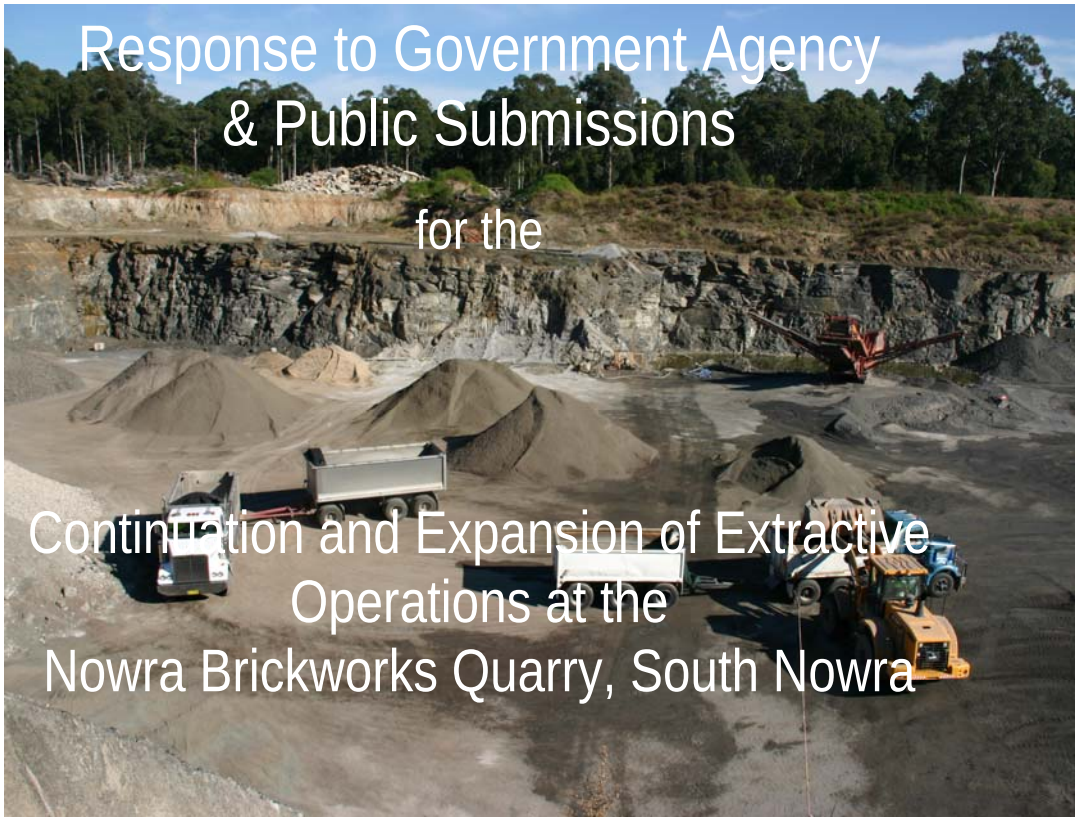
Response to Submissions

South Coast Concrete Crushing and Recycling Pty Ltd

ABN: 76 095 243 584



Prepared by:

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CITY PLAN SERVICES

Major Project Application No 07-0123

August 2009

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South Coast Concrete Crushing and Recycling Pty Ltd

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Response to Government Agency & Public Submissions

for the

Continuation and Expansion of Extractive Operations at the Nowra Brickworks Quarry, South Nowra

Lot 1, Deposited Plan 1126288

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Ref No. 27005

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Attachments

1 INTRODUCTION

1.1 South Coast Concrete Crushing and Recycling (SCCCR) is proposing to continue and expand their extractive operations at the Nowra Brickworks Quarry, South Nowra. The proposal involves the expansion of shale extraction, processing, blending, recycling and product dispatch-related activities, the importation of virgin excavated natural material (VENM) to create a final landform and the rehabilitation of areas no longer required for extraction.

1.2 An Environmental Assessment for the redevelopment was prepared in December 2008 to support SCCCR's application for approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.3 The Environmental Assessment was placed on public exhibition between 27 February 2009 and 30 March 2009. Following exhibition, the Department of Planning provided SCCCR with a copy of the submissions received.

1.4 This report provides a response to the issues raised in submissions and presents the '*preferred project*' for which approval is sought. The report has been prepared by City Plan Strategy & Development with strategic input and advice from R.W. Corkery & Co Pty. Limited.

1.5 In total, nine (9) submissions were received comprising:

- Six (6) written submissions from government bodies; and
- Three (3) written submissions from nongovernment organizations.

1.6 The government submissions were received from:

- City of Shoalhaven Council;
- Department of Environment and Climate Change (DECC);
- Department of Water and Energy (DWE);
- Road and Traffic Authority (RTA);
- Department of Lands; and
- Department of Primary Industries (DPI).

1.7 Submissions from nongovernment organisations were received from:

- Normans Plant Hire / South Coast Resources;
- Abby Autos; and
- DSGRB Pty Ltd.

1.8 All submissions were received by the Department of Planning and forwarded to SCCCR. City Plan Strategy & Development has reviewed the comments and analysed the issues raised by each government department, non-government organisation or public submission and assisted SCCCR in preparing a response to the submissions.

1.9 Following consideration of the issues raised, a number of meetings were held with the various Government agencies as follows: ‘

- Meeting with the DECC on 30 April 2009 to discuss noise, blasting and hydrology. Attended by the Proponent, City Plan Strategy & Development, Heggies and Martens & Associates;
- Meeting with the DWE attended by Martens & Associates; and
- Meetings with the Department of Commerce and Corrective Services and attended by the Proponent, City Plan Strategy & Development and Access Business Lawyers.

1.10 As a result of these meetings, additional information has been provided in support of the proposal. It is noted that this additional information has in most cases been provided directly to the relevant Government agencies for comment and agreement. However, and for completeness, please find attached copies of the following supplementary reports in support of the application:

- “*Response to Agencies*” Report, prepared by Martens & Associates, reference P0701757JR04_V5 and dated August 2009 (refer **Attachment A**);

- “*Additional Information – Noise Impact Assessment Report*”, prepared by Heggies Pty Ltd and dated 25 August 2009 (refer **Attachment B**);

- Letter to the RTA from John Coady, dated 9 June 2009 (reference 04072), RTA letter to the Department of Planning, reference MP 07_0123, dated 10 July 2009, and John Coady letter to City Plan Strategy & Development dated 17 July 2009 (reference 07072) (refer **Attachment C**);

- Response to the Government Agency & Public Submissions, dated April 2009 and prepared by Gaia Research (refer **Attachment D**);

1.11 In addition to the above supplementary reports, a number of issues have also been agreed through email correspondence been the professional team and a number of Government Agencies. For completeness, these emails are also appended to this report as follows:

- Email from the DECC (Craig Jones) to Chris Outtersides (City Plan Strategy & Development) dated 22 June 2009 (refer **Attachment E**);
- Email from the DECC (Craig Jones) to Chris Outtersides (City Plan Strategy & Development) dated 15 June 2009 (refer **Attachment F**);
- Email from Department of Commerce to Chris Outtersides (City Plan Strategy & Development) dated July 17 2009 (refer **Attachment G**);

1.12 For ease of reference, we have responded to the submissions about the application taking each agency in turn. Where issues have been repeated, reference is made to where the relevant issue has been addressed elsewhere in this report.

1.13 A final Statement of Commitments is also provided at **Section 12** of this report.

2 DEPARTMENT OF ENVIRONMENT AND CLIMATE CHANGE

2.1 HYDROLOGY

ISSUE

i. *DECC understands that no discharge from the storage reservoir currently servicing the premises has occurred within the past 4 years. The surface Water Quality summary (EA Part 1 – Table 6) indicates that Total Dissolved Solids (TDS) values in Nowra creek rise from 138m/L upsteam of the current quarry site to 1760 mg/L at the furthest downstream point sampled. The EA (Part 1 – Table 23_ indicates that the creek and groundwater are decoupled and soils are non-saline (Part 7 – paragraph 3.3.1.8.)*

Information required- DECC requires further information and assessment to identify the source and pathways of salinity currently within Nowra Creek. A comparison of the major ions present in the waters of Nowra Creek must be made with those of the ground and surface waters of the quarry.

RESPONSE

2.11 Martens & Associates Pty Ltd (Martens) met with the DECC on 30 April 2009 to discuss the issues raised by the DECC. As a result of this meeting (and a subsequent meeting with the DWE), Martens prepared a supplementary hydrology report. This is provided at **Attachment A** and has been prepared to address the DECC's outstanding concerns about the application.

2.12 In relation to the salt concentration within Nowra Creek, this issue is addressed in Section 2 of Martens report.

2.13 To address the salt concentration issue, a further round of soil and water sampling was undertaken on 7 May 2009. This included both floodplain and soil sampling. The results of the sampling were then laboratory analysed for pH and electrical conductivity (EC). The results of this assessment are provided in Tables 2 and 3 of the Martens report.

2.14 From the results it was concluded that the Creek water EC generally accord with results from the initial sampling undertaken in support of the EA. Whilst the recent sampling displayed slightly higher EC values, the EC values are still considered to be within the expected range of the initial EC sample values that were originally obtained. This suggests that the spike in EC values is likely to be related to natural variation and that the relatively higher creek water EC values for the recent sampling may be attributable to decreased flow within the creek and therefore reduced dilution. Decreased flow is likely to have resulted from reduced rainfall duration, frequency or intensity, or from the large bund which has been constructed on the adjacent jail site and which may have reduced the creek's catchment area.

2.15 In addition to this, the shallow piezometer (P4) (see Attachment C of Martens report) which was installed to monitor potential shallow groundwater flowing to Nowra Creek, did not intercept groundwater and remained dry throughout the entire monitoring period suggesting that shallow groundwater is unlikely to flow to Nowra Creek.

2.16 Therefore, and in conclusion, given that there is currently no quarry discharge from disturbed sections of the Project Site to Nowra Creek, it appears that local soils are the most probable source of high salt concentrations in the creek. Given that the flow in the creek is low and there are a number of ponds, there is also considerable opportunity for salt concentrations in stagnant pools. These concentrations will only increase with evaporation.

ISSUE

ii. At paragraph 6.3.3, the EA states that a maximum TDS concentration of 3875mg/L is predicted to occur in the storage reservoir, which falls into the Very High Water Salinity Rating category (Irrigation Guidelines, table 3.4). It is proposed that this water will be disposed of via land application.

Information required - DECC requires an assessment of the viability of disposal of Moderate to Very High saline rating pit water upon 4 ha of the proposed rehabilitation area. The assessment must determine the soil storage capacity and the environmental fate of salt applied to the disposal area. The assessment must also examine the viability of the proposed native plant rehabilitation species (identified in Appendix 4 pf Part 2A of the EA) under saline water application conditions.

RESPONSE

2.17 To address this issue, Martens undertook a revised amended water balance assessment. This assessment used the pit inflows as outlined in Table 7 of Martens report. The revised assessment included a number of changes to the original water balance model undertaken in support of the EA and included the following (for further information on the changes, refer to Section 5.2.2 of Martens report):

- Re-running the model with revised range of potential pit inflow volumes;
- Eliminating the irrigation field;
- Applying a conservative seepage rate of 0.037 m/d (equal to median K) to the storage reservoir in order that reservoir recharge is included in the water balance model;
- Increasing the dam surface area from 0.5ha to 0.9666ha in order to represent the current extent of the excavation that will comprise the dam;
- Increasing the area of the excavation pit that is below the water table from 2.95 ha to 3.25 ha; and
- Increasing the area of pervious catchment which drains to the excavation pit from 2.95 ha to 3.25 ha.

2.18 In addition to running the model with the range of potential groundwater ingress rates (Table 7), an additional scenario was developed to model potentially increased groundwater ingress volumes at the commencement of excavations and prior to steady inflow conditions being developed. This modeling involved using the MODFLOW model's median groundwater inflow volume from the initial two months (471 m3/day) and running the water balance model with this daily inflow rate for this period. The level within the storage reservoir was then taken after two months and the water balance model was re-run starting at this newly calculated storage level with the steady state groundwater ingress rate of 47.11 m3/day. The period of two months was determined as ingress rates in the third month drop below the groundwater ingress rate of 47.11 m3/day.

2.19 As set out in the Martens report, the results from this assessment indicate that the storage reservoir has the capacity to accommodate such groundwater ingress rates without overflow (Figure 20 of Martens report).

2.20 In conclusion, and based on the water balance results, Martens consider that the Project Site will be able to operate without the need to discharge from either the excavation pit or storage reservoir and therefore, there will be no need for an irrigation area.

ISSUE

iii. The surface water salt concentration of 220mg/L (Draft EA – Part 1 – Chapter 7.3.2.3) has not been revised to include run off and leaching from the 4 ha saline pit water disposal area. This value has been assumed of the basis of TDS present within the creek (EA Part 1 – Table 21)

Information required – revision of surface water salt concentration to include 4 ha disposal Area and impacts upon Nowra Creek.

RESPONSE

2.21 This issue is discussed at **Section 2.11 – 2.16** of this report.

ISSUE

iv. No ground or surface water monitoring program has been included in the EA.

Information required – A staged ground surface water monitoring plan should be prepared to monitor impacts of saline ground water from the proposal.

RESPONSE

2.22 Martens have prepared a surface water and ground water plan. This is set out in Section 7 of Martens report at **Attachment A**.

Proposed Surface Water Monitoring Plan

2.23 In relation to the surface water plan, Martens have recommended that water within Nowra Creek should be monitored by a suitably qualified person at a minimum of three locations (one upstream of the Project Site, one downstream of the Project Site and one adjacent to the Project Site) every quarter. Samples should then be sent to the Council and/or the DECC to be laboratory tested.

Proposed Ground Water Monitoring Plan

2.24 In terms of ground water monitoring, Martens have recommended that groundwater levels should be monitored quarterly throughout the life of the development to allow for detection of potential drawdown around the Project Site's boundaries. Martens also recommend the installation of six (6) permanent piezometers around the extraction perimeter. Data from these piezometers should be collected quarterly by a suitably qualified consultant, submitted to the Council and/or the DECC and and reviewed annually for a period of 5 years.

2.2 ECOLOGY

2.2.1 Mitigation for Bats

ISSUE

ISSUES	*DECC COMMENT*	*RECOMMENDED ACTION*
Timing of tree removal	*Micro-bats use some hollows as maternity roosts in summer and as hibernation roosts in winter and some species appear to use different hollows for these parts of their lifecycles. Removing trees in winter would avoid disruption to breeding but could impact hibernating colonies when they are least active and hence least able to locate alternative roosts.*	*If consent is granted for the removal of trees with hollows for the proposal then the consent should state that clearing of such trees is only permitted in mid-late autumn or early-mid spring and that trees should be tapped by machinery prior to removal in an attempt to make resident fauna vacate hollows*

RESPONSE

2.2.2 The Proponent is happy to accept a condition whereby the removal of any trees with hollows from the Project Site will only be permitted in mid-late autumn or early-mid spring and that such trees will be tapped by machinery prior to removal to make resident fauna vacate the hollows.

2.2.3 Biodiversity Offsets

ISSUE

ISSUES	*DECC COMMENT*	*RECOMMENDED ACTION*
Concurrence to offset strategy	*The Ecology Report states (p30) that the Department of Planning would seek concurrence form DECC for the biodiversity offset strategy. DECC has no concurrence role in Part 3A EP&A Act matters*	*Advise the Proponent*
Offset extent	*DECC notes that the proposed offset comprises about 20ha of land with similar vegetation and habitats, equating to an offset ratio of about 3:1. This proposed offset does not appear to meet or maintain of improve outcomes for biodiversity values.*	*The areas of the quarry site to be revegetated must be included in the extent of the biodiversity offset.*
Offset term	*The biodiversity offset strategy in the Ecology Report proposes a term of 80-100 years. DECC's Principles of the Use of Biodiversity Offset in NSW state that has impacts on biodiversity are likely to be permanent, the offset should also be permanent.*	*The offsets proposed by gaia research and the additional area of offsets recommended (above) must be secured in perpetuity.*

RESPONSE

2.2.4 The Proponent notes the DECC's assertion that the previously proposed offset area comprises approximately 20ha of land.

2.2.5 The Proponent also notes the DECC's requirement to include the areas of the quarry to be revegetated within the extent of the biodiversity offset area (referred to as the "*Northern Biodiversity Offset Area*"). We note that the Proponent currently operates the existing quarry under the terms of a lease from the State which also owns the adjoining South Coast Correctional Facility (SCCF). It is not the intention of the Proponent to extend this lease once the life of the quarry has expired and the Project Site has been fully revegetated. The area of the Project Site that will be revegetated is as currently included within the lease area. Under the DECC's "*Principles of the Use of Biodiversity Offset in NSW*", the offset should be secured in perpetuity. Given the Proponent's intention to terminate the lease once the Project Site has been revegetated, discussions have been held with the Department of Commerce and Department of Corrective Services which will be managing the Correctional Facility and it has confirmed that the areas of the Project Site to be revegetated can be secured in perpetuity and can therefore be formally offered as part of the biodiversity offset area. The Proponent is therefore able to include an extended Southern Biodiversity Offset Area within the offset calculation comprising the whole of the existing lease area.

2.2.6 The Proponent notes the DECC comments that the proposed offset does not appear to maintain or improve outcomes for biodiversity values. We understand that this principally relates to the number of existing hollows within the offset area compared to the number of hollows being removed to facilitate the quarry operation. In responding to this, it is noted that the proposed biodiversity offset area has changed since the submission of the original EA. Previously, the Southern Biodiversity Offset Area related to parts of Lots 228 and 229 in Deposited Plan 755952 respectively. However, the Southern Biodiversity Offset Area now relates entirely to Lot 228 in Deposited Plan 755952 only.

2.2.7 To this end, Gaia Environmental Research has resurveyed Lot 228 and has located a number of hollows across the Lot. The results of this survey are set out within the revised Ecology report at **Attachment D** but, in summary, 31 hollow bearing trees were located within Lot 228.

Offset Offer

2.2.8 Discussions have been held between the Proponent and the DECC to discuss the terms of the offset offer, and also the management of the offset land in perpetuity. As a result of these discussions, it has been agreed that the following terms would comprise the Proponents offset strategy offer:

Southern Biodiversity Offset Area

2.2.9 The Proponent has agreed lease terms for a period of 80 years for the whole of Lot 228 within DP 755952. Lot 228 comprises 16.19 hectares.

Northern Biodiversity Offset Area

2.2.10 As set out above, the Northern Biodiversity Offset Area will now comprise the whole of the existing Project Site, this being approximately 21.5 hectares. This represents an increase in area of approximately 19 hectares compared to the original offer as set out in the EA.

2.2.11 The total offset area therefore now comprises approximately 37 hectares.

2.2.12 In addition to the areas of offset, the offer has been further strengthened by the security of an in-principle agreement which has been negotiated with the Department of Commerce and Corrective Services. This will see the utilisation of the South Coast Correctional Facility's labour force to ensure the primary goals of the offset can be achieved and, utilising a viable source of labour and resources which will not disappear.

2.2.13 This agreement will involve the ongoing management of all the offset land (this being Lot 228 and the existing Project Site (once the quarry has expired)) being undertaken by the Department of Corrective Services on behalf of the Proponent. The terms of this management agreement will be set out and agreed as part of a '*Management Plan*' which will be prepared by the Proponent. The Management Plan will set out measures to ensure that the offset will improve biodiversity outcomes across the respective sites for the period of the offset and will be adopted by the Department of Corrective Services as part of their agreement to manage the offset land.

2.2.14 It is anticipated that the management of the offset land will include the following principles. These will be incorporated into the formal Management Plan:

- feral animal control - fox baiting, fencing to exclude rabbit and fox,
- weed control,
- setting out fixed plots and transects for monitoring biodiversity improvement
- trapping of animals, plant surveys and biodiversity indices (fallen logs percentage cover etc)
- providing data to DECC and Department of Planning on an annual basis for record keeping.

2.2.15 This proposal was set out in an email to Craig Jones at the DECC dated 4 June 2009. A response was received back from Craig Jones on 22 June 2009 confirming that "*the proposed offset site maintains or improves biodiversity outcomes for the clearing on the SCCCR quarry site identified in MP 07_0123*". A copy of this email is provided at **Attachment E.**

Staged Consent

2.2.16 However, and notwithstanding the response from the DECC, the Proponent has managed to secure the Northern Biodiversity Offset Area in perpetuity once operations have ceased. In terms of the Southern Biodiversity Offset Area, this has been secured by way of an agreement between the Proponent and the property owner to acquire the whole of Lot 228 by way of an 80 year Lease. This lease has been secured with significant consideration being paid up front and over the period of the Lease.

2.2.17 The Deed which was executed on 14 May 2008 contains an unconditional commitment by the owner to lease the property comprising Lot 228 to the Proponent upon the granting of consent by the New South Wales Department of Planning. The approved use of the leased premises will be directly related to the following under Item 3 marked "Permitted Use". Furthermore, the Proponent has agreed to pay outgoings and, has entered into strict covenants under Clause 6 of the Lease, which expressly restricts the use of the premises otherwise than for the purposes set out in Item 3 of the Reference Schedule which is referred to above. This means that the Department of Planning will in effect be able to clearly dictate how the premises will be used.

2.2.18 However, it is recognised by the Proponent that the 80 year lease for the Southern Biodiversity Offset Area does not satisfy Principle 7 of the DECC's "*Principles for the use of biodiversity offsets in NSW*" which is to secure the offset in perpetuity.

2.2.19 Therefore, and given that the Proponent has not managed to secure the Southern Biodiversity Offset Area in perpetuity at the time of the application, it has been agreed with the Department of Planning and the DECC that a staged consent be proposed for the development.

2.2.20 The staged consent would seek to agree a condition or similar mechanism whereby the Proponent agrees not to remove any of the forested areas of the Project Site until a suitable offset strategy in perpetuity has been agreed with the Department Of Planning. This approach will enable the Proponent to continue operations on the part of the Project Site that is not forested whilst securing the Southern Biodiversity Offset Area in perpetuity and was agreed by the DECC in email communication between Chris Outtersides of City Plan Strategy & Development and Craig Jones of the DECC on 15 June 2008 where it was agreed that the DECC would not object to a staged development. A copy of this email is provided at **Attachment F.** We understand through discussions with Kane Winwood that the Department of Planning is also happy to proceed on this basis.

2.2.21 Notwithstanding the staged consent, the Proponent still wishes to agree the principle and scope of the offset area as part of the current application process such that, once the Southern Biodiversity Offset Area has been secured in perpetuity, the Proponent can proceed with the removal of vegetation and extend extractive operations across the rest of the Project Site.

2.3 Weed Management and Rehabilitation Strategy

ISSUE

ISSUE	*DECC COMMENT*	*RECCOMMENDED ACTION*
Placement of cleared trees with hollows	*The Strategy states that cleared trees with hollows should be placed in intact vegetation adjacent to Nowra Creek in the north to provide microhabitats. This could result in damage to existing vegetation by machinery manoeuvring logs*	*The Proponent should satisfy the DG of Planning that the methods to position logs will not damage existing vegetation in the riparian protection area of Nowra Creek I in the north of the site. Alternatively, this requirement could be removed from the Strategy and such logs could be used in rehabilitation areas instead.*
Annual works program	*The annual works program in the Strategy (Table 4) does not provide enough detail regarding the sequence of actions required for rehabilitation and revegetation.*	*The Annual Works Program should include the detailed sequence of actions required for rehabilitation and revegetation*

RESPONSE

2.3.1 The Proponent notes the requirement to ensure that the placement of cleared trees with hollows will not damage any existing vegetation in the riparian protection area of Nowra Creek. In response to this, the Proponent will ensure the placement of felled hollow bearing logs in such a manner than existing vegetation will not be damaged. If this cannot be achieved then the logs will be stacked in a cleared area elsewhere on the Project Site and used in the rehabilitation areas.

2.3.2 In relation to the Annual Works Program, the rehabilitation of the Project Site will be an ongoing process. In summary, vegetation, top soil and subsoil from the fourth cell will be used to restore the first cell. The process will continue sequentially until the Project Site is exhausted and is no longer a viable mining operation. There will then be a progressive rehabilitation program gradually working behind the extraction process and extending for approximately 10 years beyond the life of the quarry. A detailed program has been prepared by Gaia Research and is provided at **Attachment D**, Section 2.1.2. This sets out the works program in more detail along with associated timing for each action. Refer to the Gaia Research Report at **Attachment D** for further information.

2.4 NOISE IMPACT ASSESSMENT

2.4.1 Noise Monitoring and Rating Background Noise Levels.

ISSUE

Limited noise monitoring was conducted by the Proponent with the aim to determining the Rating Background Levels (RBLs) surrounding the site. The Proponent indicates on page 11 of the report that monitoring at receivers was conducted in the absence of the noise from the current quarrying operations and that this was from 7:30pm on Tuesday 24 July to 4:15pm on Wednesday 25 July 2007. The Proponent indicates on page 11 that the project site commenced operation at 12:00noon on 25 July 2007 and so facr 4 hours and fifteen minutes of noise monitoring the background noise level was potentially affected by noise from current site operations. The Proponent indicates that calculations used monitoring results from before 12 noon on 25 July 2007.

DECC do not accept the RBLs or Project Specific Noise Levels (PSNL) derived by the Proponent, because of the limited duration of monitoring. Table 1 below presents DECC's nominated RBLs based on the minimum measured $L_{90,\ 15\ minute}$ level for the day, evening night, and morning shoulder, and applying the guidance in the Industrial Noise Policy (INP) and INP application notes.

Table1: DECC's nominated RBLs (dBA)

Location	*RBL L_{A90}*			
	Day	*Evening*	*Night*	*Early Morning*
Location 1 – 80 Links Road	*35*	*34*	*30*	*35*
Location 2 – Old Southern Road	*36*	*36*	*32*	*36*

As per the NIA, the level derived for Location 2 are considered to apply also to Locations 3, 4 and the proposed Correctional Centre. Note that they do not apply to Location 5, 292 Princes highway as this is understood to be a commercial premises (not residential) in an area zoned industrial.

DECC recommends noise and blasting limits for the proposed Correctional facility by applying the same criteria as for residential noise sensitive receiver location, on the basis that the incarceration is the occupants' punishment and otherwise there is no reason to consider the occupants differently to any other resident. The Department of Planning (DoP) may consider, or take advice from others, that the proposed Correctional facility may incorporate design elements that provide acceptable amenity for the occupants for higher noise and blasting levels than those nominated by DECC.

RESPONSE

2.4.2 The Proponent's noise consultant, Heggies Pty Ltd, met with the DECC on 30 April 2009 to discuss the issues raised as part of the initial consultation process. Following this meeting, unattended background noise monitoring was conducted between Friday 8 May 2009 and Monday 18 May 2009 at a number of representative locations in the vicinity of the Project Site. Environmental noise loggers were used to continuously record noise levels at three monitoring locations over the survey period at the same distances from the Princes Highway. These locations are considered to be the closest receptors and were at 80 Links Road (Locations 1), 371 Old Southern Road (Location 2) and 243 Princes Highway (Location 4).

2.4.3 In terms of the existing amenity noise levels at the Locations, these were not deemed significant, with existing industrial amenity noise levels in the locality also considered not significant, that is, the amenity noise levels are more than 6dB(A) lower than the NSW Industrial Noise Policy (INP) acceptable amenity noise levels. This is presented in **Table 1** of the Heggies Supplementary report provided at **Attachment B**. A summary of the results of the background noise surveys is presented in **Table 3** of the Heggies Report and for the proposed operational hours of the quarry.

2.4.4 A review of the data presented in **Table 3** of the Heggies report indicates that the LA90(15minute) Rating Background Level (RBL) at the monitoring locations ranged from 40dB(A) to 48dB(A) during the daytime, 35dB(A) to 44dB(A) during the evening and 30dB(A) to 39dB(A) during the night-time. Heggies consider that these measured background noise levels are typical of those of a suburban environment with transportation noise contributions associated with the Princes Highway and, to a lesser extent, nearby local traffic and commercial businesses.

Operational Noise Criteria

2.4.5 The Nowra Brickworks Quarry operational noise emission criteria were set with reference to the INP. In order to establish the operational noise criteria, this involved an assessment of the Rating Background Levels (RBL's), the intrusiveness criteria and the amenity criteria.

2.4.6 The intrusiveness criteria have been set for the proposed hours of quarry operation based on the RBLs (refer to **Table 3** of the Heggies report) at the same distances from the Princes Highway as the surrounding residences to the quarry.

2.4.7 In relation to the Correctional Facility, whilst it is relatively easy to establish operational noise criteria for residences, i.e. in accordance with the NSW Industrial Noise Policy (INP), as set out in Table 1 of the Heggies report, establishing operational noise criteria for correctional facilities is somewhat less straightforward as these are not explicitly set out within the INP.

2.4.8 To this end, and as set out in Section 3.6 of the Heggies Report, guidance on appropriate intrusive criteria has been taken from a publication entitled "*Acoustics Design Guide for Corrections*" which recommends internal acoustical design goals for correctional facilities; refer to **Attachment B** of the report. The corresponding (external) amenity criteria have been set via reference to the INP using the passive recreation category; refer to Table 1 of the report.

2.4.9 The operational noise criteria which apply to the correctional facility are set out in Table 8 of the report and it is concluded that, as the intrusive criteria are internal levels, the amenity criteria are the controlling criteria for the correctional facility.

2.4.10 It is noted that we have discussed this issue with the DECC and, given the fact that there are no intrusive noise criteria nominated within the INP for correctional facilities, they have asked us to confirm with the operators of the Correctional Facility, that they are happy with the noise assessment and the basis upon which the assessment criteria have been derived. To this end, it is noted that an email was sent to the Department of Commerce on the 7 July setting out the Proponents position and seeking confirmation that this approach was appropriate (refer **Attachment G**). To date, we have received no response to this email.

2.4.11 In terms of the residences in the vicinity of the proposed quarry operations, these are best described by the "*suburban*" receiver type. The amenity criteria have been set using the recommended LAeq(period) contribution from industrial noise as presented in **Table 1** of Heggies report..

2.4.12 The resulting operational intrusive and amenity noise emission criteria are presented in **Table 1** below (Table 4 in the Heggies report at **Attachment B**):

Table 1
Operational Noise Emission Criteria - dB(A) 20 μPa[1]

Receiver	Intrusiveness Criterion LAeq(15minutes)			Amenity Criterion LAeq(period)		
	Daytime 0700 -1800 Hours	Evening 1800 -2200 Hours	Night 2200 -0700 Hours	Daytime 0700 -1800 Hours	Evening 1800 -2200 Hours	Night 2200 -0700 Hours
Location 1 - 80 Links Road	46	40	35	55	45	40
Location 2 - 371 Old Southern Road	45	43	36	55	45	40
Location 4 - 243 Princes Highway	53	49	44	55	45	40
Correctional Facility	40 to 75 (internal)			50	50	50

2.4.13 A review of the criteria presented in **Table 1** above indicates that the amenity criteria noise levels are generally higher than the intrusiveness criteria noise levels at all the residential locations, except Location 4 during the evening and night. Compliance with the intrusiveness criteria, therefore, will demonstrate compliance with the amenity criteria. Accordingly, the following assessment is based on the intrusiveness criteria being the controlling noise criteria, except at the Correctional Facility and Location 4 during the evening and night.

2.5 Operational Noise and Project Specific Noise Levels

ISSUE

The sound power levels (SWL) contained in the EA (Part 5 – paragraph 7.2) area at the lower end of the range usually anticipated by DECC.

The Proponent has undertaken predictions for "acoustically neutral" weather conditions. DECC have included meteorological conditions under which the limits proposed below apply to allow for monitoring under a range of meteorological conditions.

RESPONSE

INP Assessment of Prevailing Weather Conditions - Wind

2.5.1 As Heggies note in their supplementary report, wind has the potential to increase noise at a receiver when conditions are light and stable and when the wind blows fom the direction of the noise source. However, as the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transport sources.

2.5.2 It is considered that wind effects need to be considered when wind is a feature of the area under consideration. Furthermore, where the wind between the source and the receiver measures 3m/s for 30% or more of the time in any seasonal period (during the day, evening or night), then wind is considered to be a feature of the area and noise level predictions must be made under these conditions

2.5.3 In relation to the INP, Section 5.3 '*Wind Effects*' states that:

> *"Wind effects need to be assessed where wind is a feature of the area. Wind is considered to be a feature where source to receiver wind speeds (at 10 m height) of 3 m/s or below occur for 30 percent of the time or more in any assessment period in any season."*

2.5.4 In order to determine the prevailing conditions for the Project Site, weather data for the period May 2007 to May 2009 were obtained from the RAN weather station at Nowra. The data was analysed in order to determine the frequency of occurrence of winds of speeds up to 3m/s in each season. The results of the weather station analysis for daytime, evening and night-time winds are presented in Table 6 and Table 7 of Heggies' revised report respectively.

2.5.5 In summary, Table 8 of Heggies' report details the prevailing winds less than (or equal to) 3m/s with a frequency of occurrence greater than (or equal to) 30% and considered to be relevant to the Project Site, and in accordance with the INP. As this table indicates, there are no occurances of when the prevailing winds are in excess of 3m/s for 35% of the time.

Additional DECC Noise Assessment Information

2.5.6 However, and not withstanding this, the DECC's recommended noise assessment criteria aim to limit potential intrusive noise emissions and preserve noise amenity. In cases where the limiting noise assessment criterion cannot be achieved, then practicable and economically feasible noise control measures should be applied. This usually requires demonstration that Best Achievable Technology and Best Environmental Management Practices have been implemented in order to mitigate adverse acoustical impacts.

Modelled Weather Conditions

2.5.7 Computation of the contributed noise levels at the four receiver locations have therefore been based on:

- "Acoustically neutral" weather conditions equivalent to Pasquil Stability Class D, representing calm conditions (i.e. daytime 20^{O}C, 70% relative humidity and 0m/s wind speed), there being no prevailing adverse weather conditions (based on the Nowra RAN weather data).

Non-Prevailing Weather - Noise Impact Assessment

2.5.8 Notwithstanding the fact that the site specific prevailing weather conditions presented above were determined strictly in accordance with the INP, recent Consent Conditions (and Environment Protection Licences) stipulate that the "Noise Limits" are to be complied with under adverse weather conditions (even though the prevailing conditions are non-adverse). The adverse weather conditions normally nominated are winds up to 3m/s and, for night-time operation only, temperature inversions of up to 3^{o}C/100m.

2.5.9 Accordingly, the Nowra Brickworks Quarry noise model was also used to predict the quarry operational noise levels under the daytime adverse weather condition of a 3m/s wind blowing in all directions for each scenario.

ISSUE

Our proposed noise limits below are based on predicted levels. Where the predicted level is less than 35dBA we have recommended a limit of 35dBA. The predicted level of 46dBA at Location 4 for Scenario 2 exceeds the Intrusive Criterion of 41dBA by 5dB. There is very little information to indicate the Proponent has implemented all feasible and reasonable noise mitigation measures, however, we recommend DECC licence to the level of 46dBA with the condition that the Proponent develop and implement a Noise management plan (NMP), and on the expectation that the Department of Planning (DoP) will assign Architectural treatment Rights to this location, consistent with recent DoP policy. The NMP is to have as a principle objective to reduce noise emissions so as not to exceed the PSNL (41dBA for Location 4), through continual and ongoing evaluation and implementation of all feasible and reasonable noise mitigation measures.

Predicted noise levels for the proposed Correctional Facility exceed the criteria by more than 5dB, a level greater than DECC will usually licence to. Therefore we recommend DoP be advised that DECC will not licence to the predicted levels for this location, and this will need to be dealt with in Planning's Project Approval, if issued, either by assigning acquisition rights or requiring some other form of negotiated agreement.

RESPONSE

Noise Impact Assessment
Modelling Scenarios

2.5.10 In response to this issue, Heggies modelled three operational scenarios were developed and modelled to be indicative of the Nowra Brickworks Quarry operations, during the life of the Project. The scenarios are illustrated in **Table 1** of Heggies Report and are summarised as follows:

- ***Scenario 1***

Current operations, including the mobile crushing and screening plant, one front end loader (FEL), one excavator (all on the existing quarry floor, RL 32) and one blasthole drill (at RL 40).

- ***Scenario 2***

Future operations, including the mobile crushing and screening plant, two FELs, one blasthole drill and two excavators. This equipment was modelled at an elevation of 14.5m below the natural surface on the western side of the active extraction area, except for the blasthole drill which was modelled 4m below the natural surface. Additionally, a bulldozer was modelled at the natural surface on the eastern side of the extraction area, removing overburden. VENM backfilling operations, incorporating a bulldozer and compactor, were modelled as occurring to the north of the active extraction area.

- ***Scenario 3***

Future operations, including the mobile crushing and screening plant, two FELs, one blasthole drill and two excavators. This equipment is located at an elevation of 14.5m below the natural surface on the western side of the Stage 6 area, except for the blasthole drill which was modelled 4 m below the natural surface. Additionally, a bulldozer was modelled at the natural surface on the eastern side of the active extraction area removing overburden. VENM backfilling operations, incorporating a bulldozer and compactor, were modelled as occurring to the north of the active extraction area.

2.5.11 In relation to the use of a rockbreaker, this will be used to break down over sized material as required, and on an intermittent basis. Modelling with the rockbreaker operational indicates that the LAeq(15minute) noise levels will increase by up to 2 dBA during Scenarios 1, 2 and 3.

On-Site Truck Movements

2.5.12 In terms of truck movements, these have been modelled travelling from the Project Site entrance to the FEL, located in the vicinity of the mobile crushing and screening plant for each scenario. Approximately 74 truck movements per day were assumed for Scenario 1, representing a production rate of 300,000 tonnes per year and 120 truck movements per day were assumed for Scenario 2 and Scenario 3, representing a production rate of 500,000 tonnes per year.

Noise Sensitive Receivers

2.5.13 LAeq (15 minute) noise levels have been calculated for the selected receiver locations. The receivers, chosen as being indicative of the closest receivers, are as follows (refer to **Figure 2** of the Heggies report (NB, Location 3 is now project related):

- Location 1 - 80 Links Road, Nowra
- Location 2 - 371 Old Southern Road, Nowra
- Location 4 - 243 Princes Highway, Nowra
- Location 5 - South Coast Correctional Facility.

Operational Noise Impact Assessment

2.5.14 The point-to-point operational noise level calculation results are summarised in **Table 2** below **(Table 9** in Heggies report at **Attachment B**).

Table 2
Modelled Environmental Noise Emissions - dB(A) re 20 µPa

Location	Project Specific Assessment Criteria	Predicted $L_{Aeq(15\ minute)}$ Noise Levels[1]					
		Scenario 1 Calm	3m/s in all Directions	Scenario 2 Calm	3m/s in all Directions	Scenario 3 Calm	3m/s in all Directions
Location 1 - 80 Links Road	46	27/27	31/32	33/33	38/38	34/34	39/39
Location 2 - 371 Old Southern Road	45	29/30	33/34	38/40	43/45	37/38	42/43
Location 4 - 243 Princes Highway	53	42/42	45/46	45/45	49/49	43/44	47/48
Location 5 - Correctional Facility	50	35 to 42/ 35 to 42	39 to 46/ 39 to 46	40 to 46/ 40 to 46	44 to 50/ 44 to 50	41 to 46/ 41 to 47	46 to 51/ 46 to 51

Note 1: Noise level without/with the operation of a rockbreaker.

2.5.15 A review of the data presented in **Table 2** indicates that compliance is met at all the nominated receiver locations, both with and without the operation of the rockbreaker, except at Location 5 for Scenario 3 only with a 3m/s source to receiver wind. Here, there is a marginal 1dB(A) exceedance predicted, but Heggies consider this to be acceptable.

On-site Haulage Trucks - Evening and Early Morning

2.5.16 LAeq(15minute) noise levels have been calculated under acoustically neutral conditions and adverse 3m/s source to receiver winds for the selected receiver locations. The receivers, chosen as being representative of the closest residences, are identified above 0. The point-to-point on-site haulage truck noise level calculation results are summarised in **Table 10** of Heggies report but in summary, the anticipated noise emissions are expected to be less than the Project Specific Noise Assessment Criteria at all residences and the Correctional Facility for all the operational scenarios modelled and therefore the propsoal is considered appropriate.

Sleep Disturbance

2.5.17 In terms of sleep disturbance, the DECC's most recent policy considers sleep disturbance as the emergence. Appropriate screening criteria for sleep disturbance are determined to be an LA1(1minute) level 15dB(A) above the Rating Background Level (RBL) for the night-time period (2200hours to 0700hours).

2.5.18 Based on the DECC's "screening" criteria of RBL + 15dB(A) for sleep disturbance, the criterion at the potentially most affected residence adjacent to the Nowra Brickworks Quarry (Location 4) is 54dB(A) with the worst case predicted LAeq noise level from the evening/night-time truck movements being 38dB(A). Given that the LAmax quarry product truck noise levels are less than 10dB(A) above the LAeq levels, compliance with the 54dB(A) LAmax criterion will therefore be met.

2.6 Blasting Noise and Vibration Impacts

ISSUE

Blasting would need to be modified to ensure the limits below are not exceeded at any residential location and at the proposed Correction Facility, or we understand DoP may assign acquisition rights to locations where the criteria will be exceeded, or require appropriate agreements to be negotiated.

RESPONSE

Blasting Impacts Assessment
Proposed Blasting Practices

2.6.1 The proposed method of material extraction for the Nowra Brickworks Quarry will be by drill and blast techniques incorporating free-face blasting. A summary of indicative blast design details is presented in **Table 11** of Heggies report.

Blast Emission Site Laws

2.6.2 Blasting site laws were developed from the blast emission data originally obtained from trial blasting conducted at the Project Site in September 2002, supplemented by recent blast emissions monitoring results from blasting conducted between April and October 2007 at the quarry. Only the blast emission results above the lower limit of measurement of the monitor were used in the analysis.

Blast Emissions Assessment

2.6.3 A full assessment of the predicted level of blast emissions is set out in Heggies' Report at **Attachment B**. From this report, the following information is derived from the predicted levels of blast emissions:

- The predicted levels of ground vibration at the residences at Locations 1 and 2 comply with the ANZECC general human comfort criterion (of 5mm/s) and consequently with the ANZECC maximum human comfort criterion (of 10mm/s) as well as the BS 7385 structural damage criterion of 15mm/s (at 4Hz).
- The predicted level of ground vibration at the residence at Location 4 exceeds the ANZECC general human comfort criterion but complies with the ANZECC maximum human comfort criterion.
- The maximum predicted ground vibration level of 20.0mm/s occurs at the closest occupied section of the Correctional Facility (Location 5) using an MIC of 112kg (corresponding to blasting a full height 11.5m bench).
- The predicted maximum level of ground vibration at the Correctional Facility complies with the guide value of 50mm/s recommended for the prevention of cosmetic damage to reinforced or framed structures in BS 7385.
- The predicted levels of peak air blast at the residences at Locations 1 and 2 comply with the ANZECC general human comfort criterion of 115 dBLinear and consequently with the ANZECC maximum human comfort criterion.
- The predicted level of air blast at the residence at Location 4 exceeds the ANZECC general human comfort criterion but complies with the ANZECC maximum human comfort criteria.
- The maximum predicted peak air blast level of 118dBLinear occurs at the Location 4 residence using an MIC of 112kg.
- The predicted levels of peak air blast are below the US Bureau of Mines damage limit of 132dBLinear (2Hz cut off) at all residences as well as at the Correction Facility.

2.6.4 Based on the above, and the current blast emissions site laws, **Table 1** (Table 13 in the Heggies Report) presents the allowable Maximum Instantaneous Charge (MIC) for compliance with the controlling general and maximum ANZECC criteria.

Table 1
Controlling General Criterion and Allowable MIC

Residence/ Receiver	Distance from Blasting	Controlling General Criterion[1]	Allowable MIC	Controlling Maximum Criterion[2]	Allowable MIC
Location 1 - 80 Links Road	980m	5mm/s	516kg	10mm/s	1,200kg
Location 2 - 371 Old Southern Road	650m	115dBLinear	169kg	10mm/s	520kg
Location 4 - 243 Princes Highway	360m	115dBLinear	28kg	10mm/s	160kg
Location 5 - Correctional Facility	200m	5mm/s	22kg	10mm/s	50kg

Note 1:Where the controlling criterion is either 5mm/s ground vibration or 115dBLinear air blast.
Note 2:Where the controlling criterion is either 10mm/s ground vibration or 120dBLinear air blast.

2.6.5 A review of the above table indicates that the limiting allowable MIC will be 22kg for blasting at the closest point of extraction to the Correction Facility. With reference to the indicative blast design details in **Table 11** of Heggies Report indicates that an MIC of 22kg per blasthole would correspond to a 6.2m high quarry bench.

2.6.6 Based on the above, it is strongly recommended by Heggies that all blasts are monitored at the closest/potentially most affected residence in order to establish compliance with the nominated criteria and to progressively update the blast emissions site laws (ground vibration and airblast) in order to optimise future blast designs, based on actual site conditions. In this way, the site laws can be used to assist with the blast designs in order to ensure compliance with the ANZECC criteria at all nearby receivers.

2.6.7 By adopting this approach, in conjunction with the inevitable future introduction of improved blasting products, it is anticipated that the blast emissions criteria can be met without imposing any significant constraints on the blast designs throughout the life of the quarry.

2.6.8 It is also recommended that the operators of the Correctional Facility are formally notified prior to every blast as to exactly when the blast is scheduled to be fired.

2.7 Road Traffic Noise Impacts

ISSUE

DECC accepts the road traffic noise assessment that the criteria in the Environmental Criteria for Road traffic Noise will not be exceeded.

RESPONSE

2.7.1 It is noted by the Proponent that the criteria in the Environmental Criteria for road traffic noise will not be exceeded.

3 DEPARTMENT OF WATER AND ENERGY SUBMISSION

3.1 LICENSING

ISSUE

Section 2.1.4 of the EA indicates the requirement for approvals under the Water Management Act 2000 from DWE. DWE advises that these approvals are currently not applicable to this proposal and the relevant licensing is a Part 5 licence for dewatering/groundwater interception under the Water Act 1912 which is not exempt under the Part 3A assessment process. Information requirements and comments regarding this licence will be considered further in this submission.

RESPONSE

3.1.1 The Proponent will ensure that all the relevant licenses are secured before works commence on the Project Site.

ISSUE

The existing 8 piezometers referred to in section 4.2.3.2 are authorised under the Water Act 1912 with licence number 10BL602172. Any proposal for additional piezometers or removal or piezometers will require consultation and appropriate licensing with DWE.

RESPONSE

3.1.2 The Proponent acknowledges this requirement. Any additional piezometers or the removal of piezometers will be subject to the appropriate licensing and consultation with the DWE.

ISSUE

The collection of surface runoff by the sump/water storage facility within the disturbed section of the project site to prevent contaminants flowing off-site is considered under the Harvestable Rights Policy by DWE. This policy establishes a volume of water which may be collected on minor watercourses however it excludes structures used to prevent contamination of a water source. To be consistent with this exclusion the structures needs to be sized in accordance with the appropriate standards (eg. Managing Urban Stormwater – Soils and Construction, Landcom 2004) and the volume of runoff water extracted must not exceed the harvestable right for the site, DWE advises that based on a property area of 21.5ha, the harvestable right for the site is 2.15megalitres/year. If the extraction of surface runoff from the sump/water storage facility is to exceed 2.15ML/y a licence under Section 10 of the Water Act 1912 will be required. Consideration of this volume requires differentiating surface runoff and groundwater inflows.

RESPONSE

3.1.3 The Proponent acknowledges this requirement. Any additional piezometers or the removal of piezometers will be subject to the appropriate licensing and consultation with the DWE.

ISSUE

The hydrology assessment (Martens 2009) defines the sediment basin requirements to be 0.88m^3 or 6.09ML, and modelling indicates the water storage reservoir's maximum volume would be 38.5ML with a mean of 4.07ML. Further information is required on the justification for the proposed 50ML storage capacity based on site management requirement.

RESPONSE

3.1.4 To justify the size of the storage reservoir, Martens undertook a revised amended water balance assessment. This assessment used the pit inflows as outlined in Table 7 of Martens report. The revised assessment included a number of changes to the original water balance. These are set out at **Section 2.17** of this report.

3.1.5 In addition to running the model with the range of potential groundwater ingress rates (Table 7 of Martens report), a scenario was developed to model potentially increased groundwater ingress volumes at the commencement of excavations prior to steady inflow conditions being developed. Modeling involved using the MODFLOW model's median groundwater inflow volume from the initial two months (471 m3/day) and running the water balance model with this daily inflow rate for this period. The level within the storage reservoir was then taken after two months and the water balance model was re-run starting at this newly calculated storage level with the steady state groundwater ingress rate of 47.11 m3/day. The period of two months was determined as ingress rates in the third month drop below the groundwater ingress rate of 47.11 m3/day.

3.1.6 Results from the scenario indicate that the storage reservoir has the capacity to accommodate such groundwater ingress rates without overflow (Figure 20 of Martens report).

ISSUE

As the water storage is proposed to be a permanent feature following rehabilitation of the 50ML significantly exceeds the 2.15ML harvestable right for the site a licence under the Water Act 1912 will be required. This licence will vary from the dewatering/groundwater interception licence which will only be valid for the life of the project. Consequently an additional licensing process under the Water Act 1912 will be necessary which will need to consider the groundwater and surface water contributions to the storage.

RESPONSE

3.1.7 The Proponent will ensure that all the relevant licenses are secured before works commence on the Project Site.

3.2 GROUNDWATER

3.2.1 Dewatering

ISSUE

The groundwater modelling is relatively simplistic and does not address several aspects of the local hydrogeology. DWE has significant concern with the feasibility of achieving effective dewatering of the put at the proposed extraction rate of 40KL/day due to the following.

- *The hydraulic conductivity is the only measured groundwater parameter and the value used in the modelling is on the low side of an average of 3 samples showing a significant range (0.003 to 0.07 m/day). With limited and varied samples such as this, a sensitivity analysis is warranted. A value must be dominated by areas of high conductivity and the reliability of a 40 KL/day solution needs to be considered.*
- *Furthermore, the 40 KL/day represents a steady state solution which does not reflect the volume of water to be extracted from storage leading up to this final extraction rate. Initial pumping rates may needs to be much higher to achieve effective dewatering.*

- *There is a need to consider storage and recharge/throughflow components of the groundwater system. Other aquifer parameters enabling an estimate of storage and throughflow should be determined and incorporate into modelling of the local system. Recharge events should also be considered in this context.*
- *Groundwater monitoring has been undertaken during an exceptionally dry period during which recharge to the groundwater system would be expected to be at extremely low levels. Consideration should be given to the impacts of a series of wet years and the effect of a period of significant groundwater recharge.*
- *Groundwater monitoring has been undertaken during an exceptionally dry period during which recharge to the groundwater system would be expected to be at extremely low levels. Consideration should be given to the impacts of a series of wet years and the effect of a period of significant groundwater recharge.*
- *The aquifer parameters should be related to an overall picture of the groundwater hydrology commenting on the expected long term recharge. Groundwater flow and discharge.*
- *There is no consideration of an increase in groundwater extraction in the current water/salt balance. The assessment does not adequately support the proposed 40 KL/day groundwater extraction, and it would be a significant problem if dewatering required any increase in this amount, as the proposed water mix to be disposed/used for irrigation is already considered marginal in terms of salinity levels. The viability of the irrigation proposal would therefore not be supported.*

RESPONSE

3.2.2 This issue is addressed at Section 5.1 of Martens report at **Attachment A**. As set out, the original EA used the analytical mining pit inflow equation (Marinelli and Niccoli, 2000) to determine a steady state pit inflow rate of 40 KL/d.

3.2.3 Following the consultation period and discussions with the DWE, a second method was used. This used the transient MODFLOW model and was based on the transient recharge data to determine time varying groundwater ingress rates. This model assumed that the stage 5 pit excavation (3.25 ha) will be instantaneous. The results of this assessment are provided in Table 6 of Martens report but are summarised below (refer to Section 5.1 of Martens report for further information):

- The maximum modeled groundwater ingress of 930.95 m3/d occurs in the first month.
- Steady state inflow is achieved at approximately 200 days o The maximum modeled yearly groundwater extraction volume of 72 ML/y) occurred in the 41st year of the model's record. On this basis 72 ML/yr can be considered as the likely maximum groundwater extraction rate per year for the life of the development.
- The median daily groundwater inflow of 47.11 KL/d (17 ML/yr) should be used for design purposes.
- Figure 12 of Martens report provides a plot of daily groundwater ingress rates and daily catchment recharge rates over the model's entire record of 50 years (608 months) and illustrates the correlation between recharge events and higher groundwater ingress rates.

3.2.4 Following this second assessment, Martens then used a transient spreadsheet model using the Dupuit-Forchheimer approach in conjunction with the original EA method and MODFLOW model in order to allow a sensitivity analysis of pit inflows to be completed. This method when used in conjunction with MODFLOW drawdown data calculated a steady state daily pit inflow volume of 35.18 KL/d (refer to section 5.1.4 of Martens report for further information).

3.2.5 In summary, the potential groundwater ingress rates calculated via the five different methods compare well and are summarised in Table 7 of Martens report. The MODFLOW method with its median pit ingress of 47.11 m3/d is considered the most reliable and likely scenario.

3.2.6 Infill of the Pit with VENM

ISSUE

The infilling of the pit with VENM has the potential to impact on the local groundwater hydrology. The water quality/leachate aspect has been reasonably addressed, however the overall picture of the local groundwater system is not clear and consequently the impact of a plug of VENM into the groundwater system is difficult to determine. Relevant to this matter would be the impact on the balance between groundwater recharge, throughflow (directions and volumes) and any groundwater discharge areas. Expected changes in groundwater paths and water levels need to be considered.

RESPONSE

3.2.7 As set out in section 5.3 of Martens report, the excavation pit areas will be backfilled progressively to natural ground level contours on completion of each extraction stage. The storage reservoir will be backfilled following completion of rehabilitation works. In order to model potential changes to the groundwater regime a steady-state model was established based on the existing models. Modeling scenarios included:

1. Pre-quarrying environment (before any excavations on site).
2. Excavated voids backfilled with sand (K = 5 m/d) and clay (0.12 m/d) cap.
3. Excavated voids backfilled with clay (K = 0.12 m/d).

3.2.8 Aquifer properties were adjusted to represent the sand and the clay scenarios based on typical property values which would represent the expected range of groundwater response curves for the range of likely backfill operations. All areas of excavation and the storage reservoir were assumed to be backfilled in the model. Backfilling was assumed to be homogeneous above the 19 mAHD proposed extraction level.

3.2.9 The results of this are outlined in Figure 21, Figure 22 and Figure 23 of Martens report and summarised below.

1. Backfilled with sand – results indicate a negligible impact to flow directions with localised drawdown (from pre-mining operations) of up to 2.5 m in the southern portion of the Project Site and mounding of up to 1.9 m in the northern portion of the Project Site.
2. Backfilled with clay – results indicate a negligible impact to flow directions with localised drawdown of up to 0.5 m in the southern portion of the Project Site and mounding of up to 0.3 m in the northern portion of the Project Site.

3.2.10 Based on the above, backfilling with lower permeability materials will deliver a final groundwater surface most similar to pre-quarry conditions. Both backfill types (sand and clay) are considered suitable as potential impacts associated with both mediums are minor, localised and unlikely to significantly impact the low value local groundwater system. The maximum likely extent of mounding (for high permeability backfill materials) will not lead to groundwater table rises which would detrimental affect surface vegetation.

ISSUE

The proposal to retain the water storage following the development has not addressed the final water level in this storage based on groundwater and surface water contributions. DWE does not support the retention of open voids/storages replenished by groundwater as a long term management approach. It is advised these voids are to be filled in and are to be retained as surface water management features where appropriate.

RESPONSE

3.2.11 This issue is discussed in **Section 3.2.7** of this report. In relation to the final water level of the storage basin, it is noted that Martens have undertaken backfill modeling to assess potential impacts associated with final site rehabilitation. Results suggest that changes to groundwater flow directions, levels and velocities will be minor and limited to the vicinity of the Project Site for a range of typical backfill types.

3.3 ADDITIONAL INFORMATION REQUIREMENTS

ISSSUE

Based on the previous comments the following information requirements are critical to adequately assess the proposal.

The groundwater modelling needs to be amended to include the following:

- *Sensitivity analysis*
- *Inclusion of aquifer parameters to assess the storage and recharge/throughflow in the system.*
- *Consideration of impacts during wet, median and dry years.*
- *The aquifer parameters need to be related to an overall picture of the groundwater hydrology commenting on the expected long term recharge groundwater flow and discharge.*
- *Consideration of the potential impact on groundwater paths and groundwater levels due to the placement of VENM in the pit.*
- *Modelled results of the final water level in the water storage facility as part of the long term predictions at the site.*

RESPONSE

3.3.1 Martens have undertaken revised groundwater and surface water modeling with results indicating that the Project Site will be able to function without discharging water from either the excavation pit or the storage reservoir. Refer to **Section 3.2.2 – 3.2.5** of this report for further information.

ISSUE

Review of the water salt balance based on revised dewatering requirements obtained from additional groundwater modelling. This is to provide justification of the long term viability of the irrigation area in terms if soil and vegetation impacts, in addition to the potential soil, water and vegetation impacts associated with the bio-infiltration facility.

RESPONSE

3.3.2 Martens have undertaken a revised water balance assessment in support of the application. This is detailed further in **Section 3.2.2 – 3.2.5** of this report. Based on the water balance results, Martens consider that the Project Site will be able to operate without the need to discharge from either the excavation pit or storage reservoir and there will be no need for an irrigation area.

ISSUE

The proposed maximum annual volume of groundwater to be intercepted during the life of the project needs to be specified. This volume and the associated impacts are to be considered by DWE under the licensing requirements under Part 5 of the Water Act 1912 for groundwater interception and dewatering.

RESPONSE

3.3.3 The Proponent will ensure that all the relevant licenses are secured before works commence on the Project Site.

ISSUE

Justification for the proposed 50ML water storage facility considering the modelling maximum storage level would be 38.5ML.

RESPONSE

3.3.4 Martens have undertaken a revised amended water balance assessment. This is detailed further at Section X of this report. The results from the assessment indicate that the storage reservoir has the capacity to accommodate such groundwater ingress rates without overflow (Figure 20 of Martens report).

ISSUE

Detail of the final water level and water volume in the water storage facility with modelled detail on the contribution of groundwater and surface water.

RESPONSE

3.3.5 This issue is discussed in **Section 3.2.7** of this report. In relation to the final water level of the storage basin, it is noted that Martens have undertaken backfill modeling to assess potential impacts associated with final site rehabilitation. Results suggest that changes to groundwater flow directions, levels and velocities will be minor and limited to the vicinity of the Project Site for a range of typical backfill types.

4 DEPARTMENT OF PRIMARY INDUSTRIES SUBMISSION

4.1 DPI – MINERAL RESOUNRCES COMMENTS

4.1.1 MINING TITLES

ISSUE

In order to assist in the collection of construction material production data, it is requested that the SCCC's Statement of Commitments be amended to include a commitment to provide annual production data to DPI- MR. in the manner required, on the standard form supplied for that purpose.

RESPONSE

4.1.2 The Proponent acknowledges the DPI's request and will amend the Statement of Commitments to include a requirement to provide annual production data to the DPI

4.1.3 ENVIRONMENTAL

ISSUE

Although the EA is comprehensive the following items should be addressed:

Surface water and groundwater monitoring is planned to be reviewed after 12 months (section 4.2.6). The review should be carried out in consultation with the Department of environment and Climate Change as well as DPI- MR.

RESPONSE

4.1.4 The Proponent acknowledges the DPI's request and will amend the Statement of Commitments to include a requirement to provide annual production data to the DPI.

ISSUE

A condition of ML's 5087 and 6322 requires the progressive site rehabilitation be reported to DPI – Mr in the Site's Annual Environmental Management report. The document defines the final landform as currently envisages however, as mining/extraction is expected to continue for the next 40 years, the closure plan at this stage should be more conceptual with the final Closure Plan being developed closer to the end of the mining/extraction.

RESPONSE

4.1.5 The Proponent acknowledges the DPI's request and commits to preparing a closure plan during the life of the Project.

