

Annexure A – Project Approval 07_0059 for Banora Point upgrade

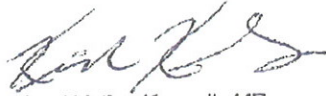
Project Approval

Section 75J of the *Environmental Planning and Assessment Act 1979*

I, the Minister for Planning, approve the project referred to in Schedule 1, subject to the conditions in Schedule 2.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the project.



The Hon Kristina Keneally MP.
Minister for Planning

Sydney

26/2/09

2009

File No: 9037857

SCHEDULE 1

Application No:	07_0059
Proponent:	NSW Roads and Traffic Authority
Approval Authority:	Minister for Planning
Land:	Land generally in the vicinity of the existing Pacific Highway through the town of Banora Point between Barneys Point Bridge and the Tweed Heads bypass within the Tweed Shire local government area.
Project:	The construction and operation of an approximately 2.5 kilometre six lane divided carriageway, comprising a land bridge, viaduct and two interchanges, referred to as the Pacific Highway Upgrade-Banora Point Project
Major Project:	The proposal is declared a major project under section 75B(1)(b) of the <i>Environmental Planning and Assessment Act 1979</i> , by virtue of an order made by the Minister for Planning and gazetted on 5 December 2006.
Critical Infrastructure:	The proposal is declared to be critical infrastructure under section 75C of the <i>Environmental Planning and Assessment Act 1979</i> , by virtue of an order made by the Minister for Planning and gazetted on 5 December 2006.

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SCHEDULE 2

Act, the	<i>Environmental Planning and Assessment Act 1979</i>
Ancillary Facility	Temporary facility for construction, including for example an office and amenities compound, construction compound, batch plant (concrete or bitumen), materials storage compound, maintenance workshop, testing laboratory or material stockpile areas.
Conditions of Approval	The Minister's conditions of approval for the project.
Construction	Includes all work in respect of the project other than survey; acquisitions; fencing; investigative drilling or excavation; building/road dilapidation surveys; minor clearing (except where heritage, threatened species, populations or ecological communities would be affected); establishing ancillary facilities in locations meeting the criteria stated in these Conditions; or other activities determined by the Environmental Representative to have minimal environmental impact (e.g. minor access roads and adjustments to services / utilities, etc.).
Council	Tweed Shire Council (TSC)
dB(A)	Decibel, "A" weighted scale
DECC	NSW Department of Environment and Climate Change
Department, the	NSW Department of Planning
Director-General, the	Director-General of the NSW Department of Planning (or delegate)
Director-General's Approval	A written approval from the Director-General (or delegate). Where the Director-General's approval is required under a condition, the Director-General will endeavour to provide a response within one month of receiving an approval request. The Director-General may ask for additional information if the approval request is considered incomplete. When further information is requested the time taken for the Proponent to respond in writing will be added to the one month period.
Director-General's Assessment Report	The report provided to the Minister by the Director-General of the Department under section 75I of the EP&A Act.
DPI	NSW Department of Primary Industries (includes divisions such as Agriculture, Forestry, Fisheries and Minerals).
DWE	NSW Department of Water and Energy
EPL	Environmental Protection Licence
Feasible and Reasonable	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community views and nature and extent of potential improvements.
L_{Aeq}	The noise level exceeded for 90 per cent of the sampling period, also referred to as the background noise level.
$L_{A10\%T}$	The noise level exceeded for 10 per cent of the time over a 15 minute sampling period.

Minister, the Operation	Minister for Planning Means the operation of the project, but does not include commissioning trials of equipment or temporary use of parts of the project during construction.
Out of Hours Works	Out of hours works which may be considered are those case by case or activity-specific works which cannot be undertaken during standard construction hours for technical/constructability reasons including but not limited to: • saw cutting - where ambient temperature and/or curing time for pavement laying prior to saw cutting requires that this occur outside the standard construction hours • asphaltting - where this cannot be managed under normal traffic conditions, for occupational health and safety or other technical reasons; • traffic switching - where measures to move traffic to enable construction to proceed cannot be managed under normal daytime traffic conditions; • rock breaking - where for safety or other technical reasons this cannot occur under normal traffic conditions.
Project	The project that is the subject of Major Projects Application 07_0059.
Proponent	NSW Roads and Traffic Authority
Publicly Available	Available for inspection in hard copy and/or electronic format by a member of the general public (for example available on the project website as well as at a local display site).
Relevant Aboriginal Stakeholders	Tweed Byron Local Aboriginal Land Council and those Aboriginal stakeholders referenced in the Environmental Assessment technical paper 8, page 13.
RTA	NSW Roads and Traffic Authority
Sensitive Receiver	Residence, education institution (e.g. school, TAFE college), health care facility (e.g. nursing home, hospital) and religious facility (e.g. church).
Stages	Stages refers to the: • division of a Project into multiple contract packages; and/or • construction or operation of a project in discrete sections.

1. ADMINISTRATIVE CONDITIONS

Terms of Approval

- 1.1 The Proponent shall carry out the project generally in accordance with the:
 - a) Major Projects Application 07_0059;
 - b) *Banora Point – Upgrading the Pacific Highway - Environmental Assessment* (volumes 1, 2 and 3), prepared by Parsons Brinckerhoff Australia Pty Ltd and dated February 2008;
 - c) *Banora Point – Upgrading the Pacific Highway – Environmental Assessment Submissions Report*, prepared by Parsons Brinckerhoff Australia Pty Ltd and dated July 2008, including the revised Statement of Commitments contained therein; and
 - d) the conditions of this approval.
- 1.2 In the event of an inconsistency between:
 - e) the conditions of this approval and any document listed from condition 1.1a) to 1.1c) inclusive, the conditions of this approval shall prevail to the extent of the inconsistency; and
 - f) any document listed from condition 1.1a) to 1.1c) inclusive, and any other document listed from condition 1.1a) to 1.1c) inclusive, the most recent document shall prevail to the extent of the inconsistency.
- 1.3 The Proponent shall comply with any reasonable requirement(s) of the Director-General arising from the Department's assessment of:
 - g) any reports, plans or correspondence that are submitted in accordance with this approval; and
 - h) the implementation of any actions or measures contained in these reports, plans or correspondence.
- 1.4 The Proponent shall notify the Director-General and other relevant government agencies of any incident with actual or potential significant off-site environmental impacts on people or the biophysical environment as soon as practicable and within 24 hours after the occurrence of the incident. The Proponent shall provide full written details of the incident to the Director-General within seven days of the date on which the incident occurred.

Note: Where an incident also requires reporting to the DECC the incident report prepared for the purposes of notifying the DECC would meet this requirement

- 1.5 The Proponent shall meet the requirements of the Director-General or relevant government agency (as determined by the Director-General) to address the cause or impact of any incident, as it relates to this approval, reported in accordance with condition 1.4, within such period as the Director-General may require.

Staging

- 1.6 The Proponent may elect to construct the Project in stages provided construction is consistent with the conditions of approval. Where stages are proposed, the Proponent shall submit a Staging Report to the Director-General at least eight (8) weeks prior to construction commencing which:
 - a) describes the stages; and
 - b) identifies how the conditions of approval will be addressed across and between the stages of the project.

Limits of Approval

- 1.7 This approval shall lapse ten years after the date on which it is granted, unless works the subject of any related project approval are physically commenced on or before that date.

Statutory Requirements

- 1.8 The Proponent shall ensure that all licences, permits and approvals are obtained and maintained as required with respect to the project. No condition of this approval removes the obligation for the Proponent to obtain, renew or comply with such licences, permits, approvals or other statutory requirements.

2. SPECIFIC ENVIRONMENTAL CONDITIONS

Ecological Impacts

Mitigation, Translocation and Offsets

- 2.1 Unless otherwise agreed with DECC, survey(s) shall be undertaken of microbats roosting in existing bridges and culverts at least 12 months in advance of planned demolition of these structures. If microbats or evidence of roosting are discovered during survey(s), the timing and number of bat boxes to be installed in an appropriate adjacent area as an alternative roosting site shall be determined in consultation with the DECC and to the satisfaction of the Director-General.
- 2.2 The Proponent shall prepare and implement a nest box plan prior to commencement of clearing of vegetation for construction to provide replacement hollows for displaced fauna in conjunction with SoC B2-4. The plan shall detail the number and type of nest boxes to be installed which must be justified based on the number and type of hollows removed, the density of hollows in the area to be cleared and adjacent forest; and the availability of adjacent food resources. An adaptive monitoring program shall be developed in accordance with Condition 3.1 b) that includes targets against which to measure the effectiveness of the nest boxes in providing replacement hollows.
- 2.3 The Proponent shall, in consultation with DPI (Aquatic Habitat Protection Unit) develop and submit for the Director General's approval, appropriate compensatory measures based on the required 2 to 1 offset ratio, for the mangroves directly impacted by the proposal.

