicant shall, with the agreement of the landowner and other quarry(s), prepare and implement a Cumulative Noise, Blasting and/or Air Quality Impact Management Plan to the satisfaction of the Director-General. This plan must provide details of the joint approach to be adopted by the Applicant and other quarry(s) to manage cumulative air quality and/or noise impacts at the landowner's dwelling.

   If the Applicant is unable to finalise an agreement with the landowner and/or other quarry(s), and/or prepare a Cumulative Noise, Blasting and/or Air Quality Impact Management Plan, then the Applicant or landowner may refer the matter to the Director-General for resolution.

   If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 2).

6. If the landowner disputes the results of the independent review, either the Applicant or the landowner may refer the matter to the Director-General for resolution.

   If the matter cannot be resolved within 21 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process (see Appendix 2).

SCHEDULE 6
ENVIRONMENTAL MANAGEMENT, MONITORING, AUDITING AND REPORTING

ENVIRONMENTAL MANAGEMENT STRATEGY

1. Within 6 months of the date of this consent, the Applicant shall prepare, and subsequently implement, an Environmental Management Strategy for the development to the satisfaction of the Director-General. This strategy must:
   (a) provide the strategic context for environmental management of the development;
   (b) identify the statutory requirements that apply to the development;
   (c) describe in general how the environmental performance of the development would be monitored and managed during the development;
   (d) describe the procedures that would be implemented to:
      - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
      - receive, handle, respond to, and record complaints;
      - resolve any disputes that may arise during the course of the development;
      - respond to any non-compliance;
      - manage cumulative impacts; and
      - respond to emergencies; and
   (e) describe the role, responsibility, authority, and accountability of all the key personnel involved in environmental management of the development.

2. Within 14 days of receiving the Director-General's approval for the strategy, the Applicant shall:
   (a) send copies of the approved strategy to the relevant agencies and Council; and
   (b) ensure the approved strategy is made publicly available during the development.

ENVIRONMENTAL MONITORING PROGRAM

3. Within 6 months of the date of this consent, the Applicant shall prepare an Environmental Monitoring Program for the development, in consultation with the relevant agencies, and to the satisfaction of the Director-General. This program must consolidate the various monitoring requirements in schedule 4 of this consent into a single document.

4. Within 3 months of the completion of each Independent Environmental Audit, the Applicant shall review, and if necessary update, the Environmental Monitoring Program to the satisfaction of the Director-General.

ANNUAL REPORTING

5. The Applicant shall prepare and submit an Annual Environmental Management Report (AEMR) to the Director-General and the relevant agencies. This report must:
   (a) identify the standards and performance measures that apply to the development;
   (b) describe the works carried out in the last 12 months;
   (c) describe the works that will be carried out in the next 12 months;
   (d) include a summary of the complaints received during the past year, and compare this to the complaints received in previous years;
   (e) include a summary of the monitoring results for the development during the past year;
   (f) include an analysis of these monitoring results against the relevant:
      - impact assessment criteria;
      - monitoring results from previous years; and
      - predictions in the EIS;
   (g) identify any trends in the monitoring results over the life of the development;
   (h) identify any non-compliance during the previous year; and
   (i) describe what actions were, or are being, taken to ensure compliance.

INDEPENDENT ENVIRONMENTAL AUDIT

6. Within 2 years of the date of this consent, and every 3 years thereafter, unless the Director-General directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:
   (a) be conducted by a suitably qualified, experienced, and independent person whose appointment has been endorsed by the Director-General;
   (b) be consistent with *ISO 19011:2002 - Guidelines for Quality and/or Environmental Systems Auditing*, or updated versions of this guideline;
   (c) assess the environmental performance of the development, and its effects on the surrounding environment;

(d) assess whether the development is complying with the relevant standards, performance measures, and statutory requirements;
(e) review the adequacy of the Applicant's Environmental Management Strategy and Environmental Monitoring Program; and, if necessary,
(f) recommend measures or actions to improve the environmental performance of the development, and/or the environmental management and monitoring systems.

7. Within 3 months of commissioning this audit, or as otherwise agreed by the Director-General, the Applicant shall submit a copy of the audit report to the Director-General, with a response to the recommendations contained in the audit report.

COMMUNITY CONSULTATIVE COMMITTEE

8. Within six (6) months of the date this consent, the Applicant shall establish a Community Consultative Committee to oversee the environmental performance of the development. This committee shall:
   (a) be comprised of:
      - 2 representatives from the Applicant, including the person responsible for environmental management at the mine;
      - 1 representative from Council (if available); and
      - at least 2 representatives from the local community, including one representative for the Fig Tree Hill Land (if available),

      whose appointment has been approved by the Director-General in consultation with the Council;
   (b) be chaired by an independent chairperson, whose appointment has been endorsed by the Director-General;
   (c) meet at least twice a year, with the first meeting to be held within six months of the date of this consent; and
   (d) review and provide advice on the environmental performance of the development, including any construction or environmental management plans, monitoring results, audit reports, or complaints.
   (e) review any document submitted to the DEC in satisfaction of condition 5 of schedule 6 and provide submissions to the DEC.

9. The Applicant shall, at its own expense:
   (a) ensure that 2 of its representatives attend the Committee's meetings;
   (b) provide the Committee with regular information on the environmental performance and management of the development;
   (c) provide meeting facilities for the Committee;
   (d) arrange site inspections for the Committee, if necessary;
   (e) take minutes of the Committee's meetings;
   (f) make these minutes available to the public for inspection within 14 days of the Committee meeting, or as agreed to by the Committee;
   (g) respond to any advice or recommendations the Committee may have in relation to the environmental management or performance of the development;
   (h) forward a copy of the minutes of each Committee meeting, and any responses to the Committee's recommendations to the Director-General within a month of acceptance of the minutes by the Committee.

Note: The Applicant may implement the reporting and consultation requirements under Schedule 5 of this consent in an integrated manner with similar and corresponding requirements under the consent to DA-467-11-2003, to the satisfaction of the Director-General.

ACCESS TO INFORMATION

10. Within 1 month of the approval of any management plan/strategy or monitoring program required under this consent (or any subsequent revision of these management plans/strategies or monitoring programs), the completion of the independent audits required under this consent, or the completion of the AEMR, the Applicant shall:
    a) provide a copy of the relevant document/s to the relevant agencies and the CCC;
    b) ensure that a copy of the relevant documents is made publicly available at the Applicant's regional office; and
    c) put a copy of the relevant document/s on the Applicant's website (once established),

    to the satisfaction of the Director-General.

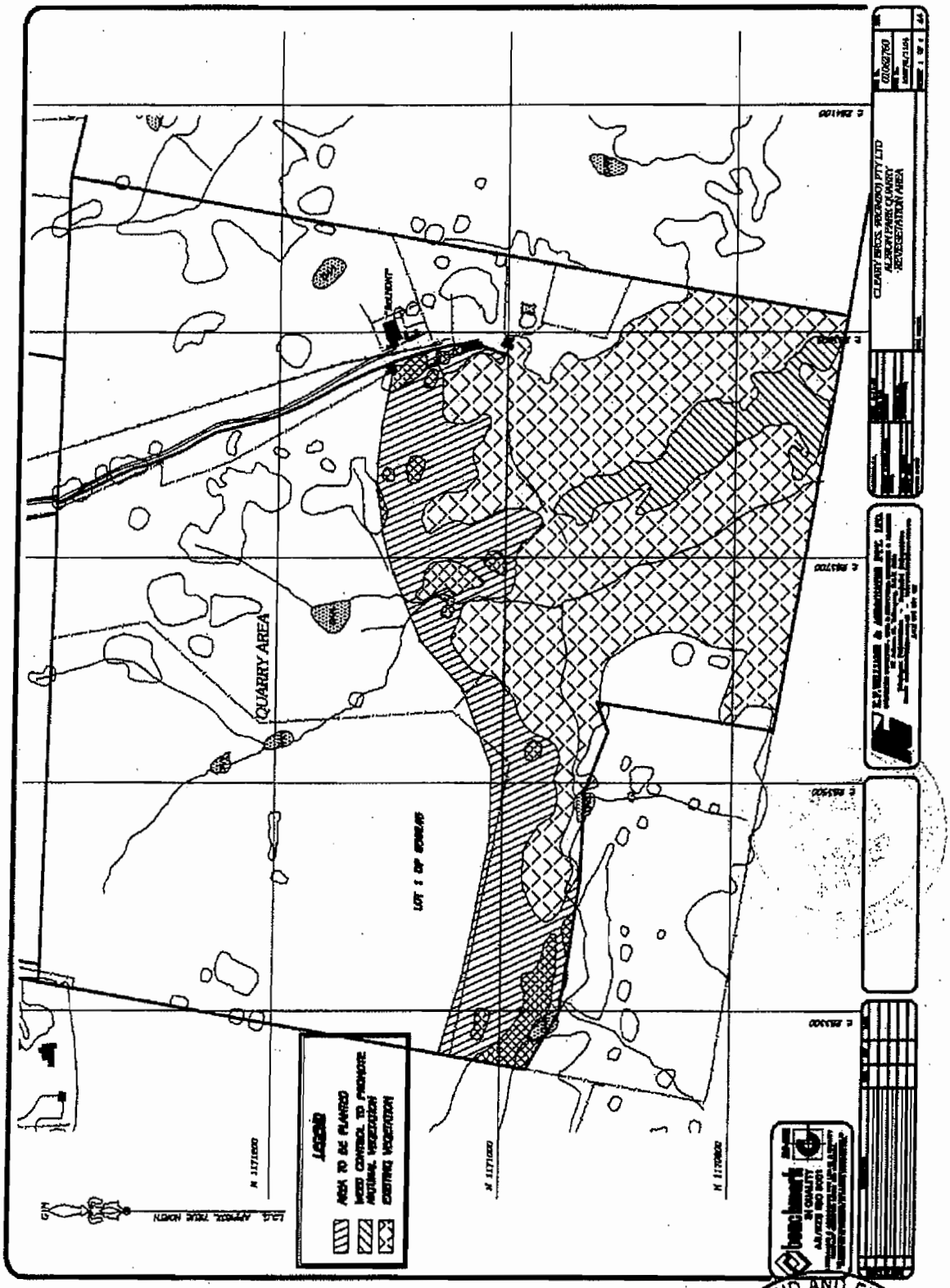
11. During the life of the development, the Applicant shall:
a) make a summary of the results of all monitoring required under this consent publicly available at the Applicant's regional office and on the Applicant's website; and
b) update these results on a regular basis (at least every 6 months),
to the satisfaction of the Director-General.

Note: The Applicant's environmental management plans/protocols should specify the reporting provisions for each environmental aspect.

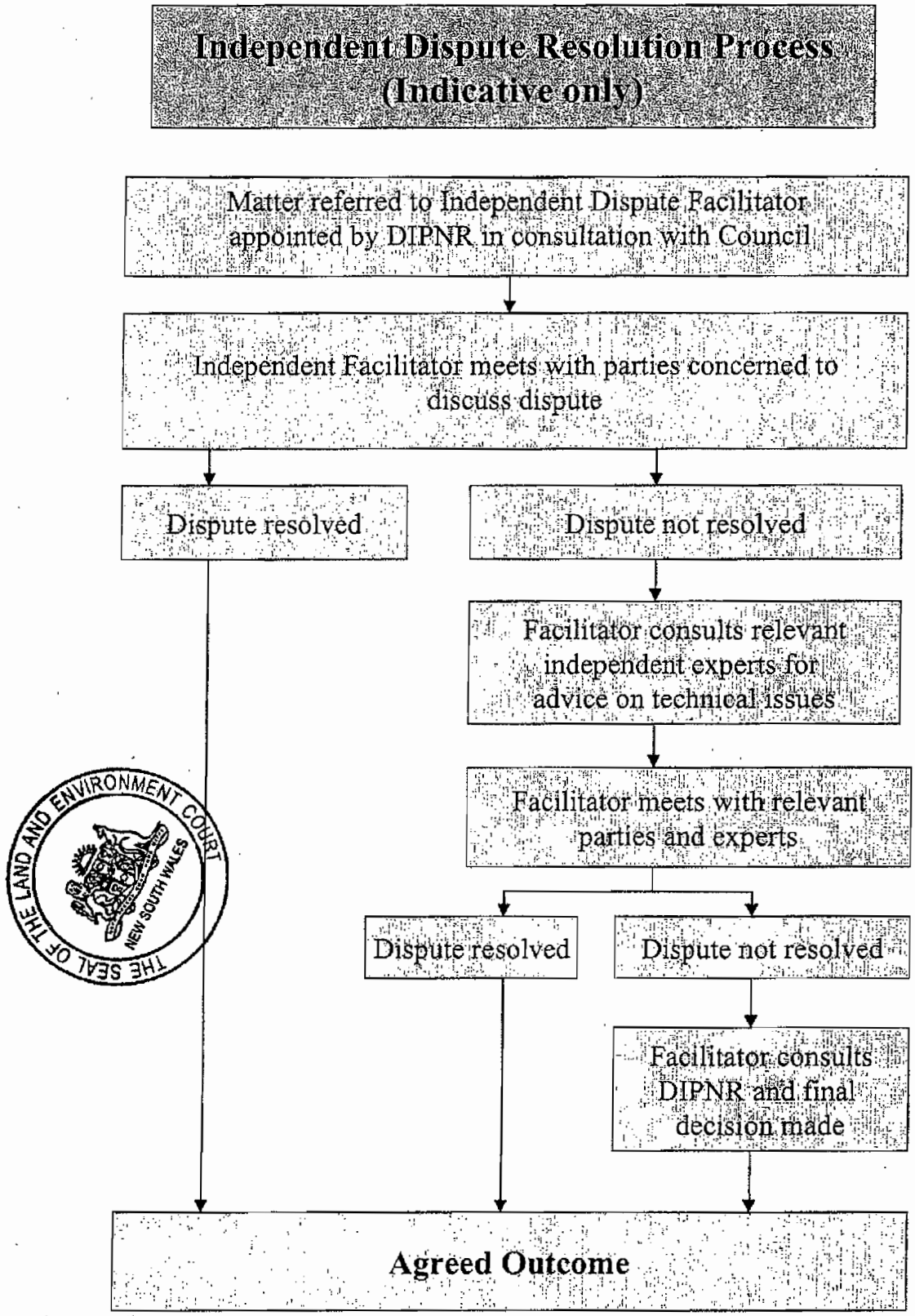
R R Hussey
Commissioner of the Court

G T Brown
Commissioner of the Court

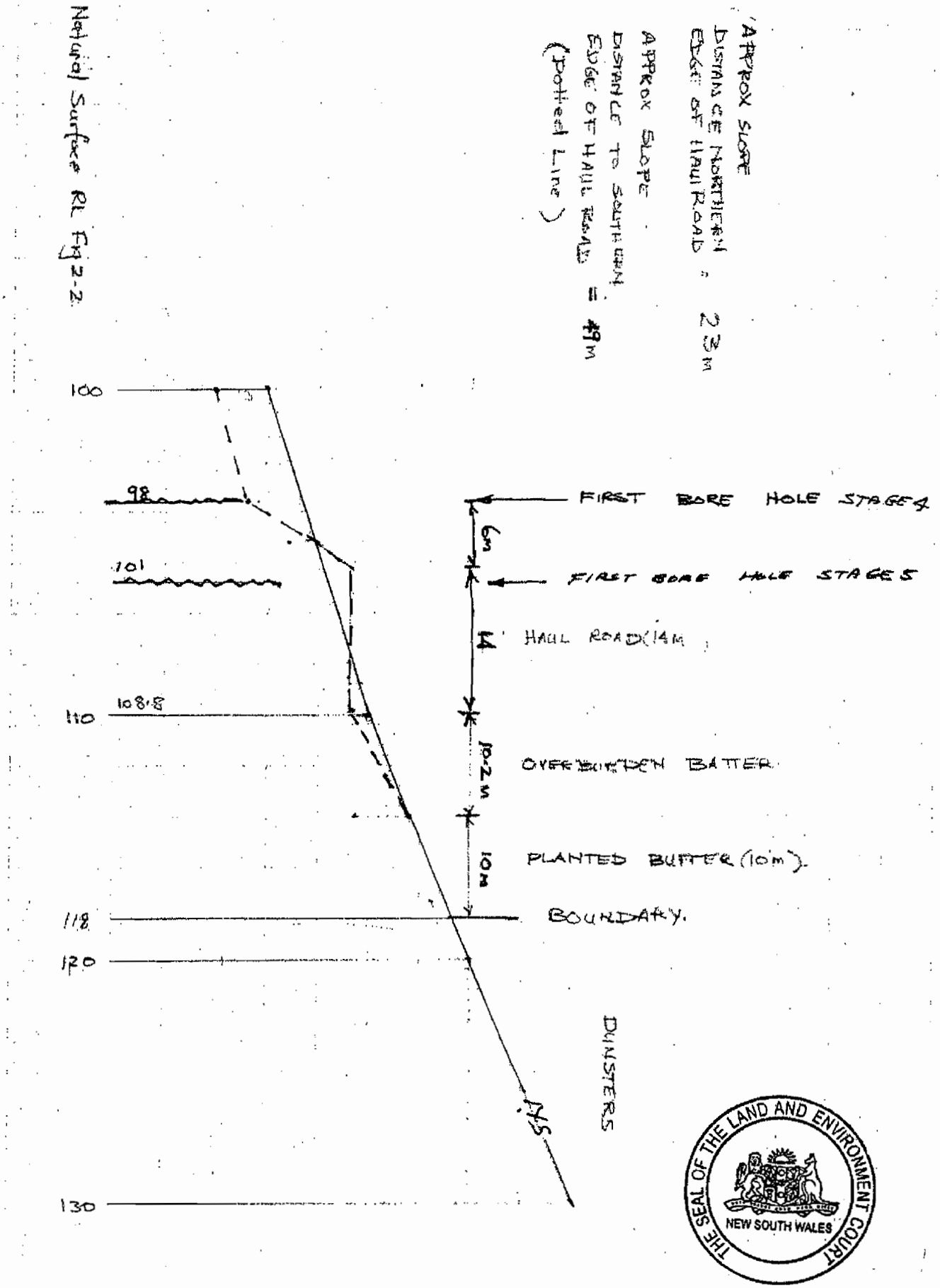
APPENDIX 1
REVEGETATION/REHABILITATION AREA



APPENDIX 2
INDEPENDENT DISPUTE RESOLUTION PROCESS



APPENDIX 3
LANDSCAPE BUND, HAUL ROAD AND BATTERS



CS1

Appendix B

ACCESS ROAD DEVELOPMENT CONSENT

All communication addressed to:
General Manager
Shellharbour City Council
PO Box 155, Shellharbour City Centre
NSW 2529

PHONE: 02 4221 6111
FAX: 02 4221 6016
DX 26402 Shellharbour City Centre
EMAIL: records@shellharbour.nsw.gov.au
WEB: www.shellharbour.nsw.gov.au

11 MAY 2007

FILE COPY

The Manager
Cleary Bros (Bombo) Pty Ltd
PO Box 210
PORT KEMBLA NSW 2505

NOTICE OF DETERMINATION OF A DEVELOPMENT APPLICATION
Issued under the Environmental Planning and Assessment Act 1979 Section 81 (1)(a)

Being the applicant of Development Application No. 614/2006 for consent to the following development:

CONSTRUCT QUARRY ACCESS & HAUL ROAD

LOTS: 1 & 2 DP: 858245
DUNSTERS LANE, CROOM

&

LOT: 23 DP: 1039967
PRINCES HIGHWAY, CROOM

BUILDING CODE OF AUSTRALIA
BUILDING CLASSIFICATION: Not Applicable

Determination date of consent 10 MAY 2007

In accordance with Section 80 of the Act the Development Application has been determined by the GRANTING OF CONSENT UNDER DELEGATED AUTHORITY SUBJECT TO THE CONDITIONS DESCRIBED BELOW.

CONSTRUCTION CERTIFICATE & PCA NOTIFICATION

1. **Before any site works, building, demolition or use is commenced,** the person having the benefit of the development consent must:

   a. obtain a construction certificate from Shellharbour City Council or an accredited certifier (S81A)

   b. appoint a principal certifying authority (S81A).

LEGISLATION

2. The development must be erected in strict conformity with the plans, specifications and conditions approved by Council and in compliance with the requirements of the Environmental Planning Instruments.

COMPLETION OF DEVELOPMENT

3. All conditions of consent must be complied with prior to the use of the access/haul road. The Principal Certifying Authority must issue a certificate verifying all conditions have been satisfied.

EASEMENTS

4. No part of any structure must encroach onto any easement.

ESTABLISHMENT OF RIGHT OF CARRIAGEWAY

5. The quarry access/haul road must be formalised to the satisfaction of Shellharbour City Council as a Right of Way whereby Lot 2, DP 858245 is burdened and Lot 1, DP 858245 and Lot 23, DP 1039967 are benefited by the development.

ERECTION OF SIGNS

6. The principal contractor and the Principal Certifying Authority will need to have a sign (or signs) erected and maintained on the development site that provides their name and contact telephone number (during and outside work hours for the principal contractor), and stating that unauthorised entry to the site is prohibited.

   The principal contractor and Principal Certifying Authority can have separate signs or they can both use one sign if they choose.

QUARRY ACCESS/HAUL ROAD REQUIREMENTS

Structural Details

7. Full engineering/construction details must be submitted to the Principal Certifying Authority prior to the commencement of any work.

ADMINISTRATIVE CONDITIONS

Obligation to Minimise Harm to the Environment

8. The applicant must implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation or rehabilitation of the development.

Scope of Development

9. The applicant must carry out the development generally in accordance with:

   a. DA No. 614/2006 and accompanying documentation

   b. Conditions of this consent.

10. If there is any inconsistency between the above, either the conditions of this consent or the most recent document shall prevail to the extent of the inconsistency.

11. The applicant must comply with any reasonable requirement/s of Shellharbour City Council arising from assessment of:

    a. any reports, plans or correspondence that are submitted in accordance with this consent, and

    b. the implementation of any actions or measures contained in these reports, plans or correspondence.

Period of Approval

12. The use of the land for quarry access and haul road shall cease 30 years after the date of the development consent for the Croom hard rock quarry approved by the Land and Environment Court in *Figtree Hill Pty Limited v Cleary Bros (Bombo) Pty Limited and the Minister for Infrastructure and Planning,* Proceedings No. 10639 of 2005, dated 21 February 2006, and thereafter, may only be used for a further 5 years for the purposes of rehabilitation.

Protection of Public Infrastructure

13. The applicant must:

    a. repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the development, and

    b. relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development.

Operation of Plant & Equipment

14. The applicant must ensure that all plant and equipment at the site, or used in connection with the development are:

    a. maintained in a proper and efficient condition, and

    b. operated in a proper and efficient manner.

ENVIRONMENTAL PERFORMANCE

Identification of Boundaries

15. Prior to the commencement of works, the applicant must:

    a. engage a registered surveyor to mark out the boundaries of the haul road corridor

    b. submit a survey plan of these boundaries to Shellharbour City Council, and

    c. ensure that these boundaries are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits.

Noise Limits

16. The applicant must ensure that noise generated by the development does not exceed the criteria specified in Table 1 of Development Application No. 466-11-2003 approved by the Land and Environment Court in *Figtree Hill Pty Limited v Cleary Bros (Bombo) Pty Limited and the Minister for Infrastructure and Planning*, Proceeding No. 10639 of 2005, dated 21 February 2006.

Operating Hours

17. The applicant must comply with the operating hours in Table 1.

Activity	Days of the Week	Time
Haulage of material from quarry to processing plant, all site construction activities, rehabilitation works, general plant and maintenance.	Monday – Friday	7.00am – 5.30pm
	Saturday	7.00am – 1.00pm

Table 1: Operating Hours for the Development

18. The following activities may be carried out at the premises outside the hours specified in Table 1:

    a. the delivery of materials as requested by Police or other authorities for safety reasons

    b. emergency work to avoid the loss of lives, property and/or to prevent environmental harm

    c. workshop activities and other maintenance work inaudible a the nearest affected receiver.

AIR QUALITY

Air Quality Criteria

19. The applicant must ensure that the air pollution generated by the development does not cause exceedances of the ambient air quality standards and goals listed in Tables 2, 3 & 4 at any sensitive receiver or residence on privately owned land.

Pollutant	Averaging Period	Criterion
Total suspended particulate (TSP) matter	Annual	90 $\mu g/m^3$
Particulate matter < 10pm (PM_{10})	Annual	30 $\mu g/m^3$

Table 2: Long Term Impact Assessment Criteria for Particulate Matter

Pollutant	Averaging Period	Criterion
Particulate matter < 10pm (PM_{10})	24 hour	50 $\mu g/m^3$

Table 3: Short Term Impact Assessment Criterion for Particulate Matter

Pollutant	Averaging Period	Maximum Increase In Deposited Dust Level	Maximum Total Deposited Dust Level
Deposited dust	Annual	2 g/m^2/month	4g/m^2/month

Table 4: Long Term Impact Assessment Criteria For Deposited Dust

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia 2003, AS 3580.10.1 – 1991:Methods for Sampling and Analysis of Ambient Air – Determination of Particulates – Deposited Matter – Gravimetric Method.

Management

20. The site must be maintained in a condition that minimises or prevents the emission of dust from the site, including the prompt and effective rehabilitation of all disturbed areas.

21. The haulage road and unsealed surfaces are to be watered as required to minimise dust generation impacting on the natural or built environment. Dust generating activity must cease in strong winds.

SURFACE & GROUND WATER

Pollution of Waters

22. Except as may be expressly provided by a Environment Protection Licence, the applicant must comply with Section 120 of the *Protection of the Environment Operations Act 1997* during the carrying out of the development.

Management

23. Within 12 months of the date of this consent and prior to the commencement of works, the applicant must prepare and subsequently implement an *Erosion & Sediment Control Plan* for the development, to the satisfaction of Shellharbour City Council. The plan must:

    a. be consistent with the requirements of the Department of Housing's 'Managing Urban Stormwater: Soils & Construction Manual'

    b. identify activities that could cause soil erosion and generate sediment

    c. describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters

    d. describe the location, function and capacity of erosion and sediment control structures, and

    e. describe what measures would be implemented to maintain the structures over time.

Reporting

24. Each year, the applicant must:

    a. review the *Erosion & Sediment Control Plan*

b. update the plan, and

c. report the results of this review in the Annual Environmental Management Report (AEMR) as required by DA 466-11-2003, including:

i. the results of any monitoring
ii. details of the review of the plan
iii. amendments to the plan, and
iv. details of the measures undertaken/proposed to address any identified issues.

FLORA & FAUNA

Vegetation Clearing Protocol

25. Prior to the commencement of works, the applicant must prepare and subsequently implement a Vegetation Clearing Protocol for the development in consultation with the Department of Environment & Conservation (NPWS) and to the satisfaction of Shellharbour City Council. This plan must:

a. delineate the areas of remnant vegetation to be cleared, and

b. describe the procedures that would be implemented for:

- pre-clearance surveys
- progressive clearing
- fauna management
- conserving and reusing topsoil
- collecting seed from the site
- salvaging and reusing materials from the site, and
- controlling weeds

Protection of Flora & Fauna

26. The route of the access road which has been designed, located and approved to minimise the removal of indigenous trees, must be strictly adhered to.

27. The stand of large Forest Red Gum trees near to the haul road route, as shown on Figure 2, Vegetation Map within the Flora & Fauna Assessment of the Statement of Environmental Effects by Perram & Partners, November 2006 112R3, must be fully protected by robust fencing, prior to the commencement of any construction of the haul road. The position of the fencing must be located and certified by a suitably qualified ecological and environmental consultant.

28. The two Fig Trees near to the haul road route must be retained and fully protected by robust barrier fencing prior to the commencement of any earthworks associated with the haul road construction. Earthworks must be carried out in a manner that protects the tree root systems and must be supervised and certified by a suitably qualified ecological and environmental consultant.

29. The area where the endangered vine *Cynanchum elegans* occurs must be protected against construction machinery by robust fencing prior to the commencement of any works on the haul road. The position of the fence must be determined and certified before construction commences by a suitably qualified ecological and environmental consultant.

30. The location of the regionally rare species *Alchorina ilicifolia* and *Abutilon oxycarpum* must be determined by a suitably qualified person and the area fenced if deemed necessary by a suitably qualified ecological and environmental consultant.

31. The exact location of specimens of *Geijera salicifolia* var. *latifolia* must be determined and illustrated on a map which must be submitted to Council prior to any works commencing. Individual plants to be removed must be clearly marked as such, whilst individual plants to be retained must also be clearly marked as such and fenced if deemed necessary. The position of the fencing is to be determined by a suitably qualified ecological and environmental consultant.

32. Throughout the entire project site, no fill is to be placed in such a way that it is against or around any tree, specifically the Forest Red Gum Woodland and the two Fig Trees.

33. Adequate sediment and erosion control must be put in place before construction and maintained throughout the project. Following completion of the project, suitable stabilisation and screening of exposed soil must be undertaken with locally indigenous species.

REHABILITATION

Rehabilitation Management Plan

34. Within six months of the date of this consent, the applicant must prepare and subsequently implement a *Rehabilitation Management Plan* for the site in consultation with Shellharbour City Council. This plan must:

    a. identify the disturbed area at the site

    b. describe in general the short, medium and long term measures that would be implemented to rehabilitate the site (including the decommissioning of the haul road the return to the natural ground levels a the expiration of the quarrying process)

    c. describe in detail the measures that would be implemented over the next five years to rehabilitate the site, and

    d. describe how the performance of these measures would be monitored over time.

Reporting

35. The applicant must include a progress report on the *Rehabilitation Management Plan* in the AEMR.

TRAFFIC & TRANSPORT

Site Access

36. All access to the quarry extension site (following construction of the haul road) is to be via the roundabout at East/West Link Road.

37. The applicant must not cause any heavy vehicle movements along Dunsters Lane, except in an emergency, as agreed by the Director/General of the Department of Planning in consultation with Shellharbour City Council.

Road Haulage

38. The applicant must ensure that all loaded vehicles entering or leaving the site are covered.

39. The applicant must ensure all loaded vehicles leaving the site are cleaned of materials that may fall on the road before they are allowed to leave the site.

HERITAGE

40. Within three months of the date of this consent and prior to the disturbance of any relic, the applicant must prepare and subsequently implement a *Heritage Management Plan* for the development, in consultation with NSW Heritage Office and to the satisfaction of Shellharbour City Council. The plan must include:

    a. archival recording of the 'Kyawana' property and other heritage elements affected by the development, in accordance with the *NSW Heritage Office Manual.*

    b. a plan for providing Council the opportunity to salvage any relic proposed to be destroyed by the development, including 'Kyawana'.

    c. should any indigenous archaeological material be located or disturbed during construction, measures to immediately mitigate any potential or proposed impacts on the heritage site. The plan must include options or alternatives to modification for especially sensitive or culturally significant sites.

    d. a procedure for obtaining permits under the *Heritage Act* prior to disturbance of any relic and permits under the *National Parks & Wildlife Act* prior to disturbance of any Aboriginal objects or archaeological remains located or identified during the haul road construction.

Reporting

41. The applicant must include a progress report on the *Heritage Management Plan* in the AEMR.

VISUAL IMPACT

Visual Amenity

42. The applicant must minimise the visual impacts of the development to the satisfaction of Shellharbour City Council.

43. The haul road batters and screen plantings must be designed and established in accordance with a landscape plan prepared in consultation with Shellharbour City Council. The landscape plan must be submitted with the Construction Certificate documentation and must be prepared by a suitably qualified landscape architect with heritage experience and must have regard to the cultural landscape of Wentworth Hills. The plant list within the Statement of Environmental Effects must be used for plant selection.

44. Following construction of any visual/noise bund, the applicant must undertake a review of its effectiveness with Shellharbour City Council and undertaken any improvements as required by Council.

45. Any bund on Lot 2, DP 858245 or Lot 23, DP 1039967 must be constructed in a manner to compliment the existing landscape. In this regard, the bund must be shaped and planted/seeded with grass and/or indigenous plants so that it blends with the existing hillside.

EMERGENCY & HAZARDS MANAGEMENT

Dangerous Goods

46. The applicant must ensure that the storage, handling and transport of dangerous goods is done in accordance with the relevant Australian Standards, particularly AS 1940 and AS 1596 and the *Dangerous Goods Code*.

Safety

47. The applicant must secure the development to ensure public safety to the satisfaction of the Principal Certifying Authority.

ENGINEERING

48. Detailed engineering plans of proposed road and associated drainage, prepared by an appropriately qualified engineer, must be submitted as part of the Construction Certificate application. The detailed plans must be to the satisfaction of the Principal Certifying Authority and must be certified by the design engineer that the pavement is adequate for the expected traffic loadings from a development of this size and type.

REASONS FOR THE IMPOSITION OF CONDITIONS

1. To minimise any possible adverse environmental impacts of the proposed development.

2. To ensure that the amenity and character of the surrounding area is protected.

3. To ensure that the design and siting of the development complies with the provisions of Environmental Planning Instruments and Council's Codes and Policies.

4. To ensure that the development does not conflict with the public interest.

SUPPLEMENTARY ADVICE

1. This development consent is subject to the prescribed conditions under Part 7 of the *Environmental Planning & Assessment Regulation 1998*.

2. Failure to comply with any of the conditions of consent may result in a Penalty Infringement Notice of $600 being issued against the owner/applicant/builder.

NOTES:

1. In accordance with Section 95 of *the Environmental Planning & Assessment Act 1979*, the development approval lapses five years after the approval date unless building, engineering or construction work relating to the building has physically commenced.

2. **Right of Appeal**

   If you are dissatisfied with this decision, Section 97 of the *Environmental Planning & Assessment Act 1979*, gives you the right to appeal to the Land & Environment Court within 12 months after the date on which you receive this notice.

   Section 97 of the *Environmental Planning & Assessment Act 1979* does not apply to the determination of a development application for state significant development or local designated development that has been the subject of a Commission of Inquiry.

3. **Review of determination**

If you are dissatisfied with this decision, Section 82A of the *Environmental Planning & Assessment Act, 1979*, provides that you may request Council to review its determination. The request cannot be made after the time limit for making of an appeal under Section 97 expires.

Section 82A of the *Environmental Planning & Assessment Act, 1979*, does not apply to:

a. a determination to issue or refuse to issue a complying development certificate

b. a determination in respect of designated development

c. a determination in respect of integrated development

d. a determination made by the Council under Section 116E in respect of an application made by the Crown.

