Wandoan Coal Project Addendum to the Technical Report Environmental Impacts from Blasting

August, 2009

Wandoan Joint Venture

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Glossary

Airblast	Airblast is the pressure wave (sound) produced by a blast and transmitted through the atmosphere.
ANFO	Ammonium Nitrate and Fuel oil — a common bulk explosive used in mining.
Aquifer	Permeable strata in which water may be stored.
Bedding plane	The boundary between contiguous layers of different sedimentary strata.
bcm	Bank cubic metre
Bench	A level or slightly inclined working area within an open pit mine.
Blast Management Plan	Standard operating procedures prepared by mine management to govern the planning and implementation of blasting operations.
Burden	The shortest distance between an explosive charge in a blast hole and point of relief or minimum confinement.
Cast blasting	A style of blast designed to preferentially displace overburden or mid-burden into a previously mined area of the pit.
Charge	A quantity of explosive placed in a blast hole.
dB(linear) Peak	The peak sound pressure level represented on a standard logarithmic scale that is not weighted to favour audible frequencies.
Detonating cord	A thin string of high explosive used to initiate some explosive charges in mine blasting.
Detonation	The rapid oxidation reaction between the ingredients of an explosive to generate stresses and high pressure gases to fracture and displace in-situ rock to form a muckpile.
Diluted ANFO	ANFO diluted with low density organic material to reduce its density.
Dip	The angle that strata lies relative to the horizontal.
Dozer	A track or rubber tyred machine with a blade designed to push broken rock and soil.
Dragline	An machine with a bucket suspended beneath a long boom capable of excavating blasted material from above a coal seam and swinging around to place it in an area of the pit from which the coal has been removed.
EPA	Environmental Protection Agency – former government agency, now part of the Department of Environment and Resource Management (DERM)
Excavator	A track mounted machine with a bucket on a hydraulic boom capable of excavating loose rock and soil and loading it into trucks.
Exclusion zone	A zone required to be evacuated of equipment of personnel prior to a near-by

	blast being fired.
Fault	A natural fracture in the ground at which some relative displacement has occurred.
Face	The vertical or sloping side of a bench.
Fly rock	Rock fragments thrown into the air by a blast.
Free face	A bench face that is free of broken material and available to act as a plane of relief for an explosive charge.
Front End Loader	A rubber tyred machine with a bucket mounted at the front capable of excavating loose rock and soil and loading it into trucks.
Highwall	The long bench face of intact overburden or mid-burden that defines the edge of the next strip.
In-situ	Undisturbed rock.
Interburden	Rock found between major coal horizons in an open pit coal mine.
Intrusion	The solidified remnants of an igneous flow of rock into sedimentary strata.
Joint	A natural fracture in rock across which no relative displacement has occurred.
Kg	kilogram
m	metre
Massive	In-situ rock which has little natural structure.
MIC	Maximum instantaneous charge which is usually taken to be that mass of explosive expected to detonate in any 8 ms time window.
Mid-burden	Non-coal strata between major coal horizons.
MPa	Mega Pascal —usually used to quantify the unconfined compressive strength of rock and equivalent to one million newtons of force per square metre.
MLA	Mining Lease Application
mm/s	Millimetres per second.
Ms	Millisecond — one thousandth of a second.
Muck	Rock and soil blasted prior to excavation.
Noise Sensitive Place	Places defined in EPA Guideline on noise and vibration from blasting including dwellings, places of business and leisure.
Overburden	Rock and soil overlying a coal seam.
Parting	A thin layer of non-coal material lying between two coal layers.
Pit	A surface excavation involving the removal of overburden and interburden to expose and mine coal.

Powder Factor	The ratio of the number of kilograms of explosive used to blast a given volume of rock expressed as kilograms per bank cubic metre.
Pre-split	A style of blast designed to create a plane of fracture on the alignment of a new bench face.
PPV	Peak Particle Velocity — the peak velocity of the ground movement as measured from the instantaneous vector sum of velocities measured by geophones in three orthogonal directions.
Ripping	The process of fracturing rock by dragging a metal tool through intact strata using a bulldozer.
ROM	Run of Mine — in the form as excavated and transported from the mine prior to any treatment of processing.
Shot	A blast designed to fragment and loosen rock in a mine.
Stemming	Inert granular material used to confine explosion gases immediately following the detonation of a blast hole.
Strip	A long mining zone within a pit allocated to a single production process.
Structure	Any fault, joint or discontinuity in a rock mass.
Superposition	The process of adding vibration waveforms from different sources to estimate the overall impact.
t	tonne
tpa	Tonne per annum.
UCS	The unconfined compressive strength of a rock measured in a laboratory according to standard testing procedures.
Waveform	The time history of ground vibration velocity as measured by a geophone.

