LIDDELL

GLENCORE

Chain of Ponds Inn

Blast Management Strategy

Number: LIDOC-90533967-3636
Owner: Environment & Community Officer
Status: Approved
Version: 6.0
Effective: 06/01/2021
Review: 06/01/2022

Table of Contents

1. Background

The Chain of Ponds Inn complex is listed on the State Heritage Register, and was constructed in stages between the 1840s and turn of the 20th century. The complex is comprised of three core buildings, being the Inn, the convict lock-up and the stables, which are located on what was the main overland route between Singleton and Muswellbrook.

The Inn operated intermittently through to about 1904, as a post office until the 1920s, and then used as a private residence through to the mid-1970s. The Electricity Commission of New South Wales acquired the land containing the Inn complex, which was in a poor state of repair, in 1966. The property was leased, however the condition of the buildings continued to deteriorate, leading the lessee to terminate the lease in 1974. With the buildings standing empty, vandalism followed with the loss of all internal and external cedar doors from the main building, all newel posts, balusters and handrails from the main staircase, skirting boards, architraves, fixtures and fittings. The buildings currently have all windows and doors boarded up and the property is surrounded by security fencing to prevent access.

The Chain of Ponds Inn complex is currently under the ownership and management of the Hunter Valley Operations Joint Venture (HVO JV).

2. Purpose

In 2013, LCO submitted a development application to modify development consent DA 305-11-01 (Mod 5) to extend the existing open cut mining operations in both the South Pit and Entrance Pit, to enable continuity of mining and maximise recovery of coal resources within the existing development consent boundary. Development Consent was granted 1st December 2014.

The Chain of Ponds Inn is located on the Old New England Highway, and will be within 95m of the open cut pit shell associated with the South Pit (refer **Figure 3-1**). The Environmental Assessment (EA) prepared for the development consent modification found that mining in the vicinity of the Inn could proceed without any major risk of damage, provided that blast design control is implemented and a number of defects in the structures within the Inn complex are rectified prior to the commencement of the close range blasting program.

This Blast Management Strategy has been developed by LCO to document the management of potential blast related impacts on the Chain of Ponds Inn, and is a requirement of DA305-11-01 (as modified). The relevant condition requirements, and where they are addressed in this document, are provided in **Table 2-1**.

In accordance with DA305-11-01, the primary objective of this Strategy is to ensure that blasting at LCO does not cause loss of heritage value, and/or have a negligible impact on the structural integrity of the external fabric of the Inn, compared to the existing condition and structural integrity of the Inn at the date that consent was granted to DA305-11-01 MOD 5 (December 2014).

DA305-11-01 Schedule 3 Conditions	Section
Chain of Ponds Inn	**Section 2.0**
5. The Applicant shall ensure that blasting at the development does not cause any exceedances of the following performance measures at the Chain of Ponds Inn, to the satisfaction of the Secretary	
negligible loss of heritage value; and	
negligible impact on structural integrity of the external fabric of the Inn having regard to the existing condition and structural integrity of the Inn at November 2014.	
Notes: *The Applicant will be required to define more detailed performance indicators (including impact assessment criteria) in the Blast Management Plan.* *Measurement and/or monitoring of compliance with performance measures and indicators is to be undertaken using generally accepted methods that are appropriate for the heritage item. These methods are to be fully described in the Blast Management Plan.* *The requirements of this condition only apply to the impacts and consequences of mining operations undertaken following the date of that consent is granted to DA 305-11-01 MOD 5.*	
Blast Management Plan	
15A (e) include a specific *Blast Management Strategy for the Chain of Ponds Inn*. This Strategy must:	**This document**
be prepared in consultation with the Heritage Council and Coal & Allied, and endorsed by the Heritage Council;	**Section 4.2**
incorporate the recommendations of the *Former Chain of Ponds Inn Buildings – Investigation of Blast Vibration and Vulnerability Report* (Bill Jordan and Associates, 2013) and *Blast Management Strategy (Enviro Strata, 2013);*	**Section 4.1**
provide details on the management of potential flyrock impacts on the Chain of Ponds Inn;	**Section 6.2**
provide details on how the stabilisation measures will be implemented and a timetable for implementation;	**Section 5.2**
provide details of the ongoing monitoring and maintenance procedures for the Chain of Ponds Inn;	**Sections 7.1 and 7.2**
repair any damage to the Chain of Ponds (should any damage occur) within 6 months of the damage occurring; and	**Section 7.2**

DA305-11-01 Schedule 3 Conditions	Section
provide and submit an annual report on the condition of the Chain of Ponds Inn to the Heritage Council.	**Section 7.3**

Table 2-1 – Project Approval Requirements for the Blast Management Strategy

3. Scope

This document addresses the management of potential blast related impacts on the structures that comprise the Chain of Ponds Inn complex as a result of operations at LCO. These structures are the Inn (building A), the convict lock-up (building B) and the stables (building C). It does not address the management and mitigation of blast impacts on other infrastructure, receptors or the natural environment.