4.1.6 DPI – FISHERIES COMMENT

ISSUE

DPI – Fisheries recommends that any approval include the following conditions:

- *All the proposed safeguards and measures to minimise environment impacts detailed in the environmental Assessment report by R.W. Corkery & Co. P/L and City Plan Services (dated February 2009), including the Statement of Commitments (section 5) are fully implemented.*

- *All the recommendations and proposed stormwater and groundwater management measures and erosion and sediment controls detailed in the EA particularly the Hydrology Assessment by Martens & associates P/L (dated January 2009) and attached Figures, are fully implemented and must be included in the final development layout.*

RESPONSE

4.1.7 The Proponent commits to implementing all of the recommendations as set out in the Statement of Commitments prepared as part of the original EA, as well as all of the recommendations of the supplementary reports prepared following the consultation period and attached to this report.

5 DEPARTMENT OF LANDS SUBMISSION

5.1 SITE FILLING AND REHABILITATION

ISSUE

The Proponent is responsible for the quality and quantity of the fill supplied for rehabilitation. The Proponent must prevent noxious or potentially polluting substances from inclusion in fill material.

RESPONSE

5.2 The Proponent acknowledges that it is SCCCR's responsibility to ensure that the fill to be supplied and used for rehabilitation will not be noxious or contain pollutants.

5.3 THREATENED SPECIES

ISSUE

Legally binding protection of the Offset Zones should be established before excavation of new areas is permitted. This will ensure the establishment and ongoing management of Offset Zones is set in place and continues for the life of the project.

RESPONSE

5.4 The Proponent acknowledges that the Offset Areas would need to be established before the excavation of new areas is permitted. This is discussed further in **Section 2.2.4 – 2.2.21** of this report.

5.5 NATIVE TITLE

ISSUE

As the proposed use of the land involves excavation activities Native Title may need to be addressed by the applicant.

RESPONSE

5.6 This issue was addressed as part of a previous judgement in the Land & Environment Court in 2006. (ref NSWLEC 390 - Plant Hire Pty Limited & (2) Ors v South Coast Concrete Crushing & Recycling Pty Limited & Anor. This judgment was directly related to the mining leases which are the subject of the current Part 3A application.

5.7 Of relevance to native title, the relevant parts of the judgment are as set out below from paragraph 48 of the judgment:

"48 Mr Ayling further submits that the lawfulness of the extractive industry conducted on ML2 has been conclusively determined by the decisions in the NSW Aboriginal Land Council v Minister Administering the Crown Lands Act litigation. That litigation related to determining whether the land subject to ML2 was "lawfully used or occupied" within the meaning of s 36(1)(b) of the Aboriginal Land Rights Act 1983. At first instance, in NSW Aboriginal Land Council v Minister Administering the Crown Lands Act (1992) 78 LGERA 1, Bignold J held that the lands were not "used" at all for the purposes of the section and further in obiter he remarked that even had he been able to conclude that the land was "used" under the relevant mining lease, it would not have been lawfully used because the interim development permission given by the State Planning Authority in 1971 "lapsed by virtue of the development not having been substantially commenced within twelve months of the grant of that permission". In the first appeal to the Court of Appeal, Minister Administering the Crown Lands Act v NSW Aboriginal Land Council (1993) 31 NSWLR 106, Priestley, Clarke and Sheller JJA held that Bignold J's conclusion was founded upon an incorrect test and land held in reserve for mining purposes, as they found ML2 was, might be so "used" for the purposes of s 36 Aboriginal Land Rights Act. The case was then remitted to this Court for determination on this basis."

49 In NSW Aboriginal Land Council v Minister Administering the Crown Lands Act [1995] NSWLEC 61, Bignold J reheard the case and applied the test approved by the Court of Appeal in determining whether the land held in reserve was "used", albeit in a passive way, not involving the actual or physical use of it. His Honour determined that if the land was "used" for the purposes of the quarrying of extractive materials, it could only be lawfully so used if that use was one permitted by the applicable planning law. Bignold J found that the 1971 consent had lapsed after twelve months due to lack of substantial commencement and therefore the use of ML2 was unlawful. An appeal was again brought to the Court of Appeal against Bignold J's finding that ML2 was not lawfully used because the 1971 consent had lapsed. However, the finding that the consent had lapsed was not in issue. Priestley, Handley and Sheller JJA found in Minister Administering the Crown Lands Act v NSW Aboriginal Land Council [No 2] (1997) 42 NSWLR 641 that Bignold J had erred in taking the step of finding that because there was a use of a passive kind it was a use subject to the requirement for consent. The Court of Appeal found that the lapse of the 1971 consent was not decisive of the question whether the land was lawfully "used" for the purposes of the Aboriginal Land Rights Act. Bignold J's decision was reversed, but his finding that the 1971 consent lapsed on 24 September 1972 was undisturbed on appeal.

50 Mr Ayling submits that in P E Bakers Pty Limited v Yehuda (1988) 15 NSWLR 437, findings as to the validity of conditions to a consent were held to operate in rem. Therefore, a finding as to the existence, or the non-existence, of a development consent is also one which operates in rem. In accordance with Lazarus-Barlow v Regent Estates Co Ltd [1949] 2 KB 465 such a judgment is conclusive evidence for and against all persons whether parties, privies or strangers, of the matters actually decided. It would therefore seem that I am bound by the prior finding of Bignold J in this Court that the 1971 consent lapsed due to lack of substantial commencement."

5.8 The effect of His Honour's finding were such that he was bound by the decision of Justice Bignold in *NSW Aboriginal Land Council v Minister Administering the Crown Lands Act* [1995] NSWLEC 61. In that case the NSW Aboriginal Land Council failed on appeal to determine aboriginal land rights under the Aboriginal Land Rights Act. On this basis the Proponent believes that the issue raised by the Department of Lands has been reviewed and, that, the granting of consent, would not remove any rights under the Native Title Act.

6 ROADS & TRAFFIC AUTHORITY SUBMISSION

ISSUE

Although the Traffic and Transportation Assessment prepared by John Coady Consulting Pty Ltd makes reference to the intended roadworks, consultation with the RTA Project Manager, Jennifer Mak has not occurred prior to the preparation of the Environmental Assessment and as such, the extent of the proposed roadworks has not been accurately reflected in the Traffic and Transport Assessment, particularly Figure 3. This is not ideal as the assumed road width available is not consistent with concept plan and as such the required driveway width and adopted turning paths do not accurately reflect the requirements of the site. The RTA therefore recommends that the applicant liaise with Jennifer Mak with the purpose of obtaining a concept road layout. This road payout should be used in order to prepare concept design place for access to the site.

RESPONSE

6.1 The Proponent's traffic and transportation consultant, John Coady Consulting Pty Ltd (JCC), has been in discussions with the RTA following the initial consultation comments received by the RTA. Following these discussions, JCC wrote to the RTA on the 9 June 2009 and provided additional supporting information in relation to the traffic impacts of the proposal, and in particular the access interface arrangements from the Princes Highway into the Project Site. This was based on an analysis of the intersection between the Princes Highway and the Project Site using the SIDRA and INTANAL traffic models. The RTA then wrote to the Department of Planning dated 10 July 2009. In response to this, JCC wrote to City Plan Strategy & Development dated 17 July 2009. Copies of all correspondence are provided at **Attachment C**,

ISSUE

Notwithstanding the above, it should be noted that based on the existing road geometry and the increase in traffic generation associated with the proposed use, the RTA considers that the applicant would be required to provide a channelised right turn treatment and a left turn deceleration lane at the junction of the existing access with the Princes Highway to ameliorate the impact of the proposal. These works and associated concept plans have not been provided within the submitted information

RESPONSE

6.2 In the correspondence received from the RTA dated 10 July 2009 (refer **Attachment C**), it is noted that the RTA still require interim measures to be put in place restricting right turning vehicle movements from the Princes Highway into the Project Site and until such time as the Warra Warra roundabout and central median lane has been constructed. Furthermore, it is noted that the RTA do not consider the construction of a dedicated right turn bay into the Project Site as an acceptable interim measure.

6.3 In lieu of this position, the RTA has recommended that a restriction be placed on the Proponent to ensure that "*heavy vehicle movements occur outside of the identified peak periods.*" To this end, the RTA have recommended that southbound heavy vehicle movements turning right into the Project Site shall be restricted to times outside 8.15 – 9.15am and 15.45 to 16.45 and until such time as the Warra Warra roundabout and central median lane has been constructed.

6.4 It is noted that the Proponent **does not** accept this interim measure and the proposed restriction on right turning southbound movements. In particular, the Proponent does not believe that such a restriction is warranted given the number of heavy vehicle movements that currently occur between these times and the projected number of vehicle movements that are anticipated prior to the upgrading of the Princes Highway. Furthermore, it is critical to the Proponent's operational requirements that he maintains access for all vehicles approaching from the north at all times to facilitate movements for vehicles involved in dropping off/picking up material from the Project Site.

6.5 In support of this position, a full day traffic survey was carried out at the Project Site as part of the Traffic Assessment prepared by JCC as part of the original EA. This included a count of the number of right turning movements for vehicles heading south along the Princes Highway. This survey is provided at **Appendix 1** of the Traffic and Transportation Assessment appended to the EA.

6.6 In summary, the following right turn movements into the Project Site from the Princes Highway at the peak times were recorded:

AM PEAK (8.15 – 9.15)
Cars = 3
2 axle rigid trucks = 0
3+ axle rigid trucks = 0
Articulated trucks = 0
B-Doubles = 0
Total vehicles = 3

PM PEAK (15.45 – 16.45)
Cars = 0
2 axle rigid trucks = 0
3+ axle rigid trucks = 0
Articulated trucks = 1
B-Doubles = 0
Total vehicles = 1

6.7 It can therefore be clearly seen from the results of the count that the number of right turning movements is so infrequent during this period that the restriction for right turning vehicles is not warranted or required. Furthermore, of the vehicles that do turn right, the majority are cars which would not be affected by the restriction.

6.8 As set out in the correspondence from JCC dated 17 July, it is also noted that the sealed carriageway of the section of the Princes highway adjacent to the quarry access is approximately 13.5m. This comprises:

- A central two-lane carriageway 6.2m wide (3.1m in each direction) located centrally within the total carriageway;
- A sealed shoulder 4.5m wide on the eastern side of the central carriageway which is used as a *passing lane* by southbound traffic on the highway at times when the central southbound traffic lane is blocked by a vehicle waiting to make a right-turn movement into the quarry; and
- A sealed shoulder 2.8m wide on the western side of the central carriageway which is used as a *slip lane* by vehicles making a left-turn movement from the highway into the quarry.

6.9 Accordingly, in the event that large vehicles do turn right into the Project Site, the width of the roadway at this point, and the presence of a passing lane, is such that other vehicles heading southbound can easily undertake a vehicle of any size that is waiting to turn right without experiencing any delay or needing to needing to take any dangerous manoeuvres.

6.10 Furthermore, should the access restriction be imposed, it is likely that heavy vehicles that wish to enter the Project Site from the north will be forced into a choice of two alternative access routes. The quickest would involve travelling over 3km south along the Princes Highway, then left movement into Forest Road, which is itself a very narrow road. The heavy vehicle would then need to make a u-turn about 50m along Forest Road where a small bay has been provided. The vehicle would then need to make a right movement back onto the Princes Highway before heading north. It is noted that the maximum speed limit on the Princes Highway at its intersection with Forest Way is 100 km per hour and therefore any vehicles turning right at that point would need to accelerate quickly to safely move into the northbound traffic flow. Whilst there is an acceleration lane at this point, this is not considered long enough for the majority of heavy vehicles that currently access the Project Site to safely accelerate to a safe speed before entering the main stream of traffic.

6.11 The alternative route, as set out by JCC in their letter dated 17 July 2009 would involve a right-turn movement from Princes Highway into Flinders Road to the north of the Project Site, a left-turn movement from Flinders Road into Albatross Road continuing along Btu Road to Princes Highway south of the Project Site, before travelling northbound along the highway to access the Project Site. This alternative route involves an increase travel distance of approximately 14 km and, in any event, requires both a right-turn movement from the highway (into Flinders Road) and a left-turn movement into the highway (from Btu Road).

6.12 In addition to the traffic survey, and as set out on pages 2 and 3 of the letter from JCC to the RTA dated 9 June 2009, a SIDRA analysis of the intersection of the Princes Highway and the Project Site was undertaken by JCC. The SIDRA analysis was undertaken based on four different scenarios, these being:

- **Scenario 1** - The existing traffic flows on the Princes Highway (2 lane) and the traffic generation of the existing quarry;
- **Scenario 2** - The existing traffic flows on the Princes Highway (2 lane) and the projected traffic generation of the expanded quarry operations;
- **Scenario 3** - The projected traffic flows on the Princes Highway (2 lane) in 2017 and the projected traffic generation of the expanded quarry operations at that time; and
- **Scenario 4** - The projected traffic flows on the enlarged Princes Highway (4 lane) in 2017 and the projected traffic generation of the expanded quarry operations.

6.13 It is acknowledged that Scenario 3 is not relevant to the subject proposal given that the upgrading of the Princes Highway will be complete prior to 2017.

6.14 As a result of the SIDRA analysis, the following conclusions were reached:

- Whilst scenarios 1, 2 and 3 demonstrate "*unsatisfactory intersection performance*", this is purely as a result of predicted long delays for vehicles **departing the site** only with all other movements through the intersection (including right turning movements into the Project Site) operating at a **satisfactory level** and within accepted limits for the model.

6.15 It is also noted that the SIDRA analysis typically indicates a less favourable level of intersection performance than the INTANAL analysis. On this basis, it can be assumed that even with the more conservative modelling, right turning movements into the Project Site will satisfactorily operate and there is no need for the right turning operating restriction.

ISSUE

Considering the future road configuration along the frontage of the site, the RTA would be willing to forego the constriction of the channelised right turn bay in lieu of a contribution towards the costs of a central medial along the Princes Highway. However, the RTA maintains the requirement for the left turn deceleration into the site and recommends that concept plans for this treatment be prepared, taking into consideration the future road alignment.

RESPONSE

6.16 It is acknowledged by JCC and the Proponent that a left turn deceleration lane is required to service the Project Site for northbound vehicles. To this end, the Proponent is prepared to financially contribute towards the construction of a left turn deceleration lane as it has been demonstrated that this is required and therefore directly related to the proposed application.

6.17 However, it is also noted that the Proponent has already given the RTA (at no cost) a proportion of Lot 464 in DP 1058778 to facilitate the construction of the Warra Warra Road roundabout. This piece of the Proponents land was previously considered part of the extractable resource within the Project Site. The construction of the roundabout will effectively sterilise this piece of the Proponents land and prevent extraction from taking place in this location. It is again noted that no compensation was paid by the RTA for this parcel of land.

6.18 In conclusion, the Proponent's position is that it considers that recognition of the land dedication for the roundabout should be included as part of the contribution to the left turn deceleration lane. To this end, the Proponent considers that an offer to fund 50% of the deceleration lane would be a fair and representative figure.

6.19 In terms of the central median strip, the RTA have advised that it requires a monetary contribution for the construction of the Princes Highway central median for a length of 60m to a total value of $47,659.10. It is noted that the Proponent **does not** accept this requirement and the basis for the contribution for the following reasons:

- Whilst it is acknowledged that the proposed upgrade works to the Princes Highway requires a median strip, the Proponent does not believe that there is a sound basis for requesting that the payment for this strip is paid wholly by it;
- The proposed median strip is not directly required and related to the proposed development and therefore has no relevance or nexus to the application;
- We understand that the proposed median strip has been within the RTA's scope of upgrade works for the Princes Highway for some time. Therefore the median strip will be provided irrespective of the subject proposal;
- The usual method for contributing to the required infrastructure works is through a Section 94 Contributions Plan. It is noted that there is no requirement within the Section 94 Contributions Plan prepared by Shoalhaven Council for such a contribution for road works along the Princes Highway to be made. The Proponent therefore does not consider the request to be fair and reasonable in relation to the subject proposal; and

- The proposed median strip upgrade that is the subject of the financial contribution extends for 60m along the Princes Highway. The Project Site lies on the west of the Princes Highway with a number of commercial and industrial business lying to the east of the Highway. The Proponent does not believe that the total cost for providing the median strip should lie solely with it, and does not believe that the subject application is an most appropriate mechanism for facilitating a contribution.

ISSUE

The RTA acknowledges that the staging of the proposed road upgrades and the commencement of the expanded operation at the existing quarry may not coincide so it is therefore proposed that a mechanism such as a developer agreement or similar be proposed to hold the full costs of the required deceleration works until the construction of the road widening along the frontage of the site have been commenced. This will allow these works to be completed as part of the construction activities and would therefore benefit the RTA, the application and the general community. IN this regards, the RTA would be willing to consider an interim arrangement that permits access for the expanded facility via the existing access point provided a developer agreement or similar has been conditioned in the approved application.

RESPONSE

6.20 As set out in **Section 6.16**, JCC and the Proponent accept that a left turn deceleration lane is required to service the expanded quarry. The Proponent also agrees that such works should be delayed until such time as the road widening works along the frontage of the Project Site have been commenced.

6.21 However, and not withstanding this, the Proponent notes that the RTA is prepared to accept an "*interim*" arrangement based on the **current access arrangements** until such time as the proposed road widening works are to take place. Based on this position, it is the opinion of the Proponent and JCC that this approach should also be applied to the right turning vehicle movements into the Project Site also using the **current access arrangements** with no restrictions in place as set out in **Section 6.2 – 6.15** of this report.

7 SHOALHAVEN CITY COUNCIL SUBMISSION

7.1 STRATEGIC

7.2 Shoalhaven LEP 1985

ISSUE

The land is zoned Rural 1(b) - Rural "B" (arterial and Main Road Protection Zone) under the SLEP 1985. Extractive industries are permitted with Consent. (see attachment (i)).

A road reserve designated as "Regional Services Corridor" is provided as part of the Shoalhaven LEP 1985 and Nowra Bomaderry Structure Plan, south-west of the development site. The applicant has not taken this corridor into account in preparing the proposal. The future road will not have direct access except at designated locations. The development proposal for "biodiversity offset" is located across the Regional Services Corridor.

RESPONSE

7.2.1 The Shoalhaven LEP 1985 was gazetted some 25 years ago and is now considered to be of some vintage. In relation to the proposed "*Regional Services Corridor*", and as discussed at **Section 7.2.3** of this report, we consider the relief road to be essentially without proper justification. This is for a number of reasons including the fact that the road finishes at the Shoalhaven River, which is approximately 15 kilometres north of the location of the Quarry. In addition, the proposed road does not take up a review of the infrastructure, road works, compulsory acquisition, or the other strategic projects which will be required to bring the plan into effect, including the erection of very significant bridge spanning across the Shoalhaven River in an area which is considered to be both of high ecological value and which will be extremely difficult to construct given that the bridge location will be on a part of the river which is bounded by sandstone cliff faces.

7.2.1.1 In addition, it is relevant to note that the proposed road has not received support from the RTA as referred to in Council's submission. Further, representations which have been made by the RTA to the Proponent suggest that the plan has not even been funded yet and, furthermore, the RTA has a current funding program for other more important priority roadworks which are currently underway and which will result in the proposed road not being built until well after the 20 – 30 year period. It is therefore questionable how much (if any) of the proposed infrastructure will actually be constructed during the life of the LEP and therefore how much weight should be placed on the road reserve as a material consideration.

7.2.1.2 However, and notwithstanding the above, it is noted that even if the road is built at some point in the future, it is our understanding of the offset requirements that, whoever builds the road in the future will need to provide sufficient offset land to replace all of the land that is being lost to construct the road (including Lot 228). In this event, it is also our understanding of the offset requirements, that the land that would be required to offset the (partial) development of Lot 228 for the road would be no greater if it had previously been allocated as an offset, than if it was unencumbered, i.e. the ratio of offset that would need to be safeguarded in perpetuity would be no greater. Therefore, it is argued that even if the road does proceed, the fact that Lot 228 has been identified as an offset land for the quarry would not make the offset requirements for the proposed road builder anymore onerous.

7.2.2 Nowra Bomaderry Structure Plan (NBSP)

Issue

The Nowra Brickworks proposal is not completely compatible with the Nowra Bomaderry Structure Plan requirements for the local road network required to support the South Nowra Industrial growth area up to the year 2036 (see attachment (iii)).

The NBSP identifies the South Nowra Industrial area that is north and north-west of the quarry site as an important employment area that will expand its area and employment population in the next 20 - 30 years. The growth potential is constrained by there being only three roads into that area while it is estimated there needs to be up to six road systems servicing the area and leading to the main road network. One proposal under the NBSP is to connect a road link to the proposed Warra Warra Road / Princes highway intersection. This link runs across the ML6322 site. The roundabout intersection is also referred to later in this submission (RTA proposals).

To achieve the optimum road link, the Proponent's application should be amended to retain a road corridor across the undeveloped mining lease area, and to be capable of connection with the Flinders South Nowra industrial area. This will entail a review of the extent of extraction work in both leases and with provision for vehicle connection from the link road rather than direct access to the Highway. The road link is also impacted by the site of the South Coast Correction Centre on adjacent land and it is likely there will need to be discussions and negotiations about land for the purposes of the road link.

RESPONSE

7.2.3 The NBSP was endorsed by the New South Wales Department of Planning on 25 February 2008, some 14 to 15 months after the initial plan was adopted by Council and (of relevance to the proposal), before the South Coast Correctional Facility (SCCF) proposal immediately west of the Project Site.

7.2.4 It is noted that the NBSP does not comprise a legal planning document, but rather one that provides strategic direction and guidance. Its purpose is to identify land that will be further investigated in detail for possible consideration as part of an Environmental Planning Instrument, and through a public and transparent process as required in the Environmental Planning and Assessment Act 1979. It does not provide zonings and it is therefore considered that any infrastructure proposed within the plan should be considered "*strategic*" at best as it will be the subject of further consideration at a later date which could determine the proposed uses inappropriate.

7.2.5 Furthermore, and whilst the NBSP apparently sets an "*agenda*" for the next "*20 to 30 years*", it is relevant to note that the plan has not received support from the RTA in relation to the proposed road infrastructure as referred to in Council's submission. Further, representations which have been made by the RTA to the Proponent suggest that the plan has not even been funded yet and, furthermore, the RTA has a current funding program for other more important priority roadworks which are currently underway and which will result in the proposed road not being built until well after the 20 – 30 year period. It is therefore questionable how much of the proposed infrastructure will actually be constructed during the life of the Plan and therefore how much weight should be placed on the NBSP as a material consideration.

7.2.6 In support of this position, it is noted that the proposed "link road" between the (proposed) Warra Warra Road/Princes Highway and the South Nowra Industrial Area located immediately west of the Project Site (and as referred to by Council) not only runs through the Project Site, but also runs directly across the middle of the SCCF site with a junction proposed where one of the SCCF buildings is currently being constructed. As the DOP will be aware, the SCCF occupies the entire western boundary of the Project Site.

7.2.7 With reference to Council's position that the application should be amended to allow a road to be constructed across the Project Site and also through the SCCF site, the Proponent do not believe that this road will ever be built in its current location given the presence of the SCCF. Indeed, discussions with the Department of Corrective Services have confirmed that they would not allow a road to run through the middle of the SCCF as it would present a clear security issue for the operation of the facility. It is therefore reasonable to consider that this road will not be constructed along its current alignment, and therefore the proposal should not be amended.

7.2.8 In summary, it is considered that the NBSP requires significant review given the impact of the SCCF on the proposed infrastructure. More particularly, it is considered that the Council has not provided an objective assessment of the likely economic impact or benefit associated with the construction of the SCCF and its consequential affect on the NBSP and the road infrastructure proposed. For the NBSP to move forward, Council needs to address this in the context that the NBSP was as, at best, and at October 2006 a concept plan for the future which was looking ahead on its terms for 20 to 30 years.

7.2.9 Furthermore, and in relation to the proposed relief road, the plan is also unfounded with the proposed road finishing at the Shoalhaven River, which is only 10 to 15 kilometers north of the location of the Quarry. In addition, the plan does not take up a review of the infrastructure, road works, compulsory acquisition, or the other strategic projects which will be required to bring the plan into effect, including the erection of very significant bridge spanning across the Shoalhaven River in an area which is considered to be both of high ecological value and which, furthermore, will be extremely difficult to construct given that the bridge location will be on a part of the river which is bounded by sandstone cliff faces.

7.2.10 Finally, and in relation to the proposed ring road that is projected to run through the Proponent's offset land (Lot 228), it is noted that even if the road is built at some point in the future, it is our understanding of the offset requirements that, whoever builds the road in the future will need to provide sufficient offset land to replace all of the land that is being lost to construct the road (including Lot 228). In this event, it is also our understanding of the offset requirements, that the land that would be required to offset the (partial) development of Lot 228 for the road would be no greater if it had previously been allocated as an offset, than if it was unencumbered, i.e. the ratio of offset that would need to be safeguarded in perpetuity would be no greater. Therefore, it is argued that even if the road does proceed, the fact that Lot 228 has been identified as an offset land for the quarry would not make the offset requirements for the proposed road builder anymore onerous.

7.2.11 Draft Shoalhaven LEP 2009

ISSUE

The draft SLEP 2009 is currently with the Department of Planning Regional Office for S65 certification and will then be placed on public exhibition. The land, the subject of the Part 3A application, in the draft SLEP 2009 that was submitted to the Department is proposed to be zoned RU2 - Rural Landscape and extractive industries are not permitted. The Council has since determined that the zoning of the ML 5078 quarry site should be IN2 - Light Industrial, with the ML6322 quarry site remaining as RU2, and this has been separately conveyed for consideration of the Department's Regional Office and a response is expected from the Department as part of the issuing of a S65 certificate.

One of the reasons for the change in draft zoning is to encourage medium term site rehabilitation of the quarry site, as this may partially offset the loss of industrial land through the approval of the adjacent South Coast Correction Centre (MP07_0053). The proposed zoning for the adjacent South Coast Correction Centre site under SLEP 2009 is SP1.

RESPONSE

7.2.12 We understand that the Draft Shoalhaven LEP has not yet been granted Section 65 Certification by the Department of Planning and has therefore not yet been placed on public exhibition. We also understand that the Department of Planning has requested further information and clarification on a number of issues and this may delay the exhibition period for some time.

7.2.13 We would therefore note that it is hard to formally comment on a LEP that has not been released for public exhibition and in any case the Proponent would provide a submission opposing any rezoning of the land in a manner that would prevent extraction operations if and when the draft plan reaches the consultation stage.

7.2.14 In terms of the weight to be placed on the draft LEP, we would note that Section 79C of the Environmental Planning & Assessment act sets out what should be considered in the determination of a development application as follows:

> *(1) "Matters for consideration-general In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application:*
>
> *(a) the provisions of:*
> *(i) any environmental planning instrument, and*
> *(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Director-General has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved)"*

7.2.15 The draft LEP does not constitute an environmental planning instrument, nor has it been the subject of public consultation. It is therefore considered that the draft LEP and its contents do not constitute a material consideration in the assessment of the application and accordingly no weight should be attached to the policies contained therein.

7.3 TRAFFIC

7.3.1 Proposed RTA designs for the upgrade of Princes Highway

ISSUE

The RTA placed proposed upgrade works in Princes Highway for the section from Hillcrest Avenue to Forest Road on public exhibition 8 December 2008 to 6 February 2009 and this includes the Nowra Brickworks site location. The RTA proposal is displayed on the RTA website. The EA does not consider the RTA proposals.

The draft RTA proposal is for additional northbound and southbound lanes, a median strip across the quarry site frontage and a roundabout at the Warra Warra Road / Princes Highway intersection. This will require that trucks using the quarry site entering from the north or leaving to the south use the roundabout system (north at Central Avenue and south at Warra Warra Road) rather than direct turning across the highway lanes.

The design of the roads and roundabout by the RTA will need to consider the operations of trucks including B-doubles from the brickworks site as well as existing and future truck movements on the highway.

RESPONSE

7.3.2 The Proponent has engaged John Coady Consulting to advise on traffic issues. As set out in **Section 6.1** of this report, extended dialogue has been held with the RTA following the submission of the EA. This has resulted in a number of changes to the proposal and is further detailed at **Section 6** of this report

7.3.3 Access from the site to Princes Highway

ISSUE

The existing access to and from the highway for the quarry site is inadequate in width and formation. The trucks are not provided with turn or slip lanes and the adjacent road shoulders are in poor condition. The impacts for other vehicles on the highway are significant. The trucks using the access point bring waste materials and debris from tyres, dust and muddy water onto the road surface. The existing access does not comply with the requirements of Council's Development Control Plan No. 100 - subdivision and development or DCP No. 18 - car parking.

RESPONSE

7.3.4 The Proponent has engaged John Coady Consulting to advise on traffic issues. As set out in **Section 6** of this report, extended dialogue has been held with the RTA following the submission of the EA.

7.3.5 Timing of Proponents access upgrade works and impacts on road system

ISSUE

The Proponent states that the current volume of product that is exported from the site is 125,000 tonnes per year. The EA states that when the volume reaches 250,000 tonnes a number of internal measures will be implemented. These are; widening the entrance to 11m, constructing and sealing the internal access roads, constructing and sealing the internal access roads, constructing a wheel wash, and construction and sealing the visitor car parking area. There will also be works to install a bio-infiltration facility adjacent to the water storage. In respect of the former group of works, it is considered that the increase in production to 250,000 tonnes should not be the trigger for these works.

The existing access situation is unsatisfactory and Council recommends that these upgrade works should be implemented before there is any expansion in the importing or exporting of materials, and comply with an approved design that should also be incorporated as a condition of approval.

RESPONSE

7.3.6 The Proponent has engaged John Coady Consulting to advise on traffic issues. As set out in **Section 6** of this report, extended dialogue has been held with the RTA following the submission of the EA.

7.3.7 FLORA, FAUNA AND BIODIVERSITY OFFSETS

ISSUE

It is noted to compensate for the loss of vegetation on the two mining lease areas, it is proposed to create a leased area of approximately 17 hectares by agreement with an adjoining landowner, and area referred to above, will bisect the proposed biodiversity area. This will reduce the proposed area of the offset as well as result in a situation that is unlikely to provide for the connection of habitat for fauna. As such the proposed biodiversity offset is unsatisfactory. The applicant should consider alternative biodiversity protection measures or alternate locations.

While supporting the principle of biodiversity offsets, assuming there is an appropriate area and location available, there is concern that this is likely to sterilise land from future development including the options that may be appropriate for land uses that will be permitted under the future SLEP 2009 zoning and be available for re-routing the required road link under the NBSP referred to in (a) (ii), above. A proposed biodiversity lease of 80 years, plus, would need to be checked for legal certainty.

The Ecology Assessment mentions that hollow bearing trees are to be felled by either bulldozer or excavator and then such tress are to be retained on site for use during rehabilitation works. If hollow bearing trees are felled in this manner any fauna would not survive and the condition of such trees would be questionable for reuse in any case.

It is recommended that any hollow bearing trees are lowered to the ground and any wildlife found is rescued as mentioned in the report.

RESPONSE

7.3.8 In relation to flora, fauna and biodiversity offsets, we note that the DECC has primary responsibility for commenting on this element of the proposal and as referenced elsewhere in this report, detailed discussions have been had with the DECC in relation to this issue.

7.3.9 In relation to the NBSP and the impact that the offset area will have on the proposed road link, this is discussed at **Section 7.2.2 – 7.2.10** of this report.

7.3.10 In relation to the removal of hollows, as set out in **Section 2.2.2**, the Proponent is happy to accept a condition whereby the removal of any trees with hollows from the Project Site will only be permitted in mid-late autumn or early-mid spring and that such trees will be tapped by machinery prior to removal to make resident fauna vacate the hollows.

7.4 IMPACTS TO SURROUNDING AREAS

7.4.1 Operational and Blasting Noise

ISSUE

It is recommended that appropriate conditions be placed that will require conformity with relevant standards for industrial noise and blasting operations, including mechanisms of giving notice of blasting. If adequate controls to mitigate these impacts are not achievable, the viability of the proposal must be questioned.

RESPONSE

7.4.2 In relation to noise and blasting, we note that the DECC has primary responsibility for commenting on this element of the proposal. However, and not withstanding this, Heggies have reviewed the current blast emission site laws and have concluded that the limiting allowable MIC will be 22kg for blasting at the closest point of extraction to the SCCF. This will enable compliance with the controlling general and maximum ANZECC criteria. As set out in the revised Heggies report, it is also recommended that the operators of the SCCF are formally notified prior to every blast. For further information on this issue, please refer to **Section 2.6.5** of this report.

7.4.3 Dust and transport debris

ISSUE

The Dust Control measures are recommended to be in accordance with the Erosion and Sediment Control Plan prepared by SEEC Morse McVey.

RESPONSE

7.4.4 In relation to dust control, we note that the DECC has primary responsibility for commenting on this element of this proposal. However, and not withstanding this, the Proponent is prepared to accept the dust control measure as set out in the Erosion and Sediment Control Plan prepared by SEEC Morse McVey.

7.4.5 Damage to existing buildings

ISSUE

A complaint has been made to Council that there has been cracking damage to a building on the land on Princes highway opposite the existing quarry operation. Council has not investigated this complaint but the building owner has apparently obtained a building report. It may be appropriate to require the Proponent to prepare a dilapidation report on existing buildings within a nominated distance from the quarry site.

RESPONSE

7.4.6 We are unsure as the origins of the cracking damage and the relationship to the existing quarry operation. However, in relation to noise and blasting, we note that the DECC has primary responsibility for commenting on this element of the proposal. However, and not withstanding this, Heggies have reviewed the current blast emission site laws and have concluded that the limiting allowable MIC will be 22kg for blasting at the closest point of extraction to the SCCF. This will enable compliance with the controlling general and maximum ANZECC criteria. As set out in the revised Heggies report, it is also recommended that the operators of the SCCF are formally notified prior to every blast. For further information on this issue, please refer to **Section 2.6.5** of this report.

7.5 VEGETATION MANAGEMENT

ISSUE

It is recommended that any clearing of trees, approved are to be either mulched onsite and used for site stabilisation, removed from the development to an approved waste facility or used in licensed milling operations.

RESPONSE

7.5.1 We note that the DECC has primary responsibility for vegetation management. However, we note that the use of whole vegetation is recommended by Gaia Environmental Research and the DECC.

7.6 SOIL MANAGEMENT

ISSUE

The proposal includes the importation of virgin excavated natural material (VENM) to be stored on site as part of the rehabilitation process. It is recommended that appropriate conditions be imposed to ensure that none of the imported material contains acid sulphate soils.

The stockpiling of soils around the perimeter of ML6322 area as part of the development has occurred around existing trees and up the truck of a lot of these trees. Council issued Consent (DA07/1322) for this bunding with soil on 24 May 2008. The work under the Consent has not been completed for final inspection. This practice will cause the trees to be structurally compromised by either the compaction or smothering of the root zone and the potential for collar rot around the truck up to the height of the soil effectively ringbarking the trees.

It is recommended that the perimeter bunds be reconstructed where necessary to protect the existing trees that will remain undisturbed as operations progress, and to comply with the current consent.

RESPONSE

7.6.1 As Council correctly note, Development Consent (ref DA07/1322) was granted by Shoalhaven City Council for the existing bunds around the perimeter of the Project Site in 2007. As part of this approval, a number of conditions were attached to ensure that there was to be no contamination within the bunds. It is our understanding that the conditions of consent have now been fully satisfied. It is therefore not considered necessary to reconstruct the bunds.

7.7 ONSITE FACILITIES

ISSUE

The proposal includes the installation of staff and visitor facilities including office, onsite sewage management (OSSMS) facility, weighbridge and visitor parking. Construction certificates will be required for the structures involved and designs required for the parking areas. The OSSMS will require installation and operational approval under the provisions of the Local Government Act 1993.

RESPONSE

7.7.1 The Proponent accepts that approval for the various onsite facilities will require operational approval under the provisions of the Local Government Act 1993 and this process will be followed.

8 NORMANS PLANT HIRE / SOUTH COAST RESOURCES SUBMISSION

8.1 Nowra-Bomaderry Structure Plan

ISSUE

To provide the necessary transport capacity and accessibility for the future expansion of the industrial land at South Nowra, the Nowra-Bomaderry Structure Plan proposes a strategic road connection between the Warra Warra Road intersection with the Princes Highway and the flinders Industrial estate.

This strategic road connection would logically cross that part of the land upon which the proposed quarry extension is proposed.

The EA suggests that this proposed road would sterilise this shale resource. This is not so. The shale resource in questions could still be extracted; although it would require a difference approach to that proposed by this project. The road itself does not sterilise the resource.

Furthermore this is not the only shale, or road constriction resource located within the Shoalhaven. There are other quarry operations within the Shoalhaven which are able to supply similar materials to that which is extracted from this quarry.

There would however be few opportunities for other access road location to connect the industrial expansions area at South Nowra with the Prices Highway. Warra Warra Road is the only logical location. This proposal will place in jeopardy this strategic road infrastructure.

RESPONSE

8.1.1 This issue is discussed further at **Section 7.2.2** of this report.

8.2 DRAFT SHOALHAVEN LOCAL ENVIRONMENTAL PLAN 2009

ISSUE

Shoalhaven City Council has prepared a draft Shoalhaven LEP 2009 which seeks to ensure Council's LEP is consistent with the NSW Government's LEP template

Under the provisions of this draft LEP the subject will be zoned:

- *part RU2 Rural Landscape; and*
- *part E2 Environmental Conservation.*

A review of the draft written instrument that supports the draft LEP indicates that extractive industries would not be permissible in either of these proposed zones and therefore the proposed use of the subject land as an extractive industry would be prohibited development within the zones which will affect the land under Council's draft LEP.

It is acknowledged that, at this time, the draft LEP 2009 has not been placed on public exhibition. It is however understood that the issue of a S.65 Certificate by the Minister is imminent. There is all likelihood that the exhibition of the draft LEP will occur while this application is still before the Department for consideration. Once this occurs, the provisions of the draft LEP will become a matter for consideration.

RESPONSE

8.2.1 The draft Shoalhaven LEP 2009 has not yet been released for public exhibition. Under the provisions of Section 79C of the Environmental Planning & Assessment Act, it is therefore considered that no weight should be attached to this document in the assessment of the application. This issue is discussed further at **Section 7.2.11** of this report.

ISSUE

In our view there is a clear lack of justification to support this project in light of the inconsistency with the proposed planning provisions that are likely to apply to the site especially given:

- *The project is inconsistent with the proposed Nowra-Bomaderry Structure Plan (see section 2.2 of this submission). As such the project is inconsistent with the provisions of the South Coast Regional Strategy.*
- *The project fails to recognise upgrades to the Princes Highway proposed by the RTA*
- *The project is unable to demonstrate that it will not adversely affect the amenity of surrounding premises in terms of air quality, noise and blasting impacts.*
- *The EA for the project provides insufficient information, as detailed in this submission:*
- *In terms of justifying the life expectancy of the quarry;*
- *In terms of providing a legal means of providing the required biodiversity offsets;*
- *In that it does not provide details as to how sufficient financial resources will be available to ensure ongoing rehabilitation of the site;*
- *In that it underestimates traffic movements associated with the proposed developments; and*
- *In failing to address potential land contamination.*

RESPONSE

8.2.2 The issues raised in this submission have been addressed elsewhere in this report. However, it is relevant to note that the Quarry has been in existence and operating now since the late 1940's. It has provided employment to the local area and, the expansion and continuation of its operations under a 3A Consent will both enhance local employment opportunities and, provide a valuable source of economic return for the 100 plus suppliers who provide services and goods to the Quarry's operations. The continuation of the Quarry's operations will not limit but will enhance the local economy and employment prospects of an area which has demonstrably poor levels of both adult and youth unemployment.

8.3 THE LIFE EXPECTANCY OF THE QUARRY

ISSUE

The quarry is sited adjacent to and within proximity of existing residences and within a clearly defined urban area. This siting of a quarry with a 30 year life expectancy will be completely at odds with the expected nature of development in this locality.

Clearly having regard to the pattern of development generally in this area and the existing and future planning provisions, the siting of a quarry with a 30 year life expectancy will be completely at odds with expected nature of development in this locality.

It is unusual to find a major quarry in such close proximity to urban development. Quarries tend to be located in isolated positions away from urban development. This ensures the environmental and amenity impacts associated with quarry uses are mitigated by separation from urban uses.

Seeking to establish a quarry with a life expectancy of 30 years in such a context is inappropriate. This concern is exacerbated by the proposal being entirely inconsistent with the future strategic planning for this area.

If the Department considers the project worthy of support, despite the issues raised overall in this submission, it is our view that any approval should limit the life of the quarry in this submission, it is our view that any approval should limit the life of the quarry to a lesser period, say 15 years. This would ensure that the proposal would not obstruct or hinder future development and land issues within this locality.

RESPONSE

8.3.1 In relation to the proximity of the Project Site to the residences, we consider that this is neither precise nor correct. Further, we note that the council has not raised any issues about urban development and the impact on surrounding residences. In addition, the application has specifically assessed the impact of the proposal on the closest residences to the Project Site in relation to noise, air quality and hydrology. In addition, we note that the closest residence, and that which is located immediately south of the Project Site, is now project related and therefore not a consideration as part of the assessment of the application.

8.3.2 Furthermore, the properties to the east of the Project Site are occupied by small businesses. There is no suggestion this use will change.

8.3.3 In relation to the location of a quarry close to urban development, the Proponent would strongly disagree with this assertion. Indeed, there is clear local evidence of the existence of quarries near urban development at Tommerong Quarry and also within the immediate vicinity such as South Coast Equipment and Shoalhaven Excavations.

8.3.4 In relation to the assertion limiting of the life expectancy of the quarry to 15 years, this is without any merit or, substance in law or in fact. This restraint fails to objectively link a period of 15 years to any criteria, plan or accepted practice.

8.4 TRAFFIC AND TRANSPORTATION

8.4.1 PRINCES HIGHWAY UPGRADE

ISSUE

According to Section 4.4.3.2 of the EA the proposal by the RTA to upgrade the Princes Highway along the frontage of the development site has not been finalised and is not publicly available.

This position which underpins the EA's traffic assessment is incorrect. The RTA has released information on its future planning for the upgrade of the Princes Highway to four lanes between Kinghorne Street within Nowra to forest Road further to the south of the site. This planning upgrade was on public exhibition from the 8th December 2008 to 6th February 2009.

RESPONSE

8.4.2 We note that the RTA are the relevant authority for traffic and transport issues. However, and notwithstanding this, the Proponent has engaged John Coady Consulting to advise on traffic issues. As set out in **Section 6** of this report, extended dialogue has been held with the RTA following the submission of the EA. This has resulted in a number of changes to the proposal and is further detailed at **Section 6** of this report

ISSUE

The RTA's upgrade proposals for the Princes highway have significant implications for any traffic assessment for this Project. The upgrade proposals include:

- *Restricting turning movements from the highway directly into the site to left turn in and out only;*
- *Three south-bound lanes between Quinns Lane and Warra Warra Road with a left lane for access to business premises. No similar provision is made for the Subject Site.*
- *The construction of a new roundabout at Warra Warra Road.*

None of the above proposals has been taken into consideration by the traffic assessment that is included in the EA.

RESPONSE

8.4.3 We note the RTA is the relevant authority for traffic and transport issues. However, and notwithstanding this, the Proponent has engaged John Coady Consulting to advise on traffic issues. As set out in **Section 6** of this report, extended dialogue has been held with the RTA following the submission of the EA. This has resulted in a number of changes to the proposal and is further detailed at **Section 6** of this report

ISSUE

Restricting right turn movement into the site for south-bound trucks will result in trucks having to negotiate the proposed Warra Warra Road roundabout. This will result in major conflicts at the roundabout and a significant increase in the number of heavy vehicles that will enter the site form the south-bound lane compared to that which has been calculated in the EA. The EA fails to address this issue. This concern is exacerbated it is it proposed to provide three south-bound lanes and only one north bound lane along the frontage of the site as suggested by the RTA.

RESPONSE

8.4.4 We note the RTA is the relevant authority for traffic and transport issues. However, and notwithstanding this, the Proponent has engaged John Coady Consulting to advise on traffic issues. As set out in **Section 6** of this report, extended dialogue has been held with the RTA following the submission of the EA. This has resulted in a number of changes to the proposal and is further detailed at **Section 6** of this report

ISSUE

Likewise the EA fails to address how the proposed access to the site could be accommodated if the road along the frontage of the site is widened to four lanes.

The EA has therefore failed to address the specific requirements of the DGRs for this project.

It is also noted that Shoalhaven City Council has stated that any intensification of access to this existing site entrance should not be supported. Rather council's preference is for access to the site take place from the roundabout proposed for the Warra Warra Road – Princes Highway intersection. The Traffic Assessment fails to address this issue at all.

RESPONSE

8.4.5 We note the RTA is the relevant authority for traffic and transport issues. However, and notwithstanding this, the Proponent has engaged John Coady Consulting to advise on traffic issues. As set out in **Section 6** of this report, extended dialogue has been held with the RTA following the submission of the EA. This has resulted in a number of changes to the proposal and is further detailed at **Section 6** of this report

8.4.6 NOWRA – BOMADERRY STRUCTURE PLAN

ISSUE

Obstructing the provision of the Warra Warra Road future access road would result in additional traffic at existing intersections, leading to increased traffic conflicts and tensions along the Princes Highway.

RESPONSE

8.4.7 We note the RTA is the relevant authority for traffic and transport issues. However, and notwithstanding this, the Proponent has engaged John Coady Consulting to advise on traffic issues. As set out in **Section 6** of this report, extended dialogue has been held with the RTA following the submission of the EA. This has resulted in a number of changes to the proposal and is further detailed at **Section 6** of this report

8.4.8 TRAFFIC GENERATION

ISSUE

In assessing the likely traffic impacts associated with the proposed quarry extensions the traffic assessment for the project only utilises 85th percentile traffic movements (Section 4.4.6.2). The traffic assessment therefore does not assess the peak traffic generation associated with the development as required by the RTA's "Guide to Traffic Generation Developments".

Section 3.2 of the RTA's guidelines details the requirements for traffic impact assessment to terms of the traffic generation. The guidelines detail the need to quantify the traffic impact in terms of daily traffic volumes and during peak periods. The guidelines do not suggest the use of the 85th percentile figures for the project.

The EA does not justify the use of the 85th percentile figures for the project.

As a result the traffic assessment, underestimates the traffic impacts associated with the development in terms of the:

- *level of service*
- *the adequacy of the intersection to the site: and*
- *the environmental capacity of the road systems.*

Having regard to the significant increases in heavy vehicle traffic associated with the project; it is a concern and surprising that the proposal does not propose any upgrading works to the intersection of the site and the Princes Highway in terms of providing, for instance, a Channelised intersection for right tiring heavy vehicles into the site. The use of the lower traffic generation rates within the EA results in an understatement of the need for the entry to the site to be upgraded.

RESPONSE

8.4.9 We note the RTA is the relevant authority for traffic and transport issues. However, and notwithstanding this, the Proponent has engaged John Coady Consulting to advise on traffic issues. As set out in **Section 6** of this report, extended dialogue has been held with the RTA following the submission of the EA. This has resulted in a number of changes to the proposal and is further detailed at **Section 6** of this report

8.5 THE SOUTH COAST CORRECTIONAL FACILITY (SCCF)

ISSUE

The SCCF is situated to the west of the proposed quarry site. It is understood that this facility will house up to 500 inmates.

In determining appropriate assessment criteria for this facility in terms of noise impacts and blasting, the EA suggests that the facility should not be considered similar to a residential use as it would have limited windows and would be constructed of heavier materials than most residences.

If the impacts on the SCCF are associated with the project are considered in the same light as other residential uses, then the proposal will exceed the assessment criteria in terms of daytime noise impacts and blasting.

RESPONSE

8.5.1 The Proponents approach to the appropriate noise assessment criteria for the SCCF is addressed at **Section 2.4.10** of this report. It is again noted that the Proponent has discussed this issue with the DECC and, given the fact that there are no intrusive noise criteria nominated within the INP for correctional facilities, the DECC have asked the Proponent to confirm with the operators of the Correctional Facility, that they are happy with the noise assessment and the basis upon which the assessment criteria have been derived. To this end, it is noted that an email was sent to the Department of Commerce on the 7 July setting out the Proponents position and seeking confirmation that this approach was appropriate. To date, the Proponent has received no response to this email.

8.5.2 In relation to blasting, Heggies have reviewed the current blast emission site laws and have concluded that the limiting allowable MIC will be 22kg for blasting at the closest point of extraction to the SCCF. This will enable compliance with the controlling general and maximum ANZECC criteria. For further information on this issue, please refer to **Section 2.6.5** of this report.

ISSUE

In terms of blasting, the assessment criteria for Residence C for ground vibration is 5(10) mm/s and peak air blast 115(120) db linear. According to Table 4.48 in the EA, the SCCF will experience a ground vibration of 18.4mm.s and a peak air blast of 122dB Linear. Such impacts from blasting are well in excess of the relevant assessment criteria for the closest residential property to this facility.

RESPONSE

8.5.3 In relation to blasting, Heggies have reviewed the current blast emission site laws and have concluded that the limiting allowable MIC will be 22kg for blasting at the closest point of extraction to the SCCF. This will enable compliance with the controlling general and maximum ANZECC criteria. For further information on this issue, please refer to **Section 2.6.5** of this report.

8.6 PROPOSED BIODIVERSITY OFF-SET

ISSUE

By a combination of the definition of "subdivision of land" under the Environmental Planning and Assessment Act and sections 23F and 23G of the Conveyancing Act, it would not be possible for the Proponent to lease only part of the adjoining land for a period of in excess of five (5) years. Accordingly, Council would have to approve either all of the allotment containing the offset area would have to be leased or, alternatively, Council would have to approve a subdivision of just that area under the Shoalhaven LEP. We are not aware that any such application has been made.

Accordingly, the Southern Biodiversity Offset cannot be guaranteed as there is no presently legal method of implementing that offset.

RESPONSE

8.6.1 The Proponents approach to the biodiversity offset strategy is addressed at **Section 2.2.4** of this report

8.7 PROPOSED SITE REHABILITATION

ISSUE

Section 2.15 of the EA is silent as to what measures will be put in place to provide sufficient financial security should the Proponent fail to undertake rehabilitation of the site in accordance with the rehabilitation measures detailed in the EA. The EA does not state what measures will be put into place to ensure that the NSW tax payer is not subject to the cost of rehabilitation the site should the Proponent become bankrupt or otherwise default on satisfying the rehabilitation requirements for the site.

RESPONSE

8.7.1 The Proponent is fully commited to the full rehabilitation of the Project Site in accordance with the measures as set out within the EA. To this end, it is anticipated that, as part of any approval, conditions setting out the rehabilitation requirements will be included. It is the intention of the Proponent to fully comply with any such conditions.

8.8 AIR QUALITY IMPACTS

ISSUE

The Air Quality assessment which supports the EA identifies that the project, taking into account additional dust control measures, will exceed the DECC's air quality assessment criteria as follows:

- *The rate of dust deposition form the Project alone would exceed the assessment criteria of 2/g/m^2/month at two receptor sites, namely at the Nowra Brickworks site adjacent to the northern boundary of the Project Site and at the proposed Warra Warra Road roundabout adjacent to the eastern boundary of the Project Site.*

- *The maximum cumulative daily $PM_{2.5}$ concentration would exceed the assessment criteria of 25 µg/m^3 at Residence A to the south of the Project Site.*

As a result of these exceedances the EA indicates the Proponent would undertake to negotiate a "suitable arrangement" with the owner of Residence A prior to completing Stage 1 of the Project. However, no details are provided in the EA as to what these "suitable arrangements" will be.

RESPONSE

8.8.1 As set out within the EA, Residence A is located at D260 Princess Highway, South Nowra (locally known as the "*Old Sawmill*".). Since the submission of the EA, the Proponent has entered into a lease over Lot 228 including an agreement for the first right of refusal on the purchase of this property. This includes the dwelling. As such, this property is now within the control of the Proponent and is now project related, and as such any air quality impacts are not relevant to the application.

8.9 NOISE IMPACT

ISSUE

It is evident from a review of the noise assessment which supports the project EA that, at full production, the project will result in the project-specific assessment criteria being exceeded by 5dB(A). Note: it is assumed that the residence referred to is residence A. Alternatively, the submission many be referring to the South coast Correctional Facility as a "residence".

No measures hare detailed as to how noise impacts associated with this exceedance of the assessment criteria at this residence will be ameliorated. Rather the Proponent proposes to negotiate "an arrangement" with owners of this residence prior to the completion of Stage 1 of the project. No details are provided with the EA how the noise impacts associated with this development will be mitigated to an acceptable level at this residence.

RESPONSE

8.9.1 As set out within the EA, Residence A is located at D260 Princess Highway, South Nowra (locally known as the "*Old Sawmill*".). Since the submission of the EA, the Proponent has entered into a lease over Lot 228 including an agreement for the first right of refusal on the purchase of this property. This includes the dwelling. As such, this property is now within the control of the Proponent and is now project related, and as such any air quality impacts are not relevant to the application.

8.10 BLASTING OPERATIONS

BLASTING PROPOSAL

ISSUE

In order to achieve compliance with the general blasting criteria at the two residences (A and B) when blasting in the southern-most and northern-most sections respectively of the extraction area, an MIC of approximately 0.3 kg and 33 kg are proposed.

Given the standard MIC is 112 kg, a MIC of only 0.3 kg is a significant reduction of normal practice. The practicality of such a charge is questioned. It is understood that such a charge will not be adequate to sufficiently fragment the rock; and it would require secondary breaking activities which have not presently been assessed in terms of air quality and noise impacts associated with the proposal.

RESPONSE

8.10.1 The Proponent has engaged Heggies to advise on blasting and the impact of blasting on noise and air quality. This is detailed further in **Section 2.6** of this report.

8.10.2 FLY ROCK

ISSUE

Given the proposal involves a substantial increase in production from the site; and therefore associated blasting operations, the opportunities for fly rock to impact on adjoining properties and / or vehicles travelling along the Princess Highway will increase. No assessment is included within the EA addressing the issue.

RESPONSE

8.10.3 The Proponent has engaged Heggies to advise on the flyrock issue and they have prepared a supplementary report at **Attachment B**. As set out within their report, there are generally two main areas within the blast from which flyrock has the potential to be produced. These are at the blasthole collar (where the stemming length has not been optimised and the explosive column is too close to the upper surface of the rock mass thereby creating crater effects - rifling) and at the face of the blast (where there could be less than optimum burden on a blasthole whereby the explosives gases are able to vent to atmosphere - blowouts, producing flyrock).

8.10.4 For the subject quarry blasting, the front-row blastholes will likely be "*boretraked*" in order to identify any areas of less than optimum burden so that, if required, inert material (rather than explosives) can be placed at this location in the blasthole. Consequently, in this circumstance, flyrock ejection at the face of the blast would not occur.

8.10.5 In terms of collar ejection, the proposed stemming length of 2.7m is considered optimum for the proposed blasthole lengths and has been selected in order to totally contain the explosives and separate them from the collar of the blasthole.

8.10.6 In addition to this, aggregate (typically 14mm) will be used as the stemming material (not drill dust) so as to contain the explosives within the blasthole.

8.10.7 Finally, Drilling Services Pty Ltd have been contacted by Heggies and they have advised that, based upon their experience in quarries and road construction projects, they are able to confidently state that blasted rock will fall within a blast envelope with dimensions:

- 50m in front of the face
- 20m on either side of the face, and
- 10m behind the face

8.10.8 Drilling Services have also confirmed that such dimensions are consistent with industry best practice and are readily achievable.

8.10.9 Finally we would again note that the DECC is the responsible agency for this element of the Proposal and they have raised no concern to date in relation to this issue

8.11 BLASTING IMPACTS ON THE SCCF

ISSUE

In addition to this concern is the potential that group vibration created by blasting operations at the proposed quarry will have an adverse impact on the security systems at the SCCF. It is anticipated that the SCCF would have an intricate and sensitive electronic computerised security system that will control surveillance, security and lock down functions at the facility. The group vibration created by blasting operations has the potential to adversely impact upon these systems. This would raise serious concerns for the safety of the broader community and the staff and inmates of the facility itself.

RESPONSE

8.11.1 The Proponent has met with the Department of Commerce and the Department of Corrective Services on a number of occasions to discuss the subject proposal. It is noted that the proposal has the in principle support of both Government departments and the dialgogue between both parties has been constructive. In relation to the impact of blasting on the security systems for the SCCF, we understand that this primarily relates to the '*anti climb'* fencing that will be erected around the boundary of the facility. This prevents inmates from climbing over the fences. To this end, it has been agreed with the Department of Corrective Services who will operate the SCCF, that the Proponent will give sufficient warning to the staff at the SCCF when a blast is going to happen at the Project Site. This will enable the staff at the SCCF to temporarily disable the fence system until after the blast has occured. We understand that whilst the fences have been temporarily disengaged and during the blast, additional security patrols would be in operation around the SCCF. This approach has been agreed with the Department of Commerce and Corrective Services and also with the DECC who are the relevant authority in relation to blasting.

8.11.2 In terms of the blasting criteria generally, Heggies have concluded that the relevant ANZEEC blast emissions criteria can be met in relation to the SCCF without imposing any significant constraints on the blast designs throughout the life of the quarry. Refer to **Section 2.6.5** of this report for further information.

8.12 LAND CONTAMINATION

ISSUE

- *The DECC requirements for the EA included:*

  "Document the assessment and management of any land contamination to ensure that the land is not allowed to be put to a use that is inappropriate because of the presence of contamination"

  The EA indicates that the issue is not applicable to this project.

  However, this issue is relevant to this site for the following reasons:

  - *The site has had a history of unauthorised placement of fill in terms of the bunds that have been constructed around the quarry. Whilst these bunds have been subsequently approved by Council, no assessment has been made of the potential for the materials placed with these bunds to contain contaminated substances.*

  - *The site has had a long history of use (particularly ML1). Heavy plant and equipment has been used on the site for a long time, and fuels and oils likely to have been stored and used on the site in the past.*

  Clearly, given these circumstances, there is the potential for the site to be contaminated. The EA should include a contaminated land assessment as required by DECC? The EA is deficient in this regard.

RESPONSE

8.12.1 Section 3.3.2.6 of the EA refers to State Environmental Planning Policy No. 55 – Remediation of Land, concluding that no parts of the land within the Project Site are known to be contaminated. It is also noted that the DECC has not requested a contaminated land assessment as part of the Director General's Requirements, or as part of the consultation process.

8.12.2 However, and not withstanding this, in relation to the bunds that have been constructed around the quarry, we would note that the Proponent was granted DA approval for these works as part of DA07/1322, approved by Shoalhaven City Council. As part of this approval, Condition 9 required the submission of a validation report to confirm that all materials within the bunds were free from contamination. It is noted that the material within the bunds was sourced locally and was certified prior to being allowed onto the Project Site, and this information was submitted to Council. It is therefore considered that there are no contaminated substances within the bunds.

8.12.3 In relation to the historical use of the Project Site and the leaching of fuels and oils onto the Project Site, there have been a number of investigative works undertaken across the Project Site as part of the EA preparation, and also in response to the consultations. These have included the drilling of boreholes across the Project Site and the excavation of nine soil test pits in connection with the Soil Assessment undertaken by SEEC Morse McVey (refer **Part 7A** of the Specialist Consultant Studies Compendium). The results of these various investigations have been analysed as part of the EA process and no evidence of any contamination on the Project Site has been found.

8.13 ECONOMIC IMPACTS

ISSUE

The EA justifies the proposal in terms of increasing job opportunities. In our view the proposed quarry will not result in additional employment opportunities within the broader community. Rather, at best it will have a neutral employment generation impact.

The EA does not demonstrate or provide any evidence that additional markets will be tapped into by the proposed quarry. Rather it will rely on similar constriction projects that all of the existing quarries within the Shoalhaven supply. For every job created at this quarry another job is likely to be lost at other existing quarries within the City. Under these circumstances it is unlikely that the proposed quarry will generate additional employment opportunities within the local area. Employment generation cannot be used to justify this project.

RESPONSE

8.13.1 As set out at Section 6.2.3 of the EA, it is considered that the Project will create a number of full time positions and job opportunities throughout its lifetime. Whilst the above submission contends that these jobs will result in the loss of jobs at another quarry, it is the Proponent's view that there is sufficient demand and unemployment within the South Nowra job market to cater for the demand that the Project will create without jobs being lost at other existing quarries in the region. In support of this position, it is noted that a number of local employers have recently made redundant a significant number of skilled employees. It is therefore considered that the Project will contribute in a beneficial way to enabling job creation in the South Nowra economy.