Executive summary

The Wandoan Coal Project will develop a major open cut coal mine to the west of the township of Wandoan in the Western Downs Regional Council local government area. Approximately 30 Mt per year of run of mine coal will be mined and processed in an operation with a scheduled life of 30 years. A number of coal seams will be mined after the removal of the overlying overburden and interburden materials. Blasting will be required to fragment and loosen the overburdens and interburdens. The EIS technical report TR 16-1-V1.5 evaluated the environmental impact of the proposed blasting operations on the township of Wandoan and neighbouring areas. This Addendum to that report describes changes that have been made to the Project plans since the original report was prepared, and the effect that these changes will have on the environmental impact of blasting operations on the township of Wandoan and neighbouring areas.

Modifications to the proposed mine plan since the preparation of the technical report in October, 2008 involve the further design of the Austinvale North Pit, the adoption of a 2 km zone around the township of Wandoan, the addition of Wubagul Pit on the south-east corner of MLA 50230 and the deferral of mining in the Woleebee South Pit. These changes also include further storage facilities for the tailings from the coal handling and preparation plant. The coal extraction deferred by these changes will be replaced by mining the new Wubugal Pit further away from the town.

The environmental impact of blasting operations in the areas where the mine plan has changed have been evaluated, and progress with mitigation measures in other affected areas have been reviewed. Blasting operations in the north-west corner of the revised Austinvale North Pit will impose ground vibration and airblast levels on the near-by Project accommodation facilities that exceed the EPA Guideline recommendations of 5 mm/s ground vibration velocity and 115 dBl airblast overpressure. The resulting levels will be below those required to cause physical damage. Scheduling blasts in the critical area of the pit for times when occupants of the accommodation facilities are not resting and advising them in advance of the blasting times should avoid any unreasonable disturbance.

The 2 km zone around the township of Wandoan results in a significant reduction in impacts on the town from blasting operations. A house (sensitive receptor MLA-520) on the eastern side of the Leichhardt Highway north of Wandoan may experience airblast overpressure levels up to 116 dBl from a small number of blasts in the northern half of the remaining Frank Creek Pit. The WJV commits to undertaking negotiations with the owners of this property with regard to the management of these impacts.

No sensitive receptors are expected to experience ground vibration or airblast effects from blasting operations in the Wubagul Pit that exceed the EPA Guideline levels. The deferral of the Woleebee South Pit eliminates potential impacts on properties south of that area. A number of properties have been purchased by the WJV and/or under negotiations to purchase with the owners of remaining properties potentially impacted by blasting operations in the western half of the Project area.

1. Introduction

1.1 Project background

Building on the Project background provided in the EIS Volume 1, Chapter 16 Vibration technical report TR 16-1-V1.5, this Addendum describes the changes to the Project, and considers various submissions on the EIS relevant to vibration and blasting related issues.

1.2 Description of study area

Refer to the EIS technical report TR 16-1-V1.5.

2. Methodology of assessment

2.1 Relevant legislation and guidelines

Refer to the EIS technical report TR 16-1-V1.5.

2.2 How the study was conducted and information obtained

Refer to the EIS technical report TR 16-1-V1.5.

2.3 Limitations

Refer to the EIS technical report TR 16-1-V1.5.

3. Existing environment

3.1 Current level of disturbance

Refer to the EIS technical report TR 16-1-V1.5.

3.2 Ground conditions

Refer to the EIS technical report TR 16-1-V1.5.

3.3 Sensitive receptors

Further to the information in the EIS technical report TR 16-1-V1.5 regarding sensitive receptors, the Wandoan Joint Venture has purchased or is undertaking negotiations with landholders to purchase a number of properties. This includes the abattoir, described as sensitive receptors MLA-740 and MLA-741 which has now been purchased by the WJV.

