Appendix 3 – Communications Strategy for Controlled Blasting at St Helena Tunnel & Tunnel Control Centre

BAULDERSTONE

COMMUNICATIONS STRATEGY FOR CONTROLLED BLASTING AT ST HELENA TUNNEL & TUNNEL CONTROL CENTRE

Pacific Highway Upgrade – Tintenbar to Ewingsdale Project

Client: Roads & Maritime Services

Document Number: PLAN-CI-002

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Appendices

1. OVERVIEW OF THE WORKS

Roads and Maritime Services, (RMS, formerly RTA), has awarded a contract to Baulderstone Pty Ltd (Baulderstone) to design and construct the Pacific Highway upgrade – Tintenbar to Ewingsdale. This project is jointly funded by the NSW State and Federal Governments.

The upgrade will provide approximately 16.3 kilometres of dual carriageway, starting at the northern end of the Ballina bypass at Ross Lane and extending to the Ewingsdale interchange. It is anticipated that substantial construction will commence in mid 2012.

The alignment of the Pacific Highway upgrade –Tintenbar to Ewingsdale has been designed to avoid the steep grades of St Helena hill by way of a tunnel 434m long, 19m wide and 46m below the ridge line, connecting Ewingsdale to the Tinderbox Valley. Geotechnical investigation and testing has determined that the rock (basalt) in St Helena hill is of a high strength and will require controlled blasting.

Controlled tunnel blasting is a process used in the excavation of tunnels whereby explosives are used to break up material that is unable to be broken up by traditional mechanical methods in a controlled manner. Controlled tunnel blasting involves drilling a series of production holes (approximately 45mm in diameter) in a predetermined pattern in the tunnel face.

For each blast there may be in excess of 100 holes drilled. To assist the blast and reduce ground vibration, a number of larger diameter holes known as relief holes are drilled to create a weak zone in the rock face. The production holes are then initiated in a predetermined pattern to break the rock. The blasted material is 'mucked out' from the face by specialised underground loaders and trucks.

This process will be used to break up approximately 155,000m³ of rock for the St Helena tunnel. Controlled blasting will occur at the northern and southern tunnel portals (entrances) and during excavation of the submerged tunnel control centre at the top of St Helena hill and will involve a maximum of one controlled blast event per day.

It is also anticipated that controlled blasting in the tunnel could be potentially carried out six times per day (for example, two blasts in each tunnel at the southern portal end and two blasts in the northbound tunnel from the northern portal end), commencing in late 2012 for approximately 12 months.

This strategy also covers the anticipated need to increase vibration limits from the current approved 5 mm/s to 15 mm/s and an increase in the airblast overpressure limits from the current approved 115 dB (Lin Peak) to 125 dB (Lin Peak) for controlled blasting at the tunnel, tunnel portals and tunnel control centre.

A detailed Blast Management Plan covering all blasting works will be prepared for the project.

2. PURPOSE OF THIS PLAN

The primary purpose of this plan is to outline the communications activities that will underpin consultation with the residents living within a 500 metre radius of the St Helena tunnel who will be potentially affected by tunnel construction, particularly controlled blasting and vibration. Beyond this radius, there may be some perception of vibration and airblast, however, this will be minimal and would comply with project approval requirements.

2.1 COMMUNICATION OBJECTIVES

- Develop a strategic communications plan to support proactive consultation with residents who will be potentially affected by tunnel construction and blasting activities.
- Identify potential blasting, vibration, over pressure and construction issues for residents and stakeholders and develop key messages to support mitigation strategies.
- Develop communication materials to inform and educate residents and key stakeholders about the tunnel blasting, vibration and construction activities.
- Develop a communication calendar for consultation with directly affected residents within a 500m radius of the tunnel.
- Develop a complaints (general) / complaints (damage) procedure / flow chart.

3. PROPOSAL TO EXTEND TUNNEL BLASTING HOURS

Current approved work hours

Under the Minister's Conditions of Approval (10 January 2010) for the project, construction hours are currently approved from 7am to 6pm Monday to Friday and 8am to 1pm on Saturday.

In addition to these hours of work, further restrictions apply to controlled blasting, with the current approved controlled blasting hours restricted to 9am to 5pm Monday to Friday and 9am to 1pm on Saturday.

What is proposed?

The project team is proposing to seek approval from Department of Planning and Infrastructure (DoPI) to alter the controlled blasting hours for construction of the St Helena tunnel to 7am to 6pm Monday to Friday, to match the approved construction hours. Approved controlled blasting hours for Saturday would remain unchanged. This would only apply to the controlled blasting within the tunnel itself.

The hours for blasting for the open cut surface blasts at the tunnel portals and tunnel control centre would remain unchanged at 9am to 5pm Monday to Friday and 9am to 1pm on Saturdays.

Need to extend blasting hours

It is envisaged that controlled blasting inside the tunnel will generally be carried out in two discreet periods, one in the morning and one in the afternoon. Controlled blasts will be grouped together within each period to minimise the overall impact of the daily blasting operations.

It is anticipated that controlled blasting in the tunnel could be potentially carried out six times per day (for example, two blasts in each tunnel at the southern portal end and two blasts in the northbound tunnel from the northern portal end), commencing in late 2012 for approximately 12 months.

Controlled blasting will also occur at the northern and southern tunnel portals (entrances) and during excavation of the submerged tunnel control centre at the top of St Helena hill and will involve a maximum of one controlled blast event per day.

Extending the controlled blasting hours would allow any potential delays caused by equipment failure or unforseen geotechnical conditions to then be absorbed in the work schedule. Without this time buffer, the second scheduled controlled blast of the day may need to be postponed to the next working day and in every instance, this would delay the tunnel excavation program.

The combined impact from a number of postponed blasts would result in a significant extension to the duration of the tunnel construction and overall controlled blasting program, and greater associated community impacts.

What are the impacts for residents?

Both open cut and tunnel controlled blasting have a number of issues which need to be managed including:

- Ground vibration, i.e. shaking of the ground and objects sitting on it (e.g. structures and buildings).
- Air blast over pressure or noise.
- Regenerated noise.
- Dust.
- Scattering of 'fly rock'.
- Venting of blast fumes.

These impacts will be carefully managed by the project team to avoid/minimise any potential impacts on local residents, and/or motorists.

The noise expected from controlled blasts is likely to be audible at nearby residences, however, it will be minimal and will only last for a few seconds.

The vibration from controlled blasts is expected to be very minor beyond the immediate vicinity of the blast zone. Noise monitoring will be undertaken initially at the start of any controlled blasting (i.e., at the tunnel portals, in the tunnel and at the tunnel control centre) and subsequently on a monthly basis or more frequent as may be required to demonstrate compliance with approval limits and the various management plans for the project, or respond to community complaints. Monitoring to record airblast overpressure and vibration levels will be carried out for each controlled blast.

There will be minimal dust and no fly rock beyond the immediate vicinity of the blasts at the tunnel, tunnel portals and tunnel control centre. Where there is the potential for fly rock, 'blast mats' (made of thick shock absorbing rubber) may be used or alternatively the overburden earth material may be kept in place.

What are the benefits of extending the hours of controlled blasting in the St Helena tunnel?

- Controlled blasting in the tunnel would be completed in the shortest timeframe possible.
- The cumulative delays caused by missed controlled blasts would be minimised enabling the overall tunnel blasting works to be completed without significant increases to the duration of the blasting operation.
- The duration of any potential impacts on residents would be minimised.
- Allows greater flexibility to the timing of the controlled blasts each day.

4. PROPOSAL TO INCREASE VIBRATION AND AIRBLAST OVERPRESSURE LIMITS

Current approved vibration limits without written consent of the affected receiver?

The peak particle velocity limit (ground vibration) cannot exceed 10 millimetres per second (mm/s) without written agreement of the affected sensitive receiver. The current approved vibration limits for blasting on the project measured at the most affected sensitive receiver are: -

Peak particle velocity (mm/s)	Allowable exceedance
5	5% of total number of blasts over a 12 month period
10	Never

What are the new proposed limits?

With the agreement of the affected sensitive receivers, the project team is proposing to increase the blasting vibration limits above 10 millimetres per second for five per cent of the blasts but to never exceed a limit of 20 millimetres per second. This is for controlled blasting undertaken in the St Helena tunnel, for the tunnel portals and the tunnel control centre as follows: -

Peak particle velocity (mm/s)	Allowable exceedance
15	5% of total number of blasts over a 12 month period
20	Never

The proposed increased limits would still ensure the comfort and safety of residents during each controlled blast. The proposed blasting limits would be below the level at which any cosmetic damage to structures, such as minor paint cracking, would occur.

The project has already undertaken detailed precondition surveys on affected sensitive receivers property. In the unlikely event that damage is caused to property by controlled blasting activities, the project team will investigate and repair accordingly any damage found to be caused by the controlled blasting activities.

Current approved airblast overpressure limits without written consent of the affected receiver?

Airblast overpressure (or airblast level) is the energy transmitted from the blast site within the atmosphere in the form of pressure waves. The pressure wave consists of both audible (noise) and inaudible (concussion) energy. The maximum excess pressure in this wave is known as the peak air overpressure, generally measured in decibels using the linear frequency-weighting.