8.13.2 It is also noted that matters associated with competition between the Project and other quarry operations are not a matter for the Department of Planning to consider as part of this application and that competition is a principle that is supported by all levels of government and provides a benefit to society as a whole through increased efficiencies and lower costs for products and services.

9 ABBY AUTOS SUBMISSION

ISSUE

My premises are directly opposite (sic) the quarry and on numerous occasions we have complained to Council and the EPA about concrete or crusher dust which cakes our premises and boats and vehicle stock. They have told us that they water to stop this but they forget and we bear the brunt of it. Not to mention the health aspect as concrete dust cannot be good for you. How this became a major project is obviously because council refused approval.

RESPONSE

9.1 The Proponent has engaged Heggies Pty Ltd in relation to air quality and any impacts that the subject proposal would have on thee air quality of the surrounding area. To this end, Section 4.5 of the original Environmental Assessment, and Part 4 of the Specialist Consultants Studies Compendium provide a full air quality assessment prepared by Heggies. In addition to this, it is noted that no submissions were made by the DECC in relation to air quality as part of the consultation process. However, and notwithstanding this, it is noted that the air quality assessment concludes that, whilst there are minor exceedances of the air quality assessment criteria for Scenario 3 of the proposal, this is appropriate and furthermore, the likely air quality impacts are likely to be less than the assessment criteria.

9.2 In addition to this, we note that Abby Autos is located adjacent to the Princes Highway and this in itself is a siginficant contributor to dust in the immedate surrounds.

ISSUE

There is also a huge issue with explosives when they blast the whole area shakes violently when we complained the EPA said they are limited to amount used but no one polices this. When the jail is opened they will complain profusely and then the quarry will be closed or purchased by the government to stop explosives and dust. My neighbours have issues with cracks to buildings etc. Why not save us taxpayers a lot of money by not approving any more problems.

RESPONSE

9.3 The Proponent has engaged Heggies Pty Ltd in relation to noise and blasting, and specifically to advise on the proposed method of material extraction from the Project Site. To this end, the supplementary report prepared by Heggies (refer **Attachment B**) provides a full assessment of blast emissions as a result of the proposal, with **Section 2.6.5** of this report setting out that an MIC of 22kg would ensure full compliance with the controlling ANZECC criteria.

9.4 In addition, Heggies have recommended that all blasts are monitored at the closest/potentially most affected residence in order to establish compliance with the nominated criteria and that by adopting this approach, it is anticipated that the blast emissions criteria can be met without imposing any significant constraints on the blast designs throughout the life of the quarry. Refer to **Section 2.6.5** of this report for further information.

10 DSGRB Pty Limited

ISSUE

The application seeks to change the fundamental extractive use of the old quarry which previously only had existing use rights. If this application was to succeed it would unfairly impact on legitimate businesses that have had to comply with very thorough environmental rules and regulations.

RESPONSE

10.1 The subject application seeks approval for the continuation and expansion of extractive operations from an existing quarry. The proposal does not seek to change the nature and use of the extractive operations that currently occur on the Project Site and which have occurred on the Project Site since 1972.

10.2 As part of the Environmental Assessment prepared in support of the application, along with the responses prepared in this document as a result of the consultation process, it has been necessary to demonstrate that the proposal will comply with all necessary environmental rules and regulations and to the satisfaction of the relevant Government agencies. It is considered that this has been fully demonstrated in the documentation supporting this application. Furthermore, as part of any approval on the Project Site, it is anticipated that there will be appropriate conditions of consent pertaining to the relevant environmental rules and regulations and to which the Proponent will fully comply.

ISSUE

This application would give an unfair advantage to the current leasees of this site. Any other extractive or recycling industry has had to pay market value for their site in the correct zooming and spend many millions of dollars to ensure the site complies. This current site, the subject of the submission, would not comply even with the most generous of interpretations

RESPONSE

10.3 The Proponent currently leases the Project Site from the Department of Commerce, the terms of which are not relevant to this application. In relation to the compliance of the proposal with relevant environmental regulations, as set out in Section 10.1 and 10.2 above, it is considered that the original EA and subsequent response to the consultation process demonstrates that the proposal has been designed to comply with the relevant environmental standards and regulations.

ISSUE

It is our understanding that the current application has been moving aggregate from the site in contravene of court orders. We believe that to legitimise these current illegal actions would be at risk to current lawful and authorised businesses.

RESPONSE

10.4 It is the opinion of the Proponent and his professional advisors that he has been operating legally and fully within his right under the terms of the existing use rights legislation. The application seeks to formalise the current extractive operations on the Project Site and to allow the expansion of operations.

11 Summary and Conclusions

11.1 In summary, it is considered that the Proponent has addressed the majority of the outstanding issues raised as part of the consultation period for the Subject proposal. Indeed, these issues have largely now been directly agreed with the relevant Government agencies.

11.2 In particular, it is considered that the submissions made by the DECC, DWE, DPI and DL have now been fully addressed in the revised reports attached to this submission. Furthermore, the majority of these issues are repeated in the submissions made by the respective objectors.

11.2 However, it is noted that the Proponent has concerns in relation to the submissions made by Shoalhaven City Council and the Road and Traffic Authority, and in particular in relation to the following:

11.3 **Roads & Traffic Authority (RTA) (refer Section 6 of the report)**

- The Proponent does not accept the interim right turning restrictions requested by the RTA into the Project Site and believes that this is unwarranted for the following reasons:
    - Traffic modelling undertaken in support of the application has concluded that the restriction is not necessary;
    - The sealed carriageway of the Princes Highway adjacent to the Project Site is sufficiently wide to allow a passing lane;
    - Surveys of the existing traffic generation indicate that the demand for right turning traffic likely to be minor;
    - The Proponent needs to maintain access for vehicles approaching from the north at all times to facilitate movements by heavy vehicles dropping off or picking up material from the quarry
    - Should the right turn restriction be imposed, the alternative route would involve a number of potentially dangerous movements

- The Proponent does not believe that any contribution should be made by the applicant for the installation of a central median strip for the following reasons:
    - There is no nexus or a sound basis for requesting that the payment for this strip is paid wholly by it;
    - The proposed median strip is not directly required and related to the proposed development and therefore has no relevance or nexus to the application;
    - The proposed median strip has been within the RTA's scope of upgrade works for the Princes Highway for some time. Therefore the median strip will be provided irrespective of the subject proposal;

- In relation to the left turning deceleration lane, whilst it is acknowledged by the Proponent that a left turn deceleration lane is required to service the Project Site for northbound vehicles, the Proponent has already given the RTA (at no cost) a proportion of Lot 464 in DP 1058778 to facilitate the construction of the Warra Warra Road roundabout. This piece of the Proponents land was previously considered part of the extractable resource within the Project Site. To this end, the Proponent considers that an offer to fund **50%** of the deceleration lane would be a fair and representative figure.

11.4 **City of Shoalhaven Council** (refer **Section 7** of the report)

- The Proponent does not believe that the proposal should be amended to reflect the road infrastructure as set out in the Nowra Bomaderry Structure Plan. This is based on the following:

    - The NBSP does not comprise a legal planning document, but rather one that provides strategic direction and guidance.
    - It does not provide zonings and any infrastructure proposed within the plan should be considered "*strategic*" at best
    - The plan has not received support from the RTA in relation to the proposed road infrastructure as referred to in Council's submission
    - The proposed "link road" not only runs through the Project Site, but also runs directly across the middle of the SCCF site
    - In relation to the proposed relief road, the plan is also unfounded with the proposed road finishing at the Shoalhaven River, which is only 10 to 15 kilometers north of the location of the Quarry.
    - The plan does not take up a review of the infrastructure, road works, compulsory acquisition, or the other strategic projects which will be required to bring the plan into effect, including the erection of very significant bridge spanning across the Shoalhaven River in an area which is considered to be both of high ecological value and which, furthermore, will be extremely difficult to construct given that the bridge location will be on a part of the river which is bounded by sandstone cliff faces.

- The Proponent does not believe that the draft Shoalhaven LEP 2009 should be given any weight in the determination of the application under Section 79C (1)(a)(i) of the Environmental Planning & Assessment Act.

12 Final Statement of Commitments

12.1 This section provides the final statement of commitments for the proposal. New or amended text is indicated by blue text.

Final Statement of Commitments for the Nowra Brickworks Quarry

Page 1 of 10

Desired Outcome	Action	Timing
1. Environmental Management		
Compliance with all conditional requirements in all approvals, licences and leases.	1.1 Comply with all commitments recorded in **Table 5.1** 1.2 Comply with all conditional requirements included in the: Project Approval; Environment Protection Licence; Mining Leases; and any other approvals.	Continuous and as required.
All operations conducted in accordance with all relevant documentation.	1.3 Undertake all activities in accordance with the accepted Mining Operations Plan, environmental procedures, safety management plan and/or site-specific documentation. 1.4 provide annual production data to DPI	Continuous and as required.
2. Area of Activities		
All approved activities are undertaken generally in the location(s) nominated on the figures shown in Sections 2 and 4.	2.1 Mark, and where appropriate, survey the boundaries of the areas of proposed disturbance.	Prior to the commencement of the relevant activity.
3. Hours of Operation		
All operations are undertaken within the approved operating hours.	3.1 Extraction, processing and VENM backfilling-related activities. • 7:00am to 6:00pm, Monday to Friday. • 7:00am to 4:00pm, Saturday 3.2 Product despatch. • 7:00am to 6:00pm, Monday to Saturday. • Up to three unladen trucks would arrive at the Project Site between 6:00am and 7:00am, Monday to Saturday and may return to the Project Site between 6:00pm and 8:00pm, Monday to Friday and between 4:00pm and 6:00pm Saturday. 3.3 Maintenance-related activities • 7:00am to 6:00pm, Monday to Saturday.	Continuous

(Cont'd)
Draft Statement of Commitments for the Nowra Brickworks Quarry

Desired Outcome	Action	Timing
4. Hydrology (Surface Water and Groundwater)		
All surface water and ground water managed such that water to be discharged from the Project Site complies with all assessment criteria	4.1 Maintain and progressively relocate the existing surface water diversion and sediment containment structures.	As required
	4.2 Construct, maintain and relocate, as required, surface water diversion structures to ensure that all surface water flows within disturbed sections of the Project Site are directed to the extraction area ~~or the water storage facility~~. The maximum catchment area would be required to be less than 5.9ha. To achieve this, the Proponent would ensure that progressive rehabilitation is undertaken as soon as practicable on sections of the Project Site no longer required for extraction-related operations.	
	4.3 Construct temporary surface water diversion structures on the upslope side of all soil stockpiles or other disturbed areas to limit erosion.	
	4.4 Install sediment fencing adjacent to the down-slope toe of all soil stockpiles or other disturbed areas.	
	4.5 Regularly inspect all surface water and sediment control structures for adequacy and repair or upgrade, where required.	Six monthly and following significant rainfall events
	4.6 Install and maintain a suitably sized sump within the active extraction area to collect all surface water runoff and groundwater inflows to the extraction area.	Following receipt of project approval
	4.7 Preferentially use water within the extraction area sump for dust suppression-related activities. Surplus water within the extraction area sump would be pumped to the water storage facility.	As required
	4.8 Preferentially use water within the water storage facility for rehabilitation-related activities or for irrigation within the irrigation area.	
	4.9 Construct 'grassed buffer areas' adjacent to the site access road and other sealed sections of the Project Site.	Within 6 months of receipt of project approval

(Cont'd)
Draft Statement of Commitments for the Nowra Brickworks Quarry

Desired Outcome	Action	Timing
5. Ecology		
Minimise Project-related impacts on flora and fauna within and surrounding the Project Site.	5.1 Stage extraction activities such that they preferentially progress from disturbed sections of the Project Site to undisturbed sections.	Continuous
	5.2 Remove native vegetation only from those areas required for operational purposes during the subsequent 12 months.	
	5.3 Mark hollow-bearing trees to ensure they are readily identifiable.	
	5.4 Mark the boundaries of areas of native vegetation to be cleared.	Prior to clearing operations
	5.5 Erect cage traps in the vicinity of hollow-bearing trees for three consecutive nights.	
	5.6 Keep any trapped animal in captivity by animal for the period of clearing of native vegetation.	During clearing operations
	5.7 Clear non-hollow-bearing trees before clearing other vegetation.	During clearing operations
	5.8 Ensure a qualified fauna consultant is present during clearing of hollow-bearing trees.	
	5.9 Release any trapped animal adjacent to the Project Site.	Following clearing operations
	5.10 Break or cut cleared vegetation into manageable sections to be placed on areas undergoing rehabilitation or within other areas of native vegetation surrounding the Project Site.	Following clearing operations
	5.11 Undertake weed control programs within the Project Site.	Annually
	5.12 Strip, stockpile and spread topsoil and subsoil in accordance with Section 2.3.5.	During soil stripping programs
	5.13 Progressively rehabilitate all areas of disturbance no longer required for extraction or placement activities.	Following completion of extraction operations
	5.14 Implement the proposed biodiversity offset strategy	~~Within 6 months of receipt of project approval~~

(Cont'd)
Draft Statement of Commitments for the Nowra Brickworks Quarry

Desired Outcome	Action	Timing
6. Traffic and Transportation		
Limit the impact of Project-related traffic	6.1. Adhere to the approved hours of operation.	Continuous
	6.2. Adhere to all speed limits.	
Allow concerned residents or motorists to report any traffic-related incidents, unsafe operation or general concerns.	6.3. Establish a complaints register, advertised in the local telephone directory.	On receipt of project approval
	6.4. Investigate all complaints and act decisively on substantiated incidents.	
Ensure all weight restrictions are adhered to	6.5. Weigh all entering and exiting laden trucks.	Continuous
Limit the tracking of material onto the Princes Highway to minimise dust, particulate matter and debris emissions.	6.6. Seal a 150m section of the site access road from the entrance gate and construct a wheel wash facility.	Prior to the amount of quarry products despatched from the Project Site exceeding 250 000t per year
	6.7. Ensure all loads are covered.	Continuous
	6.8. Provide a safe area for covering loads.	
Ensure all drivers adhere to the Projects Code of Conduct	6.9. Require all truck drivers to sign a Driver's Code of Conduct.	Prior to each driver leaving site for the first time
7. Air Quality		
Site activities are undertaken without exceeding DECC air quality criteria or goals.	7.1. Utilise water sprays and water trucks in all areas of potential dust lift-off to minimise potential dust emissions.	Continuous
	7.2. Utilise a chemical dust lift-off suppression system along unsealed roads, tracks and working areas, as well as with the mobile processing plant(s).	
	7.3. Utilise efficient mist sprays and wind sheltering equipment on processing equipment.	
	7.4. Maintain a maximum speed limit within the Project Site of 10km/h.	
	7.5. Stabilise the unsealed shoulders of the site assess road.	Prior to the amount of quarry products despatched from the Project Site exceeding 250 000t per year
	7.6. Install a wheel wash on the site access road to limit tracking of material onto the Princes Highway	
	7.7. Disturb only the minimum area required for operation of the quarry during the subsequent 12 months.	Continuous
	7.8. Stabilise soil stockpiles to be in place for more than 10 days through the application of cleared vegetation, hydroseeding, hydromulching or equivalent.	Following soil stripping activities

(Cont'd)
Draft Statement of Commitments for the Nowra Brickworks Quarry

Desired Outcome	Action	Timing
7. Air Quality (Cont'd)		
Site activities are undertaken without exceeding DECC air quality criteria or goals. (Cont'd)	7.9. Minimise the creation of minor roads and access tracks.	Continuous
	7.10. Utilise dust aprons, dust extraction systems and/or water injection or sprays during drilling operations.	During drilling operations
	7.11. Adequately stem all blast holes with aggregates.	During blasting operations
	7.12. Commence rehabilitation as soon as practicable.	Once an area is no longer required for extraction or placement-related operations
8. Noise		
Project-related noise impacts on surrounding residences minimised.	8.1. Adhere to the approved hours of operation.	Continuous
	8.2. Use noise-mitigated mobile and processing equipment.	
	8.3. Undertake all processing operations within the deepest section of the quarry.	
	8.4. Maintain all mobile and processing equipment in accordance with the manufacturer's specifications.	
	8.5. Preferential selection of equipment with lower sound power levels over equipment with higher sound power levels.	As equipment renewal is required
	8.6. Progressively install frequency modulated reversing alarms on mobile equipment.	
9. Blasting		
Project-related blasting impacts within assessment guidelines.	9.1. Design and implement blasts by a suitably qualified blasting engineer and experienced shot-firer.	Each blast
	9.2. Design blasts to ensure the assessment criteria described in Section 4.7.4.5 are complied with at all residential and commercial receivers.	
	9.3. Modify blast designs, mitigation measures and operating procedures on the basis of monitoring results.	As required
	9.4. Limit blasting operations to between the hours of 9:00am and 4:00pm, Monday to Saturday.	Each blast
	9.5. Negotiate an appropriate arrangement with the owner of Residence A.	Prior to completion of Stage 1 of the Project

(Cont'd)
Draft Statement of Commitments for the Nowra Brickworks Quarry

Desired Outcome	Action	Timing
9. Blasting (Cont'd)		
Project-related blasting impacts within assessment guidelines. (Cont'd)	9.6. Notify the following organisations verbally of each blast. • Shoalhaven City Council. • NSW Police. • NSW Roads and Traffic Authority. • The owner of Residence A. • Environment Protection Authority. • The South Coast Correctional Facility (when constructed).	On the working day prior to the blast being initiated
	9.7. Maintain the existing main telephone number (02 4421 7766) for the quarry as an environmental complaints line.	Continuous
	9.8. Maintain a register of complaints.	
	9.9. Respond promptly to any issue of concern.	
10. Aboriginal Cultural Heritage		
Unidentified Aboriginal sites are not disturbed by the Proponent's activities.	10.1. Ensure representatives of the Aboriginal community are present during activities that would disturb the upper 10cm of soil in the area marked on **Figure 5.1.**	During soil stripping operations in the area indicated
	10.2. Cease all work in the event that an item of suspected Aboriginal cultural heritage is discovered, establish a 20m x 20m buffer around the item and consult with the Department of Environment and Climate Change.	As required
	10.3. Cease all work in the event that suspected human remains are discovered, establish a 50m x 50m buffer around the item(s) and consult with NSW Police and the Department of Environment and Climate Change.	As required
11. Soils		
The Proponent's activities do not result in soil degradation or loss.	11.1. Strip soils only when they are moist.	During soil stripping operations
	11.2. Strip topsoils using a scraper, excavator or bulldozer to a depth of between 180mm and 250mm below the surface.	
	11.3. Strip subsoils to a depth of between 175mm and 500mm below the base of the topsoil.	
	11.4. Place soils directly on areas undergoing progressive rehabilitation, where practicable.	During rehabilitation operations

(Cont'd)
Draft Statement of Commitments for the Nowra Brickworks Quarry

Desired Outcome	Action	Timing
11. Soils (Cont'd)		
The Proponent's activities do not result in soil degradation or loss. (Cont'd)	11.5. Place Virgin Excavated Natural Material (VENM) in the manner described in Section 2.9.5.	During VENM placement operations
	11.6. Place subsoil over the VENM to a thickness of approximately 250mm.	During soil placement operations
	11.7. Place topsoil to a thickness of approximately 200mm.	
	11.8. Apply biosolids to the topsoil at a rate of less than 20 dry tonnes per hectare.	
	11.9. Spread between 20mm to 40mm of mulched native vegetation, broken tree debris or bitumen sprayed straw mulch over the topsoil.	
	11.10. Locate soil stockpiles, where required, at least 2m from existing vegetation, areas of concentrated surface water flows, roads or other hazardous areas.	During soil stockpiling operations
	11.11. Construct soil stockpiles as low (less than 2m high), flat, elongated mounds with side slopes no greater than 1:3(V:H). Where practicable, topsoil stockpiles would be less than 1m high.	
	11.12. Stabilise stockpiles to be in place for more than 10 days through the application of mulched or broken vegetation, hydroseeding, hydromulching or equivalent.	During soil stockpiling operations
	11.13. Erect a sediment fence approximately 1m from the toe on the downslope side of soil stockpiles.	
	11.14. Use stockpiled soil material for rehabilitation-related operations within 6 months of being stockpiled.	
Ensure sediment-laden surface water is not permitted to flow off site.	11.15. Maintain and relocate an earth bank to divert all 'clean' surface water to a sediment retention structure and level spreader.	Continuous
	11.16. Divert all surface water flows from disturbed areas to the water storage facility where practicable.	
	11.17. Divert all other potentially sediment-laden surface water flows to a sump within the extraction area.	

(Cont'd)
Draft Statement of Commitments for the Nowra Brickworks Quarry

Desired Outcome	Action	Timing
11. Soils (Cont'd)		
Ensure sediment-laden surface water is not permitted to flow off site. (Cont'd)	11.18. Preferentially use water from the extraction area sump for dust suppression and watering of roads and other areas.	
	11.19. Construct a bio-infiltration facility in accordance with the specifications in Section 4.9.3.	Prior to discharge of surface water to Nowra Creek
	11.20. Preferentially use water within the water storage facility for rehabilitation-related activities.	Continuous
	11.21. Pump excess water from the extraction are sump to the water storage facility.	As required
	11.22. Pump water from the water storage facility to a bio-infiltration facility when the concentration of total suspended solids within the water storage facility is less than 50mg/L.	
	11.23. Pump water from the bio-infiltration facility to Nowra Creek.	
12. Visibility		
Limit impacts to the visual amenity of the area surrounding the Project Site.	12.1. Maintain the existing perimeter bunds.	Continuous
	12.2. Maintain the existing mature trees on the eastern boundary of the Project Site.	
	12.3. Adopt a high standard of house keeping.	
13. Socio-Economic		
Ensure Project-related adverse impacts are minimised and benefits are maximised.	13.1. Give preference to suppliers of equipment, services or consumables located within the Shoalhaven Local Government Area or Illawarra Region, where ever practicable.	Continuous
	13.2. Give preference, where reasonable to do so, when engaging new employees to candidates who live within the Shoalhaven Local Government Area.	
	13.3. Continue to support local junior sporting clubs through sponsorship or in kind support.	
	13.4. Review any request by a community organisation for support or assistance during the life of the Project.	As required

(Cont'd)
Draft Statement of Commitments for the Nowra Brickworks Quarry

Desired Outcome	Action		Timing
13. Socio-Economic (Cont'd)			
Ensure Project-related adverse impacts are minimised and benefits are maximised. (Cont'd)	13.5.	Consult with the residents and community surrounding the Project Site.	Continuous
	13.6.	Advertise and maintain a community complaints telephone line.	
	13.7.	Develop and maintain a Complaints Management Plan to ensure prompt response to issues identified by the public.	
14. Environmental Monitoring			
Ongoing monitoring of surface and groundwater-related impacts.	14.1.	Monitor groundwater levels within Piezometers P1 to P8 (**Figure 5.1**).	Monthly.
	14.2.	Monitor and record groundwater quality within piezometers P2, P3, P5, P6 and P7 (**Figure 5.1**).	Quarterly
	14.3.	Monitor and record groundwater seepage on rock faces. To be undertaken by a geotechnical engineer.	Six monthly
	14.4.	Monitor and record surface water quality within the extraction area sump, the water storage facility, the sediment containment structure and within Nowra Creek upstream and downstream of the Project-site discharge point.	Monthly
	14.5.	Determine and record the quality of water pumped from the water storage facility to the bio-infiltration facility.	During each pumping campaign
	14.6.	Determine and record the quality of water discharged from the bio-infiltration facility to Nowra Creek.	
	14.7.	Determine and record the quality of water flowing from the sediment containment structure to Nowra Creek.	During or immediately following significant rainfall events
	14.8.	Determine, using in-line meters, and record the volumes of water pumped: • from the extraction area sump to the water storage facility; • from the water storage facility to the bio-infiltration facility; and • from the bio-infiltration facility to Nowra Creek.	During pumping programs

(Cont'd)
Draft Statement of Commitments for the Nowra Brickworks Quarry

Desired Outcome	Action		Timing
14. Environmental Monitoring (Cont'd)			
Ongoing monitoring of surface and groundwater-related impacts. (Cont'd)	14.9.	Determine and record the volume of water used for extraction, processing, placement and rehabilitation-related operations.	Daily
Ongoing monitoring of ecology-related impacts.	14.10.	Undertake regular monitoring of areas undergoing rehabilitation to determine the success or otherwise of the management, mitigation and ameliorative measures and the rehabilitation programs.	Six monthly
	14.11.	Take photographs from fixed points to document activities within the Project Site, including rehabilitation progress.	Six monthly
	14.12.	Undertake weed inspection programs.	Annually
Ongoing monitoring of air quality-related impacts.	14.13.	Maintain the existing network of deposited dust monitoring gauges and determine and record dust deposition rates.	Monthly
	14.14.	Establish a meteorological station capable of measuring temperature at the surface and at a height of 10m, wind direction and speed and rainfall.	Within 3 months of receipt of project approval
Ongoing monitoring of blasting-related impacts.	14.15.	Monitor all blasts at the blast monitoring locations indicated on **Figure 5.1**.	Each blast
15. Environmental Documentation			
A systematic set of documents are in place to guide the planning and implementation of all environmental management strategies.	15.1	Incorporate the environmental procedures in an on-site management system.	Prior to relevant activity.
	15.2	Update the Mining Operations Plan.	As required.
	15.3	Incorporate relevant environmental data / information in Annual Environmental Management Reports.	Annually.
	15.4	Prepare the following environmental plans for the Project. - Air Quality Monitoring Program. - Noise Monitoring Program. - Blast Monitoring Program. - Flora and Fauna Management Plan. - Site Water Management Plan. - Groundwater Management Plan. - Rehabilitation and Landscape Management Plan	Variously.
	15.5	Incorporate the environmental procedures in an on-site management system.	Prior to relevant activity.

ATTACHMENT A

Response to Agencies Report, prepared by Martens & Associates

John Green
c/o City Plan Services

Response to Agencies: Nowra Brickworks Quarry, South Nowra

P0701757JR04_V5
August 2009

martens consulting engineers

ENVIRONMENTAL

WATER

WASTEWATER

GEOTECHNICAL

CIVIL

PROJECT MANAGEMENT

Limitations Statement

The sole purpose of this report and the associated services performed by Martens & Associates Pty Ltd is to provide a response document that addresses government agency and public submissions raised in relation to the continuation and expansion of extractive operations at Nowra Brickworks Quarry in accordance with the scope of services set out in the contract / quotation between Martens & Associates Pty Ltd and City Plan Services (hereafter known as the Client). That scope of works and services were defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

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All enquiries regarding this project are to be directed to the Project Manager.

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1 Introduction

1.1 Overview

This report has been prepared in response to the hydrology (surface water and groundwater) related requests for further information which are outlined in the NSW Department of Environment and Climate Change's (DECC, 02.04.2009) and the NSW Department of Water and Energy's (DWE, 30.03.2009) submissions to the Department of Planning (DOP). These submissions were made in light an Environmental Assessment (EA) which was completed to accompany an application under Part 3A of the *Environmental Planning and Assessment Act 1979* for project approval.

The EA (R.W. Corkery and City Plan Services, 2009) was prepared to support the proposed continuation and expansion of extractive operations at Nowra Brickworks Quarry, South Nowra, NSW. Hydrology content within the EA (R.W. Corkery and City Plan Services, 2009) was based on a detailed hydrology assessment for the project which was prepared by Martens and Associates (2009).

1.2 Departmental Comments and Actions Taken

Departmental comments and subsequent actions taken to address the issues/comments raised are summarised in Table 1. Refer to Attachment A for submissions from the DWE (30.03.2009) and DECC (02.04.2009) to the NSW Department of Planning.

Table 1: Summary of departmental comments and actions taken.

Agency	Issue #	Description	Action Taken	Relevant Section(s) in Report
DWE	1	Provide further justification of the storage reservoir's volume.	Revised water balance modelling based on remodelled groundwater ingress volumes.	5.2
	2	Provide an updated groundwater model to include transient temporal discretisation, sensitivity analysis of potential pit inflows, inclusion of aquifer storage property and further consideration into impacts associated with rehabilitation backfilling.	Amended groundwater model prepared to incorporate transient water balance based recharge and estimated S value from pump test data. Additional modelling of backfilling operations.	5.1, 5.3
	3	Modelled results of the final water level within the water storage reservoir.	Storage reservoir to be backfilled at completion of rehabilitation.	5.3
	4	Need for a review of salt budget model results in light of issue 2.	Amended water balance modelling results indicate that by including recharge at the storage reservoir, the 4ha irrigation field is no longer required. No assessment necessary.	5.2
DECC	1	Provide further explanation of the apparent spike in salt concentration of water within Nowra Creek.	Additional floodplain soil and creek water sampling.	2
	2	Provide further assessment of potential environmental impacts associated with the irrigation of potentially saline water onto the proposed 4ha irrigation field. In particular, provide an assessment of soil storage capacity as well as an assessment of the viability of the proposed irrigation of potentially saline water.	As per action taken for DWE issue #4.	5.2
	3	Amend salt budget modelling with consideration of possible salt runoff and leaching from the proposed 4ha irrigation field.	As per action taken for DWE issue #4.	5.2
	4	Provide a more detailed surface water and groundwater monitoring program proposal.	Update original EA groundwater monitoring plan and include additional surface water monitoring plan.	7

1.3 Existing Quarry Conditions

Over the course of the EA, extraction below the water table has taken place in the area where the storage reservoir is proposed. Details and impacts of this excavation are in Section 0.

1.4 Document Scope

The scope of this document is summarised as follows:

- Update groundwater assessment based on supplementary field data, extended scope of groundwater model and supplementary modelling.

- Update surface water modelling and water balance assessment.

2 Nowra Creek

2.1 Supplementary Fieldworks

A further round of water sampling with the inclusion of floodplain soil sampling was undertaken on 07.05.2009. Soil and water sample analyses were undertaken by laboratory. Water samples that were analysed by laboratory were supplemented with probe sampling to increase the sample size. The probe was calibrated by laboratory prior to use. Laboratory results are provided in Attachment B with sample locations given in Attachment C.

2.2 Soil Salt Concentration

Soil samples collected from the floodplain adjacent to the creek were sampled at a depth of 0.1 m and analysed for pH and electrical conductivity (EC). Results are provided in Table 2 and indicate generally low salt levels in surface soils. Soil salt (TSS) is plotted against chainage in Figure 1.

Table 2: Nowra Creek floodplain soil salt concentrations.

Sample I.D	1757/soil/1	1757/soil/2	1757/soil/3	1757/soil/4	1757/soil/5	1757/soil/6	1757/soil/7
pH	5.4	5.3	4.8	6.7	5.3	4.9	5.0
EC 1:5 (µS/cm)	80	41	120	130	39	27	40
TSS [1] (mg/kg)	51.20	26.24	76.80	83.20	24.96	17.28	25.60

Notes: [1.] Approximated by multiplying EC 1:5 value by 0.64.

2.3 Water Salt Concentration

EC results for creek water sampling undertaken to date is summarised in Table 3 and plotted as a function of creek chainage in Figure 1.

Table 3: Nowra Creek water EC sample results.

Chainage (m)	EA Result (EC - µS/cm) [1]	Supplementary Sampling [2]		Mean (EC - µS/cm)
		Laboratory Result (EC - µS/cm)	Probe Result (EC - µS/cm)	
0	250			
463	123			
540	137			
628	247			
670	380	1100	1027	836
736	290		1370	830
786	1096	1600	1685	1460
835	1168		1659	1414
865	654	1800	1737	1397
905	2050		1691	1871
951	3200	750	801	1584
1000			740	
1050			707	

[1.] Sampling conducted on 05.10.2007 and 07.12.2007. [2.] Sampling conducted on 07.05.2009. [3.] Chainage 0 m starts at sample 1757/C1 (see sampling plan in Attachment C).

2.4 Comments

- Creek water EC results from the more recent additional sampling round generally accord with results from the initial sampling round which show a spike in EC values. Whilst the more recent sampling round displayed higher EC values, the more recent EC values are within the expected range of the initial EC sample values. This suggests that the spike in EC values is likely to be related to natural variation.

- The relatively higher creek water EC values for the recent round of sampling may be attributable to decreased flow within the creek and therefore reduced dilution. Decreased flow is likely to have resulted from reduced rainfall duration, frequency or intensity, or

from the large bund which has been constructed on the adjacent jail site which may have reduced the creek's catchment area.

- The shallow piezometer (P4) (see Attachment C) which was installed to monitor potential shallow groundwater flowing to Nowra Creek did not intercept groundwater and remained dry throughout the entire monitoring period suggesting that shallow groundwater is unlikely to flow to Nowra Creek.

- Soil salt concentrations show a similar corresponding 'ramping' in salt concentrations to surface waters.

Based on the above, and given that there is currently no quarry discharge from disturbed sections of the site to Nowra Creek, it appears that local soils are the most probable source of salt in the creek. Given that flow in the creek is low and there are a number of ponds, there is considerable opportunity for salt concentrations in stagnant pools to increase with evaporation. We do not recommend any further assessment of this issue.

3 Groundwater Conditions

3.1 Supplementary Fieldwork

Pump testing was undertaken on May 7th, 2009 in order to provide field values for specific yield (S_y) and further measurement of hydraulic conductivity (k). Testing was completed in the immediate vicinity of the existing 'P5' piezometer (Figure 2). The aquifer's response to pumping followed the Theis type curve and therefore pump test data analysis was undertaken using the Theis method. Results of aquifer tests to date, including the recent pump test are summarised in Table 4. Raw pump test data and data used in the Theis analysis is presented in Figure 3, Figure 4 and Figure 5.

Table 4: Summary of aquifer testing data.

Borehole	Test Type	Date	K (m/d) [2]	S_y [3]	Depth Range (mAHD)
P3	Slug Test [1]	07.12.2007	0.003	-	30.57 – 37.97
P2	Slug Test [1]	21.06.2007	0.004	-	27.8 – 36.2
P8	Slug Test [1]	29.10.2007	0.070	-	29.7 – 36.7
PT2	Slug Test	11.05.2009	0.001	-	30.75 – 31.89
PT3	Pump Test – Theis analysis	07.05.2009 – 11.05.2009	0.280	0.0022	28.37 – 32.62
P5	Pump Test – Theis analysis		0.324	0.0012	28.41 – 32.66
Median			0.037	0.0017	

[1.] Completed for original hydrology report (Martens and Associates, 2009). [2.] Hydraulic conductivity. [3.] Specific yield.

3.2 Design Hydraulic Conductivity (K)

Given the variability in K values observed at the site, the following comments are offered in support of the K value used for design.

1. Exposed pit walls reveal generally good massive quality rock occurs throughout the mine site, particularly in those areas to be quarried. Major seams and defect zones with the potential to bear water do occur but represent only < 2 %.

2. Apart from test sites PT3 and P5, median site K values are 4 x 10^{-3} m/d, with P8 reaching 7 x 10^{-2} m/d. Tests sites PT3 and P5, which are within 3 m of each other, are considerably higher at 3 x 10^{-1} m/d. K estimates from these bores are considerably out of character from multiple other test sites dispersed across the study area.

3. K values reported in the literature for siltstones are provided in Table 5 below. Whilst these show K ranging over say 2-3 orders of magnitude, maximum expected K values are of the order of 10^{-2} m/d. Values $\geq 10^{-2}$ m/d would be highly atypical of siltstone or shale (less permeable still) rock environments.

4. Apart from PT3 and P5, K values observed are similar to the upper bracket of expected K values for the underlying geology. Given the relatively high K values observed, it is possible that the 'down-the-hole' hammer drilling method utilised has locally increase rock fracturing and artificially increased K values.

5. In light of the above comments, we do not consider that the K values determined at PT3 and P5 represent realistic K values for the local geology. Rather, they may be representative of an aberrant local seam or may be impacted [more so than the other bores] by the method of drilling. A median K value of 3.7 x 10^{-2} m/d based on all test site values is deemed to appropriately represent K for the site and is adequate for design. This value is higher than 50 % of the site K observations.

Table 5: Published ranges for siltstone / shale hydraulic conductivity.

Source	Lower K limit (m/d)	Upper K limit (m/d)
Bair and Lahm (2006)	10^{-5}	10^{-3}
Domenico and Schwartz (1990)	$8x10^{-7}$	10^{-3}
USGS (2002)	$3x10^{-7}$	10^{-2}

3.3 Design Specific Yield (S_y)

Given the limited S_y values observed at the site, the following comments are offered in support of the S_y value used for design.

1. Two estimates of S_y have been determined based on testing at PT3 and P5. Median S_y is 0.17 %. This is based on a significantly extended pump-testing period of 90 hours.

2. The drawdown response curve throughout the pump-test monitoring period closely followed the Theis type curve. We note that in both draw-down curves (particularly PT3), a minor 'S' bend occurs after approximately 5-10 minutes typical of unconfined aquifers. This suggests an initial confined or semi-confined response, followed by an unconfined response in the ensuing pumping period. Given that the aquifer is not confined by the surface clay capping, significant changes in S_y with time are not expected.

3. The calculated median S_y of 0.17 % is within the range of the lower bounds reported in the literature (see Table 6). This is not unexpected given the massive nature of good quality (ie. low in defect occurrence) high strength rock found at the site. The value is also consistent with the very low yielding nature of existing water table penetrations at the site (within the existing quarry pit).

4. On the basis of the above, we expect that site S_y is probably of the order of 0.1 – 0.5 %, and that a median monitoring value of 0.17 % is appropriate for design. However, in order that yield estimations are conservatively undertaken, an upper bound of 1.0 % is also used for calculation and sensitivity analysis purposes.

Table 6: Typical literature values for S_y.

Source	Lower Bound (%)	Upper Bound (%)	Typical (%)
Bair and Lahm (2006)	0	10	2.5
Waltham (1994)	-	-	1.0
ASCE (1996)	0.5	5.0	-
Smith & Wheatcraft (1993)	0.5	5.0	-
Bell (2007)	0.5	5.0	-

3.4 Groundwater Level Observations

Over the course of the EA, extraction below the water table has taken place in the area where the storage reservoir was proposed. Based on a recent survey (May, 2009), the current void in this area is approximately 111.165 ML.

We make the following comments with regard to the existing quarry conditions:

- With potential groundwater backfill levels taken into consideration the volume of storage reservoir that is above the water table remains at the original EA (R.W. Corkery and City Plan Services, 2009) proposed volume of approximately 50 ML.

- Review of pre and post storage reservoir excavation groundwater levels within P5 suggest that the excavation may have caused a minor drawdown in the surrounding water table (level within P5 on 07.05.2009 was 2.9 m below the previously monitored long-term average level).

- The recent excavation in the area where the storage reservoir is proposed has an average invert level of approximately 26 mAHD and is approximately 90m to the south east of P5. This excavation

has water levels at a generally stable level of approximately 27 mAHD. On this basis, groundwater ingress into the excavation is less than or equal to evaporation + rainfall. The potential evaporation over the water within the excavation is in the order of 30 KL/d.

- The existing pit excavation (invert level – 32mAHD) is also below natural groundwater levels and is likely to have caused localised drawdown.

- Groundwater ingress into both excavations has been sufficiently low to negate the need for dewatering perse (Figure 6). Aquifer S_y and K appear to be low enough to have allowed pit inflows to be balanced by daily evaporation. Groundwater modelling and pump test results support this assumption.

In light of the above, natural groundwater levels (before excavations) and existing groundwater levels (after excavations) have been re-evaluated and considered during the refinement of groundwater and water balance models. Refer to Figure 7 to for a schematic section showing groundwater levels before and after excavation.

4 Amended Groundwater Model

4.1 Extended Model Domain

Spatial and temporal discretisation of the extended model domain is summarised in Table 5 with the model extent shown in Figure 9.

Table 5: Temporal and spatial discretisation details for the amended MODFLOW groundwater model.

Temporal Discretisation	
Stress Periods	608 (1 per month, 1 month = 30.01644737 days) to represent 50 years of climate data.
Time Periods	Single time step per stress period
Spatial Discretisation	
Model Origin – easting, northing (AMG)	278290, 6129990
Model Upper Right Corner – easting, northing (AMG)	283290, 6134990
Grid Size (m)	non-uniform: 20 x 20 m for area within approximately 700 m of site boundaries, then 40 x 80 m, then 80 x 80 m.
Active Model Area (ha)	2002.6399
Layers	
1	Considered to represent the Siltstone Bedrock within which groundwater exists
2 [1]	Assumed to represent impermeable bedrock. Top of layer assumed to be approximately 50m below natural ground level.

[1]. Layer created to get model convergence.

4.2 Transient Recharge Regime

Recharge was calculated for each of the 608 monthly stress periods (50yr record) using a water balance approach. This was undertaken using 'Recycle' – an 'in house' irrigation and surface hydrology model. Soil depth was assumed to be 1.5m with clay properties. Crop factors were assigned in 0.5 m soil depth increments and decreased with depth. This allowed recharge to be calculated in mm/d for each day of the 50 yr record. Recharge was then summed for each monthly increment to get recharge per stress period. Recharge was then converted to a yearly rate for each stress period in order to meet Visual MODFLOW data input requirements. Refer to Figure 8 for a plot of recharge versus month for the model's record.

Modelled recharge as a % of total rainfall for the entire model record equalled 3.2%. This is within the expected range of ~ 5% for fractured rock strata.

4.3 Initial Heads

Initial heads were developed based on the contoured average groundwater level within each of the site's monitoring piezometers. Heads were then extended to the model boundaries based on observed hydraulic gradients at the site and conceptual groundwater divides which were assumed to exist in the south of the model region at Nowra Hill and at the catchment divide in the west of the model region. Refer to Figure 9 for the initial head contours which were used in the model.

We note that lack of any registered bores with data outside of the site but still within the model domain prevented more detailed estimation of initial heads. This is not considered problematic given the intent of the model and transient nature of the model.

4.4 Nowra Creek

Nowra Creek was excluded from the model due to the minor size of the system, lack of river stage data and because the creek is decoupled from the groundwater system.

4.5 Existing Groundwater Level Fluctuations

Observed groundwater levels within the MODFLOW model compare well with the actual observed levels within site piezometers. The median modelled groundwater elevation within P5 over the 50yr model record was 34.36 mAHD. This median groundwater level elevation compares well with the range of elevations which were observed within P5 over the monitoring period.

Based on the 25th %ile and 75th %ile of modelled groundwater levels and deviations from the median level, groundwater levels at the site can generally be expected to deviate from the median by up to approximately 2.4 m above the median level and approximately 1.38 m below the median level. Modelled groundwater levels within P5 over the model's 50 year record are presented in Figure 10.

4.6 Assumed Extraction Pit Characteristics

The following characteristics were assumed for the extraction pit.

- 3.25ha area of excavation below the water table.
- 3.25ha pervious catchment area draining to excavation.

- Dewatering depths associated with stage 5 (worst case scenario). The extraction pit was assumed to occupy the southern extremities of the site (location were deepest depth of dewatering is required).

4.7 Assumed Aquifer Properties

Assumed aquifer properties for modelling were as follows:

- K – 0.037 m/d (based on median of site testing values).
- S_y – 0.0017 (based on median of site testing values).
- Aquifer type – unconfined.

An S_y value of 0.01 was also used in addition to the design value of 0.0017 for sensitivity analysis purposes.

5 Updated Assessment

5.1 Groundwater Ingress Volume into Excavation

5.1.1 Method 1- Original EA Volume

The original EA used the analytical mining pit inflow equation (Marinelli and Niccoli, 2000) to determine a steady state pit inflow rate of 40 KL/d.

5.1.2 Method 2 – Transient MODFLOW modelling

A transient MODFLOW model was developed based on the transient recharge data to determine time varying groundwater ingress rates. This assumed that the stage 5 pit excavation (3.25 ha) was instantaneous. Results are summarised in Table 6 with comments provided below.

- The maximum modelled groundwater ingress of 930.95 m^3/d occurs in the first month. We note that modelling assumes an instantaneous excavation at its maximum area/depth and therefore this value is not correct as the excavation extent will development progressively.

- Steady state inflow is achieved at approximately 200 days (Figure 11).

- The maximum modelled yearly groundwater extraction volume of 72 ML/y) occurred in the 41st year of the model's record. On this basis 72 ML/yr can be considered as the likely maximum groundwater extraction rate per year for the life of the development.

- The median daily groundwater inflow of 47.11 KL/d (17 ML/yr) should be used for design purposes.

- Figure 12 provides a plot of daily groundwater ingress rates and daily catchment recharge rates over the model's entire record of 50 years (608 months) and illustrates the correlation between recharge events and higher groundwater ingress rates.

Table 6: Summary of groundwater ingress rates derived from modelling.

S_y	Sample Population	Units	Minimum	25th %ile	Median	75th %ile	Maximum
Design value of 0.0017 (derived from median of site testing values).	**608 individual monthly ingress values (i.e direct model output)**	m^3/d	1.76	21.36	40.35	69.90	930.95
	50 individual yearly ingress values (i.e 50 values derived from summing the 12 monthly values from each respective year.	m^3/yr	3057	9063	16970	34741	72375
	As per row #2 but converted to daily ingress volume [1]	m^3/d	8.49	25.16	47.11	96.45	200.93
Expected upper bound value of 0.01 (used for sensitivity analysis purposes).	**608 individual monthly ingress values (i.e direct model output)**	m^3/d	21.62	50.52	70.24	100.78	1060.62
	50 individual yearly ingress values (i.e 50 values derived from summing the 12 monthly values from each respective year.	m^3/yr	13487	20198	25495	43115	71420
	As per row #2 but converted to daily ingress volume [1]	m^3/d	37.44	56.08	70.78	119.70	198.28

1. Derived by dividing yearly value by 360.197364 (12*30.016447)

5.1.3 Specific Yield (S_y) Sensitivity Analysis

Comments in Section 5.1.2 are based on modelling results derived from using the design S_y of 0.0017. Model results derived from applying the adopted upper bound S_y value of 0.01 (Table 6) shows that

groundwater ingress rates will increase marginally. Median groundwater ingress rates increase by 50% or 23.7 KL/d. Whilst groundwater ingress rates do increase the ingress rates remain relatively low and within the realms of the inflow rates derived from using the design S_y value of 0.0017.

The impact of increasing S_y to 0.01 and the resulting decreased radius of influence of 550 m has the impact of marginally increasing the steady state daily pit inflow volume of 35.18 KL.d estimated in Section 5.1.4 by 5% or 1.81 KL/d.

5.1.4 *Method 3 - Dupuit-Forchheimer Approximation*

A transient spreadsheet model using the Dupuit-Forchheimer approach was used in conjunction with the original EA method and MODFLOW model in order to allow a sensitivity analysis of pit inflows to be completed. This method when used in conjunction with MODFLOW drawdown data calculated a steady state daily pit inflow volume of 35.18 KL/d using the following equation:

$$Q = pi\ K\ h_o^2 / ln\ (r_o/rpit)$$

Where

Q = groundwater ingress
K = hydraulic conductivity
h_o = dewatering depth
r_o = radius of influence
rpit = equivalent radius of excavation

Values used in the calculation were as follows: k = 0.037 m/d, h_o = 23.175 m, r_o = 600 m, rpit = 101.71 m. r_o was derived from the MODFLOW model.

5.1.5 *Summary*

Potential groundwater ingress rates calculated via the five different methods compare well and are summarised in Table 7. The MODFLOW method with its median pit ingress of 47.11 m^3/d is considered the most reliable and likely scenario.

Table 7: Potential pit ingress volumes derived from five different methods in order to allow a sensitivity analysis to be completed in the site water balance model.

Method No.	Method	Median Pit Inflow Volume (m^3/d)
1	Original EA steady state spreadsheet model (Marinelli and Niccoli, 2000)	40.00
3	MODFLOW 2000 (based on Visual MODFLOW transient groundwater model)	47.11
3	Spreadsheet model based on the Dupuit-Forchheimer method with radius of influence obtained from MODFLOW model.	35.18
4	As per method 2 but using S_y of 0.01.	70.78
5.	As per method 3 but with decreased radius of influence resulting from using S_y of 0.01.	36.99

5.2 Storage Reservoir Water Balance

5.2.1 Concept Model for Operation

A concept model for operation of the quarry is provided in Figure 14.

5.2.2 Assumptions

The original water and salt balance model which was used in the EA was re-run using the pit inflows outlined in Table 7. We note that no allowance for evaporation from the extraction pit area was included in the modelling. This ensures a conservative assessment of the mining operations.

Changes to the original water balance model that was documented in the EA hydrology assessment (Martens and Associates, 2009) included the following:

- Re-running the model with the revised range of potential pit inflow volumes which are outlined above in Table 7.
- Eliminating the irrigation field.
- Applying a conservative seepage rate of 0.037 m/d (equal to median K) to the storage reservoir in order that reservoir recharge is included in the water balance model.
- Increasing the dam surface area from 0.5ha to 0.9666ha in order to represent the current extent of the excavation that will comprise the dam. The maximum capacity volume above the water table remained unchanged at 50ML.

- Increasing the area of the excavation pit that is below the water table from 2.95 ha to 3.25 ha. This was done iteratively to ensure that the maximum working areas were utilised and that these areas were sufficiently small to cause no storage reservoir overflows.

- Increasing the area of pervious catchment which drains to the excavation pit from 2.95 ha to 3.25 ha. This was done iteratively in conjunction with the above extraction pit areas to ensure that the maximum working areas were utilised and that these areas were sufficiently small to cause no storage reservoir overflows.

- In addition to running the model with the range of potential groundwater ingress rates (Table 7), a scenario was developed to model potentially increased groundwater ingress volumes at the commencement of excavations prior to steady inflow conditions being developed. Modelling involved using the MODFLOW model's median groundwater inflow volume from the initial two months (471 m^3/day) and running the water balance model with this daily inflow rate for this period. The level within the storage reservoir was then taken after two months and the water balance model was re-run starting at this newly calculated storage level with the steady state groundwater ingress rate of 47.11 m^3/day. The period of two months was determined as ingress rates in the third month drop below the groundwater ingress rate of 47.11 m^3/day.

All other facets of the model remained unchanged.

5.2.3 Results – Reservoir Levels

Results of the water balance for daily groundwater pit inflows of 35.18, 40.00, 47.11, 70.78 and 250 KL/d are plotted in Figure 15, Figure 16, Figure 17, Figure 18 and Figure 19 respectively. The inflow rate of 250 KL/d was not calculated and was used to increase the scope of the sensitivity analysis. Results indicate that the storage reservoir's volume will not exceed 50 ML for daily groundwater pit inflows of 35.18, 40 and 47.11 KL/d. Based on a groundwater pit inflow of 250 KL/d, the dam's volume exceeds 50 ML (and therefore overflows but still remains in the extraction area) two times in the model's 50 year record.

Results from the scenario which was developed to model the impact of potentially higher groundwater inflow rates occurring before steady state conditions are achieved (Section 5.2.2 last dot point) indicate that the storage reservoir has the capacity to accommodate such groundwater ingress rates without overflow (Figure 20).

5.2.4 *Results - Reservoir Salt Concentrations*

Salt levels within the reservoir for the range of median groundwater ingress rate volumes (excluding 36.99 KL/d) are summarised in Table 8.

Table 8: Modelled median salt concentrations within storage reservoir.

Daily Groundwater Ingress Rate (m^3/d)	Median Salt Concentration (mg/L)
35.18	378
40.00	416
47.11	474
70.78	670
250.00	2531

5.2.5 *Summary*

Based on the water balance results, the site will be able to operate without the need to discharge from either the excavation pit or storage reservoir and there will be no need for an irrigation area. Results of the water balance are somewhat insensitive to groundwater pit inflows.

5.3 Rehabilitation Backfilling

The excavation pit areas will be backfilled progressively to natural ground level contours on completion of each extraction stage. The storage reservoir will be backfilled following completion of rehabilitation works.

In order to model potential changes to the groundwater regime a steady-state model was established based on the existing models.

Modelling scenarios included:

1. Pre-quarrying environment (before any excavations on site).

2. Excavated voids backfilled with sand (K = 5 m/d) and clay (0.12 m/d) cap.

3. Excavated voids backfilled with clay (K = 0.12 m/d).

Aquifer properties were adjusted to represent the sand and the clay scenarios based on typical property values which would represent the expected range of groundwater response curves for the range of likely backfill operations. All areas of excavation and the storage reservoir were assumed to be backfilled in the model. Backfilling was assumed to be homogeneous above the 19 mAHD proposed extraction level.

Results are outlined in Figure 21, Figure 22 and Figure 23 and summarised below.

1. Backfilled with sand – results indicate a negligible impact to flow directions with localised drawdown (from pre-mining operations) of up to 2.5 m in the southern portion of the site and mounding of up to 1.9 m in the northern portion of the site.

2. Backfilled with clay – results indicate a negligible impact to flow directions with localised drawdown of up to 0.5 m in the southern portion of the site and mounding of up to 0.3 m in the northern portion of the site.

Based on the above, backfilling with lower permeability materials will deliver a final groundwater surface most similar to pre-mine conditions. Both backfill types (sand and clay) are considered suitable as potential impacts associated with both mediums are minor, localised and unlikely to significantly impact the low value local groundwater system. The maximum likely extent of mounding (for high permeability backfill materials) will not lead to groundwater table rises which would detrimental affect surface vegetation.

6 Amended Design

6.1 Stormwater Management

The stormwater management strategy that was outlined in the original EA hydrology assessment (Martens and Associates, 2009) remains unchanged with the exception of the proposed 4 ha irrigation field, which is now to be removed from the project application.

6.2 Irrigation Scheme

Results of the storage reservoir water balance model indicate that the 4 ha irrigation field which was originally proposed in the EA will not be required. This comes about because:

a) Storage reservoir recharge characteristics were not considered in original EA modelling.

b) The storage reservoir's surface area has almost doubled in size since the preparation of the EA.

c) More reliable field data was used for model calibration.

Notwithstanding this, the median salt concentration within the storage reservoir is 474 mg/L for the median MODFLOW inflow rate of 47.11 KL/d and therefore is at the lower end of the 'slightly saline' range of typical values and suitable for irrigation (Hazelton and Murphy, 2007). Consequently, the potential use of the irrigation field does provide a degree of contingency.

6.3 Stormwater Treatment Structures

6.3.1 Storage Reservoir

The proposed storage reservoir will provide stormwater treatment. Stormwater from within the extraction area is proposed to be pumped to the storage reservoir for detention, sedimentation and nutrient removal before use on-site.

6.3.2 Grassed Buffer Strips

Grassed buffer strips are required to buffer the paved road in the northern portion of the site and also the equipment storage/staff car parking area. The paved road required a grassed buffer strip of 105 m long and 5 m wide and the equipment storage/staff car parking area requires a 145 m long and 16 m wide grassed buffer strip. The former

grassed buffer strips are shown on the concept stormwater management plan (Attachment C).

6.3.3 *Stormwater Release Point*

Water balance assessment (Section 5.2) indicates that no discharge from the storage reservoir to Nowra Creek will occur. Consequently, no stormwater release point(s) at Nowra Creek are required. Overland flow will occur as per the pre-quarrying hydrological regime. This overland flow (non-concentrated) will not require a formal discharge point and will discharge to Nowra Creek via sheet flow. To facilitate this pre-quarry surface contours will need to be reconstructed during the progressive rehabilitation process so that all surface water flows towards Nowra Creek. This may require removal of the western bund or placement of pipes through the bund and filling to reinstate pre-quarrying contours and is to be specified at detailed design stage.

7 Surface Water and Groundwater Monitoring

7.1 Proposed Surface Water Monitoring Plan

Water within Nowra Creek should be monitored by a consultant at a minimum of three locations (one upstream of the site and one downstream of the site and one adjacent to the site) at quarterly intervals. Quarterly monitoring results should be summarised in a brief annual report prepared by a consultant and submitted to the relevant authority as outlined in the consent conditions. Samples should be laboratory tested for EC, SS, TP and TN. The feasibility of splitting monitoring costs between SCCCR and the adjacent Nowra jail should be investigated.

7.2 Proposed Ground Water Monitoring Plan

Groundwater levels should be monitored quarterly throughout the life of the development by a consultant to allow for detection of potential drawdown around the Project Site's boundaries.

We recommend installation of 6 permanent piezometers around the extraction perimeter. Data should be collected quarterly and reviewed annually for a period of 5 years. Annual reports summarising the quarterly data should be prepared by a consultant and submitted to the relevant authority as outlined in the consent conditions. This will provide a valuable design data resource for the backfilling operations.

8 Summary and Conclusion

8.1 Main Findings

Further investigation into the existing salt concentration of water within Nowra Creek indicates that the apparent spike in salt concentration is likely to be attributable to natural trends. The creek appears to be naturally saline with the bulk of samples having an EC value that is consistent with marginal river water - brackish water typical EC ranges.

With transient water balance based recharge the amended groundwater model predicts a similar median groundwater pit inflow rate (47.11KL/d) to what was originally estimated in the EA (40KL/d). A third method used to predict likely groundwater ingress also compares well with the amended groundwater model with a predicted median groundwater ingress rate of 35.18 KL/d. In addition to the above the models (except original EA model) were also run with the likely upper bound S_y value which is expected for the site. This value was higher than the design value and was adopted for sensitivity analysis purposes. The increased S_y did slightly increase groundwater ingress rates, however, ingress rates remained relatively low. These relatively low ingress rates are expected given the low S_y and K values derived from aquifer testing and the observed generally static water levels within existing excavations that are below the groundwater table.

Revised water balance modelling indicates that the site will be able to operate without the need to discharge from either the excavation pit or storage reservoir under all modelled groundwater ingress rates. Results of the water balance are somewhat insensitive to groundwater pit inflows and are more strongly influenced by surface water run-off inputs to the excavation/storage reservoir. The maximum continuous daily groundwater pit inflow modelled in the water balance was 250 KL/d. This inflow volume was not calculated and was used in order to test the sensitivity of the water balance model to groundwater inflows. This maximum modelled inflow rate is some 5 times greater than the predicted median daily inflow volume and would only lead to the storage's capacity being exceeded 2 times in 50 years. A scenario set-up to model potential elevated groundwater ingress rates prior to steady state conditions being achieved did not cause the storage reservoir's capacity to be exceeded.

The 4 ha irrigation field originally proposed is not required based on the revised water balance/groundwater model which included groundwater recharge from the basin, an increased surface area of the storage reservoir and more reliable field data for model calibration.

Backfill modelling was completed to assess potential impacts associated with final site rehabilitation. Results suggest that changes to groundwater flow directions, levels and velocities will be minor and limited to the vicinity of the site for a range of typical backfill types.

8.2 Recommendations

We recommend the following.

- Installation of 6 permanent piezometers around the extraction perimeter. Data should be collected quarterly and reviewed annually for a period of 5 years. This will provide a valuable design data resource for the backfilling operations.
- Pre-quarry surface contours will need to be reconstructed during the progressive rehabilitation process so that all surface water flows towards Nowra Creek. This may require progressive removal of the western bund or placement of pipes through the bund and filling to reinstate pre-quarrying contours and is to be specified at detailed design stage.
- The volume of water that is pumped from the extraction area to the storage reservoir should be gauged, monitored and reported at monthly intervals for all stages of extraction. This will enable a water balance derived calculation of actual dewatering rates. Known dewatering rates for the initial extraction stage will allow dewatering rates for the proceeding stages to be verified. This will enable potential contingency measures to be developed (if required) that ensure compliance with storage reservoir water balance requirements (i.e that the storage reservoir's capacity is not exceeded).

8.3 Conclusion

Updated groundwater and surface water modelling results indicate that the site will be able to function without discharging water from either the excavation pit or the storage reservoir.

The proposed site stormwater management system ensures a no impact or beneficiary impact on the receiving environment whilst maximising water re-use on-site.

Potential hydrological impacts associated with the proposed development have been shown to be suitably mitigated. On this basis the proposed development is considered suitable to proceed from a hydrological perspective.

9 References

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10 Attachment A – DECC and DWE Requests for Further Information

Our reference: DOC09/8846 - FIL07/12737
Contact: Craig Jones, 02 6229 7002

Mr Howard Reed
A/Director
Major Development Assessment
Department of Planning
GPO Box 39
SYDNEY NSW 2001

Dear Mr Reed

RE: South Coast Concrete Crushing and Recycling Quarry Expansion – Major Project Application 07_0123

I refer to you letter dated 17 February 2009, seeking comments from the Department of Environment and Climate Change (DECC) in relation to the publicly exhibited Environmental Assessment (EA) for the South Coast Concrete Crushing and Recycling (SCCCR) quarry expansion proposal at South Nowra.

