



Planning

**MAJOR PROJECT ASSESSMENT:
Rasp Project
(MP 07_0018)**



Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979
January 2011

Cover photograph: Rasp mine (source: CBH Resources Limited,
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EXECUTIVE SUMMARY

Broken Hill Operations Pty Ltd (the Proponent) proposes to develop the Rasp Project, an expansion of the existing Rasp Zinc-Lead-Silver Mine in Broken Hill. The project involves the extraction of up to 8.45 million tonnes of ore over the 15-year life of the proposal, at an average rate of 750,000 tonnes per annum. The project also involves processing ore on-site to produce lead/silver and zinc concentrates, for transport off-site by rail to domestic smelter and port customers (for international export).

A significant mineral resource underlies the project site, despite having been mined almost continuously since the 1880's. Extraction and processing the remaining zinc-lead-silver resource is expected to provide significant economic and employment benefits for Broken Hill, the State and the nation. The Proponent estimates that the project would involve a capital investment of approximately \$110 million, and would employ 107 people during construction and 143 people during operation.

The proposal exceeds the thresholds in *State Environmental Planning Policy (Major Development) 2005* applicable to mining developments and is therefore declared to be a project under Part 3A of the *Environmental Planning and Assessment Act 1979*. The Minister for Planning is the approval authority for the project.

The Department received 14 submissions (six from public authorities and eight from the public) in response to the public exhibition of the project. A further eight submissions (from the same parties who made submissions on the original Environmental Assessment) were received in response to the Preferred Project Report. The majority of public submissions supported the project, based on the expected positive economic and employment effects of the project. Key issues raised in the two objection submissions principally focused on air quality and dust generation, human health impacts (associated with lead emissions) and contamination of surrounding land (as a result of historical mining operations, and in connection with additional emissions from the project).

The two most significant issues associated with the project – dust impacts and human health impacts (from lead uptake) – are closely related as the primary mechanism for the transfer of lead from the project site to surrounding properties is through the emission and deposition of lead-containing dust. The Proponent's air quality assessment has demonstrated that ambient air quality criteria and deposited dust criteria can be met by the project, subject to the implementation of a comprehensive suite of dust minimisation measures on the site. These measures include application of dust suppressants to non-developed parts of the site, management of upset operations in the tailings storage facility, enclosure and effective ventilation management of ore crushing areas and sealing haulage roads on the site. The Department is satisfied that these measures would be effective in reducing potential dust impacts to acceptable levels, but notes however that particular vigilance would be required on the Proponent's part to ensure that these acceptable outcomes continue to be met. As such, extensive conditions of approval have been recommended that require implementation of dust mitigation measures committed to by the Proponent, as well as establishment of a comprehensive, continuous air quality monitoring network, and dust management measures that focus on both proactive and reactive management.

Soil lead levels and human uptake, particularly in children, is recognised as an historical and on-going issue in the Broken Hill area. The human health risk assessment highlights this issue, demonstrating that across all age groups, background lead levels account for at least 96% of cumulative lead intakes (including background lead and contributions from the project). Notwithstanding, the worst-case impact predicted by the risk assessment equates to 60% tolerable daily intake for infants aged 0.5 to three years. The estimated lead contribution from the project contributes 4% of this intake.

The project is expected to increase child blood levels by no more than 0.75 µg/dL (one to two years old at the most-affected receiver location), which is less than 10% of the maximum blood lead concentration recommended by the National Health and Medical Research Council (10 µg/dL). This contribution is not considered significant when compared with the most recent blood level monitoring which indicates a geometric mean blood lead concentration in local children of 5.6 µg/dL. However, a significant standard deviation in this data (6.0 µg/dL) indicates that elevated blood lead levels are likely to be a significant issue in the Broken Hill area regardless of whether the project proceeds, and is attributable to background environmental lead levels.

The Department accepts that it is not the responsibility of the Proponent to address and resolve background environmental lead levels, particularly given that the project is expected to contribute low levels of lead to the environment compared with existing background intakes. Notwithstanding, the Department does consider that the Proponent, as an emitter of lead in the area, should bear some responsibility for working with public authorities such as the Greater Western Area Health Service and Broken Hill City Council to address background lead intakes, particularly in the context of managing cumulative health impacts. Until such time as background lead sources are removed from properties across Broken Hill (through future remediation proposals, if remediation is identified as a reasonable and feasible option), then disrupting the exposure pathways between background environmental lead and sensitive receivers would remain a key focus. To this end, the Department has recommended that the Proponent be required to cooperatively develop a Lead Awareness and Impact Management Strategy with Council and the Greater Western Area Health Service, aimed at disseminating information about lead health and hygiene issues, and educating local receivers about measures that can be implemented to minimise lead exposure. A coordinated approach, including shared responsibilities and resources, would be fundamental in maximising the benefits of such an information and education campaign, and in minimising the contribution of background lead intakes to cumulative lead health risks.

As part of open and transparent communication of lead risks, and to verify predicted impacts from the project, the Department has also recommended that the Proponent update the human health risk assessment for the project on a periodic basis and make it publicly available. The first update would be required within 12 months of the commencement of operation, and would be based on real-time monitoring data collected in accordance with the requirements of the conditions of approval.

The issue of dust generation, and associated lead emissions from the site, has the potential to generate impacts following completion of mining and closure of the site if appropriate rehabilitation is not undertaken. The Proponent has argued that active management of dust generation from 'free areas' on the site will result in a reduced impact during development on the site compared with current dust emissions (without the project or its associated dust mitigation measures). The Department is concerned to ensure that the site is not returned to this stage at the conclusion of the project, and that appropriate measures are implemented to ensure that the rehabilitated site does not act as a source of lead-containing dust into the future. As such, the Department has recommended that the prevention of dust emissions from free areas and other dust sources (such as the tailings storage facility) be set through any conditions of approval as a key rehabilitation objective for the site, to be implemented through a formal rehabilitation management plan.

In addition to recommended conditions to address air quality and lead health issues, the Department has developed conditions relating to noise impacts, traffic and transport management, surface water management and groundwater monitoring, heritage conservation, waste management, visual amenity and site rehabilitation. Subject to the implementation of these conditions, the Department considers that the impacts of the project would not be significant and could be mitigated and managed within acceptable limits.

On balance, the Department is satisfied that the impacts of the project could be minimised and managed such that the net outcome of the project would be positive and in the public interest.