4. The plans and/or conditions of this consent are binding and may only be varied upon **application** to Council under Section 96 of the *Environmental Planning & Assessment Act 1979*. The appropriate fee must accompany the application and no action shall be taken on the requested variation **unless and until** the **written** authorisation of Council is received by way of an amended consent.

5. **Prescribed Payment System Tax Obligations**

You may have a taxation obligation under the Prescribed Payment System. For more information, contact the Australian Taxation Office on telephone 132866.

6. **Erection of Signs**

A maximum penalty of 10 penalty units ($1,100) applies for failure to erect and maintain sign(s) detailing principal contractor and principal certifying authority identification.

7. **Critical Stage Inspections**

In the case of a Class 5, 6, 7, 8 or 9 building, the development site must be inspected:

i. at the commencement of the building work
ii. prior to covering any stormwater drainage connections
iii. after the building work has been completed and prior to any occupation certificate being issued in relation to the building

8. **Altered Position of Haul Road**

The altered position of the haul road for the Croom hard rock quarry consent granted by the Land and Environment Court: *Figtree Hill v Cleary Bros (Bombo) Pty Limited and the Minister for Infrastructure and Planning*, Proceedings No. 10639 of 2005, dated 21 February 2006 may need to be the subject of an application to vary consent.

Graham Mitchell
Manager Development Services

On behalf of Brian A Weir, General Manager

Appendix C

ENVIRONMENT PROTECTION LICENCE

Section 55 Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 299

Department of **Environment & Climate Change** NSW

Licence Details	
Number:	299
Anniversary Date:	30-September
Review Due Date:	11-Jul-2010

Licensee

CLEARY BROS (BOMBO) PTY LTD
PO BOX 210
PORT KEMBLA NSW 2505

Licence Type

Premises

Premises

CLEARY BROS (BOMBO) PTY LTD
LOT 3 PRINCES HIGHWAY
ALBION PARK RAIL NSW 2527

Scheduled Activity

Concrete Works
Extractive Industries
Mines

Fee Based Activity	**Scale**
Concrete Batching (30)	> 13000 - 25000 m3 produced
Hard-Rock Gravel Quarrying (36)	> 100000 - 500000 T obtained
Mining (Other than Coal) (64)	> 100000 - 500000 T obtained

Region

Metropolitan
Level 3, NSW Govt Offices, 84 Crown Street
WOLLONGONG NSW 2500
Phone: 02 4224 4100
Fax: 02 4224 4110

PO Box 513 WOLLONGONG EAST
NSW 2520

Environment Protection Licence

Licence - 299

Department of Environment & Climate Change NSW

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act); and
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

The EPA publication "A Guide to Licensing" contains information about how to calculate your licence fees.

The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

CLEARY BROS (BOMBO) PTY LTD
PO BOX 210
PORT KEMBLA NSW 2505

subject to the conditions which follow.

1 Administrative conditions

A1 What the licence authorises and regulates

A1.1 Not applicable.

A1.2 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity
Concrete Works
Extractive Industries
Mines

Fee Based Activity	Scale
Concrete Batching (30)	> 13000 - 25000 m3 produced
Hard-Rock Gravel Quarrying (36)	> 100000 - 500000 T obtained
Mining (Other than Coal) (64)	> 100000 - 500000 T obtained

A1.3 Not applicable.

A2 Premises to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
CLEARY BROS (BOMBO) PTY LTD
LOT 3 PRINCES HIGHWAY
ALBION PARK RAIL
NSW
2527
LOT 3 DP 858245, LOT 1 DP 359108, TEMPORARY ACCESS TO A PORTION (11540 SQ. METRES) OF LOT 2 DP 858245 AS SHOWN ON PLAN REF: KF106208 DATED: 25-6-04.

Premises Details

A3 Other activities

A3.1 Not applicable.

A4 Information supplied to the EPA

A4.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
(a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
(b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Discharges to air and water and applications to land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Description of Location
1	Dust deposition monitoring		APD 1 - approximately 200 metres west of the crushing and screening plant and labelled as APD1 on drawing No ESA PQ011 (Rev 1) titled "Water Pollution Control Plan" for Lic 299.
2	Dust deposition monitoring		APD 2 - approximately 100 metres east of quarry area and labelled as APD2 on drawing No ESA PQ011 (Rev 1) titled "Water Pollution Control Plan" for Lic 299.
3	Dust deposition monitoring		APD 3 - approximately 150m south east of main holding and sedimentation dam and and labelled as APD3 on drawing No ESA PQ011 (Rev 1) titled "Water Pollution Control Plan" for Lic 299.

P1.2 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

P1.3 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

Water and land

EPA identification no.	Type of monitoring point	Type of discharge point	Description of location
4	Effluent Quality Monitoring - Discharge to waters	Effluent Quality Monitoring - Discharge to waters	Outlet of main holding and sedimentation pond and labelled as 'sampling DP1' on drawing No ESA PQ011 (Rev 1) titled "Water Pollution Control Plan" for Lic 299.
5	Effluent Quality Monitoring - Discharge to waters	Effluent Quality Monitoring - Discharge to waters	See drawing No ESA PQ011 (Rev 1) titled "Water Pollution Control Plan" for Lic 299.

3 Limit conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Load limits

L2.1 Not applicable.

L2.2 Not applicable.

L3 Concentration limits

L3.1 For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L3.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L3.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

Water and Land

POINT 4

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile Concentration Limit
Total suspended solids	milligrams per litre				50

POINT 5

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile Concentration Limit
Oil and Grease	milligrams per litre				30
Total suspended solids	milligrams per litre				50
Biochemical oxygen demand	milligrams per litre				150

L4 Volume and mass limits

L4.1 Not applicable.

L5 Waste

L5.1 Not applicable.

L6 Noise Limits

L6.1 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not:
(a) Exceed 5mm/sec for more than five per cent of the total number of blasts carried out on the premises within the 12 months annual reporting period.

L6.2 The overpressure level from blasting operations on the premises must not:
(a) Exceed 115dB(L) for more than five per cent of the total number of blasts carried out on the premises within the 12 months annual reporting period.

The airblast overpressure values stated above apply when the measurements are performed with equipment having a lower cut-off frequency of 2Hz or less. If the instrumentation has a higher cut-off frequency then a correction of 5dB should be added to the measure value. Equipment with a lower cut-off frequency exceeding 10Hz should not be used for the purpose of measuring airblast overpressure.

L6.3 Blasting operations at the premises may only take place between 8:30am – 5:00pm Monday to Friday. Where compelling safety reasons exist, the Authority may permit a blast to occur outside the abovementioned hours. Prior written (or facsimile) notification of any such blast must be made to the Authority.

4 Operating conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.

This includes:
(a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
(b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
(a) must be maintained in a proper and efficient condition; and
(b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust.

O4 Effluent Re-use

O4.1 The quantity of effluent/solids applied to the utilisation area must not exceed the capacity of the area to effectively utilise the effluent/solids.

For the purpose of this condition, 'effectively utilise' includes the use of the effluent/solids for pasture or crop production, as well as the ability of the soil to absorb the nutrient, salt, hydraulic load and organic material. If weather or soil condition preclude irrigation, the holding tanks must not overflow and effluent must be tankered away and disposed of in a manner which does not pollute waters.

O4.2 A minimum of 2500 square metres must be retained for use as the wastewater utilisation area.

5 Monitoring and recording conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:

(a) in a legible form, or in a form that can readily be reduced to a legible form;
(b) kept for at least 4 years after the monitoring or event to which they relate took place; and
(c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
(a) the date(s) on which the sample was taken;
(b) the time(s) at which the sample was collected;
(c) the point at which the sample was taken; and
(d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Ash	grams per square metre per month	Monthly	Australian Standard 3580.10.1-1991
Insoluble solids	grams per square metre per month	Monthly	Australian Standard 3580.10.1-1991

POINT 2

Pollutant	Units of measure	Frequency	Sampling Method
Ash	grams per square metre per month	Monthly	Australian Standard 3580.10.1-1991
Insoluble solids	grams per square metre per month	Monthly	Australian Standard 3580.10.1-1991

POINT 3

Pollutant	Units of measure	Frequency	Sampling Method
Ash	grams per square metre per month	Monthly	Australian Standard 3580.10.1-1991
Insoluble solids	grams per square metre per month	Monthly	Australian Standard 3580.10.1-1991

POINT 4

Pollutant	Units of measure	Frequency	Sampling Method
Total suspended solids	milligrams per litre	Each overflow event	Grab sample

POINT 5

Pollutant	Units of measure	Frequency	Sampling Method
Biochemical oxygen demand	milligrams per litre	Quarterly	Grab sample
Oil and Grease	milligrams per litre	Quarterly	Grab sample
Total suspended solids	milligrams per litre	Quarterly	Grab sample

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:

(a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or

(b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or

(c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The Protection of the Environment Operations (Clean Air) Regulation 2002 requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M4 Recording of pollution complaints

M4.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M4.2 The record must include details of the following:

(a) the date and time of the complaint;
(b) the method by which the complaint was made;
(c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
(d) the nature of the complaint;
(e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
(f) if no action was taken by the licensee, the reasons why no action was taken.

M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

M5.1 The licensee must operate during its operating hours a telephone complaints line for the purpose

of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M5.3 Conditions M5.1 and M5.2 do not apply until 3 months after:
(a) the date of the issue of this licence or
(b) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.

M6 Requirement to monitor volume or mass

M6.1 Not applicable.

M7 Requirement to monitor blasting

M7.1 Each production blast must be monitored and recorded at the permanent station established near the Dunster residence.

M7.2 To determine compliance with Conditions L6.1 and L6.2:
(a) Airblast overpressure and ground vibration levels must be measured for all production blasts carried out in or on the premises; and
(b) The written record must include:
(i) the time and date of each blast;
(ii) the station(s) at which the noise was measured;
(iii) the ground vibration for each blast;
(iv) the airblast overpressure for each blast;
(v) evidence that during the past 12 month period, a calibration check had been carried out on each blast monitor to ensure accuracy of the reported data; and
(vi) the waveform for the ground vibration and overpressure for each blast that exceeds a ground vibration of 5mm/sec (peak particle velocity) or an airblast overpressure of 115dB(L).
(c) Instrumentation used to measure the airblast overpressure and ground vibration levels must meet the requirements of Australian Standard 2187.2 of 1993.

6 Reporting conditions

R1 Annual return documents

What documents must an Annual Return contain?

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
(a) a Statement of Compliance; and
(b) a Monitoring and Complaints Summary.
A copy of the form in which the Annual Return must be supplied to the EPA accompanies this licence. Before the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

Period covered by Annual Return

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:
(a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
(b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
(a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
(b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

Deadline for Annual Return

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

Notification where actual load can not be calculated

R1.6 Not applicable.

Licensee must retain copy of Annual Return

R1.7 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

Certifying of Statement of Compliance and signing of Monitoring and Complaints Summary

R1.8 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:

(a) the licence holder; or
(b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R1.9 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

R2 Notification of environmental harm

Note: The licensee or its employees must notify the EPA of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R2.1 Notifications must be made by telephoning the EPA's Pollution Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
(a) where this licence applies to premises, an event has occurred at the premises; or
(b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
(a) the cause, time and duration of the event;
(b) the type, volume and concentration of every pollutant discharged as a result of the event;
(c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
(d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
(e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
(f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
(g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it

is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Reporting of blasting monitoring

R4.1 The results of the blast monitoring required by Condition M7.2 must be submitted to the EPA on a weekly basis.

General conditions

G1 Copy of licence kept at the premises

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

Pollution studies and reduction programs

U1.1 Not applicable.

Special conditions

E1 Not applicable.

Dictionary

General Dictionary

In this licence, unless the contrary is indicated, the terms below have the following meanings:

3DGM [in relation to a concentration	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or

limit]	more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 1998.
flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
industrial waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
inert waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
reprocessing of waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
treatment of waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements

utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste code	Means the waste codes listed in Appendix 5 of the EPA document A Guide to Licensing Part B.
waste type	Means Group A, Group B, Group C, inert, solid, industrial or hazardous waste

Mr Nigel Sargent

Environment Protection Authority

(By Delegation)

Date of this edition - 16-Mar-2006

End Notes

1	Licence varied by notice 1003792, issued on 17-Jul-2002, which came into effect on 11-Aug-2002.
2	Licence varied by notice 1038336, issued on 30-Jun-2004, which came into effect on 05-Jul-2004.
3	Licence varied by change to DEC Region allocation, issued on 16-Mar-2006, which came into effect on 16-Mar-2006.

Appendix D

CONSIDERATION OF DESIGNATED DEVELOPMENT PROVISIONS

APPENDIX D: CONSIDERATION OF DESIGNATED DEVELOPMENT PROVISIONS

Part 2 of Schedule 3 of the EP&A Regulation, entitled *Are alterations or additions designated development?* sets down matters for consideration by a consent authority when determining whether proposed alterations or additions are designated development.

Guidance for interpreting the requirements of Part 2 are included in the Department of Planning publication *Is an EIS Required for Alterations and Additions* (March 2000)

This appendix addresses the matters for consideration in Part 2, providing a response to each of the factors listed.

Clause 1

Clause 1 of Part 2 defines the basis for consent authority to determine whether alterations or additions are designated development:

> *Development involving alterations or additions to development (whether existing or approved) is not designated development if, in the opinion of the consent authority, the alterations or additions do not significantly increase the environmental impacts of the total development (that is the development together with the additions or alterations) compared with the existing or approved development.*

The proposed modification will not create any alteration to the physical aspects of the quarry. Such issues of flora and fauna, Aboriginal heritage, visual impact and water quality will be unchanged. Monthly production will remain within the previously established tonnage range. The change that would occur with the modification is a change in average monthly production leading to increased annual production. Operational impacts of the tonnage increase have been assessed and it has been concluded there will be no significant increase in these factors. Hence it may be concluded that there will be no significant increase in environmental impacts of the total development.

Clause 2

Clause 2 sets down factors to be taken into consideration by the consent authority when forming its opinion. Each listed factor is reproduced below with a comment as to its application to this proposal:

(a) the impact of the existing development having regard to factors including:

(i) previous environmental management performance including compliance with:

- *conditions of any consents, licences, leases or authorisations by a public authority; and*
- *any relevant codes of practice; and*

Cleary Bros has extracted and processed rock from the area for some 50 years. The current extraction site was granted development consent in 2006 and has now been developed to the point where normal operations will soon be able to commence. It is anticipated that certification that Cleary Bros has complied with all conditions of consent prior to the commencement of operations pursuant to condition 13 of Schedule 3 of the consent will be forwarded to the Department of Planning in the near future.

Cleary Bros operates under an Environmental management System compliant with AS/NZS/ISO 14001.

Historically the company's quarrying activities at Albion Park have operated within the consents and licences issued by Shellharbour Council and the DECC with few incidents.

(ii) rehabilitation or restoration of any disturbed land; and

At the time of this application, preparatory works have commenced on the land approved for quarrying, but production operations have not commenced. For this reason there is not at the present time any section of the quarry where extraction is complete, releasing the land for rehabilitation. Cleary Bros has commenced restoration work on land disturbed by construction works associated with developing the site in readiness for quarry production.

(iii) the number and nature of all past changes and their cumulative effects; and

Work has commenced in accordance with the development consent issued by the Land and Environment Court in February 2006. That consent has not been modified to the present time. Cleary Bros has not acted upon a second development consent for an associated haul road issued by the Minister in May 2005. The company has received another development consent from Shellharbour Council in May 2007 for an alternative quarry access and has acted upon this consent.

Previous development consents issued to Cleary Bros have permitted quarrying of the company's lands at Albion Park, resulting in a number of former quarry sites being evident in aerial photographs. The cumulative effect of quarrying on the locality was taken into account in the application for the quarry extension subsequently approved by the Court.

(b) the likely impact of the proposed alterations or additions having regard to factors including:

(i) the scale character or nature of the proposal in relation to the development; and

The proposal involves no physical change to the quarry, processing plant or haul road or the nature of activities carried out. There will be a change in the average duration of quarrying and transport activities carried out within the approved hours of operation. The change will be an average as the quantity of material produced in a previous peak month is not expected to be exceeded.

Therefore the scale and character of development on the site will not significantly alter.

(ii) the existing vegetation, air, noise and water quality, scenic character and special features of the land on which the development is to be carried out and the surrounding locality; and

Increasing the annual production limit of the quarry will not alter the footprint of quarrying activities. It will therefore have no significant impact on vegetation, water quality, scenic character or the special features of the land and locality.

Potential air quality and noise impacts have been assessed in section 3 where it is concluded that the modification will not significantly increase the impact of the approved quarry.

(iii) the degree to which the potential environmental impacts can be predicted with adequate certainty; and

The potential environmental impacts in relation to air quality and noise have been predicted with modelling, as was done for the original EIS. The development consent for the quarry specifies noise and air quality limits which the modelling has predicted will be met should the tonnage limit increase as proposed. Traffic impacts have been considered noting that the peak traffic levels previously assessed are still applicable for the modification and the conclusions of the traffic study are still relevant.

(iv) the capacity of the receiving environment to accommodate changes in environmental impacts; and

The receiving environment and in particular the residents in the vicinity of the quarry will not be imposed upon or required to accommodate any significant additional impacts as a result of the proposed modification. The modification is expected to result in the life of quarrying on this site being reduced.

(c) any proposals:

(i) to mitigate the environmental impacts and manage any residual risk; and

All of the measures included in the Quarry Environmental Management Plan to mitigate environmental impacts and manage residual risk will continue to be implemented should the proposed modification be approved. The only alteration in the QEMP will be to the annual production limit.

(ii) to facilitate compliance with relevant standards, codes of practice or guidelines published by the Department of Planning or other public authorities.

The quarrying operation will continue to comply with conditions of the DECC licence issued for the facility.

Appendix E

AIR QUALITY ASSESSMENT

HEGGIES

REPORT 10-7319-R1

Revision 0

Albion Park Quarry
Proposed Expanded Operations
Air Quality Impact Assessment

PREPARED FOR

Perram and Partners Pty Ltd
12 Clanwilliam Street
EASTWOOD NSW 2122

29 OCTOBER 2008

HEGGIES PTY LTD
ABN 29 001 584 612

Incorporating New Environment Graeme E. Harding & Associates Eric Taylor Acoustics

Albion Park Quarry
Proposed Expanded Operations
Air Quality Impact Assessment

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
10-7319-R1	Revision 0	29 October 2008	Scott Fishwick	Ronan Kellaghan	Ronan Kellaghan

EXECUTIVE SUMMARY

Heggies Pty Ltd have been commissioned by Perram and Partners Pty Ltd to conduct an Air Quality Impact Assessment of the expansion of the Cleary Bros (Bombo) Pty Ltd operated Albion Park hard Rock Quarry. Of particular interest is the resultant impact on air quality that may be associated with the increasing of annual extraction at this quarry expansion area, from the currently approved 400,000 tpa, to 800,000 tpa. Heggies Pty Ltd have historically conducted air quality impact assessments for this quarry expansion project.

Atmospheric dispersion modelling was carried out to determine the potential impact, in terms of air quality, of worst case extractive activities for the project. Worst case operations were deemed to occur during the operation of Stage 5 of the project, due to proximity to the nearest receptors and the findings of previous Heggies reports.

The existing air quality environment was quantified through a combination of monitoring data from both the Project Site and a regional station maintained by the NSW Department of Environment and Climate Change. Data from the on-site meteorological station was used to represent the local atmospheric dispersion conditions.

The results of the modelling indicate that the predicted incremental dust deposition and 24-hour and annual average PM_{10} concentrations would not exceeded the air quality goals at any of the surrounding non-project related receptor locations. Additionally, the relevant air quality goals were not exceeded when the local background data was applied.

Based on the worse-case modelling approach taken within this assessment, it is concluded that dust and particulate impacts during operations at the Albion Park Quarry expansion at 800,000 tpa would not likely cause exceedances of the relevant air quality criteria.

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1 INTRODUCTION

Cleary Bros (Bombo) Pty Ltd (the Proponent) have gained approval to expand their current operations at the company's Albion Park hard rock quarry by accessing an additional reserve to the quarry's south.

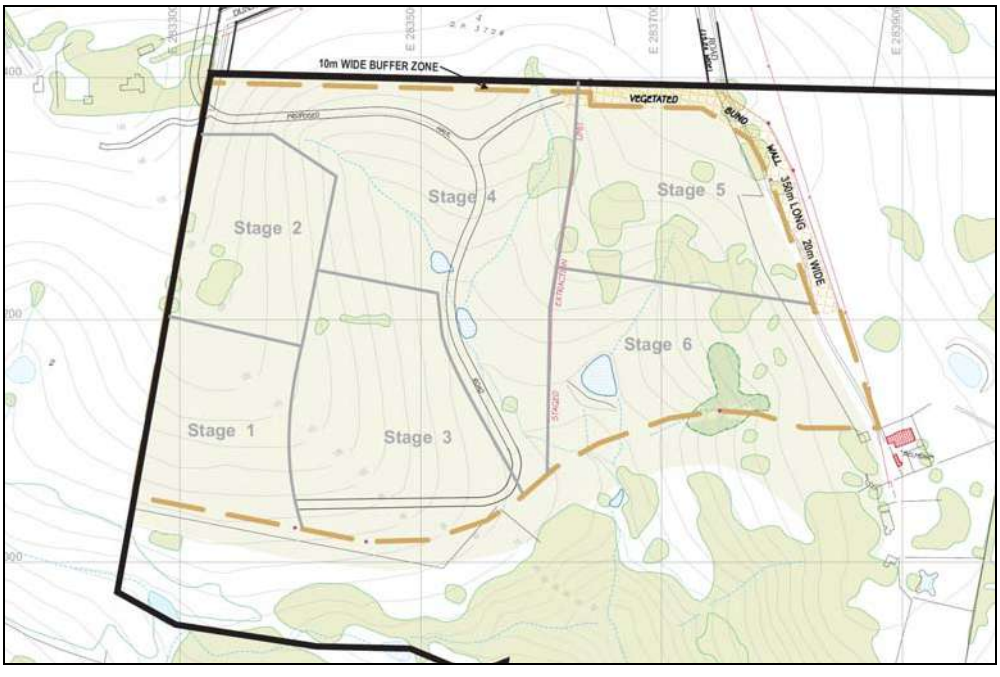
Heggies Pty Ltd (Heggies) were commissioned in 2002 by Perram and Partners Pty Ltd (P&P) to complete the air quality impact assessment of the proposed expansion (Heggies Report 10-1676-R1, dated 23 October 2002) as part of the Environmental Impact Assessment. As part of the assessment, Heggies conducted atmospheric dispersion modelling based on an annual extraction rate of 400,000 t. Results of the dispersion modelling indicated that all relevant air quality assessment goals would be satisfied for the life of the operation. Approval for the expansion of the Proponent's Albion Park hard rock quarry with a maximum annual extraction limit of 400,000 t was granted by the NSW Land and Environment Court in February 2006.

Heggies were commissioned in 2004 by P&P to conduct an additional dispersion modelling investigation (Heggies Report 10-1676-R2, dated 31 May 2004) to determine the air quality impact of increasing the annual extraction rate of the quarry expansion to 500,000 t. Results of the dispersion modelling indicated that, while maximum incremental concentrations were predicted to increase, all relevant air quality assessment goals would be satisfied with the annual extraction increased to 500,000 t.

Heggies have again been commissioned by P&P to conduct additional atmospheric dispersion modelling for the expansion of the Albion Park hard rock quarry, which is the focus of this report. The Proponent wants to determine the level of air quality impact associated with increasing the annual extraction rate to 800,000 t. Using resources not available at the time of the previous two Heggies reports, including site-specific meteorological and air quality monitoring data, the potential air quality impact of increasing operations at the quarry expansion area to 800,000 tpa on the local air shed and surrounding non-project related receptors will be assessed.

Figure 1 illustrates the proposed layout of the six-stage, 30-year operations of the Albion Park Quarry Extension,

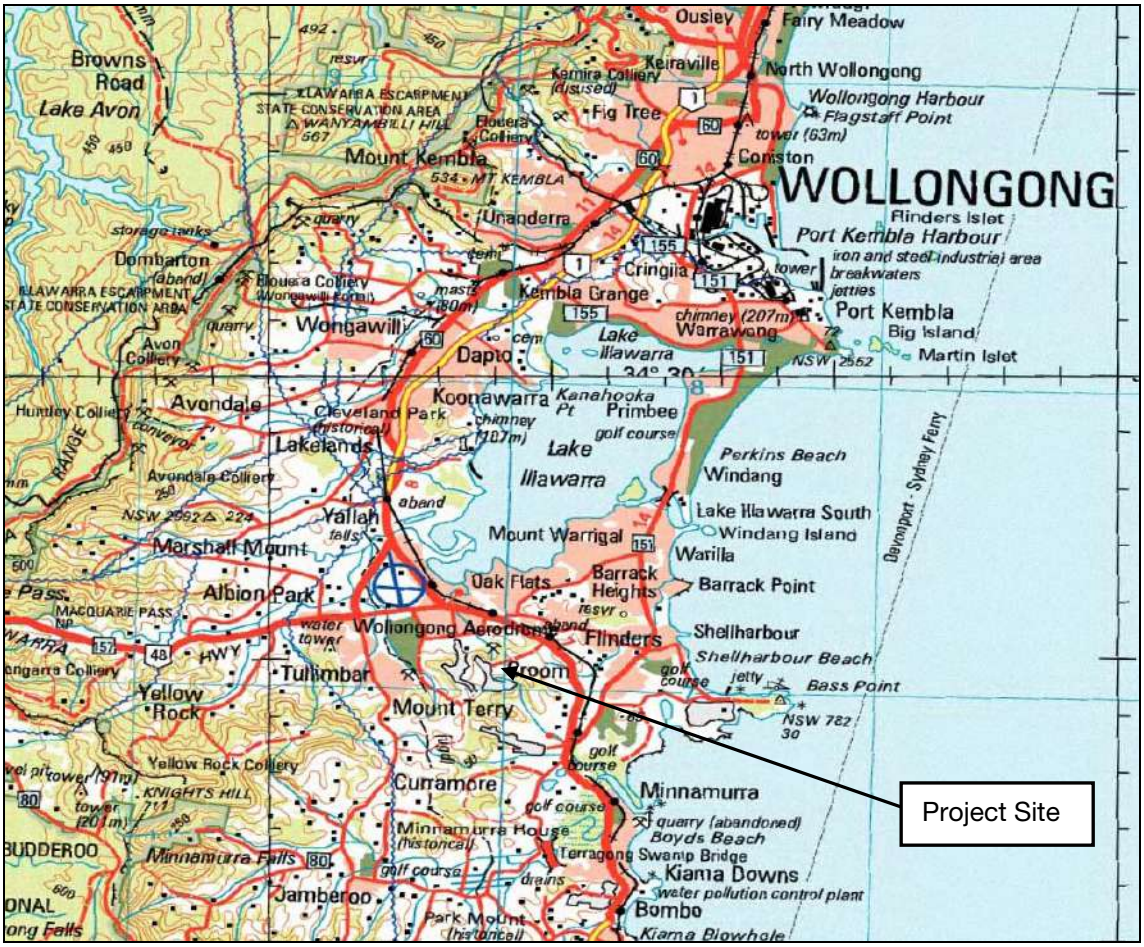
Figure 1 Layout of Albion Park Quarry Extension



2 PROJECT SETTING

The Proponent's Albion Park Quarry extension site (the Project Site) is situated approximately 20 km south-southwest of the central business district of Wollongong on the New South Wales south coast. **Figure 2** illustrates the regional setting of the Project Site.

Figure 2 Regional Setting of Project Site



Map Source: Geoscience Australia, 2008

The Project Site is currently a "greenfield" site, with historic use relating to dairy cattle farming. Surrounding land use is a mixture of quarrying operations, some of which are owned and operated by the Proponent, and rural residential holdings and associated agricultural activities. **Figure 3** shows the current land use and terrain of the Project Site, viewed from the northwest corner.

Figure 3 View of Project Site from Northwest Corner.

2.1 Sensitive Receptors

A number of non-project related residential dwellings are situated in the area surrounding the Project Site. The nearest dwellings were identified as sensitive receptor locations to be taken into account during the assessment of potential air quality impacts due to the expanded operations.

A list of existing sensitive receptor points (R1 to R6) identified in the immediate vicinity of the Project Site, and respective distances of such receptor points to the site boundary are listed in **Table 1**. **Figure 4** illustrates the location of the surrounding receptors in relation to the Project Site.

It is understood that the receptor location R3 is a location for an approved future residence. In accordance with the NSW Department of Environment and Climate Change (DECC) 2005 document, the "*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*" (the Approved Methods), this future location has also been included in this assessment.

Table 1 Surrounding Sensitive Receptor Locations

Receptor ID	Receptor Name	Location (m, ISG)		Distance (m) / Direction From Site Boundary	Elevation (m, AHD)
		Easting	Northing		
R1	"The Cottage"	368240	6394059	330 / NE	140
R2	"The Hill"	368210	6393741	440 / NE	140
R3	Approved Property	368892	6393790	520 / ENE	110
R4	"St Ives Farm"	369606	6393776	1020/ E	60
R5	"Deer Farm"	369421	6393895	970 / E	70
R6	"Kurrawong"	369306	6394140	1180 / SE	50

2.2 Local Topography

The Project Site and surrounding residences are located in undulating terrain. A ridgeline is located to the due north, running between the processing area of the Albion Park Quarry and the Project Site.

The Project Site is located at an approximate elevation of between approximately 80 and 135 m AHD, on land that increases from the southeast to northwest (as shown in **Figure 3**). The majority of sensitive receptor locations (see **Table 1**), with the exception of R1 and R2, are located at an elevation at or below that of the Project Site.

A three dimensional representation of the topographical features described above is presented in **Figure 5**.

Figure 4 Sensitive Receptor Locations

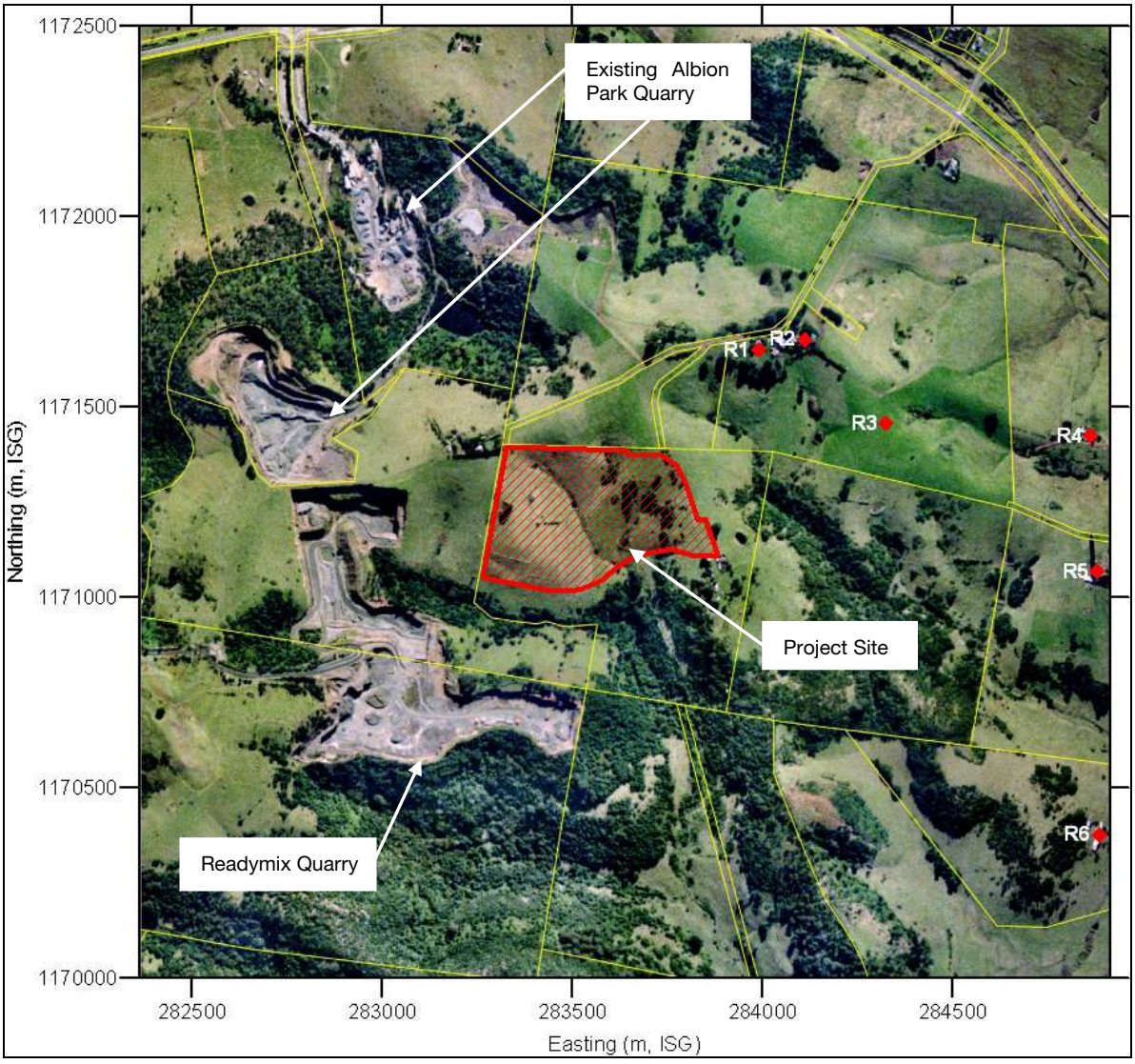
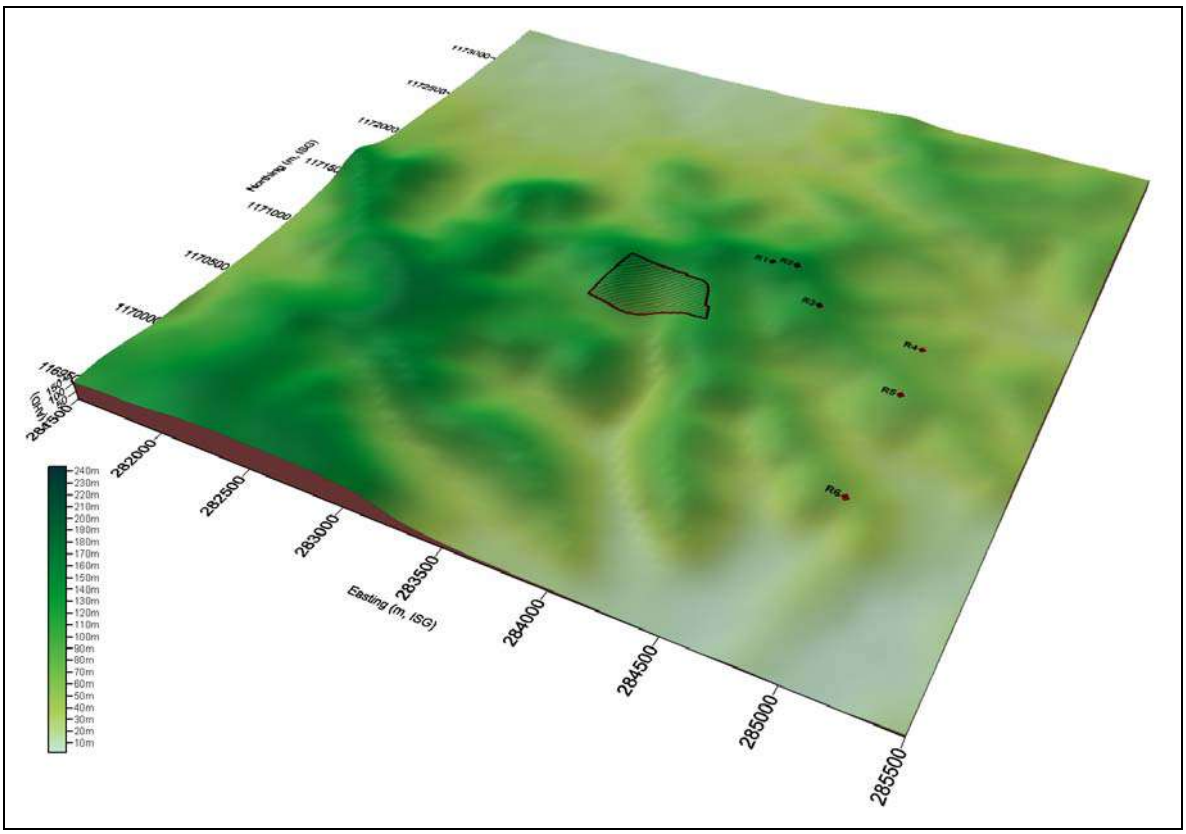


Figure 5 3-Dimensional Local Topography Surrounding Project Site



Note: Topography shown with vertical exaggeration of 1

2.3 Surrounding Quarrying Operations

As previously discussed, a number of quarrying operations exist in the region surrounding the Project Site. Of the operations currently owned by the Proponent, the existing components of the Albion Park Quarry are located approximately 500 m to the northwest (primary processing area) and 400 m to the west (current quarrying area) of the Project Site.