DECC has reviewed the EA and has provided detailed comments in relation to the following aspects of the proposal in Annexure A;

- Protection of waters
- Biodiversity values
- Noise and blast impact assessment

DECC notes that the proposal has been modified to include a 4 hectare land application area for disposal of saline water from pit dewatering operations. Further information and assessment of the environmental impacts of the disposal area are required before an informed assessment of the environmental impacts can be made.

The Biodiversity Offset strategy proposed in the EA comprises about 20 ha of land managed for conservation for an estimated 80 to 100 year term. DECC does not believe that the offset proposal maintains or improves biodiversity outcomes, and recommends that conservation of the proposed offset area be secured in perpetuity.

Finally, DECC's assessment of the Noise and Blast Impact Assessment identified a number of exceedances of noise and blast criteria.

Please contact me on 02 6229 7002 if you require any further information.

Yours sincerely

2nd April 2009.

CRAIG JONES
A/Head of Operations - South East Region
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Annexure A – DECC submission on the South Coast Concrete Crushing and Recycling Quarry continuation and expansion proposal

1. Hydrology Assessment

Subsequent to the draft Environmental Assessment (EA) being circulated to DECC for comment, the proposal has been modified to include a 4 ha pit water disposal area. The disposal area has apparently been adopted in response to DECC's concerns regarding the impacts of discharging saline pit water to Nowra Creek.

The pit water has a predicted salinity ranging from Low to Very High according to DECC's *Environmental Guidelines: Use of effluent by irrigation ('Irrigation Guidelines')*. DECC requires the following further information to assess the environmental impacts of the proposed saline water disposal by land application;

i. DECC understands that no discharge from the storage reservoir currently servicing the premises has occurred within the past 4 years. The Surface Water Quality Summary (EA Part 1 - Table 6) indicates that Total Dissolved Solids (TDS) values in Nowra Creek rise from 138 mg/L upstream of the current quarry site to 1760 mg/L at the furthest downstream point sampled. The EA (Part 1 - Table 23) indicates that the creek and groundwater are decoupled and soils are non-saline (Part 7 – paragraph 3.3.1.8.)
Information required - DECC requires further information and assessment to identify the source and pathways of salinity currently within Nowra Creek. A comparison of the major ions present in the waters of Nowra Creek must be made with those of the ground and surface waters of the quarry.

ii. At paragraph 6.3.3, the EA states that a maximum TDS concentration of 3875mg/L is predicted to occur in the storage reservoir, which falls into the Very High Water Salinity Rating category (Irrigation Guidelines, Table 3.4). It is proposed that this water will be disposed of via land application.
Information required – DECC requires an assessment of the viability of disposal of Moderate to Very High Saline Rating pit water upon 4 ha of the proposed rehabilitation area. The assessment must determine the soil storage capacity and the environmental fate of salt applied to the disposal area. The assessment must also examine the viability of the proposed native plant rehabilitation species (identified in Appendix 4 of Part 2A of the EA) under saline water application conditions.

iii. The surface water salt concentration of 220mg/L (Draft EA – Part 1 – Chapter 7.3.2.3) has not been revised to include run off and leaching from the 4 ha saline pit water disposal area. This value has been assumed on the basis of TDS present within the creek (EA – Part 1 – Table 21)
Information required – Revision of surface water salt concentration to include 4 ha disposal Area and impacts upon Nowra Creek.

iv. No ground or surface water monitoring program has been included in the EA.
Information required – A staged ground and surface water monitoring plan should be prepared to monitor impacts of saline ground water from the proposal.

2. Biodiversity Values

DECC has reviewed the Ecology Assessment and the Weed Management and Rehabilitation Strategy prepared by Gaia Research and the parts of the Environmental Assessment pertaining to ecology, weeds and rehabilitation prepared by City Plan Services.

Comments and recommended actions are provided below regarding ecology, weeds and rehabilitation.

i. Ecology - General

ISSUE	DECC COMMENT	RECOMMENDED ACTION
Impacts on vegetation communities	Adequately assessed by Gaia Research	DoP to note
Impacts on threatened flora	Adequately assessed by Gaia Research	DoP to note
Impacts on threatened fauna	Adequately assessed by Gaia Research	DoP to note

ii. Ecology – Mitigation for Bats

ISSUE	DECC COMMENT	RECOMMENDED ACTION
Timing of tree removal	Micro-bats use some hollows as maternity roosts in summer and as hibernation roosts in winter and some species appear to use different hollows for these parts of their lifecycles. Removing trees in winter would avoid disruption to breeding but could impact hibernating colonies when they are least active and hence least able to locate alternative roosts.	If consent is granted for the removal of trees with hollows for the proposal then the consent should state that clearing of such trees is only permitted in mid-late autumn or early-mid spring and that trees should be tapped by machinery prior to removal in an attempt to make resident fauna vacate hollows

iii. Ecology – Offsets

ISSUE	DECC COMMENT	RECOMMENDED ACTION
Concurrence to offset strategy	The Ecology Report states (p37) that the Department of Planning would seek concurrence from DECC for the biodiversity offset strategy. DECC has no concurrence role in Part 3A EP&A Act matters	Advise the Proponent
Offset extent	DECC notes that the proposed offset	The areas of the quarry

ISSUE	DECC COMMENT	RECOMMENDED ACTION
	comprises about 20ha of land with similar vegetation and habitats, equating to an offset ratio of about 3:1. This proposed offset does not appear to meet a maintain or improve outcome for biodiversity values.	site to be revegetated must be included in the extent of the biodiversity offset.
Offset term	The biodiversity offset strategy in the Ecology Report proposes a term of 80-100 years. DECC's *Principles for the Use of Biodiversity Offsets in NSW* state that as impacts on biodiversity are likely to be permanent, the offset should also be permanent.	The offsets proposed by Gaia Research and the additional area of offsets recommended (above) must be secured in perpetuity.

iv. Weed Management and Rehabilitation Strategy - General

ISSUE	DECC COMMENT	RECOMMENDED ACTION
Placement of cleared trees with hollows	The Strategy states that cleared trees with hollows should be placed in intact vegetation adjacent to Nowra Creek in the north to provide microhabitats. This could result in damage to existing vegetation by machinery manoeuvring logs.	The Proponent should satisfy the DG of Planning that the methods to position logs will not damage existing vegetation in the riparian protection area of Nowra Creek in the north of the site. Alternatively, this requirement could be removed from the Strategy and such logs could be used in rehabilitation areas instead.
Annual works program	The annual works program in the Strategy (Table 4) does not provide enough detail regarding the sequence of actions required for rehabilitation and revegetation.	The Annual Works Program should include the detailed sequence of actions required for rehabilitation and revegetation.

3. Noise Impact Assessment

A summary of the key findings of DECC's review of the noise and vibration impact assessment for the proposed expansion of the South Coast Concrete Crushing and Recycling Quarry at South Nowra is provided below. DECC's assessment is based on a desk-top review only. No public submissions were considered. DECC did not conduct any site specific noise monitoring in relation to this proposal.

i. Identification of noise sensitive receivers

DECC accept, based on a desk-top review only, that the Noise Impact Assessment (NIA) lists the potentially most affected noise sensitive receivers, as described variously throughout the NIA and EA as; (zonings in parenthesis are as determined by DECC from Shoalhaven City Council's on-line map as at 29 January 2009):

- Location 1 – 80 Links Road (Residence C, zoning 1(f) Rural Forest)
- Location 2 – 371 Old Southern Road (Residence D, zoning 2(c) residential Living Area)
- Location 3 – 260 Princes Highway (Residence A, zoning 1(b) Rural Arterial and Main Road Protection)
- Location 4 – 243 Princes Highway (Residence B, zoning 1(f))
- Location 5 (Table 14 of NIA) – 292 Princes Highway (Commercial A, zoning 4(a) Industrial General)
- Location 5 (Figure 3 of NIA) – Proposed Correctional Facility (area currently zoned 1(f))

ii. Noise Monitoring and Rating Background Noise Levels.

Limited noise monitoring was conducted by the Proponent with the aim of determining the Rating Background Levels (RBLs) surrounding the site. The proponent indicates on page 11 of the report that monitoring at receivers was conducted in the absence of the noise from the current quarrying operations and that this was from 7:30pm on Tuesday 24 July to 4:15pm on Wednesday 25 July 2007. The proponent indicates on page 11 that the project site commenced operation at 12:00noon on 25 July 2007 and so for 4 hours and fifteen minutes of noise monitoring the background noise level was potentially affected by noise from current site operations. The proponent indicates that calculations used monitoring results from before 12 noon on 25 July 2007.

DECC do not accept the RBLs or Project Specific Noise Levels (PSNL) derived by the proponent, because of the limited duration of monitoring. Table 1 below presents DECC's nominated RBLs based on the minimum measured $L_{90,\ 15\ minute}$ level for the day, evening night, and morning shoulder, and applying the guidance in the Industrial Noise Policy (INP) and INP application notes.

Table 1: DECC's nominated RBLs (dBA)

Location	RBL L_{A90}			
	Day	Evening	Night	Early Morning
Location 1 – 80 Links Road	35	34	30	35
Location 2 – Old Southern Road	36	36	32	36

As per the NIA, the levels derived for Location 2 are considered to apply also to Locations 3, 4 and the proposed Correctional Centre. Note that they do not apply to Location 5, 292 Princes Highway, as this is understood to be a commercial premises (not residential) in an area zoned industrial.

DECC recommends noise and blasting limits for the proposed Correctional Facility by applying the same criteria as for a residential noise sensitive receiver location, on the basis that the incarceration is the occupants' punishment and otherwise there is no reason to consider the occupants differently to any other resident. The Department of Planning (DoP) may consider, or take advice from others, that the proposed Correctional Facility may incorporate design elements that provide acceptable amenity for the occupants for higher noise and blasting levels than those nominated by DECC.

The existing level of industrial noise is not provided in the NIA so DECC is not able to recommend Amenity criteria levels. DECC recommends DoP adopt the Intrusive Criteria levels contained in Table 1 above plus 5dB as the PSNLs.

iii. Operational Noise and Project Specific Noise Levels

The sound power levels (SWL) contained in the EA (Part 5 – paragraph 7.2) are at the lower end of the range usually anticipated by DECC.

The proponent has undertaken predictions for "acoustically neutral" weather conditions. DECC have included meteorological conditions under which the limits proposed below apply to allow for monitoring under a range of meteorological conditions.

Our proposed noise limits below are based on predicted levels. Where the predicted level is less than 35dBA we have recommended a limit of 35dBA. The predicted level of 46dBA at Location 4 for Scenario 2 exceeds the Intrusive Criterion of 41dBA by 5dB. There is very little information to indicate the Proponent has implemented all feasible and reasonable noise mitigation measures, however, we recommend DECC licence to the level of 46dBA with the condition that the proponent develop and implement a Noise Management Plan (NMP), and on the expectation that the Department of Planning (DoP) will assign Architectural Treatment Rights to this location, consistent with recent DoP policy. The NMP is to have as a principle objective to reduce noise emissions so as not to exceed the PSNL (41dBA for Location 4), through continual and ongoing evaluation and implementation of all feasible and reasonable noise mitigation measures.

Predicted noise levels for the proposed Correctional Facility exceed the criteria by more than 5dB, a level greater than DECC will usually licence to. Therefore we recommend DoP be advised that DECC will not licence to the predicted levels for this location, and this will need to be dealt with in Planning's Project Approval, if issued, either by assigning acquisition rights or requiring some other form of negotiated agreement.

iv. Blasting Noise and Vibration Impacts

The blasting noise and vibration impacts are the most significant of all the impacts on the surrounding receivers. The only locations where impacts from blasting assuming a Maximum Instantaneous Charge (MIC) of 112kg is deemed acceptable are location 1 – 80 Links Road and Location 2 – 371 Old Southern Road.

Blasting would need to be modified to ensure the limits below are not exceeded at any residential location and at the proposed Correctional Facility, or we understand DoP may assign acquisition rights to locations where the criteria will be exceeded, or require appropriate agreements to be negotiated.

Note that DECC assesses for, and regulates against, annoyance due to blast overpressure and vibration at noise sensitive receiver locations (residences, schools, hospitals etc). DECC does not have blast overpressure or vibration limits to minimise annoyance at commercial or industrial premises, and does specify criteria for preventing, or regulate against, damage (cosmetic or structural) as a result. DECC recommends that DoP address these locations via the Project Approval, if issued.

v. Road Traffic Noise Impacts

DECC accepts the road traffic noise assessment that the criteria in the Environmental Criteria for Road Traffic Noise will not be exceeded.

vi. Recommended conditions for noise and blasting

Recommended conditions for noise and blasting are provided below. The recommended conditions include noise limits that apply at all times at the identified noise sensitive receivers. These limits are based on the predicted noise levels contained in the Environmental Assessment, where the predicted noise levels do not exceed the derived Project Specific Noise Levels. In addition $L_{A1(1\ minute)}$ or L_{Amax} limits are recommended for night-time hours to mitigate against sleep disturbance.

Note that DECC are proposing noise and blasting limits for the proposed South Coast Correctional Facility by applying the same criteria as for a residential noise sensitive receiver location, on the basis that the incarceration is the occupants' punishment and otherwise there is no reason to consider the occupants differently to any other resident. DoP may consider, or take advice from others, that the proposed South Coast Correctional Facility incorporates design elements that provide acceptable amenity for the occupants for higher noise and blasting levels than those below. Because the predicted noise levels for the Correctional Facility exceed DECC's derived criteria by more than 5dB, DECC expect the Project Approval, if issued, to address this issue and DECC would not include the Correctional Facility on its Environment Protection Licence.

NSW Government
Department of Water & Energy

Howard Reed
Department of Planning
GPO Box 39
SYDNEY NSW 2001

Contact: Tim Baker
Phone: (02) 6841 7403
Fax: (02) 6884 0096
Email: Tim.Baker@dnr.nsw.gov.au

File: ER20529

Attention: Kane Winwood

30 March 2009

Dear Mr Winwood

Subject: PROPOSED EXPANSION OF NOWRA BRICKWORKS QUARRY, SOUTH NOWRA – MAJOR PROJECT 07_0123

I refer to your letter dated 17 February 2009 requesting comment from the Department of Water and Energy (DWE) on the proposed continuation and expansion of the Nowra Brickworks Quarry. DWE has reviewed the submitted environmental assessment (EA) and is unable to support the current proposal due to inadequate information, specifically relating to groundwater impacts, water licensing requirements and long term water management at the site. DWE provides the following key assessment outcomes, comments and additional information requests to ensure adequate assessment of the proposal for licensing requirements under the *Water Act 1912*.

1. KEY ASSESSMENT OUTCOMES

- Licensing under Part 5 of the *Water Act 1912* is required for quarry pit dewatering and groundwater interception.
- Licensing under the *Water Act 1912* is required for the proposed permanent retention of the 50ML storage dam. DWE is not supportive of retaining storages which are replenished by groundwater hence further information is required regarding the water sources for this storage and its intended use.
- The groundwater assessment is inadequate and requires the inclusion of additional parameters and a sensitivity analysis. This additional information will require a review of the water/salt balance and the groundwater movement at the site.

2. COMMENTS

1.1 Licensing

- Section 2.1.4 of the EA indicates the requirement for approvals under the *Water Management Act 2000* from DWE. DWE advises that these approvals are currently not applicable to this proposal and the relevant licensing is a Part 5 licence for dewatering/groundwater interception under the *Water Act 1912* which is not exempt under the Part 3A assessment process. Information requirements and comments regarding this licence will be considered further in this submission.

- The existing 8 piezometers referred to in Section 4.2.3.2 are authorised under the *Water Act 1912* with licence number 10BL602172. Any proposal for additional piezometers or the removal of piezometers will require consultation and appropriate licensing with DWE.
- The collection of surface runoff by the pit sump/water storage facility within the disturbed section of the project site to prevent contaminants flowing off-site is considered under the Harvestable Rights Policy by DWE. This policy establishes a volume of water which may be collected on minor watercourses however it excludes structures used to prevent contamination of a water source. To be consistent with this exclusion the structures need to be sized in accordance with the appropriate standards (eg. *Managing Urban Stormwater – Soils and Construction*, Landcom 2004) and the volume of runoff water extracted must not exceed the harvestable right for the site. DWE advises that based on a property area of 21.5ha, the harvestable right for the site is 2.15 megalitres/year. If the extraction of surface runoff from the sump/water storage facility is to exceed 2.15 ML/y a licence under Section 10 of the *Water Act 1912* will be required. Consideration of this volume requires differentiating surface runoff and groundwater inflows.
- The hydrology assessment (Martens 2009) defines the sediment basin requirements to be 6.088m^3 or 6.09ML, and modelling indicates the water storage reservoir's maximum volume would be 38.5ML with a mean of 4.07ML. Further information is required on the justification for the proposed 50ML storage capacity based on site management requirements.
- As the water storage structure is proposed to be a permanent feature following rehabilitation and the 50ML significantly exceeds the 2.15ML harvestable right for the site a licence under the *Water Act 1912* will be required. This licence will vary from the dewatering/groundwater interception licence which will only be valid for the life of the project. Consequently an additional licensing process under the *Water Act 1912* will be necessary which will need to consider the groundwater and surface water contributions to the storage.

1.2 Groundwater

The groundwater assessment information is currently inadequate to support the proposed development due to the following considerations:

1.2.1 Dewatering

- The groundwater modelling is relatively simplistic and does not address several aspects of the local hydrogeology. DWE has significant concern with the feasibility of achieving effective dewatering of the pit at the proposed extraction rate of 40 KL/day due to the following.
    - The hydraulic conductivity is the only measured groundwater parameter and the value used in the modelling is on the low side of an average of 3 samples showing a significant range (0.003 to 0.07 m/day). With limited and varied samples such as this, a sensitivity analysis is warranted. A value must be adopted for modelling purposes, however seepage into the pit may be dominated by areas of high conductivity and the reliability of a 40 KL/day solution needs to be considered.
    - Furthermore, the 40 KL/day represents a steady state solution which does not reflect the volume of water to be extracted from storage leading up to this final extraction rate. Initial pumping rates may need to be much higher to achieve effective dewatering.
    - There is a need to consider storage and recharge/throughflow components of the groundwater system. Other aquifer parameters enabling an estimate of storage and throughflow should be determined and incorporated into modelling of the local system. Recharge events should also be considered in this context.

- Groundwater monitoring has been undertaken during an exceptionally dry period during which recharge to the groundwater system would be expected to be at extremely low levels. Consideration should be given to the impacts of a series of wet years and the effect of a period of significant groundwater recharge.
- The aquifer parameters should be related to an overall picture of the groundwater hydrology commenting on the expected long term recharge, groundwater flow and discharge.

1.2.2 Disposal of Brackish Groundwater

- There is no consideration of an increase in groundwater extraction in the current water/salt balance. The assessment does not adequately support the proposed 40 KL/day groundwater extraction, and it would be a significant problem if dewatering required any increase in this amount, as the proposed water mix to be disposed/used for irrigation is already considered marginal in terms of salinity levels. The viability of the irrigation proposal would therefore not be supported.

1.2.3 Infill of the Pit with VENM

- The infilling of the pit with VENM has the potential to impact on the local groundwater hydrology. The water quality/leachate aspect has been reasonably addressed, however the overall picture of the local groundwater system is not clear and consequently the impact of a plug of VENM into the groundwater system is difficult to determine. Relevant to this matter would be the impact on the balance between groundwater recharge, throughflow (directions and volumes) and any groundwater discharge areas. Expected changes in groundwater paths and water levels need to be considered.
- The proposal to retain the water storage following the development has not addressed the final water level in this storage based on groundwater and surface water contributions. DWE does not support the retention of open voids/storages replenished by groundwater as a long term management approach. It is advised these voids are to be filled in and are to be retained as surface water management features where appropriate.

3. ADDITIONAL INFORMATION REQUIREMENTS

Based on the previous comments the following information requirements are critical to adequately assess the proposal.

- The groundwater modelling needs to be amended to include the following:
    - Sensitivity analysis.
    - Inclusion of aquifer parameters to assess the storage and recharge/throughflow in the system.
    - Consideration of impacts during wet, median and dry years.
    - The aquifer parameters need to be related to an overall picture of the groundwater hydrology commenting on the expected long term recharge, groundwater flow and discharge.
    - Consideration of the potential impact on groundwater paths and groundwater levels due to the placement of VENM in the pit.
    - Modelled results of the final water level in the water storage facility as part of the long term predictions at the site.
- Review of the water salt balance based on revised dewatering requirements obtained from additional groundwater modelling. This is to provide justification of the long term viability of the irrigation area in terms of soil and vegetation impacts, in addition to the potential soil, water and vegetation impacts associated with the bio-infiltration facility.

- The proposed maximum annual volume of groundwater to be intercepted during the life of the project needs to be specified. This volume and the associated impacts are to be considered by DWE under the licensing requirements under Part 5 of the *Water Act 1912* for groundwater interception and dewatering.
- Justification for the proposed 50ML water storage facility considering the modelled maximum storage level would be 38.5ML.
- Detail of the final water level and water volume in the water storage facility with modelled detail on the contribution of groundwater and surface water.

On receipt of the above information DWE may require further information. Recommended conditions of approval will be provided as appropriate following the review. For enquiries related to the above comments, please contact Tim Baker on (02) 6841 7403.

Yours sincerely

Mark Mignanelli
Manager Major Projects and Planning

11 Attachment B – Laboratory Results

Envirolab Services Pty Ltd
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CERTIFICATE OF ANALYSIS 28982

Client:
Martens & Associates
6/37 Leighton Place
Hornsby
NSW 2077

Attention: Ben Rose

Sample log in details:

Your Reference:	**P0701757**
No. of samples:	7 Soils, 4 Waters
Date samples received:	19/05/09
Date completed instructions received:	19/05/09

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by:	26/05/09
Date of Preliminary Report:	Not Issued
Issue Date:	22/05/09

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This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.
Tests not covered by NATA are denoted with *.

Results Approved By:

Jacinta Hurst
Operations Manager

Miscellaneous Inorg - soil						
Our Reference:	UNITS	28982-1	28982-2	28982-3	28982-4	28982-5
Your Reference	----------	1757/soil/1	1757/soil/2	1757/soil/3	1757/soil/4	1757/soil/5
Date Sampled	----------	7/05/2009	7/05/2009	7/05/2009	7/05/2009	7/05/2009
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	20/05/2009	20/05/2009	20/05/2009	20/05/2009	20/05/2009
Date analysed	-	20/05/2009	20/05/2009	20/05/2009	20/05/2009	20/05/2009
pH 1:5 soil:water	pH Units	5.4	5.3	4.8	6.7	5.3
Electrical Conductivity 1:5 soil:water	µS/cm	80	41	120	130	39

Miscellaneous Inorg - soil			
Our Reference:	UNITS	28982-6	28982-7
Your Reference	----------	1757/soil/6	1757/soil/7
Date Sampled	----------	7/05/2009	7/05/2009
Type of sample		Soil	Soil
Date prepared	-	20/05/2009	20/05/2009
Date analysed	-	20/05/2009	20/05/2009
pH 1:5 soil:water	pH Units	4.9	5.0
Electrical Conductivity 1:5 soil:water	µS/cm	27	40

Miscellaneous Inorganics					
Our Reference:	UNITS	28982-8	28982-9	28982-10	28982-11
Your Reference	----------	1757/C12	1757/C16	1757/C18	1757/C20
Date Sampled	----------	7/05/2009	7/05/2009	7/05/2009	7/05/2009
Type of sample		Water	Water	Water	Water
Date prepared	-	20/05/2009	20/05/2009	20/05/2009	20/05/2009
Date analysed	-	20/05/2009	20/05/2009	20/05/2009	20/05/2009
pH	pH Units	6.3	6.8	6.9	6.7
Electrical Conductivity	µS/cm	750	1,800	1,600	1,100

Method ID	Methodology Summary
LAB.1	pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+.
LAB.2	Conductivity and Salinity - measured using a conductivity cell and dedicated meter, in accordance with APHA2510 20th ED and Rayment & Higginson.

QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			20/05/2009	28982-1	20/05/2009 || 20/05/2009	LCS-1	20/05/2009
Date analysed	-			20/05/2009	28982-1	20/05/2009 || 20/05/2009	LCS-1	20/05/2009
pH 1:5 soil:water	pH Units		LAB.1	[NT]	28982-1	5.4 || 5.5 || RPD: 2	LCS-1	101%
Electrical Conductivity 1:5 soil:water	µS/cm	1	LAB.2	<1.0	28982-1	80 || 81 || RPD: 1	LCS-1	105%

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			20/05/2009	[NT]	[NT]	LCS-W1	20/05/2009
Date analysed	-			20/05/2009	[NT]	[NT]	LCS-W1	20/05/2009
pH	pH Units		LAB.1	[NT]	[NT]	[NT]	LCS-W1	101%
Electrical Conductivity	µS/cm	1	LAB.2	<1.0	[NT]	[NT]	LCS-W1	105%

Report Comments:

Asbestos was analysed by Approved Identifier: Not applicable for this job
INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than
RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the sample batch were within laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and speciated phenols.

12 Attachment C – Plans

Sheet 1 - Piezometer Locations/Details/Creek Sampling Locations
Sheet 2 - Concept Stormwater Management Plan

KEY:

- 1757/C10 — EA CREEK SAMPLING LOCATION/SAMPLE ID (SAMPLED 05.10.2007 AND 07.12.2007)
- 1757/C18 / 1757/SOIL/3 OR 1757/C16 / 1757/SOIL/2 — ADDITIONAL SOIL/CREEK SAMPLING LOCATION/SAMPLE ID (SAMPLED 07.05.2009)
- PIEZOMETER/BOREHOLE LOCATION

CK CHAINAGE - 0 M — 1757/C1

P 1
PEIZO DEPTH: 28 m
SCREEN LENGTH: 6 m
CASING LENGTH: 22 m

SURFACE RL: 55.3
PEIZO INVERT: 27.3
HOLE DIMETER: 102

P8
HOLE DEPTH: 33.4
SCREEN LENGTH: na
CASING LENGTH: 8 m bgl

SURFACE RL: 50
HOLE INVERT: 16.6
HOLE DIMETER: 102
PIPE ø: 84 (INTERNAL

1757/SOIL/7
1757/SOIL/6

P4
PEIZO DEPTH: 3.5m
SCREEN LENGTH: 1 m
CASING LENGTH: 1.5 m

SURFACE RL: 43.97
PEIZO INVERT: 40.47
HOLE DIMETER: 90

P3
PEIZO DEPTH: 29m
SCREEN LENGTH: 6m
CASING LENGTH: 23m

SURFACE RL: 43.97
PEIZO INVERT: 14.97
HOLE DIMETER: 90

Nowra Creek

1757/C11
1757/SOIL/5

1757/C10
1757/C9
1757/C8
1757/C20
1757/SOIL/4
1757/C7
1757/C19
1757/C6
1757/C18
1757/SOIL/3
1757/C5
1757/C17
1757/C4
1757/C16
1757/SOIL/2
1757/C3
1757/C15
1757/C2
1757/C12
1757/SOIL/1
1757/C13
1757/C14
CK CHAINAGE - 1050 M

BH1
SURFACE LEVEL: 32.1 mAHD
BOREHOLE INVERT: 19.1 mAHD
BOREHOLE DEPTH: 13 m
(NO PEIZOMETER PRESENT)

1757/S3
(SURFACE WATER SAMPLED FROM WITHIN EXCAVATION DRAINAGE DEPRESSION)

PROPOSED 50 ML DAM

P5
PEIZO DEPTH: 24.5m BGL
SCREEN LENGTH: 6m
CASING LENGTH: 18.5m

SURFACE RL: 42.77
PEIZO INVERT: 18.27
HOLE DIMETER: 90

Water Storage
APPROXIMATE AREA = 9940 m2

Highway

ML 6322

ML 5087

Princes Highway

P7
PEIZO DEPTH: 35 m
SCREEN LENGTH: 6 m
CASING LENGTH: 29 m

SURFACE RL: 50.99
PEIZO INVERT: 15.99
HOLE DIMETER: 102

P2
PEIZO DEPTH: 28 m
SCREEN LENGTH: 6 m
CASING LENGTH: 22 m

SURFACE RL: 48.7
PEIZO INVERT: 20.7
HOLE DIMETER: 102

P6
PEIZO DEPTH: 23 m
SCREEN LENGTH: 6 m
CASING LENGTH:17 m

SURFACE RL: 38.88
PEIZO INVERT: 15.88
HOLE DIMETER: 90

NOTES:
1. PUMP TEST CONDUCTED IN IMMEDIATE VICINITY (6M) OF P5.
2. NO ADDITIONAL PIEZOMTERS WERE INSTALLED FOR THE PUMP TEST. OPEN BOREHOLES WERE UTILISED FOR THE TEST.
3. REFER TO ATTACHMENT D OF REPORT FOR IMAGE SHOWING PUMP TEST SET-UP AND LOCATION.

0 30 60 90 120 150
UNITS - METRES
SCALE - 1:100 @ A1 1:200 @ A3

martens
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Internet: http://www.martens.com.au

MARTENS & ASSOCIATES PTY LTD
Sustainable Solutions
Environmental - Geotechnical - Civil
Hydraulic - Wastewater Engineers

CLIENT/PROJECT: CITY PLAN SERVICES / HYDROGEOLOGICAL INVESTIGATION

TITLE: PIEZOMETER LOCATIONS/DETAILS AND CREEK/SOIL SAMPLING LOCATIONS

THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY
All measurements in m unless otherwise specified.

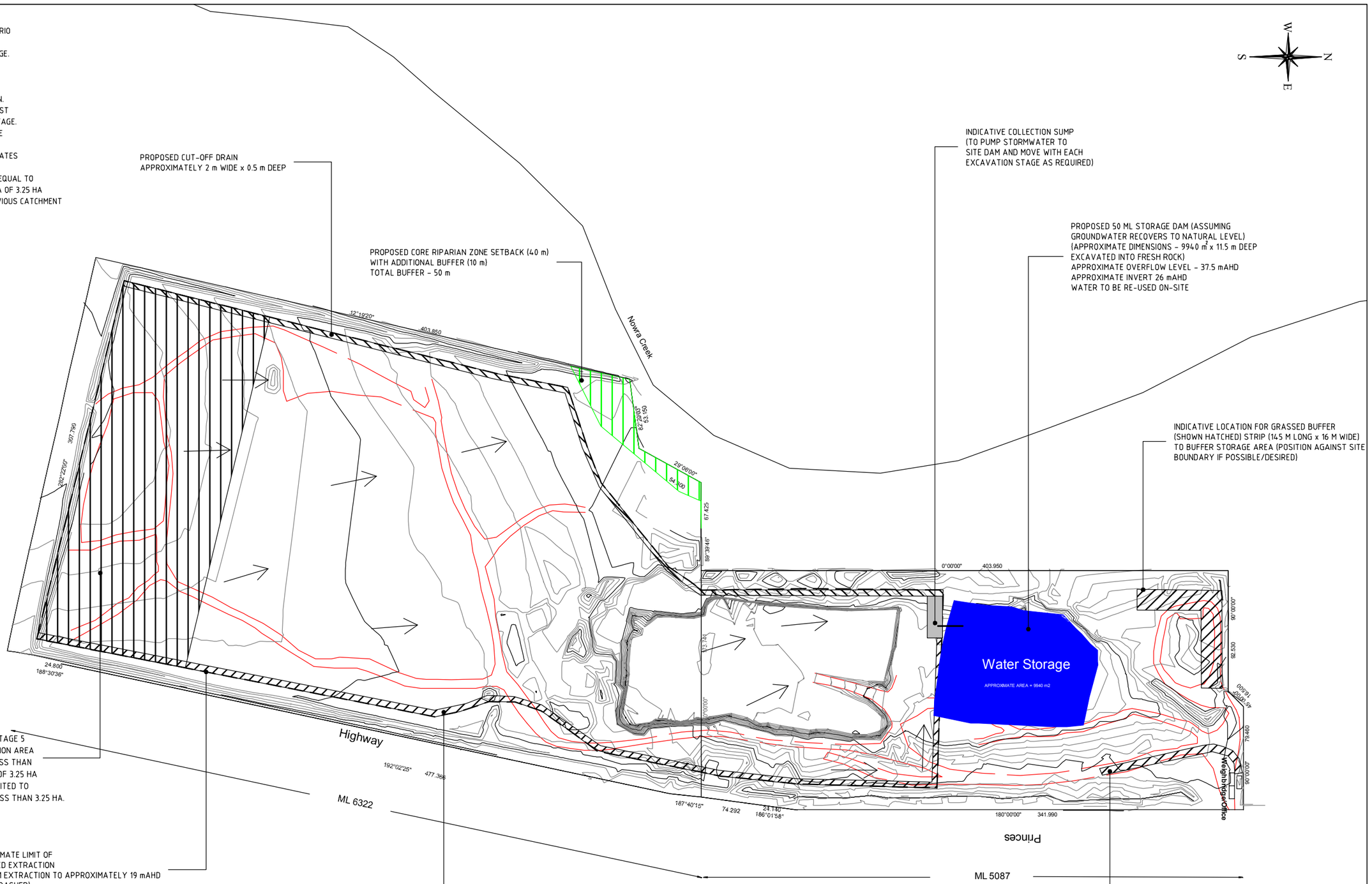
PROJECT MANAGER: DR DANIEL MARTENS

DRAWING NUMBER: P0701757JD04_V5_SHEET5

DESIGNED:	BR
DRAWN:	BR
REVIEWED:	DM
DATUM:	AHD
HORIZONTAL RATIO:	1:1500 @ A1 1:3000 @ A3
VERTICAL RATIO:	1:1500 @ A1 1:3000 @ A3
SHEET	1 OF 2 SHEETS
PAPER SIZE:	A1 / A3

REV.	DESCRIPTION	DATE	ISSUED
1.0	SUPPLEMENTARY RESPONSE SUBMISSION	25.08.2009	DM

NOTES:
1. CONCEPT PLAN SHOWN FOR MAXIMUM DEVELOPMENT SCENARIO AND DOES NOT INDICATE EXCAVATION STAGING.
2. FINAL DESIGN TO BE DETERMINED AT DETAILED DESIGN STAGE.
3. TO BE VIEWED WITH MORSE MCVEY SEEC REPORT.
4. CUT-OFF DRAIN DEPICATED FOR WHOLE EXCAVATION AREA AND NOT FOR EACH EXCAVATION STAGE.
5. CUT-OFF DRAIN TO SURROUND EACH STAGE OF EXCAVATION.
6. EXCAVATION FLOOR TO FALL TO THE NORTH AND EAST/WEST OF A CENTRAL DRAINAGE DIVIDE FOR EACH EXCAVATION STAGE.
7. COLLECTION SUMP LOCATION INDICATIVE ONLY AND TO MOVE WITH EACH EXCAVATION STAGE.
8. TO BE VIEWED IN CONJUNCTION WITH MARTENS AND ASSOCIATES HYDROLOGY ASSESSMENT (AUGUST, 2008).
9. MAXIMUM EXCAVATION AREA BELOW WATER TABLE TO BE EQUAL TO OR LESS THAN 3.25 HA FOR ALL STAGES. CATCHMENT AREA OF 3.25 HA EXCAVATION BELOW WATER TABLE TO BE LIMITED TO PERVIOUS CATCHMENT AREA EQUAL TO OR LESS THAN 3.25 HA.



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Sustainable Solutions
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Hydraulic - Wastewater Engineers

CLIENT/ PROJECT
CITY PLAN SERVICES / HYDROGEOLOGICAL INVESTIGATION

TITLE
CONCEPT STORMWATER MANAGEMENT PLAN

THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY
All measurements in m unless otherwise specified.

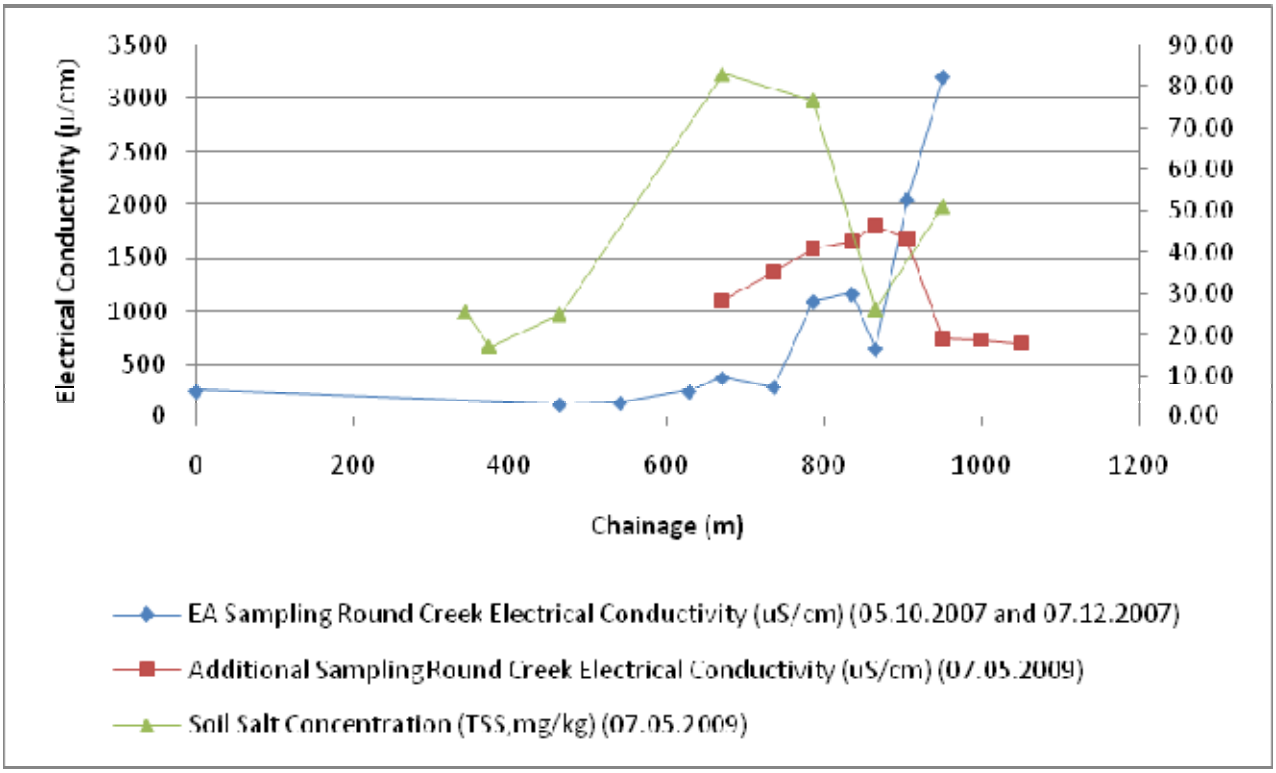
PROJECT MANAGER: DR DANIEL MARTENS

DRAWING NUMBER: P0701757JD04__V6__SHEET6

DESIGNED: BR	DATUM: AHD	SHEET 2	
DRAWN: BR	HORIZONTAL RATIO: 1:1500 @ A1, 1:3000 @ A3	OF 2 SHEETS	
REVIEWED: DM	VERTICAL RATIO: 1:1500 @ A1, 1:3000 @ A3	PAPER SIZE: A1 / A3	

REV.	DESCRIPTION	DATE	ISSUED
1.0	SUPPLEMENTARY RESPONSE SUBMISSION	25.08.2009	DM

13 Attachment D – Figures



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Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Creek and soil salt concentrations.**	Drawing No: **FIGURE 1**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757

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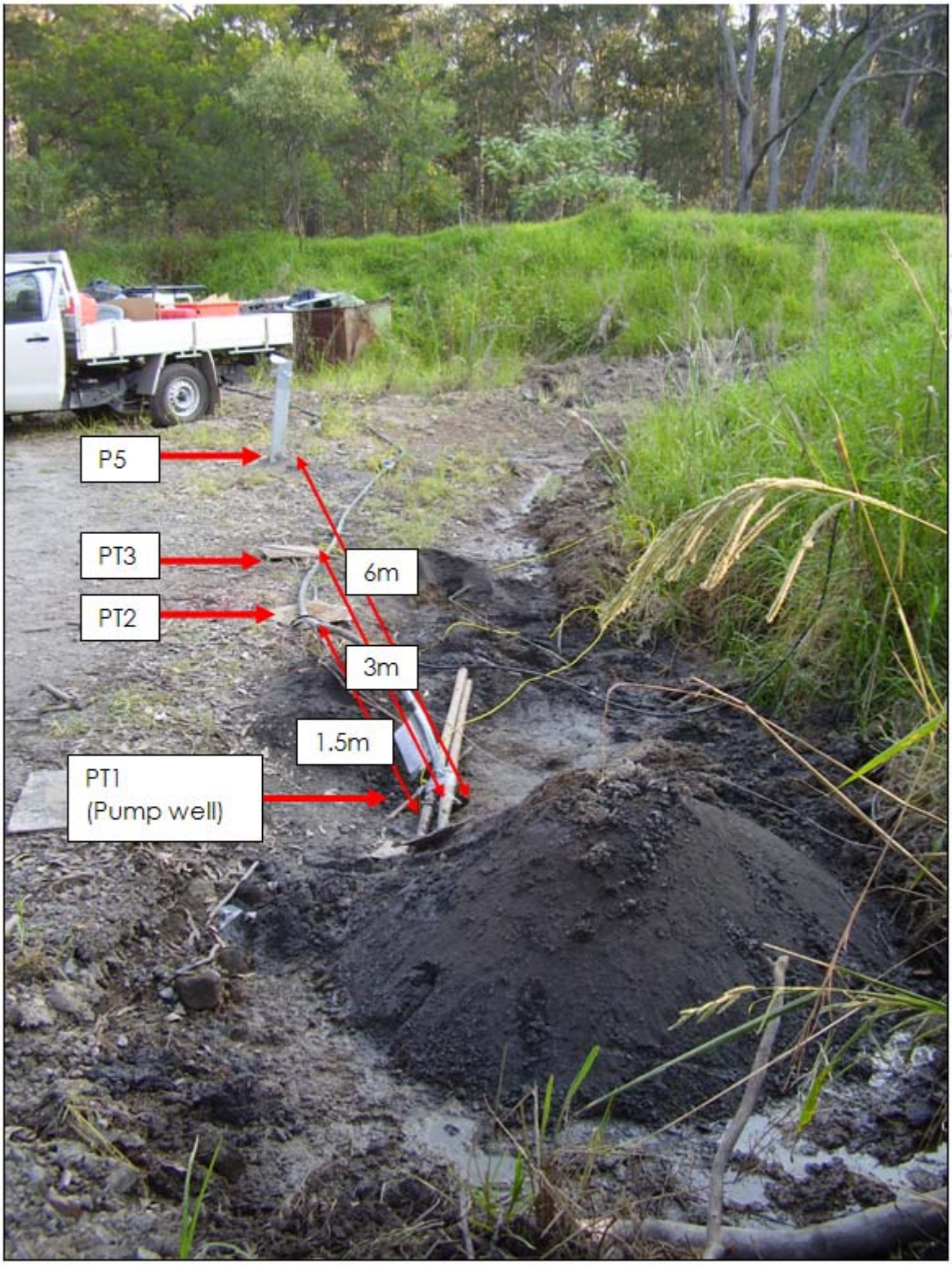
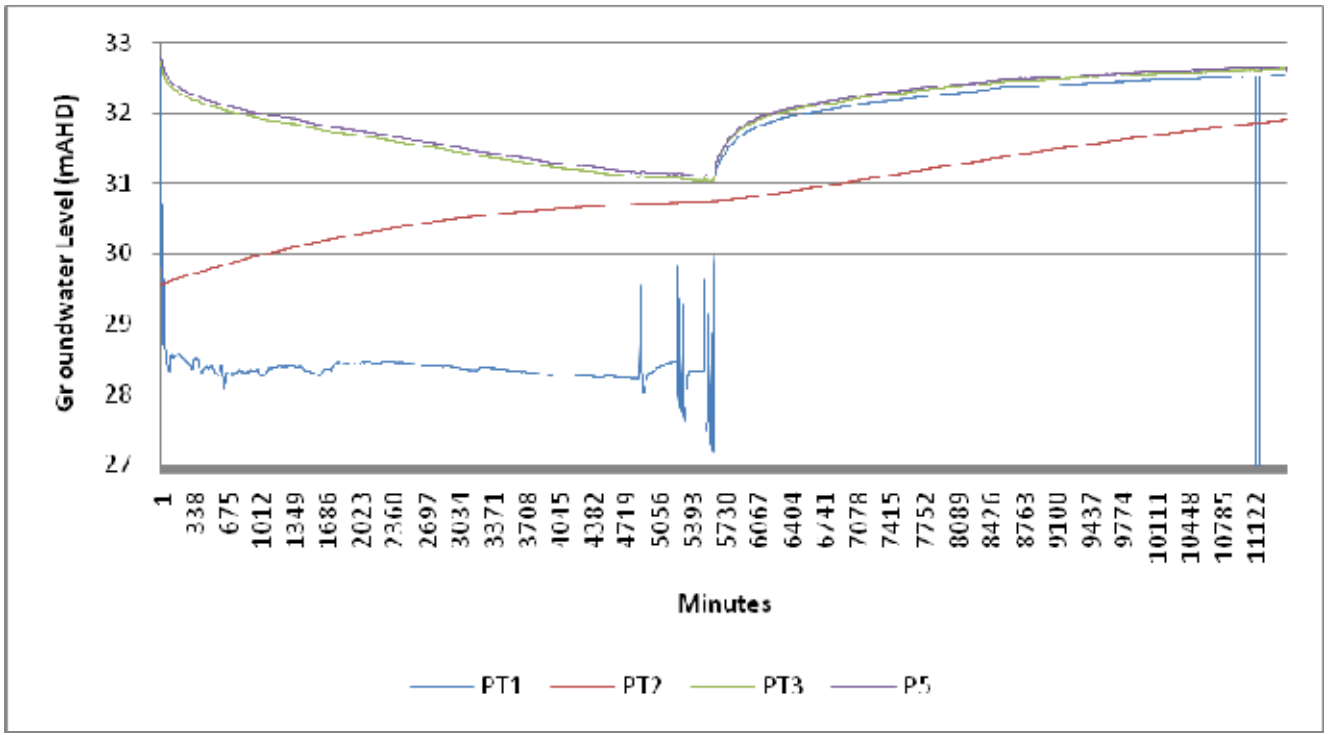


Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Pump test set-up.**	Drawing No: **FIGURE 2**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Pump test raw data.**	Drawing No: **FIGURE 3**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757

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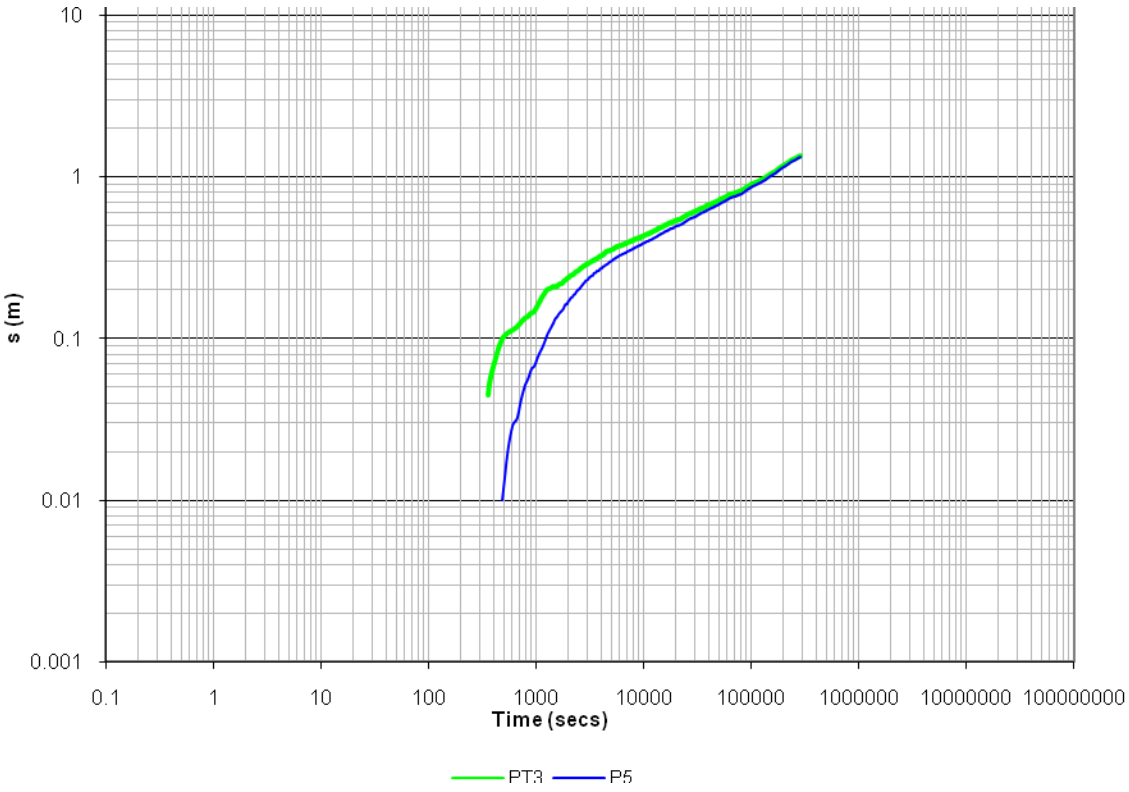
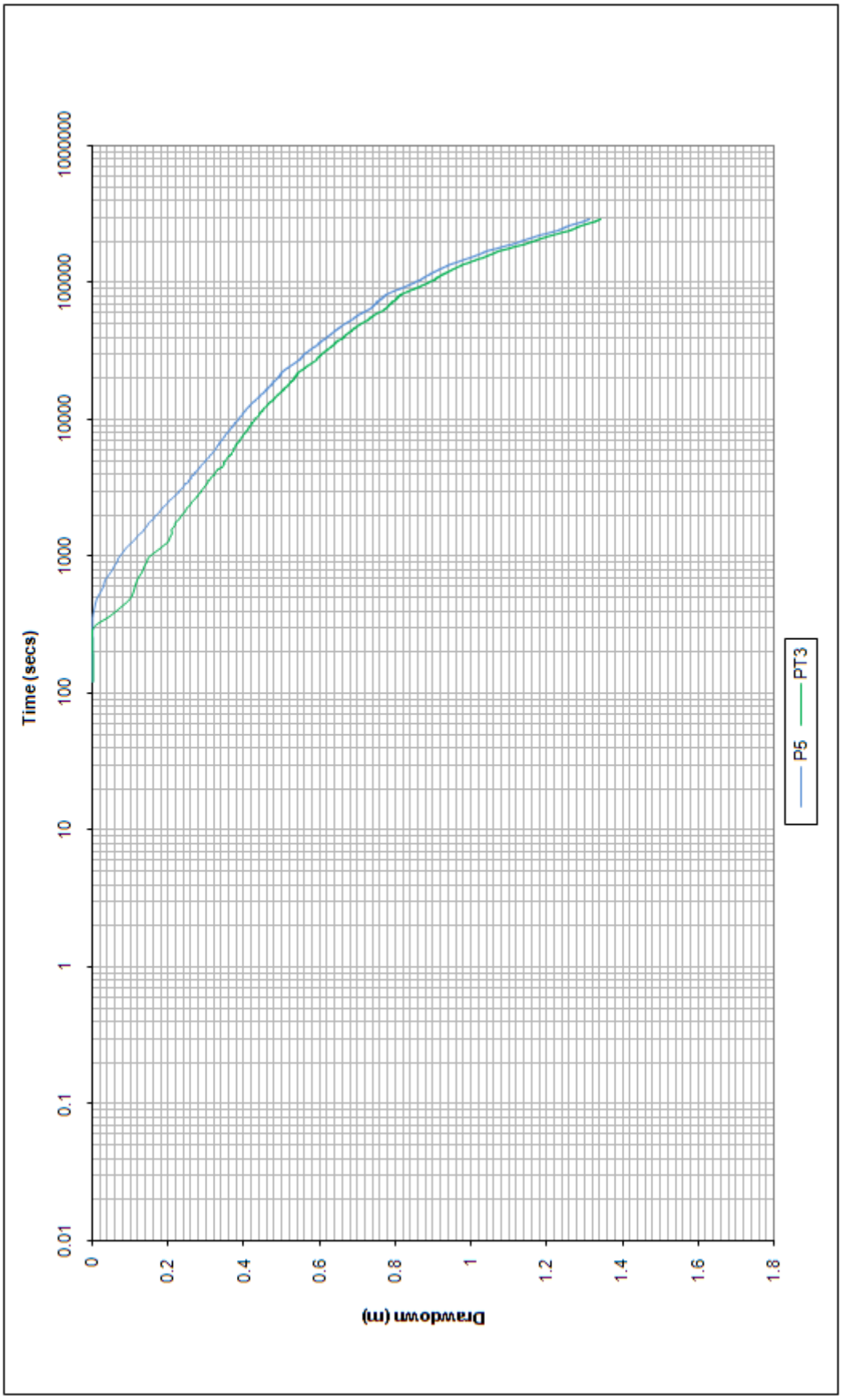


Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Pump test log-log plot of drawdown data used in Theis analysis.**	Drawing No: **FIGURE 4**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Pump test semi-log plot of drawdown data.**	Drawing No: **FIGURE 5**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757

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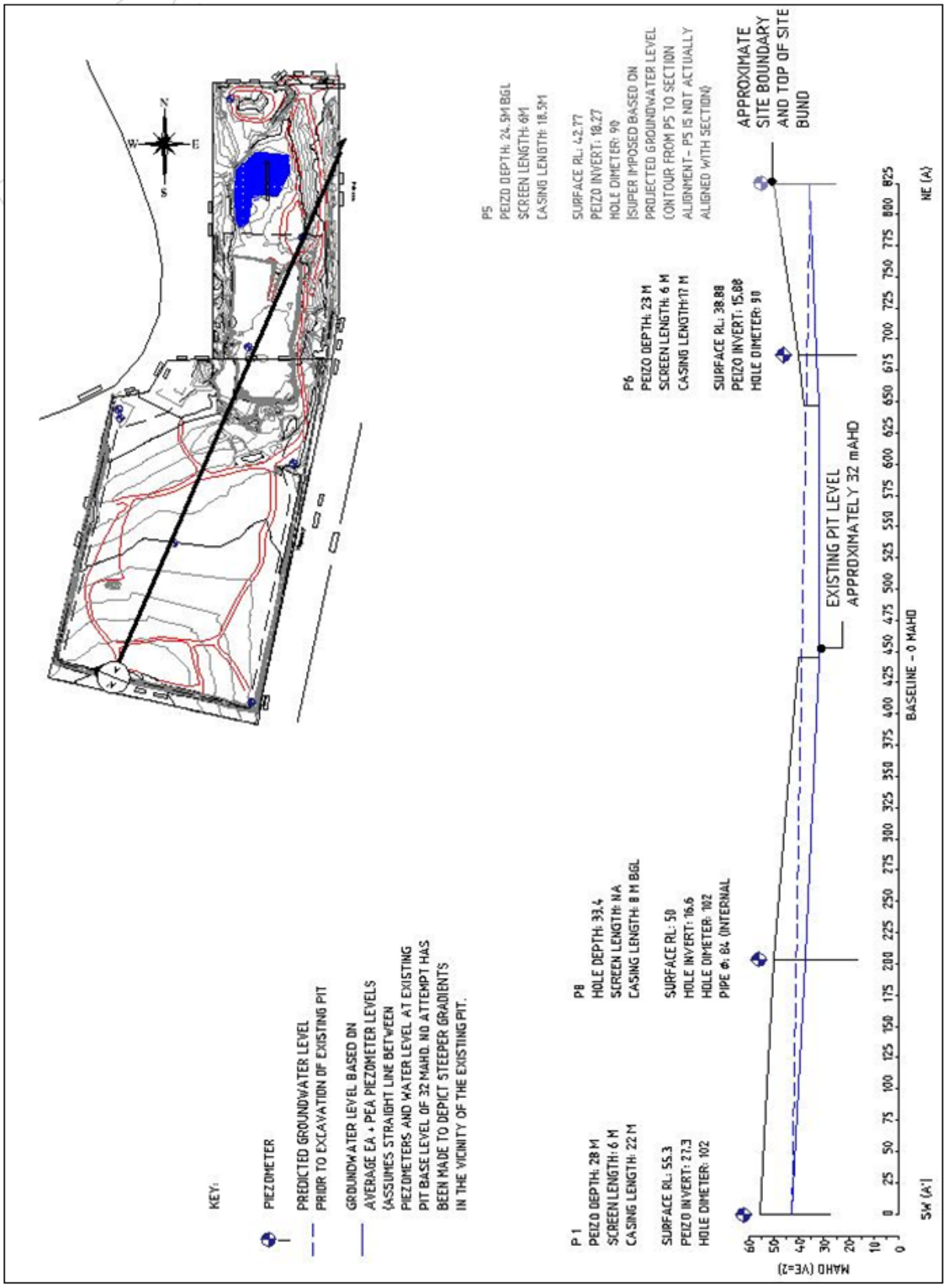
Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Existing excavation pit following rainfall (07.12.2007).**	Drawing No: **FIGURE 6**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