1. PROPOSED PROJECT

1.1 Project Description

Broken Hill Operations Pty Ltd (the Proponent) proposes to expand its operations at the Rasp mine, in Broken Hill, to extend underground mining areas to include the Western Mineralisation, Centenary Mineralisation and additional Main Lode Pillars. The project would involve extraction of up to 750,000 tonnes per annum of ore within Consolidated Mining Lease 7. Ore would be processed on site to produce lead concentrate (including silver content) and zinc concentrate, for export by rail to smelter and port customers. The major components of the project are summarised in Table 1, with the site and project layout shown in Figures 1 and 2, respectively. The project is described in full in the Proponent's Environmental Assessment and Preferred Project Report, which are attached as Appendices D and E.

Table 1: Major Components of the Project

Aspect	Description
Project Summary	The Rasp Project to mine the Western Mineralisation, Centenary Mineralisation and Main Lode Pillars, including: • expanded underground mine; • surface ventilation fan; • explosives magazine; • ROM pad; • processing plant; • concentrate loading and transport system; • mine backfill plant; • tailings storage facilities (TSF1 and TSF2); • evaporation and collection ponds; • haul roads and access corridors; and • offices, workshops and other supporting facilities (changehouse, control rooms, stores, vehicle wash facility, power distribution and core yard).
<i>Extraction Method</i>	Underground mining utilising a variety of methods, including long hole open stoping (LHOS), benching, modified Avoca, room and pillar and uphole retreat.
<i>Resources</i>	Approximately 8,450,000 tonnes of ore to be extracted over the life of the project.
<i>Depth of Extraction</i>	Most mining would occur from approximately 200 metres below the ground surface downwards
<i>Processing and Facilities</i>	Ore processing would include: ore crushing and screening; wet grinding; zinc and lead flotation; zinc and lead concentrate thickening and filtration; reagent mixing, storage and distribution; and concentrate loading.
<i>Main Products</i>	Lead and zinc concentrates.
<i>Production</i>	Extraction of approximately 750,000 tonnes per annum of ore, and concentrate production of approximately 44,000 tonnes per annum of lead (73% lead and 985 grams per tonne of silver) and 87,000 tonnes per annum of zinc.
<i>Product Transport</i>	Crushed ore would be transported from the site by road during the first 18 months of the project, until processing facilities have been constructed. Once processing facilities are operational, all lead and zinc concentrates would be transported from the site by rail.
<i>Project Life</i>	Approximately 15 years, including construction and closure.
<i>Rehabilitation</i>	The site would be rehabilitated at the conclusion of mining operations and would be returned to a condition suitable for continued tourist operations.
<i>Waste Rock Management</i>	Waste rock would be returned to the mine void to backfill voids and stopes. Waste rock with appropriate engineering properties would be used for site road repair, bunding and rehabilitation of the site upon closure.
<i>Tailings Management</i>	Approximately 620,000 tonnes of tailings would be generated per annum. Tailings from ore processing would be thickened and separated into two streams. The coarser stream (approximately 50% of the tailings) would be returned to the mine void to backfill voids and stopes. The finer stream (approximately 50% of the tailings) would be directed to the existing tailings storage facility (TSF1) for containment and settling, and once TSF1 is filled, to the disused Blackwood Pit (TSF2). TSF1 has capacity for 960,000 tonnes of tailings (4.25 years), while TSF2 would be able to accommodate 3.12 million tonnes (8.75 years).

Aspect	Description
<i>Employment</i>	The project would employ 107 people during construction and commissioning, and 143 during full production.
<i>Capital Value</i>	\$110 million.
<i>Hours of Operation</i>	• Construction – 7:00am-7:00pm, seven days; • Underground operations – 24 hours, seven days; • Processing plant crushing and screening – 7:00am-7:00pm, seven days; • Rail shunting – 7:00am-6:00pm, seven days; • Production rock blasting – 6:45am-7:15pm;and • All other activities – 24 hours, seven days.

1.2 Amendments to the Project

Following the public exhibition period for the Environmental Assessment, and in parallel with the preparation of a Response to Submissions on the project, the Proponent reviewed the scope and configuration of the project with the aim of identifying opportunities to further minimise its potential environmental impacts. As a result, the Proponent established that a number of changes to the project would enable key impacts, particularly dust generation, to be reduced further than assessed in the Environmental Assessment. The Proponent prepared a Preferred Project Report to detail and assess these changes, being:

- modifying the project area to include the new rail load-out area at the north-eastern end of the site;
- locating the processing plant to the north-eastern end of the lease (away from densely-populated residential areas) and modifying haulage road routes;
- removal of secondary and tertiary crushers and screens from the crushing circuit; and
- loading concentrate into containers on trucks and transporting them to a newly constructed rail siding located at the north eastern end of the lease.

Where relevant, this assessment report considers the amended project and additional assessment presented in the Preferred Project Report, in addition to and in place of the early assessments included in the Environmental Assessment.

1.3 Project Setting and History

The project is located within Consolidated Mining Lease 7, within central Broken Hill. The site is approximately 3.8 kilometres long and 1.2 kilometres wide (refer to Figure 1).

Various parts of the site have been mined since the 1880s, and mining has continued almost continuously since that time. The Proponent acquired the site from Normandy Mining Investments in March 2001, immediately prior to which Normandy had managed the site under a care and maintenance protocol after having completely rehabilitated the site. During that time, the site was being used as a tourist operation, including guided tours through the processing plant and heritage buildings.

From 2001 until 2008, the Proponent undertook various investigations into the commercial potential of the site, and sought and obtained various planning approvals to undertake development of the mine. These approvals include a 2001 development consent for extraction of approximately 120,000 tonnes of ore (which was never acted on), a 2006 activity approval for decline exploration and a bulk 200-tonne ore sample, and a 2007 development consent for removal of some small high-grade ore blocks. In 2008, as a result of global economic conditions, all work at the Rasp mine was suspended. Since that time, the Proponent has continued to undertake investigations into the potential ore reserve underlying the site.

In 2009, an activity approval was granted by Industry & Investment NSW for recommencement of mining on the site, and in 2010, Council granted development consent to crush, stockpile and transport ore off-site.