This document is also not intended to address the overarching management and long term use of the Chain of Ponds Inn, given that the Inn is under the ownership and management of HVO JV. A key consideration in the preparation of this management strategy was however to ensure that the management and mitigation measures committed to by LCO do not in any way impinge on HVO JV plans for the long term use and restoration of the Inn.

In addition, this strategy has been developed in consideration of the stabilisation works undertaken by HVO JV on the Inn in 2014/2015. It is understood these works are being undertaken in accordance with the report prepared by ERM (November 2013) titled *"Chain of Ponds Inn Initial Stabilisation Repairs – Scope of Works (Final)"*.

The stabilisation works include repairing/replacing damaged joists in the main building, repairing and stabilising the main verandah, repairing downpipes in the lock up building, replacing termite damaged and rotten timber in the stables, dismantling and rebuilding the chimney in the stables, and undertaking minor brickwork re-pointing/repairs also in the stables.

LCO's approach in developing this Blast Management Strategy for the Chain of Ponds Inn has been formulated on the basis that the works described in ERM's report (2013) are appropriate and are completed to the necessary standards with regards to build quality and selection of materials.

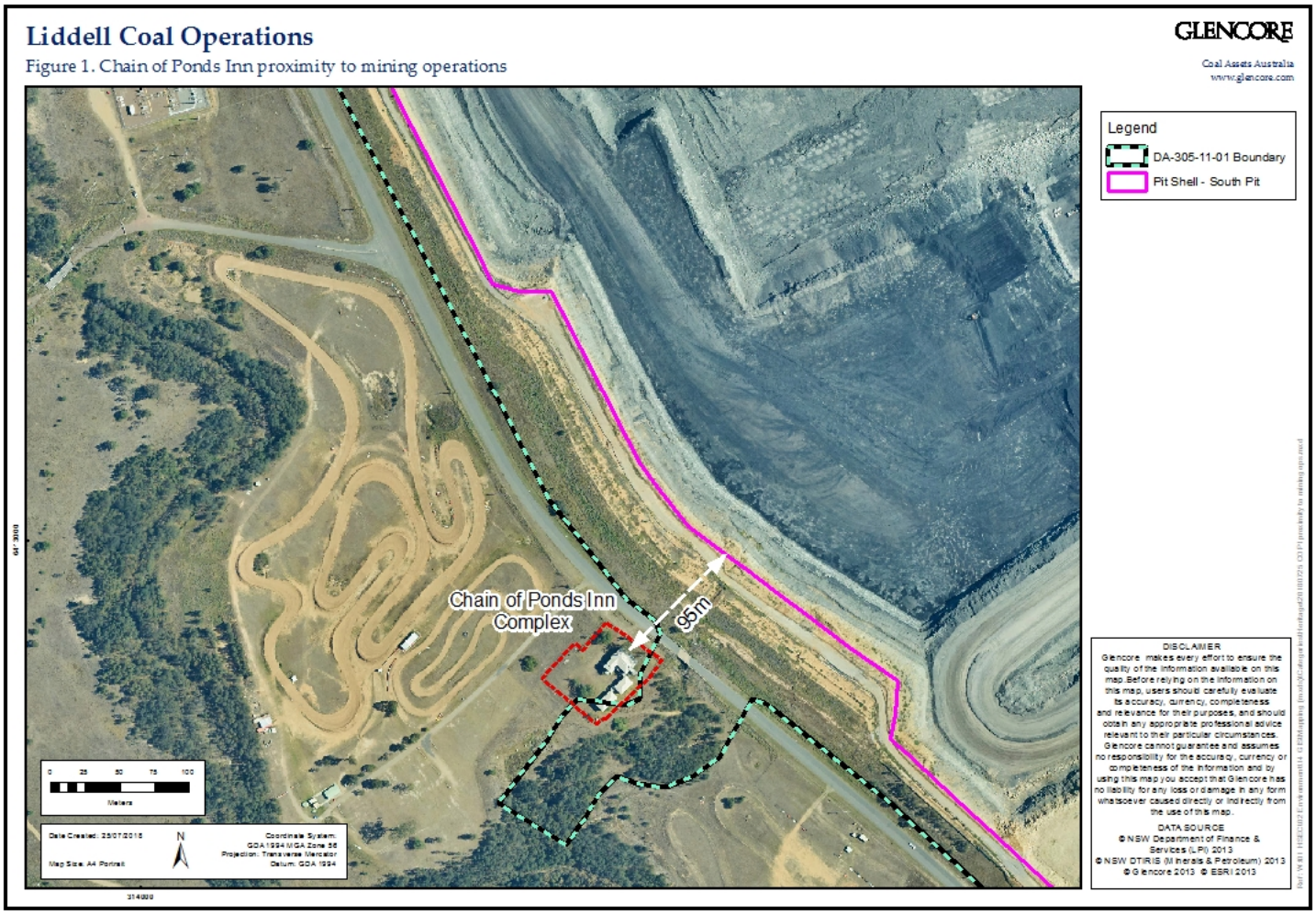

Figure 3-1 – Chain of Ponds Inn proximity to mining operations

4. Planning

4.1 Studies Undertaken

An Environmental Assessment (SLR, 2013) was prepared to support LCO's application to modify DA 305-11-01. This EA included a number of specialist reports which assessed the potential for blast related impacts on the Chain of Ponds Inn, and recommended appropriate management and mitigation measures.

