



Fortescue
The New Force in Iron Ore

Procedure




Blasting Near Aboriginal Heritage Places

Heritage Department

17 October 2019

100-PR-HE-0003 Rev 9

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Blasting Near Aboriginal Heritage Places			
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1. PURPOSE

This document outlines the procedure and guidelines to manage and protect Aboriginal Heritage Places and land not heritage surveyed (Unsurveyed Land) from impacts resulting from blasting activities. This procedure (the Procedure) ensures that:

- blasting activities comply with heritage legislative obligations by not directly or indirectly impacting upon Aboriginal Heritage Places
- blast risk management strategies are in place to mitigate potential impacts to Aboriginal heritage are developed and delivered
- effective consultation between Fortescue Heritage Department and drill and blast teams occurs
- identify key stakeholders and their roles and responsibilities in relation to this procedure; and
- the Heritage Department is provided with relevant information to confirm all conditions have been met prior to the commencement of blasting.

Project planning teams are required to liaise with the Heritage Department when Heritage Places or Unsurveyed Land fall within blast exclusion zones. This triggers a desktop assessment of the Heritage Places or Unsurveyed Land with the results being provided to drill and Blast Designers to ensure an effective Blast Management Plan(BMP) can be developed and implemented.

2. SCOPE

The Procedure is applicable to all Fortescue employees and contractors working for Fortescue across all Fortescue projects.

3. DEFINITIONS

Table 1: Definition of Terms/Acronyms

Word/Term	Definition
Fortescue	Fortescue Metals Group Limited all subsidiaries and employees.
AHA	Western Australia Aboriginal Heritage Act 1972
Blast Notice	Blast notice stipulating location, time of blast as sent out to relevant site personnel.
Blast Exclusion Zone	The exclusion area within which there is a risk of adverse effects from blasting as stipulated on the applicable blast notice

Word/Term	Definition
Blast Management Plan- BMP	Plan to manage blasting activities to ensure that the blasts are properly designed and that all risks are addressed. A BMP should provide an overview of approach to key risks and management strategies to address those risks when blasting on a specific project area. A Blast Management Plan must be approved by Heritage Department prior to the commencement of any blasting onsite.
Blast Design	Details the control of ground and air vibrations and fly rock risk whilst achieving the required outcomes from the blast (clearing for mining or construction etc...). A Blast Design proposal is provided for each individual blast.
TBA	To be assessed by Heritage department
VS	Vibration sensitive heritage place with a maximum 25mm/sec vibration limit, unless otherwise stipulated
Aboriginal Heritage Site (Site/s)	Includes any Aboriginal site as defined under the Aboriginal Heritage Act (1972)
Mining Manager	Person responsible to represent Fortescue for the management of blast activities – includes Quarry Managers, Rail Managers, Construction Managers, Mining Superintendents, or any other positions delegated by the Fortescue to approve Blast Designs.
Drill & Blast Designer - D&B Designer	Person responsible for developing the Blast Design, and resulting blast at any Fortescue controlled site including but not limited to mining or construction activities (e.g. rail or mine site construction)
Heritage Department	Fortescue's Heritage department
Heritage Professional	Consultant archaeologist or anthropologist or other person with knowledge or experience to provide advice on heritage matters
Unsurveyed Land	Land that has NOT been Heritage surveyed
Section 18 Salvage	Sites removed via a Section 18, Ministerial Consent (Government approval)
SSO	Senior Site Official
Heritage Places	Fortescue Heritage sites that may or may not have been assessed to meet Section 5 of the Aboriginal Heritage Act
PIMS™	Document management system
MM/S	Millimetres per second (Velocity)
PPV	Peak particle velocity (expressed as mm/s)
Vibration Monitor	Geophone (or equivalent device) used to monitor the PPV resulting from a blast

4. LEGISLATIVE CONTEXT

The following legislation provides the broad framework for which this procedure must operate and with which it needs to comply.

Table 2: Legislation

Act / Regulation / Standards
<i>Aboriginal Heritage Act 1972 (s5, s17, s18)</i>

5. RESPONSIBILITIES

5.1 Mining Manager

The Mining Manager is the Fortescue responsible person who ensures this procedure is followed by the Drill and Blast Designer, for every blast where Heritage Places or Unsurveyed Land is located within the blast exclusion zone, and to ensure that blasting activities do not impact Aboriginal heritage.