Figure 1: Project Location

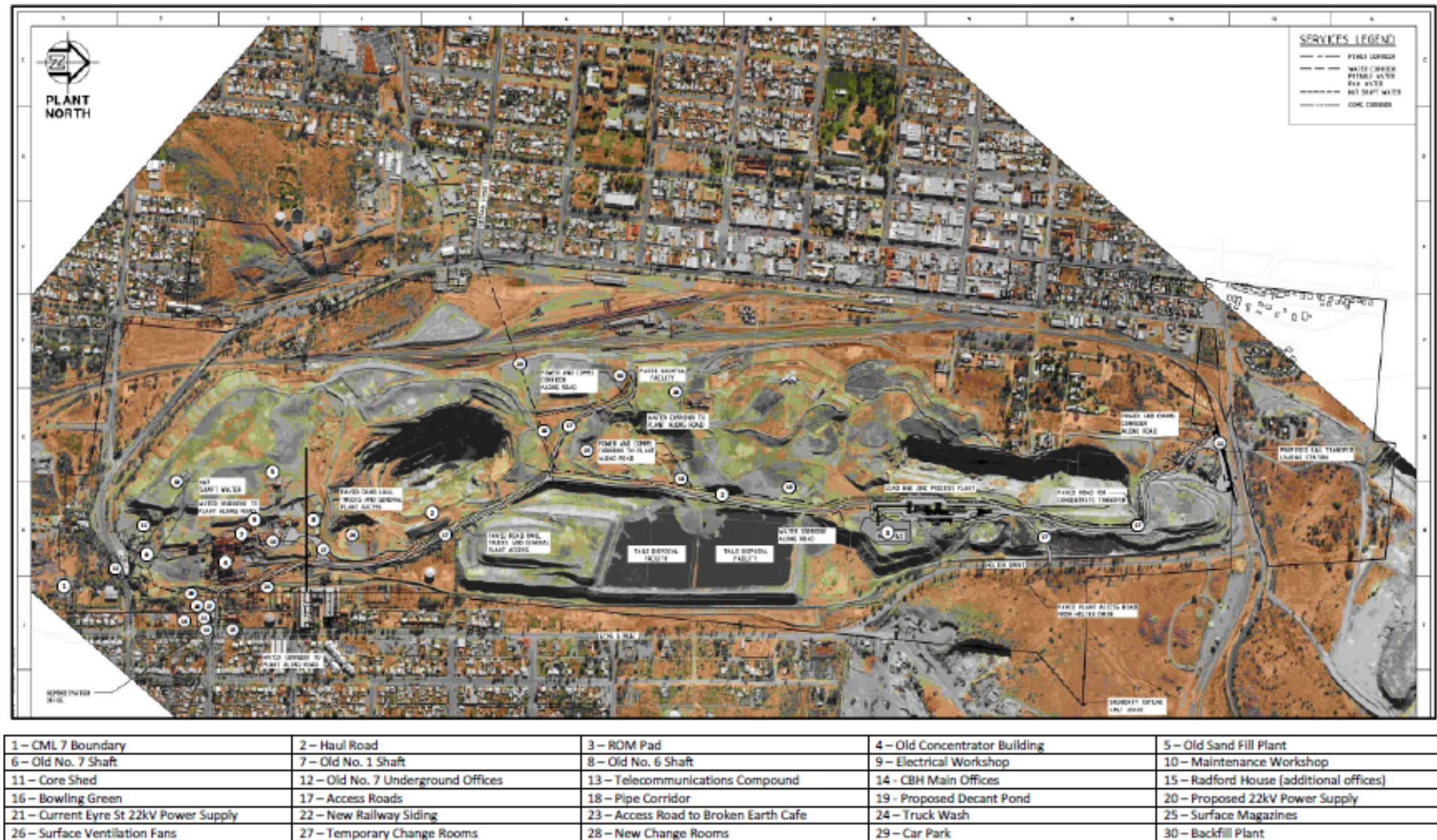


Figure 2: Project Layout

Given the historical use of the site for mining activities, significant infrastructure remains on the site (refer to Figure 2), including:

- a developed exploration decline. The current decline face is approximately 230 metres below the portal entrance, and approximately 2,140 metres of development has been completed;
- several disused open cut pits, including the Kintore Pit, Little Kintore Pit, Block 14/ Blackwood Pit and BHP Pit;
- disused mine shafts;
- a rehabilitated tailings storage facility, centrally located near the southern boundary of the site (adjacent to Eyre Street/ Holten Drive);
- buildings associated with former mining activities, the majority of which are located in the south-west corner of the site near the main access road to the site;
- a bunded hydrocarbon storage area on the western side of the existing workshop;
- wash-down pad and settling dam on the eastern side of the existing workshop, and settling dams and an oil/ water separating system below the workshop;
- haul roads and site access roads, including internal unsealed and sealed roads, and carparking;
- 22kVA electricity transmission lines, transformers and poles, and a fully-fenced substation;
- site services, including sewerage, potable water, raw water, telephone and data lines;
- two portable explosives magazines, located at the southern end of the BHP Pit;
- a 68,800-litre self-contained diesel storage tank located to the north of the existing workshop;
- a vehicle wash bay;
- a disused rail spur running across the western end of the site and connecting to the main transcontinental railway line just north of South Road;
- a surface workshop, including oil and lubricant storage facilities and a light vehicle wash-down pad and settling pond for workshop run-off;
- a weather station;
- a communications hut for surface and underground radio communications;
- a core shed;
- a transfer ramp for concrete and shotcrete, which is also used as a truck loading/ unloading area;
- a sprinkler system on the main internal unsealed roads to provide dust suppression;
- a boom gate and wire gate access infrastructure; and
- a tourist look out and descriptive signage at Block 10 and tourist descriptive signage and fencing at Brown's Shaft.

1.4 Project Need

The site is characterised by a substantial remnant ore resource in the historically-mined Main Lode Pillars, as well as an unmined separate ore body in the Western and Centenary Mineralisation. The Proponent aims to extract these high-grade zinc-lead-silver masses to re-establish a supply of high-grade zinc-lead-silver concentrates for smelting in Australia and overseas. Without the project, the economic benefits of the project to the region, State and nation would not be realised.

The Proponent suggests that the project would have the following environmental, social and economic benefits:

- provision of employment for Broken Hill residents, with approximately 107 people to be directly employed during construction and commissioning, and approximately 143 people during full-scale mining operations;
- training of Broken Hill residents as miners, trades workers and professionals for the Proponent's operations;
- indirect and induced employment (estimated at 346 people) generated via support services such as maintenance workers and short-term sub-contractors;
- economic benefits to the Broken Hill community via capital injection and value-added spending;
- enhancement of the economic position of the Proponent, which would in turn fuel investment in other projects;
- extraction of a valuable mineral resource before the site reverts to other uses, thus preventing its sterilisation;
- extension of the life of Broken Hill mining, ensuring continued provision of Government royalties; and
- preservation of historical heritage on the site for future generations.

The Department concurs with the Proponent that the project would enable the extraction of a significant mineral resource, with consequent positive economic and employment impacts for Broken Hill, the State and the nation. As detailed in section 3 of this report, the Department is satisfied that the project can be undertaken in an environmentally-acceptable manner, and as such, the net outcome of the project would be positive, and in the public interest.