The airblast overpressure limit cannot exceed 120 dB (Lin Peak) without written agreement of the affected sensitive receiver. The current approved airblast overpressure limits for blasting on the project measured at the most affected sensitive receiver are: -

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

What are the new proposed airblast overpressure limits?

The project team proposes to increase airblast overpressure limits for controlled blasting undertaken in the St Helena tunnel, tunnel portals and tunnel control centre as follows: -

Airblast overpressure (dB(Lin Peak))	Allowable exceedance
125	5% of total number of blasts over a 12 month period
130	Never

Need to increase vibration and airblast overpressure limits

The approved vibration and airblast overpressure limits specified for the project only allows for small quantities of material to be blasted in each controlled blast. Increasing the blasting vibration limits from 10mm/second to 15mm/second and airblast overpressure limits from 120 dB (Lin Peak) to 125 dB (Lin Peak) for 95% of the controlled blasts will result in a shortened blasting program and consequent reductions in noise generated by blasting activities such as drilling or rock-breaking, improving overall comfort levels for residents.

What are the impacts for residents?

It is envisaged controlled blasting within the tunnel will generally be carried out in two discreet periods, one in the morning and one in the afternoon. Controlled blasts will be grouped together within each period to minimise the overall impact of the daily blasting operations.

Controlled blasting will occur at the northern and southern tunnel portals (entrances) and during excavation of the submerged tunnel control centre at the top of St Helena hill and will involve a maximum of one controlled blast event per day.

It is also anticipated that controlled blasting in the tunnel could be potentially carried out six times per day (for example, two blasts in each tunnel at the southern portal and two blasts in the northbound tunnel from the northern portal), commencing in late 2012 for approximately 12 months.

Each blast will occur instantaneously and the impact will only last for a matter of seconds.

Controlled blasting at the tunnel portals will take approximately three months and controlled blasting at the tunnel control centre will take approximately 4-6 weeks.

Vibration impacts are controlled by adjusting the size and timing of the maximum instantaneous explosive charge (MIC), which is the amount of explosive detonated at any particular instant. The size of the MIC is adjusted so that the limits for ground vibration and air blast overpressure for each sensitive receiver (nearby residents) are not exceeded.

The vibration and airblast overpressure from any controlled blasting undertaken in the St Helena tunnel blasting works is expected to be very minor beyond the immediate vicinity of the blast zone. This would also apply to the situation where blasting vibration limits are increased as noted above. All blasts will be modelled by experienced blast engineers to ensure that the approved vibration and airblast overpressure limits are not exceeded.

Noise monitoring will be undertaken initially at the start of any controlled blasting (i.e., at the tunnel portals, in the tunnel and at the tunnel control centre) and subsequently on a monthly basis or more frequent as may be required to demonstrate compliance with approval limits and the various management plans for the project, or respond to community complaints. Monitoring to record vibration levels and airblast overpressure will be carried out for each controlled blast. This information will be regularly uploaded to the project website.

What are the benefits of increasing the blasting vibration and airblast overpressure limits?

- Controlled blasting would be completed in a shorter duration of time.
- A substantial reduction in local rock hammering operations (especially on the tunnel portals and tunnel control centre excavation works) and associated noise impacts to adjacent residents.
- The total number of controlled blasts required would be reduced i.e. less inconvenience to residents and motorists.

The following reductions and benefits are anticipated to directly reduce impacts by: -

- 80%(1) less rock breaking – reducing the duration of noise and vibration that residents would be otherwise exposed to.
- 15% less drilling – reducing the duration of noise and vibration that residents would be otherwise exposed to.
- 40%(2) less blasts.
- 50%(3) less rolling stoppages of the Pacific Highway reducing traffic delays.
- 50% less closures of St Helena Road reducing traffic stoppages and delays.

(1) This number is based on rock breaking only occurring in the TCC and the virtual elimination of the need to break with higher limits. However, there may still be some breaking in knocking out corners of the TCC excavation. Potentially it could be 100%.

(2) Averaged over total works.

(3) This corresponds directly with 50% less blasts in the portal works and TCC.

5. COMMUNITY CONSULTATION

Extensive community consultation will be undertaken with potentially affected residents within a 500 metre radius of the St Helena tunnel to advise the construction methodology and the proposed changes to blasting hours, vibration and airblast overpressure levels. Consultation activities will include, but not be limited to: -

- Property condition inspections.
- Initial 'face to face' consultation with individual residents.
- Group street meeting with all St Helena hill residents, including the distribution of a 'Blasting Fact Sheet'.

- Follow up meeting with individual residents to deliver a 'letter of non-objection' regarding the proposal to extend blasting hours.
- Follow up meeting with affected residents only to deliver a 'letter of consent' to increase vibration and airblast overpressure limits.
- Broader community consultation (e.g. Community information sessions).
- Regular follow up meetings with, and notices to, affected residents and / or key stakeholders during the controlled blasting period to keep residents informed of the controlled blasting schedule and seek feedback on the controlled blasting and query if there are any issues to be resolved.
- Regular dissemination of controlled blasting noise, vibration and airblast over pressure monitoring results.
- Meetings / briefings with affected residents and / or key stakeholders, as required, during construction of the tunnel and the control centre.
- Door knocking to ensure 'no surprises', as required.

The 500m minimum radius will be reviewed as part of the blast modelling process to ensure that this distance covers all residents who may be impacted by the blasting as a result of any increase in vibration limits.

6. COMMUNICATION TOOLS

The following communication tools will be used to support preliminary and ongoing consultation with residents within a 500 metres radius of the tunnel, with information materials available to the wider community. The Tunnel Blasting Fact Sheet will also be distributed at the community information sessions and will be available on the project website.

Communication tool	Directly affected residents	Local communities
Property condition inspections	✓	
Presentation by Baulderstone and RMS tunnel team and technical experts	✓	✓
Letter of non-objection to extend approved blasting hours	✓	
Letter of consent to increase vibration and airblast overpressure limits	✓	
Tunnel blasting fact sheet	✓	✓
Project updates		✓
Notifications / letterbox drops to advise construction activities, including controlled blasting events outside tunnel	✓	
Website updates	✓	✓
Project information line (toll free	✓	✓

Communication tool	Directly affected residents	Local communities
1800 882 787)		
Project email communityinfo@t2e.com.au	✓	✓
Variable message signs (VMS) and other signage	✓	✓
Outgoing email / SMS alert to database	✓	✓
Targeted telephone calls and 'door knocks' (check-in with directly affected residents)	✓	

7. ISSUES ANALYSIS

The table below lists the potential issues that could arise from blasting activities and the key messages that will be communicated during consultation. The issues will be proactively managed by the project team throughout construction of the tunnel and tunnel control centre by implementing this plan. Ongoing consultation will enable regular issues monitoring and refinement of communication and consultation activities.

Issue	Response
Noise	The noise expected from controlled tunnel blasts will be minimal and will only last for a few seconds. The noise expected from controlled open cut blasts at the tunnel control centre and tunnel portal will be more significant, however, it will comply with Minister's Conditions of Approval. Noise monitoring will be undertaken initially at the start of any controlled blasting (i.e., at the tunnel portals, in the tunnel and at the tunnel control centre) and subsequently on a monthly basis or more frequent as may be required to demonstrate compliance with approval limits and the various management plans for the project, or respond to community complaints. Results will be published regularly on the project website.
Vibration / airblast overpressure	The vibration and airblast overpressure from controlled blasts is expected to be very minor beyond the immediate vicinity of the blast zone. Trial blasts (and the results from routine controlled blasts) will be undertaken to confirm design blast predictions and parameters and will be used to refine ongoing controlled blast activities. Flashing warning lights attached to vibration monitors, triggered by vibrations in excess of the component Peak Particle Velocity limit for the relevant building type will provide a "real time" visual warning of vibration exceedences.

	Monitoring to record vibration and airblast overpressure levels will be carried out for each controlled blast. Results will be published regularly on the project website.
Dust/fly rock	There should be minimal dust and fly rock beyond the immediate vicinity of the blast at the tunnel portals and tunnel control centre. Where there is the potential for fly rock, 'blast mats' (made of thick shock absorbing rubber) may be used or alternatively the overburden earth material may be kept in place. Controlled blasting within the tunnel will be contained, with minimal dust and no fly rock.
Temporary road closures	Traffic and pedestrians on St Helena Road may be stopped for up to 10 minutes and 'rolling stoppages' may be implemented on the Pacific Highway during controlled blasting events for construction of the tunnel portals and the tunnel control centre to ensure the safety of local residents, pedestrians and commuters. These measures will be coordinated to ensure that they have the least impact on the local community. Provision will be made to ensure that emergency access is maintained during any road closures. The community relations team will liaise with residents in advance regarding specific access arrangements / requirements, as necessary. Emergency access would be maintained. Traffic controllers will be in place to direct traffic, whilst variable message signs will be in place to inform the community in advance of any temporary road closures.
Property damage	Detailed property condition surveys of all properties within 500m radius of blast zones have been completed and a report issued to property owners and RTA's representative prior to the start of construction. If a resident believes that damage has occurred to their property as a result of controlled blasting, they should contact the Community Relations Manager immediately on 1800 882 787 (toll free). A property condition survey (building condition inspection) will be conducted within two months of completion of vibration inducing activities, or in response to damage complaints. A written report of the final inspection supported by photographs and a list of any defects will be prepared and submitted to the property owner and RTA's Representative. Refer to Appendix 1 'Complaints Management Procedure'.