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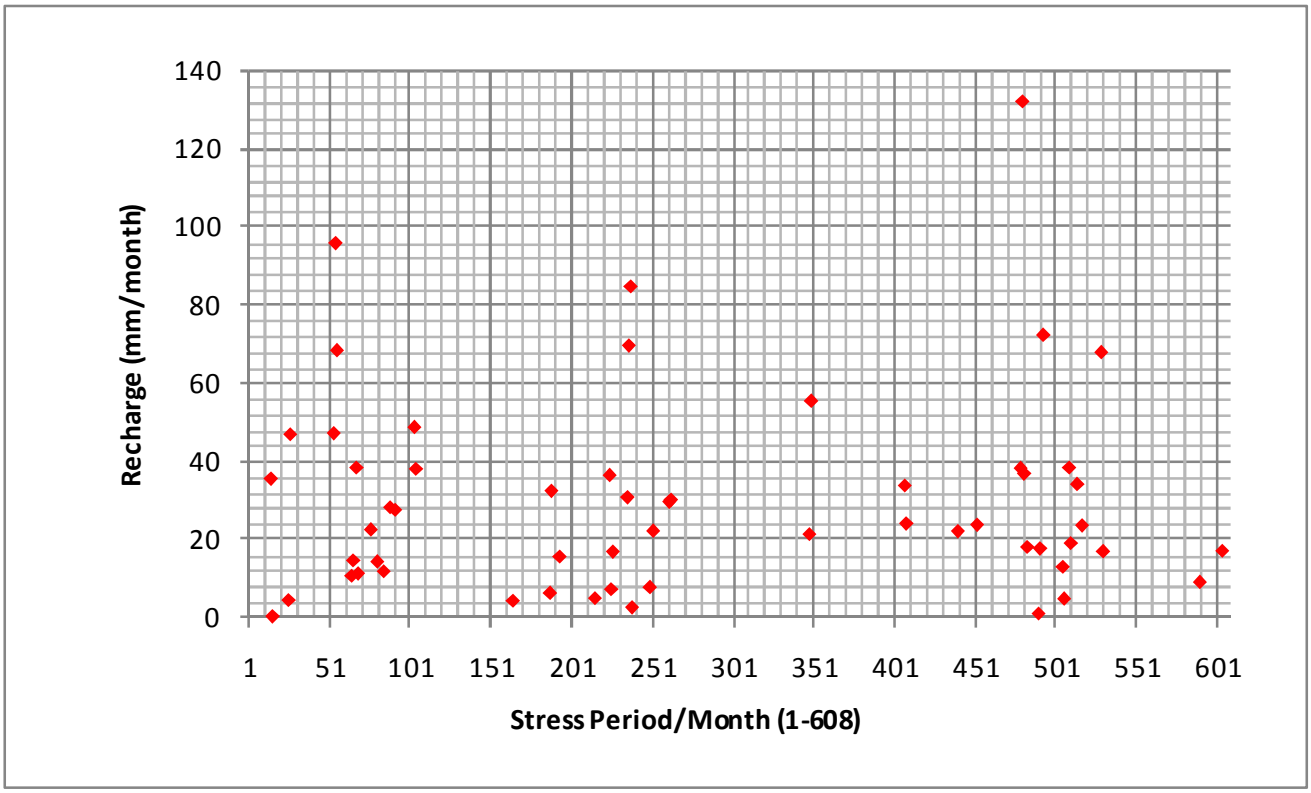
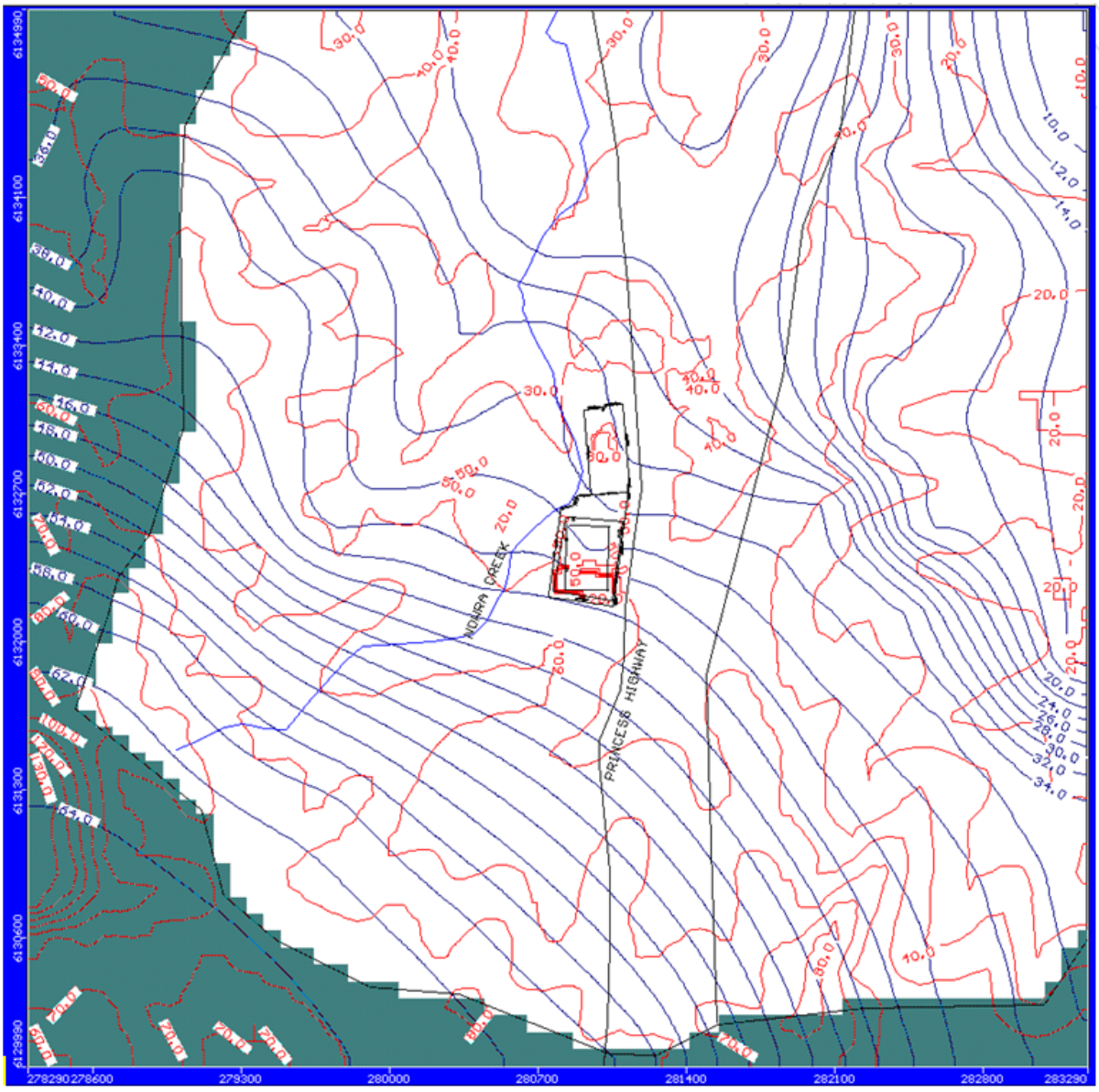
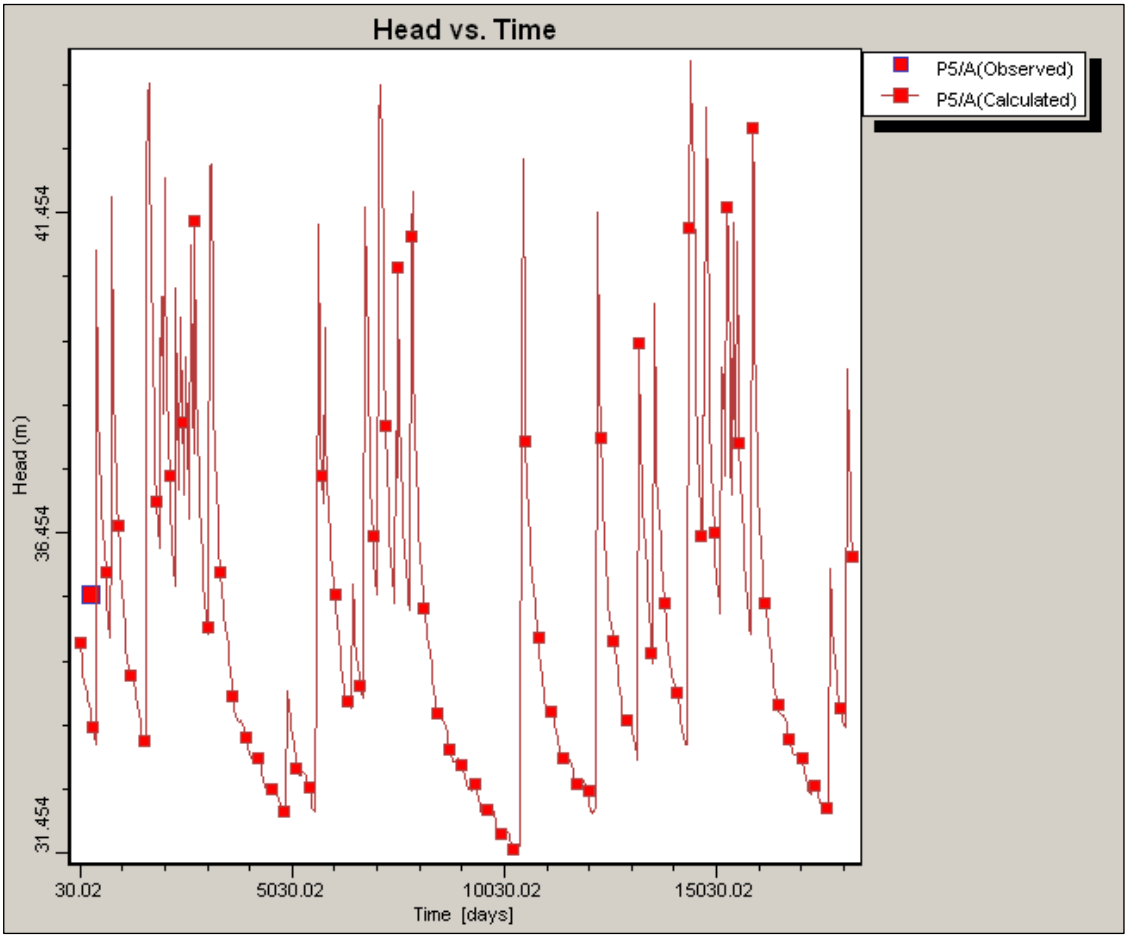
Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Schematic groundwater section.**	Drawing No: **FIGURE 7**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



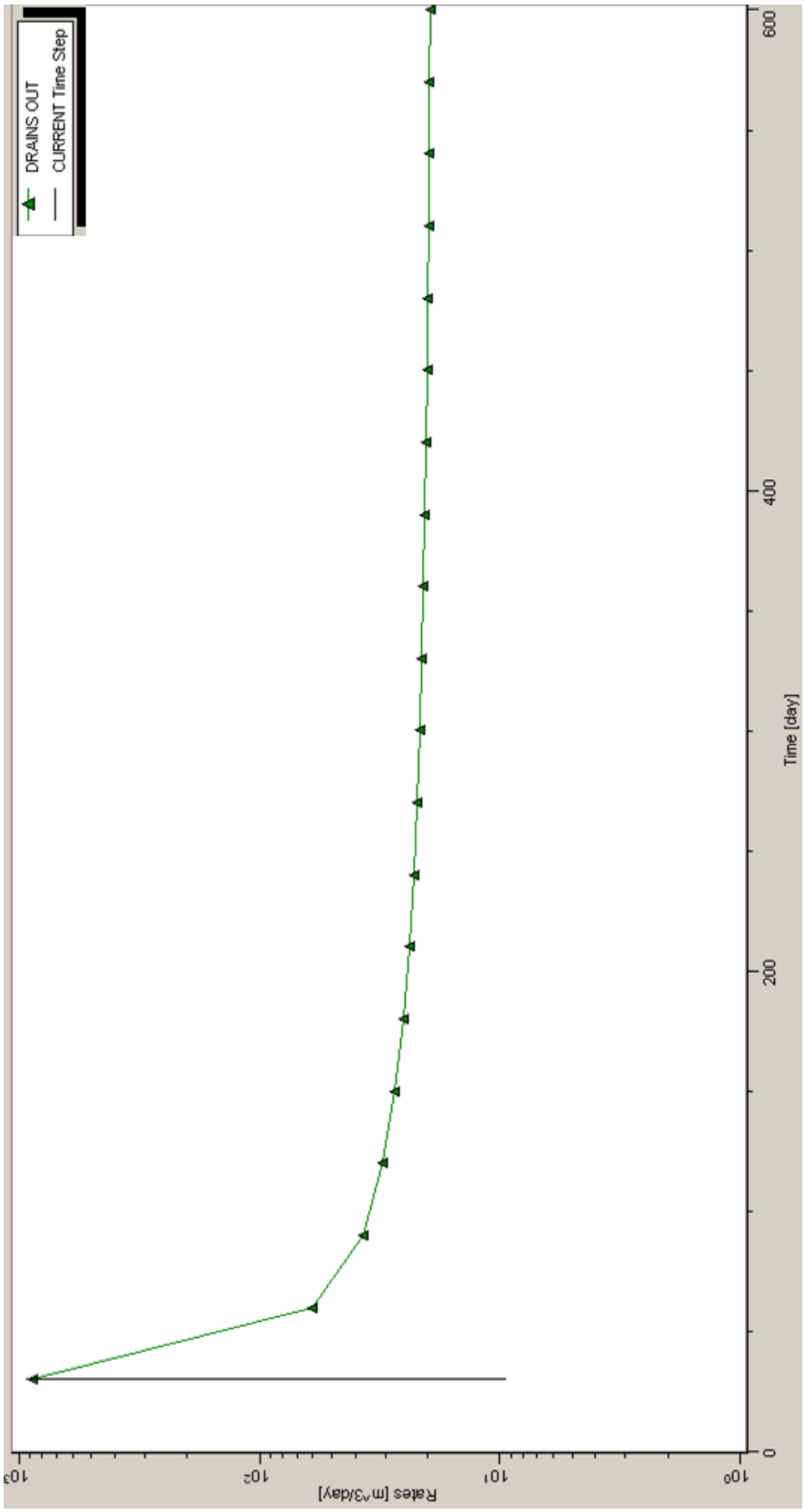
Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Modelled transient recharge.**	Drawing No: **FIGURE 8**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Initial head contours (blue) and surface contours (red) used in model.**	Drawing No: **FIGURE 9**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Modelled groundwater fluctuation at P5.**	Drawing No: **FIGURE 10**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Daily groundwater ingress rates (drains out) during initial 600 days under stable ET/Recharge balance.**	Drawing No: **FIGURE 11**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757

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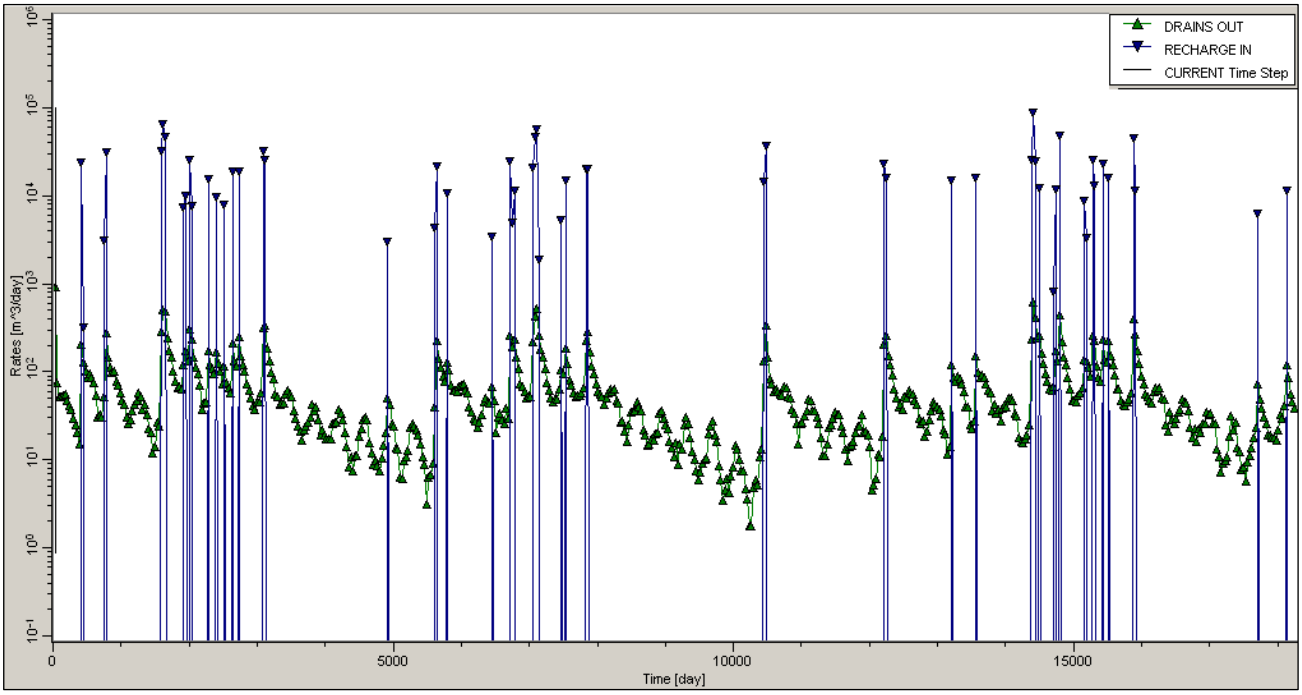
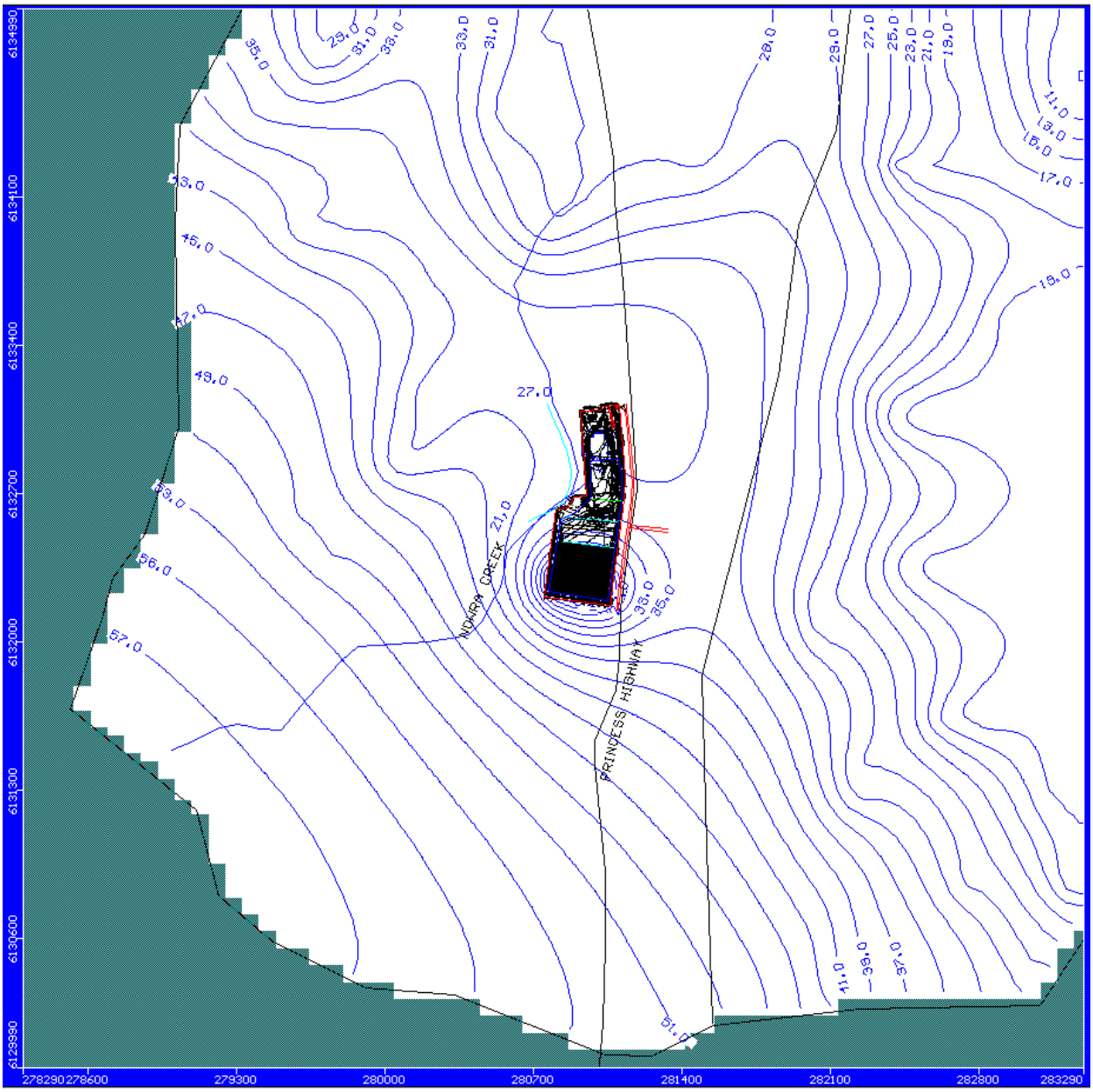


Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Daily groundwater ingress rates (DRAINS OUT) and daily catchment recharge rates (RECHARGE IN) outputted from transient recharge groundwater model.**	Drawing No: **FIGURE 12**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Groundwater elevation contours at 18,250 days outputted from transient groundwater model.**	Drawing No: **FIGURE 13**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757

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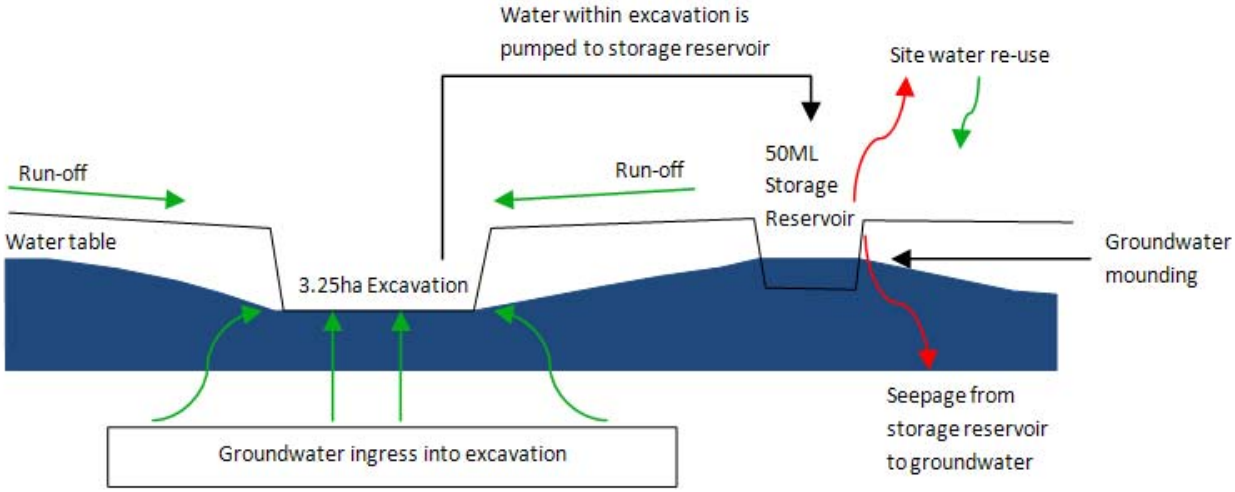
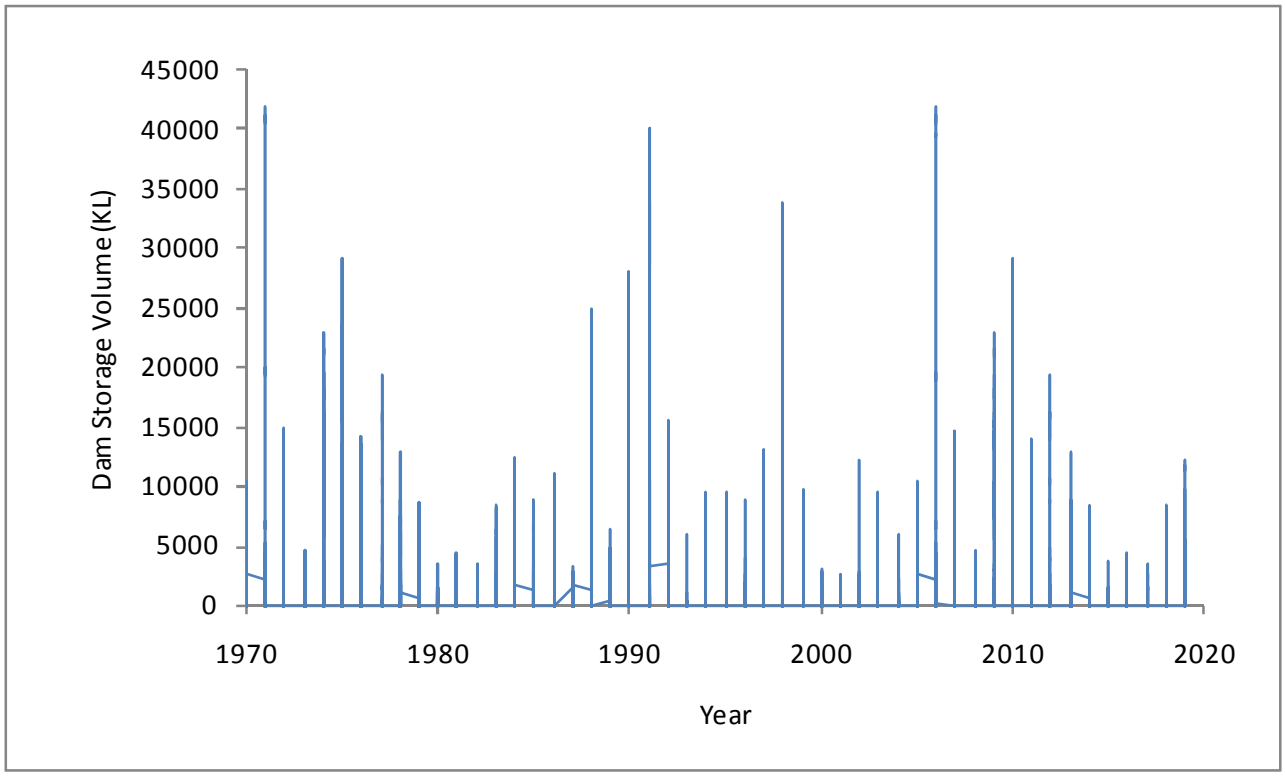
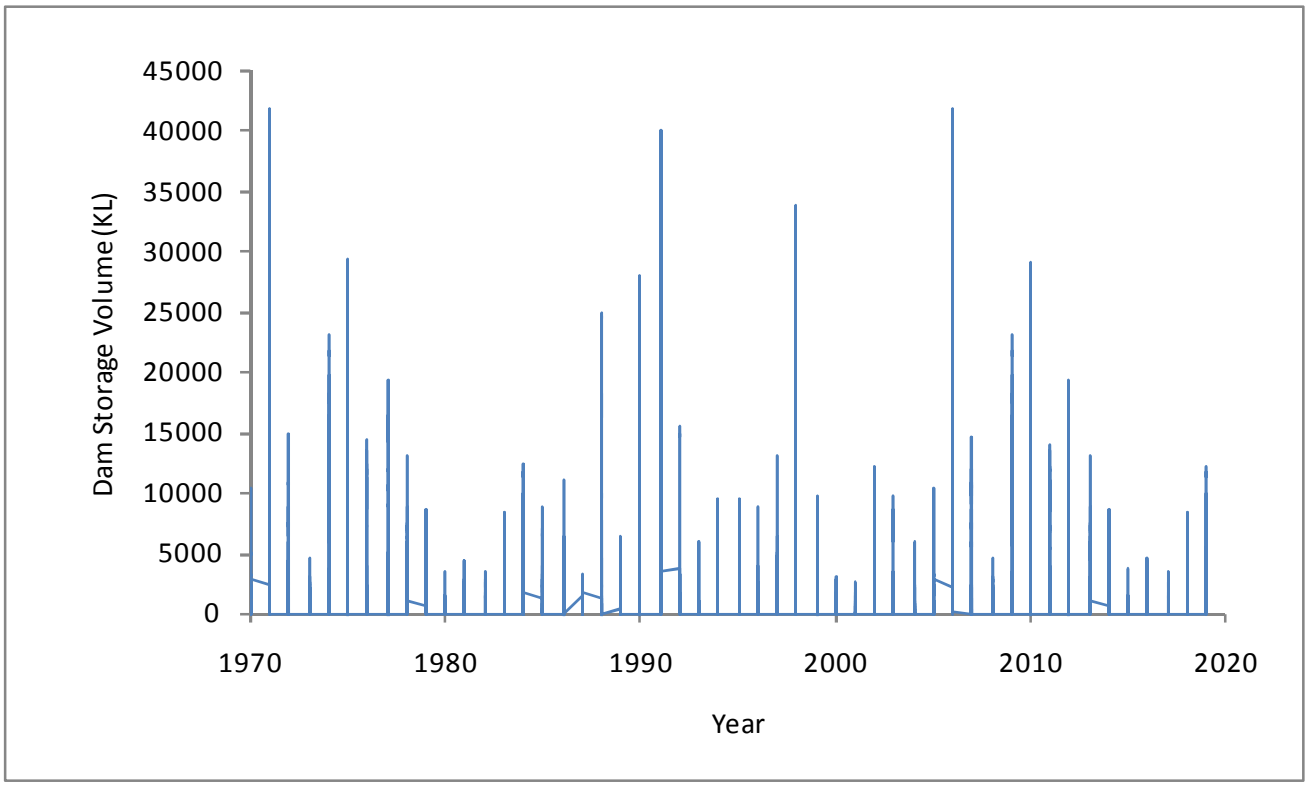


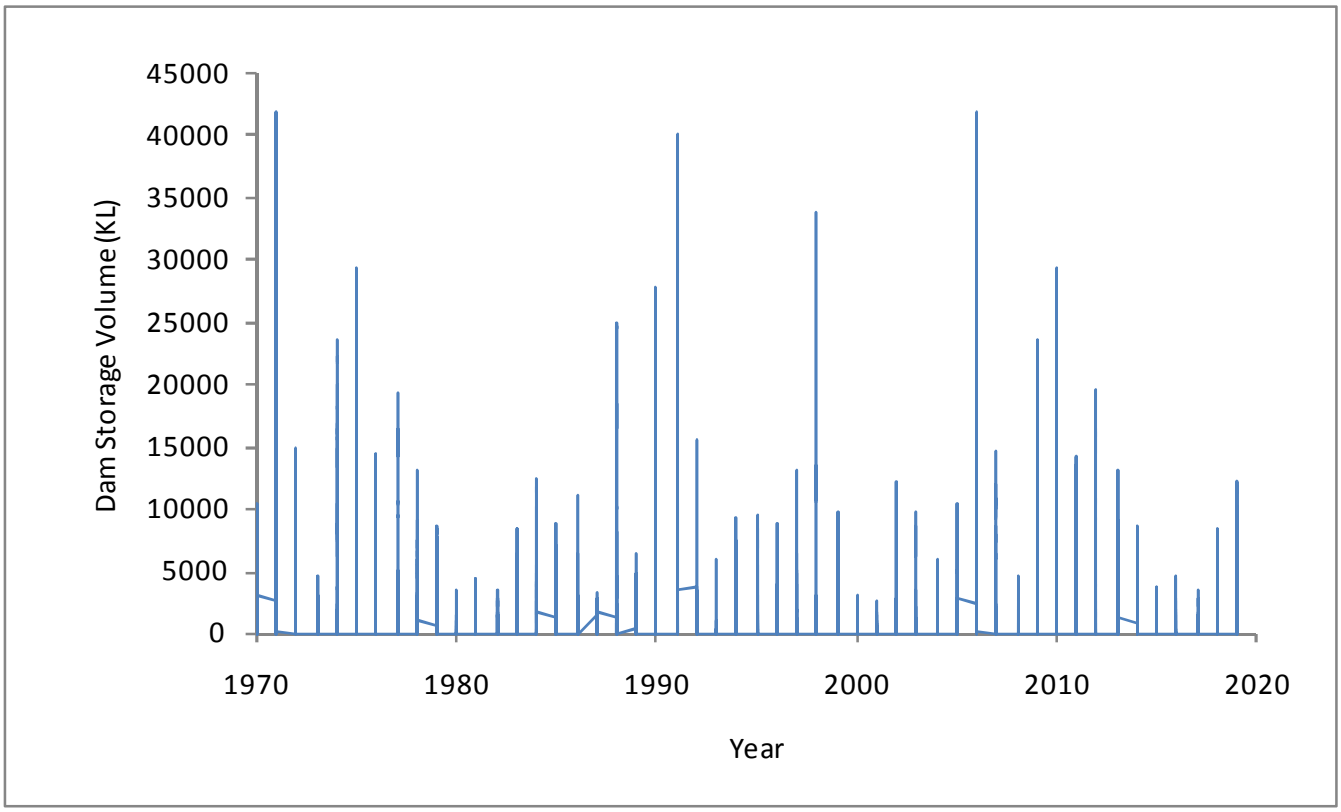
Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Summary of quarry water management.**	Drawing No: **FIGURE 14**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



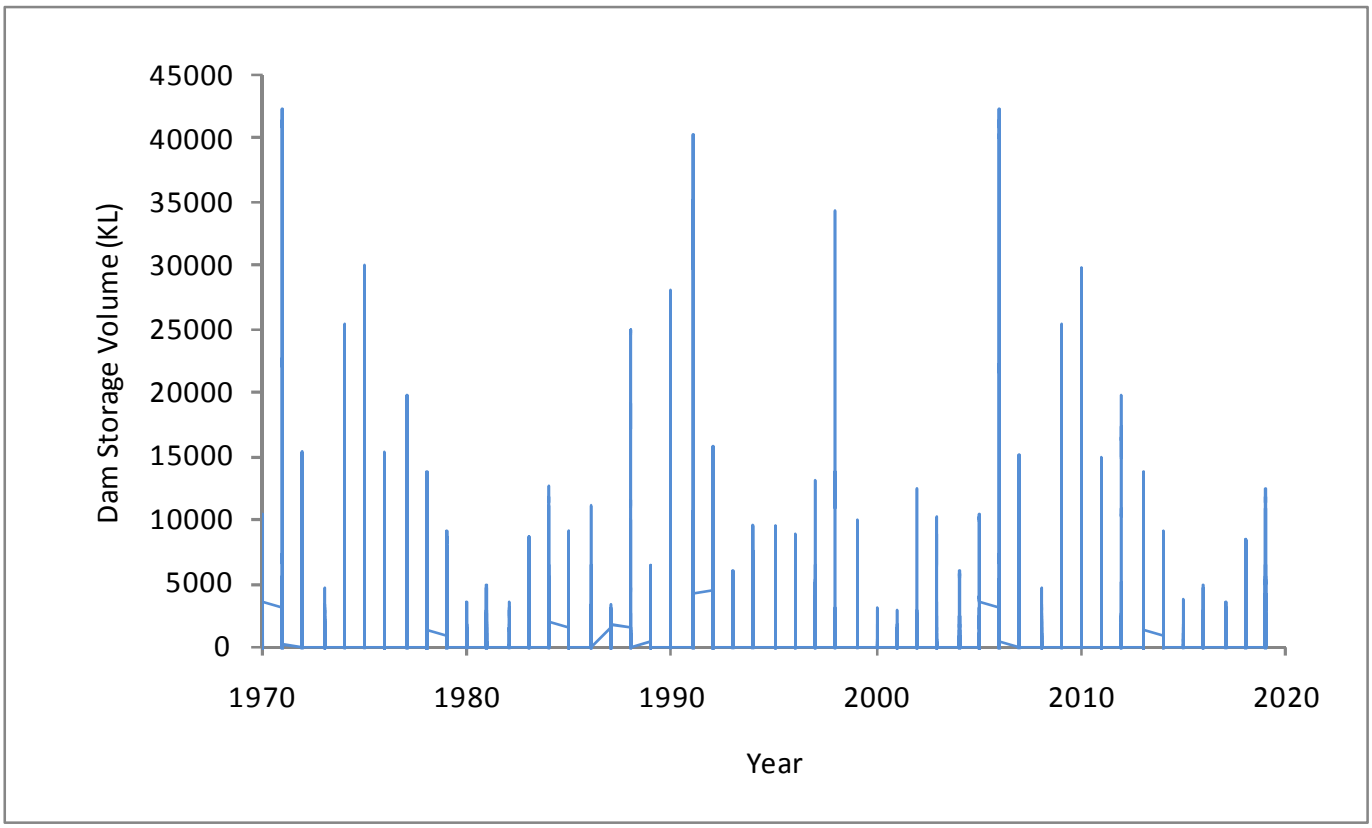
Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Dam storage volumes for groundwater inflow of 35.18 KL/d.**	Drawing No: **FIGURE 15**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



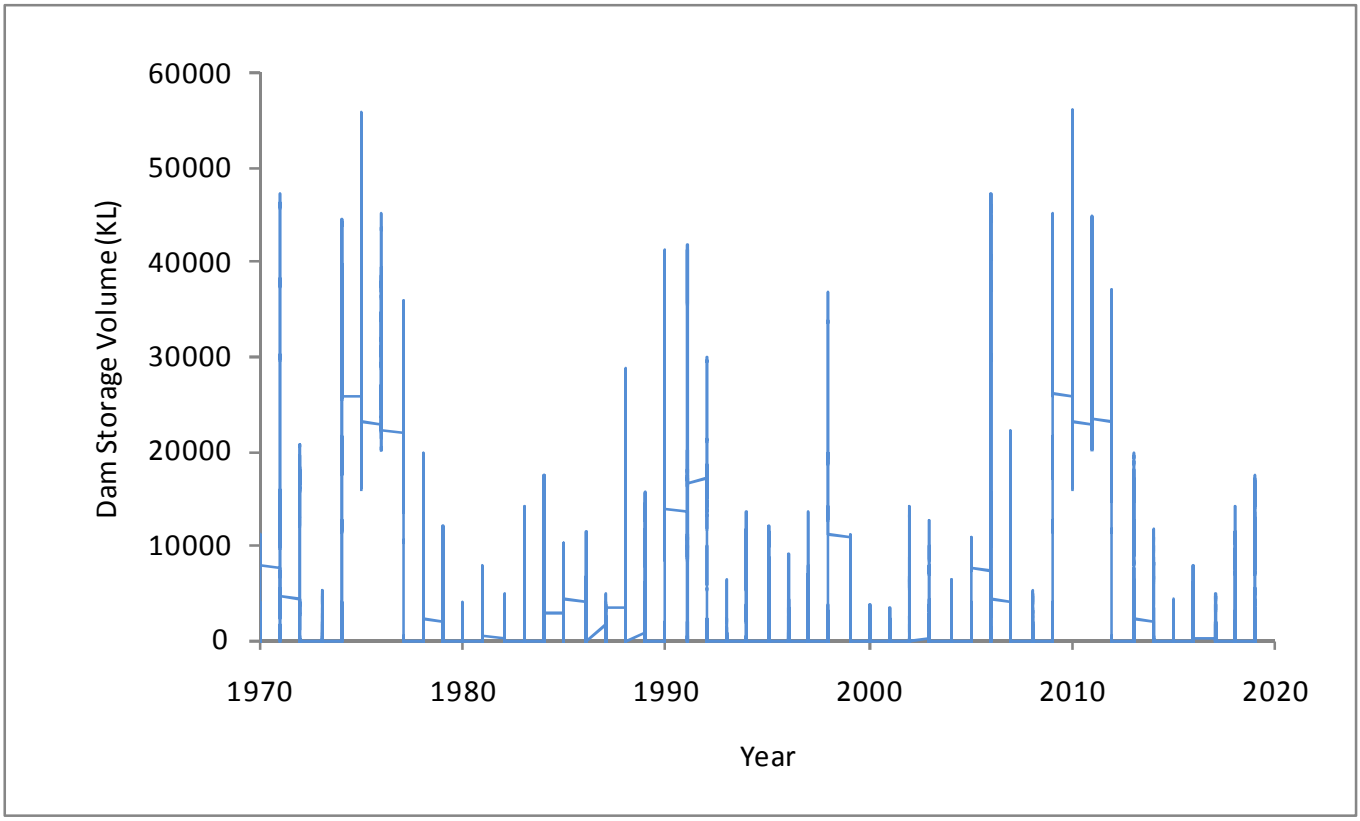
Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Dam storage volumes for groundwater inflow of 40.00 KL/d.**	Drawing No: **FIGURE 16**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



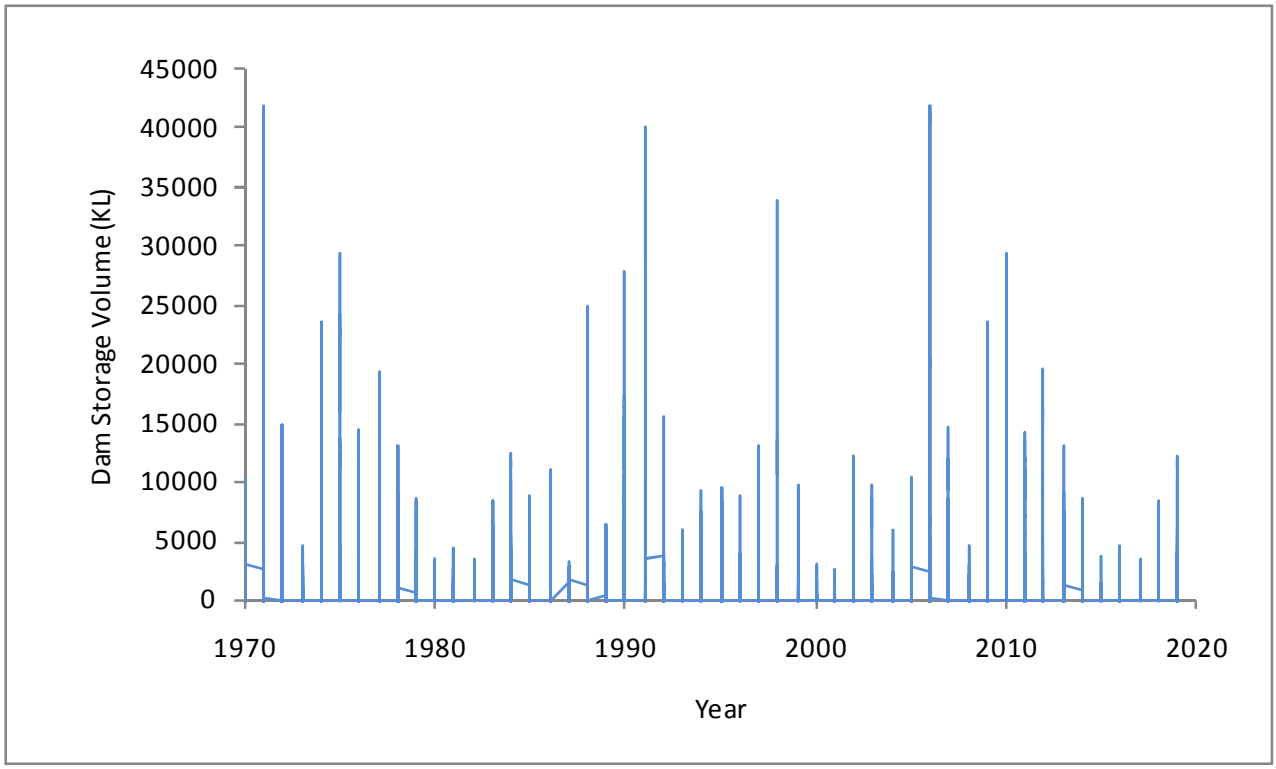
Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Dam storage volumes for groundwater inflow of 47.11 KL/d.**	Drawing No: **FIGURE 17**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



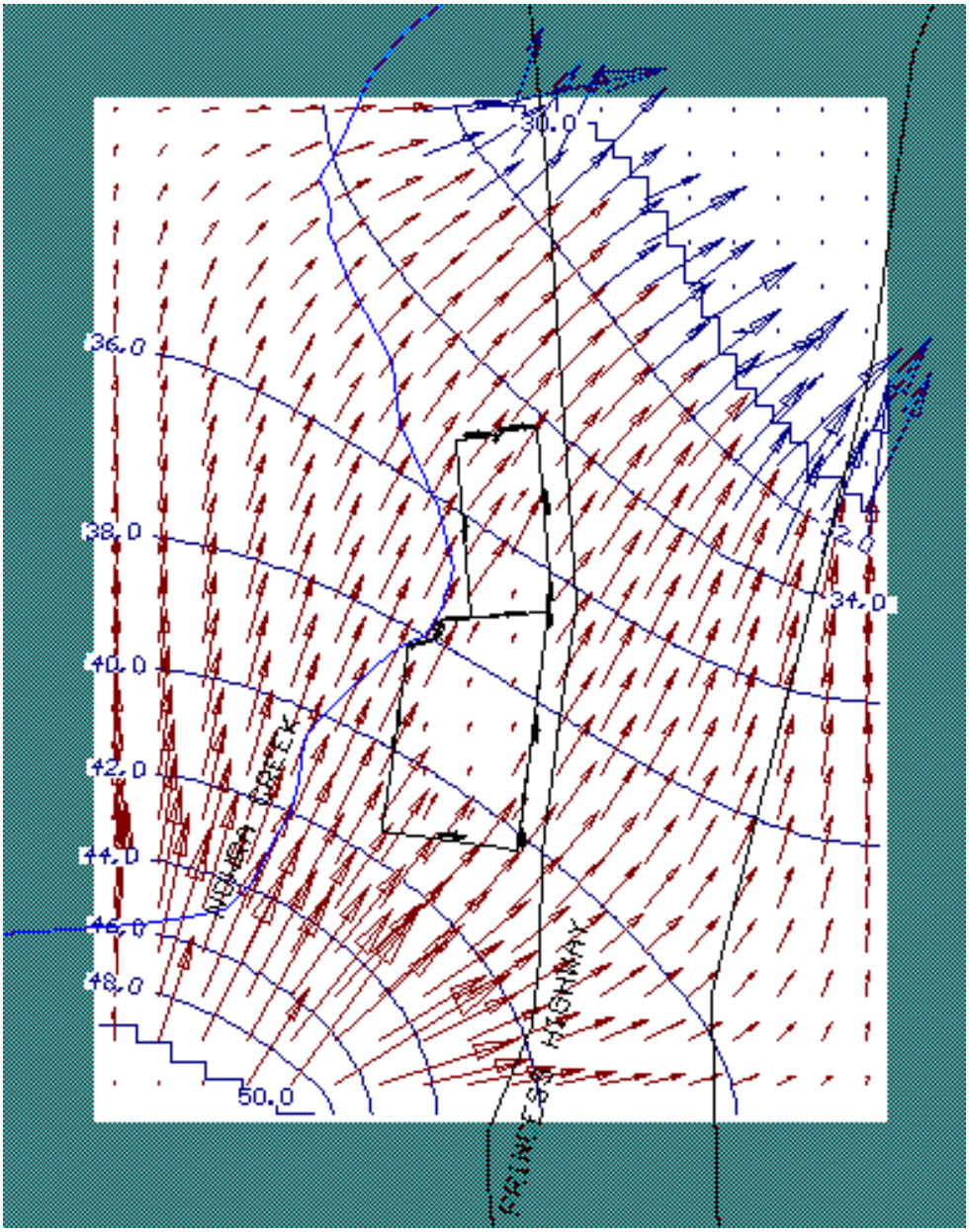
Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Dam storage volumes for groundwater inflow of 70.78 KL/d.**	Drawing No: **FIGURE 18**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Dam storage volumes for groundwater inflow of 250.00 KL/d.**	Drawing No: **FIGURE 19**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Dam storage volumes for groundwater inflow of 471 KL/d for initial two months followed by inflow of 47.11 KL/d for remainder of model record.**	Drawing No: **FIGURE 20**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Steady-state pre-quarrying model showing groundwater contours and velocity vectors.**	Drawing No: **FIGURE 21**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757

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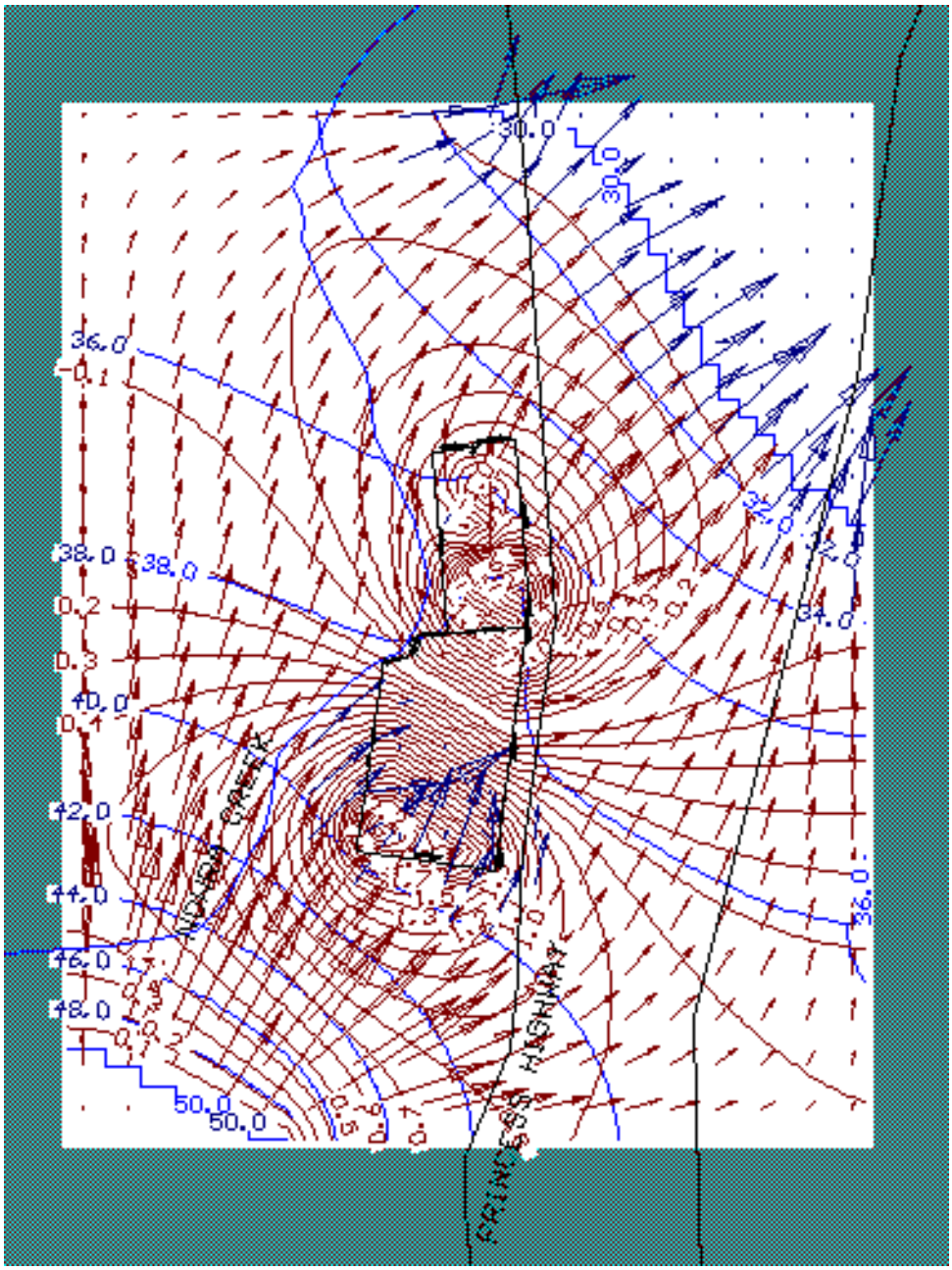
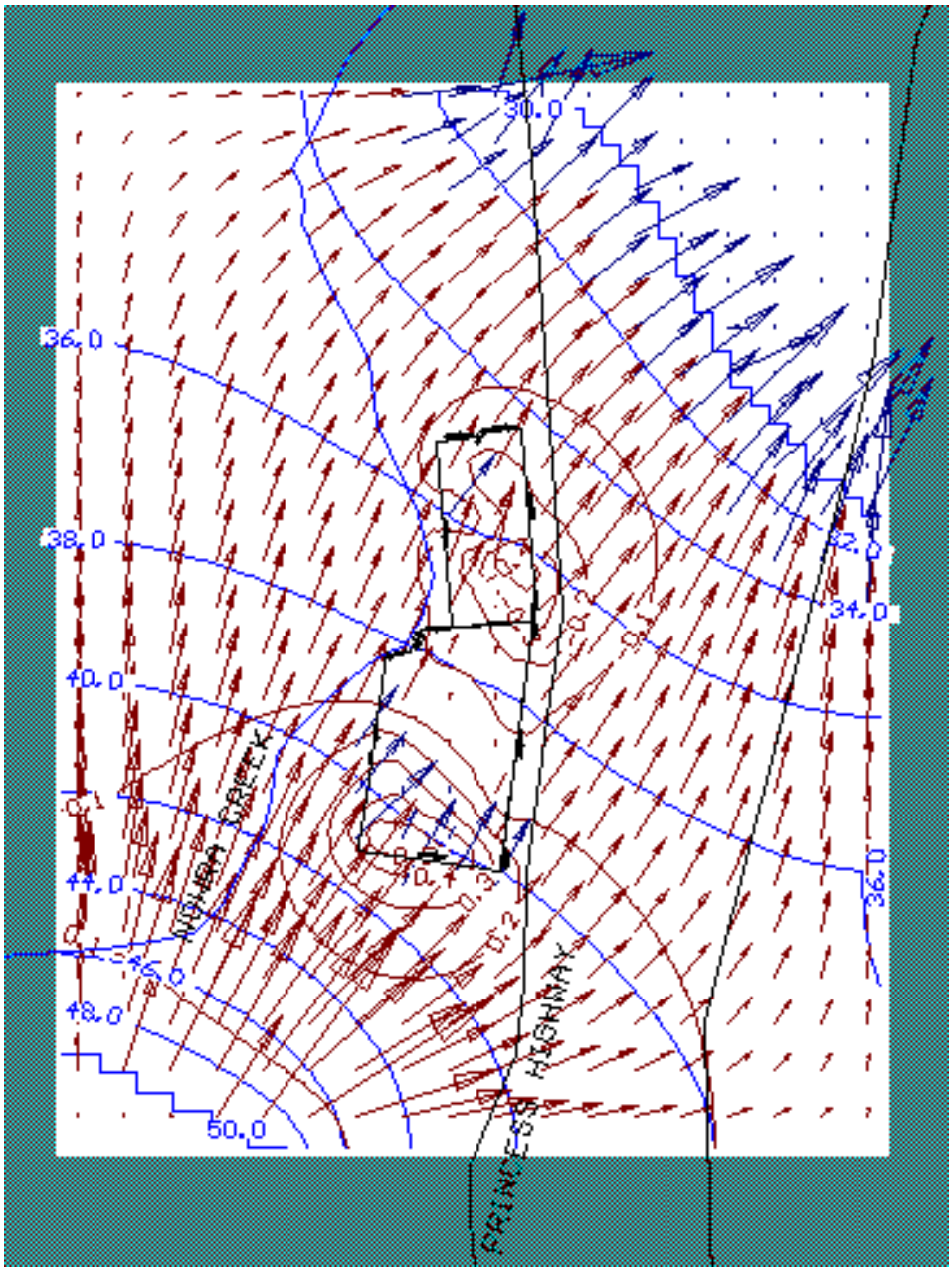


Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Steady-state post-quarrying model with sand backfill showing groundwater contours (blue), velocity vectors and drawdown (brown).**	Drawing No: **FIGURE 22**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	BR	**Steady-state post-quarrying model with clay backfill showing groundwater contours (blue), velocity vectors and drawdown contours (brown).**	Drawing No: **FIGURE 23**
Approved:	DM		
Date:	15.07.09		
Scale:	NA		Job No: P0701757

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ATTACHMENT B

Noise Impact Assessment Report, prepared by Heggies

HEGGIES

25 August 2009

10-5695 Additional Information 20090825

City Plan Services
Level 1
364 Kent Street
SYDNEY NSW 2000

Attention: Mr Chris Outtersides

Dear Chris

Nowra Brickworks Quarry, South Nowra
Additional Information - Noise and Blasting

1 Noise Impact Assessment Procedure

1.1 Environmental Noise Control - General Objectives

Residential Receiver

Responsibility for the control of noise emission in New South Wales is vested in Local Government and the Department of Environment and Climate Change (DECC). The DECC has released the NSW Industrial Noise Policy (INP), dated January 2000, which provides a framework and process for deriving noise criteria for consents and licences that will enable the DECC 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 the amenity for specific land uses.
- Use the criteria as the basis for deriving project specific noise levels.
- Promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects.
- Outline a range of mitigation measures that could be used to minimise noise impacts.
- 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 the industrial development.
- Carry out functions relating to the prevention, minimisation and control of noise from the premises scheduled under the Act.

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Assessing Intrusiveness

For assessing intrusiveness, the background noise generally 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 dBA above the measured (or default) Rating Background Level (RBL).

Assessing Amenity

The amenity assessment is based on noise criteria specific to the land use and associated activities. The criteria relate only to industrial-type noise and do not include road, rail or community noise. If present, the existing noise level from industry is generally 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 also needs to be considered in assessing the impact.

The INP recommends acceptable amenity noise levels for residences located in "Rural", "Suburban", "Urban" and "Urban/Industrial" areas, for commercial premises as well as for recreational areas. Consistent with the INP, and for the purpose of this assessment, residences in the general "residential" areas surrounding the subject site are considered to fall within the Suburban category. In particular, it is noted that the ambient noise environment in these residential areas is influenced by traffic noise from the Princes Highway and, to a lesser extent, by the noise from commercial businesses in the area.

Extracts from the INP that relate to the amenity criteria are given in **Table 1** and **Table 2**.

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

Table 1 Amenity Criteria - Recommended L_{Aeq} Noise Levels from Industrial Noise Sources

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

Notes: For Monday to Saturday, Daytime 0700 hours - 1800 hours; Evening 1800 hours - 2200 hours; Night-time 2200 hours - 0700 hours.
On Sundays and Public Holidays, Daytime 0800 hours - 1800 hours; Evening 1800 hours - 2200 hours; Night-time 2200 hours - 0800 hours.

Table 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 10dBA If existing noise level is *unlikely to decrease* in future existing noise level minus 10 dBA
Acceptable noise level minus 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 1**.

2 INP Assessment of Prevailing Weather Conditions

2.1 Wind

Wind has the potential to increase noise at a receiveyr when it is light and stable and blows from the direction of the noise source. 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 the source to receiver wind component at speeds of up to 3 m/s occur for 30% or more of the time in any seasonal period (during the day, evening or night), then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

The INP Section 5.3 Wind Effects states that:

> *"Wind effects need to be assessed where wind is a feature of the area. Wind is considered to be a feature where source to receiver wind speeds (at 10 m height) of 3 m/s or below occur for 30 percent of the time or more in any assessment period in any season."*

In order to determine the prevailing conditions for the subject site, weather data for the period May 2007 to May 2009 were obtained from the RAN weather station at Nowra. The data was analysed in order to determine the frequency of occurrence of winds of speeds up to 3 m/s in each season.

The results of the weather station analysis for daytime, evening and night-time winds are presented in **Table 3**, **Table 4** and **Table 5** respectively.

In each table, the wind directions and percentage occurrence are those dominant during each season.

Table 3 Seasonal Frequency of Occurrence Wind Speed Intervals - Daytime

Period	Calm (<0.5 m/s)	Wind Direction ±(45º)	Wind Speed		
			0.5 to 2.0 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	0.6%	N	1.2%	3.8%	5.0%
Autumn	1.6%	NNW	2.0%	6.5%	8.5%
Winter	1.9%	NNW	1.4%	4.6%	6.0%
Spring	0.5%	N	1.3%	3.6%	4.9%

Table 4 Seasonal Frequency of Occurrence Wind Speed Intervals - Evening

Period	Calm (<0.5 m/s)	Wind Direction ±(45º)	Wind Speed		
			0.5 to 2.0 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	8.2%	S	3.3%	13.5%	16.7%
Autumn	11.9%	WSW	7.9%	15.4%	23.4%
Winter	6.6%	WNW	6.1%	10.0%	16.1%
Spring	10.9%	SW	3.9%	10.8%	14.7%

Table 5 Seasonal Frequency of Occurrence Wind Speed Intervals - Night-time

Period	Calm (<0.5 m/s)	Wind Direction ±(45º)	Wind Speed		
			0.5 to 2.0 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	17.2%	WNW	7.8%	11.4%	19.2%
Autumn	11.8%	WNW	8.5%	15.7%	24.2%
Winter	3.1%	WNW	4.4%	9.7%	14.1%
Spring	13.8%	WNW	8.2%	13.2%	21.4%

The prevailing winds less than (or equal to) 3 m/s with a frequency of occurrence greater than (or equal to) 30% and considered to be relevant to the site, in accordance with the INP, are presented in **Table 6**.

Table 6 Project Prevailing Wind Conditions in Accordance with NSW INP (2000)

Season	Winds ± ≤ 3 m/s with frequency of Occurrence ≥ 30%		
	Daytime	Evening	Night-time
Summer	Nil	Nil	Nil
Autumn	Nil	Nil	Nil
Winter	Nil	Nil	Nil
Spring	Nil	Nil	Nil

Additional DECC Noise Assessment Information

The DECC's recommended noise assessment criteria aim to limit potential intrusive noise emissions and preserve noise amenity. In cases where the limiting noise assessment criterion cannot be achieved, then practicable and economically feasible noise control measures should be applied. This usually requires demonstration that Best Achievable Technology and Best Environmental Management Practices have been implemented in order to mitigate adverse acoustical impacts.

3 Noise Impact Assessment

3.1 Modelling Scenarios

Three operational scenarios were developed and modelled to be indicative of the Nowra Brickworks Quarry operations, during the life of the Project. The scenarios are illustrated in **Figure 1** and are summarised as follows:

- **Scenario 1**
  Current operations, including the mobile crushing and screening plant, one front end loader (FEL), one excavator (all on the existing quarry floor, RL 32) and one blasthole drill (at RL 40).
- **Scenario 2**
  Future operations, including the mobile crushing and screening plant, two FELs, one blasthole drill and two excavators. This equipment was modelled at an elevation of 14.5 m below the natural surface on the western side of the active extraction area, except for the blasthole drill which was modelled 4 m below the natural surface. Additionally, a bulldozer was modelled at the natural surface on the eastern side of the extraction area, removing overburden. VENM backfilling operations, incorporating a bulldozer and compactor, were modelled as occurring to the north of the active extraction area.
- **Scenario 3**
  Future operations, including the mobile crushing and screening plant, two FELs, one blasthole drill and two excavators. This equipment is located at an elevation of 14.5 m below the natural surface on the western side of the Stage 6 area, except for the blasthole drill which was modelled 4 m below the natural surface. Additionally, a bulldozer was modelled at the natural surface on the eastern side of the active extraction area removing overburden. VENM backfilling operations, incorporating a bulldozer and compactor, were modelled as occurring to the north of the active extraction area.

Figure 1 Noise Modelling Scenarios

A rockbreaker will also be used to break down over sized material as required, on an intermittent basis. Modelling with the rockbreaker operational indicates that the $L_{Aeq(15minute)}$ noise levels will increase by up to 2 dBA during Scenarios 1, 2 and 3.