2. STATUTORY CONTEXT

2.1 Permissibility

The project is permissible with development consent under clause 7 of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

2.2 Major Project

The proposal is declared to be a project under Part 3A of the *Environmental Planning and Assessment Act 1979* because it meets the requirements of *State Environmental Planning Policy (Major Development) 2005*. In particular, the proposal exceeds the thresholds specified under clause 5(1)(c) of Schedule 1 of that Policy, being development for the purpose of mining with a capital investment value of more than \$30 million.

The Minister for Planning is therefore the approval authority for the project. However, as the proposed modification generated less than 10 public submissions, the Director-General may determine the application under the Minister's delegation of 25 January 2010.

2.3 Exhibition and Notification

The Environmental Assessment for the project was publicly exhibited from 2 July 2010 until 6 August 2010, which exceeds the statutory minimum 30-day public exhibition period. The Environmental Assessment was made available at the offices of the Department, Council and the Nature Conservation Council during the exhibition period, as well as being available on the Department's website. The Department notified Council and other Government agencies of the public exhibition period, and placed an advertisement in the *Barrier Daily Truth* to notify the public.

The Preferred Project Report was also publicly exhibited from 8 to 25 October 2010, and notified in a similar manner to the Environmental Assessment.

All relevant documents relating to the project application have been made available on the Department's website.

2.4 Environmental Planning Instruments

There are no environmental planning instruments that substantially govern the carrying out of the project, as required to be considered under section 75I of the *Environmental Planning and Assessment Act 1979*.

Notwithstanding, it is highlighted that *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* specifies that the project is permissible.

Under *State Environmental Planning Policy No. 55 – Remediation of Land*, the proposed project site could be considered to be contaminated with lead-containing dust as a result of historical mining operations. However, such contamination is not inconsistent with the intended use of the land as a zinc-lead-silver mine.

The project does not constitute a 'potentially hazardous industry' under *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*. DECCW has indicated that it is prepared to issue a licence for the project under the *Protection of the Environment Operations Act 1997*, which indicates that the project would not be an offensive development.

While the *Broken Hill Local Environmental Plan 1996* does not include any provisions that would substantially govern the carrying out of the project, and does not include specific development controls or standards relevant to the project, the Department has considered the Plan and is satisfied that the project is generally consistent with the aims and objectives of the underlying land use zoning. The majority of the project site is zoned 1(m) (Mining Zone), with a small area zoned 2(c) (City Zone).

2.5 Objects of the Environmental Planning and Assessment Act 1979

The approval authority is required to consider the objects of the EP&A Act when making decisions under the Act. These objects are detailed in Section 5 of the Act, and include:

'The objects of this Act are:

- (a) to encourage:*
 - (i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
 - (ii) the promotion and co-ordination of the orderly and economic use and development of land,*
 - (iii) the protection, provision and co-ordination of communication and utility services,*
 - (iv) the provision of land for public purposes,*
 - (v) the provision and co-ordination of community services and facilities, and*
 - (vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and*
 - (vii) ecologically sustainable development (ESD), and*
 - (viii) the provision and maintenance of affordable housing, and*
- (b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and*
- (c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.'*

The Department is satisfied that the project encourages the proper use of resources (Object 5(a)(i)) and the promotion of orderly and economic use of land (Object 5(a)(ii)), particularly as the subject ore resources are located within an existing mining lease in an area that has been subject to mining for over a century.

The encouragement of environmental protection (Object 5(a)(i)) is considered in detail in Section 5 of this report. Based on this consideration, the Department is satisfied that the impacts of the project can be mitigated and/or managed to ensure an acceptable level of environmental performance.

Finally, the Department has fully considered the encouragement of ecologically sustainable development (ESD) (Object 5(a)(vii)) throughout its assessment of the merits of the project application, and sought to integrate all significant economic and environmental considerations and avoid any serious or irreversible damage to the environment, based on an assessment of risk-weighted consequences. Based on this consideration, the Department is satisfied that the project can be carried out in a manner that is consistent with the principles of ESD.

2.6 Statement of Compliance

Under Section 75I of the EP&A Act, the Director-General's report is required to include a statement relating to compliance with the Director-General's environmental assessment requirements issued with respect to the project. The Department is satisfied that the environmental assessment requirements have been complied with.

3. ISSUES RAISED IN SUBMISSIONS

During the exhibition of the Environmental Assessment, the Department received a total of 14 submissions on the project, including six from public authorities and eight from the public. Of the public authorities who made submissions, Industry & Investment NSW stated support for the project. The Department of Environment, Climate Change and Water, the NSW Office of Water the Greater Western Area Heath Service, the Roads and Traffic Authority and Broken Hill City Council did not object to the project, subject to a number of matters being addressed.

Of the eight public submissions received in response to the exhibition of the Environmental Assessment, six stated support for the project. One submission objected to the project, and another submission, while not expressly stating a position on the project raised a number of concerns for further consideration. A further eight submissions were received in response to the exhibition of the Preferred Project Report. Of these, five were made by public authorities and three were made by the public.

A summary of key issues raised in submissions in response to both the Environmental Assessment and the Preferred Project Report is provided below. A copy of these submissions is provided in Appendix F.

3.1 Submissions from Public Authorities

Department of Environment, Climate Change and Water

Environmental Assessment

The Department of Environment, Climate Change and Water considered that the air quality impact assessment presented in the Environmental Assessment was generally undertaken in accordance with relevant assessment guidelines and criteria. However, it did note that the air quality assessment did not take into consideration air emissions from aboveground conveyors and transfer points. Further, it raised concern about the proximity of the tailings storage facility to residential dwellings and the possible risk of wind-blown contaminants impacting on surrounding land and residences. DECCW recommended additional Statements of Commitments to address these issues.

With respect to the community health risk assessment, DECCW highlighted that while appropriate assessment methods had been applied, there were a number of areas with a high degree of uncertainty, such as the bioavailability of lead from dust and ore. As a result of these uncertainties, DECCW reinforced that it would be important to undertake appropriate monitoring over time to confirm and validate the results of the community health risk assessment. Such monitoring could be part of a Community Health Assessment Plan, including provision for monitoring blood lead levels of resident children and details of remedial actions to be taken should the project lead to an increase in contamination levels that may result in health concerns. Alternatively, DECCW suggested that risk from lead exposure could be addressed through reductions in current lead exposures, such as through appropriate remediation of residential backyards in risk zone 1.

DECCW noted that the site is already highly disturbed and as such, there is unlikely to be any objects of significant Aboriginal cultural heritage value remaining on the site. Notwithstanding, it recommended that the Proponent develop and implement specific management procedures in the event that an object of heritage significance is uncovered during works on the site.

In relation to noise, DECCW highlighted that although the Proponent had requested approval to undertake construction works outside standard construction hours, it had not justified the need for such out-of-hours works. As the operational noise assessment was based on assumptions about operational hours for activities including crushing and screening, and shunting of concentrate wagons, DECCW recommended that these restrictions on hours be reflected in any approval that may be granted for the project. DECCW also recommended imposition of timing restrictions on blasting activities.