Temporary relocation of residents	For safety reasons some residents may be asked to remain indoors or be temporarily relocated during controlled open cut blasting at the tunnel portals and tunnel control centre. After the first trial and controlled blasts, this procedure will be reviewed. If required, the community relations team will notify affected residents in advance, to make arrangements. Controlled blasting within the tunnel is contained will not require residents to remain indoors or be relocated.
Pets and livestock	It is advisable to keep smaller pets inside during blasting for their safety and wellbeing. Animals in paddocks should be checked before and after controlled blasting. The community relations team will provide specific timing details to those residents with nearby animals in paddocks on an individual basis.
Inclement weather	Blasting of the tunnel portals and tunnel control centre may need to be postponed during inclement weather. Controlled blasting inside the tunnel will not be affected by weather.

8. CONSULTATION METHODOLOGY

Initial face-to-face consultation meetings will be conducted with individual property owners and / or residents within a 500 metre radius of the St Helena tunnel. The tunnel construction methodology will be explained by members of the project tunnel team and the proposal to extend blasting hours and increase blasting vibration and airblast overpressure limits will be explained in detail, including potential impacts and benefits.

This will be required for submission of an application to DoPI to modify the conditional approval granted by the (former) Minister for Planning (Minister) on 29 January 2010. Residents will be encouraged to provide feedback and to ask questions and discuss their issues and concerns.

The diagram at appendix 2 will be used to explain the 24 hour tunnelling program and the activities required to achieve up to six controlled blasts per day inside the tunnel.

9. GROUP MEETING

Follow up consultation will be undertaken by the project team with property owners within a 500 metre radius of the St Helena tunnel at a 'Street Meeting'. A formal presentation by the project team will present the tunnel construction methodology and the proposal to extend blasting hours and increase blasting vibration and airblast overpressure limits will be explained in detail, including potential impacts and benefits.

The presentation will address shared issues and concerns identified in the preliminary consultation / discussions and will include input by a vibration and blasting specialist, and will provide an opportunity for residents to ask questions of the project team.

Further information about the potential need to increase the approved controlled tunnel blasting vibration and airblast overpressure limits and the anticipated benefits will also be provided by Baulderstone's vibration and blasting specialist.

Residents will be encouraged to provide feedback and to ask further questions about the controlled blasting process, proposed extension of controlled tunnel blasting hours and proposed increased vibration and airblast overpressure limits.

An information kit will be distributed at the meeting, including a tunnel blasting fact sheet, a topographical map of the tunnel location and an accompanying diagram of the 24 hour controlled tunnel blasting cycle.

10. TUNNEL BLASTING FACT SHEET

A tunnel blasting fact sheet has been developed for the Pacific Highway upgrade – Tintenbar to Ewingsdale (refer Appendix 3). It provides detailed information regarding the controlled blasting activities inside the St Helena tunnel, at the tunnel portals and at the tunnel control centre in a question and answer format.

The tunnel blasting fact sheet will be distributed to all residents within a 500 metres radius of the St Helena tunnel, as well as at future community information sessions. The fact sheet will also be available for viewing and download from the project website.

11. FOLLOW UP MEETINGS AND LETTERS OF NON OBJECTION AND CONSENT

A follow up face-to-face meeting will be organised by the project team with residents within a 500 metre radius of the St Helena tunnel to distribute a 'letter of non-objection' to extend controlled tunnel blasting hours.

A follow-up meeting will also be held with affected residents to distribute a 'letter of consent' to increase controlled blasting vibration and airblast overpressure limits (smaller number of affected residents only).

The follow up meetings will provide an opportunity for residents to clarify information contained in the letters.

The 'letter of non-objection' to extend controlled tunnel blasting hours will outline the current approvals for controlled blasting hours, the need for change, the impacts of the proposed change and the benefits (refer Appendix 4).

A signature box will be included on the letter asking for residents' to sign if they have no objections to the proposed extension of hours for controlled blasting inside the St Helena tunnel. The approved blasting hours for controlled blasting at the tunnel portals and tunnel control centre would remain unchanged. A reply paid envelope will be provided with the letter.

The 'letter of consent' to increase controlled blasting vibration and airblast overpressure limits will outline the current approved limits for vibration and airblast overpressure, the need for change, the potential impacts and benefits of the proposed change for residents (refer Appendix 5).

A signature box will be included on the letter asking for residents' consent to the proposed increase to blasting vibration and airblast overpressure limits for controlled blasting inside the St Helena tunnel, at the tunnel portals and at the tunnel control centre. A reply paid envelope will be provided with the letter.

12. BROADER COMMUNITY CONSULTATION

Construction of the St Helena tunnel including controlled blasting of the tunnel, tunnel portals (entrances) and the tunnel control centre will be the subject of a community information session on 23 May 2012.

A presentation will be given to the community by members of the project team, including Baulderstone's blasting and vibration expert, providing information about the tunnel construction methodology and program, controlled blasting procedures, vibration and airblast overpressure and any associated impacts.

The proposal for extension of approved controlled blasting hours at the St Helena tunnel will also be outlined at the meeting as well the proposal to increase vibration and airblast overpressure limits for controlled

blasting within the St Helena tunnel, at the tunnel portals and the tunnel control centre. Attendees will have the opportunity to participate in follow-up discussions with the project team members.

13. ADVERTISEMENTS

To coincide with the start of construction, an advertisement (quarterly construction update) will be placed in local newspapers regarding the upcoming construction activities planned for the next three months.

Information regarding the tunnel construction and controlled tunnel blasting will be included in the advertisement and / or subsequent quarterly construction updates, as required.

14. NOTIFICATION / LETTERBOX DROP

A notification will be distributed to residents within a 500 metre radius of the St Helena tunnel (via letterbox drop) five working days prior to the start of tunnel construction.

The community relations team will letterbox drop weekly progress updates to affected residents to advise the upcoming work program in keeping with Baulderstone's commitment to 'no surprises' and to ensure residents have ample opportunity to contact the project team regarding issues and/or concerns.

Where possible 'open cut' blasts which occur less frequently will be organised to occur at a similar regular day and or time of each week; e.g., each Tuesday or Wednesday between say 10am and 2pm so residents can plan around these times.

Any controlled blasts will be preceded by a short warning siren and flashing warning lights on site to signal the imminent blast.

15. WEBSITE UPDATES

All communication material about the construction of the St Helena tunnel, upcoming controlled tunnel blasting and any related temporary road closures will be regularly updated on the RMS Pacific Highway upgrade – Tintenbar to Ewingsdale website.

16. VARIABLE MESSAGING SIGNS (VMS) AND OTHER SIGNAGE

VMS and other signage will be used to inform the community about upcoming controlled blasting events and to advise drivers of potential temporary road closures as a result of controlled blasting at the tunnel portals or tunnel control centre.

17. MEETINGS/BRIEFINGS

Meetings and / or briefings with key stakeholders regarding the controlled tunnel blasting activities will be undertaken as required or requested, in consultation with the RTA's Representative.

A briefing with local police and emergency services will also be undertaken to discuss the controlled blasting activities for the St Helena tunnel, traffic management and safety procedures.

18. TEMPORARY RELOCATION OF RESIDENTS

For safety reasons, some residents within close proximity to controlled blasts may be asked to remain indoors or be temporarily relocated during controlled blasting (open cut blasting only). The community relations team will be in contact with affected residents in advance.

In the event that temporary relocation of residents within close proximity of the tunnel or control centre are required during controlled blasting events, temporary relocation notices will be hand-delivered to affected residents, to enable customised arrangements to be made.

If required, the temporary relocation would be for less than one hour.

In lieu of temporary relocations, residents may be required to remain indoors if the project team believes it is safe to do so. Requests to remain indoors will be communicated to residents in advance.

19. DOOR KNOCKING

All residents who received a building condition inspection and or who are within a 200 metre radius of the controlled tunnel blast zone will be door knocked prior to blasting events, to advise impacts and / or safety precautions, and following blasting events to ascertain whether or not there have been any impacts from the controlled blasting. This contact will be followed up at minimum of monthly intervals until the completion of vibration and air blast generating activities. A record will be kept of owner / occupier feedback and the response to owner / occupier concerns.

20. OUTGOING E-MAIL / SMS ALERT TO DATABASE

In addition to the above measures, in the unlikely event that blasting will delay traffic on the Pacific Highway, an E-Mail and/or SMS alert will be sent to registered stakeholders listed on the project database.

21. TARGETED TELEPHONE CALLS

The community relations team will contact all residents who received a building condition inspection and or who are within 500 metres of the controlled tunnel blast zone via regular telephone calls prior to blasting events, to advise impacts and / or safety precautions, and following blasting events to ascertain whether or not there have been any impacts from the controlled blasting and to reassure them that Baulderstone is monitoring the impacts of controlled blasting inside the tunnel, and at tunnel portals and tunnel control centre to ascertain whether or not there have been any impacts from the controlled blasting to date.