Other houses and farm buildings have also been purchased by the WJV, with any changes in potential impacts and mitigation measures discussed in the following sections.

4. Description of proposed development

4.1 Mining areas

4.1.1 Pits

There have been some modifications to the proposed mine plan since the preparation of the technical report in October 2008. Significant changes involve the detailed design of the Austinvale North Pit, the adoption of a 2 km exclusion zone from the township of Wandoan, the addition of Wubagul Pit on the south-east corner of MLA 50230 and the deferral of mining in the Woleebee South Pit. Figure 4-1 shows the modified pit areas in the south east part of the Project (MLA 50230 and MLA 50231) where these changes have taken place. The following sections describe the changes to the proposed mining operations.

Austinvale North Pit

The Austinvale North Pit is designed to extract a shallow coal reserve that lies to the north of the rail spur near the mine infrastructure area (MIA). The intention is to mine this area as part of the initial mine development and to utilise the resulting void as the fine rejects (tailings) disposal storage area from the coal processing plant (CPP).

A dragline will excavate the periphery of the pit and place the overburden to form the outer walls of the tailings storage area, leaving the overburden in the centre of the resource to be removed by excavators and trucks to complete the construction of the tailings storage facility. Overburden thickness varies from 10 to 15 m on the northern boundary, increasing to 17 m to 28 m on the southern boundary. These modest overburden thicknesses will largely comprise weathered material, much of which may be able to be excavated without blasting or require minimal explosive energy to generate sufficient looseness for efficient excavation.

The Project accommodation facilities will occupy an area approximately 800 m by 400 m and at its closest point lies 500 m to the north of the western end of the Austinvale North Pit. Blasts with therefore be required at distances that range from 500 m to more than 2,000 m from the nearest boundary of the accommodation facilities.

Frank Creek Pit

A 2 km zone has been defined around the Wandoan township as shown on Figure 4.1. Mining will not take place within this zone during the early years of the Project and the potential for future mining within this zone will be dependent upon the results of on-going monitoring and community consultation. The areas of the pit that lie outside this zone will be mined using excavators and trucks with the northern area mined in Years 3 to 5 and the southern area mined in Years 6 to 10 of the Project.

Mud Creek
Austinvale North Pit & Dump
Leichhardt
Austinvale
Woleebee North
Frank Creek West
MLA 50231
Woleebee Creek
Woleebee
Frank Creek
Woleebee South
Glen Haven
Wubagul
MLA 50230
GROSMONT ROAD
L ROAD
Q ROAD
NATHAN ROAD
BUNDI ROAD
JACKSON WANDOAN ROAD
WOLEEBEE CREEK
ROAD
PARADISE DOWNS ROAD
PEAKES ROAD
LAWTON STREET
GULUGUBA DOWNFALL CREEK ROAD
JUANDAH CREEK
LEICHHARDT HIGHWAY

Legend

- Town
- Cemetery
- Mine access road
- Road deviations
- Rail Spur
- SBR Rail
- Major creek
- Major road
- Secondary road
- Minor road
- Proposed Gas Supply Pipeline
- MIA
- Power Station
- Accomodation Facilities
- Mining Pit
- Future Mining Area
- Potential Mining Areas
- Proposed revised MLA boundary
- Cadastre
- Mining Lease Application Boundary

Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006)

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0 1 2 3 4 5
Kilometres

Figure 4-1
Revised Pit layouts within
MLA 50230 and MLA 50231

Wubagul Pit

An additional pit, Wubagul, has been defined in the south-east corner of MLA 50230. Operations in the Wubagul Pit are scheduled to take place in Years 3 to 5 of the Project after which the pit will become dormant for some time. Operations will then resume in Years 25 to 30 of the Project schedule.

Mining will begin with a dragline box cut parallel to the Leichhardt Highway on the eastern side of the pit and progress in a series of strips towards the south west. The depth of the box cut will range from 20 to 25 m. Similar depths will be experienced on the northern and southern ends of the pit during the early years of mining. The depth of cover in the centre of the strips will increase to 30 m by Year 5 of the Project and interburden thicknesses of this order will develop on the southern side of the pit. Overburden thicknesses vary between 30 m and 53 m in the later strips which will be mined in the final years of the Project.