DECCW provided a set of recommended conditions of approval as part of its submission, principally focused on air quality issues.

Preferred Project Report

DECCW's submission on the Preferred Project Report indicated that it was able to continue to support approval of the project, and noted that its recommended additions and amendments to Statements of Commitments had been adopted by the Proponent.

DECCW indicated that it supported reconfiguration of the site to minimise air quality impacts, and was satisfied that relocation of the processing facility to the northern end of the mine and the proposed crushing circuit change to include a primary crusher reporting directly to a semi-autogenous grinding mill (wet process) is expected to result in reduced air quality impacts for most receivers.

Best management practice should be adopted with respect to dust management, and in this regard, DECCW supported the Proponent's proposal for complete enclosure of the processing plant, including all crushing, screening and grinding activities, in a negative pressure enclosure vented via a baghouse.

DECCW confirmed its satisfaction with additional information provided by the Proponent in relation to construction noise and construction hours, and indicated that it would be prepared to support extended construction hours (7:00 am to 7:00 pm, seven days).

DECCW's submission on the Preferred Project Report included updated recommended conditions of approval, addressing air quality and noise issues.

Greater Western Area Health Service

Environmental Assessment

The Greater Western Area Health Service (GWAHS) raised concern about the proposed increase in traffic volumes as a consequence of the project, and the associated increase in traffic noise. It also highlighted that exposure to noise and vibration (whether traffic-, construction- or operation-related) can cause adverse health impacts, and recommended that a Noise Management Plan be developed for the project to the satisfaction of the Department of Environment, Climate Change and Water.

The GWAHS considered the air quality assessment was generally satisfactory, but given the location of the project surrounded by sensitive receivers, real-time dust monitoring should be installed based on the predictions of the air quality modelling. Where dust monitoring indicates that dust management controls are not effective, contingency measures including restrictions on relevant works should be implemented. The GWAHS also recommended that the high volume samplers be located based on modelling contours identifying high lead risk zones, and in consultation with DECCW. Particular lead dust sources identified as being of concern include heavy vehicle movements along Eyre Street, the tailings storage facility and fugitive emissions from free areas on the site. The GWAHS recommended that active surveillance and reactive management of emissions from the tailings storage facility be implemented.

While the GWAHS generally agreed with the health risk assessment methodology applied in the Environmental Assessment, it was concerned around the sensitivity of a number of assumptions applied to the assessment, and the potential for small changes in those assumptions to significantly affect the outcomes of the assessment. Key assumptions in this regard included stabilisation of dust and dust control measures, bioaccessibility of lead, and community knowledge about lead risks.

The GWAHS also stated that current blood lead monitoring should go beyond employees and contractors and include monitoring of community members, with a particular focus on children between zero and five years of age. GWAHS noted that the Proponent has committed to lead awareness and community education programs regarding lead.

If the project is approved, the GWAHS recommended that:

- a blood lead monitoring/ surveillance program be developed and implemented for the targeted local population with respect to potential impacts from the mine;
- a community awareness and education program around lead risk should be undertaken;
- an effective long-term stabilisation and rehabilitation plan needs to be developed and implemented to reduce potential dust impacts off the lease once the mining operations have ceased; and
- the health risk assessment should be updated and approved in relation to dust control measures before operations commence on site.

The GWAHS also recommended that the Proponent consider, as a goodwill gesture, proactively engaging with the community to remediate identified areas of high contamination.

Preferred Project Report

The GWAHS did not make a formal submission on the Preferred Project Report.

NSW Office of Water

Environmental Assessment

Given that the dewatering requirements of the proposed deepening at the site have been estimated based on existing pumping requirements at Shaft No. 7, with no modelling using site-specific parameters, the NSW Office of Water suggests that there is a considerable level of uncertainty around predicted dewatering requirements. Despite this uncertainty, the Proponent would need to ensure appropriate licensing under the *Water Act 1912* for all groundwater interception and/ or extraction activities.

Similarly, the NSW Office of Water identified a significant level of uncertainty around the seepage patterns within the existing tailings storage facility, and therefore a potential for mounding beneath the facility and lateral seepage movement. To address this uncertainty, the NSW Office of Water recommended development and implementation of a comprehensive monitoring program of toe drain

function, groundwater mounding and seepage points to inform effective management of this potential issue.

The submission made by the NSW Office of Water includes recommended additions to the Proponent's Statement of Commitments, and recommended conditions of approval.

Preferred Project Report

The NSW Office of Water confirmed that it supports amendments made to water management detailed in the revised Statement of Commitments in the Preferred Project Report.

Industry & Investment NSW Environmental Assessment

Industry & Investment NSW indicated that it was generally satisfied with the final land use and rehabilitation commitments made by the Proponent. However, it recommended that further detail be provided through a Rehabilitation Environmental Management Plan. Industry & Investment NSW included details of the recommended scope of such a Plan in its submission.

Preferred Project Report

Industry & Investment NSW's submission on the Preferred Project Report confirmed that the preferred project was consistent with the land use and rehabilitation outcomes presented in the Environmental Assessment.

Roads and Traffic Authority Environmental Assessment

The Roads and Traffic Authority indicated that it did not object to the project, provided that:

- if crushed ore is to be transported during the construction stage, other than during daylight hours, that lighting of intersections in accordance with AS 1158 must be provided;
- the Eyre Street access modification should be undertaken in accordance with the approved development application DA264/2009. Turning paths must be provided so that proposed haulage/ delivery/ construction vehicles would be able to turn left into or out of the Eyre Street access without crossing the centreline of Eyre Street;
- the South Road access must be used only by oversized trucks that cannot negotiate the internal road system from the Eyre Street access;
- to discourage on-street parking in Eyre Street, the visitors' carpark must be easily accessible and clearly signposted. Carparking requirements should be based on a minimum of one space for every two employees;
- all works associated with access arrangements and lighting are to be undertaken prior to the commencement of operations and at no cost to the RTA.

Preferred Project Report

The RTA noted that the Preferred Project Report includes a newly proposed access point onto Holten Drive, to be used in preference to the previously proposed South Road access, during construction. The RTA indicated that it did not object to this access arrangement, subject to upgrade of the site access to meet its design requirements (as detailed in its submission).

Further Correspondence

Following its submission on the Preferred Project Report, the RTA undertook further consultation with the Proponent in relation to the proposed Holten Drive access. Through those consultations, it was clarified that the Holten Drive access was only proposed in the event that access via Eyre Street and South Road are unsuitable for construction phase deliveries. If Holten Drive is required, the Proponent has committed to the preparation of a formal Traffic Management Plan or the irregular access to the site required at this location.