This contact will be followed up at minimum of monthly intervals until the completion of vibration and air blast generating activities. A record will be kept of owner / occupier feedback and the response to owner / occupier concerns.

If a resident believes that damage has occurred to their property as a result of controlled blasting, they will be advised to contact the Community Relations Manager immediately on 1800 882 787 (toll free).

22. COMMUNICATIONS CALENDAR

Date/ Timing	Activity / Communications Tools	Responsibility	Stakeholders
12-13/04/2012	Initial face-to-face consultation with property owners within 500m radius of northern portal to identify issues and concerns.	Susan Scott, Matt Saviana, Mark Dowell.	Residents within 500m of tunnel
19/04/2012	Combined BPL / RMS strategy meeting to agree approach and materials to be issued to residents.	Dave Packer, Matt Saviana, Mark Dowell, John Heilig, Susan Scott, Abby Wallace.	RMS
Week commencing 21/05/2012	Group presentation and meeting to address issues and concerns. Controlled tunnel blasting fact sheet to be distributed.	Susan Scott, Peter Borrelli John Heilig, Matt Saviana, Mark Dowell, Abby Wallace.	Residents within 500m of tunnel

Date/ Timing	Activity / Communications Tools	Responsibility	Stakeholders
23/05/2012	Community Information Session.	Susan Scott.	Broader community
Week commencing 28/05/2012	Follow up meeting and letters to be distributed to property owners.	Susan Scott.	Residents within 500m of tunnel
Week commencing XX (TBA)	Publish quarterly construction update advertisement in local newspapers.	Susan Scott.	Residents within 500m of tunnel and Broader community
Week commencing XX (TBA)	Distribute Letter to Householder notification (letterbox drop) to affected residents two weeks prior to start of tunnel construction (controlled blasting).	Susan Scott.	Residents within 500m of tunnel
Week commencing XX (TBA)	Doorknock for evacuation, if required.	Community Relations Team.	Residents within 500m of tunnel

23. TUNNEL SITE TOUR

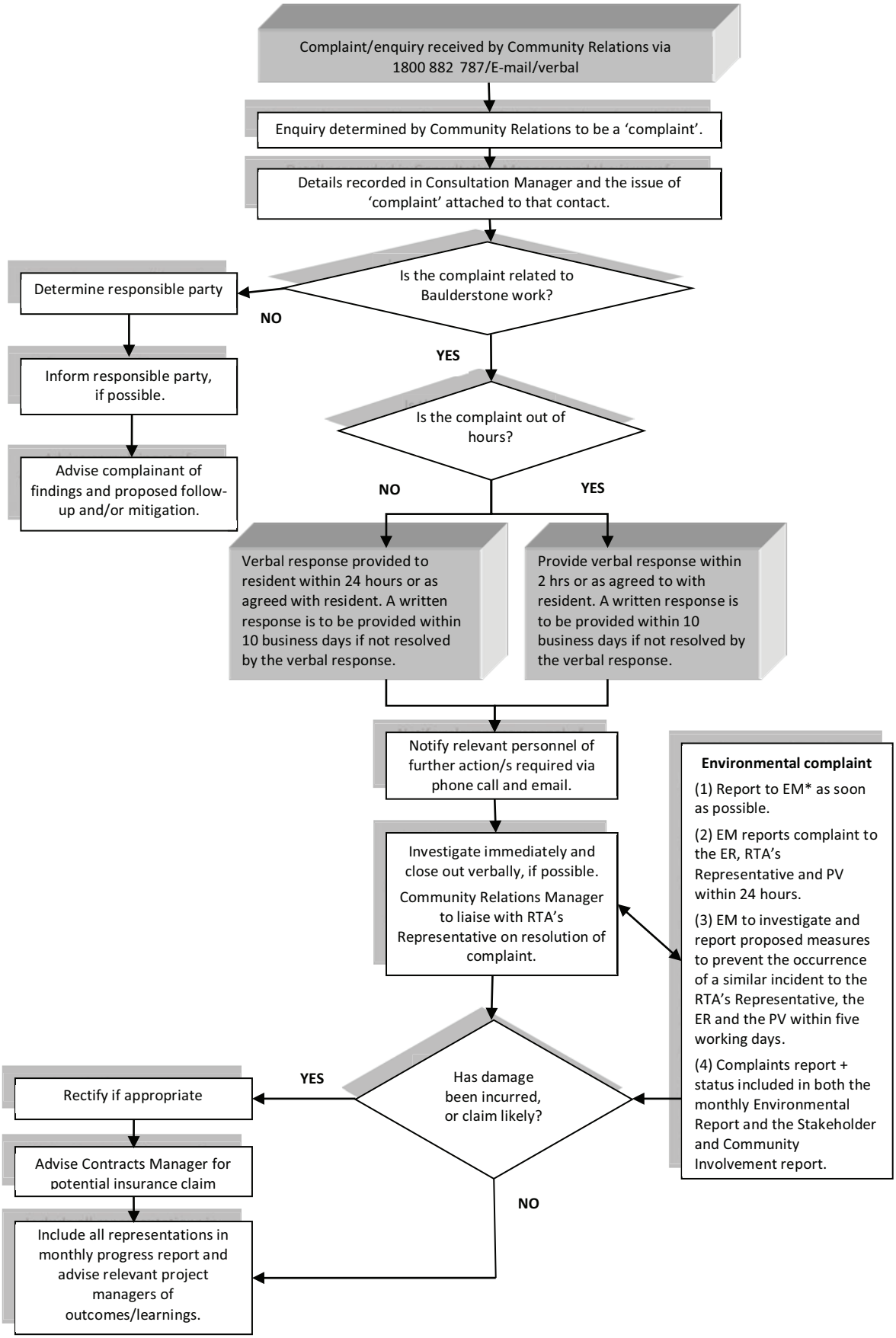
During construction of the St Helena tunnel, the community relations team will organise community engagement initiatives for residents who are affected by the St Helena tunnel construction. This could include a BBQ, opportunity for residents to watch a live controlled blast take place from a safe distance and / or a site tour/s.

These engagement initiatives will be 'good will' gestures and will assist with managing community expectations and perceptions and provide an opportunity for the residents to view the construction activities first hand.

The initiatives will aim to:

- Provide the community with first-hand experience of tunnel construction.
- Provide more detailed knowledge of the complexities involved in constructing the tunnel.
- Assist in managing resident perceptions and expectations.
- Generate a sense of ownership of the project.
- Build and maintain positive relationships with the community.

Appendix 1 – Complaints Management Procedure


Complaint/enquiry received by Community Relations via 1800 882 787/E-mail/verbal
Enquiry determined by Community Relations to be a 'complaint'.
Details recorded in Consultation Manager and the issue of 'complaint' attached to that contact.
Is the complaint related to Baulderstone work?
NO
Determine responsible party
Inform responsible party, if possible.
Advise complainant of findings and proposed follow-up and/or mitigation.
YES
Is the complaint out of hours?
NO
YES
Verbal response provided to resident within 24 hours or as agreed with resident. A written response is to be provided within 10 business days if not resolved by the verbal response.
Provide verbal response within 2 hrs or as agreed to with resident. A written response is to be provided within 10 business days if not resolved by the verbal response.
Notify relevant personnel of further action/s required via phone call and email.
Investigate immediately and close out verbally, if possible.
Community Relations Manager to liaise with RTA's Representative on resolution of complaint.
Environmental complaint
(1) Report to EM* as soon as possible.
(2) EM reports complaint to the ER, RTA's Representative and PV within 24 hours.
(3) EM to investigate and report proposed measures to prevent the occurrence of a similar incident to the RTA's Representative, the ER and the PV within five working days.
(4) Complaints report + status included in both the monthly Environmental Report and the Stakeholder and Community Involvement report.
Has damage been incurred, or claim likely?
YES
Rectify if appropriate
Advise Contracts Manager for potential insurance claim
NO
Include all representations in monthly progress report and advise relevant project managers of outcomes/learnings.