Bill Jordon and Associates (2013) was commissioned to undertake a structural assessment and investigation of blast vibration vulnerability of the Chain of Ponds Inn, recommending a number of stabilisation measures to be carried out on the buildings of the Inn.

The results of this Study were used by Enviro Strata (2013) to develop a Blast Management Strategy for the Inn, recommending blast design parameters to ensure that blast results at the Inn (in particular peak particle velocity (PPV)) remain within the required limits, and subsequently minimising the risk of blast related impacts on the Inn. This strategy is based on an adaptive management approach, undertaking an ongoing review of blast processes and building response as blasting locations approach closer to the Inn and vibration levels increase.

Ozark Environmental and Heritage Management (OzArk) (2013) was also engaged to undertake an Aboriginal and Historic Heritage Assessment of the modification, including an assessment of the Chain of Ponds Inn. OzArk concluded that none of the proposed stabilisation works or mitigation measures recommended by Bill Jordon and Associates (2013) or Enviro Strata (2013) would be likely to have an impact on the aesthetics, current function or historical significance of the buildings, and would temporarily protect the dilapidated buildings from further deterioration.

The recommendations from each of these specialist assessments have been included in this Blast Management Strategy, as discussed in **Section 5.0** below. It is noted however that with regards to the stabilisation measures recommended in the report by Bill Jordan & Associates (2013), many of these measures have been carried out on the Inn as part of the stabilisation works undertaken by HVO JV, as discussed in **Section 3.0**. As a result, preparation of this Strategy has involved a review by Bill Jordan & Associates of the stabilisation measures to the Inn recommended as part of the EA for MOD 5 in consideration of the works undertaken by HVO JV. This Strategy therefore identifies works required in addition to the HVO JV stabilisation works to ensure that there is negligible impact on the structural integrity and heritage value of the Inn.

4.2 Consultation

This document was prepared in consultation with HVO JV, as the owners of the Inn, and the Heritage NSW. **Table 4-1** describes the consultation undertaken in preparation of this plan.

Date	Stakeholder	Outcomes
14 July 2014	HVO JV	Key issues raised included the blast management/control process and fly rock management. Addressed in **Sections 6** and **7**.
17 July 2014	Heritage NSW	Focus was on our activities not impinging on final end use planned by C&A conservation strategy.

Date	Stakeholder	Outcomes
		Opinion that best form of conservation was for the building to be utilised in the short term and therefore concerned that our activities would be postponing beneficial use for approx 10yrs. Concerned whether stabilisation measures would be removed after close range blasting is complete i.e. are they actually temporary or will they be incorporated into the long term conservation? These items are addressed in **Sections 5.1** and **5.2**.
27 November 2014	HVO JV	Update meeting to discuss progress made with strategy, and how key concerns have been addressed. Discussion of progress of structural restoration program and opportunity for inspection. No further action for management strategy from meeting.
5 February 2015	HVO JV	Formal review of document. Minor adjustments to descriptions etc. Suggestions for visual inspection regime to be developed in consultation with C&A (added to **Section7.1**) and improved definition of significant damage and response process for "make good provisions" (**Section 7.2**). Supporting correspondence from Coal & Allied is included in **Appendix A**.
14 April 2015	Heritage NSW	Formal review of document. Determined that the Strategy has adequately addressed issues raised by the Heritage Council. Supporting correspondence is included as **Appendix B**.
5 May 2015	DPIE	Formal review of document. Approval granted 11 May 2015. Supporting correspondence is included as **Appendix C**.

Table 4-1 – Management Strategy Revision

As a prominent structure within the area, consultation with the community will be undertaken regularly to inform the community of the stabilisation works on the Chain of Ponds Inn and mining activity in the vicinity. This will be undertaken primarily through consultation with the LCO Community Consultative Committee, however the HVO JV also have an established Community Heritage Advisory Group , and the opportunity exists to be able to meet with this group periodically as invited by HVO JV. Blasting results and works undertaken on the Inn will also be reported in the Annual Environmental Management Report, as well as an annual report on the Inn (refer **Section 7.3** below).

5. Implementation

A staged increase in the vibration level and air blast exposure at the Chain of Ponds Inn, combined with continual monitoring of vibration and air blast levels and corresponding structural behaviour, enables an adaptive management approach to blasting in the vicinity of the Inn. The strategy involves both *at-receptor* mitigation measures (structural stabilisation measures at the Chain of Ponds Inn) and *at-source* management measures (blast design control), particularly within a distance of 350 metres to the Inn, combined with an inspection and blast review regime to effectively manage blasting in the vicinity of the Inn.

The key components of the strategy are summarised below.