Biodiversity Offset and Mitigation Strategy and Package

- 2.4 The Proponent shall develop and submit for the Director-General's approval, a Biodiversity Offset and Mitigation Strategy. The Strategy shall provide a framework for developing the Biodiversity Offset and Mitigation Package required by Condition 2.5 and shall be developed in consultation with the DECC. The Strategy shall:
- include a minimum requirement to provide 4.4 hectares of native vegetation to offset direct and indirect impacts of the proposal;
 - identify the extent and types of habitat/vegetation communities that would be lost or degraded as a result of the project;
 - describe the quality of habitat/vegetation communities identified in point b);
 - identify the objectives and outcomes to be met by the final Biodiversity Offset and Mitigation Package;
 - consider the biodiversity management measures or activities identified in the documents set out in condition 1.1 or elsewhere in these Conditions of Approval, including:
 - fauna crossing measures, including vegetated medians, fauna structures and associated fauna fencing to be installed as part of the project;
 - revegetation measures;
 - translocation plans;
 - any other fauna mitigation measures such as nest boxes and frog breeding ponds; and
 - any ongoing biodiversity or threatened species monitoring requirements.
 - provide details of available compensatory habitat in the region to offset the loss of Endangered Ecological Communities and habitat for threatened fauna species as a result of the project. This may include other non land-purchase management measures or actions to deliver a beneficial outcome for the region;

- g) provide a decision-making framework to be used in selecting the priority ranking of compensatory habitat options available in the region; and
- h) a process to address additional impacts associated with unforeseeable impacts including:
 - i. changes to footprint due to design changes;
 - ii. changes to predicted impacts resulting from changes to mitigation measures; and
 - iii. additional impacts associated with ancillary facilities.

Unless otherwise agreed, the Biodiversity Offset and Mitigation Strategy shall be submitted to the Director-General for approval no later than 6 weeks prior to the commencement of any construction that would result in the disturbance of Endangered Ecological Communities or threatened fauna species' habitat or not later than 12 months from the date of this approval. To avoid any doubt, disturbance of Endangered Ecological Communities or threatened fauna habitat cannot commence until the Director-General has approved the strategy.

Nothing in this condition or this approval precludes the Proponent from implementing a suitable offset package which addresses impacts from multiple Pacific Highway Upgrade projects (including the Banora Point Upgrade) within the North Coast Bio-region. Any such agreement made with the Department of Environment and Climate Change must be made in consultation with the Department and approved by the Director-General.

- 2.5 Within 12 months of the approval of the Biodiversity Offset and Mitigation Strategy, or as otherwise agreed by the Director-General, the Proponent shall submit the Biodiversity Offset and Mitigation Package for the approval of the Director-General. The Package shall be developed in consultation with the DECC and:
 - a) shall detail the final suite of biodiversity offset measures selected in accordance with the Strategy; and
 - b) include a program (timeline) to achieve the implementation of the final suite of measures. Where possible, this should include purchase of land, development of agreements with identified land management authorities (e.g. DECC, DPI, local council etc.) for long term management and funding of offsets and mitigation measures, and installation of identified mitigation measures.

Traffic and Access

- 2.6 Where approved access to a property is affected by either construction or operation of the project, the Proponent shall provide an alternative access of a standard that is at least equivalent to that currently existing and meets relevant road safety standards prior to commencement of construction or opening of the project to traffic, whichever is relevant. Details for provision of altered access for both construction and operation shall be determined in consultation with the landholder.
- 2.7 The Proponent shall upgrade or maintain existing shared pedestrian and cycleway facilities between Barney's Point Bridge and Minjungbal Drive. The upgraded shared pedestrian and cycleway facilities should provide access to existing network facilities. Where feasible and reasonable, the network shall be constructed in accordance with Austroads Guide to Traffic Engineering Practice – Bicycles and must be completed within 12 months of the Banora Point Upgrade being opened to traffic.

Noise Impacts

Construction and Blasting Restrictions

- 2.8 Standard construction hours for the duration of construction are:
 - a) 7:00am to 6:00pm Mondays to Fridays, inclusive; and
 - b) 8:00am to 1:00pm Saturdays; and
 - c) at no time on Sundays or Public Holidays.

The following exceptions (without further approval) to standard construction hours apply:

- i. any works that do not cause construction noise to be audible at any sensitive receiver; or
 - ii. for delivery of materials required outside these hours by the Police or other authorities for safety reasons; or
 - iii. where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.
- 2.9 Certain construction activities (Out of Hours Works) may be allowed to occur outside the standard construction hours with the prior written approval of the Director-General. Requests for out of hours approval will be considered for construction activities which cannot be undertaken during standard construction hours for technical or other justifiable reasons and will be considered on a case by case or activity-specific basis. Any request for Out of Hours Works must be accompanied by:
- a) details of the nature and need for activities to be conducted during the varied construction hours;
 - b) written evidence to the DECC and the Director-General that activities undertaken during the varied construction hours are justified, appropriate consultation with potentially affected receivers and notification of Council has been undertaken, issues raised have been addressed, and all feasible and reasonable mitigation measures have been put in place; and
 - c) evidence of consultation with the DECC on the proposed variation in standard construction hours.

Despite the above, Out of Hours Works may also occur where a process for considering the above on a case by case or activity specific basis by the proponent including factors a) to c) above, has been approved as part of a Construction Environmental Management Plan or Construction Noise and Vibration Management Plan for this project.

- 2.10 Blasting associated with the construction is only permitted during the following hours:
- a) 9:00 am to 5:00 pm, Mondays to Fridays, inclusive;
 - b) 9:00 am to 1:00 pm on Saturdays; and
 - c) at no time on Sundays or public holidays.

This condition does not apply in the event of a direction from police or other relevant authority for safety or emergency reasons to avoid loss of life, property loss and/or to prevent environmental harm.

- 2.11 The Proponent shall consult with affected educational institutions and ensure that noise-generating construction works in the vicinity of the institutions are not timetabled during examination periods, unless other arrangements acceptable to the affected institutions are made at no cost to the affected institutions.

Construction and Blasting Limits

- 2.12 The construction noise objective for the project is to manage noise from construction (as measured by a L_{A10} (15minute) descriptor) so that it does not exceed the background L_{A90} noise level by:
- a) more than 20 dB(A) for a construction period of equal to or less than four weeks;
 - b) more than 10 dB(A) for a construction period of greater than four weeks, but not exceeding 26 weeks; and
 - c) more than 5 dB(A) for a construction period greater than 26 weeks.

Any activities that could exceed the construction noise objectives specified under this condition shall be identified and managed in accordance with the Construction Noise and Vibration Management Plan specified under Condition 6.4 d) of this approval. If the noise from construction is substantially tonal or impulsive in nature (as described in Chapter 4 of the NSW Industrial Noise Policy), 5dB(A) shall be added to the measured construction noise

level when comparing the measured noise with the construction noise objectives. The Proponent shall implement all reasonable and feasible noise mitigation measures with the aim of achieving the construction noise objective.

- 2.13 The Proponent shall ensure that airblast overpressure generated by blasting associated with the project does not exceed the criteria specified in Table 1 when measured at the most affected residence or other sensitive receiver.

Table 1 - Airblast Overpressure Criteria

Airblast Overpressure (dB(Lin Peak))	Allowable Exceedance
115	5% of total number of blasts over a 12 month period
120	Never

- 2.14 The Proponent shall ensure that ground vibration generated by blasting associated with the project does not exceed the criteria specified in Table 2 when measured at the most affected residence or other sensitive receiver.

Table 2 - Peak Particle Velocity Criteria

Peak Particle Velocity (mm/s)	Allowable Exceedance
5	5% of total number of blasts over a 12 month period
10	Never

Operational Noise

- 2.15 Unless otherwise agreed to by the Director-General, the Proponent shall submit for the approval of the Director-General a review of proposed operational noise mitigation measures identified in the documents nominated in Condition 1.1 within six months of commencing construction. The review shall take into account the detailed design of the project and, where feasible and reasonable, refine the proposed measures with the objective of meeting the criteria outlined in the *Environmental Criteria for Road Traffic Noise* (NSW EPA, 1999). The review shall be undertaken in consultation with the DECC.

Air Quality, Soil and Water Quality Impacts

- 2.16 The Proponent shall design, construct, commission, operate and maintain the project in a manner that minimises or prevents the emission of dust including wind blown and traffic generated dust, including but not limited to:
- implementing practical measures for construction vehicles carrying loads; and
 - minimising tracking of material from construction sites onto public roads.
- 2.17 The Proponent shall take all appropriate measures to prevent soil erosion and the discharge of sediments and pollutants from the project during construction and operation of the project consistent with the Department of Housing's publication *Managing Urban Stormwater - Soils and Construction*.
- 2.18 Where available and of appropriate chemical and biological quality, the Proponent shall use stormwater, recycled water or other water sources in preference to potable water for construction activities, including concrete mixing and dust control.