3.2 On-Site Truck Movements

Trucks have been modelled travelling from the site entrance to the FEL, located in the vicinity of the mobile crushing and screening plant for each scenario. Approximately 74 truck movements per day were assumed for Scenario 1, representing a production rate of 300,000 tonnes per year and 120 truck movements per day were assumed for Scenario 2 and Scenario 3, representing a production rate of 500,000 tonnes per year.

Trucks were modelled as entering the extraction area in the centre at the north for Scenario 1 and then for Scenario 2 and Scenario 3, entering along the eastern wall then traversing across the quarry floor, at the stage being quarried.

Additionally, during the evening and early morning, there may be 3 truck movements. Accordingly, a worst case scenario of 2 truck movements to the extraction area in a single 15 minute period were assumed.

3.3 Modelled Weather Conditions

Computation of the contributed noise levels at four receiver locations have been based on:

- "Acoustically neutral" weather conditions equivalent to Pasquil Stability Class D, representing calm conditions (ie daytime 20^{O}C, 70% relative humidity and 0m/s wind speed), there being no prevailing adverse weather conditions (based on the Nowra RAN weather data, refer to **Section 1**).

Non-Prevailing Weather

Notwithstanding the fact that the site specific prevailing weather conditions presented above were determined strictly in accordance with the INP, recent Consent Conditions (and Environment Protection Licences) stipulate that the "Noise Limits" are to be complied with under adverse weather conditions (even though the prevailing conditions are non-adverse). The adverse weather conditions normally nominated are winds up to 3 m/s and, for night-time operation only, temperature inversions of up to 3^{o}C/100 m.

Accordingly, the Nowra Brickworks Quarry noise model was also used to predict the quarry operational noise levels under the daytime adverse weather condition of a 3m/s wind blowing in all directions for each scenario.

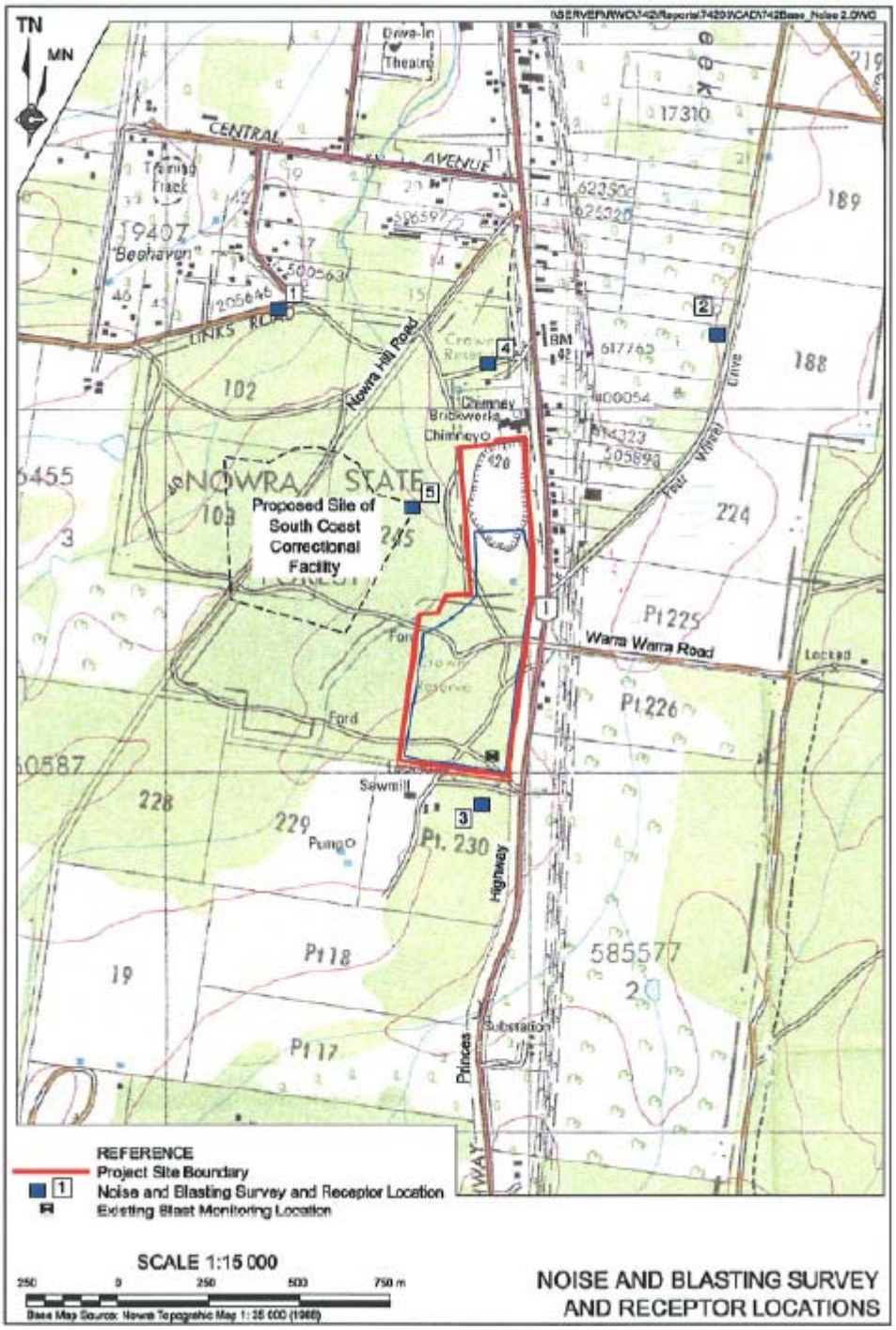
3.4 Noise Sensitive Receivers

$L_{Aeq(15minute)}$ noise levels have been calculated, under acoustically neutral and adverse 3 m/s wind conditions, for the selected receiver locations. The receivers, chosen as being indicative of the closest receivers, are as follows (refer to **Figure 2** - note, Location 3 is now project related):

- **Location 1 - 80 Links Road, Nowra**
  This residence is situated approximately 850 m to the west-northwest of the quarry and is representative of residences in this area on Links Road.
- **Location 2 - 371 Old Southern Road, Nowra**
  This residence is situated approximately 630 m to the northeast of the quarry and is representative of residences in this area on Old Southern Road, Nowra.
- **Location 4 - 243 Princes Highway, Nowra**
  This residence is located approximately 140 m north of the northern quarry boundary and approximately 380 m north of the northern boundary of the extraction area.

- **Location 5 - South Coast Correctional Facility.**
  The South Coast Correctional Facility is currently being constructed. Several proposed areas of occupation within the facility have been identified as potential noise receiver locations. Hence a range of predicted noise levels are presented.

Figure 2 Noise and Blasting Survey and Receptor Locations



3.5 Existing Acoustical Environment

3.5.1 Unattended Background Noise Surveys

Unattended background noise monitoring was conducted between Friday 8 May 2009 and Monday 18 May 2009 at a number of representative locations in the vicinity of the proposed quarry operations on Browns Road, South Nowra. Environmental noise loggers were used to continuously record noise levels at the respective monitoring locations over the survey period at the same distances from the Princes Highway as Locations 1, 2 and 4, and in comparable noise environments. This approach was adopted as monitoring at Locations 1, 2 and 4 would likely be affected by the existing quarry operations.

Within the periods selected as being representative of the background noise level, noise data during periods of any rainfall and/or wind speeds in excess of 5 m/s (approximately 9 knots) were discarded.

Existing industrial amenity noise levels in the locality are not significant, that is, the amenity noise levels are more than 6 dBA lower than the INP acceptable amenity noise levels presented in **Table 1**.

A summary of the results of the background noise surveys is presented in **Table 7** (and graphically in **Attachment A**) for the proposed operational hours of the quarry.

Table 7 Summary of Existing L_{A90} Rating Background Levels (RBL's) and Existing L_{Aeq} Ambient Noise Levels - dBA re 20 µPa

Monitoring Location Equivalents	$L_{A90(15minute)}$ Rating Background Noise Level[1,2]			$L_{Aeq(period)}$ Existing Ambient Noise Level[1]			Estimated Maximum $L_{Aeq(period)}$ Industrial Amenity Noise[3]		
	Daytime 0700-1800 Hours	Evening 1800-2200 Hours	Night 2200-0700 Hours	Daytime 0700-1800 Hours	Evening 1800-2200 Hours	Night 2200-0700 Hours	Day	Evening	Night
Location 1 80 Links Road	41	35	30	64	58	54	<49	<39	<34
Location 2 371 Old Southern Road	40	38	31	50	44	42	<49	<39	<34
Location 4 243 Princes Highway	48	44	39	63	55	51	<49	<39	<34

Note 1: 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.
Note 2: In accordance with INP procedures, if the RBL is below 30 dBA, then 30 dBA shall be the assumed RBL.
Note 3: Where the estimated maximum $L_{Aeq(period)}$ industrial amenity noise level is more than 6 dBA less than the INP acceptable amenity noise level then it is not considered significant, consequently levels below this limit are not shown.

Review of the data presented in **Table 7** indicates that the $L_{A90(15minute)}$ RBL's at the monitoring locations ranged from 40 dBA to 48 dBA during the daytime, 35 dBA to 44 dBA during the evening and 30 dBA to 39 dBA during the night-time. The measured background noise levels are typical of those of a suburban environment with transportation noise contributions associated with the Princes Highway and, to a lesser extent, nearby local traffic and commercial businesses.

3.5.2 Operator-Attended Noise Surveys

At selected locations, operator-attended noise surveys of 15 minutes duration were conducted during the collection of the noise loggers on Monday 18 May 2009.

The operator-attended noise measurements were conducted using a precision integrating sound level meter in order to qualify the results obtained with the unattended noise loggers. During the attended noise surveys, the operator identified the character and duration of acoustically significant ambient noise sources. Wherever possible, the operator quantified local traffic flows and made a qualitative assessment of the prevailing weather conditions.

The operator-attended noise survey results are presented in **Table 8** for 18 May 2009. The weather conditions during the attended noise surveys were those of varying cloud cover (0 to 8 okta) and air temperatures 16°C to 20°C with no wind.

Table 8 $L_{Aeq(15minute)}$ Operator-Attended Noise Survey Results

Location Equivalent	Date/ Time (Hours)	Primary Noise Descriptor (dBA re 20 µPa)			Description of Noise Emission Sources
		L_{A10}	L_{A90}	L_{Aeq}	
Location 4 80 Links Road	18/5/09 12:23	51	45	49	Traffic 44-58 Birds 35-66 Insects 43 Reversing Alarm - not measurable
Location 4 Actual Residence	18/5/09 14:23	57	50	55	Traffic 49-67 Birds 46-50 Quarry 45-50 Plane 54-66
Location 4 80 Links Road	18/5/09 14:47	55	45	53	Traffic 55-68 Birds 44-58 Talking 45-54 Car Alarm 73 Reversing Alarm 53 Car Start 56
Location 2 371 Old Southern Road	18/5/09 12:49	45	36	43	Birds 42-52 Highway Traffic 36-41 Local Traffic 38-57 Workshop 41-53 Workshop Machine 38-39 Dog 33-36 Workshop Telephone 37-38 Reversing Alarm 57-62
Location 1 243 Princes Highway	18/5/09 13:40	67	40	66	Local Traffic 68-89 Birds 36-66 Car Horn 53 Dog 46-47 Plan 45-46 Telephone 42
Location 1 243 Princes Highway	18/5/09 15:13 (after school)	70	48	67	Local Traffic 68-85 Local Motorcycle 87 Birds 49-57 Talking 50-63

3.6 Operational Noise Criteria

The Nowra Brickworks Quarry operational noise emission criteria have been set with reference to the INP, as outlined in **Section 1**. Establishing the operational noise criteria includes an assessment of the RBLs, the intrusiveness criteria and the amenity criteria.

The intrusiveness criteria have been set for the proposed hours of quarry operation based on the RBLs (refer to **Table 7**) at the same offset distances from the Princes Highway as the surrounding residences to the quarry. The controlling criterion at the Correctional Facility is the amenity criterion for passive recreational areas, as nominated in the INP (refer to **Table 1**), as the recommended noise levels for prisons are internal noise levels (refer to "Acoustics Design Guide for Corrections", attached as **Attachment B**).

The residences in the vicinity of the proposed quarry operations are best described by the "suburban" receiver type. The amenity criteria have been set using the recommended $L_{Aeq(period)}$ contribution from industrial noise as presented in **Table 1**, with reference to **Table 7**.

The resulting operational intrusive and amenity noise emission criteria are presented in **Table 9**.

Table 9 Operational Noise Emission Criteria - dBA 20 µPa[1]

Receiver	Intrusiveness Criterion LAeq(15minutes)			Amenity Criterion LAeq(period)		
	Daytime 0700 -1800 Hours	Evening 1800 -2200 Hours	Night 2200 -0700 Hours	Daytime 0700 -1800 Hours	Evening 1800 -2200 Hours	Night 2200 -0700 Hours
Location 1 - 80 Links Road	46	40	35	55	45	40
Location 2 - 371 Old Southern Road	45	43	36	55	45	40
Location 4 - 243 Princes Highway	53	49	44	55	45	40
Correctional Facility	40 to 75 (internal)			50	50	50

Review of the criteria presented in **Table 9** indicates that the amenity criteria noise levels are generally higher than the intrusiveness criteria noise levels at all the residential locations, except at Location 4 during the evening and night. Compliance with the intrusiveness criteria, therefore, will demonstrate compliance with the amenity criteria. Accordingly, the following assessment is based on the intrusiveness criteria being the controlling noise criteria, except at the Correctional Facility and Location 4 during the evening and night.

3.7 Operational Noise Impact Assessment

The point-to-point operational noise level calculation results are summarised in **Table 10**.

Table 10 Modelled Environmental Noise Emissions - dBA re 20 µPa

Location	Project Specific Assessment Criteria	Predicted LAeq(15 minute) Noise Levels[1]					
		Scenario 1 Calm	3 m/s in all Directions	Scenario 2 Calm	3 m/s in all Directions	Scenario 3 Calm	3 m/s in all Directions
Location 1 - 80 Links Road	46	27/27	31/32	33/33	38/38	34/34	39/39
Location 2 - 371 Old Southern Road	45	29/30	33/34	38/40	43/45	37/38	42/43
Location 4 - 243 Princes Highway	53	42/42	45/46	45/45	49/49	43/44	47/48
Location 5 - Correctional Facility	50	35 to 42/ 35 to 42	39 to 46/ 39 to 46	40 to 46/ 40 to 46	44 to 50/ 44 to 50	41 to 46/ 41 to 47	46 to 51/ 46 to 51

Note 1: Noise level without/with the operation of a rockbreaker.

A review of the data presented in **Table 10** indicates that compliance is met at all the nominated receiver locations, both with and without the operation of the rockbreaker, except at Location 5 for Scenario 3 only with a 3 m/s source to receiver wind. Here, there is a marginal 1 dBA exceedance predicted.

3.8 On-site Haulage Trucks - Evening and Early Morning

$L_{Aeq(15minute)}$ noise levels have been calculated under acoustically neutral conditions and adverse 3 m/s source to receiver winds for the selected receiver locations. The receivers, chosen as being representative of the closest residences, are identified in **Section 3.4**.

The point-to-point on-site haulage truck noise level calculation results are summarised in **Table 11**.

Table 11 Modelled Environmental Noise Emissions - dBA re 20 µPa

Location	Project Specific Assessment Criteria		Predicted LAeq(15minute) Noise Levels			
	Evening	Early Morning	Scenario 2 Calm	3 m/s in all Directions	Scenario 3 Calm	3 m/s in all Directions
Location 1 - 80 Links Road	40	35	17	22	21	26
Location 2 - 371 Old Southern Road	43	36	20	25	25	30
Location 4 - 243 Princes Highway	45	40	34	37	35	38
Location 5 - Correctional Facility	50	50	22 to 28	27 to 32	27 to 32	32 to 37

In summary, the anticipated noise emissions are expected to be less than the Project Specific Noise Assessment Criteria at all residences and the Correctional Facility for all the operational scenarios modelled.

Sleep Disturbance

The DECC's most recent policy considers sleep disturbance as the emergence of the $L_{A1(1minute)}$ level above the $L_{A90(15minute)}$ level at the time. An appropriate screening criterion for sleep disturbance is therefore an $L_{A1(1minute)}$ level 15 dBA above the Rating Background Level (RBL) for the night-time period (2200 hours to 0700 hours).

When the criterion is not met, a more detailed analysis may be required which should cover the maximum noise level or $L_{A1(1minute)}$ the extent that the maximum noise level exceeds the background level and the number of times this happens during the night-time period. Some guidance on possible impacts is contained in the review of research results in the appendices to the NSW Environmental Criteria for Road Traffic Noise (ECRTN).

Other factors that may be important in assessing the extent of impacts on sleep include:

- How often high noise events will occur.
- Time of day (normally between 2200 hours and 0700 hours).
- Whether there are times of the day when there is a clear change in the noise environment (such as during early morning shoulder periods).

Based on the DECC's "screening" criteria of RBL + 15 dBA for sleep disturbance, the criterion at the potentially most affected residence adjacent to the Nowra Brickworks Quarry (Location 4) is 54 dBA.

The worst case predicted L_{Aeq} noise level from the evening/night-time truck movements is 38 dBA.

Given that the L_{Amax} quarry product truck noise levels are less than 10 dBA above the L_{Aeq} levels, compliance with the 54 dBA L_{Amax} criterion will be met.

4 Blasting Impacts Assessment

4.1 Proposed Blasting Practices

The proposed method of material extraction for the Nowra Brickworks Quarry is by drill and blast techniques incorporating free-face blasting. A summary of indicative blast design details is presented in **Table 12**.

Table 12 Indicative Blast Design Details

Parameter	Free-Face
Bench height	Up to 11.5 m
Sub-drill	0.5 m
Stemming (using 14 mm aggregate)	2.7 m
Blasthole diameter	76 mm
Blasthole inclination (to vertical)	10°
Blasthole spacing	3.0 m
Burden	2.0 m
Blastholes per Delay	2
Explosives weight/Lineal metre	5.4 kg
Maximum Instantaneous Charge (MIC)	112 kg (for 11.5 m bench)

4.2 Blast Emission Site Laws

Blasting site laws were developed from the blast emission data originally obtained from trial blasting conducted at the site in September 2002, supplemented by recent blast emissions monitoring results from blasting conducted between April and October 2007 at the quarry. The original site laws were presented in Heggies letter report to SCCC dated 11 September 2002. Only the blast emission results above the lower limit of measurement of the monitor were used in the analysis.

The ground vibration and airblast criteria advocated by the DECC and the ANZECC cater for the inherent variation in emission levels from a given blast design by allowing a five percent exceedance of a general criterion up to a (never to be exceeded) maximum. Correspondingly, the "5% exceedance" prediction formulae were generated in the blast emission site laws.

The resulting 5% site laws for ground vibration and airblast are:

- **Ground Vibration**

  $PVS\ (mm/s)\ (5\%) = 2{,}789\ (R/Q^{1/2})^{-1.68}$

- **Airblast**

  SPL (dBL) (5%) =147.0 -15.4 log (R/Q1/3)

  PVS = Peak Vector Sum ground vibration level (mm/s)
  SPL = Peak airblast level (dBLinear)
  R = Distance between charge and receiver (m)
  Q = Charge mass per delay (kg)

  Where PVS (5%) and SPL (5%) are the levels of ground vibration (Peak Vector Sum - mm/s) and airblast (dBLinear) respectively, above which 5% of the total population (of data points) will lie, assuming that the population has the same statistical distribution as the underlying measured sample.

The relationship between distance and the peak vector sum (PVS) ground vibration and peak airblast from the quarry blasting are presented in **Figure 3** and **Figure 4** respectively for an MIC of 112 kg (corresponding to firing a full 11.5 m bench with two blastholes per delay).

Figure 3 Peak Vector Sum Ground Vibration for an MIC of 112 kg

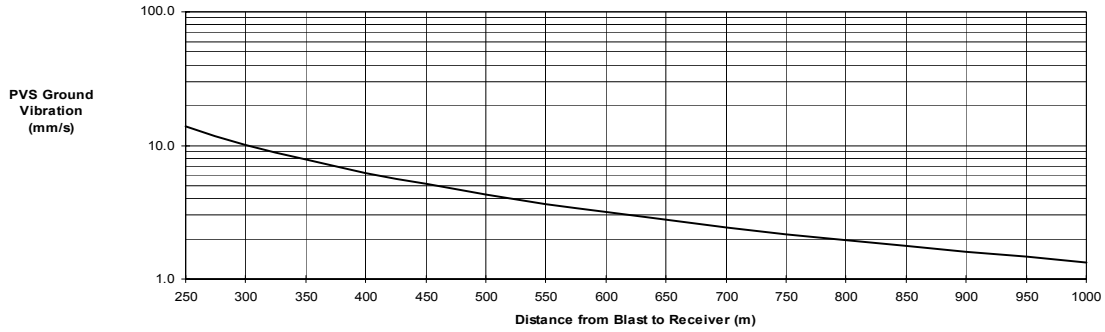
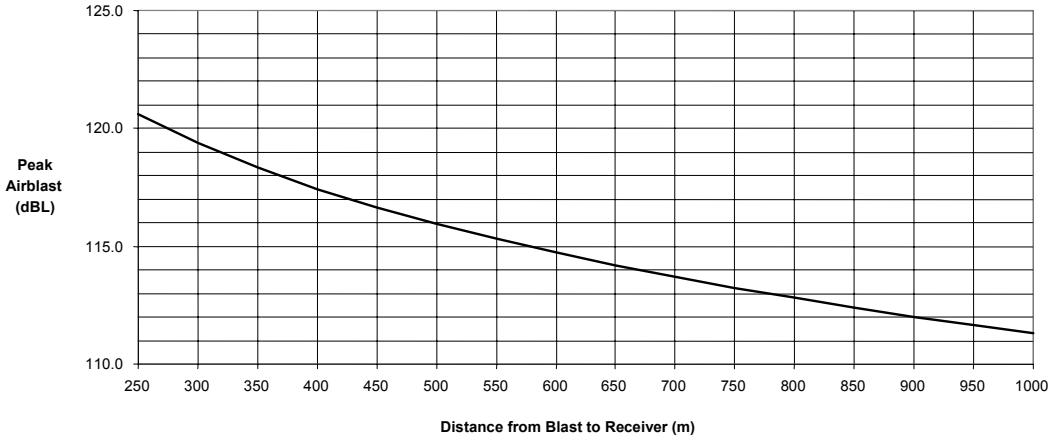


Figure 4 Peak Airblast for an MIC of 112 kg



4.3 Blast Emission Assessment

The predicted level of blast emissions, based on the indicative blast design parameters presented in **Table 12**, were determined using the near distances to the quarry extraction boundary. The predicted levels of Peak Vector Sum (PVS) ground vibration velocity and peak airblast at the nearest potentially affected properties to the quarry blasting are presented in **Table 13**. Also included in **Table 13** is Location 5, the Correctional Facility, refer to **Figure 2**.

Table 13 Predicted Levels of Blast Emissions for a 112 kg MIC

Residence/Receiver[1]	Distance from Blasting	PVS Ground Vibration		Peak Airblast	
		General/ Maximum Criterion	Anticipated Emissions	General/ Maximum Criterion	Anticipated Emissions
Location 1 - 80 Links Road	980 m	5/10 mm/s	1.4 mm/s	115/120 dBLinear	111 dBLinear
Location 2 - 371 Old Southern Road	650 m	5/10 mm/s	2.8 mm/s	115/120 dBLinear	114 dBLinear
Location 4 - 243 Princes Highway	360 m	5/10 mm/s	7.5 mm/s	115/120 dBLinear	118 dBLinear
Location 5 - Correctional Facility	200 m	5/10 mm/s	20.0 mm/s	115/120 dBLinear	116 dBLinear[2]

Note 1: Location 3 is now project related.
Note 2: Within the Correctional Facility, a predicted attenuation of 6 dBLinear is provided by the perimeter wall.

The following information is derived from the predicted levels of blast emissions:

- The predicted levels of ground vibration at the residences at Locations 1 and 2 comply with the ANZECC general human comfort criterion (of 5 mm/s) and consequently with the ANZECC maximum human comfort criterion (of 10 mm/s) as well as the BS 7385 structural damage criterion of 15 mm/s (at 4 Hz).
- The predicted level of ground vibration at the residence at Location 4 exceeds the ANZECC general human comfort criterion but complies with the ANZECC maximum human comfort criterion.
- The maximum predicted ground vibration level of 20.0 mm/s occurs at the closest occupied section of the Correctional Facility (Location 5) using an MIC of 112 kg (corresponding to blasting a full height 11.5 m bench).
- The predicted maximum level of ground vibration at the Correctional Facility complies with the guide value of 50 mm/s recommended for the prevention of cosmetic damage to reinforced or framed structures in BS 7385.
- The predicted levels of peak airblast at the residences at Locations 1 and 2 comply with the ANZECC general human comfort criterion of 115 dBLinear and consequently with the ANZECC maximum human comfort criterion.
- The predicted level of airblast at the residence at Location 4 exceeds the ANZECC general human comfort criterion but complies with the ANZECC maximum human comfort criteria.
- The maximum predicted peak airblast level of 118 dBLinear occurs at the Location 4 residence using an MIC of 112 kg.
- The predicted levels of peak airblast are below the US Bureau of Mines damage limit of 132 dBLinear (2 Hz cut off) at all residences as well as at the Correction Facility.

Based on the current blast emissions site laws, **Table 14** presents the allowable MICs for compliance with the controlling general and maximum ANZECC criteria.

Table 14 Controlling General Criterion and Allowable MIC

Residence/ Receiver	Distance from Blasting	Controlling General Criterion[1]	Allowable MIC	Controlling Maximum Criterion[2]	Allowable MIC
Location 1 - 80 Links Road	980 m	5 mm/s	516 kg	10 mm/s	1,200 kg
Location 2 - 371 Old Southern Road	650 m	115 dBLinear	169 kg	10 mm/s	520 kg
Location 4 - 243 Princes Highway	360 m	115 dBLinear	28 kg	10 mm/s	160 kg
Location 5 - Correctional Facility	200 m	5 mm/s	22 kg	10 mm/s	50 kg

Note 1: Where the controlling criterion is either 5 mm/s ground vibration or 115 dBLinear airblast.

Note 2: Where the controlling criterion is either 10 mm/s ground vibration or 120 dBLinear airblast.

Review of the data presented in **Table 14** indicates that the limiting allowable MIC is 22 kg for blasting at the closest point of extraction to the Correction Facility.

Reference to the indicative blast design details in **Table 12** (specifically the subdrill, blasthole diameter and stemming) indicates that an MIC of 22 kg per blasthole would correspond to a 6.2 m high quarry bench.

Based on the above, it is strongly recommended that all blasts are monitored at the closest/potentially most affected residence in order to establish compliance with the nominated criteria and to progressively update the blast emissions site laws (ground vibration and airblast) in order to optimise future blast designs, based on actual site conditions. In this way, the site laws can be used to assist with the blast designs in order to ensure compliance with the ANZECC criteria at all nearby receivers.

By adopting this approach, in conjunction with the inevitable future introduction of improved blasting products, it is anticipated that the blast emissions criteria can be met without imposing any significant constraints on the blast designs throughout the life of the quarry.

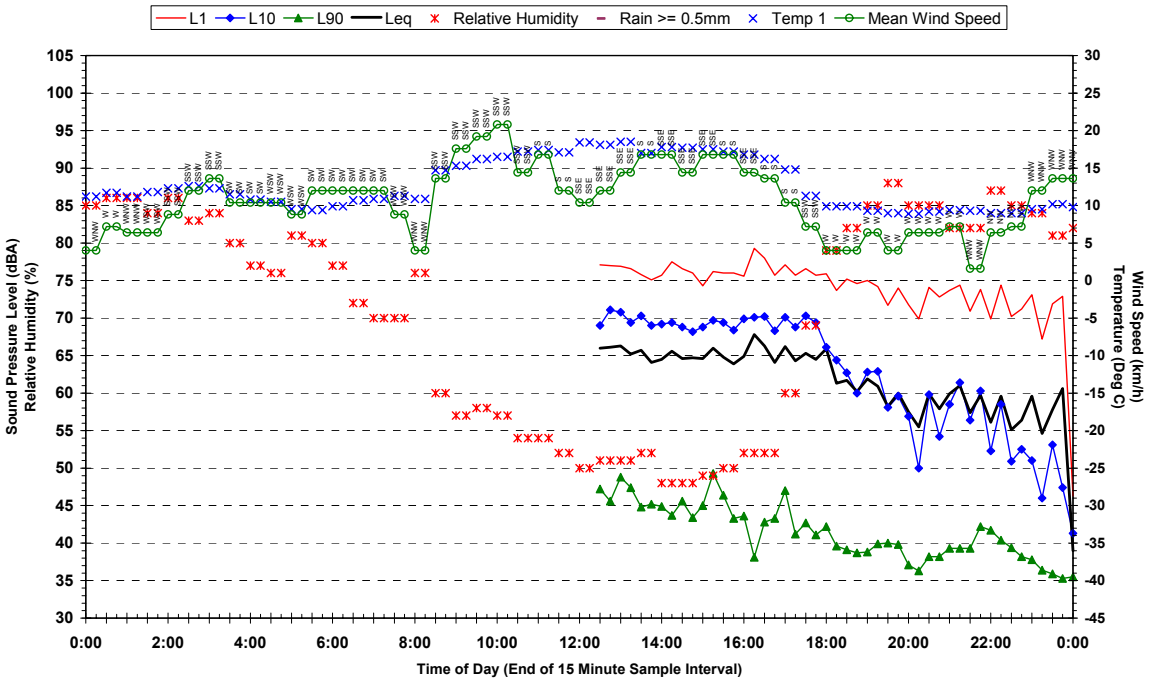
It is further recommended that the operators of the Correctional Facility are formally notified prior to every blast as to exactly when the blast is scheduled to be fired.

I trust the above information satisfies your immediate requirements. However should you have any queries or require more information please call me on 02 9427 8100.

Regards

DICK GODSON

Statistical Ambient Noise Levels
Representative of Location 1 - 1000m Along Browns Road - South Nowra - Friday 8 May 2009



Statistical Ambient Noise Levels
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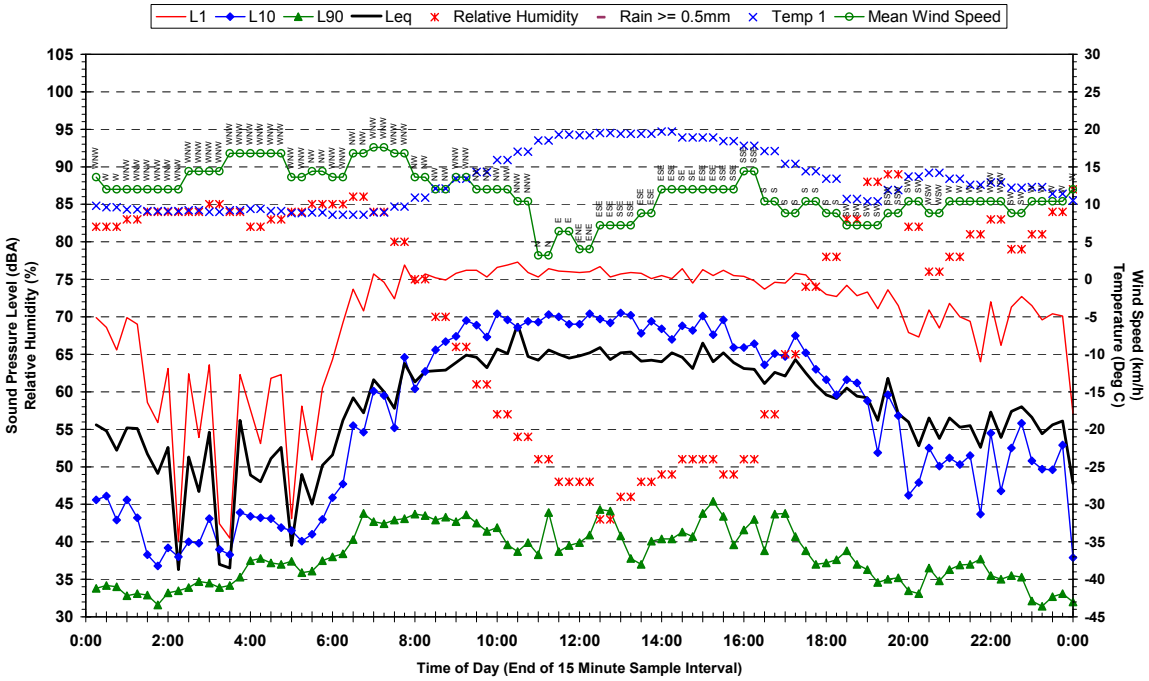

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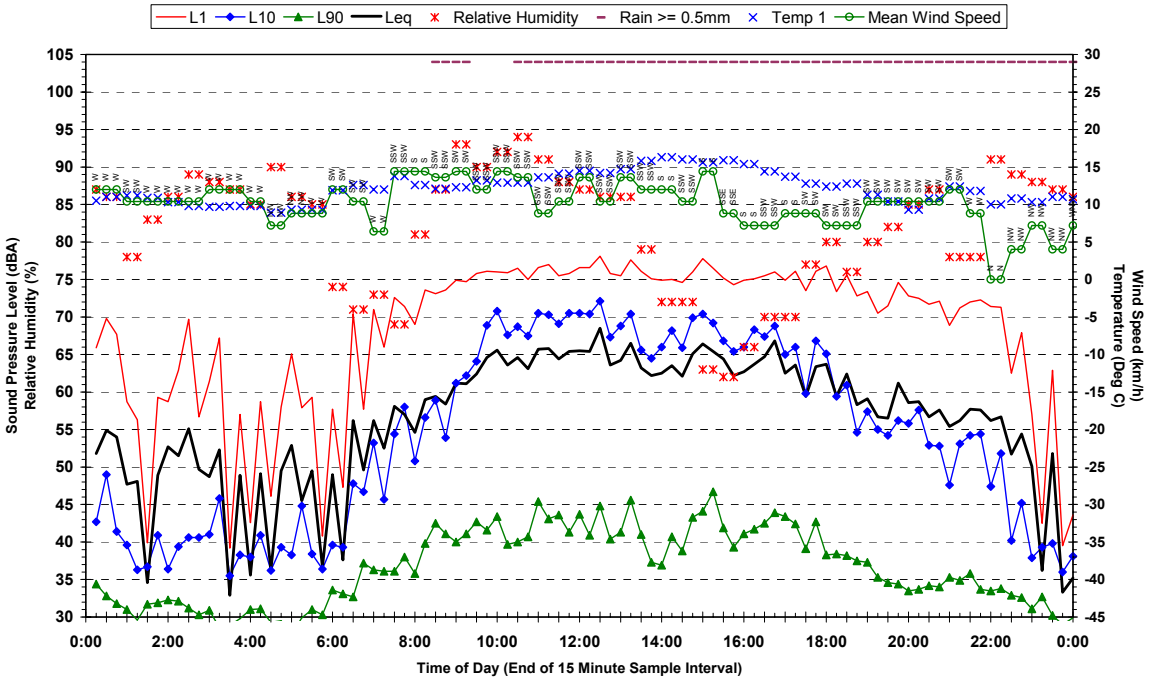

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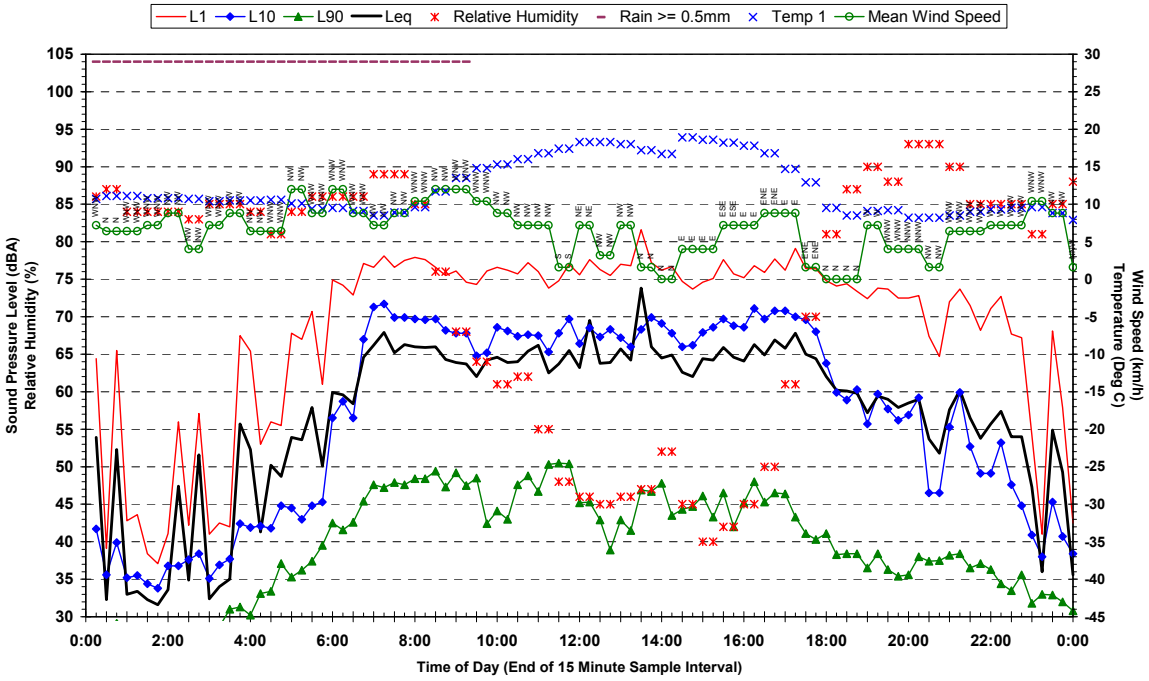

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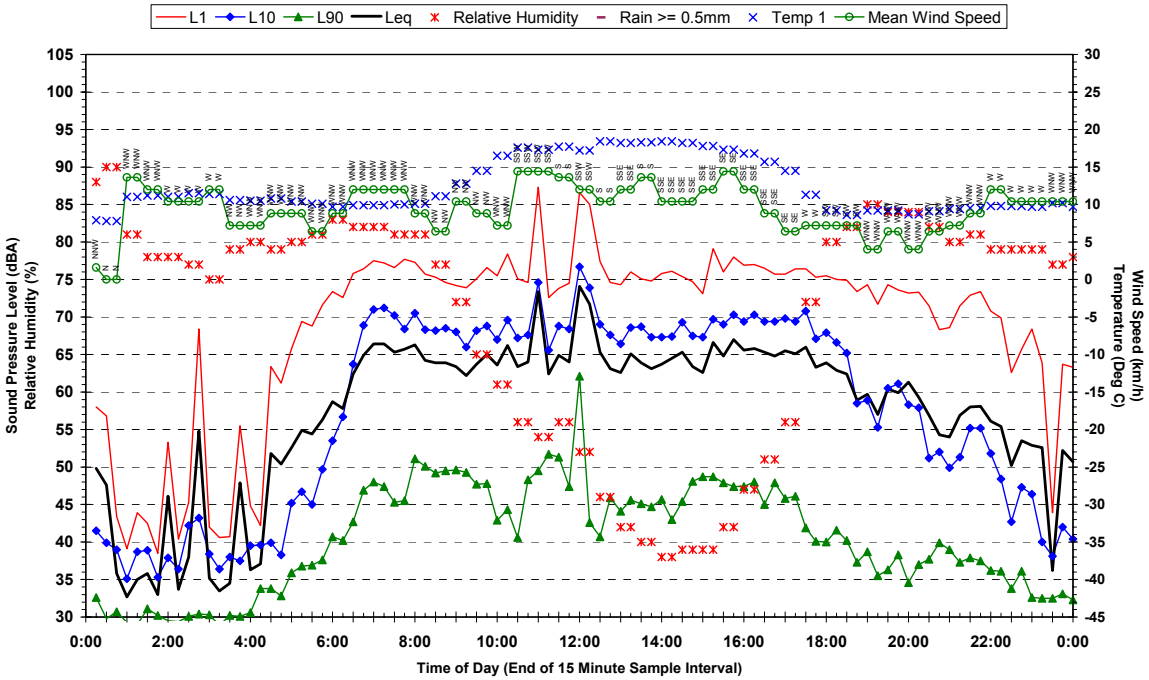

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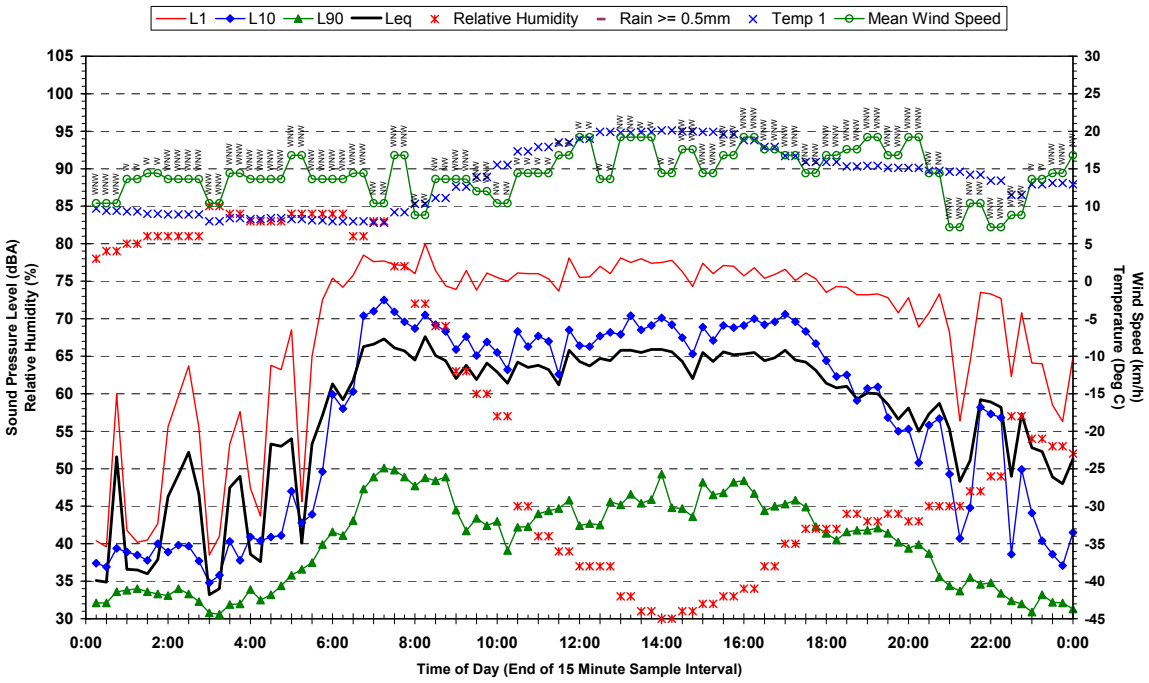

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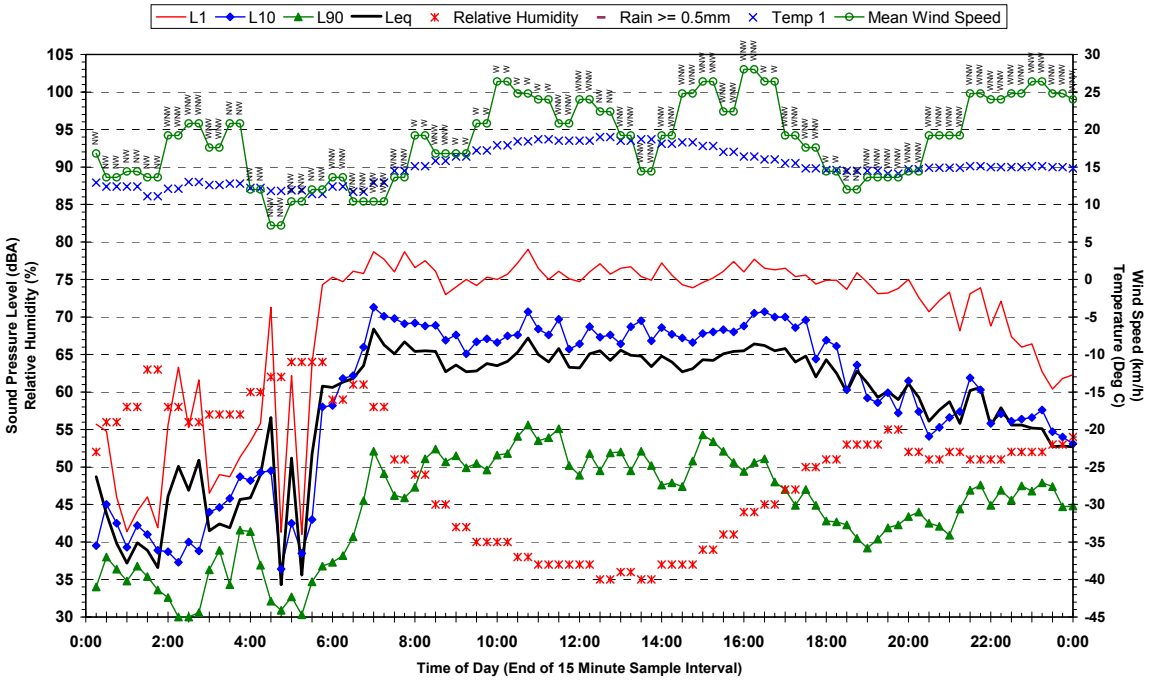

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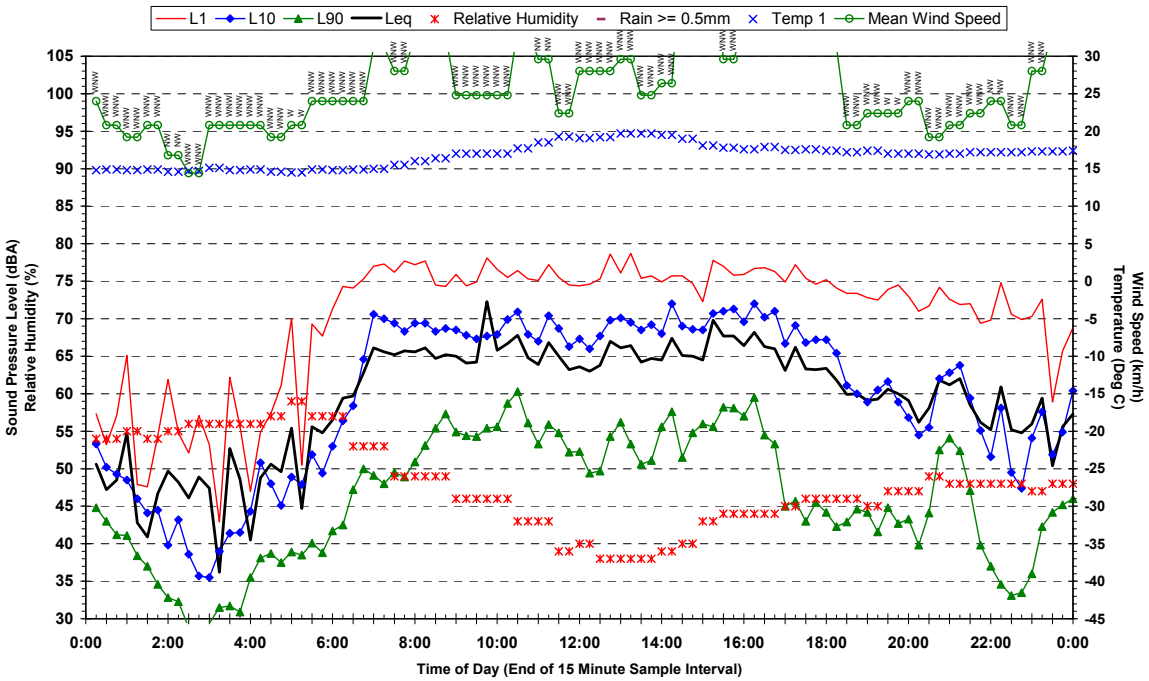

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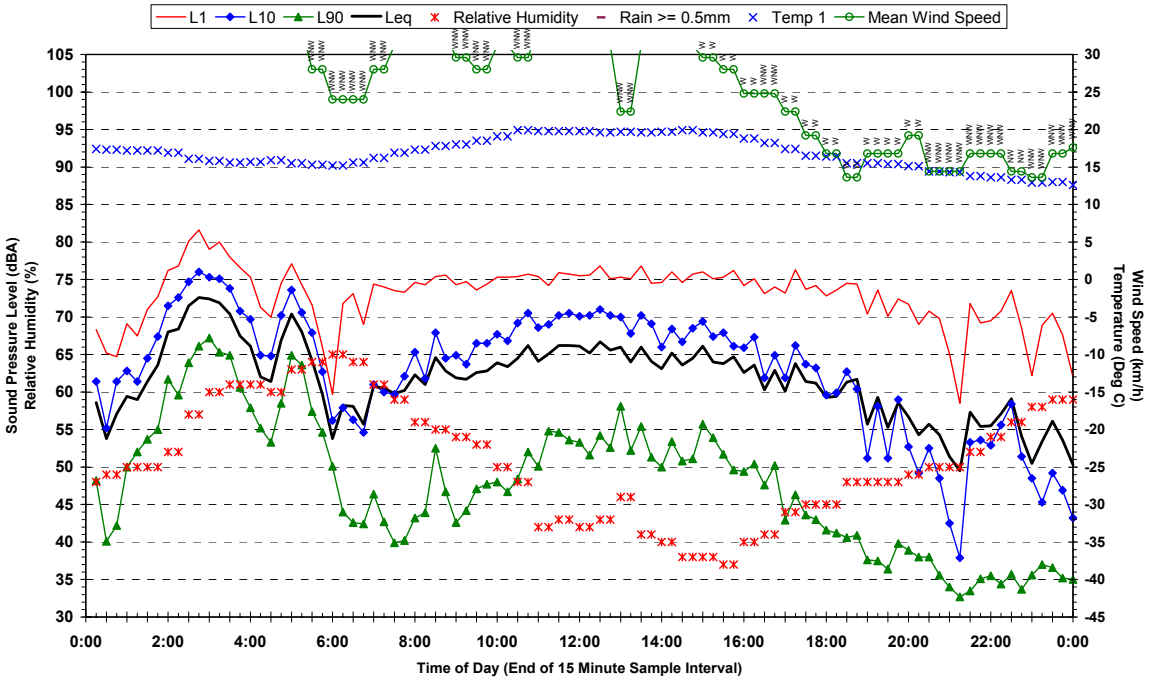

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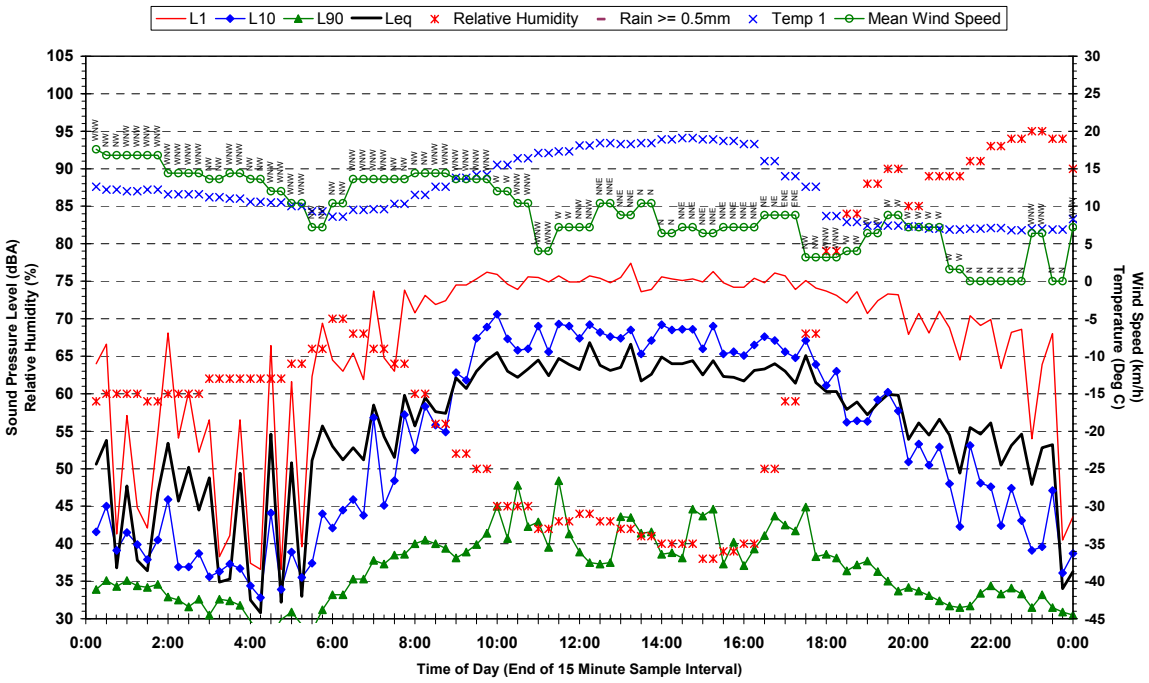
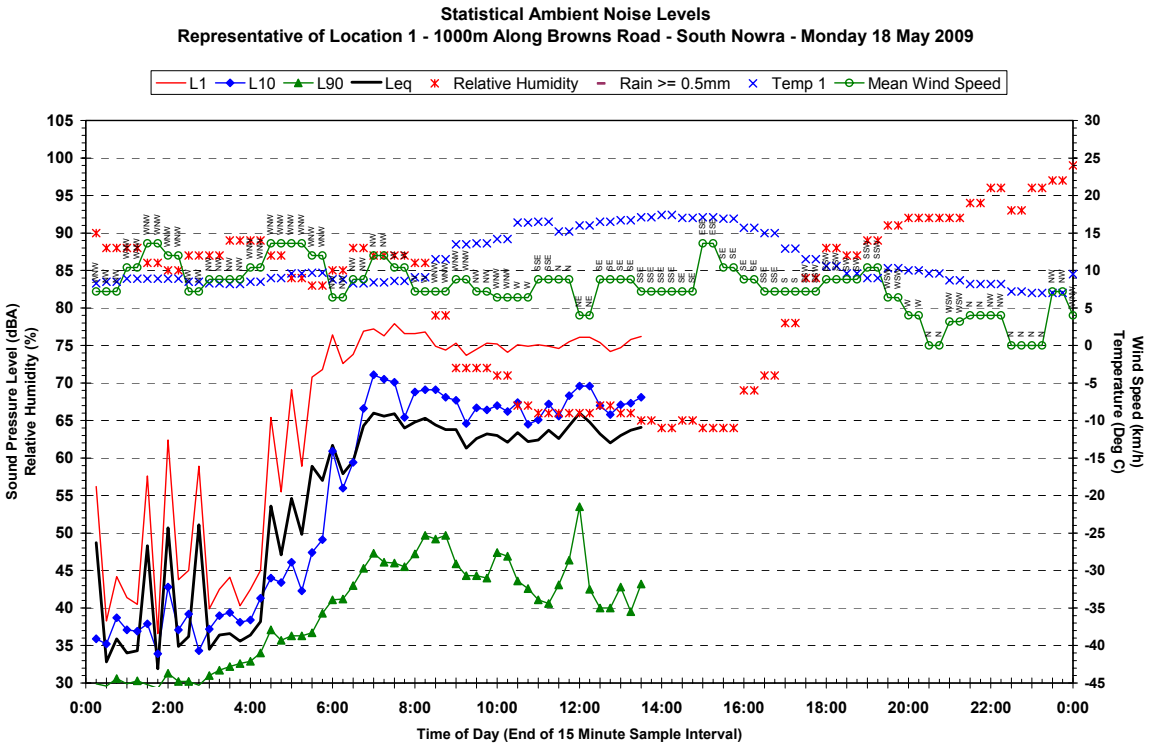
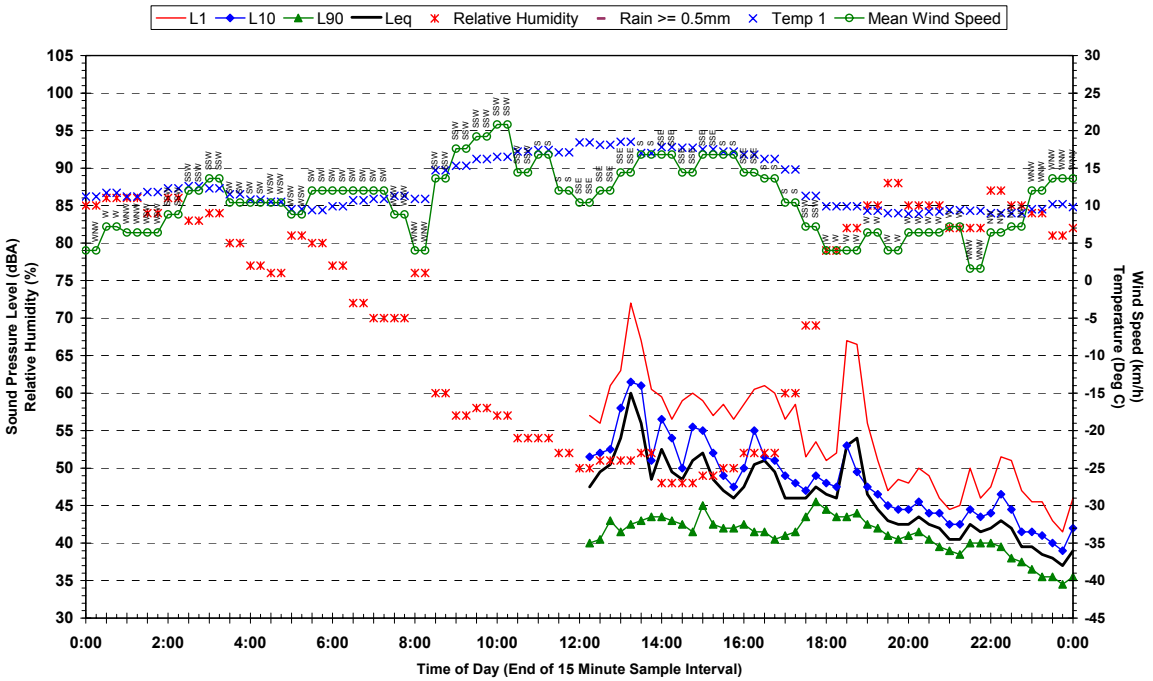



Statistical Ambient Noise Levels
Representative of Location 1 - 1000m Along Browns Road - South Nowra - Monday 18 May 2009
L1
L10
L90
Leq
Relative Humidity
Rain >= 0.5mm
Temp 1
Mean Wind Speed
Sound Pressure Level (dBA)
Relative Humidity (%)
Wind Speed (km/h)
Temperature (Deg C)
Time of Day (End of 15 Minute Sample Interval)

Statistical Ambient Noise Levels
Representative of Location 2 - 463m Along Browns Road - South Nowra - Friday 8 May 2009



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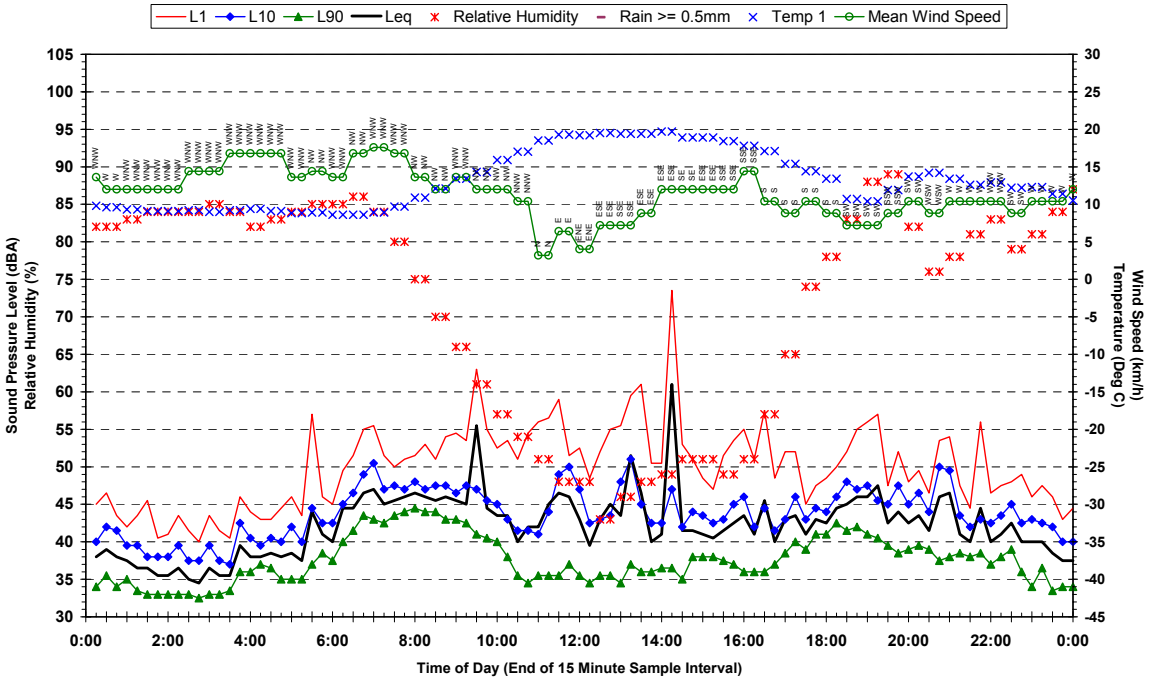