The Mining Manager must ensure that:

- BMPs are developed ensuring risks of impact to Heritage Places or Unsurveyed Land are adequately addressed
- Blasts are designed in accordance with the BMP and approved prior to the commencement of blast related drilling
- The Blast Design is properly implemented by the Drill and Blast Designer
- Vibration monitoring processes are confirmed, recorded and reported as required; and
- Any blasts that deviate from the Blast Design (i.e. vibration limits are exceeded) are reported to the Heritage department.

5.2 Drill and Blast Designer

The D&B Designer is responsible for designing all aspects of the blast in line with the approved BMP. This includes ensuring the blast parameters chosen are suitable for managing fly rock and minimising the potential for exceeding vibration levels at the heritage place or Unsurveyed Land.

Any Heritage Places that fall within the blast exclusion zone must be visible with polygon and heritage place identification on the blast notice map. In the event Unsurveyed Land falls within the blast exclusion zone the D&B designer is required to contact Heritage Department to discuss managing the risk to the Unsurveyed Land from the blast activities.

5.3 Heritage Department

Fortescue's Heritage Department is responsible for:

- Keeping up to date the Heritage Places that are vibration sensitive in accordance with Table 4: Blast Sensitivity by Heritage Place Type (this data will be made available for every Heritage place through Fortescue's GIS system, via attributes table)
- Provide the relevant heritage place data, including Identification and type to GIS for updating
- Ensuring GIS heritage place data is up to date, including but not limited to, Heritage Places that have been salvaged / achieved, newly identified Heritage Places and newly surveyed land
- Work with D&B Designer and Mine Manager to assess and mitigate risk of impact to Heritage Places or Unsurveyed Land that falls within the blast exclusion zone.

6. ALLOWABLE VIBRATION LEVELS FROM BLASTING

There are a number of Heritage Places that have features that may be sensitive to impact from vibrations that result from blasting. These heritage place types are detailed in Table 4: Blast Sensitivity by Heritage Place Type, and the information is available for all individual Heritage Places via live attribute data on the GIS system. The Heritage Department may also advise of any other Aboriginal places deemed to be structurally and/or culturally sensitive, which may also require Vibration Monitoring.

Unsurveyed Land may require Vibration Monitoring, it will be assessed on a case by case basis by the Heritage department.

Unless otherwise stipulated, all vibration sensitive sites have a maximum allowable limit of 25mm/s at the nearest boundary point of the heritage place to the blast. This 25mm/s limit is based on recommendations of safe vibration levels for Heritage Places with structural features (Orchard Report 2009; 2012).

If the D&B Designer requires an increase in the maximum allowable limit, a re-inspection of the heritage place must be arranged prior with the Heritage Department to determine whether the

25mm/s can be increased. This re-inspection must be undertaken by a person with acknowledged expertise in the assessment of the structural stability of the type of heritage place that requires those maximum allowable vibration levels to be re-assessed.

6.1 Vibration Monitoring

Vibration Monitoring of Heritage Places is required for all blasts where a vibration sensitive heritage place is located within the blast exclusion zone and should be recorded using an approved Vibration Monitoring device (Vibration Monitor). It is the responsibility of the Mining Manager to determine whether Vibration Monitoring is implemented for blasts where vibration sensitive heritage place is outside the blast exclusion zone.

Where the blast exclusion zone intersects Unsurveyed Land there may be a requirement for Vibration Monitoring. This will be determined by the Heritage Department and communicated to relevant stakeholders.

7. PROCEDURE

7.1 Preparation

The Mining Manager must ensure the Drill and Blast Designer has the most up to date information in relation to heritage, including:

- Spatial information; Fortescue Heritage Places, buffers, HRZ's and Fortescue heritage survey area
- Site ID numbers; and
- The Drill and Blast Designer must complete a desktop assessment on vibration sensitive sites in accordance with Table 4: Blast Sensitivity by Heritage Place Type (and via GIS system), or any other information relating to structural stability that may be provided by relevant professionals, and assess if the blast exclusion zone extends into Unsurveyed Land
- If the blast exclusion zone extends into Unsurveyed Land, the Heritage Department must be contacted immediately
- Heritage will conduct a desktop assessment of the Unsurveyed Land. Consultation and agreement between Heritage, the Mine Manager and D&B team will determine the required risk mitigation to be implemented for the protection of the Unsurveyed Land, if any. Risk mitigation measures for the Unsurveyed Land, may include all or part of steps

2, 3, 4 and 5 of this procedure, as determined by the outcome of the desktop assessment.