5.1 Use of the Buildings

The Chain of Ponds Inn buildings are all currently unoccupied and have been for many years. Consequently, the buildings are uninhabitable in their current state, primarily as a result of both vandalism and termite damage over the years. Potential uses of the buildings were considered during preparation of this management plan as a possible conservation option, however due to the un-inhabitable state of the buildings the option of occupation at this time was deemed unfeasible. As stated above in **Section 3.0**, this management strategy is not intended to address the overarching management and long term use of the Chain of Ponds Inn, given that the Inn is under the ownership and management of the HVO JV. All mitigation measures committed to by LCO have been designed to ensure both that the potential risk of further damage to the Inn complex as a result of close range blasting in the South Pit mining area is minimised, and so as to not affect any long term plans the HVO JV have for the use of the buildings.

5.2 Structural Improvements

The 2013 studies identified a number of stabilisation measures to be undertaken at the Chain of Ponds Inn to ensure the risk of blasting related impacts is minimised. In particular, support of badly termite-damaged timber structures, such as the front verandah, would need to be undertaken as they are liable to further damage from many causes, blasting-related or not. It was also identified that chimneys would also likely need to be supported laterally over most of their heights, and in the case of the chimney on Building C, vertically. Also, some walls may also receive lateral support by external props or internal ties, together with soldier and wale members, as required.

The timing and design of this structural support to date has been completed progressively as further monitoring data has been obtained. The works described below were carried out *before* blasting was predicted to reach these PPV levels at the Inn as detailed in the annual reporting completed to date:

- 10 mm/s to 20mm/s (August 2015)
    - Front veranda was repaired as detailed by the ERM scope of works.
    - Coal & Allied rebuilt the fireplace on new timber supports and had the chimney de-constructed and stored for future rebuilding.
- 20 mm/s to 30mm/s (April 2016) The chimneys on Building A have been supported by timber framing attached to the roof structure by reversible means.

To date, further structural mitigation has not been deemed necessary based on the monitoring data collected. The building will continue to be subject to analysis of blast vibration, air blast levels and corresponding structural behaviour to identify any further mitigation measures as follows:

- Up to 50 mm/s (or agreed revised level).

Support any identified vulnerable elements with non-intrusive and reversible temporary structures. Further design of measures required will be subject to progressive monitoring results and subsequent design. Stabilisation and repair work will conserve the heritage value of an item. Measures to protect the buildings will be guided by the Burra Charter, replace like with like and will be reversible, temporary and/or easily removed. Propping, straps and ties applied to the buildings will be minimised to that which is necessary to stabilise buildings during the phase of nearby blasting.

The stabilisation measures implemented by LCO as listed in the dot points above will remain in place for a relatively short period of time, until close range blasting (i.e. in the South Pit at LCO) is complete, which is anticipated to be around 2020/2021. LCO will consult with the HVO JV at this time to determine whether the stabilisation measures can then be removed, which will primarily depend on the status of their restoration program as well as the outcomes of structural assessments of the buildings at the time.

5.3 Gradual Approach

This is a key component of this strategy, which is underpinned by a gradual advancement of drill and blast activities towards the Chain of Ponds Inn, a gradual increase in vibration and air blast exposure, and the corresponding progressive implementation of stabilisation measures, as described above. This staged approach, combined with an appropriate monitoring program (see **Section 7**) to identify required adjustments to the blast design and/or stabilisation measures, will minimise the risk of any structural damage to the Inn.

6. Implementation

6.1 Blasting Protocol

Strict blast design, loading and blast execution protocols will be implemented to ensure blasting is well controlled in the vicinity of the Chain of Ponds Inn.

350 m Blast Control Zone

The blast strategy for the Chain of Ponds Inn focuses on blasting within 350 metres of the Inn. The vibration modelling undertaken as part of the EA by Enviro Strata (2013) showed that beyond 350 metres, substantial charge masses would be required to generate vibration levels of up to 50 mm/s at the Inn, masses that are generally beyond the operational parameters at LCO. In addition, LCO has previously blasted within 380 metres of the Chain of Ponds Inn when constructing the Raw Water Transfer Void, demonstrating compliance with the vibration criterion of 10 mm/s at the time.

Blasting Protocol

The control of blasting within 350 metres of the Inn will involve the following steps for each blast.

a) Initial blast design will be based on a Maximum Instantaneous Charge (M.I.C) determined from the use of site parameters that are constantly reviewed to incorporate recent site data.

b) Unless subject to review by an appropriately qualified expert, all blasts fired within 350 metres of the Chain of Ponds Inn will have blasting specifications that have been proven by prior experience to result in vibration levels, frequencies and air blast levels that conform with applicable structural limits

c) Blast execution, including vibration monitoring at the Inn.

d) Ongoing revision of the predictive model based on vibration monitoring results from subsequent blasts. Results of the structural monitoring of the Chain of Ponds Inn will also be reviewed, and the blast design modified if structural response is different to that expected (refer **Section 7.1** below).

6.2 Meeting targets and blast design

6.2.1 Vibration

The work completed to date continues to indicate that PPV levels of up 50 mm/s will be acceptable at the Inn. Notwithstanding, to limit the risk of any damage being incurred at the Chain of Ponds Inn, the exposure of the Inn to vibration levels will be done in a progressive manner.