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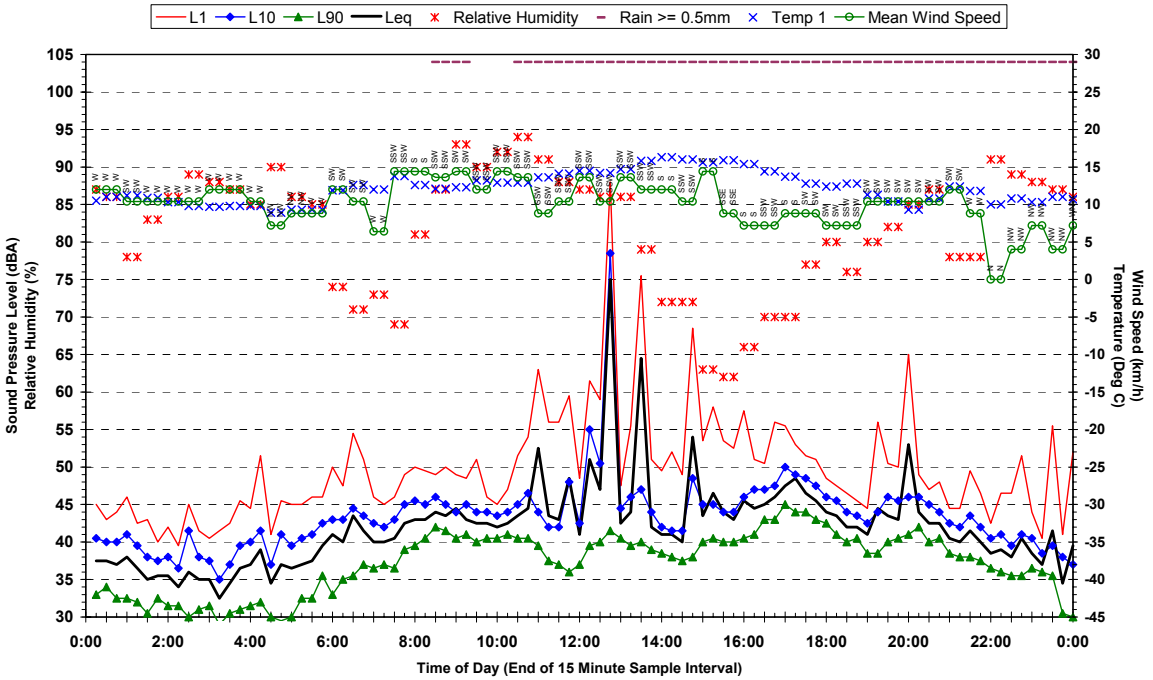

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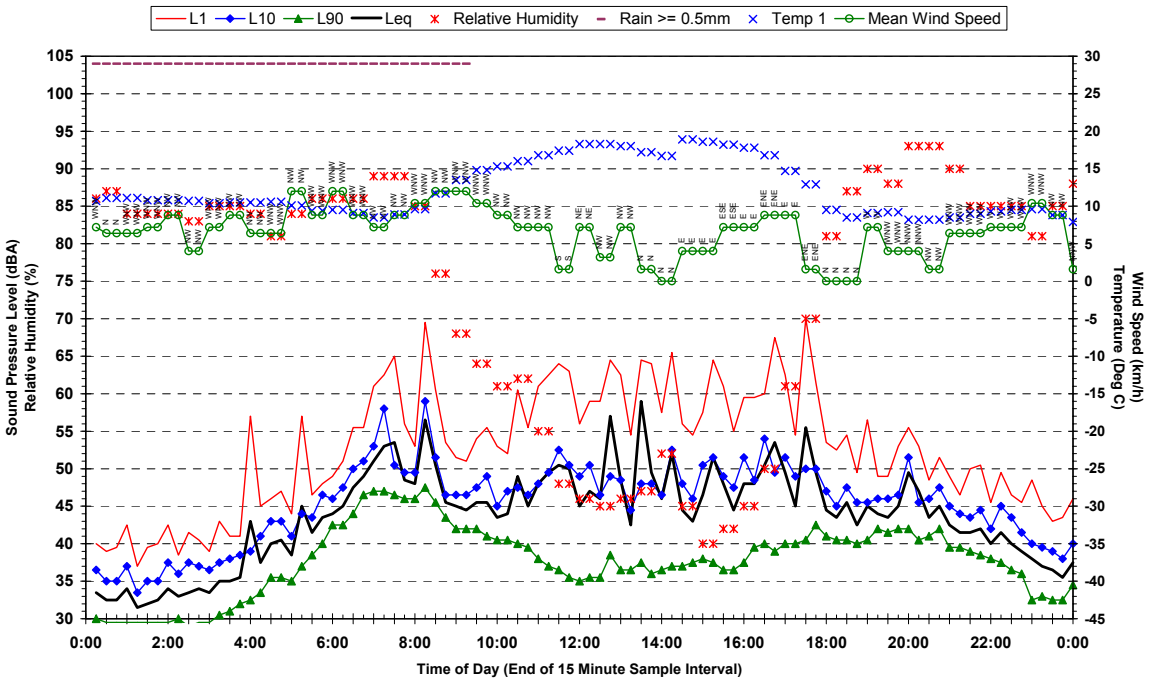

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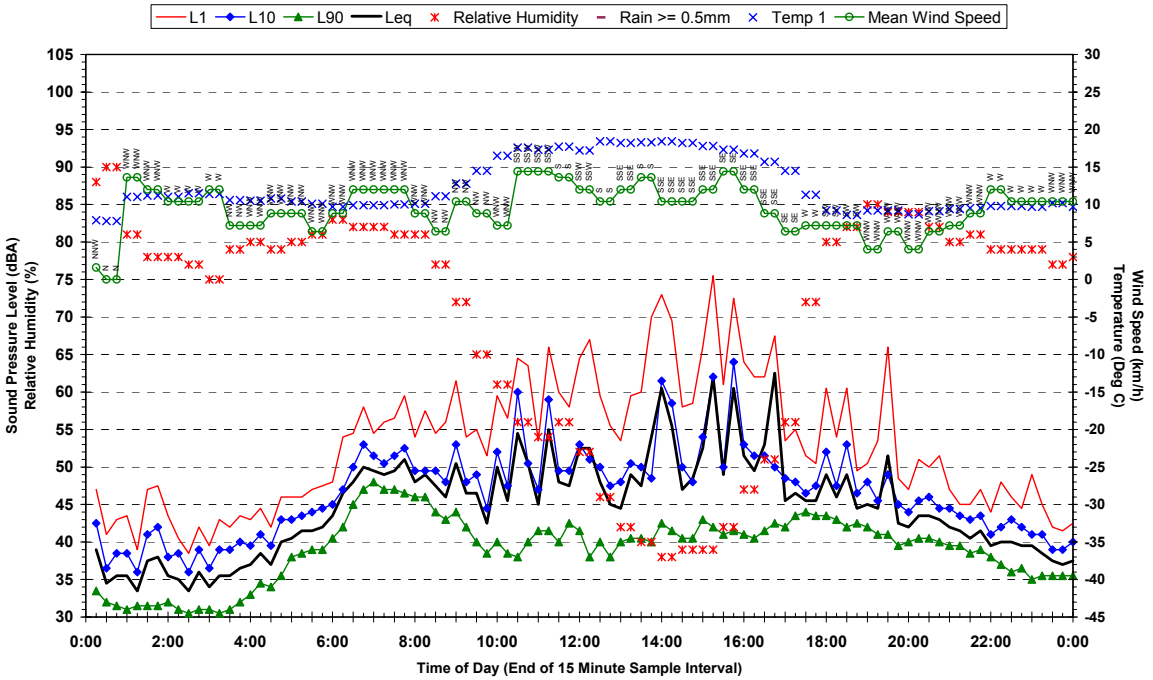

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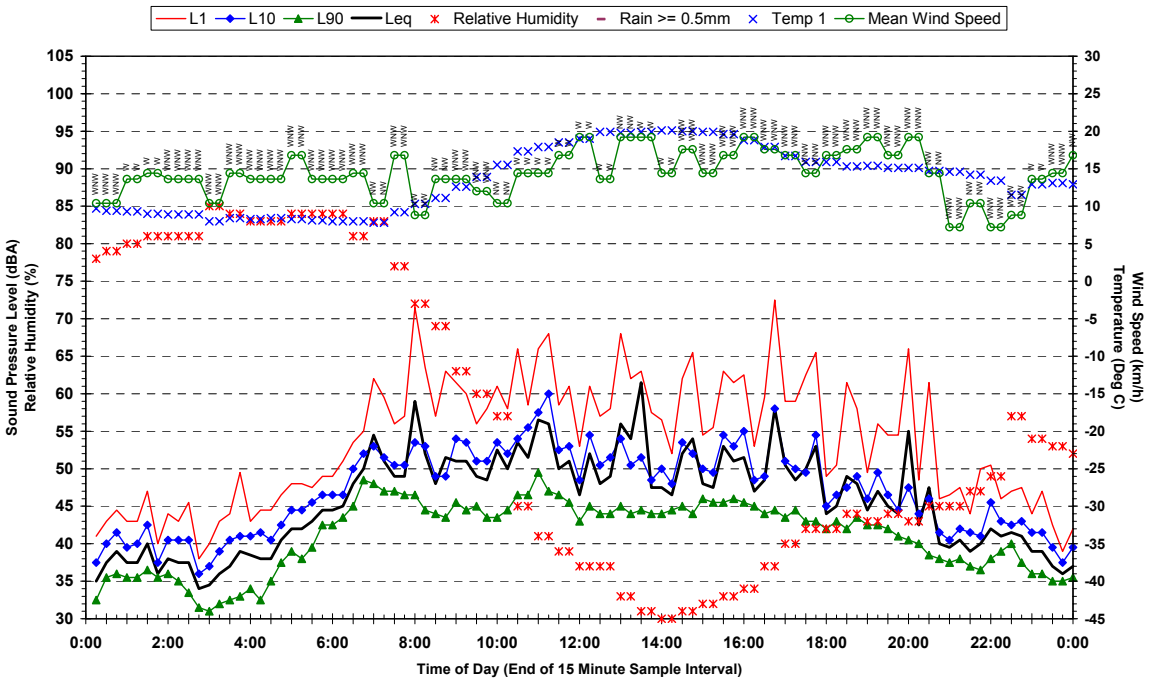

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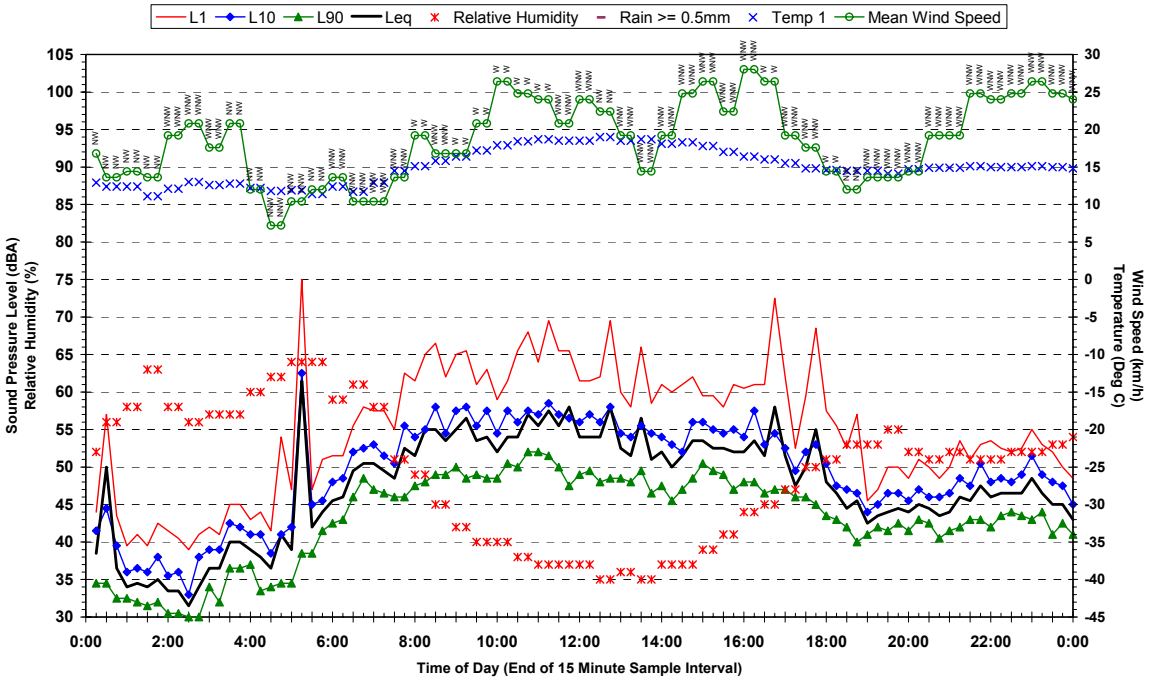

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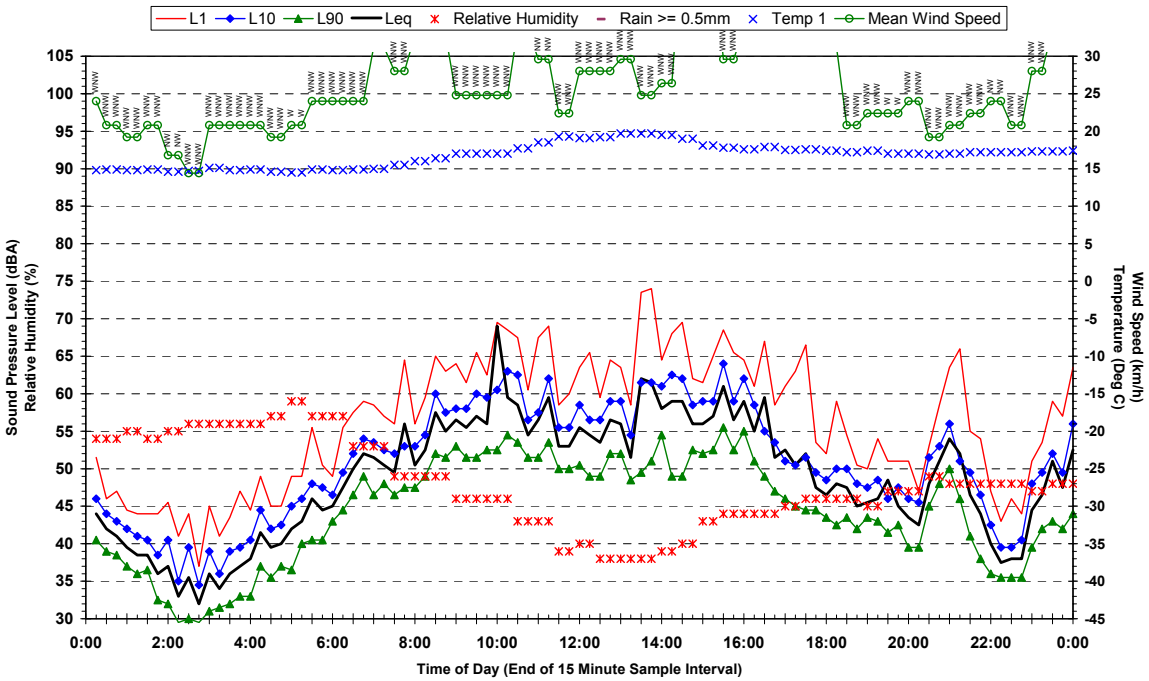

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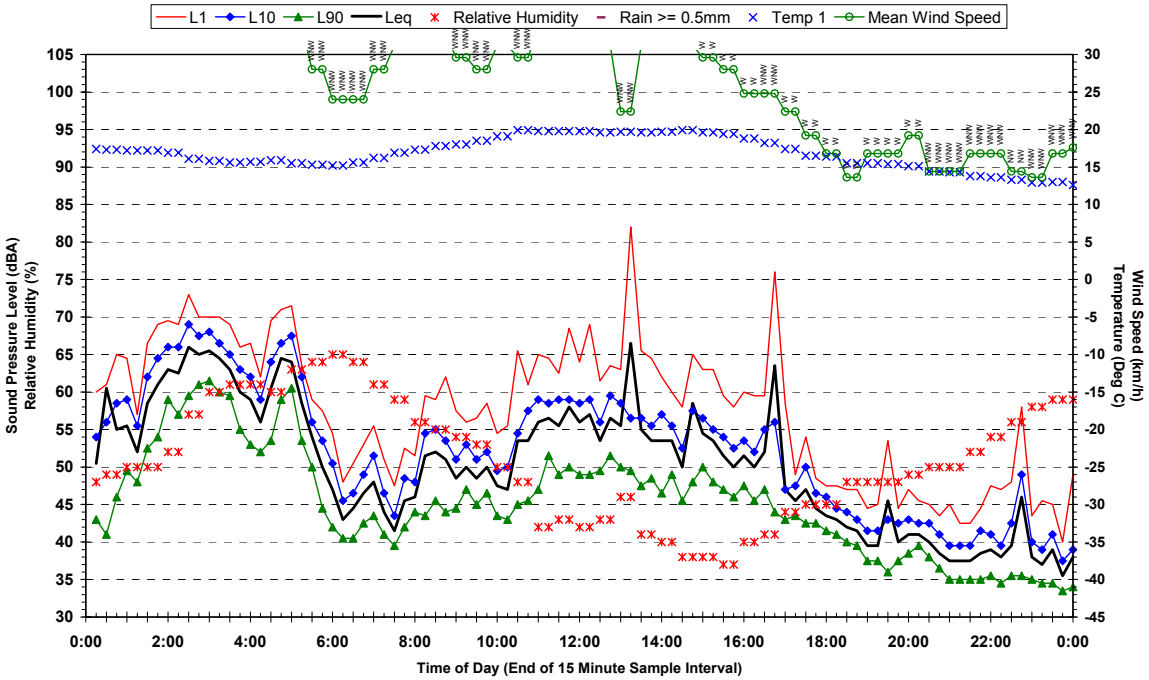

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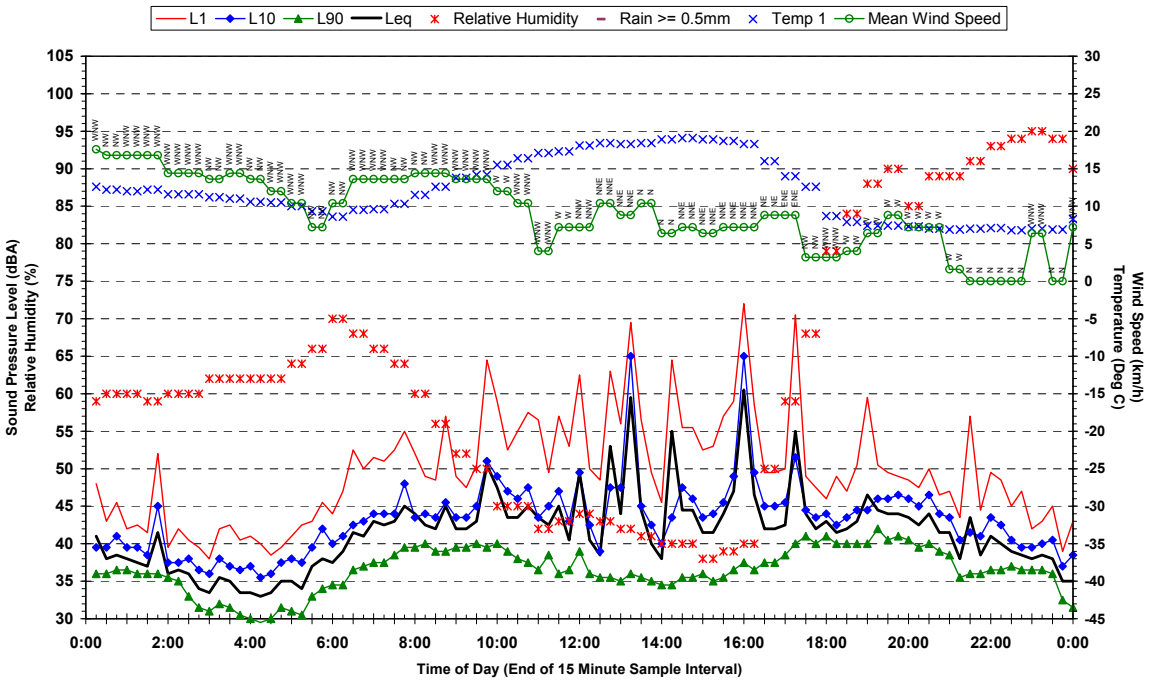

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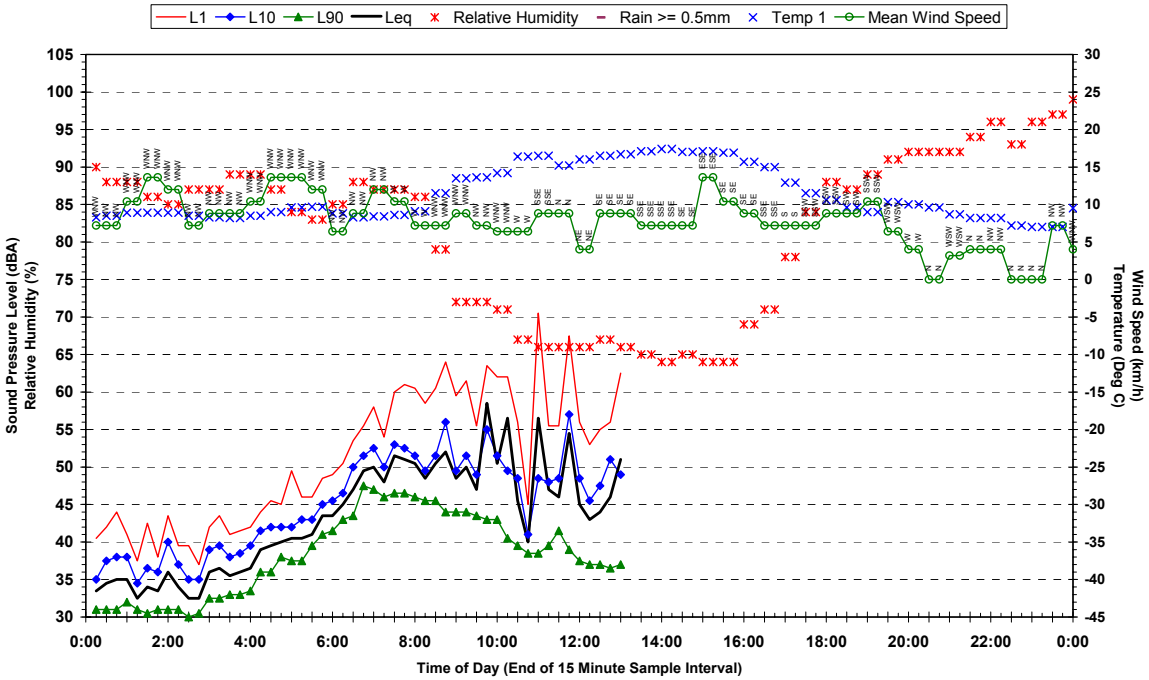

Statistical Ambient Noise Levels
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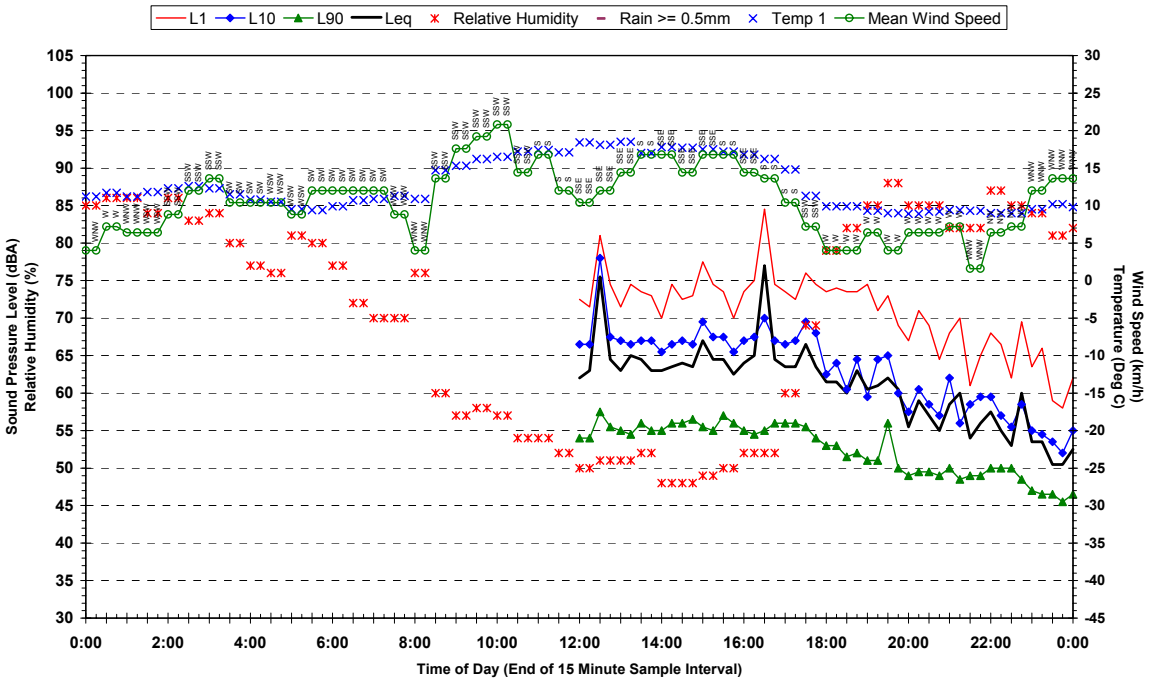

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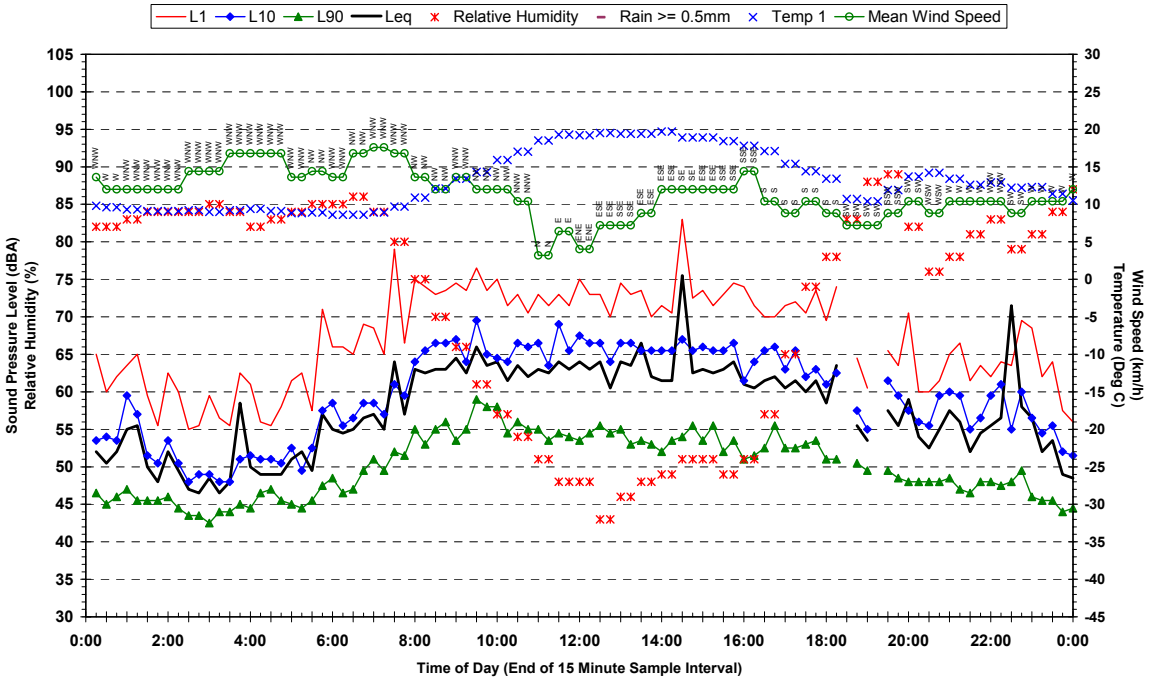

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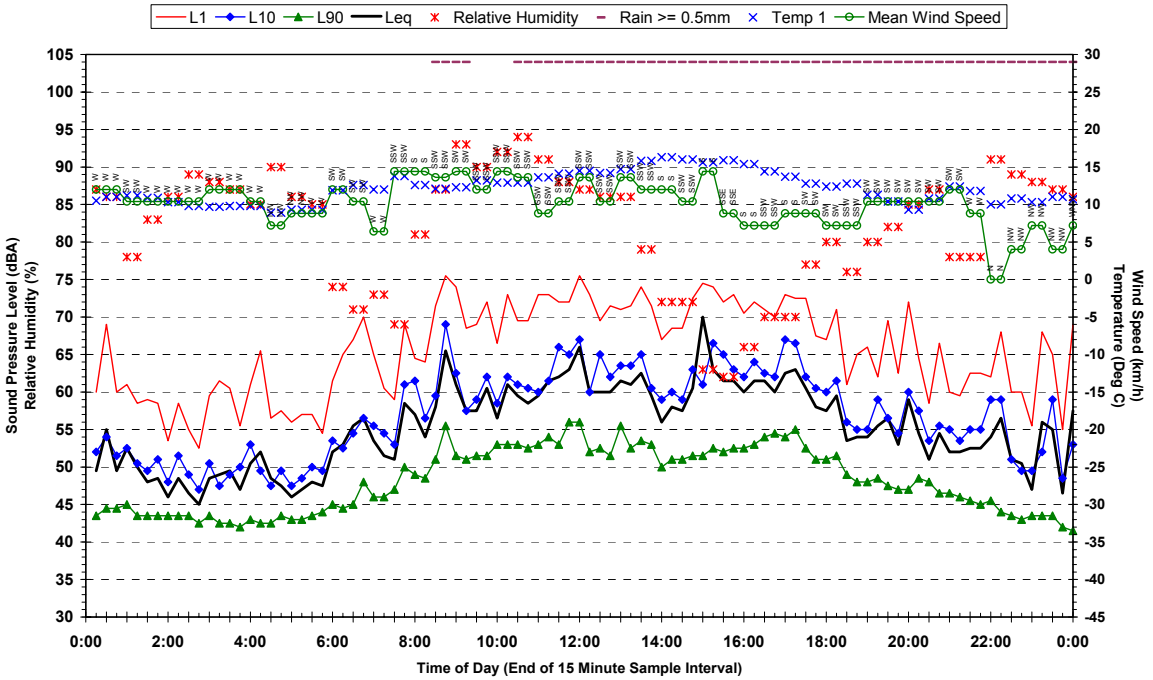

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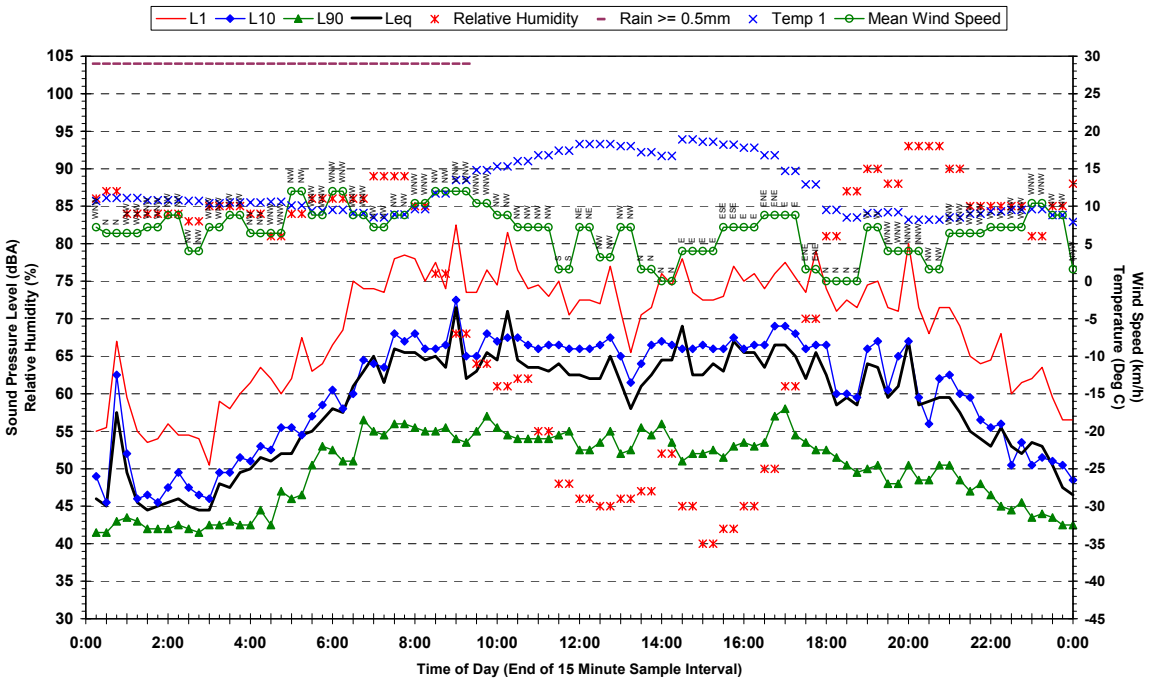

Statistical Ambient Noise Levels
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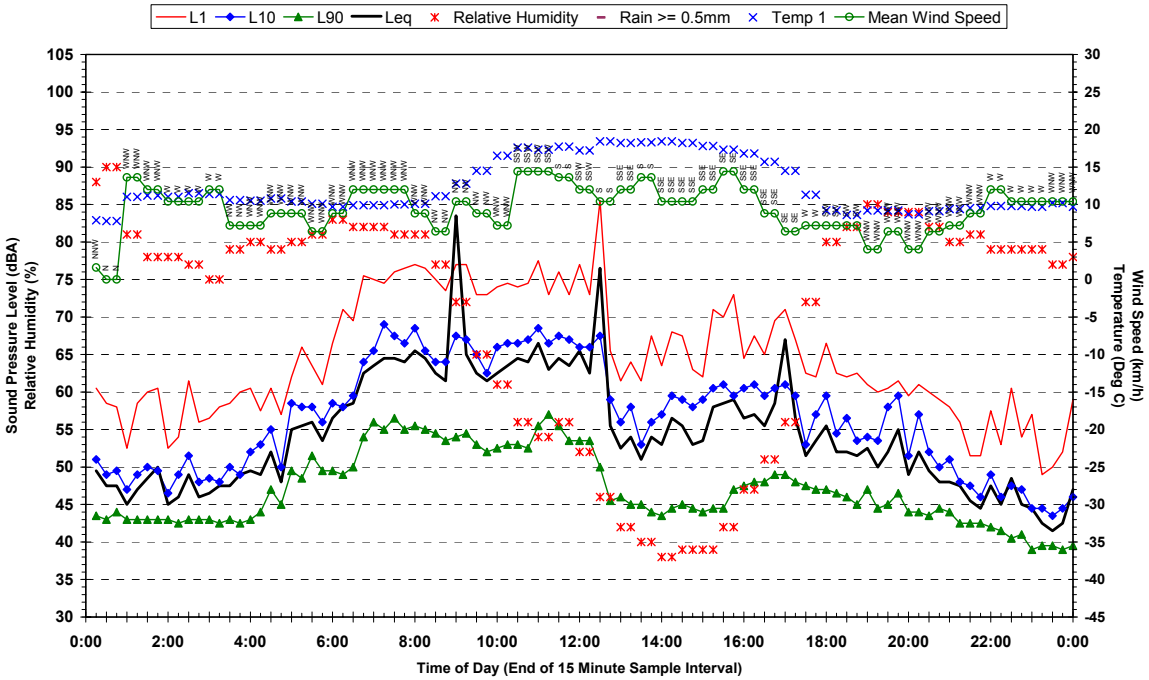

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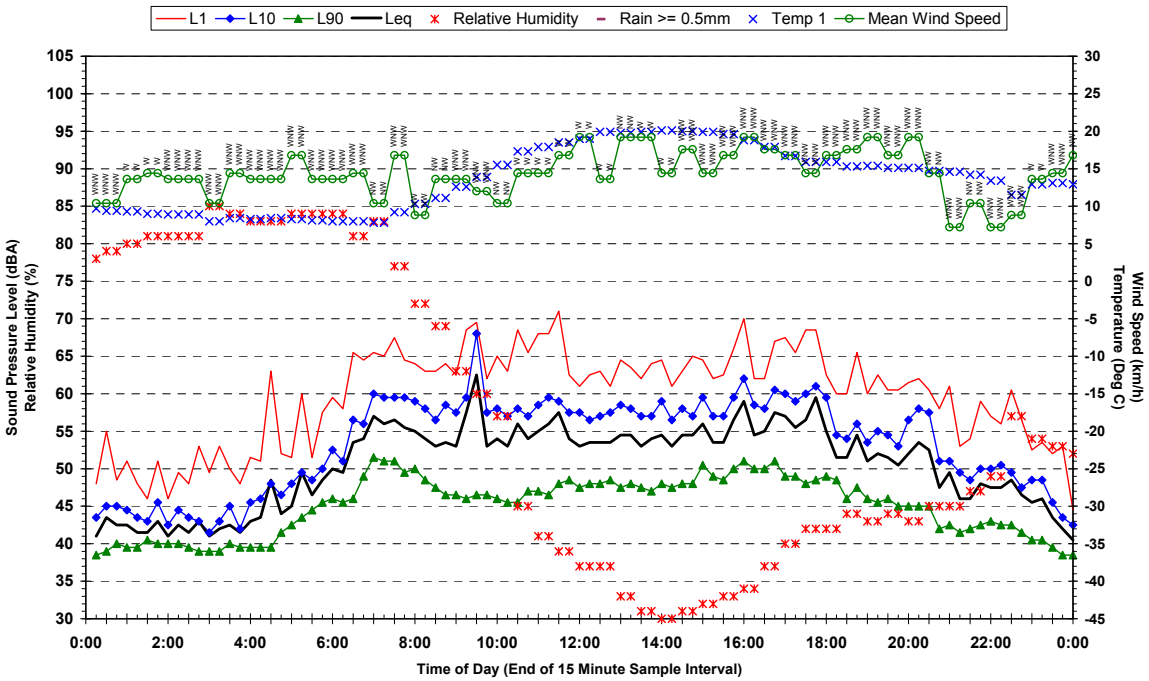

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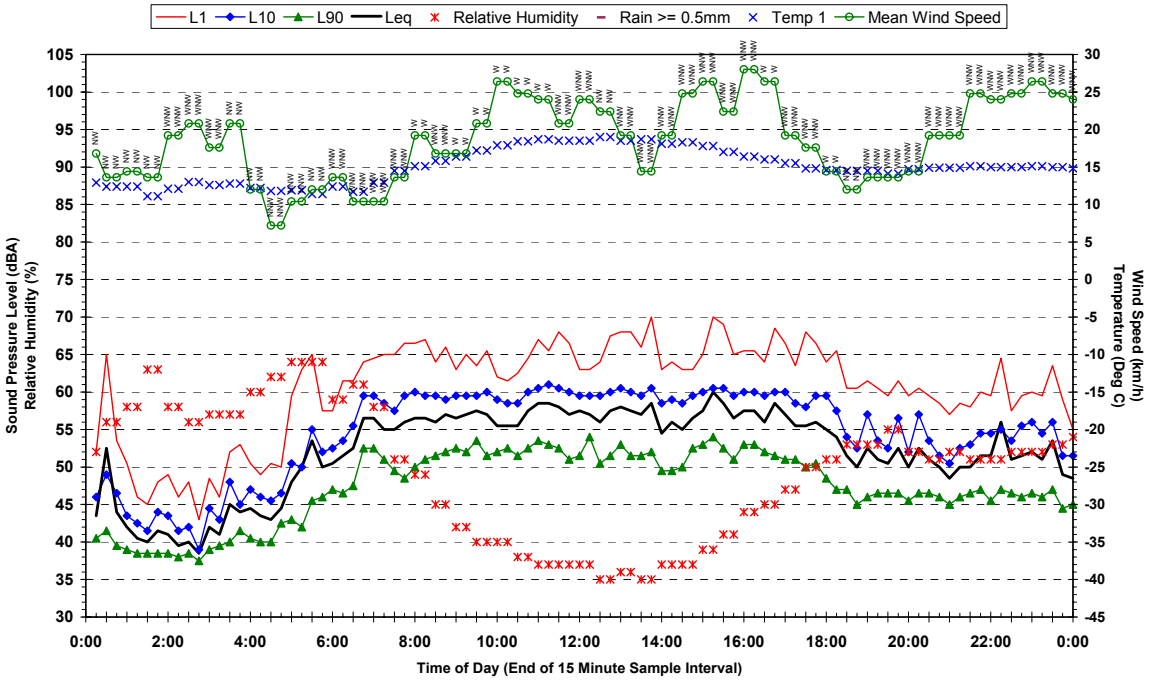

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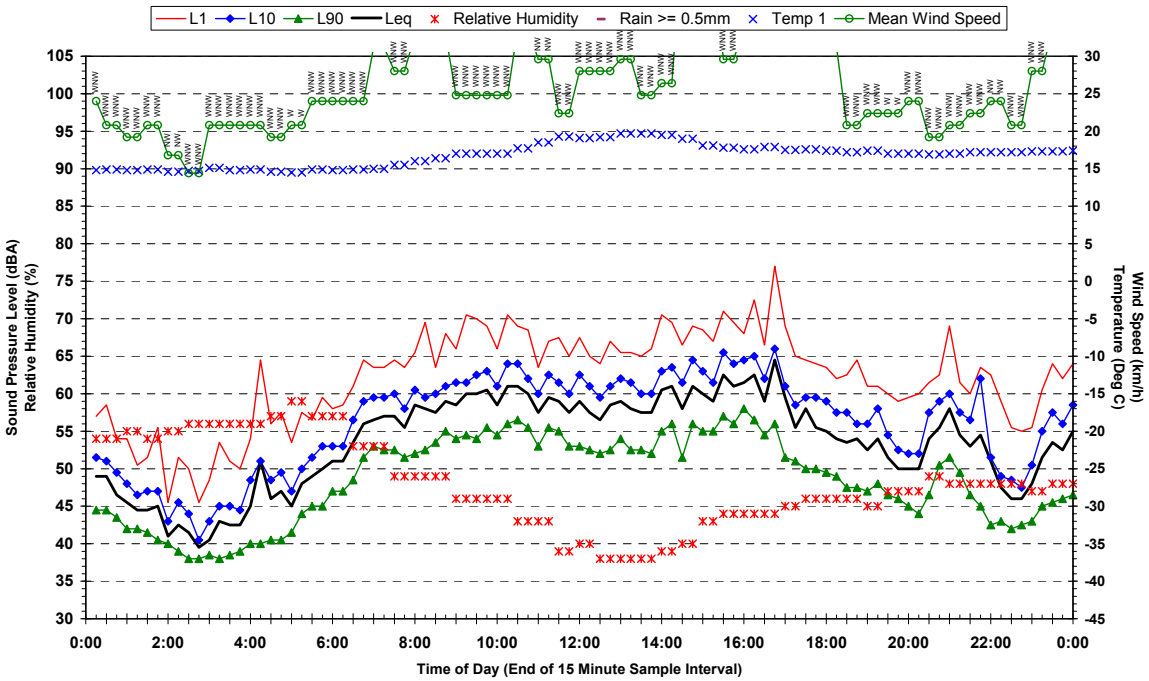

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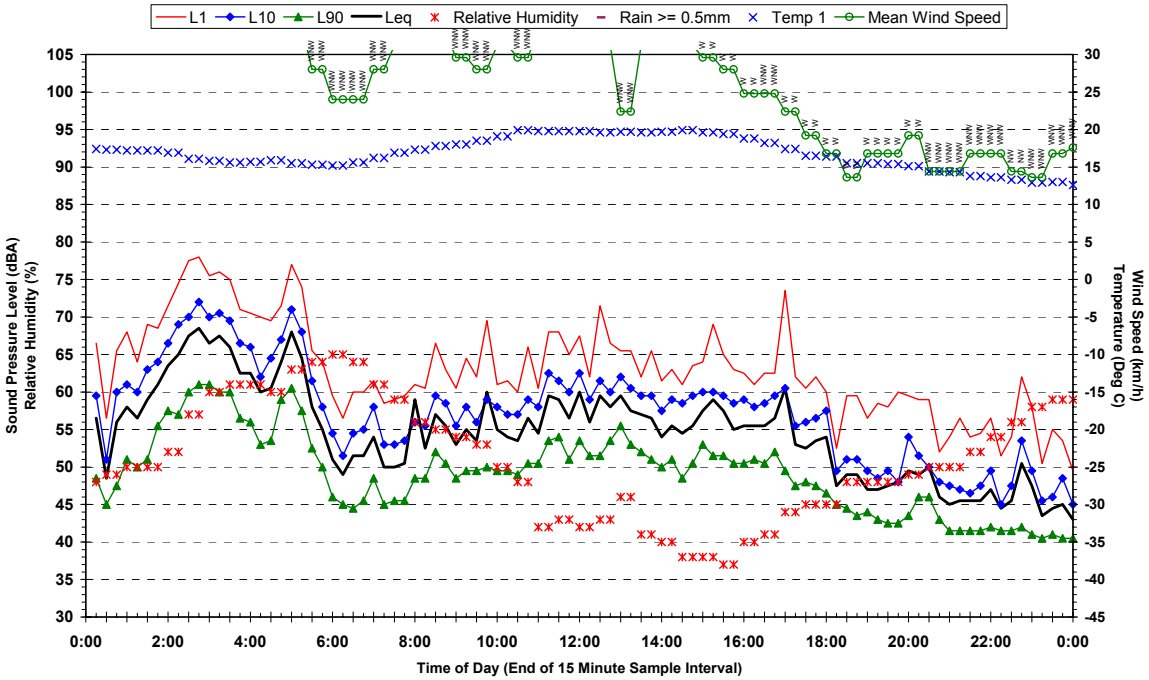
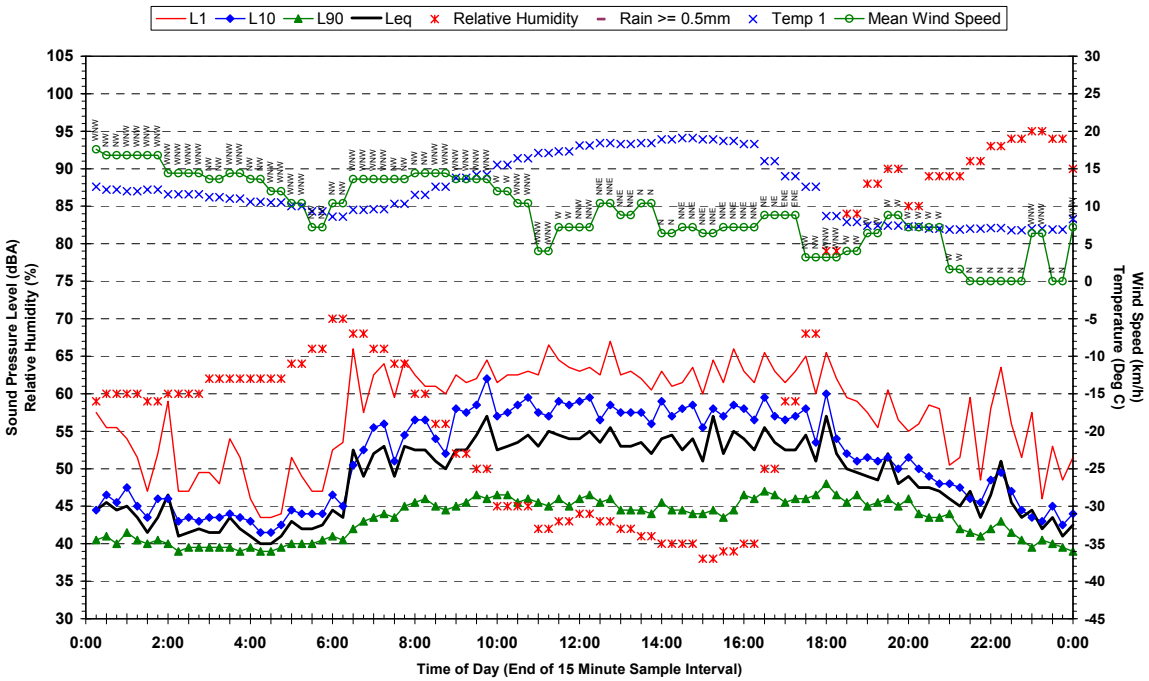
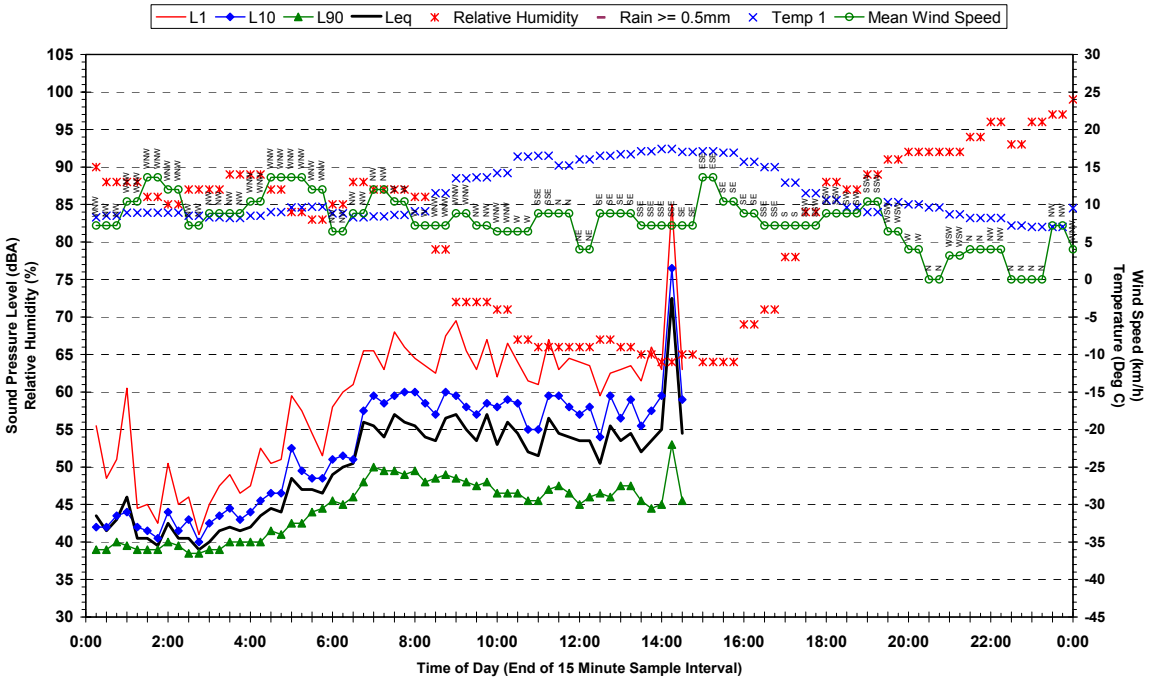


Statistical Ambient Noise Levels
Representative of Location 4 - 106m Along Browns Road - South Nowra - Sunday 17 May 2009



Statistical Ambient Noise Levels
Representative of Location 4 - 106m Along Browns Road - South Nowra - Monday 18 May 2009



What Should a Prison Sound Like?

PRISONS ARE HARD, tough places, and they sound like it. Architects know that enclosing a space with predominately hard, reflective surface finishes will result in reverberant, noisy spaces. Mechanical designers know that equipment selection and duct layouts determine system noise levels. Electrical designers know that light-ballast and engine-generator noise affect indoor and environmental noise levels.

Yet, a visitor to many modern correctional facilities could easily assume that noise was never considered in the design process.

It's easy to understand why: Budgets do not support extravagant design luxuries. Security and maintenance requirements prohibit use of fragile materials. Energy-efficiency requirements for mechanical and electrical systems overshadow operational concerns. Sure, we would like to have good acoustics, but after all, these facilities are for incarceration of criminals.

Design professionals should ask "What are the purposes of these facilities?" Are they purely punitive, or are they correctional facilities for training and rehabilitation? Is it safe to subject staff and inmates alike to intolerable environments known to induce stress and antisocial behavior? As practitioners of a state-licensed design profession, is it ethical to ignore issues that could help create more efficient, secure, and successful correctional environments?

The fact is that good acoustics and noise control can be achieved economically without jeopardizing security. The design process is simply incomplete if acoustical problems are not defined, analyzed, and solved as part of the architectural and engineering design effort. A correctional facility's professional design team should include knowledgeable and experienced acoustical consultants to assist with interpretation of criteria, determination of potential noise or acoustical problems, analyses of architectural and engineering schemes, and development of design solutions.

Source, Path, Receiver

ACOUSTICS and noise control deal with three basic variables: the source, path, and receiver of sound. Of these, the receiver is the most complex and hardest to quantify and deal with; architectural and engineering designers can achieve the greatest effect on source and path variables, although these must go beyond typical "rule-of-thumb" band-aids. Attenuation or modification of noise sources is often feasible for mechanical and electrical equipment, but much less so for (inmate) occupants. Barriers in the path of sound can reduce transmission. Sound that reflects off room walls, floors, and ceilings is affected by the surface characteristics.

Acoustical Criteria

HOW MUCH noise is too much? Architectural designers need to consider the types of spaces that will be created, and the facility's design and operational parameters, to assess the noise impact on the various functional areas. And they should remember that it is neither precise nor efficient to say that rooms should be "quiet."

Some groups have put together acoustical criteria, although these are not always useful. The American Correctional Association (ACA), for example, in its *Standards for Adult Correctional Institutions* (third edition), says "Noise levels in inmate housing units [should] not exceed 70 dBA in daytime and 45 dBA at night." But the ACA standard is believed by many to be inadequate, since it is vague as to whether the controlled variable is continuous background noise level of an unoccupied room (primarily HVAC noise), or occupant-generated noise (including speech, radios, TVs, and PA systems), and because, in either case, the ACA's stated levels may be excessive. The 45-dBA level is associated with known sleep-disturbance levels, and the daytime level is louder than average conversational speech; it would require staff and inmates to speak in raised voices. Finally, the ACA standard disregards fatigue and annoyance due to low-frequency rumble.

In Texas prisons today, designers routinely ignore acoustical issues that can affect stress and antisocial behavior. But these issues can be addressed economically without jeopardizing security.

The Advisory Council on Corrections and Acoustics, a board of corrections officials, architects, and acoustical consultants, has developed better criteria. The following chart, from the group's 1993 publication, "Acoustics Design Guide for Corrections," shows recommended acoustical design goals for correctional facilities

Functional Space	Background Level (dBA)	Reverberation @ 500 Hz (sec.)
Administrative Offices	45	0.90
Conference Rooms	35	0.75
Classrooms	40	0.75
Clinic or Infirmary	45	0.90
Dayrooms	50	1.50
Dining Areas	45	1.50
Exercise Rooms	50	1.50
Housing Units	40	1.00
Shops-Vocational	70	1.50
Shops—Maintenance & Manufacturing	75	1.50

For the purpose of specifying smooth-spectrum ambient-sound levels (avoiding tonality or unbalanced spectrum annoyances), acoustical consultants recommend use of Noise Criteria (NC) of Room Criteria (RC), as characterized by ASHRAE (1991 HVAC Applications, Chapter 42, Sound and Vibration Control), and used for engineering design of most commercial and institutional building projects.

Analysis and Design

THE ACOUSTICAL CONSULTANT will analyze large open spaces for reverberation based on room size, shape, volume, and surface finishes, comparing projected reverberation times for various spaces with the criteria to indicate what kind of changes are necessary and how much surface area should be affected. Review of adjacent space functions and ambient sound-level spectra will determine how much sound-transmission loss is necessary in each audible octave. Impact transmission can significantly change barrier-design requirements. The varying needs for low-, mid-, and high-frequency noise reduction prescribe certain wall, floor, and ceiling designs. Analysis of the fan noise generated by air handlers and exhaust fans, and the system attenuation provided by the combination of air distribution system and room losses, will project the room's mechanical sound level. This continuous background sound level may be compared to the noise criteria to determine how much additional attenuation, if any, is needed to achieve permissible levels in each type of space. Other sound sources, such as light-ballast noise radiation, radio, television,

"Prison Noise," continued on page 72

"Prison Noise," continued from page 76

telephone, and PA-speaker noise, along with impact noises such as exercise-room foot falls and ball bounces, can also be analyzed for effect in the source room or adjacent spaces.

Solution Applications

ARCHITECTURAL ACOUSTICS solutions for most correctional facilities focus on controlling reverberation in dayrooms, dining/assembly halls, and exercise/gym rooms. Smaller spaces, including classrooms, vocational shops, inmate cells or housing units, and administrative offices and conference rooms should also be treated. Security and maintenance require that sturdy, abuse-resistant materials be used wherever inmates have access. Rugged new acoustical products developed specifically for correctional facilities are now available. Several manufacturers produce cost-effective, acoustically absorbent surface finishes, including "Alcan" or "IAC" perforated-metal panels, "Tectum" secure ceiling systems and wall panels, and "Pyrok" cement concrete or gypsum-based acoustic plaster. While most applications are planned for installation out of the reach of inmates, the cement-based plaster can resist abuse at floor levels, particularly in direct-supervision areas.

Sound-isolation and acoustical-privacy separation design in walls, doors, windows, ceilings, and floors may involve use of high-mass materials or unbalanced and decoupled barrier elements, depending on the construction system desired by the architect and building user. Decoupled elements—two or more mass layers separated by resilient layer(s)—are generally a necessity where impacts are common. Sound-isolation design must consider location and detailing of flanking paths or acoustical leaks in the room envelope, resulting from ducts, pipes, conduits, lights, or electrical fixtures, and doors.

HVAC noise has traditionally been controlled in a haphazard manner by assuming that internally lined ducts and elbows would quieten the fan noise. Now, however, most public-sector owner-agencies mandate use of unlined sheet-metal ducts to avoid growth of microbes and airborne transmission of various contaminants, so control of noises from fans, fittings, and velocity in ducts will need to be accomplished with passive duct-attenuator elements. These noise traps should be sized and selected carefully to control pressure drop and additional noise generation. Active-noise-cancellation systems may be employed in specialized cases. In general, fan-noise attenuators should be located as close to the air-handler or mechanical-equipment room as possible. High-frequency attenuators, such as insulated flexible-duct connections to supply diffusers or boots, should be located as near the end of the air-distribution system as possible, to attenuate noise generated in the duct system. Most important, return- and supply-air distribution paths must be considered equally.

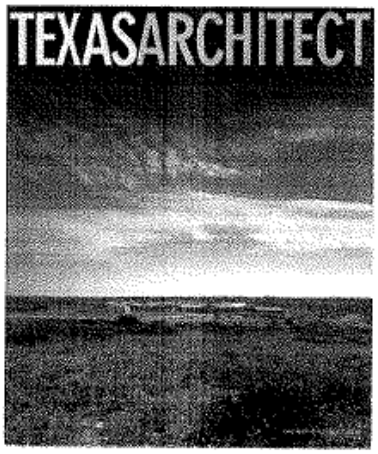
Electrical noise sources in occupied spaces, such as ballasts for vapor lamps, should be enclosed or remotely located. Pipes for chilled or hot water or plumbing should not be routed above or through sleeping, classroom, conference, and other quiet spaces, unless enclosed or lagged with decoupled, high-mass noise-containing materials.

Central-plant and emergency-generator equipment should be located remotely from inmate housing and dayrooms. Indoor generator rooms should have noise attenuation for inlet and radiator discharge openings, in addition to mufflers for exhaust pipes. Vibration-isolation systems should be employed for rotating-shaft, reciprocating, and impact sources, as well as attached ducts, pipes, and conduits.