4.1.2 Production schedule

Changes to the production schedule associated with the changes to pit designs are discussed in the above.

4.2 Mining method

Refer to the EIS technical report TR 16-1-V1.5.

4.3 Blasting operations

Refer to the EIS technical report TR 16-1-V1.5.

5. Potential impacts

Further to the potential impacts described in the EIS technical report TR 16-1-V1.5, the following outlines the potential impacts resulting from the changes to the Project scope relevant to blasting and vibration.

5.1 Environmental impacts from blasting

5.1.1 Impacts

Refer to the EIS technical report TR 16-1-V1.5.

5.1.2 Fly-rock

Refer to the EIS technical report TR 16-1-V1.5.

5.1.3 Ground vibration

Refer to the EIS technical report TR 16-1-V1.5.

5.1.4 Airblast overpressure

Refer to the EIS technical report TR 16-1-V1.5.

5.1.5 Impacts from blasting operations

Summary of analyses

There are some areas where the impacts from blasting are predicted to exceed the recommendations of the EPA Guideline on noise and vibration from blasting. These are discussed in the following sections.

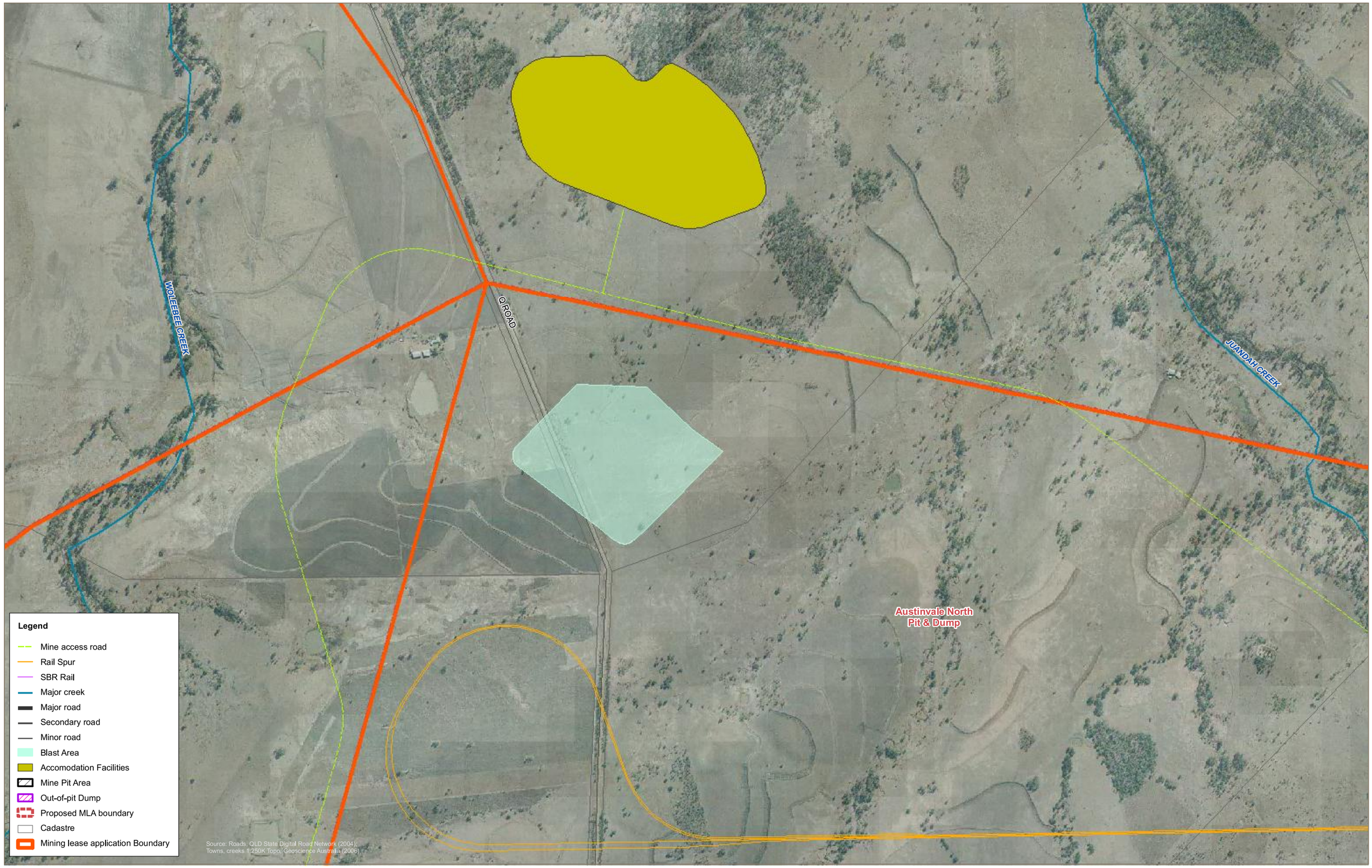
Accommodation Facilities

Analyses indicate that blasting operations in the north western end of the Austinvale North Pit may impose ground vibration levels up to 8 mm/s at the nearest boundary of the accommodation facilities. Airblast levels up 124 dBl may also be experienced. These levels drop to 4.6 mm/s and 120 dBl in the centre of the accommodation facilities area. It should be noted that these figures represent the 90th percentile of the range of vibration and airblast levels likely to be experienced, with the majority of blasts expected to generate lower values.

The levels predicted for the southern boundary of the accommodation facilities area exceed the EPA guideline limits of 5 mm/s and 115 dBl respectively, but are well below the levels required to cause physical damage. The blast effects may be noticed as a mild vibration from either the ground vibration directly or the airblast interacting with accommodation facility structures.

The blast locations where environmental impacts at the accommodation facilities may exceed the guideline limits are shown within the blue area on Figure 5.1. This area will be mined very early in the Project life. Operations in this area should be completed in a matter