Hydrological Impacts

- 2.19 The Proponent shall, where feasible and reasonable, design and implement new or duplicated drainage infrastructure, in consultation with Council, the DWE, DECC and DPI (Fisheries division), and taking into account:
- relevant Council stormwater management policies;
 - the need for stormwater treatment measures to treat discharges from the road corridor;

- c) measures to minimise changes to afflux and flooding behaviour as result of the project; and
- d) the integration into, and complementing of, adjoining existing Council drainage infrastructure.

Heritage Impacts

Aboriginal and Non-Aboriginal Heritage

2.20 The Proponent shall not destroy, modify or otherwise physically affect potential burial 04-2-00162.

2.21 The Proponent shall investigate alternate locations for the proposed work site area, east of the proposed southern interchange identified in figure 7.1 of the Environmental Assessment. Where alternate locations are not viable the Proponent shall undertake further detailed cultural assessment for the cultural area including Aboriginal midden sites 04-02-0017 and 04-02-166, in consultation with the Aboriginal Stakeholders

The Proponent shall develop a Cultural Heritage Strategy, detailing consultation, assessment and any mitigation and management measures required to protect the cultural value of the site, associated with any impacts to the area.

The Cultural Heritage Strategy shall be submitted for the approval of the Director-General no later than one month prior to the commencement of construction, or within such period otherwise agreed by the Director-General. Pre- construction and construction works shall not commence in this area until written approval has been received from the Director-General.

2.22 The Proponent shall investigate, through detailed design, measures to minimise disturbance to Aboriginal sites formerly identified as potential archaeological deposits (the terraced slope and basal slope) and the agricultural terraces (H1).

Where these sites cannot be avoided, the Proponent shall implement the mitigation and management measures detailed within the Construction Heritage Management Plan required under this approval.

2.23 The proponent shall provide public interpretation of the Aboriginal and non-Aboriginal heritage sites along the shared user pathway required under condition 2.7 of this approval. This should be undertaken in consultation with the relevant Aboriginal stakeholders and Council where appropriate.

Ancillary Construction Facilities

2.24 The sites for ancillary facilities associated with the construction of the project shall satisfy the following criteria unless otherwise approved by the Director-General:

- a) be located more than 100 metres from a waterway;
- b) have ready access to the road network;
- c) be located in areas of low ecological and heritage conservation significance (including identified Aboriginal cultural value), and will not require any significant clearing of native vegetation beyond that already required by the project;
- d) be located on relatively level land;
- e) be separated from the nearest residences by at least 200 metres (or at least 250 metres for a temporary batching plant and stockpiling sites);
- f) be above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented;
- g) shall not unreasonably affect the land use of adjacent properties;
- h) provide sufficient area for the storage of raw materials to minimise, to the greatest extent practical, the number of deliveries required outside standard construction hours; and

- i) shall not impact on heritage sites beyond those already impacted by the project.

Ancillary sites identified within the Environmental Assessment that do not meet the above criteria should be assessed against this criteria and demonstrate how they will manage and mitigate any environmental impacts to the satisfaction of the Director General.

The location of ancillary facilities shall be identified within the relevant Construction Environmental Management Plan.

3. ENVIRONMENTAL MONITORING AND AUDITING

Ecological Monitoring

- 3.1 Prior to the commencement of construction, the Proponent shall develop and implement a Monitoring Program to monitor the effectiveness of the mitigation measures identified in Condition 2.4 for threatened species directly impacted by the project. The Program shall be developed in consultation with the Department, DECC, DPI (Fisheries and Forestry divisions), and suitably qualified ecologist(s) and shall include but not necessarily be limited to:

- monitoring methodology for threatened species in and adjacent to the project footprint. The methodology shall be decided in consultation with DECC;
- an adaptive monitoring program to assess the effectiveness of the mitigation measures identified in Condition 2.4 e) i-v and allow their modification if necessary. The monitoring program shall nominate appropriate and justified monitoring periods and targets against which effectiveness will be measured;
- monitoring shall be undertaken during construction (for construction-related impacts) and from opening of the project to traffic (for operation/ongoing impacts) until such time as the effectiveness of mitigation measures can be demonstrated to have been achieved over a minimum of three successive monitoring periods following establishment of vegetation planted as part of mitigation and after opening of the project to traffic, or as otherwise agreed by the Director-General in consultation with DECC;
- provision for the assessment of the data to identify changes to habitat usage and if this can be attributed to the project;
- details of contingency measures that would be implemented in the event of changes to habitat usage patterns directly attributable to the construction or operation of the project; and
- provision for annual reporting of monitoring results to the Director-General and the DECC, or as otherwise agreed by those agencies.

The Program shall be submitted to the Director-General prior to the commencement of construction.

Noise Auditing

- 3.2 No later than one year after commencement of operation of the project, or as otherwise agreed by the Director-General, the Proponent shall undertake operational noise monitoring to compare actual noise performance of the project against noise performance predicted in the review of noise mitigation measures required by Condition 2.15 and prepare an Operational Noise Report. The Report shall include, but not necessarily be limited to:
- noise monitoring to assess compliance with the operational noise levels predicted in the review of operational noise mitigation measures required under Condition 2.15 and documents specified under Condition 1.1 of this approval;
 - a review of the operational noise levels in terms of criteria and noise goals established in the *Environmental Criteria for Road Traffic Noise* (EPA 1999);
 - methodology, location and frequency of noise monitoring undertaken, including monitoring sites at which project noise levels are ascertained, with specific reference to locations indicative of impacts on sensitive receivers;

- d) details of any complaints and enquiries received in relation to operational noise generated by the project between the date of commencement of operation and the date the report was prepared;
- e) any required recalibrations of the noise model taking into consideration factors such as noise monitoring undertaken and actual traffic numbers and proportions; and
- f) an assessment of the performance and effectiveness of applied noise mitigation measures together with a review and if necessary, reassessment of all reasonable and feasible mitigation measures; and
- g) any additional feasible and reasonable measures to those identified in the review of noise mitigation measures required by Condition 2.15, that would be implemented with the objective of meeting the criteria outlined in the *Environmental Criteria for Road Traffic Noise* (NSW EPA, 1999), when these measures would be implemented and how their effectiveness would be measured and reported to the Director-General and the DECC.

3.3 The Proponent shall provide the Director-General and the DECC with a copy of the Operational Noise Report within 60 days of completing the operational noise monitoring referred to under condition 3.2 of this approval, or as otherwise agreed by the Director-General.

4. COMPLIANCE MONITORING AND TRACKING

Compliance Tracking Program

- 4.1 The Proponent shall develop and implement a program to track compliance with the requirements of this approval. The Program shall be submitted to the Director-General for approval prior to the commencement of construction. The Program shall relate to both construction and operational stages of the project, and shall include, but not necessarily limited to:
- a) provisions for periodic review of project compliance with the requirements of this approval, Statements of Commitment and documents referred to in Condition 1.1 of this approval) and reporting of compliance status to the Director-General;
 - b) provisions for the notification of the Director-General prior to the commencement of construction and prior to the commencement of operation of the project;
 - c) a program for independent environmental auditing in accordance with ISO 19011:2003 - Guidelines for Quality and/ or Environmental Management Systems Auditing;
 - d) mechanisms for reporting and recording incidents and actions taken in response to those incidents;
 - e) provisions for reporting environmental incidents to the Director-General during construction and operation; and
 - f) procedures for rectifying any non-compliance with the documents referred to in Condition 1.1 identified during environmental auditing or review of compliance.

5. COMMUNITY INFORMATION, CONSULTATION AND INVOLVEMENT

Access to Information

- 5.1 Subject to confidentiality, the Proponent shall make all documents required under this approval available for public inspection on request.
- 5.2 Prior to the commencement of construction, the Proponent shall establish and maintain a new website, or dedicated pages within an existing website, for the provision of electronic information associated with the project. The Proponent shall, subject to confidentiality, publish and maintain up-to-date information on the website or dedicated pages including, but not necessarily limited to:
- a) a copy of the documents referred to under condition 1.1 of this approval, and any documentation supporting modifications to this approval that may be granted from time to time;
 - b) a copy of this project approval;
 - c) a copy of each relevant environmental approval, licence or permit required and obtained in relation to the project;

- d) a copy of each current strategy, plan, program or other document required under this approval; and
- e) the outcomes of compliance tracking in accordance with the requirements of condition 4.1.

Complaints and Enquiries Procedure

- 5.3 Prior to the commencement of construction, the Proponent shall ensure that the following are available for community complaints and enquiries during the construction period:
- a) a telephone number on which complaints and enquiries about construction and operation activities may be registered;
 - b) a postal address to which written complaints and enquiries may be sent; and
 - c) an email address to which electronic complaints and enquiries may be transmitted.