On this basis, the RTA wrote the Department to clarify that it reserves further comment on the Holten Drive access to such time as it is identified as being necessary. The RTA did, however, indicate that Holten Drive should only be used as an access point where a clear need has been demonstrated, and subject to a Traffic Management Plan development in consultation with the RTA.

Broken Hill City Council Environmental Assessment

In its submission on the Environmental Assessment, Broken Hill City Council indicated that it is supportive of appropriate mining developments within the 1(m) Mining Zone under the *Broken Hill Local Environmental Plan 1996* (although the plan itself does not apply in the case of the proposed project). Council also indicated that the social and economic impacts of the project are likely to be positive, and the project should be supported on that basis. It was also noted that the project is consistent with *A Sustainable Future for Broken Hill* – Council's strategic plan for the local government area up until 2030.

With respect to environmental impacts, Council also indicated that it is supportive of mining operations that can be conducted in an environmentally sustainable manner without adverse impacts on surrounding neighbourhoods and communities. Council considers that the Environmental Assessment demonstrates a responsible approach to environmental management and monitoring, and recommended that appropriate conditions of approval be imposed to reflect the Proponent's commitments in these areas. In particular, Council suggested that the proposed Heritage Management Plan for the project should be developed as a full Conservation Management Plan for the lease area based on the principles of the Burra Charter.

Council recommended that further consideration be given to the site access from Eyre Street to ensure that the existing road pavement is sufficient capability to withstand expected traffic movements, and that the existing configuration of the intersection is safe and that vehicles can queue and carry out turning movements without crossing or disrupting traffic flow on Eyre Street. In the event that upgrades of the access road or its intersection with Eyre Street are required to achieve these outcomes, Council indicated that the required upgrades should be funded by the Proponent.

Preferred Project Report

In its submission on the Preferred Project Report, Council noted the Proponent's additional commitments with respect to road works at the Eyre Street site access, and requested that further details of works be provided before their commencement. Council also requested that the road pavement at the proposed temporary access via Holton Drive be assessed and that any damage as a result of the project be rectified at no cost to Council.

3.2 Submissions from the Public Environmental Assessment

Eight submissions were received from the public in response to the public exhibition of the Environmental Assessment.

The six submissions that indicated support for the project did so on the basis of:

- the mine is a best practice operation that would provide employment for 140 personnel, predominantly local residents of Broken Hill;
- the project would create hundreds of jobs in an area of current high unemployment;
- without continuation of the mine, the Broken Hill area would suffer economic hardship;
- Broken Hill has always been a mining town and the community needs employment, which in turn supports local business;
- the Proponent's explanation of controls for dust, noise and other environmental concerns are sufficient to allay and override objections against the project;
- provided that all legislative requirements are met, the benefits of the project to the community and to the State would far outweigh any disadvantages caused by mining operations;
- the project would assist Broken Hill in creating opportunities and employment, which is greatly needed due to a declining population;
- the re-opening of the mine represents a resurgence in the mining industry in the iconic Australian mining town of Broken Hill;
- the estimated 12-year life of the project is welcomed and would be an asset to the region;
- the Environmental Assessment is well prepared and addressed the issues of concern raised by stakeholders;
- the Proponent has demonstrated integrity and a high level of consideration for safety, community and environmental impact; and
- the Proponent would adopt best practice while creating both direct and indirect jobs in Broken Hill.

The two submissions that objected to or raised concerns in relation to the project did so on the basis of:

- the location of the first tailings dam approximately 300 metres from residential properties. Odours from the tailings would affect nearby residents during the pumping and drying process;
- without odour mitigation measures in place, odours from the flotation mill and treatment plant would produce odour impacts on nearby residents;
- the chemical composition of the dust suppressant to be used on site is unknown;
- the design of the ventilation fan has not been finalised, including its direction and the location of water sprays;
- independent dust monitoring must be required to ensure credibility and transparency;
- the project would be located in the heart of an established residential community;
- the project would generate noise impacts despite proposed noise mitigation measures;
- the use of spray suppressants would not fully mitigate dust and airborne pollutants;
- residences around the site already have elevated soil lead levels and are subject to adverse health effects;
- historical mining operations in Broken Hill have a record of cutting corners to reduce costs, with adverse impacts on watercourses and through lead pollution; and
- the noise impact assessment presents different data from previous assessments and its veracity is questioned.

Preferred Project Report

Three submissions were received from members of the public in response to the public exhibition of the Preferred Project Report.

The two submissions that indicated support for the project did so on the basis of:

- the Proponent has adequately addressed the issues raised by local residents;
- the project would create hundreds of jobs in an area of current high unemployment;
- without continuation of the mine, the Broken Hill area would suffer economic hardship; and
- Broken Hill has always been a mining town and the community needs employment, which in turn supports local business.

The submission that raised concerns in relation to the project did so on the basis of:

- dust and other pollutants remain above acceptable levels and can be blown across residences. Cessation of works during these conditions should be considered;
- noise impacts remain above accepted levels. Continuous operations are unacceptable given that winds during the night time and early morning would lead to elevated noise impacts at residences;
- the stormwater retention dam is too small, and during rain events, stormwater would spill across the public road and into regeneration and public areas;
- the Proponent has offered to conduct a bi-annual soil contamination assessment, and this is insufficient. Contaminated areas must be remediated before the project proceeds;
- it is not clear that dust suppression measures are adequate;
- local property values would be degraded as a result of the project and land contamination;
- there remains increased risks to human health and the biophysical environment as a result of off-site contamination;
- greening of the perimeter of the site should be pursued as it would minimise health risks;
- the Proponent has poor regard for community concerns; and
- the project should not be considered in the middle of an established residential area.

3.3 Response to Submissions and Preferred Project Report

The Proponent provided a detailed response to all issues raised in submissions and a Preferred Project that detailed changes to the project aimed at minimising environmental impacts. A revised Statement of Commitments was provided as part of the Preferred Project Report. The Response to Submissions and Preferred Project Report are provided as Appendix C and Appendix D of this report, respectively.

The Department has considered all issues raised in submissions and the Proponent's responses to these issues in its assessment of the project.

4. ASSESSMENT

The Department considers the follow to be key issues associated with the project:

- air quality impacts;
- human health impacts;
- noise and vibration impacts; and
- traffic and transport impacts.

All other issues are considered to have been adequately addressed by the Proponent in its Environmental Assessment (refer to Appendix E), Response to Submissions (refer to Appendix C), Preferred Project Report (refer to Appendix D) and Statement of Commitments (as part of the Preferred Project Report in Appendix D), and have therefore not been considered in detail as part of this report.