Note: All Heritage Places are susceptible to impact from fly rock. D&B Designers and the Mining Manager should be aware that impact to a heritage place by fly-rock is considered a heritage incident.

7.2 Development of a Blast Management Plan (BMP)

- D&B Designer to undertake a desktop assessment of any Heritage Places and Unsurveyed Land that fall within the proposed blast exclusion zone and develop a Blast Design that ensures that:
- No Heritage Place or Unsurveyed Land is impacted by fly rock;
 - Vibration Sensitive Sites are noted and monitored; and
 - Consultation with Heritage Department for management of Unsurveyed Land that falls within the blast exclusion zone
 - maximum vibration levels are adhered to
- The Blast Design is to be reviewed and approved by the respective Mining Manager (or approved delegate).

7.3 Monitoring and Execution

- Vibration Monitoring is required for any blasts where any Vibration Sensitive Heritage Place and or any at risk Unsurveyed Land that falls within the Blast Exclusion Zone.
- The D&B Designer must provide a summary of predicted vibration levels to the Mining Manager prior to the blast for all vibration Sensitive Sites and at risk Unsurveyed Land within the Blast Exclusion Zone.
- The location of Vibration Monitors must be approved by the Mining Manager to ensure:
 - The nearest boundary point of a Vibration Sensitive Site records an “actual” reading; and
 - Reasonable positioning of additional Vibration Monitors are located to allow for desktop calculations of other Vibration Sensitive Sites in the Blast Exclusion Zone.
- Every effort must be made to ensure that PPV readings provide accurate results of vibration levels from the blast.



- Included as part of the Blast Notice map, it shows the site polygons and Site_ID, of the Heritage Places fall within the Blast Exclusion Zone.
- Blasting can proceed whilst strictly adhering to the above mentioned BMP and Blast Design.

7.4 Reporting and Review

- Following each blast, a blast report is to be provided to the Mining Manager.
- The outcome of a blast will be assessed in terms of fly rock and Vibration Monitoring reports.
- The Mining Manager identifies any significant issues or significant deviations from the original BMP.
- If a site has been impacted or there was any significant deviation from the approved Blast Design, then:
 - The Mining Manager must advise, and provide the blast report to Fortescue Heritage and the SSO;
 - Fortescue Heritage will undertake a post-blast inspection of the Site and provide a report to the Mining Manager;
 - Incident to be logged onto BMS; and
 - Incident will be investigated and reported in accordance to the *Procedure for the Investigation and Reporting of Heritage Incidents* (100-PR-HE-0020).

Note: A significant deviation (in relation to vibration only) is not considered if the predicted and actual vibration does not exceed the 25mm/sec threshold. The above steps are not required if vibration is below the 25mm/sec threshold.

7.5 Deviation

There will be no deviation from this procedure without written approval from Fortescue Heritage management. Approval will not be given until there is a plan in place to ensure the full and proper management of Heritage Places during blasting.

7.6 Record Keeping

- D&B Designer must keep accurate records of each blast including but not limited to:

- Proposed Blast Design versus actual Blast Design;
 - Predicted PPV versus actual PPV at Sites and Unsurveyed Land (as required) within the Blast Exclusion Zone; and
 - Fly rock assessment results
- These records must be made available to the Heritage Department for auditing purposes.