The telephone number, the postal address and the email address shall be published in a newspaper circulating in the local area prior to the commencement of construction and prior to the commencement of project operation. The above details shall also be provided on the website (or dedicated pages) required by this approval.

The Proponent must prepare and implement a Construction Complaints Management System consistent with AS 4269 Complaints Handling prior to the commencement of construction activities and must maintain the System for the duration of construction activities.

Information on all complaints received, including the means by which they were addressed and whether resolution was reached and whether mediation was required or used, must be maintained by the Proponent and included in a complaints register. The information contained within the System must be made available to the Director-General on request.

Community Consultation

- 5.4 The Proponent shall establish and maintain a Community Interest Group for the duration of construction of the project unless otherwise agreed by the Director-General. Membership of the group shall comprise:
- a) representatives of the Proponent;
 - b) the Environmental Representative required in Condition 6.1;
 - c) Council officers representing the relevant Council through which the project passes; and
 - d) community representatives (equal to or greater in number than the Proponent representatives) identified and drawn from relevant community and business groups, individual members of the community adjoining the project.

Issues for discussion by the Group may include but not necessarily be limited to:

- i. project information dissemination to the community;
- ii. design issues and mitigation measures related to this approval;
- iii. the Construction Environmental Management Plan required in Condition 6.3; and
- iv. construction activities.

Comments made by the group regarding these issues must be considered by the Proponent and feedback provided to the group.

The first meeting of the group shall be held prior to the commencement of construction unless otherwise agreed by the Director-General. The Proponent may review the group's membership and/or need for the group at any time during construction. The Group may only be dissolved with the Director-General's approval.

- 5.5 The Proponent shall prepare and implement a Community Communication Strategy for the project. This Strategy shall be designed to provide mechanisms to facilitate communication between the Proponent, the Contractor, the Environmental Representative and the local

community (particularly adjoining landowners) on the progress and the related environmental management of the project. The Strategy shall include, but not necessarily limited to:

- a) identification of community stakeholders to be consulted as part of the Strategy, including affected landowners;
- b) procedures and mechanisms for the regular distribution of information to the community and adjoining land owners on the progress of the project and matters associated with environmental management;
- c) procedures and mechanisms through which the community and/or adjoining landowners can discuss or provide feedback to the Proponent and/or Environmental Representative in relation to the environmental management and delivery of the project. This may include focused discussion forums and site inspections;
- d) procedures and mechanisms through which the Proponent can respond to any enquires or feedback from the community and/or adjoining landowners in relation to the environmental management and delivery of the project; and
- e) procedures and mechanisms that would be implemented to resolve any issues/disputes that may arise between parties on the matters relating to environmental management and the delivery of the project. This may include the use of an appropriately qualified and experienced independent mediator.

Issues that should be addressed in the Community Communication Strategy may include (but not necessarily be limited to):

- i. traffic management (including property access, pedestrian and cycleway access);
- ii. property acquisition
- iii. landscaping/urban design matters; and
- iv. noise and vibration mitigation and management.

The Proponent shall maintain and implement the Strategy throughout construction. The Strategy shall be approved by the Director-General prior to the commencement of any construction associated with the project.

6. ENVIRONMENTAL MANAGEMENT

Environment Representative

- 6.1 Prior to the commencement of construction of the project, or as otherwise agreed by the Director-General, the Proponent shall nominate for the approval of the Director-General a suitably qualified and experienced Environment Representative(s) that is independent of the design and construction personnel. The Proponent shall employ the Environment Representative(s) for the duration of construction, or as otherwise agreed by the Director-General. The Environment Representative(s) shall:
 - a) be the principal point of advice in relation to the environmental performance of the project;
 - b) be consulted in responding to the community concerning the environmental performance of the project;
 - c) monitor the implementation of all environmental management plans and monitoring programs required under this approval;
 - d) monitor the outcome of all environmental management plans and advise the Proponent upon the achievement of all project environmental outcomes;
 - e) have responsibility for considering and advising the Proponent on matters specified in the conditions of this approval, and all other licences and approvals related to the environmental performance and impacts of the project;
 - f) ensure that environmental auditing is undertaken in accordance with the requirements condition 4.1 and the project Environmental Management System(s); and
 - g) be given the authority and independence to require reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on the environment be likely to occur.

Urban Design and Landscaping Management Plan

6.2 Prior to the commencement of construction of the project, or as otherwise agreed by the Director-General, the Proponent shall prepare an Urban Design and Landscape Plan in consultation with relevant Council, relevant Government agencies and the Community Liaison Group (refer to condition 5.5 of this approval). The Plan shall include, but not necessarily be limited to:

- a) sections and perspective sketches;
- b) location and identification of existing and proposed vegetation including use of indigenous and endemic species where possible (including enhancement of local access roads);
- c) location of mounds, bunds, structures (noise walls, bridges) or other proposed treatments, finishes of exposed surfaces (including paved areas) and form and fabric (noise walls);
- d) pedestrian and cycle elements including footpaths and paving, pedestrian crossings and fixtures (e.g. tree guards, seating, lighting, fencing and signage);
- e) progressive landscaping strategies incorporating other environmental controls such as erosion and sedimentation controls, drainage, noise mitigation; and
- f) monitoring and maintenance procedures.

The Plan shall be submitted for the approval of the Director-General no later than one month prior to the commencement of construction, or within such period otherwise agreed by the Director-General. Construction works shall not commence until written approval has been received from the Director-General.

Construction Environment Management Plan

6.3 Prior to the commencement of construction, the Proponent shall prepare and implement a Construction Environment Management Plan (CEMP). The CEMP shall outline the environmental management practices and procedures that are to be followed during construction, and shall be prepared in accordance with *Guideline for the Preparation of Environmental Management Plans* (DIPNR, 2004). The CEMP shall include, but not necessarily be limited to:

- a) a description of all relevant activities to be undertaken during construction of the project including an indication of stages of construction, where relevant;
- b) statutory and other obligations that the Proponent is required to fulfil during construction including all approvals, consultations and agreements required from authorities and other stake, and key legislation and policies;
- c) a description of the roles and responsibilities for all relevant employees involved in the construction of the project;
- d) details of how the environmental performance of the construction works will be monitored, and what actions will be taken to address identified adverse environmental impacts; and
- e) complaints handling procedures during construction.

The Plan shall be submitted for the approval of the Director-General no later than one month prior to the commencement of construction, or within such period otherwise agreed by the Director-General. Construction works shall not commence until written approval has been received from the Director-General.

6.4 As part of the Construction Environment Management Plan for the project required under condition 6.3 of this approval, the Proponent shall prepare and implement the following sub plan(s):

- a) a **Construction Traffic Management Plan**, prepared in accordance with the RTA's *QA Specification G10 – Control of Traffic and Traffic Control at Work Sites Manual* (2003) to manage disruptions to highway and local traffic movements as a result of construction activities (and associated construction traffic). The Plan shall be developed in consultation with Council and shall include, but not necessarily be limited to:

- i) identifying measures to minimise impacts on existing traffic (including pedestrians, vehicles, cyclists and disabled persons) including the staging of construction works to minimise lane closures during peak periods and delay to traffic;
- ii) identifying access routes, entry and exit points for construction sites, and parking areas for construction vehicles;
- iii) identifying temporary and interim traffic arrangements including intersection and property access;
- iv) the provision of barriers between working and trafficked areas;
- v) traffic incident procedures during construction; and
- vi) appropriate review and amendment mechanisms.
- b) a **Construction Flora and Fauna Management Plan** to detail how construction impacts on ecology will be minimised and managed. The Plan shall be developed in consultation with the DECC and DPI and shall include, but not necessarily be limited to:
 - i) details of work practices (such as fencing and construction worker education) to minimise the potential for damage to vegetation (particularly EECs) and native fauna during construction. Measures shall also be included to minimise the extent of soil disturbance during construction;
 - ii) weed management measures focusing on early identification of invasive weeds, identifying effective management controls and methods to measure effectiveness;
 - iii) details of the mitigation measures to be implemented and associated procedures for the installation and monitoring of these measures;
 - iv) a procedure detailing the timing for the implementation and monitoring of the mitigation and management measures consistent with Condition 2.4; and
 - v) a description of how the effectiveness of the mitigation and management measures would be monitored during the proposed works and, if any non-compliance is detected, how any non-compliance would be rectified consistent with Condition 2.4.
- c) a **Construction Heritage Management Plan** to detail how construction impacts on Aboriginal and non-Aboriginal heritage will be minimised and managed. The Plan shall be developed in consultation the Department of Planning (Heritage Branch) and the DECC and shall include, but not necessarily be limited to:
 - i) a strategy for the salvage and storage of salvaged objects, both during construction and for the long term management;
 - ii) specific measures to be applied to works undertaken in close proximity to identified Aboriginal and non-Aboriginal heritage items to minimise and avoid impacts on these items including a component within the site induction program for construction workers on measures to be employed to manage and minimise impacts to heritage;
 - iii) procedures to be followed should previously unidentified objects be uncovered or additional impacts to sites be identified;
 - iv) procedure for continued consultation with Aboriginal stakeholders;
 - v) procedures to be followed should non-compliance against any of the documents identified in Condition 1.1 or this management plan be detected.
- d) a **Construction Noise and Vibration Management Plan** to detail how construction noise and vibration impacts would be minimised and managed. The Plan shall be developed in consultation with the DECC and include, but not necessarily be limited to:
 - i) details of and an indicative schedule for construction activities;
 - ii) identification of noise and/or vibration generating construction activities that would affect sensitive receivers, particularly residential areas;
 - iii) procedures to ensure overpressure and vibration criteria are met during blasting, including a suitable blast program supported by test blast results;
 - iv) a detailed description of the reasonable and feasible actions and measures to be implemented to ensure compliance with the relevant noise and vibration criteria/objectives;