Advancement to larger vibration levels will follow a review of blast impacts and will be based on monitoring of vibration levels at the Inn, assessment of the structures response to a number of blasts generating a particular vibration level, and importantly, a lack of structural damage. Following the process described in **Section 7.1** below, proposed trigger levels for monitoring and progression to higher vibration levels are:

- 10mm/s to 20mm/s PPV – implemented August 2015;
- 20mm/s to 30mm/s PPV – implemented April 2016;
- 30mm/s to 40mm/s PPV – implemented June 2016; and
- 40 to 50mm/s PPV – implemented October 2019.

6.2.2 Airblast

The possible effects of air blast on structural elements of the Inn should be considered as part of the ongoing structural assessment of the Inn commensurate with the gradual ground vibration trigger levels. The most sensitive structural element vulnerable to air blast is glass windows, however these have been previously removed from the Inn.

Terrock Consulting Engineers (Feb, 2015) advised that most of the research and guidance levels are to prevent damaging windows, whereby AS2187.3 – 2006 in Table J5.4(B) indicates that a maximum of 133dBL should be applied for damage control unless an alternate limit agreement is reached with the building owner, yet Section J5.3 Damage Limits says “windows are the building element currently regarded as most sensitive to air blast, and damage to windows is considered as improbable below 140dBL”.

Further work was completed under ACARP Investigation C9040 (Nov 2002) ‘Structure response to Blast Vibration’ which compared the effect of ground vibration and air blast on typical Australian houses of brick veneer construction, This study indicated 10mm/s peak ground vibration gave an equivalent response to air blast overpressure of 142dBL.

An older U.S Bureau of Mines Report of Investigations 8485 ‘Structure Response and Damage Produced by Airblast from Surface Mining” (USBM, 1980) summarising investigations by various researchers into the effects of sonic booms on structural elements other than windows revealed that damage to plaster walls on wood laths occurred at 144 – 148dBL, and also damage to an 8 inch concrete wall began to occur at 153dBL sound pressure level for 10mins, indicating that exposure dos is an important factor. However, Terrock advises that the literary search has not disclosed information directly comparable to the situation with the Inn.

Therefore, similar to vibration, Terrock have proposed that in order to limit the risk of any damage to the Inn occurring, exposure to air blast overpressure shall be conducted via a gradual approach, whereby vibration trigger levels should also be extended to cover equivalent air blast trigger levels. **Table 3** presents the proposed progressive air blast levels with respect to ground vibration triggers. These have been developed assuming a straight line relationship between structure response to ground vibration and airblast equivalent.

PPV Limit mm/s	Equivalent Overpressure Limit dBL
10	140
20	146
30	149
40	150
50	150

Table 6-1 – Ground Vibration and Projected Airblast Overpressure Equivalent

The monitoring program proposed in **Section 7** below, will also permit monitoring of the building response due to airblast, and therefore the structural investigation will be able to quantify the relationship between all three factors to allow appropriate increase or decrease of the proposed levels as required.

6.2.3 Advancing Vibration and Airblast Limits

Prior to advancing to the next vibration and airblast trigger level, LCO will advise the DPE of the proposed change and provide justification for advancement.

6.2.4 Management of Flyrock

Blasting within the South Pit has been undertaken within 95 metres of the Chain of Ponds Inn at its closest point with no impacts recorded to date. Flyrock control will continue to be managed by the use of a control system based on the Terrock flyrock model. This model predicts the distance that rock will fly based on significant blast parameters that can be readily controlled, and a site constant that is determined by a calibration process. A substantial safety factor is then applied to the "worst case" distances measured resulting in the determination of a conservative clearance zone.

The Terrock model has been calibrated by site measurements, and will be used to predict flyrock distances and set clearance zones for all blasts within 300 metres of the Chain of Ponds Inn.

In the event that flyrock is observed or is found to have entered the Inn complex then this will be notified to DPE as an incident in accordance with Schedule 4 Condition 11 of DA305-11-01. The intent is to trigger an investigation and review of the blast models and loading practices to identify the root cause and action required to mitigate the reoccurrence of a flyrock incident.

7. Measurement and Evaluation

7.1 Monitoring and Assessment

Monitoring of the Chain of Ponds Inn buildings will be undertaken on an ongoing basis. The exposure of the Chain of Ponds Inn to increasing PPV levels and air blast levels will be gradual and fully monitored. A suitably qualified person will be engaged to monitor the condition of the buildings on an ongoing basis and if necessary, further stabilisation measures will be put in place.

Monitoring and evaluation of blast results and corresponding structural behaviour will form an important component of the strategy, using an adaptive management approach to allow for continual improvement and refinement of the blast design as required. This will involve the following:

a) Ground vibration and air blast monitoring at the Chain of Ponds Inn, together with periodic frequency analyses to show that the blast design is keeping within the established parameters. Frequency analysis of blast monitoring results should be undertaken for each blast measuring over 20mm/s at the Inn when structural monitoring is undertaken on the Inn. Based on extrapolation of the monitoring results to date, no impact is envisaged at the established PPV magnitudes and frequency profile,

b) Verification of the monitoring results at the Inn and comparison with the vibration predictive model; and

c) Ongoing review of the model for subsequent blasts.