of months and may involve a significant amount of free digging supplemented by a small number of individual blasts.



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0 250 500 750 1,000 1,250
Metres

Figure 5.1
Area of Austinvale North Pit where blasts may affect the Accommodation Facilities

Frank Creek Pit

Analyses indicate that sensitive receptor MLA-520, a house on the eastern side of the highway just to the north of Wandoan, will experience ground vibration levels up to 2.2 mm/s and airblast overpressures up to 116 dBl as a result of blasting operations in the northern part of the modified Frank Creek Pit. Predictions for other potential sensitive receptors previously identified in this area indicate ground vibration and airblast levels below the EPA Guideline recommended limits.

Wubagul Pit

Table 5-1 shows the maximum ground vibration and airblast levels predicted for sites previously identified as being sensitive in this area. MLA-570 is clearly going to be disturbed by the blasting operations, but this has been purchased by the WJV and these impacts will be managed by them. MLA-427 may suffer some airblast events above 115 dBl, but this property has also been purchased by the WJV. No other potential sensitive receptors have been identified that will be impacted by ground vibration or airblast levels greater than the EPA Guideline limits.

Table 5-1: Predicted maximum vibration impacts around the Wubagul Pit

Site	Minimum distance m	Ground vibration mm/s	Airblast dBl
MLA 427	900	4.8	120
MLA 570	300	28.0	134
MLA 640	1,400	2.4	114
MLA 503	4,000	0.5	103
MLA 579	1,850	1.8	113
MLA 494	2,400	1.2	110
MLA 484	5,000	1.0	105

Leichhardt Highway

The eastern boundary of the Wubagul Pit has been set 500 m from the Leichhardt Highway. This means that the fly-rock exclusion zone required for blasts in the box cut and the first mining strip, at a distance between 500 m and 600 m from the highway, will extend beyond the highway.

Telstra communications tower

The environmental impacts on the Telstra communications tower from blasts in the revised Frank Creek Pit operations will be below the EPA Guideline recommended limits. The potential impacts on the tower of any future mining operation within the 2 km zone around Wandoan will need to be considered prior to the area being mined.

Abattoir

The abattoir has been purchased by the WJV.

Wandoan Cemetery

Refer to the EIS technical report TR 16-1-V1.5.