- v) procedures for notifying sensitive receivers of construction activities likely to affect their noise and vibration amenity, as well as procedures for managing noise complaints; and
 - vi) a description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be conducted, the locations where monitoring would take place, how the results of this monitoring would be recorded; and, procedures to be followed should non-compliance against any of the documents identified in Condition 1.1 or this management plan be detected.
- e) a **Construction Groundwater Management Plan** to detail how construction activities would be managed and monitored to minimise and mitigate impacts on groundwater. The plan shall be developed in consultation with the DECC and DWE and include, but not necessarily be limited to:
- i) description and identification of groundwater resources potentially affected by the proposal;
 - ii) identification of licensed bores, dams or other water supplies and groundwater dependant ecosystems affected by the project;
 - iii) measures to manage identified impacts on water table, flow regimes and quality;
 - iv) groundwater inflow control, handling, treatment and disposal methods; and
 - v) a detailed monitoring plan to identify monitoring methods, locations, frequency, duration and analysis requirements.
- f) a **Construction Soil and Erosion Control Plan** to detail how construction activities would be managed to minimise soil and erosion from the Project and include references to Condition 2.17. This plan shall be prepared in consultation with the DECC and DPI.

Operational Environment Management Plan

- 6.5 The Proponent shall prepare and implement an Operational Environment Management Plan for the project that details the environmental management framework, practices and procedures to be followed during its operation. The Plan shall be consistent with the Department's *Guideline for the Preparation of Environmental Management Plans* (DIPNR 2004) to provide a clear environmental management framework. The Plan shall be prepared in consultation with the relevant government agencies and shall include, but not necessarily be limited to:
- a) a description of all relevant activities to be undertaken during operation of the project including an indication, where relevant, of stages of operation;
 - b) statutory and other obligations that the Proponent is required to fulfil during operation including all approvals, consultations and agreements required from authorities and other stakeholders, and key legislation and policies;
 - c) details of how the performance of the upgrade, in relation to the traffic performance (level of service), identified in the Environmental Assessment, will be monitored. In particular the following traffic performance issues shall be addressed in the plan:
 - i) identify the methodology that will be used to measure and monitor performance;
 - ii) the timing of the monitoring and reporting;
 - iii) details of the long term monitoring process.
 - d) details of how the project's environmental performance will be monitored and what actions will be taken to address identified adverse environmental impacts. In particular, the following environmental performance issues shall be addressed in the Plan:
 - i) measures to monitor and manage ecological factors, including effectiveness and maintenance of fauna crossings and rehabilitation measures, with reference to Condition 2.4;
 - ii) measures to monitor and manage heritage sites within the road reserve with reference to Conditions 2.20 - 2.23;
 - iii) measures to monitor and manage noise impacts with reference to Condition 2.15;

- iv) measures to monitor and minimise soil erosion and the discharge of sediment and other pollutants to surrounding lands and/or waters;
- v) measures to monitor and maintain landscaping undertaken along the project corridor until the vegetation has sufficiently been established.
- e) a description and contact details of the roles and responsibilities for all relevant employees involved in the operation of the project; and
- f) complaints handling procedures during operation.

The Plan shall be submitted for the Director-General's approval no later than one month prior to the commencement of operation, or within such period as otherwise agreed by the Director-General. Operation of the project shall not commence until written approval has been received from the Director-General.

Annexure B - Technical report prepared by Dr. John Heilig



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Construction •
Open Pit Mining •
Quarrying •
Underground Mining •
Blast Design •
Blast Permitting •
Vibration Monitoring •
Vibration Analysis •

Sunday, August 29, 2010

Ref:jhh:Banora Point increase.docx

Mr. Steve Allan
Barona Point
PO Box 546
Banora Point, NSW 2460

RE: Banora Point increase

Dear Steve,

I ask that the following technical letter is considered in assessing the suitability of the presently imposed 5mm/s vibration criterion for impulsive vibration associated with the Banora Point Upgrade Alliance construction. Impulsive vibration is characterised by short duration, generally not more than several seconds, of elevated levels beyond those typical of the normal background environment. It is distinguished from continuous vibration, such as that produced by hydraulic hammers, in both the higher amplitude and much shorter duration. The most common impulsive vibration is that generated by drilling and blasting activities.

Whilst overly restrictive vibration criteria will unnecessarily affect the scale of any blasting activities can be undertaken as part of the construction process, provide no greater assurance against building damage and significantly increase the cost and duration of constructing the project, appropriate constraints on any drilling and blasting activities are necessary to ensure the integrity of the infrastructure is maintained. An appropriate constraint must therefore address three key issues:

- Ensure that the structural integrity of adjacent infrastructure is protected;
- Ensure that adjacent infrastructure is not impacted superficially from the vibration activities;
- Ensure that the activity does not unnecessarily impose of the "quality of life" for persons about the works area.

It is beyond question that an appropriate vibration criterion should ensure the initial two of these objectives are met. The integrity of a property adjacent to a construction site should not be jeopardised by the type or scale of the construction activities undertaken. Almost all vibration criteria applied to drilling and blasting activities undertaken in Australia, as well as the greatest majority of other countries, are however strongly biased towards the protection of "quality of life" for residents, ensuring that neither structural nor superficial damage can occur. Further, the "quality of life" level reflects an acceptable value for long term operations generating impulsive vibrations, such as production blasting at quarries and mines and is less appropriate for short term construction projects that incorporate dedicated teams covering community relations, management and project engineering as well as immediate reporting procedures and a well developed quality assurance and environmental management plans.

As a consequence of these vibration restrictions which are very heavily biased towards human comfort, there exist areas along the proposed alignment where blasting cannot be used as the method of excavation. In these areas, excavation will be limited to the use of hydraulic rock breakers as a primary means of excavation. Whilst the rock breakers induce lower levels of vibrations, the vibration will necessarily persist for longer periods of time (days as opposed to the short duration blast event of not more than several seconds) and in almost all cases, is considered more intrusive to adjacent residents. Further, the accompanying regenerated noise associated with low level continuous vibration is often considered more intrusive than associated vibration.



The greater amplitude, although shorter duration, vibration from blasting is therefore preferable by many residents and local authorities, providing the induced vibration is not sufficiently high to be capable of causing superficial or structural damage to the building. Adherence to all local and internationally accepted guidelines or standards necessarily prohibits damage of these types, whilst at the same time minimising discomfort to the occupants of the affected buildings. Vibration levels in excess of the current 5mm/s criterion equally pose no greater threat to building integrity and may be only marginally more perceptible to building occupants, but importantly, allow drilling and blasting activities to operate in those areas where hydraulic rock hammers were previously required. Hence, an overall reduced impact on residents, particularly in terms of duration.

It is therefore considered appropriate to investigate alternative vibration management programmes, limited not only to vibration monitoring, but include and account for the intensive management and community awareness programmes typical of large scale, high profile construction projects. The additional management resources necessary for these projects warrants investigation of an increased acceptable vibration level over that applicable to a small scale, less rigorously scrutinised construction projects operating without the same level of community consultation, monitoring and reporting procedures. When these aspects are combined and included as a component of a managed program, vibration limits exceeding 5mm/s could be considered appropriate with no instance of damage to properties or considered objectionable to the vast majority of residents around the works area.

Property Damage

Limits designed to protect personal amenity are well below those considered to represent the onset of superficial damage (cracking of plaster, flaking of paint etc.) and are commonly less than one hundredth of the value at which structural damage may occur. Several well documented studies that link vibration levels from blasting to observed damage have been completed, with perhaps the most comprehensive completed under the guidance of the United States Bureau of Mines (USBM). Aside from a few studies that actually produced data that identified when failure of a structure occurs, most identify limits of vibration that have not resulted in any damage and make no reference to what additional vibration the structure could have tolerated without causing damage. Two standards, the Australian Standard and Swedish Standard, also cite acceptable levels of vibration with respect to building damage.