Appendix 2 – Tunneling Diagram

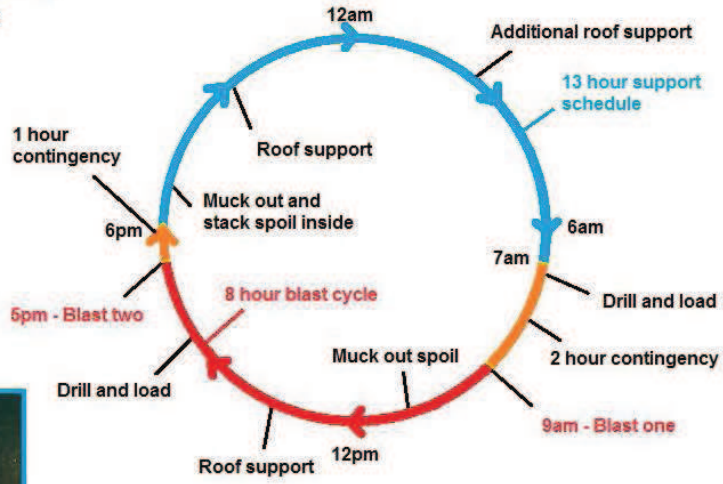
Installing rock bolts to provide roof support

4

Additional roof support - shotcrete

5

Optimised
24 Hour Schedule



Drilling blast holes

1

Mucking out spoil

3

Loading explosives into drill holes

2

Appendix 3 – Tunnel Blasting Fact Sheet

Fact sheet

Australian Government
Nation Building Program

NSW GOVERNMENT Transport Roads & Maritime Services

MAY 2012

ST HELENA TUNNEL BLASTING WORKS

Roads and Maritime Services, has awarded a contract to Baulderstone Pty Ltd (Baulderstone) to design and construct the Pacific Highway upgrade — Tintenbar to Ewingsdale. This project is jointly funded by the NSW State and Federal Governments. The upgrade will provide approximately 16.3 kilometres of dual carriageway, starting at the northern end of the Ballina bypass at Ross Lane and extending to the Ewingsdale interchange. It is anticipated that substantial construction will commence in mid 2012.

The alignment of the upgrade has been designed to avoid the steep grades of St Helena hill. To achieve this, a tunnel will be constructed through St Helena hill which will also remove the dangerous accident black spot at the top of the hill.

St Helena tunnel features and benefits

- The tunnel is 434 metres in length.
- Two side by side tunnels will be built, each being 19 metres wide with a 10 metre wide rock pillar separating the two tunnels.
- The tunnel is approximately 46 metres below the ridge line.

Background

Controlled tunnel blasting will be required to break up approximately 155,000m³ of high strength basalt rock during construction of the northbound and southbound tunnels through St Helena hill. It is anticipated that controlled blasting in the tunnel is expected to be carried out up to six times per day. Each blast event in the tunnel is expected to take approximately 10 seconds to complete, with the instantaneous blasts in the separate tunnels initiated within a few seconds of each other.

Controlled open cut blasting will also be required to break up the rock at the tunnel portals (entrances) and the tunnel control centre on top of St Helena hill.

The type of controlled tunnel blasting inside the tunnel will differ from controlled 'open cut' blasting that will be undertaken at the tunnel portals and tunnel control centre.

What is controlled tunnel blasting?

Controlled tunnel blasting is a process used in the excavation of tunnels using explosives to break up material in a highly controlled manner that is unable to be practically broken up by traditional mechanical methods. Controlled blasting involves drilling a series of production holes (approximately 45mm in diameter) in a predetermined pattern in the tunnel face.

For each blast there may be in excess of 100 holes drilled. To assist the blast and reduce ground vibration, a number of larger diameter holes known as relief holes are drilled to create a weak zone in the rock face. The blasting holes are then loaded with explosives and set off in a predetermined pattern to break the rock. The blasted material is 'mucked out' from the face by specialised underground loaders and trucks.

What is controlled open cut blasting?

Controlled open cut blasting will be used to excavate the tunnel portals and tunnel control centre with explosives where traditional mechanical methods such as rock hammers are not feasible due to the strength of the rock, the volume of material to be removed and the significant associated noise and vibration impacts to nearby residents. The broken rock will then be excavated and taken away by earthworks equipment.

Why is controlled blasting required?

The St Helena tunnel will connect Ewingsdale to the Tinderbox Valley. Geotechnical investigation and testing has determined that the rock, which is

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'basalt', in the tunnel is of a very high strength. Due to this very high strength rock, it is not suited to mechanical excavation techniques such as roadheaders and will require the use of controlled tunnel blasting to excavate.

When is controlled blasting likely to start?

It is anticipated that controlled open cut blasting at the tunnel portals and the tunnel control centre will start in the second half of 2012, and controlled tunnel blasting will start in late 2012.

How often will controlled tunnel blasting occur?

It is anticipated that there will be a morning and an afternoon blast cycle each day in the St Helena tunnel (up to three blasts in each of the two tunnels per day). This activity will take place over a 12 month period, however, the time taken to complete the tunnel will be largely determined by the geology, strength and condition of the rock that is encountered.

How often will controlled open cut blasting occur?

The controlled blasting at the tunnel portals and the tunnel control centre will involve a maximum of one blast per day, although blasts will not be occurring on a daily basis. Controlled blasting at the tunnel portals will take approximately three months and controlled blasting at the tunnel control centre will take approximately 4 – 6 weeks to complete.

What time will controlled tunnel blasting occur?

Blasting inside the tunnel would occur sometime between 7am and 6pm each day (pending approval of the extension of blasting hours for the tunnel). It is anticipated that there will be one blast period in the morning and a second blast period in the afternoon. Controlled blasting will not take place on Saturdays after 1pm, on Sundays or on public holidays.

What time will controlled open cut blasting occur?

Controlled blasting for the tunnel portals and tunnel control centre will only occur between 9am and 5pm. Controlled blasting will not take place on Saturdays after 1pm or, Sundays or on public holidays.

What are the potential impacts of controlled blasting?

Both open cut and tunnel controlled blasting have a number of potential issues which need to be managed, including:

- Ground vibration i.e. shaking of the ground and objects sitting on it (e.g. structures and buildings).
- Air blast overpressure or noise.
- Dust.
- Scattering of 'fly rock'.

These impacts will be carefully managed by the project team to avoid and or minimise any potential impacts on local residents, and/or motorists. The proposed increased limits would still ensure the comfort and safety of residents during each controlled blast. The blasting limits would be below the level at which any cosmetic damage to structures, such a minor paint cracking, may occur. The vibration from controlled blasts is expected to be very minor beyond the immediate vicinity of the blast zone. Monitoring will be carried out to record noise and vibration for each controlled blast. All blasts will be designed and controlled to ensure that the nominated vibration limits are not exceeded at the nearest sensitive receiver (nearby residents).

There will be minimal dust and no fly rock beyond the immediate vicinity of the blasts at the tunnel, tunnel portals and tunnel control centre.

How do we manage the impacts of controlled blasting?

Significant blast design and modelling work considering the geology of the area, the location and condition of sensitive receivers and vibration and air blast overpressure limits is undertaken. In addition, the project team will prepare a project specific Blast Management Plan and associated work method statements.

Vibration is controlled by adjusting the size and timing of the maximum instantaneous charge (MIC), which is the amount of explosive detonated at any particular instant. The size of the MIC is adjusted so that the limits for ground vibration and air blast overpressure for each sensitive receiver are not exceeded. The size of the MIC is managed by using delays on the detonators so that the controlled blast is set off in a predetermined sequence and by reducing or extending the length of each controlled blast.

The data recovered from the monitoring of each controlled blast, incluidng an initial trial blast, is compared to the predicted effects, to enable the project team to further refine and optimise each blast design.

Noise monitoring will be undertaken initially at the start of any controlled blasting (i.e., at the tunnel portals, in the tunnel and at the tunnel control centre) and subsequently on a monthly basis or

more frequent as may be required to ensure compliance with approved limits and the various management plans for the project, or in response to community complaints. Monitoring to record vibration levels and airblast overpressure will be carried out for each controlled blast. Flashing warning lights attached to vibration monitors, triggered by vibrations in excess of the component Peak Particle Velocity limit for the relevant building type will provide a "real time" visual warning of vibration exceedances. This information will be regularly uploaded to the project website.

Where there is the potential for fly rock, 'blast mats' (made of thick shock absorbing rubber) may be used or alternatively the overburden earth material may be kept in place.

What are the vibration and airblast overpressure limits for controlled blasting?

The current approved controlled blasting vibration limits for the tunnel, tunnel portals and tunnel control centre is set at 5 mm/s and 115 dB (Lin Peak) for airblast overpressure and are not to be exceeded for 95% of the controlled blasts.

The project team is currently proposing to increase the vibration limit to 15mm/s and the airblast overpressure limit to 125 dB (Lin Peak) for 95% of the controlled blasts. Increasing the limits will minimise the overall number of blasts, blasting program duration and the extent of rock hammering works in the St Helena Road area. These proposed changes to the vibration and airblast overpressure limits are currently being discussed in consultation with affected residents and require Department of Planning and Infrastructure approval.

What are the blasting mitigation measures?

Affected residents will be informed prior to any controlled blast. Public safety and government guidelines require that all people, vehicles and livestock are a safe distance away from the blast zone. To ensure people are at a safe distance from each blast, mitigation measures may include: -

- Temporary closure of access locations to local roads, and property accesses (residents will be notified in advance).
- Stopping of traffic on St Helena Road for up to 10 minutes and 'rolling stoppages' on the Pacific Highway. These measures will be coordinated to ensure that they have minimal impact on the local community. Provision willl be made to ensure that emergency access is maintained during any road closures.
- For safety reasons, some residents within close proximity to controlled blasts may be asked to remain indoors or be temporarily relocated during controlled blasting (open cut blasting only). The community relations team will be in contact with affected residents in advance.

These mitigation measures relate to the controlled open cut blasting only. The controlled tunnel blasting is contained within the tunnel and, as such, it is not envisaged that any specific mitigation measures will be required.

What about the safety of animals and pets during open cut blasting?