Additionally, Readymix operates a sand and gravel quarry which has extractive activities to the western boundary of the Project Site, while Boral operates a hard rock quarry approximately 1.9 km to the south.

All of these surrounding extractive industries generate similar emissions to air as those likely to be associated with the Project Site. The locations of the existing quarrying operations directly adjacent to the Project Site are highlighted in **Figure 4**.

3 AIR QUALITY CRITERIA

3.1 Results of Previous Assessments

As previously stated, Heggies have historically been commissioned to conduct air quality impact assessments for proposed operations at the Project Site for lower annual extraction rates, specifically 400,000 tpa and 500,000 tpa (Heggies Reports 10-1676R1 and 10-1676R2 respectively).

The results of these assessments indicated that the key pollutants for determining compliance with relevant air quality criteria were particulate matter and fugitive dust deposition. While emissions of pollutants associated with the combustion of diesel fuel, including nitrogen dioxide, sulphur dioxide, carbon monoxide, and air toxics, could be expected to be generated by proposed operations at the Project Site, these emissions are unlikely to compromise air quality goals at the closest receptors, given the nature and scale of the operation.

3.2 Criteria Applicable to Particulate Matter

The term *"particulate matter"* refers to a category of airborne particles typically less than 50 microns (µm) in diameter and ranging down to 0.1 µm in size. Particles less than 10 µm is referred to in this report as PM_{10}.

Emissions of PM_{10} are considered important pollutants in terms of impact due to their ability to penetrate into the respiratory system. Potential adverse health impacts associated with exposure to PM_{10} include increased mortality from cardiovascular and respiratory diseases, chronic obstructive pulmonary disease and heart disease, and reduced lung capacity in asthmatic children.

The NSW DECC PM_{10} impact assessment criteria, as expressed in the Approved Methods, are presented in **Table 2**.

Table 2 DECC Goals for PM_{10} – 24-hour and Annual

Averaging Period	Maximum Concentration
24-hour	50 µg/m^3
Annual	30 µg/m^3

Source: Approved Methods, DECC 2005

The 24-hour PM_{10} reporting standard of 50 µg/m^3 is numerically identical to the equivalent National Environment Protection Measure (NEPM) reporting standard except that the NEPM reporting standard allows for five exceedances per year. These NEPM goals were developed by the National Environmental Protection Council (NEPC) in 1998 to be achieved within 10 years of commencement.

3.3 Nuisance Impacts of Fugitive Emissions

The preceding sections are concerned in large part with the health impacts of particulate matter. Nuisance impacts need also to be considered, mainly in relation to dust. In NSW, accepted practice regarding the nuisance impact of dust is that dust-related nuisance can be expected to impact on residential areas when annual average dust deposition levels exceed 4 g/m^2/month.

Table 3 presents the DECC impact assessment goals for dust fallout, showing the allowable increase in dust deposition level over the ambient (background) level which would be acceptable so that dust nuisance could be avoided.

Table 3 DEC Goals for Allowable Dust Deposition

Averaging Period	Maximum Increase in Deposited Dust Level	Maximum Total Deposited Dust Level
Annual	2g/m^2/month	4g/m^2/month

Source: Approved Methods, DECC 2005.

3.4 Project Air Quality Goals

In view of the foregoing, the air quality goals adopted for this assessment, which conform to current DECC air quality criteria, are summarised in **Table 4**.

Table 4 Project Air Quality Goals

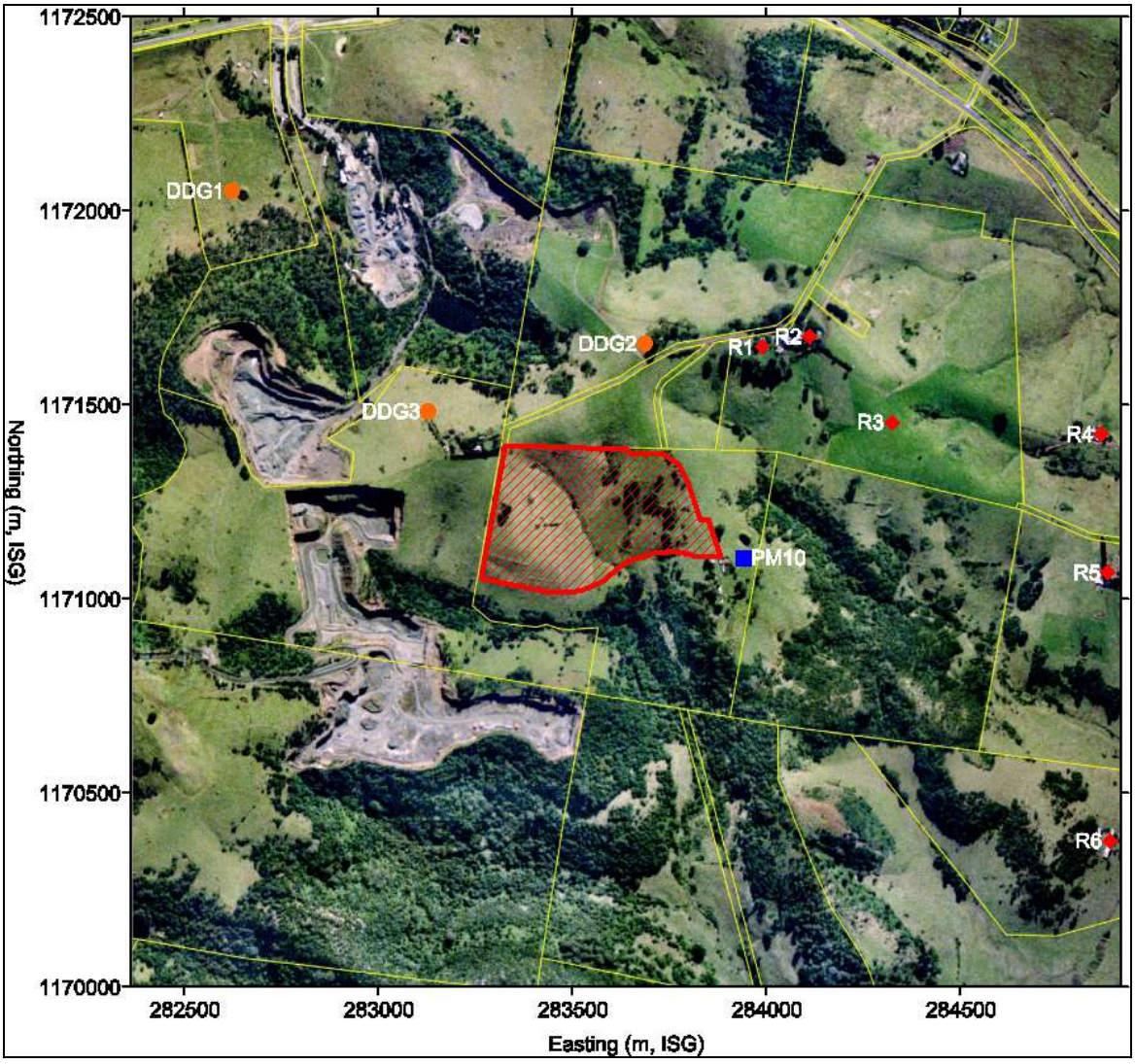
Pollutant	Averaging Time	Goal
PM_{10}	24 hours Annual	50 µg/m^3 30 µg/m^3
Dust Deposition	Annual	Maximum Total of 4 g/m^2/month

4 EXISTING AIR QUALITY ENVIRONMENT

4.1 Air Quality Monitoring Locations

Air quality monitoring data, for PM_{10} and dust deposition, has been provided by the Proponent for use in this assessment to provide an indication of the existing air quality environment. The Proponent-owned monitoring locations, from which data was sourced in this report, are presented in **Figure 6**.

Figure 6 Air Quality Monitoring Locations – Albion Park Quarry



4.2 Background Dust Deposition Environment

Dust deposition monitoring has been conducted at three locations in the area surrounding the Project Site. Monthly dust deposition data for the period between January 2006 and July 2008 are presented in **Table 5**. The location of the dust deposition gauges (DDG), marked DDG1 to DDG3, are illustrated in **Figure 6**.

Table 5 Ambient Dust Deposition Monitoring Data – January 2006 and July 2008

DDG ID	DDG Location	Number of Samples	Average Total Insoluble Solids (g/m^2/month)
DDG1	West of Processing Plant	23	2.3
DDG2	"Kyawana"	24	2.9
DDG3	Dunsters Lane	23	2.1
Average			**2.4**

Based on the data presented in **Table 5**, a conservatively high estimation of the ambient dust deposition rate at the Project Site for assessment purposes may be assumed to be of the order of 2.9 g/m^2/month expressed as an annual average. This value corresponds to the maximum of all the annual average deposition rates from the three monitoring locations, recorded at DDG2. It is noted that DDG2 is located in close proximity of both of the existing quarries operated by the Proponent and Readymix and is therefore a suitably conservative representation of background dust deposition accounting for the influence of existing sources.

4.3 Ambient Particulate Matter Environment

PM_{10} monitoring has been conducted in the vicinity of the Project Site at the *Belmont* property, indicated on **Figure 6** by *PM_{10}*. Monitoring has been conducted using a high volume air sampler (HVAS) with 24-hour samples collected in accordance with the one-in-six day sampling routine. The results of 24-hour PM_{10} monitoring at the Project Site, conducted between December 2005 and June 2008, are presented in

Table 6 24-hour Average PM_{10} Concentrations – Project Site – December 2005 to June 2008

	24-hour Average PM_{10} (µg/m^3)			Number of Samples
	Average	Minimum	Maximum	
2006*	4.3	1.0	13.6	55
2007	6.3	0.5	17.4	56
2008	4.1	2.1	9.4	30

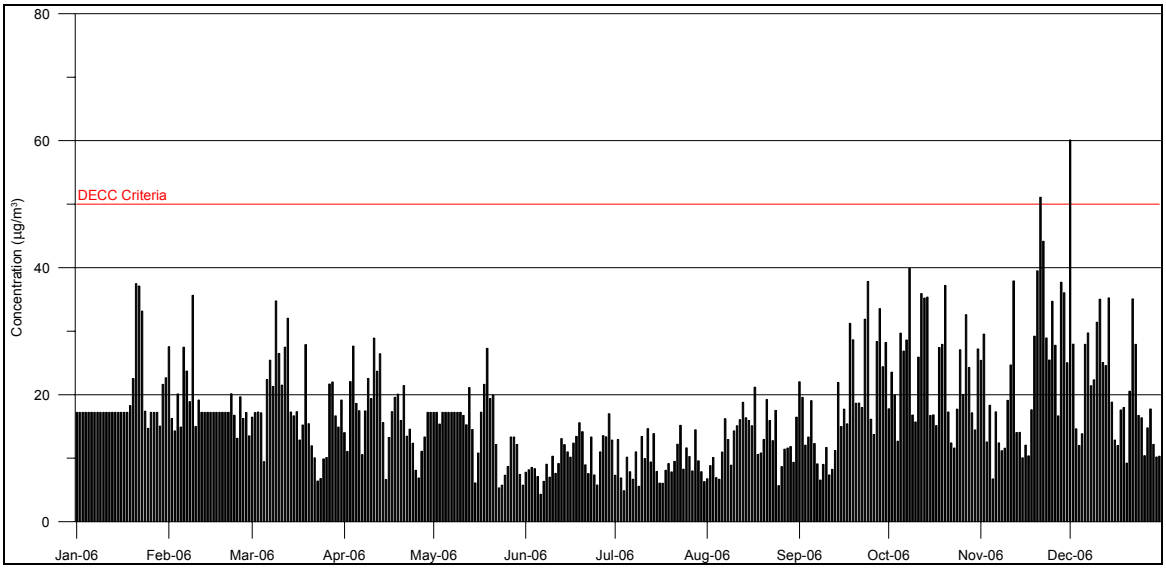
Note *: 2006 includes data recorded in December 2005

However, Section 5.1.1 of the Approved Methods states that for air quality assessments of this nature, ambient monitoring data for at least one year of continuous measurements should be used in dispersion modelling.

Data is available from the DECC's Albion Park South air quality monitoring station. This air quality monitoring site is located in Terry Reserve on Hughes Drive, Albion Park, approximately 3.5 km west-northwest of the Project Site.

The 24-hour average PM_{10} concentrations recorded at the Albion Park South monitoring station for the period 1 January 2006 to 31 December 2006 are presented in **Figure 7**. This dataset is concurrent with the meteorological data set used in the atmospheric dispersion modelling conducted for this assessment.

Figure 7 NSW DECC PM_{10} (24-Hour Average) Monitoring Results for Albion Park South, 2006



The results indicate that the highest 24-hour average PM_{10} concentration recorded at the DECC's Albion Park South monitoring site was 60.1 µg/m^3 recorded on 1 December 2006. This is above the DECC goal of 50 µg/m^3. In addition to this exceedance, there was one further exceedance during this period, 51.1 µg/m^3 on 21 November 2006.

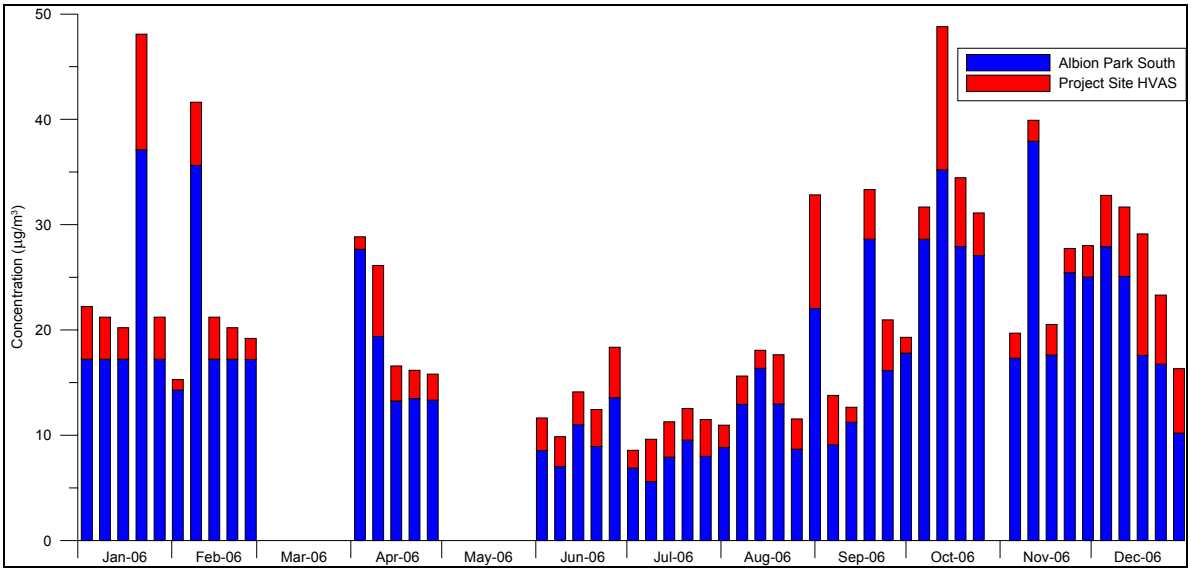
Review of the NEPM *New South Wales Annual Compliance Report 2006* (DECC, 2007) has indicated that extensive bushfire events occurred in the southern NSW/ northern Victoria region between November and December 2006, a fact reflected in the elevated concentrations shown in **Figure 7**. Indeed, the two exceedances of the DECC goal recorded at Albion Park South in 2006 were attributed to bushfires. However, in accordance with the Approved Methods, these values have been included in the assessment as it is appropriate to demonstrate that no additional exceedances of the impact assessment criteria will occur as a result of the proposed activity.

The highest PM_{10} concentration not in exceedance of the 24-hour criterion at Albion Park South was 44.1 µg/m^3, recorded on 21 November 2006. It is noted that this concentration is also amongst the identified bushfire period and may be considered as elevated for the region. The annual average PM_{10} concentration for 2006, recorded at the DECC's Albion Park South monitoring site was 17.2 µg/m^3. It is noted that for periods of missing data, the annual average PM_{10} concentration was inserted.

In order to provide a comparison between the two datasets, the concurrent concentrations recorded at the Albion Park South DECC monitoring station and Project Site HVAS during 2006 are presented in **Figure 8**.

It is clear from the **Figure 8** that the 24-hour average PM_{10} concentrations recorded at the Albion Park South monitoring location are significantly higher that those recorded at the Project Site HVAS. Indeed, during 2006, the PM_{10} concentrations recorded at the Project Site HVAS are, on average, 27% of the corresponding measurements obtained at the Albion Park South location. The use of the Albion Park South continuous 24-hour average PM_{10} dataset, in accordance with the requirements of the Approved Methods, is considered highly conservative in representing the existing concentrations of PM_{10} in the vicinity of the Project Site.

Figure 8 24-hour Average PM_{10} Comparison – Albion Park South and Project Site HVAS Data – 2006



4.4 Ambient Air Quality Environment for Assessment Purposes

For the purposes of assessing the potential air quality impacts from the Project, an estimation of ambient air quality levels is required. The site-specific ambient air quality levels adopted for this assessment are summarised in **Table 7**.

Table 7 Ambient Air Quality Environment for Assessment Purposes

Air Quality Parameter	Averaging Period	Assumed Background Ambient Level	Data Source
PM_{10}	24-Hour	Daily Varying	DECC
	Annual	17.2 µg/m^3	
Dust Deposition	Annual	2.9 g/m^2/month	The Proponent

5 DISPERSION METEROLOGY

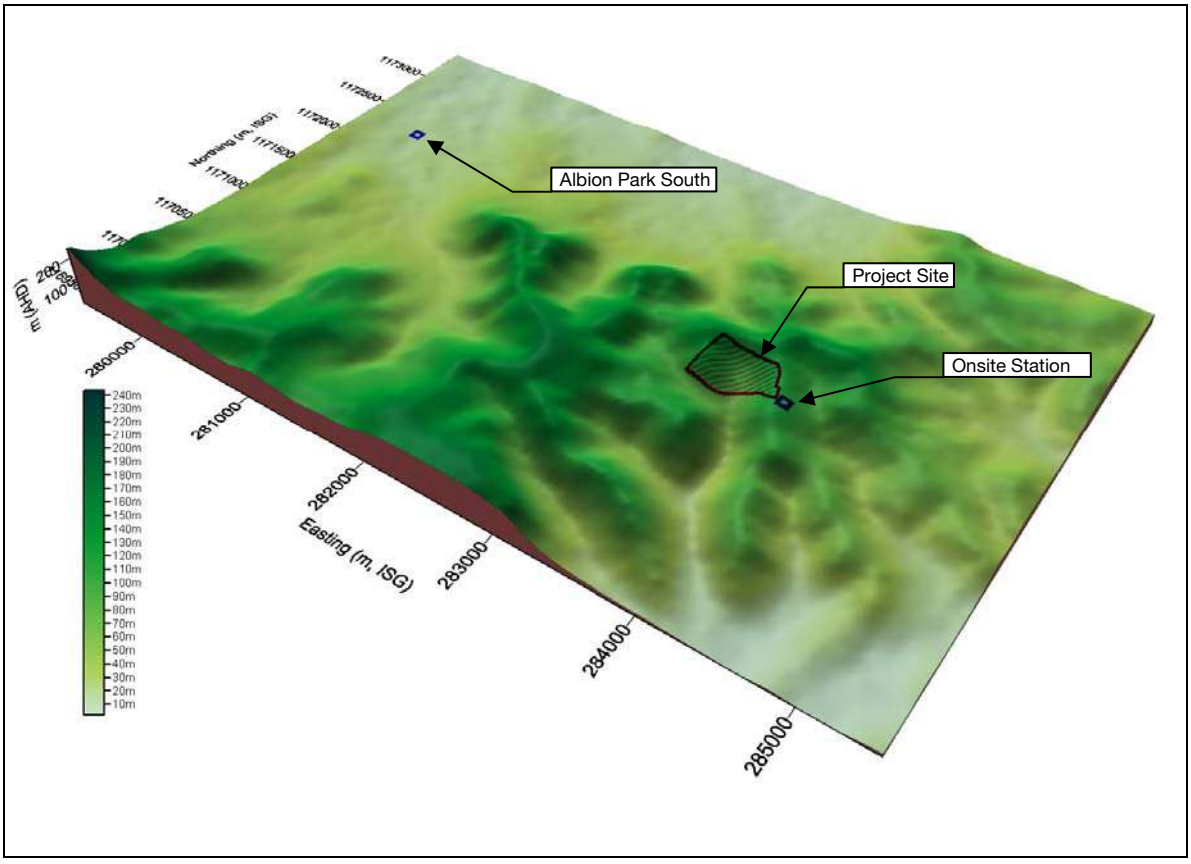
To adequately characterise the dispersion meteorology of the Project Site, monitoring data from the onsite meteorological station and the DECC's Albion Park South air quality monitoring station were sourced. The location details of these two monitoring stations are summarised in **Table 8**.

The data from these monitoring stations were used to characterise the local meteorology and provide the input datasets for the meteorological modelling undertaken. The proximity of these two weather stations to the Project Site and the topographical features between is presented in **Figure 9.**

Table 8 Meteorological Monitoring Station Details

Station Name	Location (m, ISG)		Distance (km) / Direction From Project Site	Elevation (m, AHD)
	Easting	Northing		
Onsite Meteorological station at *Belmont*	283920	1171123	At eastern site boundary	120 m
Albion Park South (DECC)	279858	1171964	3.5 km / WNW	20 m

Figure 9 Regional Topography Surrounding the Project Site



Note: Topography shown with vertical exaggeration of 2

5.1 Meteorological Modelling

Data obtained by the onsite meteorological monitoring station was sourced to compile the majority of parameters required to conduct atmospheric dispersion modelling. For indirect parameters not recorded onsite, The Air Pollution Model (TAPM) meteorological model (Version 3) was used to create a complete meteorological dataset for the Project Site.

TAPM, developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) is a prognostic model which may be used to predict three-dimensional meteorological data and air pollution concentrations, with no local data inputs required.

TAPM model predicts wind speed and direction, temperature, pressure, water vapour, cloud, rain water and turbulence. The program allows the user to generate synthetic observations by referencing databases (covering terrain, vegetation and soil type, sea surface temperature and synoptic scale meteorological analyses) which are subsequently used in the model input to generate site-specific hourly meteorological observations.

Additionally, the TAPM model may assimilate actual local wind observations so that they can optionally be included in a model solution. The wind speed and direction observations are used to realign the predicted solution towards the observation values. This function of accounting for actual meteorological observations within the region of interest is referred to as "data assimilation".

Thus, direct measurements for 2006 of hourly average wind speed and wind direction at the Proponent's onsite meteorological station and the DECC's Albion Park South station were input into the TAPM simulations to provide realignment to local and regional conditions.

Table 9 details the parameters used in the meteorological modelling for this assessment.

Table 9 Meteorological parameters used for this study

TAPM (v 3.0)	
Number of grids (spacing)	5 (30 km, 10 km, 3 km, 1 km, 300 m)
Number of grid points	25 x 25 x 30
Year of analysis	2006
Centre of analysis	34°35' S, 150°49' E
Data assimilation	Meteorological data assimilation using wind data from onsite station and Albion Park South.

5.2 Meteorological Conditions

5.2.1 Wind Regime

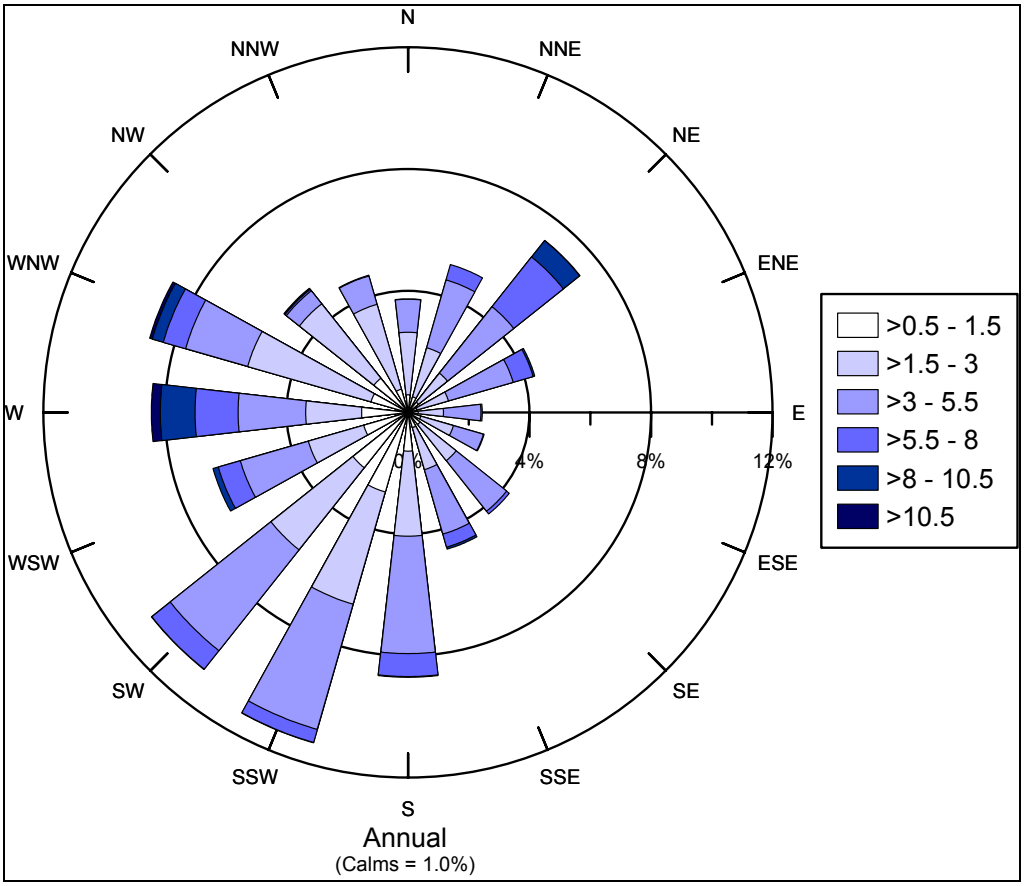
A summary of the 2006 annual wind behaviour recorded at the Project Site is presented as a wind rose in **Figure 10.** This wind rose displays occurrences of winds from all quadrants.

Figure 10 indicates that winds experienced at the Project Site are predominately light to fresh (between 1.5 m/s and 10.5 m/s) from the west-southwest to west-northwest (approximately 23% combined) and light to moderate (between 1.5 m/s and 8 m/s) from the south to southwest (approximately 30% combined). Calm wind conditions (wind speed less than 0.5 m/s) were recorded approximately 1.0% of the time throughout 2006.

The seasonal variation in predicted wind behaviour at the Project Site is presented in **Appendix A**. The seasonal wind roses indicate that:

- In spring, light to fresh winds are experienced from all directions, particularly from the northeast, south and south-southwest.
- In summer, light to fresh winds are experienced predominantly from the north-northeast to east-northeast (approximately 30% combined).
- In autumn, light to fresh winds are experienced predominantly from the south-southwest to west-northwest (approximately 58% combined).
- In winter, light to fresh winds are experienced from the west-southwest to west-northwest (approximately 38% combined) and light to moderate from the south-southwest to southwest (approximately 23% combined).

Figure 10 Annual Wind Rose for Project Site - 2006



5.2.2 Atmospheric Stability and Mixing Depth

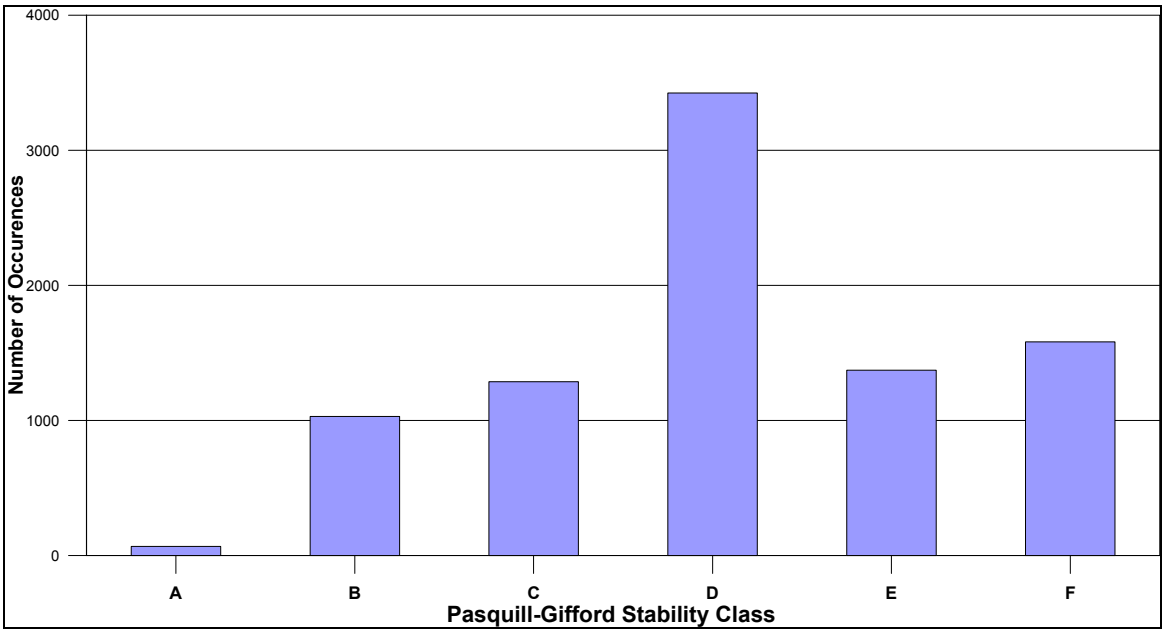
Atmospheric stability refers to the tendency of the atmosphere to resist or enhance vertical motion. The Pasquill-Turner assignment scheme identifies six Stability Classes, “A” to “F”, to categorise the degree of atmospheric stability. These classes indicate the characteristics of the prevailing meteorological conditions and are used as input into various air dispersion models (Error! Reference source not found.).

Table 10 Description of atmospheric stability classes

Atmospheric Stability Class	Category	Description
A	Very unstable	Low wind, clear skies, hot daytime conditions
B	Unstable	Clear skies, daytime conditions
C	Moderately unstable	Moderate wind, slightly overcast daytime conditions
D	Neutral	High winds or cloudy days and nights
E	Stable	Moderate wind, slightly overcast night-time conditions
F	Very stable	Low winds, clear skies, cold night-time conditions

Using the 10-minute recorded sigma-theta (standard deviation of wind direction) data from the onsite meteorological station, hourly atmospheric stability class was calculated using the approach adopted by the US EPA (USEPA, 2000). The calculated frequency of each stability class at the Project Site is presented in Error! Reference source not found.. The seasonal stability class distributions for each station are included in **Appendix B**.