Stagg et al¹ constructed a test house from standard construction materials (timber studs, gypsum board interior, block foundations, etc.) near an operating mine and concluded that most of the cracking was indistinguishable from that which occurred from natural shrinkage. The study further concluded that the first cracking of the gypsum board occurred at around 8mm/s and that concrete only showed some cracking after a peak level of more than 150mm/s was applied. The effects of repeated blasting were also addressed and the study concluded that fatigue failure can occur, although the first indication of such was not evident until the property was subjected to an equivalent of 10,000 blasts, with each blast inducing a vibration level near 10mm/s.

Moore & Richards² documented observations on a brick veneer house from blasting activities that occurred within 50 metres of the property. Minor damage was observed, including extension of existing plaster cracks, opening of new hairline cracks and the cracking of plaster around nail heads at a minimum vibration level of near 70mm/s. Like the Stagg et al study, their study also showed that new defects were more correctly linked to environmental factors such as rainfall, temperature and temperature cycling.

The Australian Standard also AS2187.2 recommends maximum peak particle velocities for different types of structures based on damage rather than human discomfort. Table J4.4.2.1 of the standard suggests levels for the prevention of minor or cosmetic damage occurring to structures from ground vibration generated by blasting. The table is reproduced below:

¹ Stagg, M.S., Siskind, D.E., Stevens, M.G., & Dowding, C.H., (1984). Effects of repeated blasting on a wood-frame house", United States Bureau of Mines, Report of Investigation 8896

² Moore, A.J. & Richards, A.B., (2001). "Structure response of a brick veneer house to open pit coal mine blasting", Proceedings of the EXPLO 2001 Conference, The Australasian Institute of Mining and Metallurgy, Publication Series No. 4/2001



Type of Building	Peak component particle velocity in frequency range of predominant pulse	
	4Hz to 15Hz	15 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s at 4 Hz and above	
Un-reinforced or light framed structure. Residential or light commercial type buildings	15mm/s at 4 Hz increasing to 20mm/s at 15Hz	20mm/s at 15 Hz increasing to 50mm/s at 40 Hz and above

Table 1: Transient vibration guide values for cosmetic damage (reproduced from AS2187.2-2006)

The standard further defines *cosmetic* damage as the formation of hairline cracks on drywall surfaces, the growth of existing cracks in plaster or drywall surfaces or the formation of hairline cracks in the mortar joints of brick/concrete constructions. *Minor* damage is defined as the formation of cracks or loosening and falling of plaster or drywall surfaces, or cracks through brick/concrete blocks. The same standard proposes limits for ground vibration for control of damage to structures.

Category	Type of Blasting Operations	Peak component particle velocity (mm/s)
Other structures or architectural elements that include masonry, plaster and plasterboard in their construction	All blasting	Frequency dependent damage limit criteria as in Table J4.4 2.1
Unoccupied structures of reinforced concrete or steel construction	All blasting	100mm/s maximum unless agreement is reached with the owner that a higher limit may apply
Service elements, such as pipelines, powerlines and cables	All blasting	Limit to be determined by structural design methodology

Table 2: Recommended ground vibration limits for control of damage (reproduced from AS2187.2-2006)

Given the high frequency of the vibration pulses from small scale construction blasting, the dominant frequency will exceed 40Hz. Table 1 indicates an acceptable value of 20mm/s.

Aside from the AS2187.2 (2006) standard, the Swedish Standard also addresses the potential for causing damage to structures from varying levels of vibration. The guidance levels do not take into account human annoyance. The standard provides guidance levels used to establish permissible vibration limits which provide an acceptable factor of safety for the structure of concern. The standard is stated to be based on more than 100,000 measurements from blasting of all types, including tunnelling, mining, construction, and specifically addresses variable rock types, type of structure, type of construction material, frequency of vibration and the duration of blasting. Accounting for each of these factors, for a typical non-reinforced residential property, an acceptable value is 70mm/s.

Summary

It is the professional opinion of Heilig & Partners that an increase in the permissible level of impulsive vibration could lead to an overall improvement in the "quality of life" for residents around the works area. Presently imposed vibration limits will necessitate the use of equipment, like hydraulic hammers, that generate lower, however continuous, levels of vibration which are considered by almost all residents as more intrusive and pose a greater imposition on their "quality of life". Providing the level of vibration from any drilling and blasting activities remains below accepted values linked with the damage to properties, and the residents are well briefed on the timing of any blasting, the benefits to the community are positive.

To account for the variability in explosive performance and ground characteristics, and therefore varying vibration levels from blasting activities, it is accepted industry practice to design blast patterns using an equation that predicts the 95 percentile level (ie. a level which will exceed 95% of all measured values). In view of the above comments

HEILIG & PARTNERS
ABN 56 082 976 714

Sunday, 29 August 2010

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and the motivation for an increase in the permissible level, an acceptable vibration criterion could be one that considers a level of compliance based on an upper limit of 10mm/s. Understandably this will necessitate a continual review of the vibration data and blasting patterns to ensure that subsequent blast patterns are designed with knowledge of previous results. This approach will produce some blasting patterns that induce less than 5mm/s whilst others will exceed 5mm/s (ie an average level of 5mm/s). In all cases, blast patterns must be controlled to produce vibration levels less than the limit of 10mm/s, still considered to less than the lowermost value associated with the on-set of superficial damage to properties. In all cases, the properties around the works areas should continue to have condition surveys to assess their susceptibility to vibration effects, which may necessitate an acceptable vibration value of less than 10mm/s in the event the condition of the building is poor. Community briefing to all residents around the works area will remain essential to offset the proposed increase in vibration and ensure the "quality of life" remains satisfactory.

As always, you are most welcome to contact me at your convenience to discuss in further detail any of the issues raised in this letter.

Yours truly,

John Heilig

Dr. John Heilig
Principal - Heilig & Partners Pty Ltd



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- Construction
- Open Pit Mining
- Quarrying
- Underground Mining
- Blast Design
- Blast Permitting
- Vibration Monitoring
- Vibration Analysis

Friday, October 01, 2010

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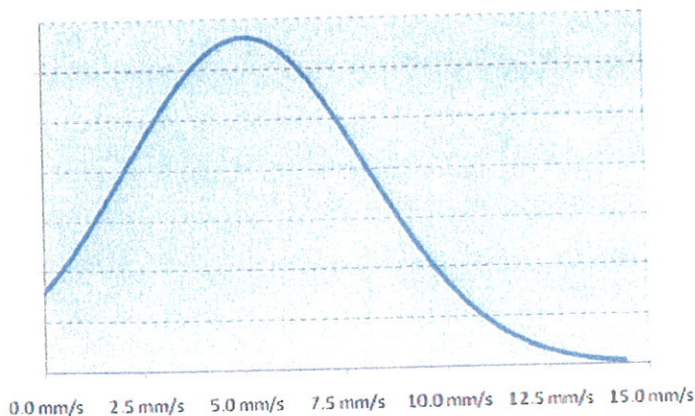
Mr. Craig Gordon
Banora Point Upgrade Alliance
PO BOX 789
Banora Point, NSW 2486

RE: Banora Point increase

Dear Craig,

Further to previous information provided by to your group, it is the professional opinion of Heilig & Partners that an increase in the permissible level of impulsive vibration could lead to an overall improvement in the "quality of life" for residents around the works area. Presently imposed vibration limits will necessitate the use of equipment, like hydraulic hammers, that generate lower, however continuous, levels of vibration which are considered by almost all residents as more intrusive and pose a greater imposition on their "quality of life". Providing the level of vibration from any drilling and blasting activities remains below accepted values linked with the damage to properties, and the residents are well briefed on the timing of any blasting, the benefits to the community are positive.

To account for the variability in explosive performance and ground characteristics, and therefore varying vibration levels from blasting activities, it is accepted industry practice to design blast patterns using an equation that predicts the 95 percentile level (ie. a level which will exceed 95% of all measured values). In view of the comments submitted previously, an acceptable vibration criterion could be one that considers a level of compliance based on an upper limit of 10mm/s. Blast designs would be continually reviewed and the relationships between vibration level, distance between the blast and the monitoring location and the explosive weight updated on the basis of previous blasting activities. Blast patterns would be designed to comply with the 10mm/s on 95% of occasions. Based on the inherent variability in the rock mass, the range of peak vibration will vary as shown in the following figure.



The variability is based upon the variation in the measured data collected during the trial blasts and indicates:

- the average level of vibration will be around 5mm/s;
- 95% of the blast patterns will generate less than 10mm/s at the nearest property;
- 99% of the blast patterns will generate less than 12mm/s and all blasts are predicted to generate less than



15mm/s.