It is advisable to keep smaller pets inside during blasting for their safety and wellbeing. Animals in paddocks should be checked before and after controlled blasting. The community relations team will provide specific timing details to those residents with nearby animals in paddocks on an individual basis.

What should I do if I have valuables and antiques in my house?

Whilst there should be no discernable impact for most residents from the blasting operations, it may be advisable, as a precautionary measure, to remove any valuables and antiques from shelves or walls during the controlled blasting works. The project team will be available to inspect individual properties and provide additional guidance on this matter on a case by case basis.

What should I do if I think my house has been damaged?

In the unlikely event that any damage is sustained to your property during the blasting process please contact the Community Relations Manager immediately on 1800 882 787 (free call). The project team will organise to have the damage inspected and will monitor your dwelling during future blasts to determine if the controlled blasting has caused the damage. Any damage sustained as a result of the controlled blasting works will be rectified.

Appendix 4 – Letter of Non-Objection to Extend Blasting Hours

To the householder

Australian Government
Nation Building Program

NSW GOVERNMENT Transport Roads & Maritime Services

MAY 2012

Dear Resident/Community member

Re: Pacific Highway upgrade — Tintenbar to Ewingsdale extension to blasting hours for St Helena tunnel construction

NSW Roads and Maritime Services (RMS), formerly the Roads and Traffic Authority (RTA), has engaged Baulderstone Pty Ltd to design and construct the Pacific Highway upgrade — Tintenbar to Ewingsdale.

This project is jointly funded by the NSW State and Federal governments.

The upgrade will provide approximately 16.3 kilometres of dual carriageway, starting at the northern end of the Ballina bypass at Ross Lane and extending to the Ewingsdale interchange. It is anticipated that substantial construction will commence in mid 2012.

Controlled blasting will be required to excavate approximately 155,000m³ of rock during construction of the St Helena tunnel, with additional controlled blasting needed for excavation of the tunnel portals and the tunnel control centre. The type of controlled tunnel blasting inside the tunnel will differ from controlled 'open cut' blasting that will be undertaken at the tunnel portals and tunnel control centre.

Current approved work hours

Under the Minister's Conditions of Approval (January 2010) for the project, **construction hours** are currently approved from 7am to 6pm Monday to Friday and 8am to 1pm on Saturday.

In addition to these hours of work, further restrictions apply to controlled blasting, with the current approved **controlled blasting hours** restricted to 9am to 5pm Monday to Friday and 9am to 1pm on Saturday.

What is proposed?

The project team is proposing to seek approval from Department of Planning and Infrastructure (DoPI) to alter the **controlled blasting hours** for construction of the St Helena tunnel to 7am to 6pm Monday to Friday, to match the approved construction hours. Approved controlled blasting hours for Saturday would remain unchanged. This change would only apply to the controlled blasting within the tunnel itself.

The hours for blasting for the open cut surface blasts at the tunnel portals and tunnel control centre would remain unchanged at 9am to 5pm Monday to Friday and 9am to 1pm on Saturdays.

Need to extend blasting hours

It is envisaged that controlled blasting inside the tunnel will generally be carried out in two discreet periods, one in the morning and one in the afternoon. Controlled blasts will be grouped together within each period, to minimise the overall impact of the daily blasting operations.

It is anticipated that controlled blasting in the tunnel could be potentially carried out six times per day (for example, two blasts in each tunnel at the southern portal and two blasts in the northbound tunnel from the northern portal), commencing in late 2012 for approximately 12 months.

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This project is funded by the NSW State and Federal Governments.

Controlled blasting will also occur at the northern and southern tunnel portals (entrances) and during excavation of the submerged tunnel control centre at the top of St Helena hill and will involve a maximum of one controlled blast event per day.

Extending the controlled blasting hours would allow any potential delays caused by equipment failure or unforeseen geotechnical conditions to then be absorbed in the work schedule. Without this time buffer, the second scheduled controlled blast of the day might need to be postponed to the next working day and in every instance, this would delay the tunnel excavation program.

The combined impact from a number of postponed blasts would result in a significant extension to the duration of the tunnel construction and overall controlled blasting program, and greater associated community impacts.

What are the potential impacts for residents?

Both open cut and tunnel controlled blasting have a number of issues which need to be managed, including:

- Ground vibration i.e. shaking of the ground and objects sitting on it (e.g. structures and buildings).
- Air blast over pressure or noise.
- Regenerated noise.
- Dust.
- Scattering of 'fly rock'.
- Venting of blast fumes.

These impacts will be carefully managed by the project team to avoid/minimise any potential impacts on local residents and/or motorists.

The noise anticipated from controlled blasts is likely to be audible at nearby residences, however, it will be minimal and will comply with the approval conditions for the project and will only last for a few seconds.

The vibration and airblast overpressure from controlled blasts is expected to be very minor, beyond the immediate vicinity of the blast zone. Noise monitoring will be undertaken initially at the start of any controlled blasting (i.e. at the tunnel portals, in the tunnel and at the tunnel control centre) and subsequently on a monthly basis, or more frequently as may be required, to demonstrate compliance with approval limits and the various management plans for the project, or to respond to community complaints. Monitoring to record vibration levels and airblast overpressure will be carried out for each controlled blast. This information will be regularly uploaded to the project website.

There will be minimal dust and no fly rock beyond the immediate vicinity of the blasts at the tunnel, tunnel portals and tunnel control centre. Where there is the potential for fly rock, 'blast mats' (made of thick, shock-absorbing rubber) may be used or alternatively, the overburden earth material may be kept in place.

What are the benefits of extending the hours of controlled blasting in the St Helena tunnel?

- Controlled blasting in the tunnel would be completed in the shortest timeframe possible.
- The cumulative delays caused by missed controlled blasts would be minimised, enabling the overall tunnel blasting works to be completed without significant increases to the duration of the blasting operation.
- The duration of any potential impacts on residents would be minimised.
- Allows greater flexibility to the timing of the controlled blasts each day.

What are we asking you to consider?

The project team is currently preparing a submission to Department of Planning and Infrastructure (DoPI) to alter the **controlled blasting hours** as detailed above. This submission will include details on potential community impacts, benefits, and the outcomes of any consultation. If you have no objections to the proposal to extend controlled blasting hours in the St Helena tunnel, as set out in this letter, please sign the declaration below and return in the reply paid envelope provided, at your earliest convenience.

If you require more information or have any queries about the information outlined above, please contact our community relations team on **1800 882 787 (toll free)** or email communityinfo@t2e.com.au.

Yours faithfully

Vincent Newton
Baulderstone Project Director

Property owners' and/or resident's letter of non-objection

I/We _____

of_____ St Helena Road, McLeods Shoot have participated in consultation with Baulderstone Pty Ltd about the proposal to extend the hours for controlled blasting, as set out in this letter and I/we have no objections.

Signed_____

Date_____

Appendix 5 – Letter of Consent to Increase Vibration and Airblast Overpressure Limits

To the householder

Australian Government
Nation Building Program

NSW GOVERNMENT Transport Roads & Maritime Services

MAY 2012

Dear Resident/Community member

Re: Pacific Highway upgrade — Tintenbar to Ewingsdale increased vibration and airblast overpressure limits for St Helena tunnel construction

NSW Roads and Maritime Services (RMS), formerly the Roads and Traffic Authority (RTA), has engaged Baulderstone Pty Ltd to design and construct the Pacific Highway upgrade — Tintenbar to Ewingsdale.

This project is jointly funded by the NSW State and Federal governments.

The upgrade will provide approximately 16.3 kilometres of dual carriageway, starting at the northern end of the Ballina bypass at Ross Lane and extending to the Ewingsdale interchange. It is anticipated that substantial construction will commence in mid 2012.

Controlled tunnel blasting will be required to excavate approximately 155,000m³ of rock during construction of the St Helena tunnel, with additional controlled open cut blasting needed for excavation of the tunnel portals and the tunnel control centre. The type of controlled blasting inside the tunnel will differ from controlled 'open cut' blasting that will be undertaken at the tunnel portals and tunnel control centre.

Due to the very high strength 'basalt' rock that is expected to be encountered, the project team is seeking approval from Department of Planning and Infrastructure (DoPI) to increase the blasting vibration and airblast overpressure limits for controlled blasting in the tunnel.

The project is subject to strict environmental controls, including managing construction noise and vibration impacts.

Current approved vibration limits at the most affected receiver

The current approved vibration limits for blasting on the project measured at the most affected sensitive receiver are:

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

What are the new proposed limits?

With your agreement, the project team is proposing to increase the blasting vibration limits above 15 millimetres per second for five per cent of the blasts, but never to exceed a limit of 20 millimetres per second. This is for controlled blasting undertaken in the St Helena tunnel, tunnel portals and tunnel control centre, as follows:

Peak Particle Velocity (mm/s)	Allowable Exceedence
15	5% of total number of blasts over a 12 month period
20	Never

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This project is funded by the NSW State and Federal Governments.

The proposed increased limits would still ensure the comfort and safety of residents during each controlled blast. The blasting limits would be below the level at which any cosmetic damage to structures, such a minor paint cracking, may occur.