8. MONITORING AND REVIEW

Table 3: Programmes and Schedules

Monitor (Audit) and Review	Frequency	Responsibility
Monitoring (audits) of blasts areas	As required	Heritage Department
Review of Procedure	Annual	Heritage Department

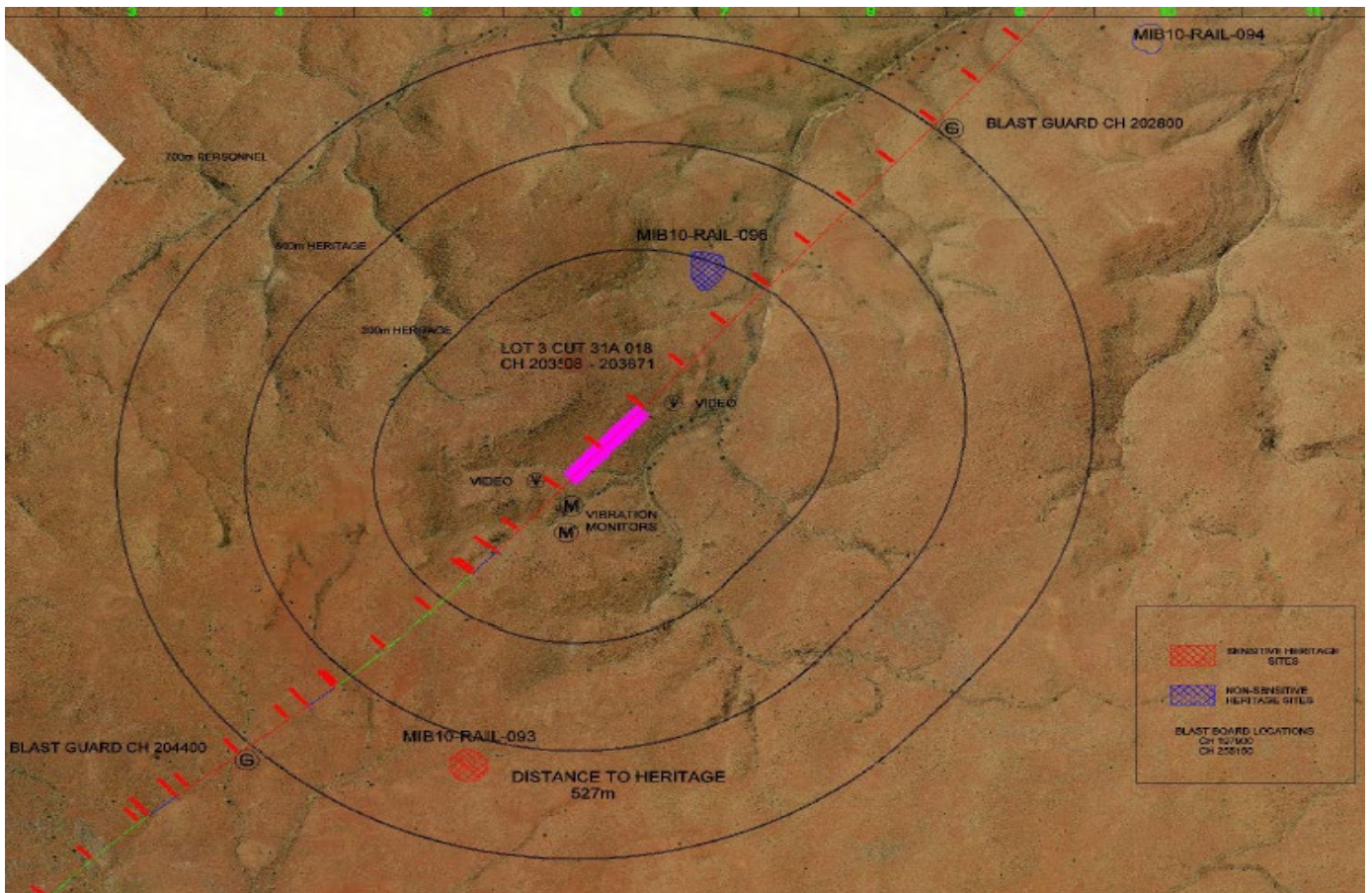
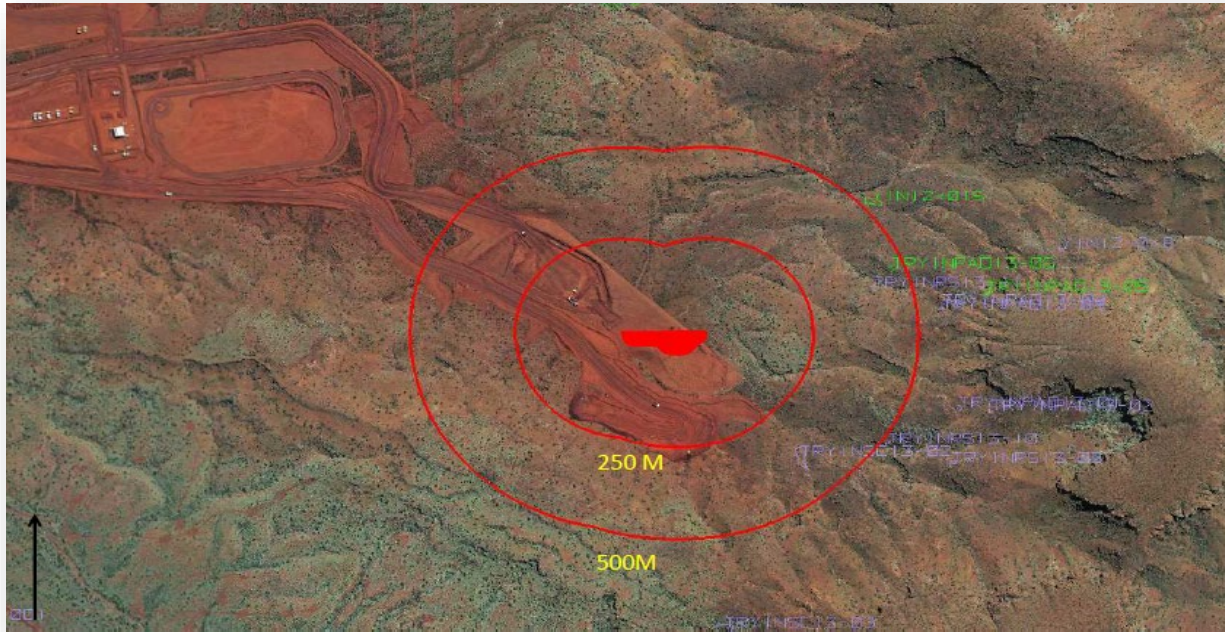
9. DOCUMENTATION AND RECORDS MANAGEMENT