Understandably this will necessitate a continual review of the vibration data and blasting patterns to ensure that subsequent blast patterns are designed with knowledge of previous results. This approach will produce some blasting patterns that induce less than 5mm/s, others will exceed 5mm/s and almost all patterns (95%) will comply with 10mm/s

In all cases, blast patterns will be controlled to produce vibration levels less than the lowermost value associated with the on-set of superficial damage to properties. In all cases, the properties around the works areas should continue to have condition surveys to assess their susceptibility to vibration effects, which may necessitate an acceptable vibration value of less than 10mm/s in the event the condition of the building is poor. Community briefing to all residents around the works area will remain essential to offset the proposed increase in vibration and ensure the "quality of life" remains satisfactory.

As always, you are most welcome to contact me at your convenience to discuss in further detail any of the issues raised in this letter.

Yours truly,

John Heilig

Dr. John Heilig
Principal - Heilig & Partners Pty Ltd

Annexure C – Stakeholder Comments

Table of Comments – BPUA Modification Request Blasting & Blast Management Plan

Name of Agency	Section / Page	Agency Comment	BPUA Response	Updated Section No.
DECCW		If the proposal is approved by the Department of Planning (DoP) an application will need to be submitted by the BPUA to vary the conditions of the current Environmental Protection Licence (EPL). Given the nature of the site and the noise and dust issues experienced too date it is absolutely imperative that an effective communication strategy is developed and implemented if the proposal is approved. This strategy must ensure that all potentially affected residents are consulted and provided with relevant information and the ability to contact the BPUA in relation to the proposed activity or in response to blasting noise and vibration or property damage.	Noted. This will occur subject to DoP's decision. Extensive consultation has already occurred in relation to the proposal and these details are provided in the modification submission. Following the community presentations, the group were asked if they had any concerns or issues regarding the proposed increase in vibration limits, no one in attendance indicated that they were uncomfortable with the proposal, and many were on board with the opportunity to complete the works faster with reduced impacts from less rock hammering. The Blast Management Plan (section 7) details the extent of community consultation BPUA will undertake prior to blasting activities. This includes: - Notifying all residents within a 1km radius of the blasts via a letterbox drop. The letter will inform them of the blasting works including days of the week, time of the day, number of blasts etc. This notification will be disseminated at least one week prior to the blasting commencing and advice given to the receiver will also include details of the 1800 telephone number and BPUA contact details should they have any concerns. - A specific blast notification shall then occur at least 5 days prior to each blast to the affected residents. Notification will be via a doorknock. The letter will advise the resident to stay indoors during the blasting. It will also include relevant contact information of the Community Relations Team should stakeholders have an issues/concerns. - In addition, VMS signs within the corridor will be continuously updated advising the next day and time of the blast.	

Name of Agency	Section / Page	Agency Comment	BPUA Response	Updated Section No.
			- The Community Relations Team will monitor the 1800 number and manage complaints and follow up on any other enquires in relation to the works. All complaints will be reported in BPUA's monthly report to DECCW and DoP. - BPUA will also provide the opportunity to potentially affected residents (ie. residences where vibration levels may potentially exceed 10mm/s) to attend the site compound during the blasts where tea and/or lunch facilities would be provided.	
		The BPUA have advised that the increase in the blasting limits will result in fewer blasts being required. The modification request document states "By increasing the % of blasts that can exceed the 5mm/s peak particle velocity beyond 5%, the following benefits are anticipated in the community: Fewer blasts would be required (ie. 25 blasts instead of 35). The community should be provided with certainty about the number of blasts that are to occur and what impacts are likely.	It is correct that the increase in blasting limits will reduce the number of blasts, and at this stage it is estimated to be from 35 to 25. At this stage the geological model indicates this estimate however there is still a fair degree of uncertainty regarding the thickness and extent of the basalt lens. Hence the exact number of blasts cannot be confirmed more accurately than the current estimate. Every effort will be made to increase the blast sizes whilst still complying with the approved blasting limits in order to continually reduce the number of blasts required. The community has been made aware of the impacts of blasting and expected number of blasts through the numerous community presentations. In addition, the community will be advised prior to each blast in accordance with the Blast Management Plan.	
		DECCW is willing to endorse a maximum blasting limit of 10mm/s peak particle velocity (PPV) as an absolute maximum limit (this is consistent with both the Australian Standard	BPUA understands DECCW's concerns regarding the proposed increase in vibration levels, these being: - Potential structural damage; and - Human comfort concerns. Regarding the potential to damage we advise:	

Updated Section No.	BPUA Response	Agency Comment	Section / Page	Name of Agency									
	As stated in the modification submission, almost all vibration criteria applied to drilling and blasting activities undertaken in Australia, as well as the greatest majority of other countries, are strongly biased towards the protection of "quality of life" for residents, ensuring that neither structural nor superficial damage can occur. Further, the "quality of life" level reflects an acceptable value for long term operations generating impulsive vibrations, such as production blasting at quarries and mines and is less appropriate (although still relevant) for short term construction projects that incorporate dedicated teams covering community relations, management and project engineering as well as immediate reporting procedures and a well developed quality assurance and environmental management plans. Limits designed to protect personal amenity are well below those considered to represent the onset of superficial damage (cracking of plaster, flaking of paint etc.) and are commonly less than one hundredth of the value at which structural damage may occur. The Australian Standard (AS2187.2) recommends maximum peak particle velocities for different types of structures based on damage rather than human discomfort. Table 14.4.2.1 of the standard suggests levels for the prevention of minor or cosmetic damage occurring to structures from ground vibration generated by blasting. The table is reproduced below: <table><tr><th>Type of Building</th><th>Peak component particle velocity in frequency range of predominant pulse 4Hz to 15Hz</th><th>15 Hz and above</th></tr><tr><td>Reinforced or framed structures. Industrial and heavy commercial buildings</td><td>50mm/s at 4 Hz and above</td><td></td></tr><tr><td>Un-reinforced or light framed structure. Residential or light commercial type buildings</td><td>15mm/s at 4 Hz increasing to 20mm/s at 15Hz</td><td>20mm/s at 15 Hz increasing to 50mm/s at 40 Hz and above</td></tr></table> Table 1: Transient vibration guide values for cosmetic damage (reproduced from AS2187.2-2006) The standard further defines cosmetic damage as the formation of hairline cracks on	Type of Building	Peak component particle velocity in frequency range of predominant pulse 4Hz to 15Hz	15 Hz and above	Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s at 4 Hz and above		Un-reinforced or light framed structure. Residential or light commercial type buildings	15mm/s at 4 Hz increasing to 20mm/s at 15Hz	20mm/s at 15 Hz increasing to 50mm/s at 40 Hz and above	AS2187.2-2006 and the ANZECC Technical Basis for blasting), with the 5mm/s provision in the existing EPL to be removed. In practical terms this means you will have to design blasts not to exceed ~ 8mm/s to provide a safety margin to ensure you do not exceed 10mm/s.		
Type of Building	Peak component particle velocity in frequency range of predominant pulse 4Hz to 15Hz	15 Hz and above											
Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s at 4 Hz and above												
Un-reinforced or light framed structure. Residential or light commercial type buildings	15mm/s at 4 Hz increasing to 20mm/s at 15Hz	20mm/s at 15 Hz increasing to 50mm/s at 40 Hz and above											

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drywall surfaces, the growth of existing cracks in plaster or drywall surfaces or the formation of hairline cracks in the mortar joints of brick/concrete constructions. *Minor* damage is defined as the formation of cracks or loosening and falling of plaster or drywall surfaces, or cracks through brick/concrete blocks. The same standard proposes limits for ground vibration for control of damage to structures. See Table J4.5B as reproduced below:

Category	Type of Blasting Operations	Peak component particle velocity (mm/s)
Other structures or architectural elements that include masonry, plaster and plasterboard in their construction	All blasting	Frequency dependent damage limit criteria as in Table J4.4.2.1
Unoccupied structures of reinforced concrete or steel construction	All blasting	100mm/s maximum unless agreement is reached with the owner that a higher limit may apply
Service elements, such as pipelines, powerlines and cables	All blasting	Limit to be determined by structural design methodology

Table 2: Recommended ground vibration limits for control of damage
(reproduced from AS2187.2-2006)

Given the high frequency of the vibration pulses from small scale construction blasting, the dominant frequency will exceed 40Hz. Table J4.4.2.1 indicates an acceptable value of 20mm/s.

The absolute maximum blasting limit of 10mm/s peak particle velocity (PPV) referred to by DECCW is taken from Table J4.5A of AS2187.2-2006 and relates solely to ground vibration limits for human comfort.

BPUA believe that the limit of 10mm/s for 95% of blasts and 100% never exceeding 15mm/s is consistent with the Australian Standard and Global Standards with respect to not causing any damage and we have conducted some 310 dilapidation reports to date.