Monitoring of the Chain of Ponds Inn buildings with increasing vibration and air blast levels using accelerometers will also enable a more complete understanding of structural behaviour, and assist in identifying any required changes to the blast design. The PPV vibration and air blast trigger levels discussed in **Section 6.2** will require at least two blast events to be monitored, with the possible removal or addition of other trigger levels as knowledge of the buildings' behaviour changes at the increasing levels.

The dilapidation survey carried out by EJE Heritage (2013) forms a useful basis for determining whether blasting is having any effect on the buildings, and will enable detection of non-structural and insignificant damage such as the dislodgment of loose plaster.

As a minimum, documented visual inspection of the Inn buildings will also be conducted at least every quarter, together with an inspection post blast. If any anomalies are detected in this process they will be documented in the blast report. A detailed inspection may also be completed after any extreme natural event such as cyclonic winds, tornado or an earthquake. A visual inspection methodology was developed based on the results of the initial dilapidation survey, in consultation with the building owners with the results of each visual inspection reported in the annual report.

Not all subtle indications may be observed during the inspections after a blast event, and therefore the dilapidation report will also be updated after the first 40 mm/s vibration level event at the Inn. This requirement was triggered following a blast on 9 July 2020. The dilapidation survey was completed on 31 July 2020, with a 3D external and internal model developed.

In summary the inspection regime at the Chain of Ponds Inn will involve the following:

- Visual inspection of the Inn buildings at a minimum of at least one visual inspection carried out on a quarterly basis throughout the year;
- Revised dilapidation survey completed 31 July 2020; and
- Annual condition report of the Inn by a suitably qualified person, to be included in the annual report on the Inn to the NSW Heritage and HVO JV.

7.2 Monitoring Exceedance Notification

In the event that:

- the target vibration or airblast levels are exceeded; and
- the established building displacement tolerances determined by the engineer are exceeded; or
- visual inspection identifies a structural (non-cosmetic) impact;

for a particular blast, then this will be notified to DPE as an incident in accordance with Schedule 4 Condition 11 of DA305-11-01. The intent is to trigger an investigation and review of the blast models and loading practices to identify the root cause and action required to mitigate the reoccurrence.

Building deformation tolerances have been set with reference to serviceability limit state criteria in the ***Australian Standard for Structural design actions, Part 0: General principles (AS 1170.0:2002, Table C1)***; the tolerable deformations have been further reduced by 50% in recognition of the buildings' heritage status.

7.3 Make Good Measures

If any damage or impact to the Chain of Ponds Inn determined to be as a result of LCO blasts is observed during monitoring, a specialist structural engineer and/or materials conservator will be engaged to assess the damage. Any damage will be repaired by approved specialists in the relevant heritage building trades within six months of the damage occurring; repairs will be undertaken in accordance with the policies of the approved Conservation Management Plan and in recognition of the overall aims of that Plan.

If the damage is deemed to be of a structural nature (i.e. non-cosmetic) the following shall occur:

- blasting to cease at the current design vibration range;
- should structural analysis determine that it is safe to do so, blasting shall continue at the previously proven lower levels of vibration until repairs and further structural mitigations are put in place as required;
- As a minimum conduct visual inspections or further monitoring as recommended by the structural engineer after each blast to identify if further damage is occurring; and
- if investigations into the cause of the damage find that modifications to this Blast Management Strategy are required, these modifications will be made in consultation with HVO JV and the Heritage NSW, and will be resubmitted for approval by DPIE.

Where a minor or cosmetic impact occurs and in consultation with relevant stakeholders, it is proposed to establish a record of cosmetic damage for use in the eventual conservation of the building. Only structural damage needs repair before conservation, as it is most likely that all elements subject to cosmetic repair will be the subject of major conservation work.

7.4 Reporting

An annual report on the condition of the Chain of Ponds Inn Complex will be provided to the Heritage NSW and the HVO JV.

8. Accountabilities

Role	Accountabilities for this Role
Operations Manager	Maintain a working knowledge of this BMS and be aware of all environmental legislative requirements associated with its implementation Mine operations are undertaken in accordance with this BMS. Provide adequate resources for environmental management including: qualified personnel, adequate financial resources and training as required for all employees.
Drill & Blast Engineer	All blasts are designed to comply with the limits in this BMS. Blast monitors are operational before each blast. Inform Liddell Coal Operations Environment and Community Department weekly on blasting schedule and blast parameter predictions.
Environment & Community Manager	Develop, implement and maintain this BMS. Liaise with Coal & Allied, government and community stakeholders regarding management of the Chain of Ponds Inn in relation to blasting at LCO. Liaise with senior management personnel to promote awareness and delegate tasks associated with blast management and heritage issues/commitments. Develop and deliver necessary environmental management/awareness training to all personnel, including management of the Chain of Ponds Inn. Prepare the annual status reports to the Heritage Council and DP&E. Coordinate the activities of specialist consultants for vibration monitoring and structural inspections.
All Persons	Have a general awareness of this BMS. Conduct their work activities in accordance with this BMS. Report all heritage incidents to the Environment and Community Department or their immediate supervisor. Participate in relevant environmental training.