The project has already undertaken a detailed precondition survey on your property. In the unlikely event that damage is caused to your property by controlled blasting activities, the project team will investigate and repair accordingly any damage found to be caused by the controlled blasting activities.

Current approved airblast overpressure limits at the most affected receiver

Airblast overpressure (or airblast level) is the energy transmitted from the blast site within the atmosphere, in the form of pressure waves. The pressure wave consists of both audible (noise) and inaudible (concussion) energy. The maximum excess pressure in this wave is known as the peak air overpressure, generally measured in decibels, using the linear frequency weighting.

The current approved airblast overpressure limits for blasting on the project, measured at the most affected sensitive receiver, is:

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

What are the new proposed airblast overpressure limits?

The project team proposes to increase airblast overpressure limits for controlled blasting undertaken in the St Helena tunnel, tunnel portals and tunnel control centre, as follows:

Airblast Overpressure (dB(Lin Peak))	Allowable Exceedence
125	5% of total number of blasts over a 12 month period
130	Never

Need to increase vibration and airblast overpressure limits

The approved vibration and airblast overpressure limits specified for the project only allow for small quantities of material to be blasted in each controlled blast. Increasing the blasting vibration limits from 10 mm/second to 20 mm/second and airblast overpressure limits from 120 dB (Lin Peak) to 130 dB (Lin Peak) for 95% of the controlled blasts will result in a shortened blasting program. Consequent reductions in noise generated by blasting activities, such as drilling or rock breaking, will improve overall comfort levels for residents.

What are the impacts for residents?

It is envisaged that the controlled blasting within the tunnel will generally be carried out in two discreet periods, one in the morning and one in the afternoon. Controlled blasts will be grouped together within each period, to minimise the overall impact of the daily blasting operations.

Controlled blasting will occur at the northern and southern tunnel portals (entrances) and during excavation of the submerged tunnel control centre at the top of St Helena hill and will involve a maximum of one controlled blast event per day.

It is also anticipated that controlled blasting in the tunnel could be potentially carried out six times per day (for example, two blasts in each tunnel at the southern portal and two blasts in the northbound tunnel from the northern portal), commencing in late 2012 for approximately 12 months.

Each blast will occur instantaneously and the impact will only last for a matter of seconds.

Controlled blasting at the tunnel portals will take approximately three months and controlled blasting at the tunnel control centre will take approximately 4-6 weeks.

Vibration impacts are controlled by adjusting the size and timing of the maximum instantaneous explosive charge (MIC), which is the amount of explosive detonated at any particular instant. The size of the MIC is adjusted so that the limits for ground vibration and air blast overpressure for each sensitive receiver (nearby residents) are not exceeded.

The vibration from any controlled blasting undertaken in the St Helena tunnel blasting works is expected to be very minor, beyond the immediate vicinity of the blast zone. This would also apply to the situation where blasting vibration limits are increased, as noted above. All blasts will be modelled by experienced blast engineers, to ensure that the approved vibration and airblast overpressure limits are not exceeded. In addition, trial blasts will be undertaken to confirm design blast predictions and parameters and will be used to refine ongoing controlled blast activities.

Noise monitoring will be undertaken, initially at the start of any controlled blasting (i.e. at the tunnel portals, in the tunnel and at the tunnel control centre) and subsequently, on a monthly basis or more frequently as may be required, to demonstrate compliance with approval limits and the various management plans for the project, or to respond to community complaints. Monitoring will be carried out for each controlled blast to record vibration levels and airblast overpressure. This information will be regularly uploaded to the project website.

What are the benefits of increasing the blasting vibration and airblast overpressure limits?

- Controlled blasting would be completed in a shorter duration of time.
- A substantial reduction in local rock hammering operations (especially on the tunnel portals and tunnel control centre excavation works).
- The total number of controlled blasts required would be reduced i.e. less inconvenience to residents and motorists.

The following reductions and benefits are anticipated to directly reduce impacts by:

- 80% less rock breaking — reducing the duration of noise and vibration to which residents would be otherwise exposed.
- 15% less drilling — reducing the duration of noise and vibration to which residents would be otherwise exposed.
- 40% fewer blasts.
- 50% fewer rolling stoppages of the Pacific Highway, reducing traffic delays.
- 50% fewer closures of St Helena Road, reducing traffic stoppages and delays.

What are we asking you to consider?

The project team is currently preparing a submission to the Department of Planning and Infrastructure, to modify the blasting vibration and airblast overpressure limits for controlled blasting in the tunnel. This submission will include details on potential community impacts, benefits and the outcomes of any consultation.

If you consent to the proposal to increase blasting vibration and airblast overpressure limits at the St Helena tunnel, as set out in this letter, please sign the consent declaration below and return in the reply paid envelope provided, at your earliest convenience.

If the increase in controlled blasting and airblast overpressure limits are unsatisfactory, due to vibration or any other impacts you may experience, please notify the Tintenbar to Ewingsdale project team to arrange a meeting to resolve any issues. If a resolution cannot be reached by both parties during these discussions, you may give notice to the project team for the termination of this agreement.

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This project is funded by the NSW State and Federal Governments.

If you choose to terminate the agreement, the current approved blast limits under the Minister's approval (no exceedence of 10 millimetres per second for vibration and 120 dB (Lin Peak) for airblast overpressure at any time) would continue to apply to your property.

For more information about controlled blasting or if you have any queries about the information outlined above, please contact our community relations team on **1800 882 787 (toll free)** or email communityinfo@t2e.com.au.

Yours faithfully

Vincent Newton
Baulderstone Project Director

Property owners' and/or resident's letter of consent

I/We _____ of _____ St Helena Road, McLeods Shoot, have participated in consultation with Baulderstone Pty Ltd about the proposal to increase blasting vibration and airblast overpressure limits, as set out in this letter, and I/we consent to this proposal.

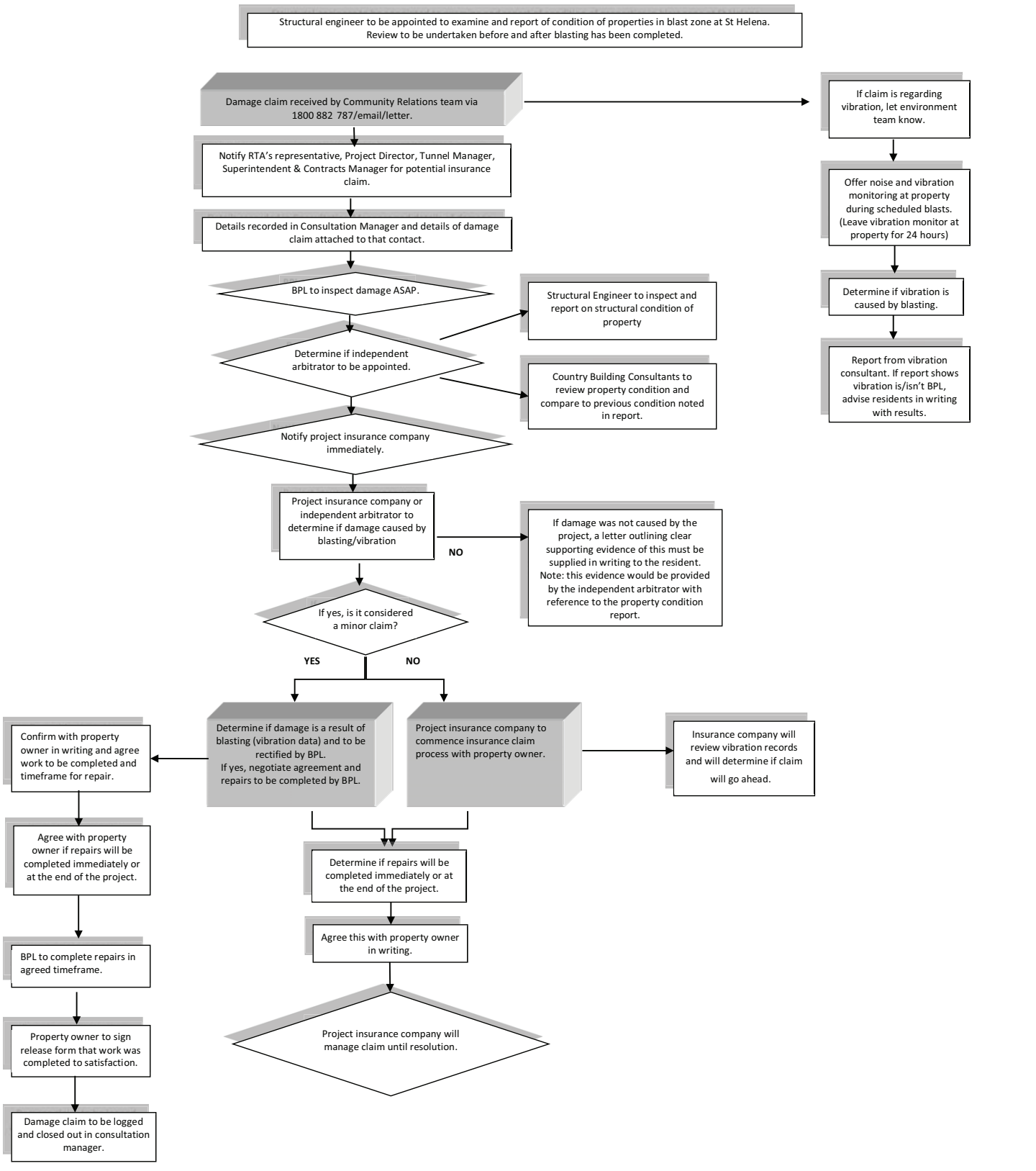
I/We acknowledge that this consent can be withdrawn in writing at any time.