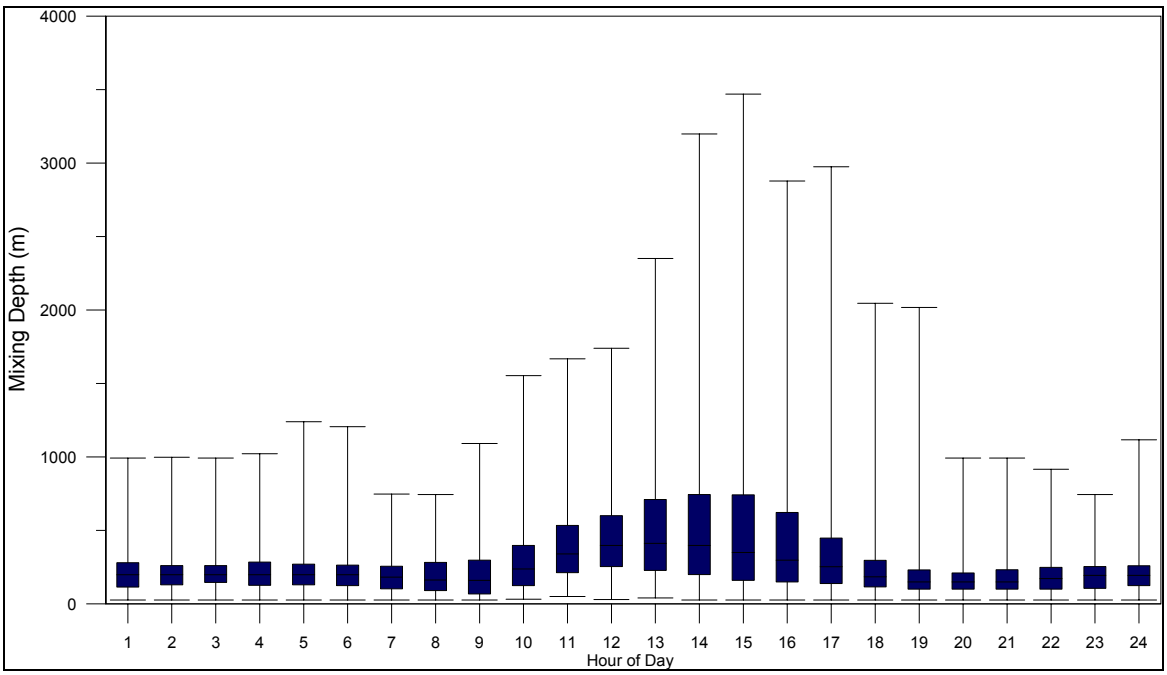
Figure 11 Annual Stability Class Distributions for the Project Site, 2006



The results indicate a high frequency of conditions typical to Stability Class "D". Stability Class "D" is indicative of neutral conditions, conducive to a moderate level of pollutant dispersion due to mechanical mixing.

Diurnal variations in maximum and average mixing depths predicted by TAPM at the Project Site during 2006 are illustrated in **Figure 12**. It can be seen that an increase in the mixing depth during the morning, arising due to the onset of vertical mixing following sunrise, is apparent with maximum mixing heights occurring in the mid to late afternoon, due to the dissipation of ground-based temperature inversions and the growth of convective mixing layer.

Figure 12 TAPM-Predicted Diurnal Variation in Mixing Depth for the Project Site, 2006



6 ATMOSPHERIC DISPERSION MODELLING

6.1 Model Selection and Configuration

The atmospheric dispersion modelling carried out in the present assessment for emissions from the Project Site utilises the Ausplume Gaussian Plume Dispersion Model software (Version 6.0) developed by the EPA Victoria.

Ausplume is the approved dispersion model for use in the majority of applications in NSW. Default options specified in the Technical Users Manual have been used, as per the Approved Methods.

For this assessment, Ausplume will be configured over a 4 km x 4 km modelling domain, centred on the Project Site. The gridded receptor spacing will be defined at 50 m, providing adequately fine computational resolution to calculate near field impacts.

In order to account for the potential influence on pollution dispersion and varying receptor elevations across the modelling domain, a terrain file incorporating the local topographical features has been included in the modelling process.

6.2 Modelling Scenario

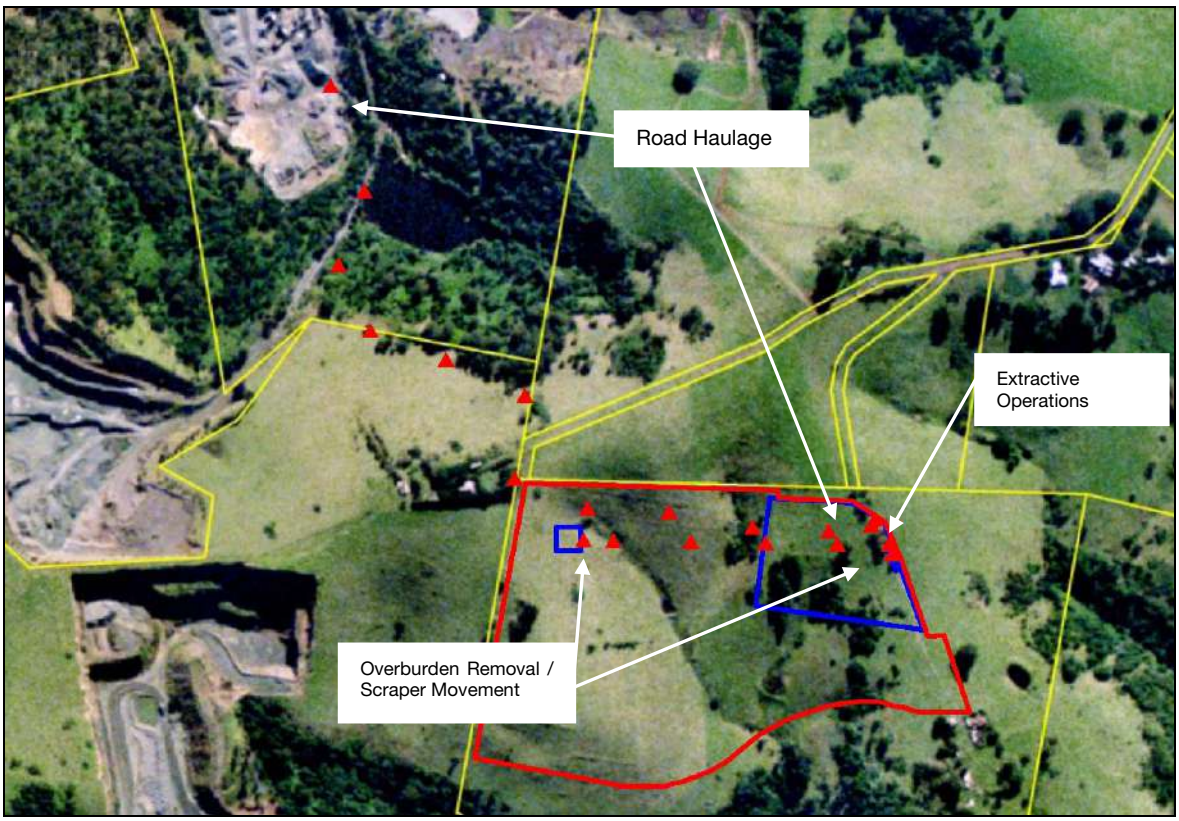
One scenario has been modelled to reflect proposed expanded extraction operations at the Project Site. The modelling scenario takes into consideration the movement of mobile plant and equipment during operation of the Stage 5 area of extraction (see **Figure 1**). This stage is situated in the closest proximity to the receptors to the northeast and was identified during the previous Heggies assessments as having the greatest potential for air quality impact.

The modelling scenario incorporates the following operations:

- Extraction operations, including drilling and blasting, bulldozer and excavator;
- Overburden removal, including use of scraper and excavator;
- Stockpiling of overburden material, including wind-generated erosion;
- Stockpile management;
- Movement of haul trucks about the Project Site; and
- Unloading of extracted materials at the existing operations to the north.

Figure 13 illustrates the location of the sources simulated in the dispersion modelling. The selected source locations are deemed appropriate to represent maximum potential impacts at the closest surrounding receptors.

Figure 13 Dispersion Modelling Source Locations



6.3 Emission Factors

6.3.1 Project Site Emissions

Table 11 presents the emission factors for particulate matter from the Project Site used in the dispersion modelling for this assessment. These relate to emissions expected under normal operating conditions.

Table 11 Particulate Emission Factors for Air Quality Dispersion Modelling

Activity	Total Particulate Emission Factor	PM_{10} Emission Factor	Emission Factor Units
Bulldozer	9.88	2.31	kg/hr
Excavator - Rock	0.00096	0.00053	kg/t
Excavator - Overburden	0.00055	0.00026	kg/t
Air - Track Drill	0.59	0.31	kg/hole
Scrapers	4.76	1.63	kg/VKT[1]
Grader	1.08	0.34	kg/VKT[1]
Blasting	42.91	22.31	kg/blast
Wheel Dust (Empty)	3.04	0.93	kg/VKT[1]
Wheel Dust (Full)	4.33	1.33	kg/VKT[1]
Open Pit Wind Erosion	0.40	0.20	kg/ha/hr
Trucks dumping Rock	0.00096	0.00053	kg/t
Scraper dumping overburden	0.00055	0.00026	kg/t
Wind Erosion	4,563	2,282	kg/ha/yr

Note 1: VKT – Vehicle Kilometres Travelled

In general, default emission factors have been used as contained in Table 1 of the *Emission Estimation Technique Manual for Mining, Version 2.3*, (hereafter, "EETMM") (Environment Australia, 2001). In some instances, the moisture content of materials at the Project Site is not adequately reflected within the default emission factors contained in the EETMM, and the equations given in either Table 1 of the EETMM document or USEPA AP-42 documentation were therefore used to derive representative emission factors. The following emission factors were derived using this method:

Bulldozer

$$EF = k \times \frac{s^{1.2}}{M^{1.3}} \quad \text{kg/h}$$

where k=2.6 for TSP and 0.34 for PM_{10}, s = silt content and M = moisture content.

Miscellaneous Handling (Excavators, loading/unloading of material)

$$EF = k \times 0.0016 \times \left(\frac{U}{2.2}\right)^{1.3} \left(\frac{M}{2}\right)^{-1.4} \quad \text{kg/t}$$

where k=0.74 for TSP and 0.35 for PM_{10}, U = mean wind speed and M = moisture content.

Scraper Operation

$$EF = k \times 10^{-6} \times s^{1.3} W^{2.4} \quad \text{kg/VKT}$$

where k=7.6 for TSP and 1.32 for PM_{10}, s = silt content and W = vehicle gross mass.

Grader Operation

$$EF = 0.0034 \times S^k \quad \text{kg/VKT}$$

where k=2.5 for TSP and 2 for PM_{10}, S = average vehicle speed.

Blasting

$$EF = 344 \times \frac{A^{0.8}}{M^{1.9} \times D^{1.8}} \quad \text{kg/blast}$$

where A = Blast area, M = moisture content and D = depth of blast holes. PM_{10} is 52% of TSP.

Haul truck wheel dust (USEPA AP-42)

The emission factor for wheel generated dust is estimated from the USEPA emission equation for Wheel Generated Dust from Unpaved Roads (2003).

$$EF = k \times \left(\frac{s}{12}\right)^{0.7} \times \left(\frac{W}{3}\right)^{0.45} \times \left(\frac{281.9}{1000}\right) \quad \text{kg/VKT}$$

where k=4.9 for TSP and 1.5 for PM_{10}, s = silt content and W = vehicle gross mass.

Stockpile wind erosion

Hourly-varying wind erosion from exposed surfaces was estimated using the USEPA AP-42 approach for determining wind erosion (Chapter 13, Section 13.2.5 Industrial Wind Erosion). The total wind erosion potential for the modelling period is presented in **Table 11**.

6.4 Modelling Assumptions for Project Site

Appendix C provides details of the emission inventory associated with the modelled scenario for the Project Site using the emission factors given in **Table 8**.

The emission inventory has been derived to reflect the worst-case scenario for airborne emissions over a 24 hour period, and mean average operational conditions for annual assessments.

The following assumptions were made in creating the emissions inventory for the Project.

- Based on a worst case daily hours of operation (10.5 hours), all processes at the Project Site, excluding the bulldozer, grader and blasting, are assumed to operate for 11 hours each day. The bulldozer (5 hours), blasting (1 hour) and grader (1 hour) are assumed to occur for shorter time periods in an operational day.
- The total annual extraction rate at the Project Site is assumed to be 800 kt.
- The following moisture content (mc) and silt content (sc) were assumed for the modelling.
  - Rock: mc – 3%, sc – 10% (based on previous Heggies studies).
  - Overburden: mc – 5%, sc – 15% (based on previous Heggies studies).
  - Unsealed Haul Routes: mc – 1.1%, sc – 6.4% (USEPA, 1998).
- Overburden removal was estimated based on the total area of Stage 5, a continuous overburden depth of 5 m, a soil density of 1.8 t/m^3 and a five year extraction period for Stage 5.

- Specifications for the following on-site equipment was taken from the Caterpillar website (www.cat.com):
  - Haul Truck - CAT 773F Off Highway Truck
  - Excavator - CAT 325DL
  - Bulldozer - CAT D9
  - Grader – CAT 12H Global
  - Scraper - CAT 623G
- In order to represent the potential constraint of emissions due to the quarrying depth, a pit retention emission reduction factor of 50% for TSP and 5% for PM_{10} has been applied to all sources within the extraction area. This reduction is consistent with Table 3 of the EETMM.
- Drilling is assumed to occur at a rate of 1570 holes per year, in accordance with previous Heggies modelling for the Project. Blasting area is assumed to be 270 m^2, based on a bench width of 22.5 m and depth of 12 m.
- Wind erosion from the overburden stockpile is assumed to occur only from the active area, as the remainder will be stabilised. The active area is assumed to total 900 m^2.
- The entire Stage 5 area has been used to represent wind erosion from the exposed area.
- Wheel generated dust from the movement of trucks (haul and product) has been represented as a simulated line source using the "volume source" Ausplume input. Each volume source is located along the centreline of the real line source with separations less than one quarter of the distance to the nearest residential receptor.
- It has been assumed that Level 2 watering (> 2 Litres/m^2/hour) will be applied to all unsealed haul routes when required. As such, a reduction factor of 75% has been applied to relevant haul truck movements. This reduction factor consistent with emission reductions quoted in Table 3 of the EETMM.

7 MODELLING RESULTS

7.1 Dust Deposition

Table 12 shows the results of the Ausplume predictions for dust deposition from the Project Site, using the emission rates calculated in **Appendix C**, at each of the identified receptors.

The results show the mean average monthly dust deposition predicted at the nearest residences surrounding the Project Site over a one-year time frame. As detailed in **Section 4.2** the background level of dust deposition for the area surrounding the Project Site is taken as 2.9 g/m^2/month. It is reiterated that this background was taken from the DDG monitoring location situated in the closest proximity to the two surrounding extractive operations and should therefore be viewed as highly conservative.

The results presented in **Table 12** indicate that the total mean monthly dust deposition (background plus increment) associated with the Project are predicted to be less than 3.9 g/m^2/month, at all the nearest residences.

Table 12 Background and Incremental Dust Deposition at Nearest Residences

Residence	Dust - Annual Average (g/m^2/month)			
	Background	Increment	Background + Increment	Assessment Criterion
R1	2.9	1.0	3.9	4
R2	2.9	0.7	3.6	4
R3	2.9	0.5	3.4	4
R4	2.9	0.2	3.1	4
R5	2.9	0.2	3.1	4
R6	2.9	0.1	3.0	4

A contour plot of the incremental increase in dust deposition is presented in **Appendix D**. The contour plot is indicative of the levels of dust deposition that can be potentially reached under the conditions modelled.

7.2 PM_{10} (24-Hour Average)

Table 13 shows the results of the Ausplume predictions for 24-hour average PM_{10} concentrations from the Project Site, using the emission rates calculated in **Appendix C**, at each of the identified receptors

As detailed in **Section 4.3**, it has been assumed that background levels of PM_{10} vary on a daily basis. These background levels have been incorporated into the model. However as noted previously, elevated PM_{10} concentrations within the background file already exceed the impact assessment criteria on two separate occasions.

In accordance with Section 5 of the Approved Methods, the purpose of this assessment is to demonstrate that no additional exceedances of the impact assessment criterion would occur as a result of the Project. Accordingly, the results in **Table 13** present the maximum (background plus increment) 24-hour average concentration of PM_{10} predicted at the residences surrounding the site, excluding the two days when the background already exceeds the DECC impact assessment criterion.

The results presented in **Table 13** show that the maximum 24-hour average concentration of PM_{10} (background plus increment, (excluding days on which the background PM_{10} concentration is already greater than 50 µg/m^3) associated with the Project are predicted to be below 44.9 µg/m^3 at all residences. As discussed in **Section 4.3**, the use of a daily-varying PM_{10} dataset recorded at Albion Park South for the background concentrations at the Project Site is a conservative approach, thus the maximum predicted ground-level concentrations detailed in **Table 13** could be considered conservatively high.

Table 13 Background and Incremental 24-hour Average PM_{10} Concentrations at Nearest Residences

Residence	PM_{10} – 24-hour Average (µg/m^3)			
	Background (Date)	Increment	Background + Increment	Assessment Criterion
R1	44.1 (08/10/2006)	0.3	44.4	50
R2	44.1 (08/10/2006)	0.2	44.3	50
R3	44.1 (08/10/2006)	0.4	44.5	50
R4	44.1 (08/10/2006)	0.2	44.3	50
R5	44.1 (08/10/2006)	0.8	44.9	50
R6	44.1 (08/10/2006)	0.8	44.9	50

A contour plot of 3rd highest 24-hour PM_{10} concentrations (background plus increment) attributable to operations at the Project Site is presented in **Appendix E**.

In addition to the data presented in **Table 13**, the maximum predicted incremental increase at each receptor attributable to the Project, the corresponding background concentration within the Albion Park South dataset and the combined predicted concentration is presented in **Table 14**. It can be seen that for all surrounding receptors, the maximum predicted incremental increase at the surrounding receptors attributable to worst case operations (Stage 5, worst-case source locations) is 34.1 µg/m^3. This occurs on a day when the background concentration is 10.3 µg/m^3, resulting in a total predicted concentration of 44.4 µg/m^3.

Table 14 Maximum Predicted Incremental Increase and Corresponding Background

Residence	PM_{10} – 24-hour Average (µg/m^3)			
	Maximum Predicted Increment	Background (Date)	Background + Increment	Assessment Criterion
R1	34.1	10.3 (22/11/2006)	44.4	50
R2	23.3	10.3 (22/11/2006)	33.6	50
R3	14.2	10.3 (22/11/2006)	24.5	50
R4	7.4	13.4 (27/11/2006)	20.8	50
R5	9.5	17.5 (6/11/2006)	27.0	50
R6	5.1	14.5 (21/02/2006)	19.6	50

A contour plot of the maximum incremental 24-hour PM_{10} concentrations attributable to operations at the Project Site is presented in **Appendix F**.

7.3 PM_{10} (Annual Average)

Table 15 shows the results of the Ausplume predictions for annual average PM_{10} concentrations from the Project Site, using the emission rates calculated in **Appendix C**, at each of the identified receptors

As detailed in **Section 4.3** the annual average background concentration of PM_{10} assumed for the Project Site is 17.2 µg/m^3. This background level has been incorporated into the model through the hourly varying background file.

The results presented in **Table 15** indicate that annual average PM_{10} concentrations (background plus increment) associated with the Project are predicted to be below the assessment criterion of 30 µg/m^3 (annual average) at each residence.

A contour plot of the annual average PM_{10} concentrations (background plus increment) attributable to the Project Site is presented in **Appendix G**

Table 15 Annual Average PM_{10} Concentrations at Nearest Residences

Residence	PM_{10} – Annual Average (µg/m^3)			
	Background	**Increment**	**Background + Increment**	**Assessment Criterion**
R1	17.2	2.8	20	30
R2	17.2	1.8	19	30
R3	17.2	1.1	18.3	30
R4	17.2	0.5	17.7	30
R5	17.2	0.5	17.7	30
R6	17.2	0.3	17.5	30

8 CONCLUSION

Heggies Pty Ltd has been commissioned by Perram and Partners Pty Ltd on behalf of Cleary Bros (Bombo) Pty Ltd to conduct an air quality impact assessment of proposed expanded operations at their Albion Park Quarry. Cleary Bros have gained approval to access an additional resource to the south of their existing operations, at an annual rate of 400,000 tpa. The purpose of this assessment is to determine the potential impact to air quality that may result from increasing this extraction rate to 800,000 tpa.

Modelling was conducted based on worst case operations, focusing on Stage 5 extraction area. Emissions from the Project Site were modelled using Ausplume V 6.

These predictions indicate that dust deposition and particulate matter emissions attributable to the increased extractive operations at the quarry expansion area are anticipated to be within the current DECC assessment criteria.

9 REFERENCES

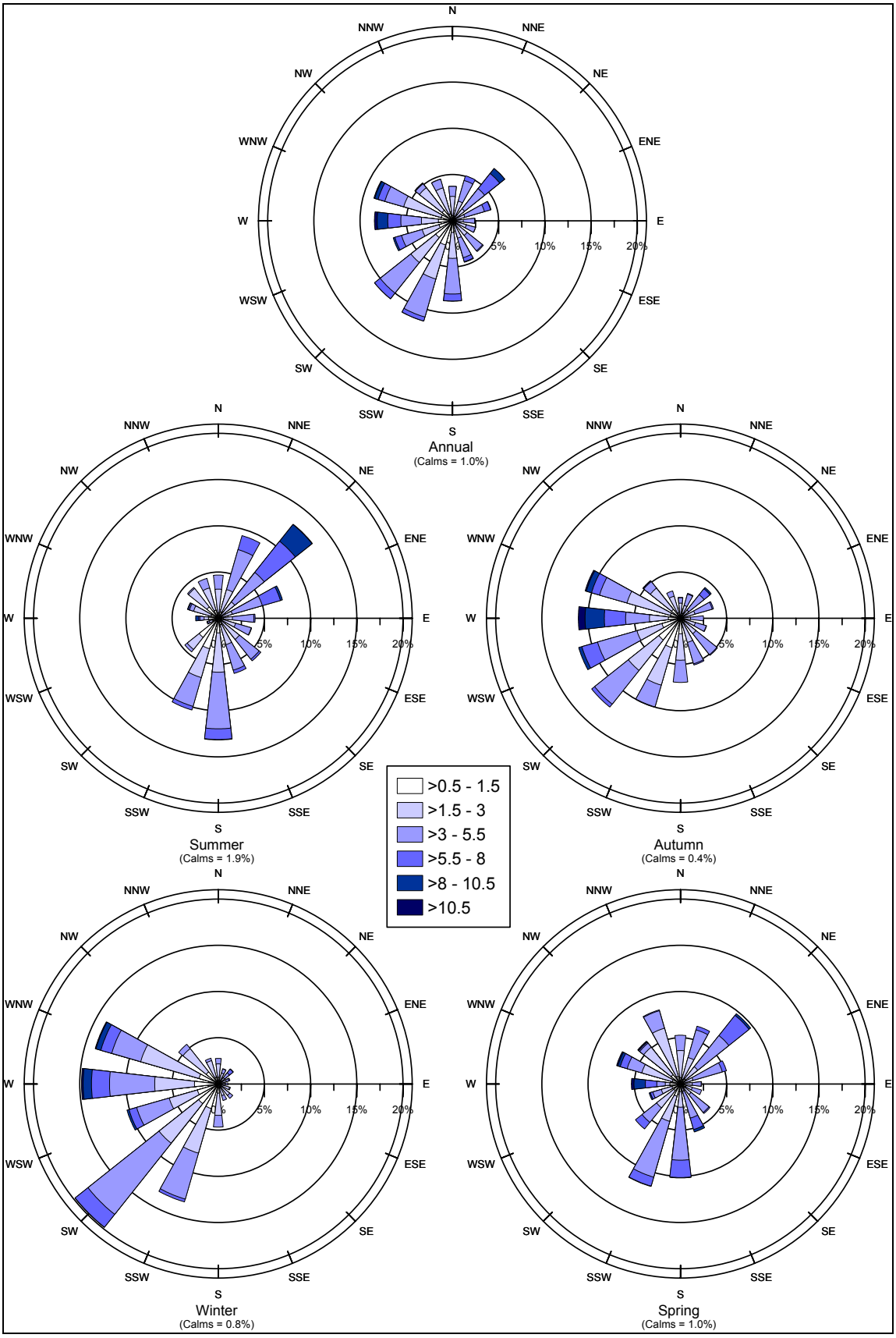
The following documents and resources have been used in the production of this report:

- Cleary Bros (2008), Dust Deposition, PM_{10} and Meteorological Monitoring Data from established monitoring equipment at Project Site.
- Environment Australia National Pollution Inventory (2001), Emission Estimation Technique Manual for Mining, Version 2.3.
- National Environmental Protection Council (1998) "National Environmental Protection Measure for Ambient Air Quality".
- NSW Department of Environment and Climate Change (2005), Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.
- NSW Department of Environment and Conservation (2006), PM_{10} and Meteorological data from the DECC's Albion Park South monitoring site for 2006.
- NSW Department of Environment and Conservation (2007), New South Wales Annual Compliance Report 2006.
- US EPA (2000), Meteorological Monitoring Guidance for Regulatory Modeling Applications.
- US EPA (2003) Compilation of Air Pollutant Emission Factors AP-42 - Chapter 13.2.2 Unpaved Roads .;
- US EPA (2006) Compilation of Air Pollutant Emission Factors AP-42 (Chapter 13, Section 13.2.5 Industrial Wind Erosion).

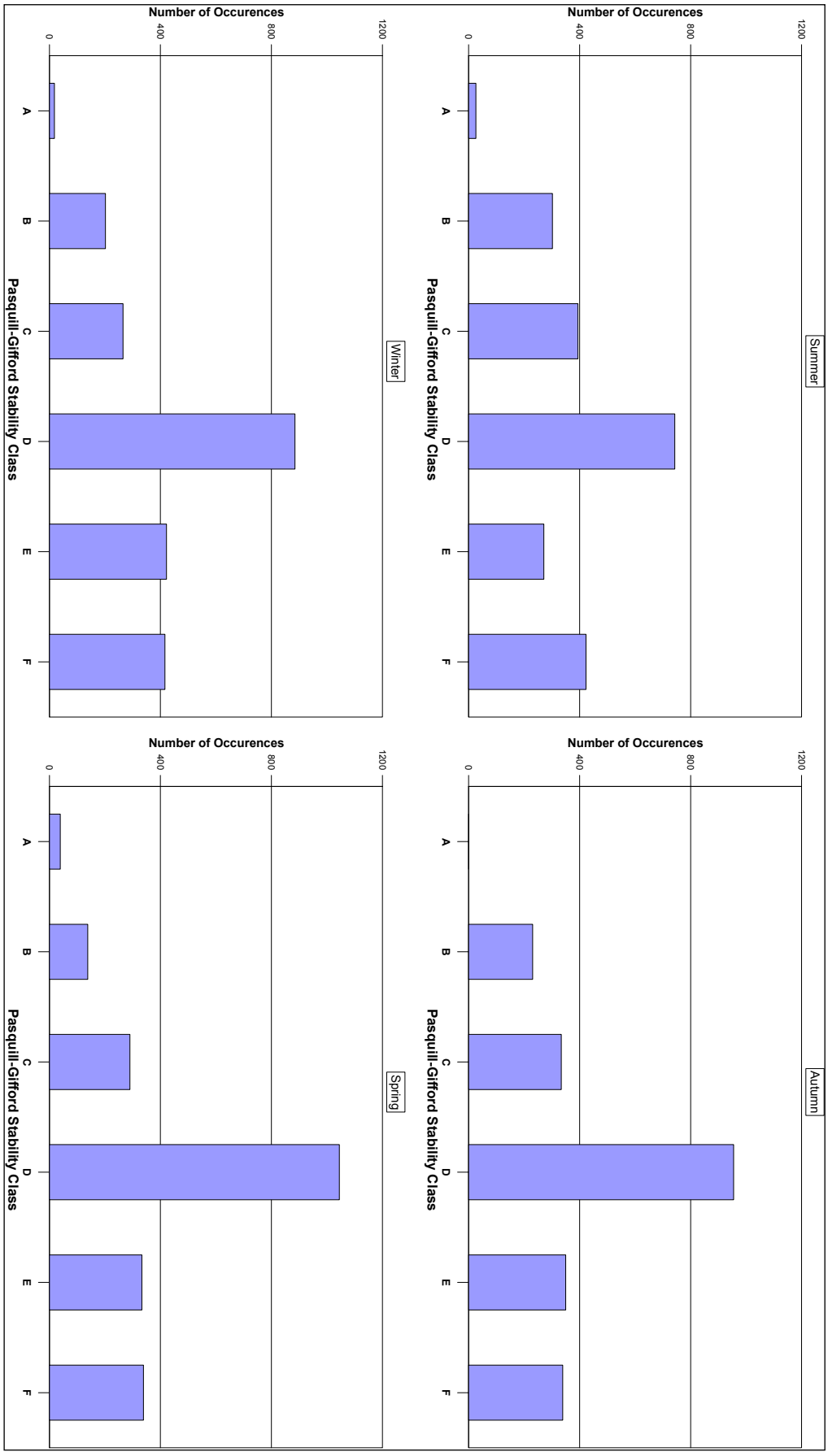
10 GLOSSARY OF TERMS, SYMBOLS AND ACRONYMS

AHD	Australian Height Datum
Approved Methods	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DECC	NSW Department of the Environment and Climate Change
EETMM	Emission Estimation Technique Manual for Mining, Version 2.3
$g/m^2/month$	Grams per square meter per month
Heggies	Heggies Pty Ltd
HVAS	High Volume Air Sampler
ISG	Integrated Survey Grid
µg	Microgram ($g \times 10^{-6}$)
µm	Micrometre or micron ($metre \times 10^{-6}$)
m^3	Cubic meter
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
P&P	Perram and Partners Pty Ltd
PM_{10}	Particulate matter less than 10microns in aerodynamic diameter
The Project Site	Albion Park Quarry expansion area
The Proponent	Cleary Bros (Bombo) Pty Ltd
tpa	Tonnes per Annum
TAPM	"The Air Pollution Model"
TSP	Total Suspended Particulate
USEPA	United States Environmental Protection Agency
VKT	Vehicle Kilometres Travelled

Seasonal Wind Roses – Project Site - 2006

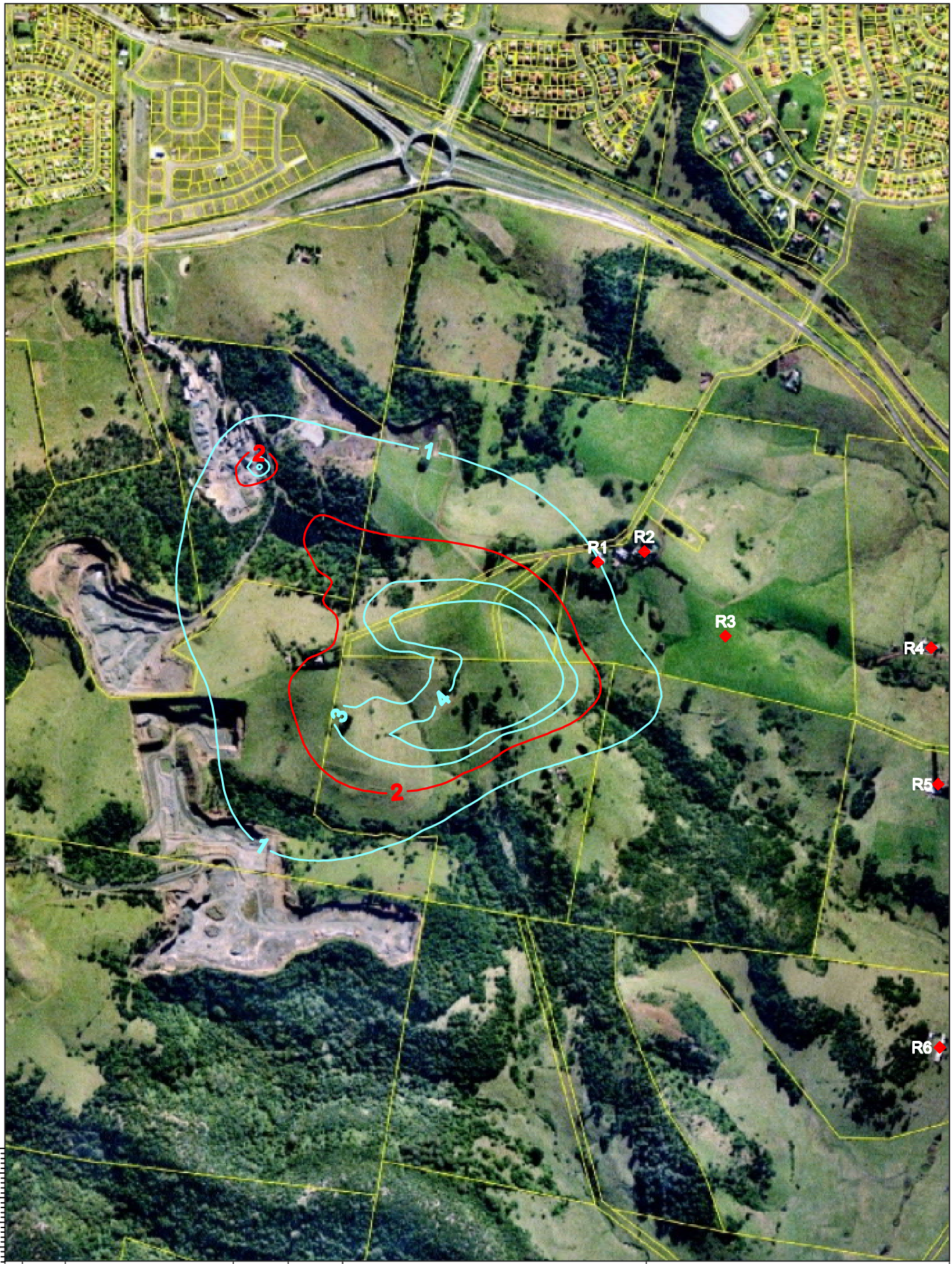


Seasonal Stability Class Distribution – Project Site - 2006



Dispersion Modelling Emissions Inventory

	TSP Emission Factor	PM10 Emission Factor	Emission Factor Units	Throughput (tonnes per hour)	Average number of kilometres per hour	Working hours per day	Dust Deposition Emission Rate (mg/s)	PM10 Emission Rate (mg/s)	TSP Emission Flux (mg/s/m2)	PM10 Emission Flux (mg/s/m2)
Bulldozer	9.88	2.31	kg/hr	N/A	N/A	5	1372.09	609	N/A	N/A
Excavator - Rock	0.00096	0.00053	kg/t	273.50	N/A	11	36.534	38.049	N/A	N/A
Excavator - OB	0.00055	0.00026	kg/t	14.95	N/A	11	1.132	1.018	N/A	N/A
Drill	0.59	0.31	kg/hole	N/A	N/A	11	43.98386	43.90931	N/A	N/A
Scrapers	4.76	1.63	kg/VKT	N/A	1.73	11	285.534	186.035	N/A	N/A
Grader	1.08	0.34	kg/VKT	N/A	1.10	11	12.320	7.402	N/A	N/A
Blasting	42.91	22.31	kg/blast	N/A	N/A	1	N/A	N/A	0.59602	0.58887
Wheel Dust (Empty)	3.04	0.93	kg/VKT	N/A	5.47	11	57.720	33.572	N/A	N/A
Wheel Dust (Full)	4.33	1.33	kg/VKT	N/A	5.47	11	82.23031	47.8278	N/A	N/A
Open Pit Wind Erosion	0.40	0.20	kg/ha/hr	N/A	N/A	24	N/A	N/A	0.01111	0.00528
Trucks dumping Rock	0.00096	0.00053	kg/t	273.50	N/A	11	36.534	38.049	N/A	N/A
Scraper dumping overburden	0.00055	0.00026	kg/t	14.95	N/A	11	1.132	1.018	N/A	N/A