4.1 Air Quality Impacts

Issues

The project has the potential to impact on local and regional air quality principally through the generation of dust, including lead-containing dust. The Environmental Assessment includes an air quality impact assessment prepared in accordance with *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC, 2005), which was subsequently updated in the Preferred Project Report to account for the relocation and reconfiguration of certain components of the project. The assessment considers total suspended particulates (TSP), particulate matter with aerodynamic diameters of 10 and 2.5 micrometres (PM₁₀ and PM_{2.5}, respectively), deposited dust, lead and other heavy metals. Representative receiver locations in and around the project were considered as part of the assessment (identified as receivers R1 to R30).

The air quality impact assessment considers four scenarios:

- Scenario 1 – normal operation of the tailings storage facility and all crusher emissions contained in a full enclosure under negative pressure;
- Scenario 2 – normal operation of the tailings storage facility with the crusher area enclosed with noise cladding and emissions captured through hooded extraction;
- Scenario 3 – 'upset' operation of the tailings storage facility and all crusher emissions contained in a full enclosure under negative pressure; and
- Scenario 4 - 'upset' operation of the tailings storage facility with the crusher area enclosed with noise cladding and emissions captured through hooded extraction.

For the purpose of the air quality assessment, 'upset' conditions at the tailings storage facility were defined to approximate a situation in which the effectiveness of dust suppressants on inactive tailings storage cells is reduced (to 90%).

The air quality modelling also takes into account active dust suppression in 'free areas' of the site (ie those areas of the site not directly affected by development). The Proponent has assumed an 80% reduction in dust generation from these areas as a result of the application of synthetic dust suppressants. Free areas of the site (hatched in red) are illustrated in Figure 3.

The following sections provide a summary of the outcomes of the air quality modelling and assessment for each of these scenarios. It should be noted that all scenarios have been considered for short-term (24-hour average) pollutant impacts, however, only 'normal operations' at the tailings storage facility (Scenarios 1 and 2) have been considered for longer-term impacts (annual average) as it is unlikely that upset conditions would occur within the tailings storage facility for sufficient period to significantly affect modelling outcomes relative to predictions for normal operations.

Suspended and Deposited Dust

The air quality impact assessment for the project found that in all cases, and for all receivers, relevant air quality standards and criteria would be comfortably met (refer to Table 2). In most cases, impacts from the project are expected to be an order of magnitude lower than the relevant criteria. It is important to note from the data that the most affected receiver during normal operations at the tailings storage facility is Proprietary Square, a heritage building on CML7, and a residential dwelling on Eyre Street North when considering upset conditions.

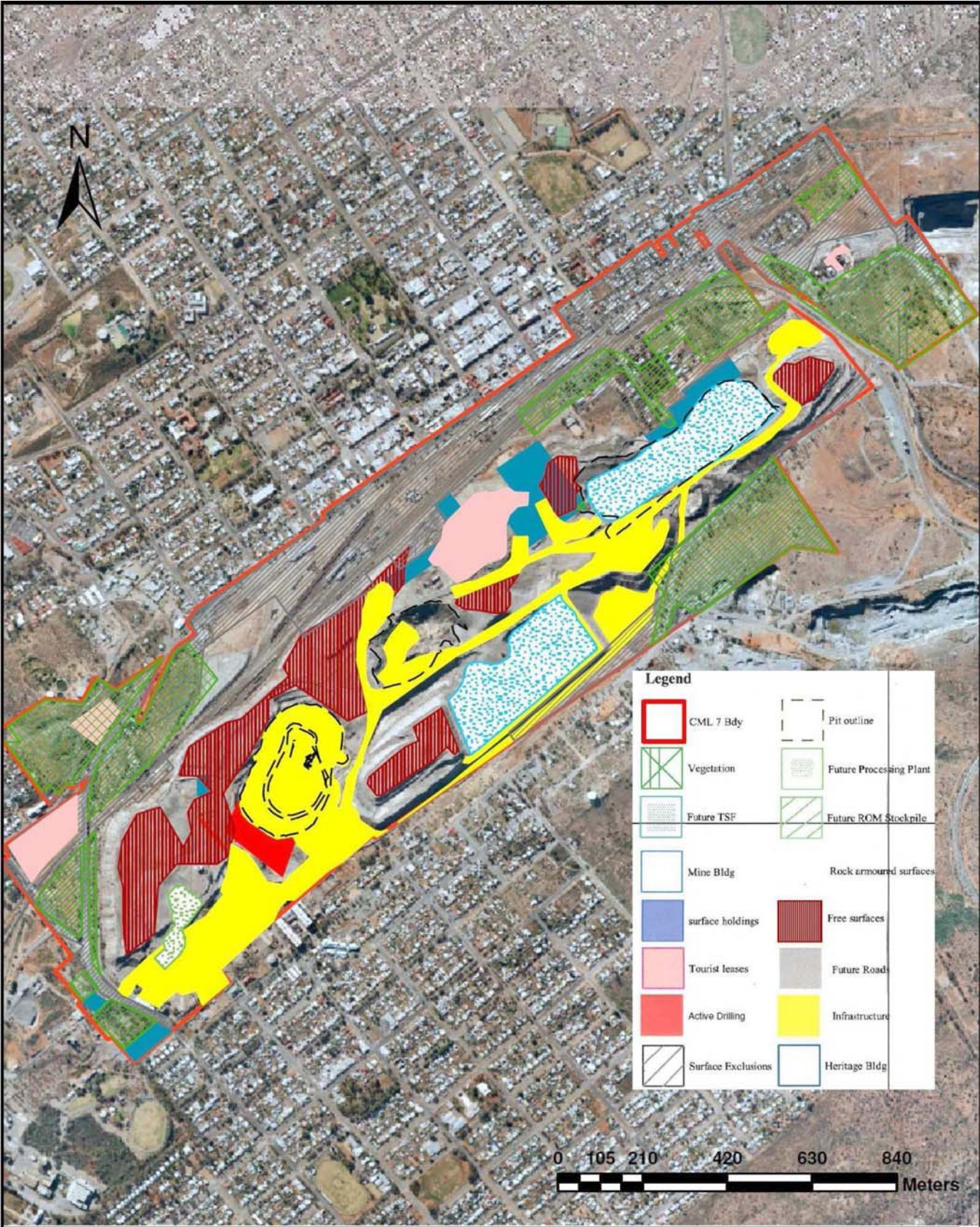


Figure 3: Free Areas of the Site

Modelling predictions highlight that upset conditions at the tailings storage facility can markedly increase dust contributions from the project on a short-term basis, indicating that the facility should be a key focus in any dust mitigation and management strategy implemented on the site.