Houses and farm infrastructure

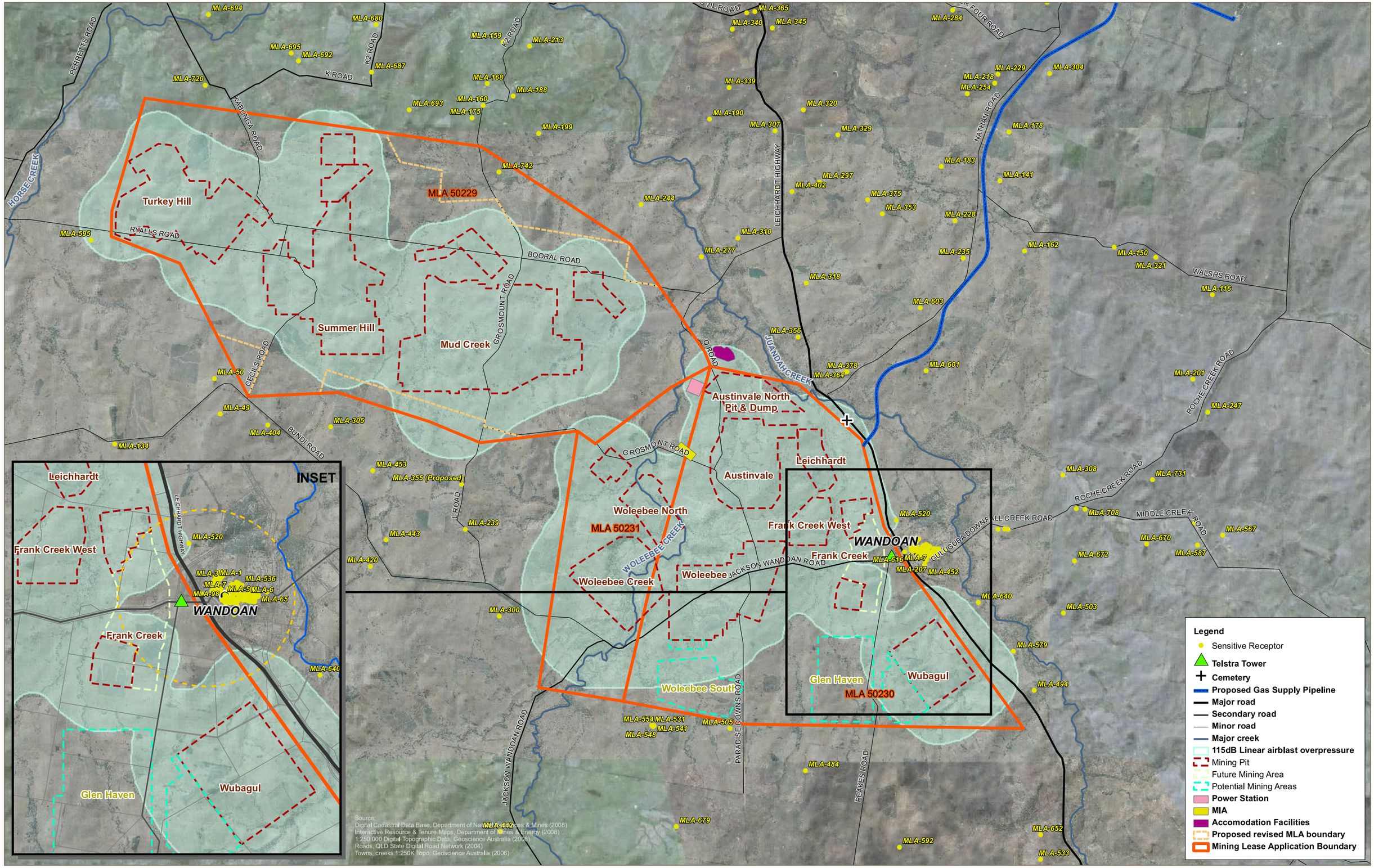
Figure 5-2 identifies a number of houses and farm facilities lying outside the MLA areas that may experience airblast overpressures greater than 115 dB(linear). These were summarised on Table 5–3 of EIS technical report TR 16-1-V1.5. Table 5-2 below updates this table as a result of the changes made to the mine plan.