50 mm ON ORIGINAL

REV	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED
0	24/09/08		SF	RK

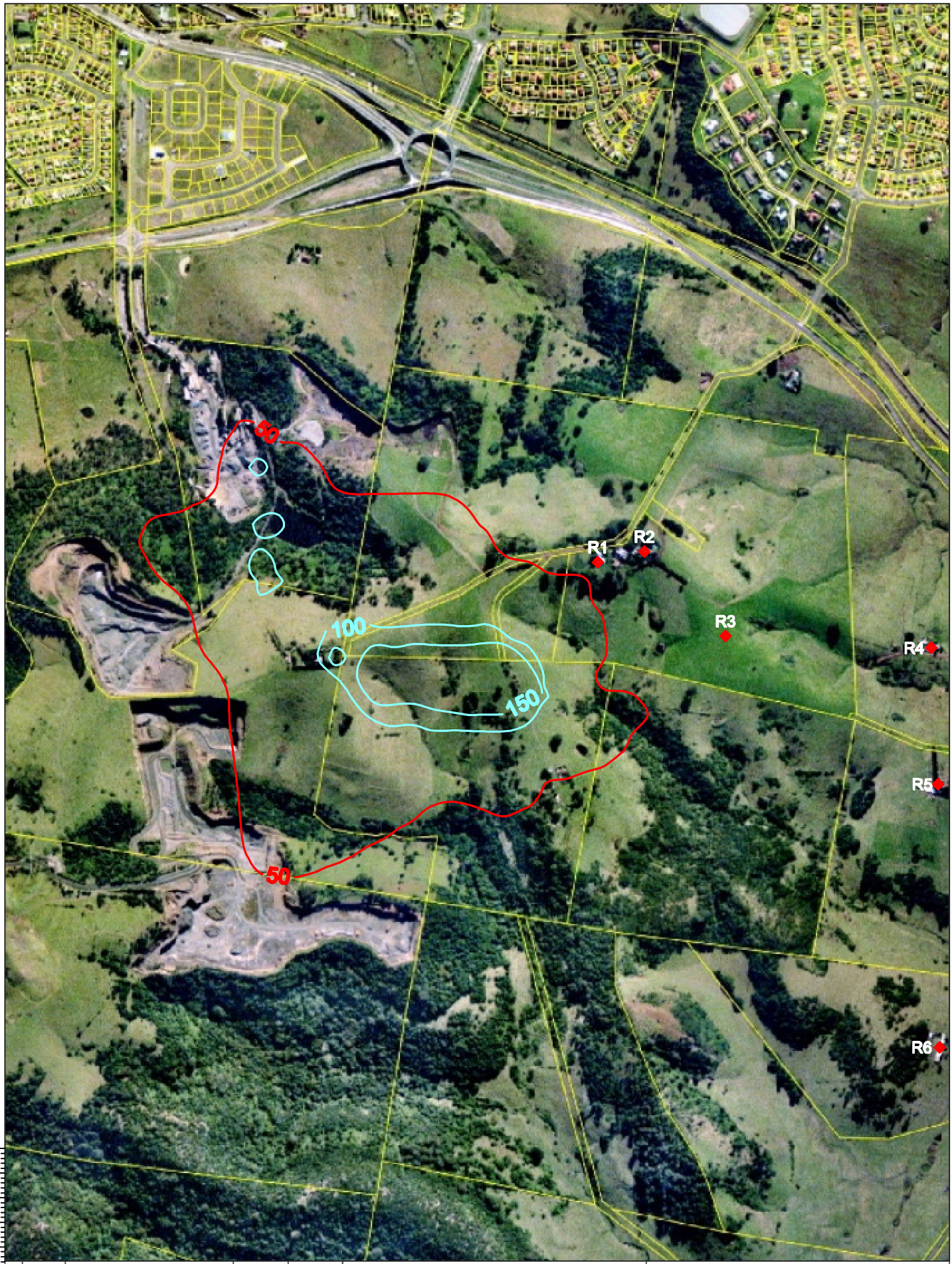
Heggies Pty Ltd
2 Lincoln Street
Lane Cove NSW 2066 Australia
PO Box 176 Lane Cove NSW 1595
Email address sydney@heggles.com.au
Telephone 02 9427 8100 Facsimilie 02 9427 8200

Appendix D:
Annual Average Dust Deposition
Increment Only - g/m2/month

FILE NAME: 10-7319 Modelling Plots.dwg

DRAWING No. 10-7319 Dust Contour

REVISION 0



50 mm ON ORIGINAL

REV	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED
0	24/09/08		SF	RK

Heggies Pty Ltd
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Lane Cove NSW 2066 Australia
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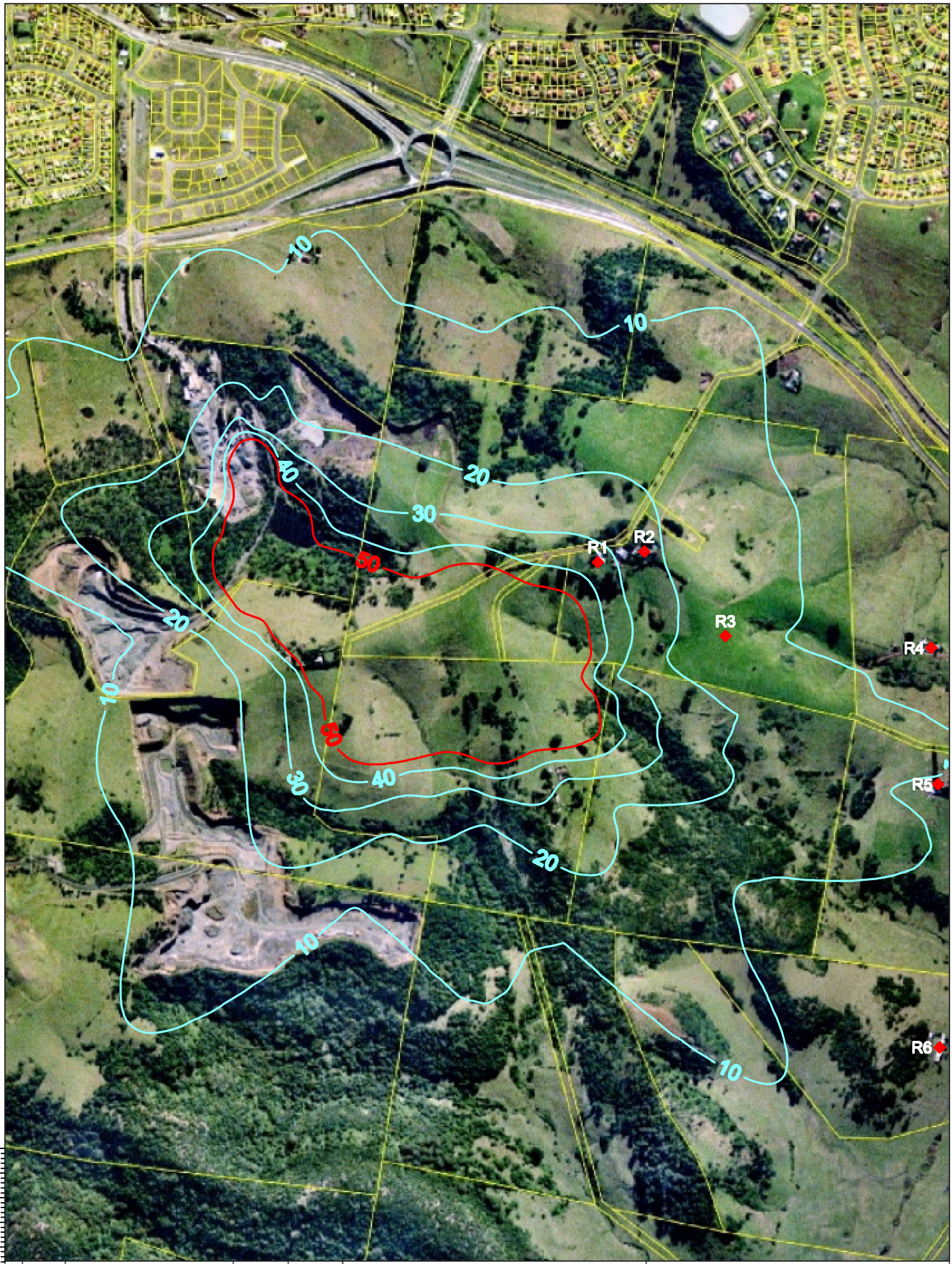
Appendix E:
3rd Highest 24-Hour Average
Concentration of PM_{10}
Background + Increment - µg/m³

FILE NAME: 10-7319 Modelling Plots.dwg

DRAWING No. 10-7319 PM10 3rd Contour

REVISION 0



50 mm ON ORIGINAL

REV	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED
0	24/09/08		SF	RK

Heggies Pty Ltd
2 Lincoln Street
Lane Cove NSW 2066 Australia
PO Box 176 Lane Cove NSW 1595
Email address sydney@heggles.com.au
Telephone 02 9427 8100 Facsimilie 02 9427 8200

Appendix F:
Highest 24-Hour Average Incremental Concentration of PM_{10} - $\mu g/m^3$

FILE NAME: 10-7319 Modelling Plots.dwg

DRAWING No. 10-7319 PM10 Max Increment Contour

REVISION 0

REV	DATE	AMENDMENT / ISSUE DESCRIPTION	PREPARED	CHECKED
0	24/09/08		SF	RK

50 mm ON ORIGINAL

Heggies Pty Ltd
2 Lincoln Street
Lane Cove NSW 2066 Australia
PO Box 176 Lane Cove NSW 1595
Email address sydney@heggles.com.au
Telephone 02 9427 8100 Facsimilie 02 9427 8200

Appendix G:
Annual Average Concentration of PM_{10}
Background + Increment - µg/m³

FILE NAME: 10-7319 Modelling Plots.dwg

DRAWING No. 10-7319 PM10 Annual Contour

REVISION 0

Appendix F

NOISE ASSESSMENT

HEGGIES

30 October 2008

30-2138 CB LR1 20081029

Cleary Bros Pty Ltd
C/O Perram & Partners
12 Clanwilliams Street
Eastwood NSW 2122

Attention: Terry Perram

Dear Terry

Albion Park Quarry Increase in Production

Heggies Pty Ltd (Heggies) has been commissioned by Perram & Partners on behalf of Cleary Bros Pty Ltd to undertake an assessment of noise impact from the proposed increase of production at Albion Park Quarry. It is planned to increase the production limit at Albion Park Quarry from 400,000 to 800,000 tonnes per annum.

1 Project Description

The increase in production limit will not result in an increase of plant and equipment from that assessed in 2002 (refer Heggies Report 30-1079 R1 *Noise and Blasting Impact Assessment Cleary Bros Albion Park Quarry*). The sound power levels of plant and equipment used in the 2002 assessment are summarised in **Table 1**.

Table 1 Equipment Sound Power Levels

Equipment	Sound Power Levels
Processing Plant	
Primary crusher	112 dBA
Secondary crushers and screens	116 dBA
Pug mill	115 dBA
Mobile Equipment	
CAT 773 dump truck (or similar)	114 dBA each
CAT 627 scraper*	111 dBA
CAT 245 face shovel (or similar)	117 dBA
CAT 992 loader	118 dBA
Rock drill	118 dBA
Water cart	109 dBA
CAT D8L dozer*	116 dBA
235C hammer excavator*	112 dBA
CAT 980C loader	114 dBA

* Note Used on an intermittent basis

HEGGIES PTY LTD
ABN 29 001 584 612
Level 1, 14 Watt Street Newcastle NSW 2300 Australia
PO Box 1768 Newcastle NSW 2300 Australia
Telephone 61 2 4908 4500 Facsimile 61 2 4908 4501
Email newcastle@heggies.com Website www.heggies.com
Incorporating New Environment Graeme E. Harding & Associates Eric Taylor Acoustics

As production increases towards an average of 800,000 tonnes per annum, plant and equipment utilisation rates will increase. An increase in despatch of finished product will also occur.

2 Noise Assessment of Current Proposal

2.1 Operational Noise

Although the utilisation of the existing plant and equipment will increase with the current proposal, this will not result in an increase in the predicted noise emission levels from the quarry as the existing plant and equipment has been considered, as a worst case, to operate continuously (over a 15 minute period) in the noise modelling for the site. Haul truck utilisation will also increase (i.e. the trucks will be used more often during the day), however, the number of truck movements per 15 minute period will not change from that considered in the previous 2002 and 2004 noise assessments. Notwithstanding this, the noise impact of the haul truck movements has been reassessed in this report to account for the change in haul road alignment since the 2002 and 2004 assessments.

2.1.1 Haul Road

To assess the greater utilisation of haul trucks to and from the extraction area and the changes in haul road location since the 2002 assessment, noise modelling was undertaken for the operation. The results of this noise modelling was then compared to a previous assessment of the haul road in isolation (refer Heggies Report 30-1079 DEC Haul Road 050404 dated April 2004). The assumptions used for noise modelling are as follows:

- Two (2) haul trucks operate between the quarry face and processing plant;
- Six (6) haul truck movement were considered to occur every 15 minutes; and
- Temperature 20^0 C, relative humidly 65%, calm.

The results of the modelling are presented in **Table 2**.

Table 2 Noise Modelling Results

Location	Noise Contribution of Trucks on Haul Road ($L_{Aeq(15minute)}$)		
	Previous Assessment	**Current proposal**	**Criteria (entire operation)**
"The Hill"	28 dBA	29 dBA	38 dBA
"The Cottage"	29 dBA	30 dBA	38 dBA
Greenmeadows Estate	23 dBA	26 dBA	41 dBA
"Belmont Residence" (owned by Cleary Bros.)	33 dBA	30 dBA	

The current proposal will marginally increase the noise contribution of the haul road in isolation at the "The Hill", "The Cottage" and Greenmeadows Estate. These predicted levels, considering the quarry haul road in isolation, are consistent with the previous noise impact assessment in 2002. As the haul road noise component is minor in comparison with other sources on site the predicted total contributed noise level for the Albion Park Quarry operation will not change.

2.2 Traffic Noise Predictions

In order to achieve the higher production levels an increase in traffic volumes is expected from the quarry. However, the peak volume of traffic will not change as a result of this proposal.

The noise impact from a peak traffic volume of 130 vehicles per hour with approximately 60% being heavy vehicle movements was assessed in 2002 at receivers in Greenmeadows Estate (refer Heggies Report 30-1079 R1 *Noise and Blasting Impact Assessment Cleary Bros Albion Park Quarry*). The assessment found that the overall traffic noise on the East-West Link would remain below the daytime traffic noise goals with the inclusion of quarry peak traffic volumes.

3 Conclusion

Heggies has conducted a detailed investigation into the potential noise impacts from a production increase, to 800,000 tonnes per annum, at the Cleary Bros Albion Park Quarry. Findings of the investigation indicate that noise from the increased production levels at the quarry would remain below current noise consent levels.

Traffic flows from the quarry would not exceed the peak levels assessed during the original EIS 2002 and therefore the impact of the proposed traffic flows would be consistent with the previous findings.

I trust that the preceding is sufficient to meet your current requirements. If you need any further information please do not hesitate to contact me on 4908 4500 or email john.cotterill@heggies.com.

Regards

John Cotterill
Heggies Pty Ltd

REPORT 30-1079-R1
Revision 0

Noise and Blasting Impact Assessment Cleary Bros Albion Park Quarry

Prepared for

Perram and Partners
12 Clanwilliam Street
EASTWOOD NSW 2122

13 December 2002

RICHARD HEGGIE
ASSOCIATES
ACN 001 584 612

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Noise and Blasting Impact Assessment
Cleary Bros Albion Park Quarry

Quality System
Quality Endorsed Company
ISO 9001 Lic 3236
Standards Australia

Richard Heggie Associates Pty Ltd operates under a Quality System which has been certified by Quality Assurance Services Pty Limited to comply with all the requirements of AS/NZS ISO 9001:2000 "Quality management systems - Requirements" (Licence No 3236).

This document has been prepared in accordance with the requirements of that System.

AAAC
MEMBER FIRM OF THE ASSOCIATION OF AUSTRALIAN ACOUSTICAL CONSULTANTS

Richard Heggie Associates Pty Ltd is a Member Firm of the Association of Australian Acoustical Consultants.

Reference	Status	Date	Prepared	Checked	Authorised
30-1079R1	Revision 0	13 December 2002	JC		

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TABLE OF CONTENTS

1 INTRODUCTION

Richard Heggie Associates Pty Ltd (RHA) has been commissioned by Perram and Partners (on behalf of Cleary Bros (Bombo) Pty Ltd) to conduct a noise and blasting impact assessment for expansion of the subject Albion Park Quarry. The quarry is owned by Cleary Bros (Bombo) Pty Ltd and is located near Albion Park in the Illawarra region of NSW.

Broadly, the objectives of the noise and blasting assessment are to identify the potential impacts of noise from construction activities, overburden removal, resource extraction, processing and transporting of finished product at the Albion Park Quarry site. The effect of ground vibration and airblast from blasting at the quarry was also addressed.

The noise assessment has been prepared in accordance with Australian Standard AS 1055-1997 "*Description and Measurement of Environmental Noise*" Parts 1, 2 and 3 and with reference to the EPA's "*Industrial Noise Policy"* (INP) and "*Environmental Noise Control Manual*" (ENCM). The assessment has been guided by the NSW Department of Urban Affairs (DUAP) Director General's requirements.

2 DESCRIPTION OF PROPOSED PROJECT

2.1 Proposed Development

The proposed development is to be a continuation of the existing Albion Park quarrying operation. The area of operation for extraction is to be extended, whilst existing infrastructure is utilised for crushing, screening and stockpiling of extracted rock. Finished products will be transferred to the market by road style haul trucks at existing production rates using the East-West Link Road.

The proposed expansion to the operations may be broken down into 8 stages of development:

- Construction of visual/acoustic screens
- Land clearing
- Topsoil removal and stockpiling
- Overburden removal
- Resource extraction

- Haulage of extracted rock to the processing plant
- Crushing, screening and stockpiling of extracted rock
- Transportation of finished product to the market

2.2 Plant and Equipment

Plant and equipment to be used on the site are listed under two distinct categories:

Processing Plant

- Primary crusher
- Secondary crushers and screens
- Pug mill

Mobile Equipment

- CAT 773 or CAT 769 dump truck (or similar)
- CAT 245 face shovel (or similar)
- CAT 992 loader (or similar)
- Rock drill
- Water cart
- CAT D8L dozer (or similar) used intermittently
- 235C hammer excavator (or similar) used intermittently
- CAT 980C loader
- Cat 627 Scraper (or similar) used intermittently

2.3 Plant and Equipment Noise Levels

Acoustically significant items of plant and equipment were measured at Albion Park Quarry during February 2001. The sound power levels determined from these measurements are given in **Table 2.3.1**. The details of the octave band levels recorded are given in **Appendix A**.

Table 2.3.1 Equipment Sound Power Levels

Equipment	Sound Power Levels
Processing Plant	
Primary crusher	112 dBA
Secondary crushers and screens	116 dBA
Pug mill	115 dBA
Mobile Equipment	
CAT 773 dump truck	114 dBA
CAT 627 scraper*	111 dBA
CAT 245 face shovel	117 dBA
CAT 992 loader	118 dBA
Rock drill	118 dBA
Water cart	109 dBA
CAT D8L dozer*	116 dBA
235C hammer excavator*	112 dBA
CAT 980C loader	114 dBA

* Intermittent use only

3 SITE DETAILS

The Albion Park Quarry site is located within the Illawarra region near Albion Park, NSW. Existing extraction, processing and transportation occurs on Lot 3 DP 858245 and Lot 1 DP 35908.

It is proposed that existing the infrastructure be maintained and that future extraction will take place on a 18 hectare portion of Lot 1 DP 858245. For this to be viable, haulage of raw material must occur across Lot 2 DP 858245, an adjoining parcel of land owned by CSR Readymix.

The nearest potentially affected residence to the boundary of the proposed development, which is not owned by Cleary Bros, is the "The Hill" Residence, situated approximately 430 m to the northeast (see Location Map **Appendix B**). The "Belmont" Residence, directly to the east of the proposed development, is owned by Cleary Bros.

4 HOURS OF OPERATION

Continued operations of the quarry would be undertaken within the existing daytime hours of operation for the Albion Park Quarry as specified within the current Conditions of Consent. A summary of the hours of operation is contained within **Table 4.1**.

Table 4.1 Hours of Operation

Activity	Hours	Day
Drilling	7.00 am to 5.30 pm 7.00 am to 1.00 pm	Monday to Friday Saturday
Blasting	8.30 am to 5.00 pm	Monday to Friday
Loading and haulage of blasted rock, topsoil and overburden stripping, bund wall construction, routine maintenance	7.00 am to 5.30 pm 7.00 am to 1.00 pm	Monday to Friday Saturday
Crushing, screening and stockpiling operations	7.00 am to 5.00 pm 7.00 am to 1.00 pm	Monday to Friday Saturday
Other activities [1]	7.00 am to 5.00 pm	Monday to Friday

[1] "Other activities" include those activities associated with the extraction operation but exclude other site activities which are the subject to their own approvals and/or licences eg workshop activities.

5 EXISTING ACOUSTICAL ENVIRONMENT

5.1 Background Noise Survey

The objective of the background monitoring survey was to measure $L_{A90(15minute)}$ and $L_{Aeq(15minute)}$ noise levels at the nearest potentially affected receptors during daytime, evening and night-time periods to enable the determination of the intrusiveness and amenity criteria for the development.

Background noise levels were monitored at three locations adjacent to the Albion Park Quarry site during February 2001. ARL Type EL215 environmental noise loggers were used to monitor the ambient noise levels located at the residential locations given in **Table 5.1.1**. A Location Map showing each noise monitoring location is contained in **Appendix B**. Attended noise measurements were also taken in order to determine the variety of noise sources likely to affect and contribute to the unattended noise surveys.

Table 5.1.1 Ambient Noise Monitoring Locations

Noise Monitoring Location	Date of Monitoring	Description
1	February 2001	"The Hill" Residence, Dunster Lane
2	February 2001	94 Jarrah Way, Greenmeadows Estate
3	February 2001	12 Madden Street, Oak Flats

Continuous Unattended Monitoring

Weather data for the unattended noise survey period was obtained from the weather station located at Albion Park Airport. Noise survey data during periods of any rainfall and/or wind speeds in excess of 5 m/s (approximately 9 knots) were discarded. A summary of the results of the daytime background noise surveys is given in **Table 5.1.2**. The ambient noise levels from each monitoring location are presented in graphical format in **Appendix C**.

Table 5.1.2 Summary of Existing Daytime and Ambient Background Noise Levels

Location	Description	Background Noise Level L_{A90} Rating Background Level (RBL)	Measured Existing Ambient L_{Aeq} Noise Level	Estimated L_{Aeq} Contribution from Industrial Noise Sources
Location 1 "The Hill" Residence, Dunster Lane	**Daytime** 7am to 6pm	34 dBA	52 dBA	<49 dBA
Location 2 94 Jarrah Way, Greenmeadows Estate	**Daytime** 7am to 6pm including Cleary Bros Quarrying activities	38 dBA	63 dBA	<49 dBA
	Daytime 7am to 6pm excluding Cleary Bros Quarrying activities	38 dBA	50 dBA	<39 dBA
Location 3 12 Madden Street, Oak Flats	**Daytime** 7am to 6pm	42 dBA	60 dBA	<49 dBA

Note: The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level.

The L_{Aeq} is the equivalent continuous noise level defined as the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

Location 1 is the nearest potentially affected residence to the proposed quarry extension. Location 2 is likely to represent the general character of noise in the area but has the potential to include the influence of existing quarrying activities on the background noise levels.

Location 3 was chosen as a noise monitoring location which is likely to be representative of the local environment in the absence of noise from existing quarrying activities, being in the same general vicinity, and with a similar setback to the Princes Highway.

Ambient Noise Environment for Assessment Purposes

Monitoring results indicate that Location 3 displayed higher RBLs and ambient L_{Aeq} levels than Location 2, indicating that, although there was no contribution from existing quarrying activities, the background level was raised by other noise sources including residential activities and both local traffic and traffic on the Princes Highway. Therefore, this data has not been used in the determination of RBL values and project specific noise levels. In order to estimate background noise levels at Location 2 in the absence of the Cleary Bros Albion Park Quarry operations, ambient noise levels were examined with and without the quarry in operation.

For the purpose of assessing potential noise impacts from the Albion Park Quarry expansion, ambient noise level data has been divided into two distinct localities, namely:

- "The Hill" Residence - including background monitoring at Location 1.
- Greenmeadows Estate Residential - including background monitoring at Location 2.

On the basis if these two localities, the RBLs used to determine the project specific noise levels are presented in **Table 5.1.3**.

Table 5.1.3 Daytime L_{A90} RBL Values for Assessment Purposes

Location	L_{A90} Rating Background Level Values (dBA)
"The Hill" Residence	34
Greenmeadows Estate Residential	38

6 IMPACT ASSESSMENT PROCEDURES

6.1 General Objectives

Residential Receiver

Responsibility for the control of noise emission in New South Wales is vested in Local Government and the EPA. The EPA released a NSW Industrial Noise Policy in December 1999 that provides a framework and process for deriving noise criteria for consents and licences that will enable the EPA to regulate premises that are scheduled under the Protection of the Environment Operations Act, 1997.

The specific policy objectives are:

- To establish noise criteria that would protect the community from excessive intrusive noise and preserve amenity for specific land uses.
- To use the criteria as the basis for deriving project specific noise levels.
- To promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects.
- To outline a range of mitigation measures that could be used to minimise noise impacts.
- To provide a formal process to guide the determination of feasible and reasonable noise limits for consents or licences that reconcile noise impacts with the economic, social and environmental considerations of industrial development.
- To carry out functions relating to the prevention, minimisation and control of noise from premises scheduled under the Act.

Assessing Intrusiveness

For assessing intrusiveness, the background noise needs to be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than 5 decibels above the measured background level (L_{A90}).

Assessing Amenity

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include road, rail or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion. For high-traffic areas there is a separate amenity criterion. The cumulative effect of noise from industrial sources needs to be considered in assessing impact.

Extracts from the NSW Industrial Noise Policy that relate to the amenity criteria is given in **Table 6.1.1** and **Table 6.1.2**.

Table 6.1.1 Amenity Criteria - Recommended L_{Aeq} Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
	Urban/Industrial Interface (for existing situations only)	Day	65	70
		Evening	55	60
		Night	50	55
School classrooms – internal	All	Noisiest 1-hour period when in use	35	40
Hospital ward - internal	All	Noisiest 1-hour period	35	40
- external	All	Noisiest 1-hour period	50	55
Place of worship – internal	All	When in use	40	45
Area specifically reserved for passive recreation (eg National Park)	All	When in use	50	55
Active recreation area (eg school playground, golf course)	All	When in use	55	60
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Notes For Monday to Saturday, Daytime 7.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 7.00 am

On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am

The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period

Table 6.1.2 Modification to Acceptable Noise Level (ANL)* to Account for Existing Levels of Industrial Noise

Total Existing L_{Aeq} noise level from Industrial Noise Sources	**Maximum L_{Aeq} Noise Level for Noise from New Sources Alone, dBA**
≥ Acceptable noise level plus 2 dBA	If existing noise level is *likely to decrease* in future acceptable noise level minus 10 dBA If existing noise level is *unlikely to decrease* in future existing noise level minus 10 dBA
Acceptable noise level plus 1 dBA	Acceptable noise level minus 8 dBA
Acceptable noise level	Acceptable noise level minus 8 dBA
Acceptable noise level minus 1 dBA	Acceptable noise level minus 6 dBA
Acceptable noise level minus 2 dBA	Acceptable noise level minus 4 dBA
Acceptable noise level minus 3 dBA	Acceptable noise level minus 3 dBA
Acceptable noise level minus 4 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 5 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 6 dBA	Acceptable noise level minus 1 dBA
< Acceptable noise level minus 6 dBA	Acceptable noise level

* ANL = recommended acceptable L_{Aeq} noise level for the specific receiver, area and time of day from **Table 6.1.1**.

6.2 Quarry Noise Emission Design Goals

The noise emission design goals for the proposed expansion of Albion Park Quarry have been established with reference to the NSW Industrial Noise Policy outlined in **Section 6.1**.

The existing background noise levels exhibited a trend typical of a suburban area that is, rising significantly during the day as a result of increased traffic activity. The intrusiveness criteria have been based on noise measurements taken without the quarry in operation.

The existing $L_{Aeq(period)}$ noise levels include natural sources, some passing traffic noise and noise from the existing quarrying operations. The amenity criteria were based from measurements of only industrial noise sources in the area (ie, excluding noise from transportation and natural sources). As the existing industrial noise level contributions are more than 6 dBA below the respective daytime, evening and night-time criteria, the amenity criteria were set via reference to **Table 6.1.1**. The residences in the general area (although some being in a rural setting) are influenced by extractive industry in the general area as well as noise from traffic on the Princes Highway and are therefore best described by the "suburban receiver" type.

The resulting intrusiveness and amenity design goals are given in **Table 6.2.1**.

Table 6.2.1 Albion Park Quarry Intrusiveness and Amenity Noise Design Goals

Location	Description	Intrusiveness Criterion $L_{Aeq(15minute)}$	Amenity Criterion L_{Aeq}
Location 1 "The Hill" Residence	**Daytime** 7am to 6pm	39 dBA	55 dBA
Location 2 Greenmeadows Estate Residential	**Daytime** 7am to 6pm	43 dBA	55 dBA

For assessment purposes the intrusive and amenity criterion levels at "The Hill" residence have been adopted at the Company owned "Belmont" residence.

6.3 Construction Noise Criteria

The EPA NSW "*Environmental Noise Control Manual"*, Chapter 171, sets out noise criteria applicable to construction site noise for the purpose of defining intrusive noise impacts. The EPA's construction site noise control guidelines are presented in **Table 6.3.1**. Based upon the EPA's guidelines, the project specific construction noise limits outlined in **Table 6.3.2** will apply to the project.

Table 6.3.1 Construction Site Noise Control Guidelines

Total Construction Period	Acceptable L_{A10} Noise Level[1]
4 weeks and under	Background L_{A90} plus 20 dBA
4 weeks to 26 weeks	Background L_{A90} plus 10 dBA
Greater Than 26 Weeks	Background L_{A90} plus 5 dBA

1. Applicable between the hours of 7.00 am and 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays. For all other times construction noise must be inaudible at the receiver. No construction work is to take place on Sundays or Public Holidays.

Table 6.3.2 Project Specific Construction Noise Limits

Total Construction Period	L_{A90} Background Level		Project Specific L_{A10} Noise Level[1]
4 weeks and under	"The Hill" Residence	34 dBA	54 dBA
4 weeks to 26 weeks		34 dBA	44 dBA
Greater Than 26 Weeks		34 dBA	39 dBA
4 weeks and under	"Belmont" Residence	34 dBA	54 dBA
4 weeks to 26 weeks		34 dBA	44 dBA
Greater Than 26 Weeks		34 dBA	39 dBA

1. Applicable between the hours of 7.00 am and 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays. For all other times construction noise must be inaudible at the receiver. No construction work is to take place on Sundays or Public Holidays.

6.4 Traffic Noise Design Goals

All vehicles travelling to and from the quarry will now use the East-West Link Road. Traffic noise assessments in this report are based on vehicles using the East-West Link Road.

The Environment Protection Authority released the "*Environmental Criteria for Road Traffic Noise*" in May 1999.

The policy sets out noise criteria applicable to different road classifications for the purpose of defining traffic noise impacts.

The East-West Link Road clearly falls into the category of "collector road" and it is for this reason the noise criteria outlined in **Table 6.4.1** have been adopted.

Table 6.4.1 EPA Environmental Criteria for Road Traffic Noise

Category	Descriptor	Traffic Noise Goal
8. Land use developments with the potential to create additional traffic on a collector road	$L_{Aeq(1hour)}$ daytime	60 dBA*
	$L_{Aeq(1hour)}$ night-time	55 dBA*

* In all cases (where criteria are already exceeded), traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dBA.

7 ASSESSMENT OF NOISE IMPACTS

7.1 Operational Noise Modelling

A computer model was used to predict the noise emissions from the current operations and future development of the Albion Park Quarry. The Environmental Noise Model (ENM) used for the noise emission predictions has been produced in conjunction with the EPA. A map giving all relevant topographic information was digitised into the computer. The model subsequently used this map, together with the noise source data, ground cover, shielding by barriers and/or adjacent buildings and atmospheric information to predict noise levels at the various receiver locations. Atmospheric conditions, which did not enhance noise (ie 20^{o}C air temperature, 65% Relative Humidity, 0 m/s wind speed and 0^{o}C/100 m temperature inversion), were assumed for the initial phase of the modelling exercise. Noise contours for the Year 10, 20 and 40 quarry plans are contained within **Appendix D**. These noise contours are given for the situation without the extension to the noise control bund intended to screen the "Belmont" residence.

Noise Mitigation and Management

A visual/noise bund is to be constructed on the eastern boundary of the proposed extraction area. The location of the bund is given in the Location Map in **Appendix B**. The bund will be constructed of earth to a height of 3 m above the existing ground level and will be planted and treed with appropriate species for the area.