Signed_____

Date_____

Appendix 6 – Damage Claim Procedure – St Helena

DAMAGE CLAIM PROCEDURE – RESIDENTS WITHIN 500M OF ST HELENA TUNNEL



DISPUTE RESOLUTION

If there is a dispute, provide reports (vibration and structural) to independent arbitrator.

Appendix 4 – Written Consents and Non-Objections

To the householder

Australian Government
Nation Building Program

NSW GOVERNMENT Transport Roads & Maritime Services

MAY 2012

Dear Resident/Community member

Re: Pacific Highway upgrade — Tintenbar to Ewingsdale increased vibration and airblast overpressure limits for St Helena tunnel construction

NSW Roads and Maritime Services (RMS), formerly the Roads and Traffic Authority (RTA), has engaged Baulderstone Pty Ltd to design and construct the Pacific Highway upgrade — Tintenbar to Ewingsdale.

This project is jointly funded by the NSW State and Federal governments.

The upgrade will provide approximately 16.3 kilometres of dual carriageway, starting at the northern end of the Ballina bypass at Ross Lane and extending to the Ewingsdale interchange. It is anticipated that substantial construction will commence in mid 2012.

Controlled tunnel blasting will be required to excavate approximately 155,000m³ of rock during construction of the St Helena tunnel, with additional controlled open cut blasting needed for excavation of the tunnel portals and the tunnel control centre. The type of controlled blasting inside the tunnel will differ from controlled 'open cut' blasting that will be undertaken at the tunnel portals and tunnel control centre.

Due to the very high strength 'basalt' rock that is expected to be encountered, the project team is seeking approval from Department of Planning and Infrastructure (DoPI) to increase the blasting vibration and airblast overpressure limits for controlled blasting in the tunnel.

The project is subject to strict environmental controls, including managing construction noise and vibration impacts.

Current approved vibration limits at the most affected receiver

The current approved vibration limits for blasting on the project measured at the most affected sensitive receiver are:

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

What are the new proposed limits?

With your agreement, the project team is proposing to increase the blasting vibration limits above 15 millimetres per second for five per cent of the blasts, but never to exceed a limit of 20 millimetres per second. This is for controlled blasting undertaken in the St Helena tunnel, tunnel portals and tunnel control centre, as follows:

Peak Particle Velocity (mm/s)	Allowable Exceedence
15	5% of total number of blasts over a 12 month period
20	Never

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BAULDERSTONE

This project is funded by the NSW State and Federal Governments.

The proposed increased limits would still ensure the comfort and safety of residents during each controlled blast. The blasting limits would be below the level at which any cosmetic damage to structures, such a minor paint cracking, may occur.

The project has already undertaken a detailed precondition survey on your property. In the unlikely event that damage is caused to your property by controlled blasting activities, the project team will investigate and repair accordingly any damage found to be caused by the controlled blasting activities.

Current approved airblast overpressure limits at the most affected receiver

Airblast overpressure (or airblast level) is the energy transmitted from the blast site within the atmosphere, in the form of pressure waves. The pressure wave consists of both audible (noise) and inaudible (concussion) energy. The maximum excess pressure in this wave is known as the peak air overpressure, generally measured in decibels, using the linear frequency weighting.

The current approved airblast overpressure limits for blasting on the project, measured at the most affected sensitive receiver, is:

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

What are the new proposed airblast overpressure limits?

The project team proposes to increase airblast overpressure limits for controlled blasting undertaken in the St Helena tunnel, tunnel portals and tunnel control centre, as follows:

Airblast Overpressure (dB(Lin Peak))	Allowable Exceedence
125	5% of total number of blasts over a 12 month period
130	Never

Need to increase vibration and airblast overpressure limits

The approved vibration and airblast overpressure limits specified for the project only allow for small quantities of material to be blasted in each controlled blast. Increasing the blasting vibration limits from 10 mm/second to 20 mm/second and airblast overpressure limits from 120 dB (Lin Peak) to 130 dB (Lin Peak) for 95% of the controlled blasts will result in a shortened blasting program. Consequent reductions in noise generated by blasting activities, such as drilling or rock breaking, will improve overall comfort levels for residents.

What are the impacts for residents?

It is envisaged that the controlled blasting within the tunnel will generally be carried out in two discreet periods, one in the morning and one in the afternoon. Controlled blasts will be grouped together within each period, to minimise the overall impact of the daily blasting operations.

Controlled blasting will occur at the northern and southern tunnel portals (entrances) and during excavation of the submerged tunnel control centre at the top of St Helena hill and will involve a maximum of one controlled blast event per day.

It is also anticipated that controlled blasting in the tunnel could be potentially carried out six times per day (for example, two blasts in each tunnel at the southern portal and two blasts in the northbound tunnel from the northern portal), commencing in late 2012 for approximately 12 months.

Each blast will occur instantaneously and the impact will only last for a matter of seconds.

Controlled blasting at the tunnel portals will take approximately three months and controlled blasting at the tunnel control centre will take approximately 4-6 weeks.

Vibration impacts are controlled by adjusting the size and timing of the maximum instantaneous explosive charge (MIC), which is the amount of explosive detonated at any particular instant. The size of the MIC is adjusted so that the limits for ground vibration and air blast overpressure for each sensitive receiver (nearby residents) are not exceeded.

The vibration from any controlled blasting undertaken in the St Helena tunnel blasting works is expected to be very minor, beyond the immediate vicinity of the blast zone. This would also apply to the situation where blasting vibration limits are increased, as noted above. All blasts will be modelled by experienced blast engineers, to ensure that the approved vibration and airblast overpressure limits are not exceeded. In addition, trial blasts will be undertaken to confirm design blast predictions and parameters and will be used to refine ongoing controlled blast activities.

Noise monitoring will be undertaken, initially at the start of any controlled blasting (i.e. at the tunnel portals, in the tunnel and at the tunnel control centre) and subsequently, on a monthly basis or more frequently as may be required, to demonstrate compliance with approval limits and the various management plans for the project, or to respond to community complaints. Monitoring will be carried out for each controlled blast to record vibration levels and airblast overpressure. This information will be regularly uploaded to the project website.

What are the benefits of increasing the blasting vibration and airblast overpressure limits?

- Controlled blasting would be completed in a shorter duration of time.
- A substantial reduction in local rock hammering operations (especially on the tunnel portals and tunnel control centre excavation works).
- The total number of controlled blasts required would be reduced i.e. less inconvenience to residents and motorists.

The following reductions and benefits are anticipated to directly reduce impacts by:

- 80% less rock breaking — reducing the duration of noise and vibration to which residents would be otherwise exposed.
- 15% less drilling — reducing the duration of noise and vibration to which residents would be otherwise exposed.
- 40% fewer blasts.
- 50% fewer rolling stoppages of the Pacific Highway, reducing traffic delays.
- 50% fewer closures of St Helena Road, reducing traffic stoppages and delays.

What are we asking you to consider?

The project team is currently preparing a submission to the Department of Planning and Infrastructure, to modify the blasting vibration and airblast overpressure limits for controlled blasting in the tunnel. This submission will include details on potential community impacts, benefits and the outcomes of any consultation.

If you consent to the proposal to increase blasting vibration and airblast overpressure limits at the St Helena tunnel, as set out in this letter, please sign the consent declaration below and return in the reply paid envelope provided, at your earliest convenience.

If the increase in controlled blasting and airblast overpressure limits are unsatisfactory, due to vibration or any other impacts you may experience, please notify the Tintenbar to Ewingsdale project team to arrange a meeting to resolve any issues. If a resolution cannot be reached by both parties during these discussions, you may give notice to the project team for the termination of this agreement.

Pacific Highway upgrade – Tintenbar to Ewingsdale
Reply paid 85913
PO Box 604
BANGALOW NSW 2479
www.rms.nsw.gov.au/pacific | T 1800 882 787

This project is funded by the NSW State and Federal Governments.

If you choose to terminate the agreement, the current approved blast limits under the Minister's approval (no exceedence of 10 millimetres per second for vibration and 120 dB (Lin Peak) for airblast overpressure at any time) would continue to apply to your property.

For more information about controlled blasting or if you have any queries about the information outlined above, please contact our community relations team on **1800 882 787 (toll free)** or email communityinfo@t2e.com.au.

Yours faithfully

Vincent Newton
Baulderstone Project Director

Property owners' and/or resident's letter of consent

I/We _____ of _____ St Helena Road, McLeods Shoot, have participated in consultation with Baulderstone Pty Ltd about the proposal to increase blasting vibration and airblast overpressure limits, as set out in this letter, and I/we consent to this proposal.

I/We acknowledge that this consent can be withdrawn in writing at any time.

Signed_____

Date_____