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			Regarding Human Comfort we advise: BPUA's proposed modification to the blasting vibration limits is largely to improve the quality of life for the surrounding residents by reducing the amount of blasting and secondary rock breaking (rock hammers) that will be required due to low explosive weights to meet the current criteria. Extensive consultation with the affected residents and the broader community has occurred in relation to the proposal to increase the vibration limits in lieu of reducing vibration and noise from rock breaking and noise and dust from drilling operations. BPUA believe the community is generally on board with the proposal as no one in attendance to the community meetings indicated that they were uncomfortable with the proposal and many were on board with the opportunity to complete the works faster with reduced impacts from less rock hammering. As stated in the modification submission, the proposed increase to vibration limits will result in: • Less secondary breakage (ie. rock hammering) would be required next to properties which has higher vibration limits than blasting (can be up to 50mm/s, frequency dependant - refer to Table 2-1 and 2-2 below). • Less noise, dust and vibration impacts from drilling activities. Drilling time expected to reduce by 24% drilled meters due to larger charge weights. • Fewer blasts would be required - 25 blasts instead of 35 blasts. • Exposure to fewer blasts (impulsive vibrations) and greatly reduced exposure to rock breaking (continuous vibration). • Fewer traffic stoppages and delays - 25 stoppages instead of 35 stoppages. • Less noise and dust impacts due to less use of rock hammers. • Less number of vibration exposures due to the ability to increase the charge weights in each drill hole. • Less number of times residents need to stay indoors or be evacuated due to blasting events. • The increased blasting limits proposed will NOT cause structural damage to adjacent properties (refer to table 2-1 and 2-2 below) and Section 4 of this report for further	

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			details on property type damage limits. - The overall duration of rock excavation and continuous rock breaking would be greatly reduced which directly benefits the local community. - Faster completion of the 35,000m³ excavation will also bring early noise reduction benefits to the community by having the southbound lane of the highway open early. The noise reduction benefits will be from better grade, low noise wearing surface and noise barriers completed. BPUA agree with DECCW that we should plan for a lower vibration limit to ensure we do not exceed the upper limits. DECCW comments suggest planning for 8mm/s to not exceed 10mm/s. The blast evaluation trials BPUA undertook to fine tune the vibration model (Page 42 of the submission) indicates that we actually need to plan for 5mm/s to never exceed 15mm/s and maintain 95% of blasts under 10mm/s. This is solely due to statistical scatter of vibration out of BPUA's control. An example is changing geology between blast and resident or underground water conditions. There is a very real chance (95%) that we will never exceed 10mm/s. However by adopting an absolute maximum of 10mm/s simply moves the median to a lower vibration level so the majority of blasts will be reduced to below 5mm/s. There is statistically only 1.25 blasts that may exceed the 10mm/s limit while the vast majority (95%) of blasts will be below this value and concentrated around 5mm/s. By removing the potential for the 1.25 blasts to exceed 10mm/s we move the remaining 95% of blasts to a lower average vibration below 5mm/s. This will greatly increase the amount of secondary rock breaking. The goal of increasing the vibration limit is to increase human comfort by reducing the rock breaking and drilling requirements. Eliminating the risk of the 1.25 blast exceeding 10mm/s greatly jeopardises our ability to reduce the impacts from increased drilling noise and rock breaking vibration and noise. BPUA feel there would be greater human comfort achieved by reducing the exposure to continuous rock breaking and drilling at the closest residents for 95% of the blasts instead of eliminating the 5% chance of a blast exceeding 10mm/s. The actual exposure	

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			of 13mm/s vs 10mm/s to the resident is unlikely to be perceptible to the human senses (As advised by John Heilig & Partners (Blasting Consultant)). In the one instance that the blast goes over 10mm/s but not greater than 15mm/s, the levels would still be less than the lowermost value associated with the on-set of superficial damage to properties. "Quality of life" for residents will be maintained at the highest of standards through the BPUA community relations group and their continual association with residents regarding the planned drilling and blasting activities. Residents will be well briefed on the timing of any blasting to ensure a policy of no surprises. Consultation during the blasting program will be conducted in accordance with Section 7.7 of the Blast Management Plan (BMP) and would involve: • Notifying all residents within a 1km radius of the blasts via a letterbox drop. • A specific blast notification shall then occur at least 5 days prior to each blast to the affected residents. Notification will be via a doorknock. The letter will advise the resident to stay indoors during the blasting. It will also include relevant contact information of the Community Relations Team should stakeholders have an issues/concerns. • In addition, VMS signs within the corridor will be continuously updated advising the next day and time of the blast. • The Community Relations Team will monitor the 1800 number and manage complaints and follow up on any other enquires in relation to the works. All complaints will be reported in BPUA's monthly report to DECCW and DoP. • BPUA will also provide the opportunity to potentially affected residents (ie. residences where vibration levels may potentially exceed 10mm/s) to attend the site compound during the blasts where tea and/or lunch facilities would be provided. Any complaints received in relation to blasting will be dealt with immediately and follow the same process as all other community complaints as outlined in the BPUA Community Consultation Strategy.	

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		Continuation of blasting should be on a blast by blast basis and subject to there being no significant unresolved complaints.	Upon receiving a complaint, it will be referred to BPUA's community relations team, environmental manager and the blasting consultant to review the significance and validity of the complaint. The complaints would be responded to immediately to resolve prior to the next blast. Consideration also needs to be given to potential vexatious complainants. The Maximum Vibration level at a residence with a Valid and non-vexatious complaint due to the higher vibration levels and that needs to be addressed prior to another exposure of higher vibrations will revert to the lower vibration criteria.	
		In the event that there are unresolved complaints the limits will revert to 5mm/s.	Noted. However this should be a significant and valid complaint and not a vexatious complaint and should refer back to current criteria.	
		Each blast (including trial blasts) should be monitored at the most affected receiver location and reported to the DoP and DECCW. Monitoring should include but not be limited to: details of the blast, measured vibration levels, complaints received and actions taken to resolve the complaint/s.	Noted. This is included in the Blast Management Plan and is a requirement of the existing MCoA & EPL conditions.	
		Dilapidation surveys should be conducted of all potentially affected residences before any blasts resulting in vibration levels greater than 5mm/s.	Noted. This is included in the Blast Management Plan and is a requirement of the existing Statement of Commitment L4 which states: <i>Property inspections will be conducted, subject to landowner agreement, on all structures within 200 metres of proposed blasting locations, within 50 metres of construction activities that generate vibration impacts and at any other locations identified in the risk assessment.</i>	

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			To date BPUA have completed dilapidation surveys on 310 of the 358 potentially affected residences with a copy of the dilapidation reports provided to the residents. The remaining residences have been targeted however at this stage no response has been received or the owners have denied access. BPUA will try all reasonable attempts to gain approval to enter these residences to conduct the dilapidation surveys prior to commencing blasting activities. Secondary letters have been provided to these residences advising them of the need to accept the dilapidation inspection to help identify any damage resulting from the BPUA works. The dilapidation reports have been provided to the Blasting Consultant for review to ensure the dwelling type, location, height and dilapidation details have been considered in the management and design of the blast patterns. The vibration monitoring results will be continuously reviewed in relation to the affected properties and blast designed modified to not influence these properties. Ok – BPUA would like to review draft conditions.	
		If approved DECCW will be recommending to DoP to include appropriate conditions to address the issues discussed above including blasting damage (including cosmetic damage) limits. DECCW will also be recommending that DoP include appropriate conditions that require BPUA to make good at their expense any damage as a result of blasting.	Noted. This is a requirement of existing Statement of Commitment L6 which states: <i>Where liable, any property damage caused directly or indirectly by the project's construction or operation will be rectified at no cost to the property owner(s). Alternatively the RTA may negotiate compensation for the property damage with the property owner.</i>	
ER	Ann C / Sec	There was an indication from those present that all were	Added 'Following the presentation, no one in attendance indicated that they were uncomfortable with the proposal.'	Ann D / Sec 6.3.2 &

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	6.3.2	<i>comfortable with the proposal.</i> This may be true, but is probably stretching the inference from the feedback. It may be more accurate to state (if that is, in fact, the case) that: <i>Following the presentation, no one in attendance indicated that they were uncomfortable with the proposal.</i>		7
Ann C / Sec 6.5.2		<i>A survey will now be prepared and distributed in the coming weeks.</i> Has there been any further follow-up with the Bione Ave residents yet as to their feelings? As you are undoubtedly aware, one of the key issues affecting residents will be that of timing, so that school pick-ups, appointments etc are not missed. The former can be addressed by ensuring that traffic delayed by the blast is clear by 2:30pm, the	BPUA has decided not to proceed with any additional surveys. The affected residents have been provided with the opportunity to comment during the community presentations. Noted. This is included in the BMP.	



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		latter through adequate warning, and consistency with regard to the blast time.		

Annexure D – Community Consultation Report