Table 7.1.1 Daytime Noise Impact Assessment - Calm Weather Conditions

Receiver Location	Predicted LAeq(15minute) Noise Level dBA)				Design Goals		
	Existing Situation	Year 10	Year 20	Year 30	Description	Intrusiveness Criterion LAeq(15minute)	Amenity Criterion LAeq(period)
"The Hill" Residence	27	33	38	34	**Daytime** 7.00 am to 6.00 pm	39 dBA	55 dBA
Greenmeadows Residential Estate	42	41	41	41	**Daytime** 7.00 am to 6.00 pm	43 dBA	55 dBA
"Belmont" Residence (owned by Cleary Bros)	22	47	52	67	**Daytime** 7.00 am to 6.00 pm	39 dBA	55 dBA

Noise Impact Assessment for Calm Weather Conditions

The noise level predicted for the existing situation and the future expansion (refer to **Table 7.1.1**) indicate that noise from the site will be between 1 dBA and 12 dBA below the project specific noise goal at the "The Hill" Residence and between 1 dBA and 2 dBA below the project specific noise goal at Greenmeadows Estate for daytime operation.

The "Belmont" Residence is owned by Cleary Bros but is currently occupied by the previous owner. It is likely that the previous owner will vacate the residence within approximately 5 years of the commencement of the proposed development.

It is predicted that the noise levels during the initial 10 year period of the proposed operations will exceed the project specific intrusive criterion at the "Belmont" Residence. The major impact will occur during operation of the rock drill. In order to reduce the impact of noise to an acceptable level, and subject to agreement of the previous owner, the visual/noise bund will be extended to shield the residence from the proposed operation. This will reduce noise from the proposed operation to 35 dBA which is below the project specific intrusive criterion. During the construction of the section of the bund wall closest to the "Belmont" Residence the Company will offer temporary accommodation to the resident if required.

7.2 Effects of Meteorology on Noise Levels

Wind

Wind has the potential to increase noise at a receiver when it is light and stable and blows from the direction of the source of the noise. As the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transport sources.

Wind effects need to be considered when wind is a feature of the area under consideration. Where wind blows from the source to the receiver at speeds up to 3 m/s for more than 30% of the time in any season, then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

Weather data was obtained from the Bureau of Meteorology for the past 12 months from a weather station at the Albion Park Airport. This data was analysed to determine the frequency of occurrence of winds up to speeds of 3 m/s for daytime in each season. The results of this analysis are contained within **Table 7.2.1**.

Table 7.2.1 Seasonal Frequency of Occurrence Wind Speed Intervals - Daytime

Period	Calm	Wind Direction	0.5 to 1.5 m/s	1.5 to 3 m/s	0.5 to 3 m/s
Summer	2.4%	WSW±34^o	0.3%	4.2%	4.5%
Autumn	3.8%	W±34^o	2.0%	5.6%	7.7%
Winter	4.2%	W±34^o	1.9%	5.3%	7.2%
Spring	1.6%	ENE±34^o	0.5%	4.1%	4.6%

Seasonal wind records indicate that daytime winds of up to 3 m/s predominate in autumn from the western sector (ie west ±34^o) for up to approximately 8% of the time. The percentage of occurrence of daytime winds blowing from the subject mining operations towards the closest residences is therefore significantly less than 8%.

As the frequency of occurrence of daytime winds in all seasons is below 30%, then wind is not considered to be feature of the area.

Temperature Inversion

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. For a temperature inversion to be a significant characteristic of the area it needs to occur for approximately 30% of the total time during winter, or about 2 nights per week.

The EPA Industrial Noise Policy states that temperature inversions need only be considered for the night noise assessment period (ie after 10.00 pm). As the proponent does not intend to operate at night, the effect of temperature inversions has not been considered as part of this assessment.

7.3 Construction Noise Modelling

A visual/noise bund is to be constructed on the eastern boundary of the proposed extraction area. Noise modelling was undertaken to determine the likely noise level received at the nearest, most potentially affected residences during the construction period. These residences are the "The Hill" and "Belmont" Residences. Greenmeadows Estate is unlikely to be affected by this construction as it is sufficiently distanced, and topographically shielded from the construction area.

Construction Noise Calculation Inputs

The computer noise model was used to predict the noise emissions during noise bund construction. Atmospheric conditions which did not enhance noise were assumed for the modelling exercise.

The L_{10} sound power levels of acoustically significant plant and equipment to be used in the construction of the noise bund are given in **Table 7.3.1**. The sound power levels were determined from on-site measurements, and measurements obtained from a Richard Heggie Associates database.

Table 7.3.1 Equipment Sound Power Levels

Equipment	Sound Power Level
Bulldozer - CAT D9 (or similar)	116 dBA
Dump Truck or Scraper	118 dBA

Construction Noise Calculation Results

Construction noise calculations were based upon the "worst case" scenario, with equipment working at the likely closest point to the respective receivers. The results, contained in **Table 7.3.2**, indicate that acoustic bund construction noise levels will be met at the "The Hill" Residence provided that the construction period at the closest point to this residence is restricted to four weeks. Due to the proximity of the "Belmont" Residence to the bund construction, noise levels are predicted to be exceeded by up to 10 dBA at this location.

To alleviate the impact of noise during the construction of the section of the bund wall closest to the "Belmont" Residence the Company will offer temporary accommodation to the resident if required.

Table 7.3.2 Construction Noise Calculation Results

Total Construction Period	L_{A10} Construction Noise Level		Project Specific L_{A10} Noise Level[1]
4 weeks and under	"The Hill" Residence	51 dBA	54 dBA
	"Belmont" Residence	68 dBA	54 dBA
4 weeks to 26 weeks	"The Hill" Residence	51 dBA	44 dBA
	"Belmont" Residence	68 dBA	44 dBA
Greater Than 26 Weeks	"The Hill" Residence	51 dBA	39 dBA
	"Belmont" Residence	68 dBA	39 dBA

1. Applicable between the hours of 7.00 am and 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays. For all other times construction noise must be inaudible at the receiver. No construction work is to take place on Sundays or Public Holidays.

7.4 Traffic Noise Predictions

Traffic generated from product sales at the quarry will not alter from existing levels as a result of the proposed extension. All vehicles entering or leaving the quarry site now use the East-West Link Road. Opening of the East-West Link Road has effectively reduced the noise levels generated by quarry traffic at Greenmeadows Estate residences as the quarry traffic will pass some 145 m from the closest dwelling.

A traffic survey conducted in March 2000 suggested that the peak hourly traffic flow would be up to 130 vehicles per hour with approximately 60% being heavy vehicle movements.

A prediction of traffic noise levels at the closest Greenmeadows Estate residence generated from quarry traffic is given in **Table 7.4.1**.

Table 7.4.1 Predicted Quarry Traffic Noise Contribution

Receiver Location	Predicted Traffic Noise Level $L_{Aeq(1hour)}$	Design Goals	
		Period	Traffic Noise Goal $L_{Aeq(1hour)}$
Greenmeadows Estate Residence	42 dBA	**Daytime** 7 am to 10pm	60 dBA
		Night 10 pm to 7 am	55 dBA

The predicted contribution to the noise at the closest residence at Greenmeadows Estate for the peak hourly flow from quarry generated traffic is clearly below the daytime traffic noise goal. Consequently, continuation of the Cleary Bros Quarry traffic flow will not cause the noise from the total traffic flow on the East-West Link Road to exceed the daytime traffic noise goals.

There may be a requirement, at some time in the future, to import fill material into the quarry for landform rehabilitation purposes. The exact amount of fill required, or number of trucks needed, is not known at this time. It may be possible to backload aggregate delivery trucks with fill material to fulfil some of this requirement. The contribution to noise at residential receivers of current quarry traffic flow is such that some potential for traffic growth is possible without breaching the EPA criterion.

8 CUMULATIVE NOISE IMPACT

The NSW INP prescribes detailed calculation routines for establishing "project specific" $L_{Aeq(15minute)}$ intrusive criteria and $L_{Aeq(period)}$ amenity criteria at potentially affected receivers for a development (in isolation).

Potential cumulative noise impacts from existing and successive resource developments are embraced by the INP procedures by ensuring that the appropriate noise emission criteria (and consent limits) are established with a view to maintaining acceptable noise *amenity* levels for residences.

In order to assess potential cumulative noise impacts it is important to appreciate and distinguish between the INP's first and second environmental noise control objectives as follows:

Intrusive Noise Criteria $L_{Aeq(15minute)}$

The INP's first objective, that the intrusive noise emission from any single source does not exceed the background level by more than 5 dBA, relates to each individual development and the intrusive noise limit is generally specified in the Development Consent and/or Licences and Approvals.

There is not an established procedure (or regulatory requirement) to determine the cumulative intrusive $L_{Aeq(15minute)}$ noise criterion in relation to the simultaneous operation of the existing CSR and Cleary Bros quarrying operations.

Cumulative Noise Amenity Criteria $L_{Aeq(period)}$

The INP's second objective is that the $L_{Aeq(period)}$ amenity level does not exceed the specified "acceptable" level appropriate for the particular locality and land use and is aimed at restricting the potential cumulative increase in noise *amenity* levels (otherwise known as "background creep").

Based on the INP, the acceptable $L_{Aeq(period)}$ noise *amenity* level in relation to the simultaneous operation of the CSR and Cleary Bros quarries are daytime 55 dBA $L_{Aeq(11hour)}$, evening 45 dBA $L_{Aeq(4hour)}$ and night-time 40 dBA $L_{Aeq(9hour)}$.

Indicative Cumulative Noise Impact Assessment

An indicative cumulative noise impact assessment has been based upon an evaluation of the predicted worst case noise emission levels produced by the existing and future operations of the CSR and Cleary Bros quarrying operations. The noise predictions used for the CSR quarry have been obtained from a recent report submitted to Council.

In order to prepare the indicative assessment the following assumptions have been made:

- The individual $L_{Aeq(15minute)}$ emission limits from each development are simultaneously additive to give a total $L_{Aeq(15minute)}$ intrusive level.
- The cumulative $L_{Aeq(period)}$ amenity level is approximately 3 dBA less than the total $L_{Aeq(15minute)}$ intrusive level.

A summary of the indicative cumulative assessment is contained within **Table 8.1.1**.

Table 8.1.1 Indicative Maximum Cumulative Noise Impact Assessment Summary

Mine	"The Hill" Residence $L_{Aeq(15minute)}$ Daytime	Greenmeadows Estate Residential $L_{Aeq(15minute)}$ Daytime	"Belmont" Residence $L_{Aeq(15minute)}$ Daytime
Cleary Bros Quarry	38 dBA	42 dBA	47 dBA*
CSR Quarry	30 dBA	44 dBA	40 dBA
Total Intrusive Level	39 dBA	46 dBA	48 dBA
Cumulative Amenity level	**36 dBA**	**43 dBA**	**45 dBA**
Acceptable Amenity Level	**55 dBA**		

* Note: It is assumed that the "Belmont" Residence will be vacated by the end of Year 10 of the quarry extension.

Based on the foregoing, the estimated maximum cumulative $L_{Aeq(period)}$ amenity levels are well below the INP's acceptable amenity criteria during the daytime period.

9 USE OF EXPLOSIVES

An extensive study into the impact of blasting at the existing Cleary Bros Albion Park Quarry has been conducted by Richard Heggie Associates and is the subject of a detailed report entitled "*Blast Emissions Impact and Control Proposed Albion Park Quarry Extension*" Report 10-1594R1. A summary of the findings of this report, and subsequent blast emission predictions for the proposed future operation, are as follows.

9.1 Ground Vibration and Airblast Limits

Future blast design and monitoring procedures will be implemented with the primary objective of maintaining the levels of Peak Vector Sum (PVS) ground vibration velocity and peak airblast at the closest residences below 5 mm/s and 115 dB Linear respectively, the existing EPA criteria. The EPA also states that the blast emissions criteria may be exceeded for up to 5% of the total number of blasts over a period of 12 months.

These blast emission limits have been imposed on Cleary Bros Albion Park Quarry by the EPA via a Licence Number 299 for blasting between the hours of 8.30 am and 5.00 pm Monday to Friday.

Airblast Emission Levels

At the existing Cleary Bros Albion Park Quarry the limiting parameter for blast design is airblast, rather than ground vibration.

In over 3 years of accurate blast monitoring (ie since January 1999) there have been no exceedances of the EPA's vibration criteria at the nearby "The Hill" Residence and there has been only one measured airblast level (of the 113 blasts) greater than 110 dB Linear (at 112 dB Linear).

9.2 Blast Emission Monitoring Results

Presented in **Appendix E** is a summary of the Blast Emissions Monitoring Results recorded for the blasts conducted between January 1999 and February 2002. The Blast Emissions Monitoring Results sheet includes the following information:

Blast Details

- Blast identification number
- Type of blast (production or overburden)
- Date of blast event
- Time of blast initiation
- Overall and front row Maximum Instantaneous Charge (MIC) in any 8 ms interval (kg)
- Plan distance from blast to monitoring location
- Peak Vector Sum (PVS) resultant ground vibration level (mm/s)
- Peak linear airblast level (dB Linear)

9.3 Influence of Blast Initiation Direction and Face Orientation on Airblast

Results of research conducted both overseas and in Australia indicate that the level of airblast in the direction of initiation of the detonators is about 4 dB Linear higher than in the opposite direction.

Correspondingly, this research indicated that the increase in airblast in front of the blast face relative to behind the face is 5 dB Linear to 10 dB Linear.

Site specific monitoring conducted at Cleary Bros Albion Park Quarry has yielded airblast levels up to 13 dB Linear lower behind the blast face (relative to in front) and up to 11.5 dB Linear lower in the opposite direction to the direction of initiation of the detonators (relative to in the direction of initiation), at offset distances of between 300 m and 900 m.

It is on the basis of this phenomenon that the blast faces in the existing Cleary Bros Albion Park Quarry were progressively reorientated (between the beginning of 1998 and mid 1998) in order to initiate the blast in the opposite direction to the nearby residence and thereby minimise the airblast emission impacts at the "The Hill" Residence.

9.4 Future Blast Designs and Offset Distances

In order to optimise bench heights and MICs, whilst maintaining a 5% likelihood of exceeding the 115 dB Linear airblast criterion, the feasibility of using "deck charges" was investigated. Deck charges are those that are separated within a blasthole by inert material.

The initial decked blasthole design assumed the following:

- Direction of detonator initiation is away from near residences
- Use of 1.5 m solid decking per blasthole
- Two columns of explosives of equal length per blasthole
- Two detonators per blasthole
- Explosive columns initiated from the bottom
- Use of 76 mm diameter blastholes
- Stemming depth 2.2 m
- Subdrill of 1.2 m for both production and overburden blasts (where subdrill is the portion of the blasthole drilled beyond the excavation limit).

9.5 Verification of Future "Deck Charge" Blast Designs

In order to confirm the practicality and to quantify the blast emissions from decked blastholes, a series of thirteen trial blasts were conducted at Albion Park Quarry between 25 June 2001 and 15 February 2002. To demonstrate the principle of decked blastholes, the blasthole loading parameters for Blast No 22/01 are shown diagrammatically in **Appendix F**.

A summary of the most pertinent blast design parameters, the offset distances and the resulting levels of airblast and ground vibration for these deck charge trial blasts are presented in **Table 9.5.1**. Here, the front row MIC has been nominated as this is the critical row for containing and controlling airblast.

A critical design parameter for these trial blasts, apart from using deck charges, was the initiation of the blast in the direction away from the monitoring location.

Table 9.5.1 Trial Blast Design Parameters and Blast Emission Levels

Blast No	Front Row MIC	Nominal Bench Height	Monitoring Offset Distance	Airblast (dB Linear)	Ground Vibration (PVS-mm/s)
22/01	7 kg	10.5 m	500 m	110.4	2.6
28/01	21 kg	10 m	500 m	113.3 (with face blowout) 108.0 (without blowout)	3.0
30/01	21 kg	10 m	500 m	107.5	2.1
32/01	29 kg	11 m	500 m	110.6	2.5
33/01	28 kg	9.5 m	500 m	106.8	2.9
35/01	25 kg	10 m	500 m	106.5	2.7
36/01	33 kg	14 m	633 m	107.5	2.4
37/01	36 kg	11 m	500 m	109.3	2.2
38/01	35 kg	11 m	500 m	103.6	3.2
39/01	39 kg	12.2 m	250 m	117.6	6.81
40/01	34 kg	11.8 m	500 m	106.1	2.19
43/01	36 kg	12.0 m	500 m	103.8	2.00
3/02	11 kg	11.0 m	500 m	110.0	1.77

The blasts shown in **Table 9.5.1** were monitored (for airblast and ground vibration) at a nominal distance of 500 m at the same orientation from the blast that the "Belmont" Residence will be from initial blasting in the proposed quarry extension.

9.6 Blast Emissions Prediction - Decked Blastholes

In order to predict future blast emission levels for decked blastholes, the measured airblast and ground vibration data for the deck charge blasts listed in **Table 9.5.1** (together with the data for those deck charge blasts presented in **Appendix E)** were used to develop airblast and ground vibration "site laws" (as defined below).

The site specific relationships between the level of blast emissions for decked blastholes and Scaled Distance (site laws), which form **Appendices G** (airblast) and **H** (ground vibration), are presented in **Figure 9.6.1** for peak airblast and **Figure 9.6.2** for PVS (peak vector sum) ground vibration velocity.

Figure 9.6.1 Peak Linear Airblast - Site Law for Decked Blastholes - 44 Data Points

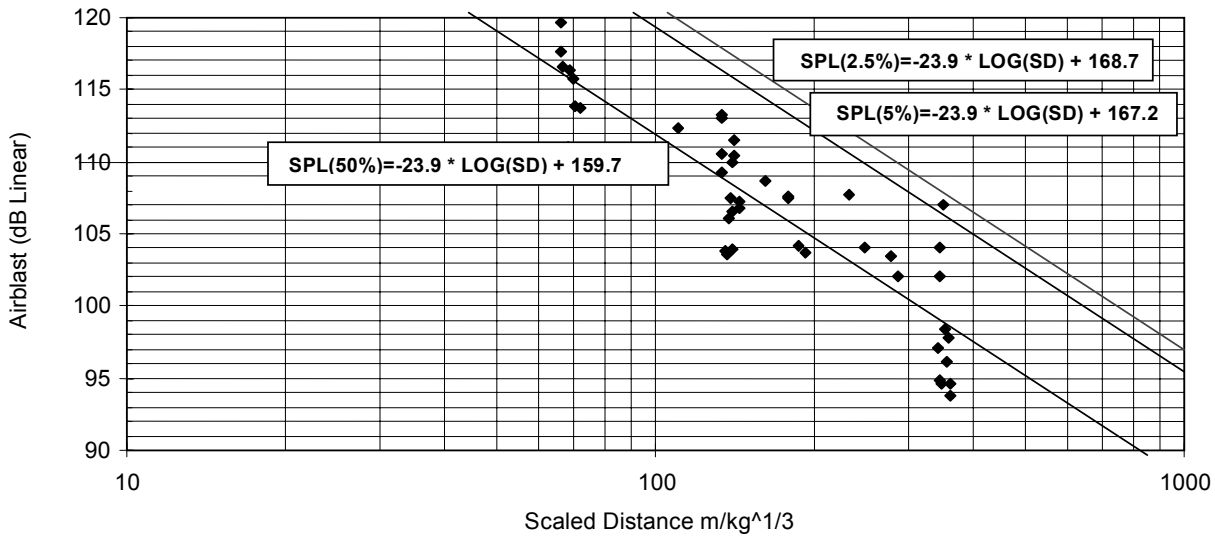
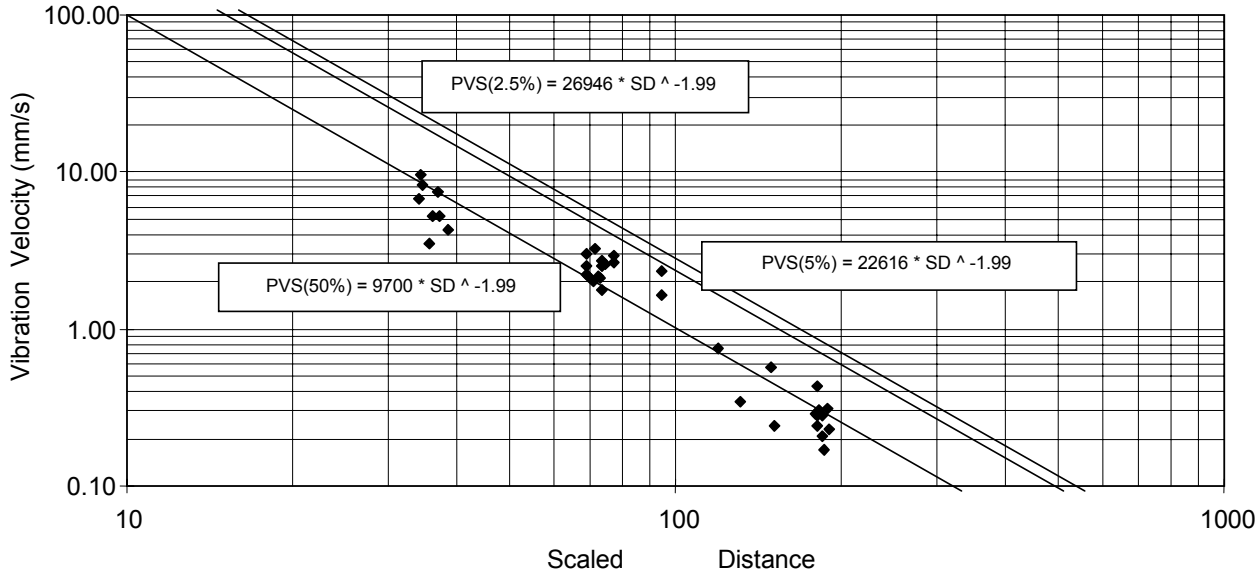


Figure 9.6.2 PVS Ground Vibration Velocity for Decked Blastholes - 37 Data Points



Based on these site laws, calculations were conducted to indicate the allowable MICs for compliance with the general EPA human comfort criteria of 115 dB Linear (airblast) and 5 mm/s (ground vibration) for a range of offset distances. The results of these calculations are presented in **Appendix I** (airblast) and **Appendix J** (ground vibration) for both a 50% and 5% likelihood of exceedance.

Review of the data presented in **Appendix I** indicates that for a 5% likelihood of exceeding 115 dB Linear airblast at 500 m the allowable MIC is 36 kg. The corresponding allowable MIC for a 5% likelihood of exceeding 5 mm/s ground vibration is 53 kg.

9.7 Blast Impact Assessment

By incorporating deck charges of the front row of blastholes in each blast and initiating the blast in the direction away from the closest receiver location, it is predicted that emissions from blasting in the proposed extension, using an MIC of up to 36 kg, would result in compliance with the EPA's general Licence Conditions of 115 dBA airblast and 5 mm/s ground vibration.

Further, as the initial blasting in the proposed quarry extension will be conducted at the farthest point from both the "The Hill" and "Belmont" Residences, the opportunity exists to monitor the blasting as extraction gradually advances towards the residences and to adjust future blast designs, if necessary.

Based on initiating the blast in the direction away from the closest residence (as is the current practice) and the use of deck charges in the front row of blastholes, trials have clearly demonstrated that blasting can be conducted to within about 500 m of the "The Hill" and "Belmont" Residences whilst maintaining compliance with the current EPA Licence Conditions. However, the inevitable future introduction of improved blasting products (eg electronic detonators) will likely enable this offset distance to be reduced.

10 SUMMARY OF FINDINGS AND RECOMMENDATIONS

10.1 Operational Noise Impact

The continued operation of the Cleary Bros Albion Park Quarry will result in noise impacts at the closest most affected non Company owned residences being maintained within the EPA project specific criteria developed for the site. Noise levels at Greenmeadows Estate residential area will be 1 dBA below the project specific criteria and 1 dBA below the project specific criteria at the "The Hill" Residence.

In order to reduce the impact of noise to an acceptable level, and subject to agreement of the previous owner, the visual/noise bund will be extended to shield the "Belmont" Residence from the proposed operation. This will reduce noise from the proposed operation to 35 dBA which is below the project specific intrusive criterion.

10.2 Construction Noise Impact

Noise from construction of the visual/noise bunds will meet the EPA construction noise criteria at the "The Hill" Residence provided that the construction time, at the closest point to the residence, is limited to less than 4 weeks. Further stripping or haul road construction activities following the construction of the visual/noise bund will be maintained at or below the operational noise levels of the proposed quarrying activity.

During the construction of the section of the bund wall closest to the "Belmont" Residence the Company will offer temporary accommodation to the resident if required.

10.3 Cumulative Noise Impact

An indicative cumulative impact assessment revealed that noise from the existing and future operation of the Cleary Bros and CSR quarries would result in levels below the acceptable amenity noise level at surrounding residential areas.

10.4 Blasting Impact

Blasting impacts in the proposed quarry extension will be maintained within the EPA's Licence Conditions (for the existing operation) of 115 dBA airblast and 5 mm/s ground vibration (with an allowance 5% exceedance in a 12 month period) at the closest most affected residences surrounding the site.

10.5 Noise Mitigation and Management

It is recommended that a visual/noise bund be constructed on the northern and eastern boundaries of the proposed extraction area to mitigate noise from the future quarrying operations. The location of the bund is given in the Location Map in **Appendix B**. The bund will be constructed of earth to a height of 3 m above the existing ground level and be planted and treed with appropriate species for the area.

It is proposed that the bund will be extended, with agreement of the previous owner, to shield "Belmont" Residence.

RICHARD HEGGIE
ASSOCIATES

6 April 2004 30-1079 DEC Haul Road 050404.doc

Perram & Partners
12 Clanwilliam St
Eastwood NSW 2122

Attention: Terry Perram

Dear Terry

Proposed Cleary Bros Hardrock Quarry Extension - Albion Park
Noise Impact of Quarry Trucks on Haul Road

Further to a request by DEC for an assessment on the effect of noise from quarry trucks using the haul road (located on Readymix land) on nearest residential receivers for the proposed Cleary Bros Hardrock Quarry Extension at Albion Park, the following is provided;

Cleary Bros has two haul trucks that transport rock from the quarry face to the processing plant. Each truck has an operating cycle of between 8 minutes to 10 minutes. For the noise modelling process it was assumed that there would be six haul truck movements every 15 minutes.

The Noise Impact Assessment (NIA) considered a quarry truck at the entrance of the haul road to the proposed quarry extension. The haul truck location was deemed to be the most exposed location to the Hill and Cottage dwellings.

To calculate a noise contribution from the haul road only, a further assessment was conducted. A haul truck noise source was considered at the entrance of the haul road to the proposed Cleary Bros extension (as per the NIA), at the highest point of the proposed haul road (Chainage 800 RL 142.5), and at the end of the haul road at the existing Cleary Bros. quarry. Contributions at these locations were calculated given the number of haul truck movements per 15 minute period.

The noise contribution from the operation of vehicles on the haul road is given in **Table 1**:

Table 1 Noise Contribution of Quarry Trucks on Haul Road

Location	Noise contribution of trucks on haul road LAeq(15minute)
"The Hill"	28 dBA
"The Cottage"	29 dBA
Greenmeadows Estate	23 dBA
"Belmont Residence" (owned by Cleary Bros.)	33 dBA

MEMBER FIRM OF THE ASSOCIATION OF AUSTRALIAN ACOUSTICAL CONSULTANTS

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Quality Endorsed Company ISO 9001 Lic 3236 Standards Australia

The predicted noise levels from considering the quarry haul road in isolation are consistent with the NIA for the operation and will not change the total contributed noise level from the Cleary Bros. operation in the proposed quarry extension.

I trust the above response satisfies your immediate requirements. However, should you wish to discuss the matter further please call me.

Yours sincerely

John Cotterill

Richard Heggie Associates

Appendix G

TRAFFIC ASSESSMENT

MASSON | WILSON | TWINEY
TRAFFIC AND TRANSPORT CONSULTANTS

Cleary Bros (Bombo) Pty Ltd
C/- Perram & Partners
12 Clanwilliam Street
Eastwood NSW 2122

30 September 2008

Attention: Mr Terry Perram

Dear Terry,

RE: Cleary Bros. Albion Park Quarry - Proposed Increase of Annual Production Levels Traffic Advice

It is understood that Cleary Bros (Bombo) Pty Ltd is seeking approval to increase the annual production levels of the Albion Park Quarry from 400,000 tpa to 800,000 tpa. Increased production would be achieved with an increase in the average monthly production levels rather than capacity improvements associated with on site production facilities.

In 2003, Masson Wilson Twiney (MWT) undertook a traffic impact assessment on behalf of Cleary Bros for the proposed extension of Quarry activities. The proposal sort to expand the extractive area to include the site to the south-east of the existing operation, while maintaining the existing production rate (ie. 400,000 tpa). Approval was granted for this expansion in 2003.

The purpose of this report is to provide a comparative assessment of the potential traffic conditions associated with the proposed production levels and the 2003 approved production level.

Background

Quarrying has been undertaken on the Cleary Bros Albion Park site for over thirty years. The Quarry lies to the south west of the Princes Highway.

Vehicle access to the Quarry is provided from the East-West Link Road (opened in 2002) which extends between the Princes Highway and Croome Road.

SYDNEY SUITE 20/809 PACIFIC HIGHWAY CHATSWOOD NSW 2067 AUSTRALIA TEL 02 9410 4100 FAX 02 9410 4199

The East-West Link Road includes an overpass of the railway line and a grade separated interchange with the Princes Highway.

Quarry Access Arrangements

A roundabout has been installed at the intersection of the East-West Link Road and the Quarry access. Investigations undertaken by the RTA indicated that the Link Road is forecast to carry around 11,000 vehicles per day by around 2018.

The Quarry access road does not provide access to any developments other than the Cleary Bros Quarry. Thus all traffic along the Quarry access road is associated with the Quarry. The roundabout intersection has been designed to accommodate vehicle activity generated by the Quarry.

The roundabout on the Link Road provides direct access between the Quarry access road and the arterial road network with access to the Princes Highway via the Oaks Flat interchange. Thus a haulage route is provided between the Quarry and the Highway which avoids the need to travel through the residential areas of Albion Park Rail.

These vehicle access arrangements to and from the Quarry were approved as part of the 2003 Quarry extension DA.

These access arrangements would be maintained for the proposed increase to annual production levels.

Historical Quarry Production Levels

Monthly production level data has been provided by Cleary Bros for the Albion Park Quarry for the period between July 1999 and August 2008. The monthly production levels for this period are presented in Figure 1.

As can be seen in Figure 1, monthly production levels have fluctuated significantly between 16,000 and nearly 87,000 tonnes per month.

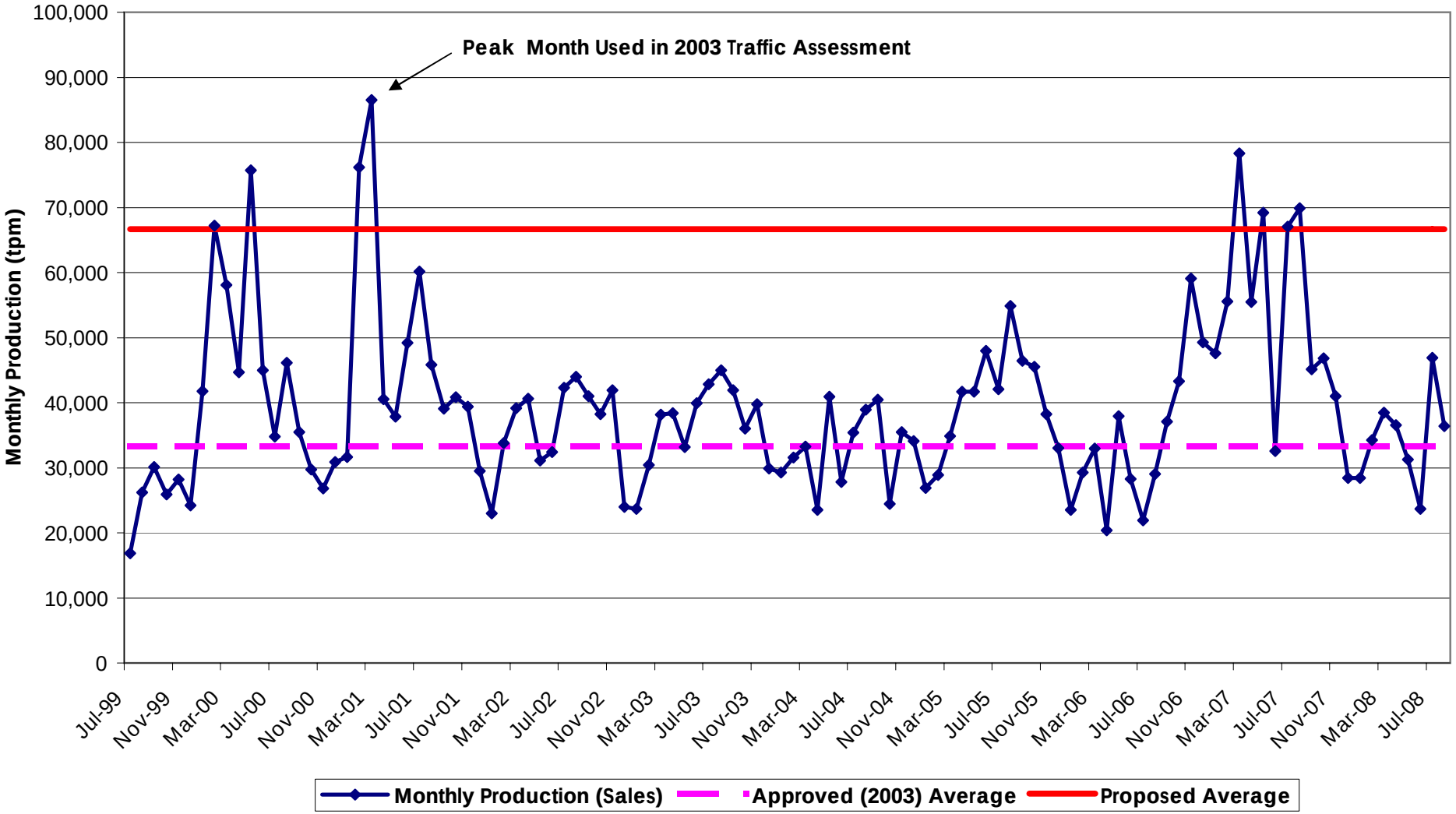
As shown in Figure 1, the peak monthly production level of approximately 86,500 tonnes occurred in March 2001. The March 2001 peak monthly production has not been exceeded in the seven years since.