Post-Design Assurance

AFTER PROGRAMMING, planning, and implementing acoustics and noise-control solutions in architectural and engineering contract documents, diligence must be maintained in "value engineering," bidding, and construction phases to assure materials and installations that meet design intent. Post-construction validation measurements of vibration and noise should be conducted by qualified acoustical consultants or according to established standards. Rooms failing to meet criteria should be evaluated for unexpected flanking paths, improper or incomplete installations of acoustical and noise-control elements, on-site modifications of design, or other anomalies. Good planning efforts will create correctional facilities with acceptable acoustics and background noise levels that do not endanger the health of staff and inmates. Integration of acoustical solutions into architectural and engineering designs can provide these benefits with little, if any, additional cost or compromise to security. *Jack Evans*

Jack Evans is principal of Jack Evans & Associates, Austin, vibration, acoustics, and noise consultants



ATTACHMENT C

Various Correspondence between John Coady and the RTA

John Coady Consulting Pty Ltd
ABN: 99 001 929 219 | ACN: 001 929 219

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9 June 2009
Ref : 07072

Mr Chris Millet
Manager, Land Use Development Impacts
Southern Region
Roads and Traffic Authority
PO Box 477
WOLLONGONG 2520

Email : Christopher_MILLET@rta.nsw.gov.au

Dear Chris

NOWRA BRICKWORKS QUARRY, SOUTH NOWRA
PROPOSED CONTINUATION AND EXPANSION OF EXTRACTIVE OPERATIONS

I refer to your enquiries regarding the access off Princes Highway for the Nowra Brickworks Quarry, and the implications of the proposed continuation and expansion of extractive operations for that access.

As you are aware, John Coady Consulting Pty Ltd prepared a Traffic and Transportation Assessment of the proposal[1] which formed part of the DA submission. That assessment addressed four scenarios as follows:

- Scenario 1 – Existing (2007) traffic flows on Princes Highway (2-lane), and the traffic generation of the existing quarry under the 85th percentile operating condition (**Table 12**).
- Scenario 2 – Existing (2007) traffic flows on Princes Highway (2-lane), and the projected traffic generation potential of the quarry with expanded extractive operations (**Table 13**).
- Scenario 3 – Projected (2017) traffic flows on Princes Highway (2-lane), and the projected traffic generation potential of the quarry with expanded extractive operations (**Table 14**).
- Scenario 4 – Projected (2017) traffic flows and Princes Highway (4-lane divided carriageway) and the projected traffic generation potential of the quarry with expanded extractive operations (**Table 15**).

Each of those scenarios was tested using the INTANAL traffic model and the results of the INTANAL analysis were set out in Tables 12, 13, 14 and 15 of the report (reproduced as Annexure A to this letter), revealing that:

- satisfactory intersection performance is indicated for existing (2007) traffic conditions on Princes Highway with the 85th percentile operating condition at the existing quarry, and the 85th percentile operating condition with the expanded extractive operations.

[1] *John Coady Consulting Pty Ltd "Continuation and Expansion of Extractive Operations at the Nowra Brickworks Quarry, South Nowra – Traffic and Transportation Assessment" December 2007*

- satisfactory intersection performance is also indicated for projected 2017 traffic conditions on Princes Highway and with the expanded quarry operation, although Level of Service "C" is indicated for the AM peak period. However, it can reasonably be anticipated that this section of Princes Highway will be amplified by 2017 in which case Princes Highway will be a four-lane divided road and quarry access will be restricted to left-turn/in/out only. The results of the INTANAL analysis of the intersection of Princes Highway and quarry access driveway under this road configuration and the expanded extractive operations are set out in **Table 15** revealing satisfactory intersection performance.

On the basis of the results of the INTANAL analysis, the report concluded *"... that the continuation and expansion of extractive operations at the Nowra Brickworks Quarry will have no unacceptable traffic implications"*.

You have requested that the analysis be repeated using the SIDRA traffic model. In our experience, the SIDRA traffic model typically yields a less favourable indication of intersection operation than the INTANAL traffic model. We have previously conducted surveys of actual operating conditions to check the accuracy of predictions made by the SIDRA model and found those predictions to be inaccurate, indicating a level of operating performance significantly inferior to that demonstrated by the surveys. We suggest that the results of the SIDRA analysis of the access arrangements for the Nowra Brickworks Quarry need to be considered in that context.

The results of the SIDRA analysis of the four scenarios addressed in the Traffic and Transportation report are set out in Tables 16, 17, 18 and 19 which are included in Annexure B along with criteria for interpreting the results of SIDRA analysis. The detailed output sheets of the SIDRA analysis are included as Annexure C.

As anticipated, the results of the SIDRA analysis indicate a less favourable level of intersection performance for each scenario than the INTANAL analysis. In this respect, the following points can be made:

Scenario 1

Although unsatisfactory intersection performance is indicated for the AM peak period, that does not represent unacceptable intersection performance because:

- the unsatisfactory intersection performance is a consequence of predicted long delays (average 66.6 secs) for vehicles departing the site only. All other movements through the intersection operate at satisfactory levels

- the number of vehicles departing the site is relatively minor with only 5 departures per hour in the AM peak.

Scenario 2

Once again, although unsatisfactory intersection performance is indicated for the AM peak period, that does not represent unacceptable intersection performance because:

- the unsatisfactory intersection performance is a consequence of predicted long delays (average 70.8 secs) for vehicles departing the site only. All other movements through the intersection operate at satisfactory levels

- the number of vehicles departing the site is relatively minor with only 10 departures per hour in the AM peak.

Scenario 3

Although the SIDRA model indicates unsatisfactory intersection performance during both the AM peak period and midday, Scenario 3 is not strictly relevant as it assumes that upgrading of this section of Princes Highway will not occur until after 2017. This is an unrealistic scenario.

Scenario 4

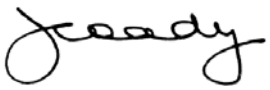
Although this analysis indicates unsatisfactory intersection performance during the AM peak period, that does not represent unacceptable traffic conditions because:

- the unsatisfactory intersection performance is a consequence of predicted long delays (average 146.7 secs in AM peak and 49.2 secs at midday) for vehicles departing the site only. All other movements through the intersection operate at satisfactory levels

- the number of vehicles departing the site is relatively minor, with 10 departures in the AM peak and 44 departures during the midday period.

Accordingly, on the basis of the SIDRA analysis it can be concluded that the continuation and expansion of extractive operations at the Nowra Brickworks Quarry will have no unacceptable traffic implications.

Yours faithfully



John Coady
Director
John Coady Consulting Pty Ltd

cc. Chris Outtersides
Cityplan Strategy and Development
Email: ChrisO@cityplan.com.au

cc Kane Winwood
NSW Department of Planning
Email : Kane.Winwood@planning.nsw.gov.au

ANNEXURE A

RESULTS OF INTANAL ANALYSIS

TABLE 12 INTANAL ANALYSIS – SCENARIO 1				
Key Indicators		**AM**	**MIDDAY**	**PM**
Level of Service		B	A	A
Degree of Saturation		0.03	0.06	0.01
Average Vehicle Delay (secs/veh)				
Princes Highway (north)	T R	0 6.4	0 4.9	0 4.7
Site Access (west)	L R	17.2 0	8.1 12.4	7.1 12.3
Princes Highway (south)	L T	2.9 0	2.9 0	0 0
TOTAL AVERAGE VEHICLE DELAY		**11.1**	**7.1**	**8.1**

Note : See criteria for interpreting the results of INTANAL analysis in the following pages

TABLE 13 INTANAL ANALYSIS – SCENARIO 2				
Key Indicators		**AM**	**MIDDAY**	**PM**
Level of Service		B	A	A
Degree of Saturation		0.10	0.20	0.02
Average Vehicle Delay (secs/veh)				
Princes Highway (north)	T R	0 6.5	0 5.0	0 0
Site Access (west)	L R	18.3 0	9.3 13.4	7.1 12.4
Princes Highway (south)	L T	2.9 0	2.9 0	0 0
TOTAL AVERAGE VEHICLE DELAY		**12.7**	**8.0**	**8.9**

Note : See criteria for interpreting the results of INTANAL analysis in the following pages

TABLE 14
INTANAL ANALYSIS – SCENARIO 3

Key Indicators		AM	MIDDAY	PM
Level of Service		C	B	B
Degree of Saturation		0.20	0.28	0.02
Average Vehicle Delay (secs/veh)				
Princes Highway (north)	T	0	0	0
	R	8.4	5.6	0
Site Access (west)	L	38.6	14.4	9.9
	R	0	20.9	18.6
Princes Highway (south)	L	2.9	2.9	0
	T	0	0	0
TOTAL AVERAGE VEHICLE DELAY		**24.9**	**11.7**	**12.8**

Note : See criteria for interpreting the results of INTANAL analysis in the following pages

TABLE 15
INTANAL ANALYSIS – SCENARIO 4

Key Indicators		AM	MIDDAY	PM
Level of Service		A	A	A
Degree of Saturation		0.05	0.14	0.02
Average Vehicle Delay (secs/veh)				
Princes Highway (north)	T	0	0	0
Site Access (west)	L	10.9	6.7	9.3
Princes Highway (south)	L	2.9	2.9	0
	T	0	0	0
TOTAL AVERAGE VEHICLE DELAY		**7.4**	**5.5**	**9.3**

Note : See criteria for interpreting the results of INTANAL analysis in the following pages

Criteria for Interpreting Results of INTANAL Analysis

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good operation.	Good operation.
'B'	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
'C'	Satisfactory.	Satisfactory but accident study required.
'D'	Operating near capacity.	Near capacity and accident study required.
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.
'F'	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode.

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (ie inner city conditions) and on some roads (ie minor side street intersecting with a major arterial route).

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation.	Good operation.
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	29 to 42	Satisfactory.	Satisfactory but accident study required.
D	43 to 56	Operating near capacity.	Near capacity and accident study required.
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.

3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by traffic signals[2] both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a roundabout or GIVE WAY or STOP signs, satisfactory intersection operation is indicated by a DS of 0.8 or less.

[2] *The values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs.*

ANNEXURE B

RESULTS OF SIDRA ANALYSIS

TABLE 16
SIDRA ANALYSIS – SCENARIO 1

Key Indicators		AM	MIDDAY	PM
Level of Service		E	C	A
Degree of Saturation		0.67	0.36	0.57
Average Vehicle Delay (secs/veh)				
Princes Highway (north)	T	0	0	0
	R	29.8	35.3	0
Site Access (west)	L	66.6	24.3	13.8
	R	0	24.0	13.9
Princes Highway (south)	L	27.3	23.7	0
	T	0	0	0
TOTAL AVERAGE VEHICLE DELAY		**0.3**	**0.5**	**0**

Note : See criteria for interpreting the results of SIDRA analysis in the following pages

TABLE 17
SIDRA ANALYSIS – SCENARIO 2

Key Indicators		AM	MIDDAY	PM
Level of Service		F	C	A
Degree of Saturation		0.58	0.35	0.57
Average Vehicle Delay (secs/veh)				
Princes Highway (north)	T	0	0	0
	R	30.0	35.7	0
Site Access (west)	L	70.8	28.4	11.1
	R	70.8	28.1	11.2
Princes Highway (south)	L	27.3	23.7	0
	T	0	0	0
TOTAL AVERAGE VEHICLE DELAY		**0.6**	**1.8**	**0**

Note : See criteria for interpreting the results of SIDRA analysis in the following pages

TABLE 18
SIDRA ANALYSIS – SCENARIO 3

Key Indicators		AM	MIDDAY	PM
Level of Service		F	F	D
Degree of Saturation		1.0	0.80	0.81
Average Vehicle Delay (secs/veh)				
Princes Highway (north)	T	0	0	0
	R	78.7	48.2	0
Site Access (west)	L	3027.5	133.2	54.8
	R	0	133.9	54.9
Princes Highway (south)	L	27.3	23.7	0
	T	0	0	0
TOTAL AVERAGE VEHICLE DELAY		**13.8**	**3.9**	**0.1**

Note : See criteria for interpreting the results of SIDRA analysis in the following pages

TABLE 19
SIDRA ANALYSIS – SCENARIO 4

Key Indicators		AM	MIDDAY	PM
Level of Service		F	D	A
Degree of Saturation		0.41	0.40	0.40
Average Vehicle Delay (secs/veh)				
Princes Highway (north)	T	0	0	0
Site Access (west)	L	146.7	49.2	7.2
Princes Highway (south)	L	22.7	25.2	0
	T	0	0	0
TOTAL AVERAGE VEHICLE DELAY		**0.8**	**1.6**	**0**

Note : See criteria for interpreting the results of SIDRA analysis in the following pages

Criteria for Interpreting Results of SIDRA Analysis

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good operation.	Good operation.
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'D'	Operating near capacity.	Near capacity and accident study required.
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The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (ie inner city conditions) and on some roads (ie minor side street intersecting with a major arterial route).

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
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3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by traffic signals[3] both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a roundabout or GIVE WAY or STOP signs, satisfactory intersection operation is indicated by a DS of 0.8 or less.

[3] *The values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs.*

ANNEXURE C

SIDRA DETAILED OUTPUT SHEETS

SIDRA INTERSECTION

Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 1 (2007) AM Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
1	L	2	100.0	0.667	27.3	LOS B	0	0.00	0.83	57.5
2	T	1122	1.4	0.583	0.0	LOS A	0	0.00	0.00	80.0
Approach		**1124**	**1.6**	**0.583**	**0.0**	**LOS A**		**0.00**	**0.00**	**80.0**
Princes Hwy (north)										
8	T	457	4.4	0.241	0.0	LOS A	0	0.00	0.00	80.0
9	R	3	0.0	0.008	29.8	LOS C	0	0.80	0.89	46.8
Approach		**460**	**4.3**	**0.241**	**0.2**	**LOS A**	**0**	**0.01**	**0.01**	**79.7**
Brickworks (west)										
10	L	5	40.0	0.089	66.6	LOS E	3	0.95	0.97	14.5
Approach		**5**	**40.0**	**0.090**	**66.6**	**LOS E**	**3**	**0.95**	**0.97**	**14.5**
All Vehicles		**1589**	**2.5**	**0.667**	**0.3**	**Not Applicable**	**3**	**0.00**	**0.01**	**78.8**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: Scenario 1 AM Peak
C:\Documents and Settings\Michael\My Documents\aaTraffic\aaSIDRA Projects\07072 South Nowra Brickworks.aap
Processed May 29, 2009 03:25:05PM

A1613, JohnCoady Consulting, Large Office
Produced by SIDRA Intersection 3.2.0.1455

www.sidrasolutions.com

SIDRA INTERSECTION

Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 1 (2007) Midday Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
1	L	2	50.0	0.333	23.7	LOS B	0	0.00	0.83	61.5
2	T	591	2.9	0.310	0.0	LOS A	0	0.00	0.00	80.0
Approach		**593**	**3.0**	**0.310**	**0.1**	**LOS A**		**0.00**	**0.00**	**79.9**
Princes Hwy (north)										
8	T	677	3.7	0.356	0.0	LOS A	0	0.00	0.00	80.0
9	R	8	75.0	0.028	35.3	LOS C	1	0.68	0.87	47.0
Approach		**685**	**4.5**	**0.356**	**0.4**	**LOS A**	**1**	**0.01**	**0.01**	**79.5**
Brickworks (west)										
10	L	12	91.7	0.078	24.3	LOS B	4	0.80	0.86	19.4
12	R	1	0.0	0.077	24.0	LOS B	4	0.80	0.88	19.3
Approach		**13**	**84.6**	**0.078**	**24.3**	**LOS B**	**4**	**0.80**	**0.87**	**19.4**
All Vehicles		**1291**	**4.6**	**0.356**	**0.5**	**Not Applicable**	**4**	**0.01**	**0.02**	**77.3**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

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Site: Scenario 1 Midday Peak
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SIDRA INTERSECTION

Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 1 (2007) PM Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
2	T	529	3.0	0.277	0.0	LOS A	0	0.00	0.00	80.0
Approach		**529**	**3.0**	**0.277**	**0.0**	**LOS A**		**0.00**	**0.00**	**80.0**
Princes Hwy (north)										
8	T	1108	0.8	0.571	0.0	LOS A	0	0.00	0.00	80.0
Approach		**1108**	**0.8**	**0.571**	**0.0**	**LOS A**		**0.00**	**0.00**	**80.0**
Brickworks (west)										
10	L	3	0.0	0.015	13.8	LOS A	0	0.72	0.62	21.1
12	R	1	0.0	0.015	13.9	LOS A	0	0.72	0.82	21.0
Approach		**4**	**0.0**	**0.015**	**13.8**	**LOS A**	**0**	**0.72**	**0.67**	**21.0**
All Vehicles		**1641**	**1.5**	**0.571**	**0.0**	**Not Applicable**	**0**	**0.00**	**0.00**	**79.5**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: Scenario 1 PM Peak
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SIDRA INTERSECTION

Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 2 (2007) AM Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
1	L	4	100.0	0.571	27.3	LOS B	0	0.00	0.83	57.5
2	T	1122	1.4	0.584	0.0	LOS A	0	0.00	0.00	80.0
Approach		**1126**	**1.8**	**0.584**	**0.1**	**LOS A**		**0.00**	**0.00**	**79.9**
Princes Hwy (north)										
8	T	457	4.4	0.241	0.0	LOS A	0	0.00	0.00	80.0
9	R	7	0.0	0.020	30.0	LOS C	1	0.81	0.96	46.5
Approach		**464**	**4.3**	**0.241**	**0.5**	**LOS A**	**1**	**0.01**	**0.01**	**79.4**
Brickworks (west)										
10	L	10	40.0	0.179	70.8	LOS F	6	0.96	0.99	14.1
Approach		**10**	**40.0**	**0.180**	**70.8**	**LOS F**	**6**	**0.96**	**0.99**	**14.1**
All Vehicles		**1600**	**2.8**	**0.584**	**0.6**	**Not Applicable**	**6**	**0.01**	**0.01**	**77.5**

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Following LOS
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Following Queue
- Density for continuous movement

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SIDRA INTERSECTION

Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 2 (2007) Midday Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
1	L	7	42.9	0.318	23.7	LOS B	0	0.00	0.83	61.5
2	T	591	2.9	0.314	0.0	LOS A	0	0.00	0.00	80.0
Approach		**598**	**3.3**	**0.314**	**0.3**	**LOS A**		**0.00**	**0.01**	**79.8**
Princes Hwy (north)										
8	T	677	3.7	0.356	0.0	LOS A	0	0.00	0.00	80.0
9	R	27	74.1	0.092	35.7	LOS C	4	0.69	0.95	46.5
Approach		**704**	**6.4**	**0.356**	**1.4**	**LOS A**	**4**	**0.03**	**0.04**	**78.4**
Brickworks (west)										
10	L	40	92.5	0.268	28.4	LOS B	16	0.84	0.98	18.8
12	R	4	0.0	0.267	28.1	LOS B	16	0.84	0.99	18.7
Approach		**44**	**84.1**	**0.268**	**28.4**	**LOS B**	**16**	**0.84**	**0.98**	**18.8**
All Vehicles		**1346**	**7.6**	**0.356**	**1.8**	**Not Applicable**	**16**	**0.04**	**0.06**	**71.6**

Symbols which may appear in this table:

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Following LOS
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Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

Site: Scenario 2 Midday Peak
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SIDRA INTERSECTION

Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 2 (2007) PM Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
2	T	529	3.0	0.277	0.0	LOS A	0	0.00	0.00	80.0
Approach		**529**	**3.0**	**0.277**	**0.0**	**LOS A**		**0.00**	**0.00**	**80.0**
Princes Hwy (north)										
8	T	1108	0.8	0.571	0.0	LOS A	0	0.00	0.00	80.0
Approach		**1108**	**0.8**	**0.571**	**0.0**	**LOS A**		**0.00**	**0.00**	**80.0**
Brickworks (west)										
10	L	5	0.0	0.018	11.1	LOS A	1	0.67	0.61	21.6
12	R	1	0.0	0.018	11.2	LOS A	1	0.67	0.79	21.5
Approach		**6**	**0.0**	**0.018**	**11.1**	**LOS A**	**1**	**0.67**	**0.64**	**21.6**
All Vehicles		**1643**	**1.5**	**0.571**	**0.0**	**Not Applicable**	**1**	**0.00**	**0.00**	**79.2**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

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Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 3 (2017) AM Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
1	L	4	100.0	0.800	27.3	LOS B	0	0.00	0.83	57.5
2	T	1583	1.4	0.823	0.0	LOS A	0	0.00	0.00	80.0
Approach		**1587**	**1.6**	**0.823**	**0.1**	**LOS A**		**0.00**	**0.00**	**79.9**
Princes Hwy (north)										
8	T	645	4.3	0.340	0.0	LOS A	0	0.00	0.00	80.0
9	R	7	0.0	0.121	78.7	LOS F	3	0.97	1.00	20.9
Approach		**652**	**4.3**	**0.340**	**0.8**	**LOS A**	**3**	**0.01**	**0.01**	**78.2**
Brickworks (west)										
10	L	10	40.0	1.000*	3027.5	LOS F	51	1.00	1.90	0.8
Approach		**10**	**40.0**	**1.000**	**3027.5**	**LOS F**	**51**	**1.00**	**1.90**	**0.8**
All Vehicles		**2249**	**2.6**	**1.000**	**13.8**	**Not Applicable**	**51**	**0.01**	**0.01**	**55.2**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

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SIDRA INTERSECTION

Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 3 (2017) Midday Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
1	L	7	42.9	0.438	23.7	LOS B	0	0.00	0.83	61.5
2	T	834	2.9	0.441	0.0	LOS A	0	0.00	0.00	80.0
Approach		**841**	**3.2**	**0.441**	**0.2**	**LOS A**		**0.00**	**0.01**	**79.9**
Princes Hwy (north)										
8	T	955	3.7	0.501	0.0	LOS A	0	0.00	0.00	80.0
9	R	27	74.1	0.158	48.2	LOS D	8	0.86	0.98	35.4
Approach		**982**	**5.6**	**0.501**	**1.3**	**LOS A**	**8**	**0.02**	**0.03**	**78.0**
Brickworks (west)										
10	L	40	92.5	0.727	133.2	LOS F	47	0.98	1.47	10.4
12	R	4	0.0	0.800	132.9	LOS F	47	0.98	1.45	10.4
Approach		**44**	**84.1**	**0.728**	**133.2**	**LOS F**	**47**	**0.98**	**1.47**	**10.4**
All Vehicles		**1867**	**6.4**	**0.800**	**3.9**	**Not Applicable**	**47**	**0.04**	**0.05**	**68.4**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

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SIDRA INTERSECTION

Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 3 (2017) PM Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
2	T	746	2.9	0.390	0.0	LOS A	0	0.00	0.00	80.0
Approach		**746**	**2.9**	**0.390**	**0.0**	**LOS A**		**0.00**	**0.00**	**80.0**
Princes Hwy (north)										
8	T	1563	0.8	0.806	0.0	LOS A	0	0.00	0.00	80.0
Approach		**1563**	**0.8**	**0.806**	**0.0**	**LOS A**		**0.00**	**0.00**	**80.0**
Brickworks (west)										
10	L	5	0.0	0.104	54.8	LOS D	2	0.93	0.95	15.5
12	R	1	0.0	0.100	54.9	LOS D	2	0.93	0.95	15.5
Approach		**6**	**0.0**	**0.104**	**54.8**	**LOS D**	**2**	**0.93**	**0.95**	**15.5**
All Vehicles		**2315**	**1.5**	**0.806**	**0.1**	**Not Applicable**	**2**	**0.00**	**0.00**	**79.2**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

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Site: Scenario 3 PM Peak
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SIDRA INTERSECTION

Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 4 (2017) AM Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
1	L	11	36.4	0.407	22.7	LOS B	0	0.00	0.83	61.5
2	T	1583	1.4	0.413	0.0	LOS A	0	0.00	0.00	80.0
Approach		**1594**	**1.6**	**0.413**	**0.2**	**LOS A**		**0.00**	**0.01**	**79.9**
Princes Hwy (north)										
8	T	645	4.3	0.170	0.0	LOS A	0	0.00	0.00	80.0
Approach		**645**	**4.3**	**0.170**	**0.0**	**LOS A**		**0.00**	**0.00**	**80.0**
Brickworks (west)										
10	L	10	40.0	0.323	146.7	LOS F	11	0.98	1.04	9.8
Approach		**10**	**40.0**	**0.321**	**146.7**	**LOS F**	**11**	**0.98**	**1.04**	**9.8**
All Vehicles		**2249**	**2.6**	**0.413**	**0.8**	**Not Applicable**	**11**	**0.00**	**0.01**	**77.5**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

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SIDRA INTERSECTION

Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 4 (2017) Midday Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
1	L	34	70.6	0.231	25.2	LOS B	0	0.00	0.83	61.5
2	T	834	2.9	0.232	0.0	LOS A	0	0.00	0.00	80.0
Approach		**868**	**5.5**	**0.232**	**1.0**	**LOS A**		**0.00**	**0.03**	**79.3**
Princes Hwy (north)										
8	T	955	3.7	0.251	0.0	LOS A	0	0.00	0.00	80.0
Approach		**955**	**3.7**	**0.251**	**0.0**	**LOS A**		**0.00**	**0.00**	**80.0**
Brickworks (west)										
10	L	44	84.1	0.400	49.2	LOS D	25	0.91	1.13	16.2
Approach		**44**	**84.1**	**0.401**	**49.2**	**LOS D**	**25**	**0.91**	**1.13**	**16.2**
All Vehicles		**1867**	**6.4**	**0.400**	**1.6**	**Not Applicable**	**25**	**0.02**	**0.04**	**73.0**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

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Movement Summary

Princes Highway and Brickworks Access Driveway

Scenario 4 (2017) PM Peak Period

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Princes Hwy (south)										
2	T	746	2.9	0.195	0.0	LOS A	0	0.00	0.00	80.0
Approach		**746**	**2.9**	**0.195**	**0.0**	**LOS A**		**0.00**	**0.00**	**80.0**
Princes Hwy (north)										
8	T	1563	0.8	0.403	0.0	LOS A	0	0.00	0.00	80.0
Approach		**1563**	**0.8**	**0.403**	**0.0**	**LOS A**		**0.00**	**0.00**	**80.0**
Brickworks (west)										
10	L	6	0.0	0.011	7.2	LOS A	0	0.62	0.61	22.3
Approach		**6**	**0.0**	**0.011**	**7.2**	**LOS A**	**0**	**0.62**	**0.61**	**22.3**
All Vehicles		**2315**	**1.5**	**0.403**	**0.0**	**Not Applicable**	**0**	**0.00**	**0.00**	**79.5**

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Following Queue
- Density for continuous movement

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Our Ref: 404DA7-4 (09/786)
Contact: Jayd Houguet (42212523)
Your Ref: MP 07_0123

RTA

Mining and Extractive Industries
Department of Planning
GPO Box 39
SYDNEY NSW 2001

10 JUL 2009

Attention: Kane Winwood

SHOALHAVEN CITY COUNCIL – MP 07_0123, LOT 1 DP 1126288 PRINCES HIGHWAY, CONTINUATION AND EXPANSION OF EXTRACTIVE INDUSTRY AT NOWRA BRICKWORKS QUARRY, SOUTH NOWRA

Dear Sir

I refer to an email and additional information dated 9 June 2009 received from Michael Logan regarding the subject Part 3A Major Project Application forwarded to the RTA for consideration.

The RTA has reviewed the submitted information and has taken the future proposed road works for the Princes Highway into consideration during the assessment of this proposal. Given the proposed road works on the Princes Highway includes construction of an additional two lanes with a central median (which will restrict access to this development to left in left out) at this location, the RTA does not consider the construction of a right turn bay at the access to Nowra Brickworks appropriate as an interim treatment. However, the RTA is still concerned with the right turn in movements from the Princes Highway until the Princes Highway upgrade is completed and in order to minimise the impact on the Princes Highway for through vehicles, the RTA recommends a restriction be placed on the developer, to ensure that heavy vehicle movements occur outside of the identified peak periods.

Additionally, the RTA considers that any road works required for this development, such as the left turn deceleration lane should be undertaken at the same time as the road works for the Princes Highway upgrade to minimise the effect on traffic disruption and to avoid unnecessary construction. In this regard the RTA considers that a monetary contribution shall be provided towards construction by the developer.

Given the above advice, the RTA will not object to the development, subject to the following comments being included in the conditions of consent:

- Southbound heavy vehicle movements turning right into the development shall be restricted to movements outside of the AM and PM peak periods for the Princes Highway. These peak periods have been identified as 8:15 to 9:15 and 15:45 to 16:45. These restrictions shall cease once Warra Warra Road roundabout has been completed and a central median installed.

- Prior to any occupation associated with this approval, the developer shall provide a monetary contribution for the construction of the Princes Highway central median for a length of 60m to a total value of $47, 659.10 and for the construction of a left turn deceleration lane to a value of $126, 392.00 (a combined value of $174, 051.10). This monetary contribution should be in the

form of a bank guarantee in favour of the RTA until such time that the South Nowra Highway upgrade commences construction.

- Prior to any occupation associated with this approval the access to the development shall be relocated and land shall be dedicated generally in accordance with attached preliminary concept design (Quarry access – option 2). This is required to ensure the driveway access accommodates swept paths for B-doubles for the future Highway alignment.
- Section 138 concurrence under the Roads Act, 1993 shall be obtained from the RTA prior to construction of the driveway access.
- The developer shall apply for a Road Occupancy Licence (ROL) from the RTA Traffic Operations Unit (TOU) prior to commencing work within the classified road reserve or within 100m of traffic signals. The application will require a Traffic Management Plan (TMP) to be prepared by a person who is certified to prepare Traffic Control Plans. Should the TMP require a reduction of the speed limit, a Direction to Restrict will also be required from the TOU. The developer shall submit the ROL application 10 business days prior to commencing work. It should be noted that receiving an approval for the ROL within this 10 business day period is dependant upon the RTA receiving an accurate and compliant TMP.

Note: An approved ROL does not constitute an approval to commence works until an authorisation letter for the works has been issued by the RTA Project Manager.

Conditions of development consent relating to road work, traffic control facilities and other structures on the classified road network contrary to those outlined above are unlikely to receive RTA consent under the Roads Act, 1993.

It is requested that Department of Planning advise the applicant that conditions of development consent set do not guarantee the RTA's final consent to the specific road work, traffic control facilities and other structures and works on the classified road network. The RTA must provide a final consent for each specific change to the classified road network prior to the commencement of any work.

Note: The RTA will not issue its Section 138 concurrence to commence works within the classified road reserve until all design requirements have been met.

In this regard the applicant is required to submit detailed design plans and all relevant additional information for approval under Section 138 of the Roads Act. The developer will need to pay all RTA fees and charges associated with works. In the first instance the applicant should contact Ashma Ul Husna on 4221 2564.

Upon determination of this matter, it would be appreciated if a copy of the Notice of Determination is sent to the RTA within the appellant period for advice and consideration.

Yours faithfully

Trish McClure
Manager, Road Safety and Traffic Management
Southern Operations & Engineering Services

John Coady Consulting Pty Ltd
ABN: 99 001 929 219 | ACN: 001 929 219

Suite 3, 5th Floor, "Manly National"
22 Central Avenue, Manly NSW 2095
PO Box 528, Manly NSW 1655
Phone: (02) 9977 4622
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Email: john@johnco.com.au
Website: www.johnco.com.au

17 July 2009
Ref : 07072

Mr Chris Outtersides
Manager – Development
City Plan Strategy and Development
Level 1
364 Kent Street
SYDNEY NSW 2000

Fax : 8270 3571
Email : ChrisO@cityplan.com.au

Dear Chris

NOWRA BRICKWORKS QUARRY, SOUTH NOWRA
PROPOSED CONTINUATION AND EXPANSION OF EXTRACTIVE OPERATIONS

I refer to the letter from Trish McClure, Manager, Road Safety and Traffic Management of the RTA's Southern Region Office (dated 10 July 2009) advising that the RTA will not object to the proposed development subject to, inter alia, the following conditions of consent being imposed:

- *"Southbound heavy vehicle movements turning right into the development shall be restricted to movements outside of the AM and PM peak periods for the Princes Highway. These peak periods have been identified as 8.15 to 9.15 and 15.45 to 16.45. These restrictions shall cease once Warra Warra Road roundabout has been completed and a central median installed.*

- *Prior to any occupation associated with this approval, the developer shall provide a monetary contribution for the construction of the Princes Highway central median for a length of 60m to a total value of $47,659.10 and for the construction of a left turn deceleration lane to a value of $126,392 (a combined value of $174,051.10). This monetary contribution should be in the form of a bank guarantee in favour of the RTA until such time that the South Nowra Highway upgrade commences construction."*

I have set out our comments on those two suggested conditions of consent in the following:

Peak Period Right-Turn Prohibition

In our opinion, this proposed condition of consent is unnecessary and unreasonable because:

a) The proposed right-turn prohibition is not justified nor necessary.

b) The implications of the right-turn prohibition for the operation of the quarry are severe.

The proposal to prohibit right-turn heavy vehicle movements from Princes Highway into the quarry during peak periods is not justified nor necessary because:

- traffic modelling conducted by John Coady Consulting Pty Ltd reveals that the intersection of the quarry access with Princes Highway will operate satisfactorily even with expanded extractive operations at the quarry. The results of that traffic modelling are set out in a letter dated 9 June 2009 to Mr Chris Millet, Manager – Landuse Development Impacts of the RTA Southern Region Office

- the sealed carriageway of the section of Princes Highway adjacent to the quarry access is approximately 13.5m wide comprising:

  A central two-lane carriageway 6.2m wide (3.1m in each direction) located centrally within the total carriageway.

  A sealed shoulder 4.5m wide on the eastern side of the central carriageway which is used as a *passing lane* by southbound traffic on the highway at times when the central southbound traffic lane is blocked by a vehicle waiting to make a right-turn movement into the quarry.

  A sealed shoulder 2.8m wide on the western side of the central carriageway which is used as a *slip lane* by vehicles making a left-turn movement from the highway into the quarry.

- accordingly, in circumstances were a *passing lane* is available for southbound through traffic on Princes Highway there is no need for the proposed right-turn prohibition

- surveys of the existing traffic generation characteristics of the quarry indicate that the demand for right-turn heavy vehicle movement from Princes Highway into the quarry is likely to be relatively minor during peak periods such that the prohibition would not have any significant effect on traffic operations on Princes Highway in any event

- the proposed prohibition is likely to operate for only a short time as an interim measure until the Princes Highway upgrade works are completed.

The implications of the proposed right-turn prohibition for quarry operations are severe because:

- the quarry operator needs to maintain access for trucks approaching from the north at all times to facilitate movements by heavy vehicles involved in dropping off/picking up material to/from the quarry

- if the right-turn prohibition is imposed, vehicles travelling southbound on Princes Highway who need to enter the quarry site during the restricted period will have to follow an alternative route involving a right-turn movement from Princes Highway into Flinders Road to the north of the site, a left-turn movement from Flinders Road into Albatross Road continuing along Btu Road to Princes Highway south of the site, before travelling northbound along the highway to access the site. This alternative route involves an increase travel distance of approximately 14 km and, in any event, requires both a right-turn movement from the highway (into Flinders Road) and a left-turn movement into the highway (from Btu Road).

Contribution for Central Median

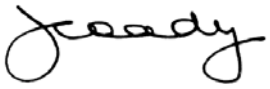
No contribution should be made by the applicant for the installation of a central median in Princes Highway for a length of 60m because that central median would need to be constructed as part of the highway upgrade whether or not the quarry is operating. In those

circumstances, it cannot be said that construction of the central median is made necessary by the operation of the quarry.

Conversely, the contribution for the construction of a left-turn deceleration lane on the approach to the quarry access is appropriate because that facility would not be constructed as part of the Princes Highway upgrade if the quarry was not operating, and therefore is made necessary by the operation of the quarry.

I trust that this advice is satisfactory at this stage and remain available to be of further assistance if required.

Yours faithfully



John Coady
Director
John Coady Consulting Pty Ltd

ATTACHMENT D

Response to the Government Agency & Public Submissions, prepared by Gaia Research

South Coast Concrete Crushing and Recycling Pty Ltd

ABN: 76 095 243 584

Response to Government Agency & Public Submissions

for the

Continuation and Expansion of Extractive Operations at the Nowra Brickworks Quarry, South Nowra

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED

and City Plan Services

Major Project Application No 07-0123 April 2009

R.W. CORKERY & CO. PTY. LIMITED

2.1 ECOLOGY

2.1.0 Mitigation for Bats

ISSUES	*DECC COMMENT*	*RECOMMENDED ACTION*
Timing of tree removal	*Micro-bats use some hollows as maternity roosts in summer and as hibernation roosts in winter and some species appear to use different hollows for these parts of their lifecycles. Removing trees in winter would avoid disruption to breeding but could impact hibernating colonies when they are least active and hence least able to locate alternative roosts.*	*If consent is granted for the removal of trees with hollows for the proposal then the consent should state that clearing of such trees is only permitted in mid-late autumn or early-mid spring and that trees should be tapped by machinery prior to removal in an attempt to make resident fauna vacate hollows.*

Response

Timing of tree removal
The proponent accepts that if consent is granted for the removal of trees with hollows then the clearing of such trees will only occur in mid-late autumn or early-mid spring and that trees will be tapped by machinery prior to removal.

2.1.1 Biodiversity Offsets

ISSUES	*DECC COMMENT*	*RECOMMENDED ACTION*
Concurrence to offset strategy	*The Ecology Report states (p30) that the Department of Planning would seek concurrence form DECC for the biodiversity offset strategy. DECC has no concurrence role in Part 3A EP&A Act matters.*	*Advise the Proponent*
Offset extent	*DECC notes that the proposed offset comprises about 20ha of land with similar vegetation and habitats, equating to an offset ratio of about 3:1. This proposed offset does not appear to meet a maintain of improve outcomes for biodiversity values.*	*The areas of the quarry site to be revegetated must be included in the extent of the biodiversity offset.*
Offset term	*The biodiversity offset strategy in the Ecology Report proposes a term of 80-100 years. DECC's Principles of the Use of Biodiversity Offset in NSW state that has impacts on biodiversity are likely to be permanent, the offset should also be permanent.*	*The offsets proposed by Gaia Research and the additional area of offsets recommended (above) must be secured in perpetuity.*

Response

Concurrence to offset strategy

The proponent has been informed that DECC has no concurrence role in Part 3A EP&A Act matters.

Offset extent

The areas of the quarry site to be revegetated area have now been included in the extent of the biodiversity offset. The area of the quarry that will be progressively revegetated is approximately 7.4 ha.

The area of the southern biodiversity offset area has been amened slightly from the original proposal. Instead of portions of Lots 228 and 229 DP 755952 being used to provide 17 ha of native vegetation the revised plan is to use all of Lot 228 DP 755952 to provide XX ha. Thirty one hollow-bearing tees were located on Lot 228. The positions of these trees and the number of various sized hollows that they contained is given in Table 1.

Table 1. Hollow-bearing Trees Located within the revised Southern Biodiversity Offset Area

* indicates tree used by Honey Bees.

Number	Species	Northing	Easting	Hollows
24	*Eucalyptus paniculata*	280139	6131933	2s
25	Stag	280144	6131706	2m
26	*Eucalyptus globoidea*	280181	6131835	1s
27	*Eucalyptus globoidea*	280039	6131744	3M
28	*Eucalyptus globoidea*	280116	6131732	1L
29	*Eucalyptus longifolia*	280122	6131725	1M
30	*Corymbia maculata*	280147	6131651	1M
31	*Eucalyptus paniculata*	280137	6131635	1L
32	*Eucalyptus longifolia*	280127	6131624	1M
33	Stag	280143	6131588	1M
34	Stag	280053	6131894	2S
35	*Eucalyptus paniculata*	280144	6131937	1S
36	*Eucalyptus paniculata*	280140	6131944	1S
37	Stag	280063	6131955	1S
38	*Eucalyptus punctata*	280055	6131966	1S
39	*Corymbia maculata*	279950	6132210	1S
40	*Corymbia maculata*	279938	6132188	1L
41	*Eucalyptus paniculata*	279926	6132140	1M
42	Stag *	279697	6131764	2M
43	*Eucalyptus paniculata*	279958	6132002	1S
44	*Eucalyptus globoidea*	279974	6132030	1S
45	*Corymbia maculata*	229994	6132023	1M
46	Stag (*Eucalyptus globoidea)*	280048	6131998	2S
47	Stag (*Eucalyptus globoidea)*	280041	6132041	1S
48	*Corymbia maculata*	280019	6132077	1M
49	*Corymbia maculata*	280058	6132170	1M
50	*Eucalyptus globoidea*	280080	6132060	1S
51	*Eucalyptus globoidea*	280131	6132135	1S
52	*Eucalyptus globoidea*	280132	6132047	1S
53	*Eucalyptus globoidea*	280139	6132228	1S
54	Stag	280064	6131960	1M
Note 1 – AMG 66 Datum Note 2 – symbols for hollows: s=small (<300mm dia.), m=medium (300-500mm dia.) and l=large (>500mm dia.)				

Offset term
The offsets proposed by Gaia Research and the additional area of offsets recommended (above) will be secured in perpetuity.

2.1.2 Weed Management and Rehabilitation Strategy

ISSUES	*DECC COMMENT*	*RECOMMENDED ACTION*
Placement of cleared trees with hollows	*The Strategy states that cleared trees with hollows should be placed in intact vegetation adjacent to Nowra Creek in the north to provide microhabitats. This could result in damage to existing vegetation by machinery manoeuvring logs*	*The Proponent should satisfy the DG of Planning that the methods to position logs will not damage existing vegetation in the riparian protection area of Nowra Creek I in the north of the site.* *Alternatively, this requirement could be removed from the Strategy and such logs could be used in rehabilitation areas instead.*
Annual works program	*The annual works program in the Strategy (Table 4) does not provide enough detail regarding the sequence of actions required for rehabilitation and revegetation.*	*The Annual Works Program should include the detailed sequence of actions required for rehabilitation and revegetation.*

Response

Placement of cleared trees with hollows
The proponent will place the felled hollow-bearing logs in such a manner that existing vegetation will not be damaged. If this can not be achieved then the logs will be stacked in a cleared area and used in the rehabilitation areas.

Annual works program
The rehabilitation of the site will be an ongoing activity. Vegetation, top soil and subsoil from the fourth cell will be used to restore the first cell. The process will continue sequentially until the site is exhausted and is no longer a viable mining operation. The time frame for these activities is difficult to predict accurately. It is dependent on external factors such as the economic climate and what the demand for the material will be at any particular time. There will be a progressive rehabilitation program gradually working behind the extraction process and extending for approximately 10 years beyond the life of the mine.

Action	**Timing**	**Comment**
Commence photographic record	At commencement of any restoration work and then ongoing every 6 months for the first 5 years	Establish photo points at strategic locations to visually record progress.
Removal of vegetation	At the commencement of the opening of a sequential cell.	All vegetation is to be stored on site and used as either habitat or mulch for the restoration of the first cell as soon as possible after clearing has commenced.
Stripping of top soil	At commencement of extractive operations of a sequential cell.	
Storing of top soil	When it is removed.	Top soil must be stored in low (less than 3m) flat stock piles to ensure maximum survival of vegetative material. It must be stored for as brief a period as possible to facilitate seed viability.
Filling of site with	As material from the site becomes	Subsoil will be removed from the fourth cell to

Action	Timing	Comment
subsoil	available.	replenish the first cell. Addition fill will be sourced from the South Coast to bring the cell to the original level
Cover with top soil	As soon as practical after earth works have been completed and the cell has been brought back to the original level.	Minimize vehicle access once the top soil is put in place.
Control erosion	ongoing	Address issues as required with the expansion of the quarry.
Add habitat opportunity	Once the original level has been achieved.	Use any hollow logs and large trees available from the site to create habitat and microclimates.
Spread mulch	As soon as practical after topsoil has been placed.	Top soil must be covered as quickly as possible by mulch or to prevent loss through erosion.
Seed collection	Ongoing as seed becomes available from the whole site and local area.	Seed will be collected regularly from the site and stored for later use when a cell is ready for revegetation.
Spread first succession seed	When rain is expected – often during autumn after the top soil has been replaced.	The species that will be used are detailed in **Table 2**. Legumes will be used in the first succession to provide a cover as quickly as possible.
Monitoring	Ongoing. Photos every 6 months.	Monitor for weed incursion every six months or less. Effectiveness of regeneration techniques to be measured by establishing one 20sqm quadrat in each cell collecting height and cover details for all species present.
Reporting	Once restoration has begun on a cell records need to be maintained every 3 months for the first year then annually for 10 years.	The timing of all activities must be accurately recorded.
Weed control activities	Treat all weed incursions as soon as they are detected.	See Weed Management Strategy
Second succession seeding and planting	Year two after initial cover has been achieved	Canopy species will be planted as tubes and seed broadcast once the initial cover has established.
Fauna Monitoring	Annually after the second year	Survey for all animals detected including trapping and on site observation.

Table 2. Species to be used for revegetation

Family	Species	Common Name
Zamiaceae	*Macrozamia communis*	Burrawang
MAGNOLIOPSIDA -	**DICOTYLEDONS**	
Epacridaceae	*Lissanthe strigosa*	Native Cranberry
Fabaceae: Faboideae	*Daviesia ulicifolia*	
	Glycine clandestina	Love Creeper
	Hardenbergia violacea	False sarsaparilla
	Kennedia rubicunda	
	Pultenaea polifolia	
	Pultenaea villosa	
Fabaceae: Mimosoideae	*Acacia elongata*	
	Acacia falcata	
	Acacia longifolia	
	Acacia myrtifolia	
	Acacia ulicifolia	Prickly Moses
Goodeniaceae	*Goodenia ovata*	Hop Goodenia
Myrtaceae	*Corymbia maculata*	Spotty Gum
	Eucalyptus globoidea	White Stringy Bark
	Eucalyptus longifolia	Woollybutt
	Eucalyptus paniculata	Grey Iron Bark
	Kunzea ambigua	
	Melaleuca decora	White Feather Honeymyrtle
	Melaleuca styphelioides	Prickly-leaved Paperbark
Proteaceae	*Hakea sericea*	Bushy Needlebush
MAGNOLIOPSIDA -	**MONOCOTYLEDONS**	
Iridaceae	*Patersonia sericea*	Silky Purple Flag
Lomandraceae	*Lomandra longifolia*	
	Lomandra multiflora	
Phormiaceae	*Dianella revoluta* var *revoluta*	Mauve Flax Lily
Poaceae	*Themeda australis*	Kangaroo Grass

ATTACHMENT E

Email from the DECC to City Plan Strategy & Development) dated 22 June 2009

Chris Outtersides

From: Craig Jones [Craig.Jones@environment.nsw.gov.au]
Sent: Monday, June 22, 2009 1:31 PM
To: Chris Outtersides; Sue Francis
Cc: jbg contractors; Tom Ellicott; kane.winwood@planning.nsw.gov.au
Subject: RE: South Nowra Brickworks Quarry

Chris,

You sought urgent preliminary advice from DECC as to the adequacy of a biodiversity offset proposal for the SCCCR quarry upgrade utilising Lot 228 DP 755952.

DECC has reviewed the information provided below and believes that the proposed offset site maintains or improves biodiversity outcomes for the clearing on the SCCCR quarry site identified in MP 07_0123. DECC has formed this opinion based solely upon the information provided in your message and has not been afforded the opportunity conduct a detailed inspection of the proposed offset site.

DECC does not, however, accept that the proposed 80 year life of the offset would maintain of improve biodiversity and will recommend to the Department of Planning that any offset site must be secured in perpetuity. This approach is consistent with DECC's *Principles for the use of biodiversity offsets in NSW.* See link, Principle 7;

http://www.environment.nsw.gov.au/biocertification/offsets.htm

I anticipate that DECC will be afforded the opportunity to formally review the proposal as part of the 3A assessment process.

Please call me if you require further information.

Regards

Craig
0408 695070

Craig Jones | Acting Head of Operations | South East Region (Queanbeyan) | Department of Environment and Climate Change | ph. 02 6229 7002 | fx. 02 6229 7006 | e. craig.jones@environment.nsw.gov.au

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From: Chris Outtersides [mailto:ChrisO@cityplan.com.au]
Sent: Thursday, 4 June 2009 1:29 PM
To: Jones Craig
Cc: jbg contractors; Tom Ellicott
Subject: South Nowra Brickworks Quarry

Craig,

Further to our discussions yesterday, we met with the Department of Commerce and Corrective Services last Thursday to discuss the proposed offset strategy for the Nowra Brickworks Quarry proposal, and also the management of the offset land.

Section 4.3.8.6 of the submitted Environmental Assessment (EA) sets out the Proponent's previous Biodiversity Offset Offer. In summary, the offset was to be split between two areas, referred to as the Northern Biodiversity Offset Area (part of the existing quarry – approximately 3 hectares) and the Southern Biodiversity Offset Area (part of Lots 228 and 229 of DP 755952 – approximately 17 hectares).

Southern Biodiversity Offset Area
Taking the Southern Biodiversity Offset Area firstly, since the submission of the EA, the Proponent has been in negotiations with the adjoining landowners and has now agreed lease terms for a period of 80 years for the whole of Lot 228 within DP 755952 as opposed to parts of Lots 228 and 229 respectively.

The fact that we were able to secure the entire area of lot 228 avoided further and very complex planning considerations arising from the operation of the Local Government Act which deems the terms of certain long leases to be "sub-divisions" and further, the lease will on its terms be linked to the conditions of the consent issued by the Department of Planning. We had concerns that a local council may attempt to override an 88B instrument through its

planning processes and with the tenant being obliged to comply with the terms of the consent as a condition of the lease the community is being provided with valuable and realistic certainty regarding the future of the offset.

As set out below this is perhaps further strengthened by the security of an in-principle agreement which has been negotiated with the DoC and, Corrective Services which will see the utilization of the Gaol's labour force to ensure the primary goals of the offset can be achieved and, utilising a viable source of labour and resources which will not disappear.

The position demonstrates the ability of private enterprise and the Government at various levels to work on a collaborative basis successfully.

The location of Lot 228, which is to form the Proponent's offset offer, is detailed on the attached plans which illustrates the site in relation to Lot 229 and also in relation to the existing quarry site.

As the attached survey plan sets out, Lot 228 comprises 16.19 hectares.

Gaia Research have surveyed Lot 228 with 31 hollow-bearing trees located within the offset area as set out below:

Number	Species	Northing	Easting	Hollows
24	*Eucalyptus paniculata*	280139	6131933	2s
25	Stag	280144	6131706	2m
26	*Eucalyptus globoidea*	280181	6131835	1s
27	*Eucalyptus globoidea*	280039	6131744	3M
28	*Eucalyptus globoidea*	280116	6131732	1L
29	*Eucalyptus longifolia*	280122	6131725	1M
30	*Corymbia maculata*	280147	6131651	1M
31	*Eucalyptus paniculata*	280137	6131635	1L
32	*Eucalyptus longifolia*	280127	6131624	1M
33	Stag	280143	6131588	1M
34	Stag	280053	6131894	2S
35	*Eucalyptus paniculata*	280144	6131937	1S
36	*Eucalyptus paniculata*	280140	6131944	1S
37	Stag	280063	6131955	1S
38	*Eucalyptus punctata*	280055	6131966	1S
39	*Corymbia maculata*	279950	6132210	1S
40	*Corymbia maculata*	279938	6132188	1L
41	*Eucalyptus paniculata*	279926	6132140	1M
42	Stag *	279697	6131764	2M
43	*Eucalyptus paniculata*	279958	6132002	1S
44	*Eucalyptus globoidea*	279974	6132030	1S
45	*Corymbia maculata*	229994	6132023	1M
46	Stag (*Eucalyptus globoidea)*	280048	6131998	2S
47	Stag (*Eucalyptus globoidea)*	280041	6132041	1S
48	*Corymbia maculata*	280019	6132077	1M
49	*Corymbia maculate*	280058	6132170	1M
50	*Eucalyptus globoidea*	280080	6132060	1S
51	*Eucalyptus globoidea*	280131	6132135	1S
52	*Eucalyptus globoidea*	280132	6132047	1S
53	*Eucalyptus globoidea*	280139	6132228	1S
54	Stag	280064	6131960	1M
Note 1 – AMG 66 Datum Note 2 – symbols for hollows: s=small (<300mm dia.), m=medium (300-500mm dia.) and l=large (>500mm dia.)				

*indicates tree used by Honey Bees.

Northern Biodiversity Offset Area

Turning to the Northern Biodiversity Offset Area, the Proponent previously proposed to protect approximately 3 hectares within the existing quarry site.

However, following comments from the DECC in relation to the EA, it was suggested that the areas of the quarry site to be re-vegetated should be included in the extent of the biodiversity offset. To this end, the offset offer is to be amended such that the Northern Biodiversity Offset Area will now comprise the whole of the existing quarry site, this being approximately 21.5 hectares, representing an increase in area of approximately 19 hectares.

Offset Offer
Further to the meeting with the Department of Commerce, the following offset offer was agreed by the Proponent for the continuation of extractive operations from the Nowra Brickworks Quarry:

- The Proponent will offer Lot 228 as an offset for the lifetime of the quarry operations (approximately 16.19 hectares);
- The Proponent will also offer the area previously referred to as the '*Northern Biodiversity Offset Area*' during the lifetime of the quarry operations (approximately 3 hectares);
- Once the quarry has expired, the Proponent will offer the whole of the existing quarry site as an offset (part of Lot 1, DP 1126288). This will be offered in perpetuity. It is relevant to note that the State are the landowners of the Nowra Brickworks Quarry with the title held by the Department of Lands and they are therefore the landowners for the Proponent. It was agreed with the Department of Commerce that the quarry site can be offered as an offset in perpetuity once operations have ceased on the site.
- The ongoing management of all the offset land (this being Lot 228 and the existing quarry site (once the quarry has expired)) will be undertaken by the Department of Corrective Services on behalf of the Proponent.
- The terms of this management agreement will be set out and agreed as part of a '*Management Plan*' which will be prepared by the Proponent. This Management Plan will set out measures to ensure that the offset will improve biodiversity outcomes across the respective sites for the period of the offset and will be adopted by the Department of Corrective Services as part of their agreement to manage the offset land.
- It is anticipated that the management of the offset land will include the following principles. These will be incorporated into the formal Management Plan:.
    - feral animal control - fox baiting, fencing to exclude rabbit and fox,
    - weed control,
    - setting out fixed plots and transects for monitoring biodiversity improvement
    - trapping of animals, plant surveys and biodiversity indices (fallen logs percentage cover etc)
    - providing data to DECC and DoP on an annual basis for record keeping.

Please contact me should you wish to discuss the matter further. Alternative, the Proponent and the Department of Commerce would be happy to meet onsite to discuss this issue further with you if necessary.

I look forward to hearing from you.

Regards
Chris

Chris Outtersides
Manager - Development

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ATTACHMENT F

Email from the DECC to City Plan Strategy & Development) dated 15 June 2009

Chris Outtersides

From: Craig Jones [Craig.Jones@environment.nsw.gov.au]
Sent: Monday, June 15, 2009 3:52 PM
To: Chris Outtersides
Subject: RE: South Nowra - Offset Strategy

Chris,

DECC has no objection to the concept of a staged development approval that prohibits any impacts on vegetation until such time as a suitable offset has been secured in perpetuity. DECC is in receipt of the current offset proposal but has not yet assessed whether it adequately maintains or improves biodiversity outcomes.

I note that a number of other issues remain outstanding from DECC's perspective, especially saline pit water disposal.

Regards

Craig

Craig Jones | Acting Head of Operations | South East Region (Queanbeyan) | Department of Environment and Climate Change | ph. 02 6229 7002 | fx. 02 6229 7006 | e. craig.jones@environment.nsw.gov.au

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From: Chris Outtersides [mailto:ChrisO@cityplan.com.au]
Sent: Friday, 12 June 2009 2:58 PM
To: Jones Craig
Cc: Tom Ellicott; jbg contractors; Scccr Quarries
Subject: South Nowra - Offset Strategy

Craig,

I understand that you have spoken to John Green in relation to the proposed offset strategy following my email to you last week.

Following those discussions I understand that the DECC would be happy, in principle, to agreed to a staged approval (or an appropriate condition attached to the consent) whereby the Proponent will agree not to remove any of the forested areas of the Project Site until a suitable offset strategy has been agreed with the Department Of Planning. As you will be aware, the Proponent is still negotiating with the owner of Lot 228 but is not able to commit to securing this land in perpetuity at this stage.

I have spoken to Kane Winwood at the DOP and he has suggested that in principle he is also happy with this staged approach. I would, however, like to formally confirm this position as soon as possible so that we can move forward on the other issues.

Would you therefore be able to confirm your agreement with this position by return email so that I can in turn forward this to Kane and seek his approval for dealing with the offset strategy as part of the current application.

I look forward to hearing from you.

Regards
Chris

Chris Outtersides
Manager - Development

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ATTACHMENT G

Email from Dept of Commerce to City Plan Strategy & Development dated 17 July 2009

Chris Outtersides

From: Lindsay Charles [Lindsay.Charles@commerce.nsw.gov.au]
Sent: Friday, July 17, 2009 12:11 PM
To: Chris Outtersides
Cc: Tom Ellicott; Dave.White@dcs.nsw.gov.au; Paul.Smith@dcs.nsw.gov.au; Dick Godson; jbg contractors; Scccr Quarries; Kane Winwood; mitchell@rwcorkery.com
Subject: RE: South Nowra Brickworks Quarry - Noise Assessment

I am just waiting for some advice on the matter. I should be able to get back to you next week.

Lindsay

>>> "Chris Outtersides" <ChrisO@cityplan.com.au> 16/07/09 09:09 >>>
Hi Lindsay,

Further to my email last week, have you had chance to consider the email below and whether you would like to meet to discuss the outstanding noise issue?

We are keen to finalise the noise assessment for submission back to the DOP as soon as possible.

Please let me know if you require any further information at this stage.

Regards

Chris Outtersides
Manager - Development

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From: Chris Outtersides
Sent: Tuesday, July 07, 2009 3:39 PM
To: 'Lindsay Charles'
Cc: 'Dave.White@dcs.nsw.gov.au'; 'Paul.Smith@dcs.nsw.gov.au'; 'jbg contractors'; 'Tom Ellicott'; 'Dick Godson'; mitchell@rwcorkery.com; 'Kane Winwood'; 'Scccr Quarries'
Subject: South Nowra Brickworks Quarry - Noise Assessment

Hi Lindsay,

As part of the 3A process for the South Nowra Brickworks Quarry, and as you will be aware, we have been discussing noise with the DECC and with Heggies who are our client's noise and blasting consultants.

As part of that process, we have established noise criteria and have predicted quarry operational noise levels at a number of sensitive receivers around the quarry site. As page 8 of the attached report prepared by Heggies sets

out, Location 5 is the proposed South Coast Correctional Facility. Other sensitive receivers include 80 Links Road (residence), 371 Old Southern Road (residence) and 243 Princes Highway (residence).

Whilst it is relatively easy to establish operational noise criteria for residences, i.e. in accordance with the NSW Industrial Noise Policy (INP), as set out in Table 1 of the Heggies report , establishing operational noise criteria for correctional facilities is somewhat less straightforward as these are not explicitly set out within the INP.

To this end, and as set out in Section 3.6 of the report, guidance on appropriate intrusive criteria has been taken from a publication entitled "*Acoustics Design Guide for Corrections*" which recommends internal acoustical design goals for correctional facilities, refer to Attachment A of the report.

The corresponding (external) amenity criteria have been set via reference to the INP using the passive recreation category, refer to Table 1 of the report.

The operational noise criteria which apply to the correctional facility are set out in Table 8 of the report and it is concluded that, as the intrusive criteria are internal levels, the amenity criteria are the controlling criteria for the correctional facility.

We have discussed this issue with the DECC and the DOP and, given the fact that there are no intrusive noise criteria nominated within the INP for correctional facilities, they have asked us to confirm with yourselves, as operators of the proposed facility, that you are happy with the noise assessment and the basis upon which the assessment criteria have been derived.

To this end, we have attached Heggies report to this email for your information and reference. You may in turn wish to pass this on to your acoustic advisors.

We would be pleased to discuss this further with you and/or your acoustic advisors if necessary. Otherwise, we would be grateful if you could confirm that the noise assessment procedures and outcomes as set out in Heggies report are acceptable to you.

Please let me know if you require any additional information.

Regards
Chris

Chris Outtersides
Manager - Development

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