9. Document Information

9.1 Related Documents

Related documents, listed in ***Table 9-1*** below, are *documents* directly related to or referenced from within this document.

Number	Title
LIDOC-90533967-3742	Blast Management

Table 9-1 – Related documents

9.2 Reference Information

Reference information, listed in ***Table 9-2*** below, is *information* that is directly referred to for the development of this document.

Reference	Title
Legislation	Work Health and Safety (Mines and Petroleum Sites) Act 2013
	Work Health and Safety (Mines and Petroleum Sites Regulations 2014
	Work Health and Safety (Mines and Petroleum Sites) Amendment Act 2014
	Work Health and Safety Act 2011
	Work Health and Safety Regulation 2011
	Environmental Planning and Assessment Act 1979
	Environmental Planning and Assessment Regulation 2000
	Protection of the Environment Legislation Amendment Act 2011
	Explosives Act 2003
	Explosive Regulation 2013
Australian Standard	AS2187.2 :2006 Explosives – Storage and use, Part 2 - Use of Explosives
	Bill Jordan and Associates Pty Ltd (2013) Former Chain of Ponds Inn Buildings Investigation of Blast Vibration Vulnerability. Report for Liddell Coal Operations.
	EJE Heritage (2013) Dilapidation Report Former Chain of Ponds Inn & Outbuildings, Old New England Highway.

Reference	Title
	Enviro Strata Consulting Pty Ltd (2013) Liddell Coal Operations Blast Impact Assessment and Management Strategy for Blasting in The Vicinity of the Chain Of Ponds Inn. Report No LC-1302-120613.
	ERM (2013) Chain of Ponds Inn Initial Stabilisation Repairs – Scope of Works (Final) Report prepared for Rio Tinto Coal Australia.
	OzArk Environmental & Heritage Management Pty Ltd (2013) Aboriginal and Historic Heritage Assessment, Liddell Coal Operations Modification 5 to Development Consent DA 305-11-01.
	SLR Consulting (2013) Liddell Coal Operations Proposed Modification to DA 305-11-01, Environmental Assessment.
	Terrock Consulting Engineers (2015) Brief report – Airblast and Potential Structure Damage at Chain of Ponds Inn
	ACARP Investigation C9040 (2002) Structure Response to Vibration
	U.S. Bureau of Mines (1980) Report of Investigation 8485 'Structure Response and Damage Produced by Airblast from Surface Mining"

Table 9-2 – Reference information

9.3 Change Information

Full details of the document history are recorded in the document control register, by version. A summary of the current change is provided in ***Table 9-3*** below. Example detail shown below.

Version	Date	Review Team	Change Details
1.0	15.01.2015	SLR, Bill Jordan & Associates, Terrock Consulting Engineers and LCO	New document. Developed to satisfy revised conditions of consent for DA 305-11-01 Modification 5.
	10.02.2015	LCO, Coal & Allied	Minor description changes throughout document. Updates to Section 7.1 & 7.2 following review by Coal & Allied. Addition of Appendix 1- Supporting Correspondence from C&A.
2.0	26/02/2015	LCO, Terrock Consulting Engineers	Addition of information on air blast considerations in Section 6.2, including minor updates to other sections to reference airblast.
3.0	05/05/2015	LCO, Dept of Environment & Planning	Updates to address DPE comments in Section 7 and inclusion of Heritage Council endorsement as Appendix B. DPE Approval included as Appendix C.

Version	Date	Review Team	Change Details
4.0	October 2016		Document migration to new SharePoint
5.0	11/10/2018	B de Somer, Bill Jordan & Associates	Various updates to Section 5, 6 and 7 to reflect current operations and remove items that have been completed. Insert DPE Approval in Appendix C and update Section 7.3 as per Approval letter requirements. H Simms, B De Somer - Transferred to current template, doc owner to E&C Officer.
6.0	05/01/2021	B de Somer L Depczynski	Full review. Update Section 4 to reflect correct building owners. Update section 6.2.1 to reflect current vibration criterion. Update Section 7.1 visual inspection requirements to reflect now operating at maximum vibration limit. Various C&A references still need to be updated to HVO.
7.0			

Table 9-3 – Change information

Appendix A - Coal & Allied Supporting Correspondence

Rio Tinto Coal Australia Pty Limited
GPO Box 207
Brisbane Queensland 4001
Australia
T +61 (0) 7 3625 3000
F +61 (0) 7 3625 3001

Private and confidential

Mr Ben de Somer
Environment & Community Superintendent
Liddell Coal Operations Pty Ltd - A Glencore Managed Company

13 February 2015

Our reference: LCO Chain of Ponds Blast Management Strategy
Your reference

Dear Ben,

Thank you for providing Coal & Allied with the final draft LCO Blast Management Strategy for the Chain of Ponds Inn Complex (via email 10/2/2015) for development consent DA 305-11-01 (Mod 5). Following your consultation with Coal & Allied addressing the requirements of the conditions in Schedule 3 of DA 305-11-01 (Mod 5), Coal & Allied is satisfied that the management of potential LCO blasting related impacts on the structures at the Chain of Ponds Inn complex are addressed adequately in the draft Blast Management Strategy document (10/2/2015). Could you please provide me with a copy of the final Blast Management Strategy document following approval by the Department of Planning and Environment.