Table 5-2: Summary of affected properties

Receptor number	Receptor type	Location	Years affected
MLA-374 and MLA-367	A house and shed complex	Approx 1,000 m north of the Austinvale North Pit	No longer a sensitive receptor
MLA-520	A house	East of the Leichhardt Highway north of Wandoan	Years 3 to 5
MLA-595 and MLA-596	A house and shed complex	Approx 900 m south west of the Turkey Hill Pit	Years 9 and 10
MLA-355 (current)	A house	Approx 1,500 m south of the Mud Creek Pit	No longer a sensitive receptor, as MLA-355 being moved to new location, shown as MLA-355 (proposed)
MLA-361	A house	Approx 2,000 m south of the Mud Creek Pit	Years 26 to 30
MLA-309, MLA-298, MLA-301 and MLA-303	A house and three shed complex	Approx 1,500 m west of the Woleebee Creek Pit	No longer a sensitive receptor
MLA-552 and MLA-551	A house and shed complex	Approx 1,900 m south west of the Woleebee Creek Pit	No longer a sensitive receptor
MLA 531, MLA 541, MLA 548 and MLA 554	Four sheds (feedlot)	Approx 900 m south west of the Woleebee South Pit	No longer affected
MLA 505 and MLA 578	A house and shed complex	Approx 500 m south east of the Woleebee South Pit	No longer affected

Mine Infrastructure Area, powerlines, pipelines, railway and bores

Refer to the EIS technical report TR 16-1-V1.5.



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0 2 4 6 8 10
Kilometres

Figure 5.2
Location of 115dB (linear) airblast overpressure after mitigation

6. Mitigation measures

Further to the mitigation measures described in the EIS technical report TR 16-1-V1.5, the following outlines the mitigation measures resulting from the changes to the Project scope relevant for blasting and vibration.

6.1 Fly rock

Parts of the accommodation facilities and other site infrastructure will fall within the exclusion zone required to protect personnel from the effects of fly-rock for some blasts early in the Project. Procedures will be required to evacuate these areas during blasting operations.

The current mine plans include dragline strips in the northern half of the Frank Creek Pit approaching within 600 m of the Leichhardt Highway. The Wubagul Pit box cut is also located within 600 m of the Highway. The recommended exclusion zone for persons around these blasts is 600 m and so it will be necessary to:

- re-define the eastern boundary of these pits to be 600 m from the highway; or
- free-dig the material within 600 m of the highway so that blasts are not required; or
- establish a procedure for temporarily closing the highway in consultation with the Department of Transport and Main Roads (formerly the Department of Main Roads) and Westerns Down Regional Council while the exclusion zone for blasts extends beyond the highway.

6.2 Ground vibration

Refer to the EIS technical report TR 16-1-V1.5.

6.3 Airblast overpressure

6.3.1 Accommodation Facilities

The impact of blasting operations on the accommodation facilities will be well below the levels required to cause physical damage. It is recommended that:

- personnel in the area be informed about blasting times so that the resulting disturbance is not a surprise
- blasts are scheduled for times when people are not sleeping or resting, but engaged on routine activities; for instance, 8 am or 4 pm might be suitable times for blasts.

6.3.2 Township of Wandoan

The township of Wandoan should not experience ground vibration or airblast levels above the EPA Guideline recommendations as a result of blasting operations outside the 2 km zone defined around the town. The impact of any operations undertaken within this zone will need to be assessed before mining should be undertaken in this area, based on monitored performance during mining operations.

6.3.3 Wandoan Cemetery

Volume 1, Chapter 16 Vibration, sections 16.5.2 and 16.6.2 stated various mitigation measures, including that:

- blasting will be scheduled not to interfere with the operations of funeral services, with the WJV liaising with the Cemetery manager and other relevant parties for all funeral services conducted, and
- the WJV will liaise with the managers of the Cemetery and seek community feedback via the Community Reference Group to manage the nuisance impact of blasts to those visiting the cemetery at times other than funeral services.

6.3.4 Telstra communications tower

The Telstra communications tower will not experience ground vibration or airblast levels above the EPA Guideline recommendations as a result of blasting operations outside the 2 km zone defined around the town. The impact of any operations undertaken within this zone will need to be assessed before mining should be undertaken in this area, based on monitored performance during mining operations.

6.3.5 Abattoir

The Abattoir has been purchased by the WJV.