It is noted that the traffic assessment for the 2003 proposal to extend the Quarry was based on traffic counts of quarry activity undertaken in March 2001, ie. peak monthly production month. It is understood that the Quarry was operating at capacity during this peak month.

Also shown in Figure 1 are the monthly average productions levels for:

- 400,000 tonnes per annum (2003 Approved Production Level); and
- 800,000 tonnes per annum (current proposed level).

Figure 1 - Historical Quarry Monthly Production Levels



It is noted that the historical peak of March 2001 was approximately 30% higher than the average monthly production level that would occur under a 800,000 tonnes per year production scenario.

Traffic Generation Characteristics of Quarry Operations

Traffic generation associated with the Quarry's operation is directly related to the monthly production (ie. sales) levels of the Quarry. That is, high sales leads to a relatively high number traffic movements to and from the site associated with the delivery of product. Similarly low production levels generate a relatively low number of movements to and from the site.

Traffic Implications of Proposed Annual Production Level Increase

As noted above, the proposed increase in annual production levels of the Quarry to 800,000 tpa would be achieved with increased average monthly production levels rather than an increase to the production capacity on the on site facilities.

With regard to traffic, the greatest potential impacts to road network operation and capacity occur when the Quarry is operating at peak production levels.

Peak production levels of the Quarry occurred in March 2001 with the sale of approximately 86,500 tonnes.

Given that the proposed increase in annual production levels would not be achieved by an increase in quarry production facility capacity, the peak production level of March 2001 is considered to the peak monthly production level for the proposed 800,000 tpa proposal.

The MWT traffic impact assessment (2003) of the now approved Quarry extension was based on the following assumptions:

- Quarry traffic generation: March 2001 Traffic Counts (peak production capacity)
- Background Traffic Flows: 2018 Forecast flows along the East – West Link Road (RTA)

These assumptions remain relevant to the assessment of the peak production level of the proposal to produce 800,000 tpa from the Quarry.

As such the findings of the 2003 MWT assessment remain unchanged for the proposed increase in production to 800,000 tpa.

The 2003 study examined the intersection performance of the roundabout formed by the quarry access road and the East-West Link Road. The analysis assumed the East-West Link Road would carry a volume of about 11,000 vpd in 2018 (as forecast by the RTA). The intersection operation results are presented in **Table 1**.

Table 1 – Intersection Assessment Results

Intersection Approach	Morning Peak Hour		Afternoon Peak Hour	
	Average Delay (sec/veh)	Level of Service (LoS)	Average Delay (sec/veh)	Level of Service (LoS)
Link Rd – Eastbound	12.0	A	12.1	A
Link Rd – Westbound	11.9	A	11.8	A
Quarry Access Rd – Northbound	19.0	B	18.5	B
Quarry Access Rd – Southbound	17.6	B	19.6	B

Source: Connell Wagner (2003)

The intersection was reported to operate with LoS B and would provide good intersection operation with ample intersection capacity and minimal traffic delays.

Furthermore the 2003 analysis concluded that:

- recent road improvements have increased the capacity of the road network surrounding the Quarry. These improvements would be sufficient to adequately accommodate traffic generated by the peak production levels of the Quarry.
- construction of the East – West Link Road and Quarry Road access removes the need for Quarry traffic to travel through residential areas of Albion Park Rail, thus providing residential amenity benefits.

These findings remain unchanged for the proposed increased annual production to 800,000 tpa.

Summary

Given that the proposed increased in annual production to 800,000 tpa would not result in the peak monthly production rate increasing beyond the peak production levels experienced in March 2001, it is considered that the findings of the 2003 MWT assessment remain relevant and valid for consideration of the proposed annual production increase.

Therefore, it is concluded that the surrounding road network has sufficient capacity to provide satisfactory operating conditions with the Quarry's proposed annual production increase to 800,000 tpa.

If you have any queries regarding the above or require further information, please do not hesitate to contact the undersigned.

Yours sincerely

Jason Rudd
Associate Director

TRANSPORT STUDY

Albion Park Quarry
Extension to Quarry Area

April 2003

Prepared for
Cleary Bros (Bombo) Pty Ltd

MASSON | WILSON | TWINEY

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Contents

1. Introduction

Masson Wilson Twiney Pty Ltd has been commissioned to study the transport aspects of a proposed extension to the existing extractive area and continuation of associated extractive industry activities at the Cleary Bros Albion Park Quarry (Quarry).

Our study report is structured through the following chapters:-

- Chapter 2 - describes the background, existing situation and transport context
- Chapter 3 - assesses the implications of the proposal
- Chapter 4 - provides a summary of the report's findings and its conclusions.

Appended is the published RTA count information on the Princes Highway and automatic counter data of the existing traffic generation of the Quarry.

2. Existing Situation and Transport Context

Background

Quarrying has been undertaken on the Cleary Bros Albion Park site for the past thirty years. The current extraction area is becoming low in resource and it is proposed to extend the quarrying area to a parcel of land (to the south-east of the existing operation) to allow continuation of existing extraction.

Part of the proposal is that the crushing, screening, processing, stockpiling, and transportation activities associated with quarry product will remain the same as the existing operations using the existing infrastructure.

Apart from market fluctuations and natural growth there is no planned expansion and/or increased production from the existing infrastructure.

Existing Situation

The Quarry lies to the south of the Princes Highway as shown in Figure 1.

Vehicle access to the Quarry is provided from the recently constructed East-West Link Road. Stage 1 of the Link Road (opened 2002) extends between the Princes Highway and Croome Road. Ultimately the Link Road will be extended to Terry Street (Jamberoo Road) as shown in Figure 2.

The Link Road includes an overpass of the railway and a grade separated interchange with the Princes Highway. A roundabout has been installed at the intersection of the Link Road and the Quarry access road as shown in Figure 3.

The Quarry access road does not provide access to any developments other than the Cleary Bros Quarry. Thus all traffic along the Quarry access road is associated with the Quarry. The roundabout intersection has been designed to accommodate vehicle activity generated by the Quarry.

The roundabout on the Link Road provides direct access between the Quarry access road and the arterial road network with access to the Princes Highway via the Oaks Flat interchange. Thus a haulage route is provided between the Quarry and the Highway which avoids the need to travel through the residential areas of Albion Park Rail.

Prior to the opening of the Link Road, access to the Quarry was via a priority controlled intersection on the Princess Highway. As a result of increasing local and regional traffic flows, Quarry traffic was experiencing increasing delays at this intersection. The existing access arrangements via the Link Road are a significant improvement on previous access arrangements.

Investigations undertaken by the RTA indicated that the Link Road is forecast to carry around 11,000 vehicles per day by around 2018.

ALBION PARK QUARRY

SITE LOCATION

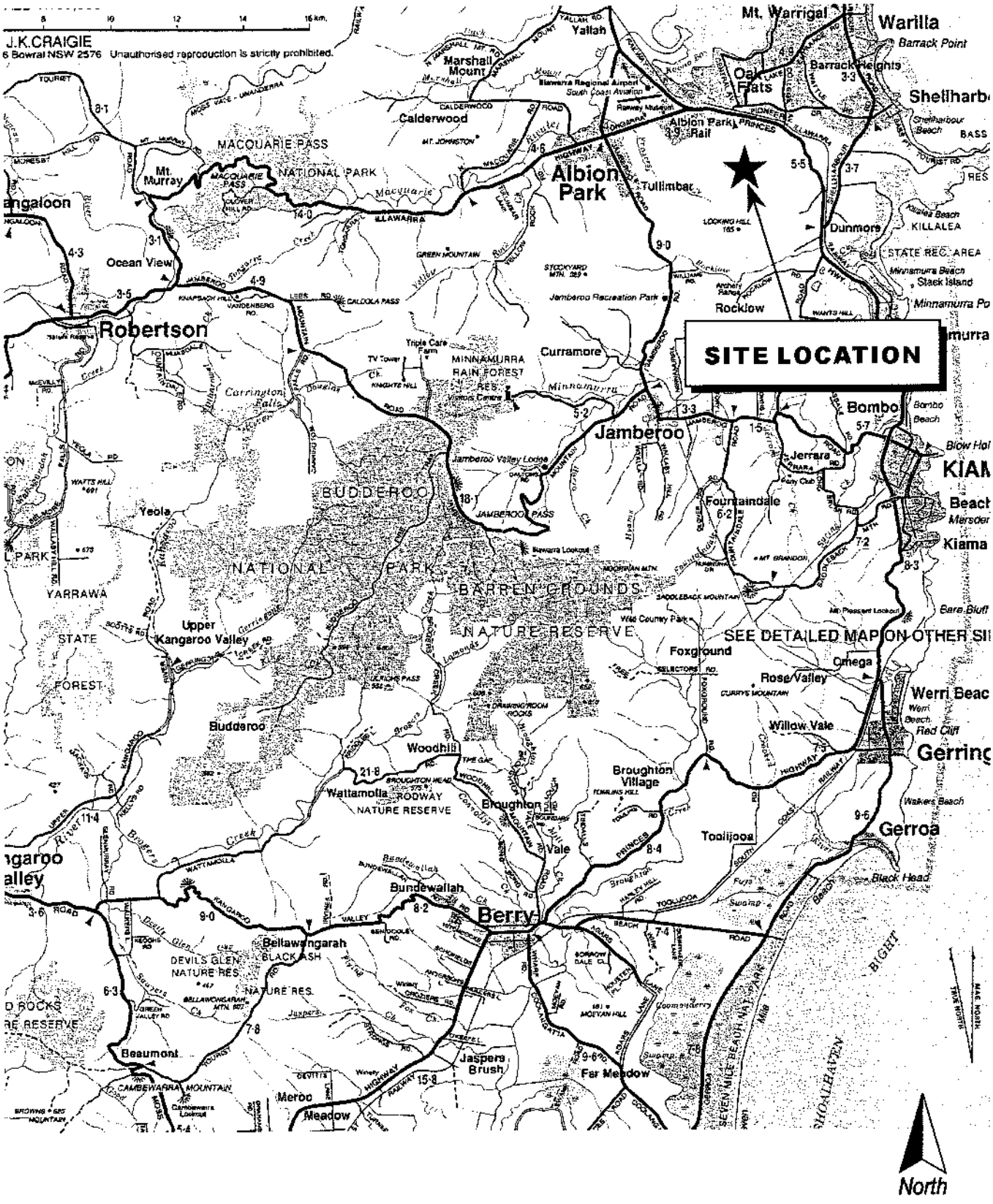

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Figure 1

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Date: 24 March 2003

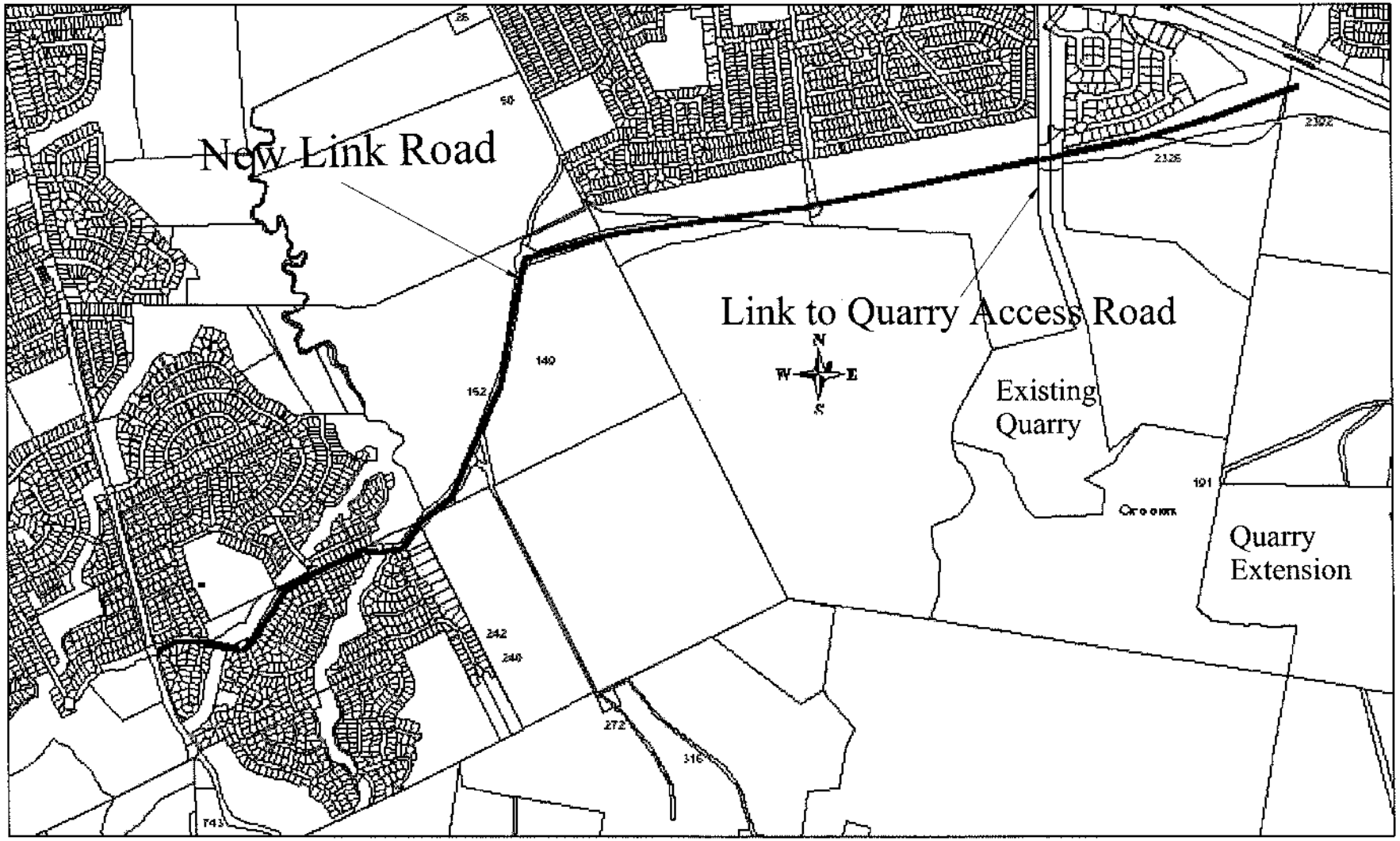

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Figure 2
New Link Road

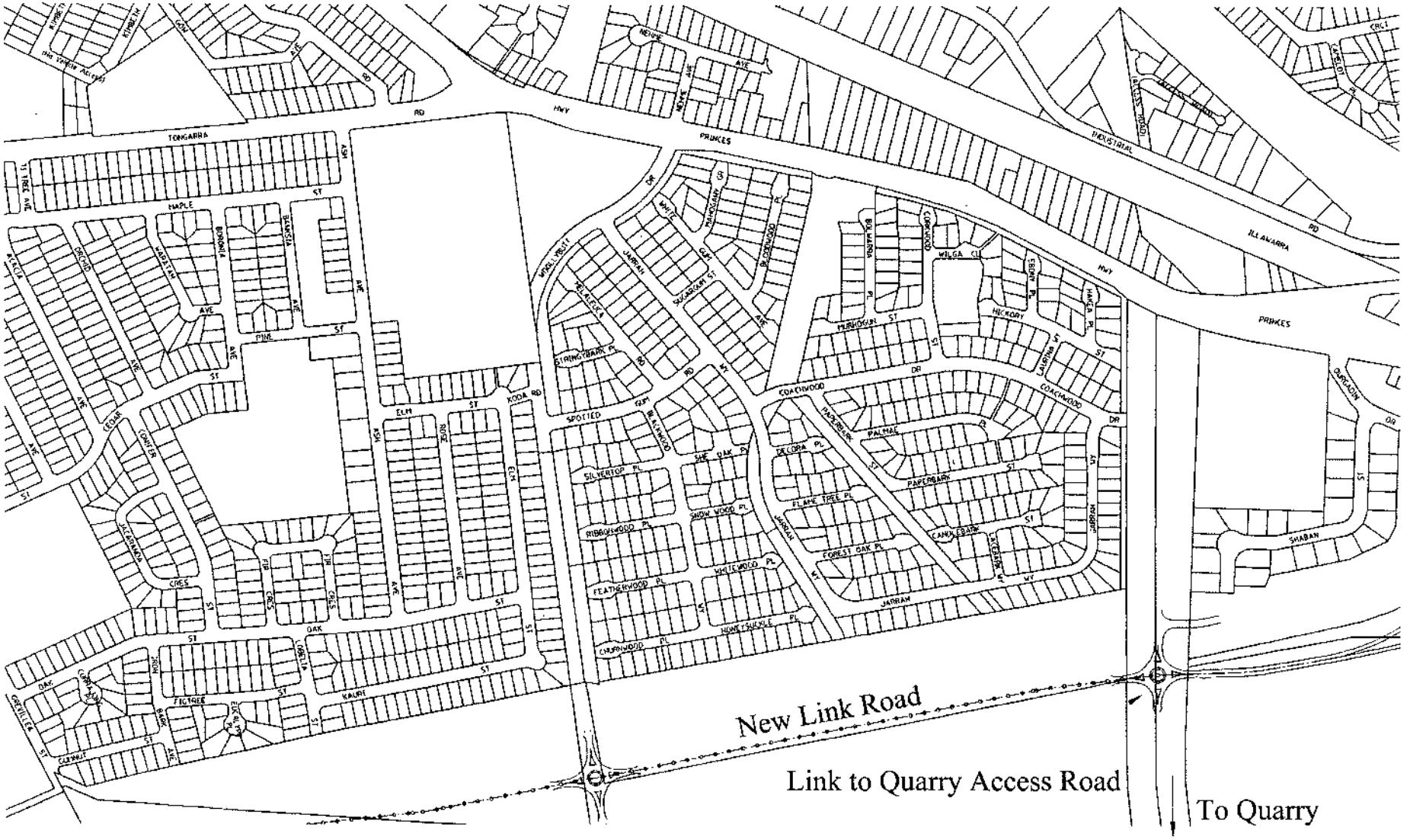

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Figure 3
New Link Road

Traffic surveys undertaken by Shellharbour City Council upon completion of Stage 1 of the link (Princes Highway to Croome Road) indicated that the Link Road carried approximately 5,500 vehicles per day in July 2002.

Traffic Flows

The Princes Highway is a major arterial road. RTA counts indicate the following average annual daily traffic flows (AADTs).

Table 1 - Princes Highway (SH1) Daily Traffic Flows

Site	Year					
	1992	**1994**	**1997**	**2000**	**2001** [1.]	**2002** [2.]
07039 Oak Flats: Nth of Tongarra Rd	28908	32806	28679	30,152	-	31,078
07040 Oak Flats: East of Tongarra Rd	33443	42204	37472	40,689	36,211	-

Notes: *1. Based on RTA survey December 2001*
2. Based on RTA survey August 2002

The traffic data for 2001 and 2002 have been provided by the RTA. These surveys are not yet published and do not take into account seasonality. As such they are treated as indicative until published survey data is produced.

It can be seen that the Princess Highway, in the immediate vicinity of the site access, currently carries in the order of 36,000 vehicles per day.

Table 1 indicates that traffic on the section of the Princes Highway between Tongarra Road and the new Link Road intersections has dropped in the order of 4,500 vehicles per day after the opening of the Link Road.

Main Road 611 which becomes the New Lake Entrance Road has the following AADTs (Table 2). Daily traffic count data post the opening of the Link Road for New Lake Entrance Road north of the Princes Highway are not yet available.

Table 2 - New Lake Entrance Road (MR611) Daily Traffic Flows

Site	Year				
	1990	**1992**	**1994**	**1997**	**2000**
07588 Oak Flats: East of Princes Highway	16,668	19,947	20,926	21,699	22,030

It can be seen that this road carried some 22,000 vehicles per day in 2000.

An idea of daily/seasonal variation in traffic flows on the Princes Highway can be gained from the permanent counter at the Macquarie Rivulet Bridge. The results at this counter are appended and indicate that:-

- there can be significant increase in southbound flows at the start of holiday periods and in northbound flows at the end of holiday periods
- Friday southbound flows have a higher AADT than other weekdays whilst Sunday northbound flows are similar to weekday average flows.

Quarry Operations

Survey in 1997
A survey of the traffic generation of the Quarry was undertaken over a two week period between 8 December and 20 December 1997.

The results of this survey may be summarised as follows:-

- Passenger vehicles[1] accounted for 60% of all quarry vehicle trips during the week. Quarry/heavy vehicles accounted for 34% of all trips. In real terms, this equates to 372 passenger trips and 189 heavy vehicle trips per week day.
- Peak vehicle movements associated with the quarry were between 6.00am-8.00am and 4.00pm-6.00pm for passenger vehicle arrivals and departures respectively.
- Peak hour heavy vehicle movements took place between 6.00am-8.00am for departures whilst arrivals were consistent for a period between 11.00am-3.00pm.

Survey in 2001
An automatic counter was located on the Quarry access road for one week (from 18 March 2001).

The detailed results are appended. Overall the survey of the access road showed:-

- an average weekday flow of 549 vehicles southbound and 513 vehicles northbound, a two-way total of 1060 vehicles
- week day flows ranged between 839 and 1368 (two-way) vehicles
- peak entry flow was either 6-7am or 7-8am with some 50 to 70 vehicles/hour
- peak exit flow was 4-5pm with 50 to 60 vehicles per hour
- some 40% of daily vehicles are 'light vehicles' such as cars and some 60% heavy vehicles. Heavy vehicles include vans and light trucks up to articulated vehicles.

Cleary Bros carried out a detailed survey of the number of vehicles generated by the Quarry, workshop, concrete, plant and 'other' as shown in Table 3 (for Thursday 22 March 2001).

[1] Differences in percentages likely to be the result of differences in vehicle definitions

Table 3 – Cleary Bros Survey 22/3/01 (weather fine)

	Quarry	Workshop	Concrete	Plant	Other	Total
6am	18	3	4	0	58	83
7am	29	1	5	1	23	59
8am	18	3	7	1	24	53
9am	20	0	3	2	20	45
10am	28	1	5	1	23	58
11am	26	0	2	1	22	51
12noon	20	2	7	0	10	39
1pm	25	3	8	1	13	50
2pm	21	2	2	1	27	53
3pm	26	2	4	1	27	60
4pm	18	2	2	1	47	70
5pm	2	1	2	0	31	36
Total	251	20	51	10	325	657

It can be seen that 'quarry' and 'other' were the two main generators of traffic of these vehicle trips 64% were reported as being to/from the east and 36% to/from the west.

The time variation of vehicle trips to/from the access directions (for the Thursday) is shown in Figure 4 and Table 4.

Table 4 – Vehicle Trip Directions (Thursday)

Hour Commencing	From East	To East	Total	From West	To West	Total
6	27	15	42	36	7	43
7	13	18	31	17	11	28
8	19	17	36	8	9	17
9	21	18	39	3	3	6
10	17	26	43	9	7	16
11	15	15	30	12	8	20
12	13	16	29	8	2	10
13	15	21	36	6	8	14
14	16	16	32	14	7	21
15	19	22	41	5	13	18
16	19	28	47	6	18	24
17	2	13	15	6	15	21
			421 (64%)			238 (37%)
TOTAL			659			

The current operation of the quarry with respect to quarry generated traffic has not changed significantly since the 2001 traffic surveys. Therefore the survey results are to be representative of existing quarry operations.

A traffic assessment has been undertaken by Connell Wagner (2003) which considered the peak period operation of the Link Road and Quarry Access road intersection.

The intersection analysis included existing Quarry generated traffic and predicted through traffic volumes on the Link Road. Link Road volumes assumed the completion link between Princes Highway and Terry Street (ie. 11,000 vehicles per day).

The results of the intersection analysis are presented in Table 5.

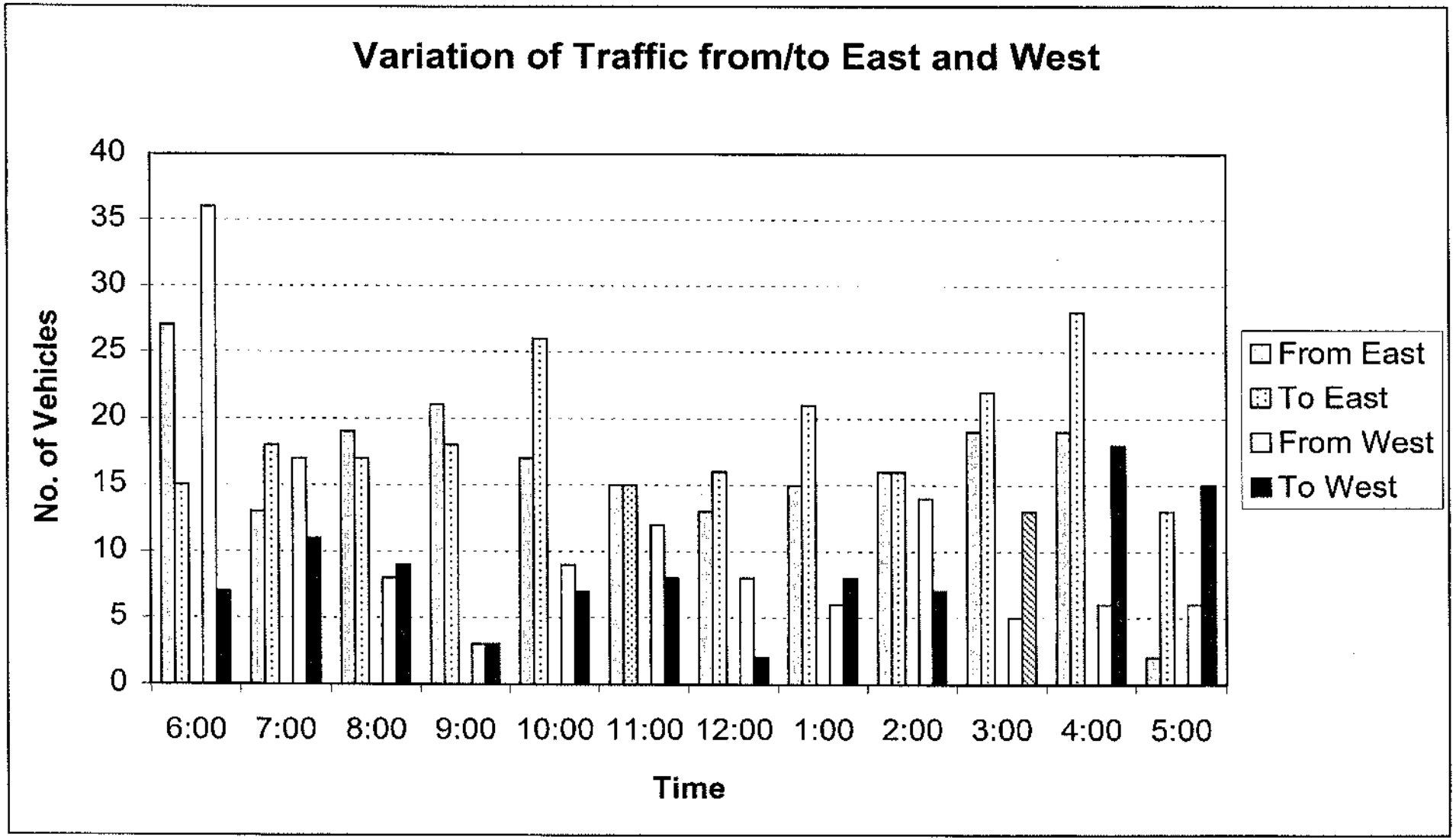

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Figure 4

Table 5 – Quarry Access Road Roundabout - Intersection Performance

Intersection Approach	AM Peak Hour		AM Peak Hour	
	Average Delay (sec/veh)	Level Of Service	Average Delay (sec/veh)	Level Of Service
Link Rd – Eastbound	12.0	A	12.1	A
Link Rd – Westbound	11.9	A	11.8	A
Quarry Access Rd – Northbound	19.0	B	18.5	B
Quarry Access Rd - Southbound	17.6	B	19.6	B

Source: Connell Wagner (2003)

The results of the intersection analysis indicate that with the existing Quarry traffic generation, the Quarry access road intersection will operate satisfactorily with acceptable delays and spare intersection capacity with the Link Road constructed through to Terry Street.

It is noted that the current traffic flows along the Link Road (Stage 1) are approximately 5,500 vehicles per day. This is approximately half of the through traffic flows used in the traffic analysis presented in Table 5. Therefore for Stage 1 flows, the Quarry access road intersection will operate with less delay and greater spare capacity than indicated in Table 5.

3. Implications of the Proposal

The Proposal

The proposal is to continue the existing Quarry processes on the site by making use of a new parcel of land (situated to the south east of the current operations).

The proposal is thus a continuation of the existing pattern of traffic generation associated with product removal from the site. Apart from market fluctuations and natural growth there are no planned expansion and / or increased production from the existing infrastructure.

Progressive backfilling of the quarry is proposed to occur to agreed levels. Traffic associated with backfilling would be additional to existing Quarry traffic generation as backfilling does not currently occur on the site.

Backfilling operations would be undertaken periodically as opportunities arise. Therefore, traffic generated by backfilling operations would be periodic.

As discussed in Chapter 2 of this report, the traffic currently generated on a daily basis by the Quarry varies significantly as a result of market fluctuations.

Traffic generated by backfilling operations is not expected to significantly change the current peak daily traffic generation of the Quarry as used in the Connell Wagner traffic assessment (see Table 5).

Traffic Effects

Traffic generation of the proposed Quarry extension proposal will not significantly change to the existing pattern of daily/seasonal generation of the Quarry site (as described in Chapter 2) which is satisfactorily accepted by the existing surrounding road network.

The recently improved access to and from the Quarry has increased the potential capacity of the road network to accommodate future quarry traffic and general traffic growth.

The RTA has designed the intersection of the Quarry access road with the Link Road mindful of the truck activity generated by the Quarry.

4. Summary and Conclusions

The existing Quarry operation generates some 1,000 vehicle trips (in plus out) per day.

Peak entry flow is some 50 to 70 vehicles per hour at around 7am and peak exit flow is some 50 to 60 vehicles per hour at around 4-5pm.

Some 40% of daily vehicles are 'light' (cars) and 60% 'heavy' (trucks). Some 60% of daily vehicle trips are to/from the east and some 40% to/from the west.

A new Link Road has been constructed from the Princes Highway to Croome Road (Stage 1) and includes a large roundabout controlled intersection with the Quarry access road. The Link Road will eventually be extended to Terry Street (Jamberoo Road).

Prior to the opening of the Link Road, access to the Quarry access was via a priority controlled intersection on the Princess Highway. As a result of increasing local and regional traffic flows, Quarry traffic was experiencing increasing delays at this intersection. The existing access arrangements via the Link Road are a significant improvement on previous access arrangements.

The proposal is to continue the existing processes on the site making use of a new parcel of land. Apart from market fluctuations and natural growth no expansion in production is planned.

Backfilling to agreed levels will generate additional traffic, as backfilling is currently not undertaken. However, additional backfilling traffic is not expected to change the current peak levels of Quarry related traffic generation.

The traffic analysis indicates that the recent road improvements have increased the capacity of the road network surrounding the Quarry. These improvements would be sufficient to adequately accommodate traffic generated by the proposed extension of the Quarry.

Furthermore, the recent construction of the Link Road and Quarry Road access removes the need for Quarry traffic to travel through residential areas of Albion Park Rail, thus providing residential amenity benefits.