Yours sincerely,

Dr David Cameron
Manager Heritage & Aboriginal Relations
Health, Safety, Environment & Communities, Coal Australia

Rio Tinto
Level 25 – 123 Albert Street
Brisbane Queensland Australia
GPO BOX 391 Brisbane QLD 4001

T: +61 (0) 7 3625 5222 M: +61 (0) 407 649 205 F: +61 (0) 7 33625 3001
david.cameron@riotinto.com http://www.riotintocoalaustralia.com.au

Appendix B - Heritage NSW Endorsement

Heritage Council of New South Wales

3 Marist Place
Parramatta NSW 2150

Locked Bag 5020
Parramatta NSW 2124
DX 8225 PARRAMATTA

Telephone: 61 2 9873 8500
Facsimile: 61 2 9873 8599

heritage@heritage.nsw.gov.au
www.heritage.nsw.gov.au

File No: DOC15/78331
Your Ref: 630.10952

Ms Nicole Armit
Principal – Environmental Management,
Planning and Approvals
SLR Consulting Australia Pty Ltd
10 Kings Road
NEW LAMBTON NSW 2305

Dear Ms Armit

RE: Endorsement of the Blast Management Strategy for the Chain of Ponds Inn – Liddell Coal Operations

I refer to the submission of the 'Blast Management Strategy – Chain of Ponds Inn' (the Strategy) by Liddell Coal Operations Pty Ltd (LCO) on 6 March 2015 for Heritage Council endorsement in accordance Schedule 3, Condition 15A(e) of the modified development consent DA 305-11-01.

The primary objective of this Strategy is to ensure that blasting at Liddell Coal Operations Pty Ltd (LCO) does not cause loss of heritage value and/or have a negligible impact on the structural integrity of the nearby State Heritage Listed Chain of Ponds Inn complex (the Inn, the convict lock-up and the stables). The Strategy includes an Environmental Assessment which recommended that existing structural defects within the Inn complex are rectified prior to commencement of the close range blasting program.

The Strategy involves both mitigation and management measures, including stabilisation measures to be installed prior to the blasting and ensuring that the internal and external structures of the Inn complex are suitably secured. The Applicant will be taking a gradual approach to mining operations with a corresponding progressive implementation approach to stabilisation measures. The assessment indicates that structural improvements will not change the overall fabric, appearance and significance of the Chain of Ponds Inn Complex. The report includes monitoring and evaluation of the blast results in conjunction with a continued inspection of the Chain of Ponds Inn.

After consideration of all the submitted documentation it is determined that the Strategy has adequately addressed the issues raised by the Heritage Council in relation to the management of potential impacts on the Chain of Ponds Inn site. Accordingly, Schedule 3, Condition 15A(e) has been met.

If you have any questions regarding the above advice, please feel free to contact Anna Foroozani, Archaeologist, Heritage Division, Office of Environment and Heritage via email at Anna.Foroozani@environment.nsw.gov.au or at 9995 6107.

Yours sincerely

Rochelle Johnston
Manager, Conservation
Heritage Division
Office of Environment and Heritage
As Delegate of the Heritage Council of NSW

14 April 2015

Helping the community conserve our heritage

Appendix C - DPIE Approval

Contact: Scott Brooks
Phone: 6575 3401
Fax: 6575 3415
Email: scott.brooks@planning.nsw.gov.au

Ben de Somer
Environment & Community Manager
Liddell Coal Operations
PO Box 7
SINGLETON 2330

DA 305-11-01

Dear Ben,

Liddell Coal Operations – Chain of Ponds Inn Blast Management Strategy Approval

Thank you for forwarding the Liddell Chain of Ponds Inn Blast Management Strategy required under the requirements of Condition 15A (e) Schedule 3 of the Liddell Coal Operations DA 305-11-01 for the Department's consideration.

The Department has reviewed the plan and is satisfied that it generally addresses the requirements set out in the relevant condition of the development consent. Consequently, I would like to advise you that the Secretary has approved the plan.

This plan is a requirement of the most recent Consent modification and is not replacing an existing plan or strategy. This Strategy comes into force on the 12th May 2015 and remains in force until replaced by any future updated approved Strategy.

Could you please place this Strategy on your website and forward a finalised copy of the above plan (preferably in PDF format with a copy of this approval letter appended) for the Department's records by the end of May 2015.

If you require further information or clarification in this matter please contact Scott Brooks on 6575 3401 or by email to scott.brooks@planning.nsw.gov.au.

Yours sincerely

Scott Brooks
Investigations (Lead) Compliance
11-5-2015
As Nominee for the Secretary, Department of Planning & Environment

Singleton Office: P.O. Box 3145, Suite 14, Level 1, 1 Civic Avenue Singleton NSW 2330
Website: www.planning.nsw.gov.au