6.3.6 Farm houses and farm structures

The number of sensitive receptors affected by blasting operations has been reduced as a result of the changes to the mine plan, and properties being purchased or under negotiation to purchase by the WJV. Measures for the remaining affected sensitive receptors are:

- negotiations to purchase the property on which sensitive receptors MLA-367 and MLA-374 are located are being undertaken by WJV. Sensitive receptors will be unlikely to experience airblast overpressure greater than 115 dBl
- negotiations will take place with the owners of a house (MLA-520) east of the Leichhardt Highway, north of Wandoan regarding the potential for modest airblast effects during the development of the northern half of the Frank Creek Pit. The sensitive receptor may experience up to 116 dBl during Years 3 to 5 of the Project for one blast in ten, which is within EPA Guideline (2006) limits
- potential impacts on the house (MLA-595) and shed (MLA-596) approximately 900 m south west of the Turkey Hill Pit will likely be managed by acquisition or negotiation prior to mining approaching the property in Year 9 of the Project. If not acquired, the sensitive receptors may experience up to 120 dBl during Years 9 and 10 of the Project for one blast in ten, which is within EPA Guideline (2006) limits
- the house (MLA-355 existing) is 1,500 m south of Mud Creek Pit, and the WJV is negotiating the relocation of this sensitive receptor, denoted as MLA-355 (proposed)
- the house (MLA-361) is 2,000 m south of the Mud Creek Pit will likely be managed by acquisition or negotiation prior to mining approaching the property in Years 26 to 30 of the Project. If not acquired, the sensitive receptors may experience up to 117 dBl during

Years 26 to 30 of the Project for one blast in ten, which is within EPA Guideline (2006) limits.

6.3.7 Mine Infrastructure, powerlines, pipelines, railway and bores

Refer to the EIS technical report TR 16-1-V1.5.

6.4 General operating procedures and monitoring

Refer to the EIS technical report TR 16-1-V1.5.

7. Residual impacts

The mitigating measures described in Section 6 will manage the fly-rock hazard at the accommodation facilities, the Leichhardt Highway adjacent to the Frank Creek Pit and Wubagul Pit. The ground vibration and airblast impacts on the accommodation facilities should be acceptable to the occupants if the procedures recommended in Section 6 are implemented.

Negotiations have commenced or are planned with the owners of residences potentially affected by the Project's blasting operations and are expected to result in satisfactory arrangements being implemented.

8. Conclusions

The following conclusions relate to the changes to the mining areas proposed for the Wandoan Coal Project and should be read in conjunction with the conclusions presented in the EIS technical report TR 16-1-V1.5.

Fly-rock hazards in the southern part of the accommodation facilities and on the Leichhardt Highway adjacent to the remaining sections of the Frank Creek Pit and the Wubagul Pit can be managed by free-digging those pit areas within 600 m of the affected areas or temporarily evacuating these areas during blasting operations.

Operations outside the 2 km zone defined around the Wandoan township will not impose environmental disturbance on the township or adjacent sensitive sites above the EPA Guideline recommended levels. MLA-520, a house on the eastern side of the Highway to the north of the town may experience airblast levels at the upper end of the recommended range.

Two previous sensitive receptors adjacent to the Wubagul Pit will experience ground vibration or airblast limits above the EPA Guideline recommendations, but these have been purchased by the WJV. Negotiations have commenced or are planned with the owners of other affected sites.

9. Summary of mitigation strategies

Recommended mitigation strategies to manage the potential impacts of the revised Project caused by blasting operations, as previously detailed in this assessment, are summarised below:

- mining areas within 600 of the accommodation facilities or the Leichhardt Highway should be excavated without blasting or procedures implemented to evacuate the affected areas during blasting operations
- operations in the north eastern corner of the Leichhardt Pit need to be managed using local monitoring data to ensure that blasting impacts do not exceed the EPA Guidelines at the cemetery
- consult with the owners of four farm houses and associated buildings potentially affected by excessive airblast levels from near-by blasting with a view to reaching agreement on appropriate mitigation arrangements prior to them being affected by the operations
- operations will need to be engineered and implemented to a high standard and routinely monitored so that local site based design rules can be used to guide the design and implementation of blasting operations near sensitive receptors.

10. References

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