Appendix A - RTA Counts

SHELLHARBOUR LGA

STATION	LOCATION	MAP	Km	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1994 AADT	1997 AADT	2000 AADT
V07.035	ALBION PARK-AT MACQUARIE RIVULET BR	E	100.3	20322	--	31230*	33808*	37781V	40752V	44635V
07.037	ALBION PARK-S OF SH25,ILLAWARRA HWY	E	100.6	16424	20799	24739	32106	33644	34575	37869
07.039	OAK FLATS-N OF MR262,TONGARRA RD	G	103.2	15061	19273	22239	28908	32806	28679	30152
07.040	OAK FLATS-E OF MR262,TONGARRA RD	G	103.3	20035	25504	31384	33443	42204	37472	40689
07.041	DUNMORE-0.8KM N OF MR522,SHELLHBR RD	G	109.1	10371	14167	15739	17449	18992	19995	20928
07.042	DUNMORE-0.8KM S OF MR522,SHELLHBR RD	G	110.7	17968	16511	22188	25153	25118	27174	27956

KIAMA LGA

STATION	LOCATION	MAP	Km	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1994 AADT	1997 AADT	2000 AADT
07.317	KIAMA-AT QUARRY RLY XING	TOWN	115.9	18159	--	22308	--	25641	26623	--
07.804	KIAMA-AT BOMBO RLY STN	TOWN	116.6	--	--	--	--	--	--	28768
07.769	KIAMA-AT SADDLEBACK MTN RD OVBR	TOWN	119.5	--	--	16000	--	13061	13483	15081
V07.800	OMEGA-0.4KM N OF ROSE VALLEY RD	54	125.0	--	11631*	12944*	14169*	14791*	15711V	17753V
07.649	OMEGA-N OF FERN ST	54	126.2	9069	--	--	--	--	--	--
07.045	GERRINGONG-W OF MR571,BELINDA ST	54	128.7	4890	--	7148	--	7724	8801	9363

SHOALHAVEN LGA

STATION	LOCATION	MAP	Km	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1994 AADT	1997 AADT	2000 AADT
07.803	BERRY-N OF TANNERY RD	54	140.0	--	--	--	--	--	--	8883
07.046	BERRY-AT BROUGHTON MILL CK BR	54	141.8	5536	--	7718	--	9118	9657	--
07.047	BERRY-S OF KANGAROO VALLEY RD	54	143.4	5849	--	7213	--	9131	--	11023
07.048	BOMADERRY-N OF MR261,CAMBEWARRA RD	TOWN	155.9	6492	--	7416	--	8952	9593	9748
07.050	BOMADERRY-S OF MR261,CAMBEWARRA RD	TOWN	156.0	10456	--	13301	--	15454	17729	18104
V07.051	NOWRA-AT SHOALHAVEN RIVER BR	TOWN	158.4	32483	--	34862V	36760V	39116V	40184V	42320V
07.703	NOWRA-S OF NORTH ST	TOWN	159.6	4836	--	--	--	--	--	--
07.659	NOWRA-N OF JUNCTION ST	TOWN	158.8	21007	--	23313	--	25465	28878	28294
07.704	NOWRA-S OF WORRIGEE ST	TOWN	160.3	24854	--	26643	--	28483	--	--
07.707	NOWRA-AT BROWNS CK BR	TOWN	162.4	14365	--	19109	--	19339	21443	23144
07.052	NOWRA-6KM S OF P.O.	55	165.8	10886	--	--	--	--	--	--
V07.053	FALLS CREEK-N OF MR312,HUSKISSON RD	55	172.1	10163*	11467*	12868*	13629*	14481V	15721V	16664V
07.802	TOMERONG-N-BRAIDWOOD RD @TOMERONG CK	55	180.0	--	--	--	--	--	--	9799
07.058	WANDANDIAN-N OF SUSSEX INLET RD	55	192.6	4928	--	5816	--	6418	6213	7849
07.059	WANDANDIAN-S OF SUSSEX INLET RD	55	192.7	4303	--	--	--	--	--	--
07.060	CONJOLA-AT CONJOLA CK BR	55	206.8	3795	--	4784	--	--	5662	6021
07.650	MILTON-N OF WASON ST	55	221.6	5742	--	--	--	--	8915	--
07.368	ULLADULLA-AT MILLARDS CK BR	55	226.2	11023	--	11892	--	10993	13586	13472
*07.063	BURRILL LAKE-1.5KM S OF BR	55	232.6	3997	4227	4580	4812	5005	5240	5804
07.691	TERMEIL-1KM N OF BAWLEY POINT RD	58	245.6	3307	--	3744	--	4012	4178	4603
07.356	AT EUROBODALLA SHIRE BDY	58	263.3	2784	--	3380	--	3530	3246	3931

EUROBODALLA LGA

STATION	LOCATION	MAP	Km	1978 AADT	1982 AADT	1986 AADT	1990 AADT	1994 AADT	1997 AADT	2000 AADT
V08.052	BATEMANS BAY-N OF MR51,BRAIDWOOD RD	TOWN	274.0	3020	3810	4205	--	6892	5818V	6352V
08.003	BATEMANS BAY-AT CLYDE RIVER BR	TOWN	274.5	6050*	6410*	8312*	9935*	11204*	--	--
08.360	BATEMANS BAY-S OF CROWN ST	TOWN	276.1	--	2670	5527	5858	6508	6249	6880
08.056	MOGO-N OF NELLIGEN RD	58	282.7	2610	2970	3326	4566	5576	6455	6549
08.368	MOGO-S OF BUCKENBOWRA RD	58	0.0	--	--	--	--	--	4754	4946
08.059	MORUYA-3.2KM N OF P.O.	58	299.0	3300	4100	3409	4069	4645	4719	5011
08.123	MORUYA-AT MORUYA RIVER BR	TOWN	301.7	4680	5750	5669	6990	7679	8287	--
08.124	MORUYA-N OF CAMPBELL ST	TOWN	302.1	4860	6240	5934	8576	9896	9521	9662
08.125	MORUYA-E OF FORD ST	TOWN	302.3	4340	5580	5602	7313	7928	8882	8637
08.126	MORUYA-S OF ALBERT ST	TOWN	302.9	2810	4190	3988	5417	5893	6581	6504
08.127	BERGALIA-N OF P.O.	58	310.9	2450	2900	3183	3716	4391	4973	5147
08.129	TURLINJAH-S OF TUROSS HEAD RD	58	316.0	2020	2510	2487	--	3624	3746	3960
*08.062	BODALLA-1.6KM S OF P.O.	58	327.5	2340	2118*	2615*	2915*	3200*	3416*	3665*
08.130	NAROOMA-AT WAGONGA INLET BR	58	342.5	5540	4930	5700	6736	7473	8031	8160
08.065	AT VICTORIA CREEK BR	58	357.2	1530	1980	2031	2218	2542	3099	2884
08.334	TILBA TILBA-S OF MR272,BERMAGUI RD	58	364.3	1330	1360	1316	--	1713	1820	1773

MAIN ROAD NO.610 - WILTON-APPIN

WOLLONDILLY LGA

STATION	LOCATION	MAP	Km	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1994 AADT	1997 AADT	2000 AADT
07.742	AT BROUGHTON PASS	48	3.0	2023	--	2035	--	1943	1870	1835
07.762	APPIN-S OF MR177,APPIN RD	49	8.0	2871	--	--	--	--	--	--

MAIN ROAD NO.611 - OAK FLATS-WARILLA

SHELLHARBOUR LGA

STATION	LOCATION	MAP	Km	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1994 AADT	1997 AADT	2000 AADT
07.588	OAK FLATS-E OF SH1,PRINCES HWY	G	0.2	14110	13153	16668	19947	20926	21699	22030
07.633	OAK FLATS-S OF LANG ST	G	0.8	11105	--	--	--	--	--	--
07.634	BARRACK HEIGHTS-S OF HUNTER ST	E	2.0	14435	15162	18963	21185	20133	23864	25213
07.291	LAKE ILLAWARRA-W OF MR522,WINDANG RD	F	5.0	20238	19744	19725	24446	21531	22084	21883

MAIN ROAD NO.612 - PHEASANTS NEST-OAKDALE

WOLLONDILLY LGA

STATION	LOCATION	MAP	Km	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1994 AADT	1997 AADT	2000 AADT
07.363	MALDON-AT NEPEAN RIVER BR	48	3.2	4084	--	4510	--	5645	6276	7074
07.404	PICTON-0.8KM S OF PRINCE ST	TOWN	8.6	4501	--	5125	--	6530	5058	7167
07.403	PICTON-E OF MR620,ARGYLE ST	TOWN	10.5	3972	--	--	--	--	--	--
07.475	PICTON-0.8KM N OF MR620,ARGYLE ST	TOWN	11.4	1443	--	1500	--	1624	--	--
07.476	0.2KM E OF BARKERS LODGE	48	18.2	518	--	1513	--	1915	1719	1174
07.472	BARKERS LODGE-0.1KM W OF THE OAKS RD	48	18.5	802	--	--	--	1497	--	--
07.471	OAKDALE-S OF MR259,CAMDEN RD	48	29.7	888	--	1111	--	--	968	896

MAIN ROAD NO.613 - PORT KEMBLA-KEMBLA GRANGE

WOLLONGONG LGA

STATION	LOCATION	MAP	Km	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1994 AADT	1997 AADT	2000 AADT
07.616	WARRAWONG-W OF MR522,KING ST	F	2.5	12461	--	--	--	--	--	--
07.254	LAKE HEIGHTS-E OF LAKE HEIGHTS RD	F	4.7	9999	10173	11688	13332	12199	13621	14165
07.630	BERKELEY-E OF F6,SOUTHERN FWY	D	8.6	12397	14795	14144	14612	--	15312	16069
07.231	KEMBLA GRANGE-E OF SH1,PRINCES HWY	D	9.3	7451	9339	8208	8869	9812	10377	10319

MAIN ROAD NO.620 - YANDERRA-PRESTONS

WOLLONDILLY LGA

STATION	LOCATION	MAP	Km	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1994 AADT	1997 AADT	2000 AADT
07.376	BARGO-0.8KM S OF BARGO P.O.	48	2.0	2132	--	4571	--	5190	--	--
07.374	TAHMOOR-0.8KM S OF TAHMOOR P.O.	48	9.2	5111	--	5872	--	6944	6710	10705
07.372	PICTON-N OF PRINCE ST	TOWN	16.1	6598	--	--	--	--	--	--
07.371	PICTON-S OF MR612,MENANGLE ST	TOWN	17.5	8129	--	9844	--	11970	12609	12019
07.370	PICTON-0.5KM N OF REGREME RD	TOWN	18.5	4235	--	5674	--	6409	6433	7704
V07.023	NORTH OF DOUGLAS PARK RD	48	30.0	5297*	6007*	6861*	7049*	7548*	8545*	8912V

MAIN ROAD NO.626 - NORTHERN SUBURBS DISTRIBUTOR

WOLLONGONG LGA

STATION	LOCATION	MAP	Km	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1994 AADT	1997 AADT	2000 AADT
V07.801	TOWRADGI-S OF TOWRADGI RD	C	0.0	--	--	16403	18790	25722V	26788V	28453V
07.142	WOLLONGONG-S OF SH1,PRINCES HWY	C	0.1	24451	28099	29550	--	26219	21484	43108

DAILY TRAFFIC VOLUMES Year 2000

PRINCES HWY,SH1 ALBION PARK-AT MACQUARIE RIVULET BR Station No. 07.035.N

Week	Beginning	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total	Percent
1	3/01/00	20982 p	21694	21532	22970	24349	20911	24298	156736	1.9473
2	10/01/00	22240	21462	21913	22617	23731	21542	25886	159391	1.9803
3	17/01/00	21955	21769	22267	22834	23967	21687	25213	159692	1.9840
4	24/01/00	23017	23620	19031 p	23766	24142	20056	22877	156509	1.9445
5	31/01/00	22066	21472	21874	22578	23491	20017	23763	155261	1.9290
6	7/02/00	22250	21806	22557	23237	23623	19141	22842	155456	1.9314
7	14/02/00	22307	22173	22436	23354	24348	20661	26004	161283	2.0038
8	21/02/00	22804	22270	22452	23819	24612	22524	24408	162889	2.0237
9	28/02/00	23277	22479	22716	23424	24538	21294	24395	162123	2.0142
10	6/03/00	23339	22418	21000	21720	23346	18795	22224	152842	1.8989
11	13/03/00	21897	22314	22579	23114	24164	20731	24308	159107	1.9767
12	20/03/00	21262	19980	20784	22320	23067	19325	23032	149770	1.8607
13	27/03/00	22259	22236	22322	23504	24204	20614	22590	157729	1.9596
14	3/04/00	22509	22256	21614	22498	23613	20505	23214	156209	1.9407
15	10/04/00	22268	22224	22617	23744	24265	21344	21682	158144	1.9648
16	17/04/00	23018	23063	23847	23461	13647 p	18323	21233	146592	1.8213
17	24/04/00	26441 p	23390 p	25514	23224	24868	22292	21469	167198	2.0773
18	1/05/00	22317	21559	21160	21548	22622	19217	21442	149865	1.8619
19	8/05/00	22065	22062	22175	22814	23839	21263	23623	157841	1.9610
20	15/05/00	21911	21955	22732	22654	23635	20486	22251	155624	1.9335
21	22/05/00	22187	21888	21772	22606	23711	20298	19530	151992	1.8884
22	29/05/00	21493	21500	21673	22504	22950	19803	21246	151169	1.8781
23	5/06/00	21431	21443	22144	22719	22770	18960	18186	147653	1.8344
24	12/06/00	22932 p	23792	22122	22731	23652	20331	20110	155670	1.9340
25	19/06/00	21231	21484	21774	22669	23388	20810	21283	152639	1.8964
26	26/06/00	21598	21531	22073	22395	21731	17975	19378	146681	1.8224
27	3/07/00	20061	19981	20995	21901	23081	19874	22839	148732	1.8478
28	10/07/00	21772	21986	22624	22987	23596	20276	21793	155034	1.9261
29	17/07/00	21312	21195	21426	22428	22906	19935	21205	150407	1.8687
30	24/07/00	21363	21696	22027	21923	23102	20493	21506	152110	1.8898
31	31/07/00	21787	21372	21475	22475	23361	19775	21624	151869	1.8868
32	7/08/00	22201	21646	21795	22353	22988	20217	20243	151443	1.8815
33	14/08/00	21577	21245	21982	22430	23478	19485	21169	151366	1.8806
34	21/08/00	21469	21793	21684	22217	23278	19470	20030	149941	1.8629
35	28/08/00	21294	21651	21853	22543	23651	19963	23097	154052	1.9139
36	4/09/00	21873	21771	21915	22451	23418	20002	22612	154042	1.9138
37	11/09/00	23864	21180	21739	22396	21967	17454	20067	148667	1.8470
38	18/09/00	20948	21150	21751	22519	23227	19557	21255	150407	1.8687
39	25/09/00	21343	21015	21554	21790	22377	18572	19670	146321	1.8179
40	2/10/00	22251 p	22814	21886	22725	23497	19579	21938	154690	1.9219
41	9/10/00	21162	21768	21913	22596	22834	19104	21971	151348	1.8804
42	16/10/00	22582	21650	21910	22016	23348	19375	23601	154482	1.9193
43	23/10/00	22237	21876	22583	22872	24511	19765	23062	156906	1.9494
44	30/10/00	22520	22161	22607	22886	23721	19748	22962	156605	1.9457
45	6/11/00	22243	20806	22399	23609	24538	20165	23502	157262	1.9538
46	13/11/00	22233	18652	20025	21769	22767	18680	19913	144039	1.7895
47	20/11/00	22132	21423	22374	23652	24595	20760	24927	159863	1.9861
48	27/11/00	23203	22887	22861	23609	24290	20964	24961	162775	2.0223
49	4/12/00	22855	23175	22986	23781	25232	21661	24187	163877	2.0360
50	11/12/00	23757	23318	23760	24485	25366	21568	22869	165123	2.0515
51	18/12/00	23634	23738	24228	24912	23778	19981	19116	159387	1.9802
52	25/12/00	20215 p	22131 p	21372	22050	23632	22999	19711	152110	1.8898
Annual Averages:		22130	21848	22145	22812	23631	20160	22237	154787	

AADT	AAWT	AAWE	AAPH
22112	22523	21199	21224

p indicates Public Holiday

DAILY TRAFFIC VOLUMES Year 2000

PRINCES HWY,SH1 ALBION PARK-AT MACQUARIE RIVULET BR Station No. 07.035.S

Week	Beginning	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total	Percent
1	3/01/00	18952 p	21704	22086	22644	25363	21239	19107	151095	1.8430
2	10/01/00	22486	21880	22277	22454	26352	23751	20527	159727	1.9483
3	17/01/00	21505	22258	22589	23549	27644	23634	19421	160600	1.9589
4	24/01/00	22533	24223	17793 p	23434	27189	21316	17313	153801	1.8760
5	31/01/00	21749	22025	22333	23436	27886	22969	18382	158780	1.9367
6	7/02/00	22185	23008	22879	23897	28275	22136	17276	159656	1.9474
7	14/02/00	21750	22572	23030	23833	29211	23651	19708	163755	1.9974
8	21/02/00	22453	22612	22948	24148	29088	23632	18332	163213	1.9908
9	28/02/00	22559	22941	23353	24288	29345	23446	19071	165003	2.0126
10	6/03/00	23164	22985	21532	22387	27189	20862	18024	156143	1.9046
11	13/03/00	21568	22651	23233	23673	28254	23549	19159	162087	1.9771
12	20/03/00	20843	19970	20912	22691	26059	21274	19241	150990	1.8417
13	27/03/00	22056	22684	22749	23940	28112	23273	18339	161153	1.9657
14	3/04/00	22227	22726	21992	22849	27232	22645	19103	158774	1.9366
15	10/04/00	21988	22726	23154	24242	26885	24168	19902	163065	1.9890
16	17/04/00	23810	24681	26038	32635	26386 p	22798	20827	177175	2.1611
17	24/04/00	18514 p	12832 p	21464	21768	24743	21724	18452	139497	1.7015
18	1/05/00	22581	21513	21587	21847	24654	21015	18551	151748	1.8509
19	8/05/00	22002	22639	22364	23474	25971	22706	20806	159962	1.9511
20	15/05/00	22037	22626	23188	23067	27110	22668	18553	159249	1.9424
21	22/05/00	22251	22392	22411	23322	26494	22160	16397	155427	1.8958
22	29/05/00	21553	21961	22355	23040	25172	21742	18712	154535	1.8849
23	5/06/00	21283	21916	22289	23886	28683	25335	17417	160809	1.9615
24	12/06/00	14019 p	22402	22360	23004	25687	21789	18108	147369	1.7975
25	19/06/00	21339	21900	22504	23154	25770	22359	18728	155754	1.8998
26	26/06/00	21700	22020	22677	22909	23702	20085	17587	150680	1.8379
27	3/07/00	20562	20848	21882	22757	26063	22473	18966	153551	1.8729
28	10/07/00	21865	22222	23099	23239	25510	21518	19037	156490	1.9088
29	17/07/00	20970	21518	21954	22975	25363	21823	18427	153030	1.8666
30	24/07/00	21362	22178	22386	22637	25833	22175	18553	155124	1.8921
31	31/07/00	21542	21836	21959	23057	26679	22323	18062	155458	1.8962
32	7/08/00	21603	21906	22250	23127	26028	21994	16719	153627	1.8739
33	14/08/00	21401	21750	22499	22927	26181	21511	18109	154378	1.8830
34	21/08/00	21112	22205	22057	22766	26148	21457	16684	152429	1.8592
35	28/08/00	21136	21875	22159	23068	26421	21926	19721	156306	1.9065
36	4/09/00	22001	22370	22628	23176	27304	23160	19524	160163	1.9536
37	11/09/00	21360	21506	21909	22953	24039	20236	17851	149854	1.8278
38	18/09/00	21669	21374	22215	22192	25078	20768	18693	151989	1.8539
39	25/09/00	21619	21310	21735	22524	27512	22888	16853	154441	1.8838
40	2/10/00	17108 p	22006	22304	23097	26846	21935	17370	150666	1.8377
41	9/10/00	20694	22256	22609	23392	26406	21085	18129	154571	1.8854
42	16/10/00	22347	22118	21777	22705	27328	21673	19207	157155	1.9169
43	23/10/00	22026	22370	22991	23616	28273	22225	18835	160336	1.9557
44	30/10/00	22823	22975	22948	23789	27995	21770	18435	160735	1.9606
45	6/11/00	21984	21142	22989	24493	28687	22625	18385	160305	1.9553
46	13/11/00	21998	18720	19610	21349	25966	20697	16608	144948	1.7680
47	20/11/00	21947	22020	22860	24278	28555	23290	20035	162985	1.9880
48	27/11/00	22649	23057	23248	23941	27786	23781	20762	165224	2.0153
49	4/12/00	22433	23533	23726	24194	28345	24107	20627	166965	2.0366
50	11/12/00	23682	23956	24096	24764	27694	24063	20404	168659	2.0572
51	18/12/00	23884	24305	24967	25873	26739	25276	21614	172658	2.1060
52	25/12/00	24636 p	26444 p	26219	23501	24994	23315	17216	166325	2.0287
Annual Averages:		21964	22247	22615	23461	26781	22423	18690	157662	

AADT	AAWT	AAWE	AAPH
22523	23442	20557	19632

p indicates Public Holiday

Appendix B - Automatic Counter Results

Traffic Count Summary Report

Count Number	2931 Ref : MWT
Street	QUARRY ACCESS ROAD, OAK FLATS : From PRINCES HIGHWAY to QUARRY SITE : SOUTH BOUND
Location	Cleary Bros. Quarry Access Road , just south of Princes Highway, On Tree near Cyclone Fence Carriageway

TOTAL COUNT MATRIX

Start Date	18-MAR-01
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	32
Weekly 85th Percentile Speed	50
Five Day AADT	549
Seven Day AADT	427

	MON	TUE	WED	THU	FRI	SAT	SUN	5 Day Total	5 Day Average	7 Day Total	7 Day Average
Midnight - 1am	0	1	0	1	1	0	1	3	1	4	1
1am - 2am	0	0	0	0	0	1	0	0	0	1	0
2am - 3am	0	0	2	0	0	0	0	2	0	2	0
3am - 4am	5	1	0	0	0	9	0	6	1	15	2
4am - 5am	17	7	7	4	5	9	1	40	8	50	7
5am - 6am	17	22	18	15	29	11	0	101	20	112	16
6am - 7am	49	67	55	69	61	49	1	301	60	351	50
7am - 8am	60	72	60	35	40	16	2	267	53	285	41
8am - 9am	64	64	56	32	39	16	3	255	51	274	39
9am - 10am	43	52	45	29	27	16	5	196	39	217	31
10am - 11am	49	63	59	34	31	21	3	236	47	260	37
11am - Midday	46	62	52	32	29	14	0	221	44	235	34
Midday - 1pm	42	52	36	28	25	10	4	183	37	197	28
1pm - 2pm	43	38	41	30	28	16	0	180	36	196	28
2pm - 3pm	50	66	35	36	22	18	0	209	42	227	32
3pm - 4pm	63	54	38	30	27	3	4	212	42	219	31
4pm - 5pm	54	57	31	29	34	3	2	205	41	210	30
5pm - 6pm	9	27	11	13	15	3	1	75	15	79	11
6pm - 7pm	8	7	6	3	6	2	1	30	6	33	5
7pm - 8pm	2	2	5	4	2	0	0	15	3	15	2
8pm - 9pm	0	1	0	1	1	0	0	3	1	3	0
9pm - 10pm	0	1	0	0	0	0	0	1	0	1	0
10pm - 11pm	0	0	0	0	1	0	0	1	0	1	0
11pm - Midnight	0	1	0	0	1	0	0	2	0	2	0
Total	621	717	557	425	424	217	28	2744	548	2989	427

Data displayed has been compiled from pneumatic traffic count processes and is subject to the documented limitations

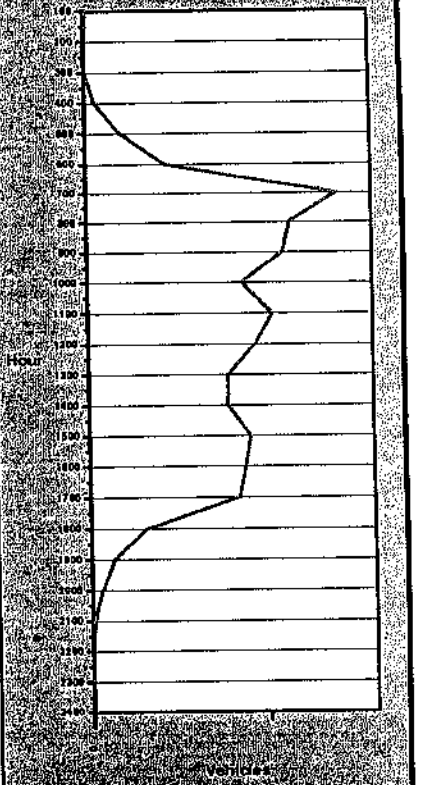
Hourly Classification Summary

Count Number	**2931** Ref : **MWT**
Street	**QUARRY ACCESS ROAD, OAK FLATS : From PRINCES HIGHWAY to QUARRY SITE : SOUTH BOUND**
Location	Cleary Bros. Quarry Access Road , just south of Princes Highway, On Tree near Cyclone Fence — Carriageway

Start Date	18-MAR-01
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	**32**
Weekly 85th Percentile Speed	**50**
Five Day AADT	**549**
Seven Day AADT	**427**

Time	01	02	03	04	05	06	07	08	09	10	11	12	13	Total
Midnight - 1am	4	0	0	0	0	0	0	0	0	0	0	0	0	4
1am - 2am	1	0	0	0	0	0	0	0	0	0	0	0	0	1
2am - 3am	1	0	1	0	0	0	0	0	0	0	0	0	0	2
3am - 4am	9	0	6	0	0	0	0	0	0	0	0	0	0	15
4am - 5am	43	0	6	1	0	0	0	0	0	0	0	0	0	50
5am - 6am	89	1	13	7	0	0	0	0	2	0	0	0	0	112
6am - 7am	237	2	45	26	3	1	0	4	18	4	11	0	0	351
7am - 8am	110	0	35	45	9	0	0	12	49	9	16	0	0	285
8am - 9am	87	0	38	55	7	1	1	10	46	13	16	0	0	274
9am - 10am	67	1	39	34	3	0	0	10	42	7	14	0	0	217
10am - 11am	73	0	47	47	8	1	1	10	48	13	12	0	0	260
11am - Midday	70	1	37	45	2	1	0	11	43	10	15	0	0	235
Midday - 1pm	58	3	23	43	4	0	0	11	39	7	9	0	0	197
1pm - 2pm	57	0	25	47	4	0	1	6	38	6	12	0	0	196
2pm - 3pm	61	0	35	44	4	1	0	13	46	11	12	0	0	227
3pm - 4pm	55	0	32	44	6	0	4	13	42	10	13	0	0	219
4pm - 5pm	62	2	29	46	4	1	0	13	35	11	7	0	0	210
5pm - 6pm	48	0	7	11	0	0	0	3	6	3	1	0	0	79
6pm - 7pm	21	0	5	4	2	0	0	0	1	0	0	0	0	33
7pm - 8pm	10	0	4	0	1	0	0	0	0	0	0	0	0	15
8pm - 9pm	2	0	1	0	0	0	0	0	0	0	0	0	0	3
9pm - 10pm	0	0	1	0	0	0	0	0	0	0	0	0	0	1
10pm - 11pm	1	0	0	0	0	0	0	0	0	0	0	0	0	1
11pm - Midnight	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	1168	10	429	499	57	6	7	116	455	104	138	0	0	2989
% of Total	39		14	17	2			4	15	3	5			



Data displayed has been compiled from pneumatic traffic count processes and is subject to the documented limitations

Traffic Count Summary Report

Count Number	2931 Ref : MWT
Street	QUARRY ACCESS ROAD, OAK FLATS : From QUARRY SITE to PRINCES HIGHWAY : NORTH BOUND
Location	Cleary Bros. Quarry Access Road , just south of Princes Highway, On Tree near Cyclone Fence Carriageway

TOTAL COUNT MATRIX

Start Date	18-MAR-01
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	32
Weekly 85th Percentile Speed	51
Five Day AADT	513
Seven Day AADT	401

	MON	TUE	WED	THU	FRI	SAT	SUN	5 Day Total	5 Day Average	7 Day Total	7 Day Average
Midnight - 1am	0	3	0	2	4	0	0	9	2	9	1
1am - 2am	0	0	0	2	0	1	1	2	0	4	1
2am - 3am	0	0	1	0	0	0	0	1	0	1	0
3am - 4am	1	0	0	0	0	5	0	1	0	6	1
4am - 5am	10	3	3	2	2	6	0	20	4	26	4
5am - 6am	5	12	9	8	16	7	1	50	10	58	8
6am - 7am	25	31	24	24	30	11	1	134	27	146	21
7am - 8am	43	56	47	31	31	14	1	208	42	223	32
8am - 9am	56	54	47	31	30	13	0	218	44	231	33
9am - 10am	36	48	43	26	29	18	4	182	36	204	29
10am - 11am	54	60	49	33	30	17	4	226	45	247	35
11am - Midday	40	60	47	34	36	17	3	217	43	237	34
Midday - 1pm	33	43	35	24	29	15	4	164	33	183	26
1pm - 2pm	33	42	37	32	28	22	2	172	34	196	28
2pm - 3pm	44	44	37	25	24	41	1	174	35	216	31
3pm - 4pm	58	55	43	44	34	5	2	234	47	241	34
4pm - 5pm	58	65	39	50	54	5	1	266	53	272	39
5pm - 6pm	32	46	31	28	31	4	3	168	34	175	25
6pm - 7pm	14	17	8	11	17	8	5	67	13	80	11
7pm - 8pm	4	3	9	6	10	1	0	32	6	33	5
8pm - 9pm	1	0	3	1	1	0	0	6	1	6	1
9pm - 10pm	0	2	0	0	0	0	0	2	0	2	0
10pm - 11pm	0	0	0	0	1	0	0	1	0	1	0
11pm - Midnight	1	4	0	0	4	0	0	9	2	9	1
Total	548	648	512	414	441	210	33	2563	512	2806	400

Data displayed has been compiled from pneumatic traffic count processes and is subject to the documented limitations

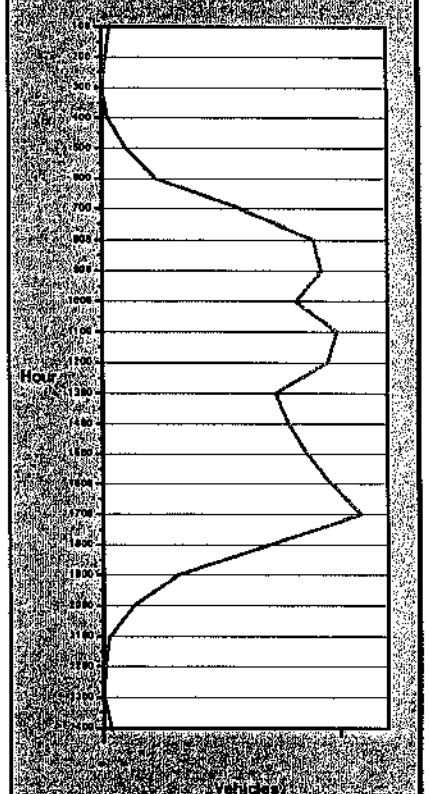
Hourly Classification Summary

Count Number	**2931**	Ref : **MWT**	
Street	**QUARRY ACCESS ROAD, OAK FLATS : From QUARRY SITE to PRINCES HIGHWAY : NORTH BOUND**		
Location	Cleary Bros. Quarry Access Road , just south of Princes Highway, On Tree near Cyclone Fence		Carriageway

Start Date	18-MAR-01
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	**32**
Weekly 85th Percentile Speed	**51**
Five Day AADT	**513**
Seven Day AADT	**401**

Time	01	02	03	04	05	06	07	08	09	10	11	12	13	Total
Midnight - 1am	9	0	0	0	0	0	0	0	0	0	0	0	0	9
1am - 2am	4	0	0	0	0	0	0	0	0	0	0	0	0	4
2am - 3am	0	0	0	0	0	0	0	0	1	0	0	0	0	1
3am - 4am	1	0	0	0	0	0	0	0	3	1	1	0	0	6
4am - 5am	4	0	5	2	0	0	0	2	7	5	1	0	0	26
5am - 6am	10	0	4	10	4	0	0	1	18	8	3	0	0	58
6am - 7am	40	0	15	34	6	0	0	8	33	6	4	0	0	146
7am - 8am	49	0	26	55	11	0	0	10	51	4	17	0	0	223
8am - 9am	63	1	28	38	5	1	0	5	58	8	24	0	0	231
9am - 10am	64	1	30	34	4	0	1	3	40	9	18	0	0	204
10am - 11am	71	0	37	44	8	0	0	6	56	4	21	0	0	247
11am - Midday	85	3	24	32	8	0	0	6	52	8	19	0	0	237
Midday - 1pm	60	1	22	25	2	0	0	5	44	10	14	0	0	183
1pm - 2pm	68	0	23	35	5	0	0	8	38	4	15	0	0	196
2pm - 3pm	78	0	24	31	7	0	0	4	49	10	13	0	0	216
3pm - 4pm	120	1	20	27	5	0	0	7	42	5	14	0	0	241
4pm - 5pm	171	0	35	19	0	1	0	2	30	4	10	0	0	272
5pm - 6pm	146	1	18	2	0	0	0	0	4	0	4	0	0	175
6pm - 7pm	73	0	5	1	0	0	0	0	1	0	0	0	0	80
7pm - 8pm	24	0	8	1	0	0	0	0	0	0	0	0	0	33
8pm - 9pm	6	0	0	0	0	0	0	0	0	0	0	0	0	6
9pm - 10pm	1	0	1	0	0	0	0	0	0	0	0	0	0	2
10pm - 11pm	1	0	0	0	0	0	0	0	0	0	0	0	0	1
11pm - Midnight	9	0	0	0	0	0	0	0	0	0	0	0	0	9
Total	1157	8	325	390	65	2	1	67	527	86	178	0	0	**2806**
% of Total	41		12	14	2			2	19	3	6			



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Golden River Vehicle Classification Scheme GRCS-10 (AUSTROADS 1994 Class Scheme)

LENGTH (indicative)	CLASS	VEHICLE TYPE	AXLES AND AXLE GROUPS		AUSTROADS CLASSIFICATION
			AXLES	GROUPS	PARAMETERS
		LIGHT VEHICLES			
SHORT Up to 5.5m	1	SHORT VEHICLE SEDAN WAGON, 4WD, UTILITY, LIGHT VAN, BICYCLE, MOTORCYCLE etc 	2	1 or 2	d(1) < = 3.2m and Axles = 2
MEDIUM 5.5m to 14.5m	2	SHORT VEHICLE TOWING eg TRAILER, CARAVAN, BOAT etc 	3, 4, or 5	3	Groups = 3 d(1) > = 2.1m, d(1) < = 3.2m d(2) > = 2.1 and Axles = 3, 4, or 5
		HEAVY VEHICLES			
	3	TWO AXLE TRUCK OR BUS 	2	2	d (1) > 3.2m and Axles = 2
	4	THREE AXLE TRUCK OR BUS 	3	2	Axles = 3 and Groups = 2
	5	FOUR AXLE TRUCK 	>3	2	Axles > 3 and Groups = 2
LONG 11.5m to 19.0m	6	THREE AXLE ARTICULATED VEHICLE RIGID VEHICLE AND TRAILER, OR 3 AXLE ARTICULATED VEHICLE 	3	3	d(1) > 3.2m, Axles =3 and Groups = 3
	7	FOUR AXLE ARTICULATED VEHICLE RIGID VEHICLE AND TRAILER, OR 4 AXLE ARTICULATED VEHICLE 	4	>2	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m Axles = 4 and Groups > 2
	8	FIVE AXLE ARTICULATED VEHICLE RIGID VEHICLE AND TRAILER, OR 5 AXLE ARTICULATED VEHICLE 	5	>2	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m Axles = 5 and Groups > 2
	9	SIX AXLE ARTICULATED VEHICLE RIGID VEHICLE AND TRAILER, OR 6 (OR MORE) AXLE ARTICULATED VEHICLE 	6 >6	>2 3	Axles = 6 and Groups > 2 or Axles > 6 and Groups = 3
MEDIUM COMBINATION VEHICLE 17.5m to 36.5m	10	B-DOUBLE B DOUBLE OR HEAVY TRUCK AND TRAILER 	>6	4	Groups = 4 and Axles > 6
	11	DOUBLE ROAD TRAIN DOUBLE ROAD TRAIN, OR HEAVY TRUCK WITH TWO TRAILERS 	>6	5 or 6	Groups = 5 or 6 and Axles > 6
LONG COMBINATION VEHICLE Over 33.0m	12	TRIPLE ROAD TRAIN TRIPLE ROAD TRAIN, OR HEAVY TRUCK AND THREE TRAILERS 	>6	>6	Groups > 6 and Axles > 6
-	13	ALL OTHER VEHICLES	-	-	-

DEFINITIONS: Group - axle group where the axles are less than 2.1m apart
Groups - number of axle groups
Axles - number of axles on the vehicle (maximum axle spacing of 10m)
d(1) - distance between first and second axle of vehicle
d(2) - distance between second and third axle of vehicle

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