This procedure and all supporting work instructions, guidelines and forms shall be maintained as controlled documents, in Fortescue’s Document Management System (PIMS) and in accordance with Fortescue Document Control procedure (100-PR-DC-0002).

The Heritage Department shall maintain all records related to this procedure and any confidential records shall be securely filed to protect them from unauthorised access.

Records shall be retained and archived in accordance with the Fortescue Records Retention Manual (100-MA-DC-0001).

Attachment 1: Example of Blast Notice Map



Note: Ensure Heritage sites within the blast exclusion zone are visible and labelled

Table 4: Blast Sensitivity by Site Type

Abbreviation	Site Type	Blast sensitivity reference
AS	Artefact Scatter	None
B	Burial	VSS
C	Cache	VSS
CS	Camp Site	VSS
EN	Engraving	VSS
ET	Ethnographic Site	TBA
GH	Gnamma Hole/Rock Hole	None
GP	Grinding Patch	None
GS	Grinding Stone/Mill Stone/Muller	None
H	Historical	TBA
NN	Nulla-Nulla	None
MM	Man Made /Wooden Structure	VSS
MY	Mythological Site	TBA
OQ	Ochre Quarry	VSS
PSR	Possible Skeletal Remains	VSS
PAD	Potential Archaeological Deposit	VSS
Q	Quarry	VSS
RA	Reduction Area/ Knapping Site/Area	None
RP	Rock Painting	VSS
RS	Rock Shelter	VSS
SA	Stone Arrangement/Structure/Cairn/ Standing Stone	VSS
SM	Shell Midden	None
ST	Scarred Tree/Culturally Modified Tree	None
WN	Walled Niche	VSS
WS	Water Source	None

Table 5: Blast Sensitivity definitions:

TBA	To Be Assessed by Heritage Department
VSS	Vibration Sensitive Site with a maximum 25mm/sec vibration limit, unless otherwise stipulated
None	No specific vibration limits. Mining Manager responsible to ensure Site is not impacted in any way