While dust contributions from the project are relatively low when considered in isolation, the Proponent highlights that ambient dust is a persistent background issue in the Broken Hill area. Total suspended particulate concentrations between January 2008 and December 2009 were $56.4 \mu\text{g}/\text{m}^3$ on average (compared with an annual ambient standard of $90 \mu\text{g}/\text{m}^3$), with peaks as high as $415.3 \mu\text{g}/\text{m}^3$. Similarly, PM_{10} concentrations have averaged $29.1 \mu\text{g}/\text{m}^3$ (compared with an annual ambient standard of $30 \mu\text{g}/\text{m}^3$), with peaks as high as $281.2 \mu\text{g}/\text{m}^3$.

Table 2: Predicted Suspended and Deposited Dust Impacts – Project Contribution

Pollutant	Criterion	Scenario	Range	Most-Affected Receiver
PM_{10} (24-hour average)	$50 \mu\text{g}/\text{m}^3$	Scenario 1	$0.6\text{--}7.3 \mu\text{g}/\text{m}^3$	R27 – Proprietary Square (heritage building on CML7)
		Scenario 2	$0.6\text{--}7.4 \mu\text{g}/\text{m}^3$	R27 – Proprietary Square (heritage building on CML7)
		Scenario 3	$0.6\text{--}11.8 \mu\text{g}/\text{m}^3$	R21 – Eyre Street North (single dwelling)
		Scenario 4	$0.6\text{--}11.8 \mu\text{g}/\text{m}^3$	R21 – Eyre Street North (single dwelling)
PM_{10} (annual average)	$30 \mu\text{g}/\text{m}^3$	Scenario 1	$0.1\text{--}0.9 \mu\text{g}/\text{m}^3$	R27 – Proprietary Square (heritage building on CML7)
		Scenario 2	$0.1\text{--}1.0 \mu\text{g}/\text{m}^3$	R27 – Proprietary Square (heritage building on CML7)
Total suspended particulates (TSP) (annual average)	$90 \mu\text{g}/\text{m}^3$	Scenario 1	$0.2\text{--}2.4 \mu\text{g}/\text{m}^3$	R27 – Proprietary Square (heritage building on CML7)
		Scenario 2	$0.2\text{--}2.9 \mu\text{g}/\text{m}^3$	R27 – Proprietary Square (heritage building on CML7)
Dust deposition (annual average)	$2 \text{ g}/\text{m}^2\text{month}^{-1}$	Scenario 1	$0.02\text{--}0.40 \text{ g}/\text{m}^2\text{month}$	R27 – Proprietary Square (heritage building on CML7)
		Scenario 2	$0.02\text{--}0.47 \text{ g}/\text{m}^2\text{month}$	R27 – Proprietary Square (heritage building on CML7)
$\text{PM}_{2.5}$ (24-hour average)	$25 \mu\text{g}/\text{m}^3$	Scenario 1	$0.1\text{--}2.3 \mu\text{g}/\text{m}^3$	R27 – Proprietary Square (heritage building on CML7)
		Scenario 2	$0.1\text{--}2.3 \mu\text{g}/\text{m}^3$	R27 – Proprietary Square (heritage building on CML7)
		Scenario 3	$0.2\text{--}4.9 \mu\text{g}/\text{m}^3$	R21 – Eyre Street North (single dwelling)
		Scenario 4	$0.2\text{--}4.9 \mu\text{g}/\text{m}^3$	R21 – Eyre Street North (single dwelling)
$\text{PM}_{2.5}$ (annual average)	$8 \mu\text{g}/\text{m}^3$	Scenario 1	$0.02\text{--}0.24 \mu\text{g}/\text{m}^3$	R27 – Proprietary Square (heritage building on CML7)
		Scenario 2	$0.02\text{--}0.25 \mu\text{g}/\text{m}^3$	R27 – Proprietary Square (heritage building on CML7)

Comparison to Scenarios 1 and 2, and Scenarios 3 and 4 indicates that there is little difference in the outcomes of the air quality assessment based on the dust mitigation measures applied at the crusher area (ie full enclosure under negative pressure and noise cladding with hooded extraction generally provide similar levels of mitigation).

Heavy Metals

The air quality impact assessment also considers heavy metal emissions from the project. Emissions modelled based on Scenario 2 are summarised in Table 3, noting that this scenario represents maximum predicted normal operational emissions (and Scenario 1 is either equivalent to, or slightly lower than, Scenario 2 outcomes). The modelling results indicate that metal criteria specified under *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC, 2005) would be met at all receivers, with the highest impact being associated with cadmium, at 15% of the relevant ambient air quality criterion.

A detailed assessment of annual average lead contributions was also undertaken for the project, considering contributions from proposed mining and processing operations, and from undeveloped areas of the site (with dust mitigation applied to reduce dust generation by 80%). The results of this modelling indicate that the cumulative annual average lead criterion of $0.5 \mu\text{g}/\text{m}^3$ is met in all cases, with maximum impacts expected at receiver R8 – Old South Road (26% of the criterion). In the

majority of cases, lead generated from areas of the site not affected by the project dominate the cumulative lead impacts, with contributions from mining and processing operations being relatively minor in comparison.

The maximum lead deposition rate is predicted at R27 – Proprietary Square, at a rate of 0.20 g/m²/year. Deposition rates at other receivers are typically in the range 0.01 to 0.1 g/m²/year.

Table 3: Predicted Heavy Metal Impacts

Metal	Criterion (µg/m³)	99.9th Percentile across all Receivers (µg/m³)	% of Criterion	Most-Affected Receiver
Antimony	9	1.1 x 10 ⁻³	0.01%	R26 – Quarry offices (single commercial receiver)
Arsenic	0.09	6.5 x 10 ⁻³	7.22%	R26 – Quarry offices (single commercial receiver)
Barium	9	2.7 x 10 ⁻⁵	0.0003%	R22 – Eyre Street North (single residential dwelling)
Beryllium	0.004	3.0 x 10 ⁻⁶	0.08%	R22 – Eyre Street North (single residential dwelling)
Cadmium	0.018	2.7 x 10 ⁻³	15.0%	R26 – Quarry offices (single commercial receiver)
Chromium III	9	1.8 x 10 ⁻³	0.02%	R6 – South Road (single residential dwelling)
Chromium VI	0.09		2.0%	R6 – South Road (single residential dwelling)
Copper	18	2.5 x 10 ⁻²	0.14%	R26 – Quarry offices (single commercial receiver)
Manganese	18	1.3 x 10 ⁻¹	0.72%	R26 – Quarry offices (single commercial receiver)
Mercury	0.18	2.2 x 10 ⁻⁴	0.12%	R6 – South Road (single residential dwelling)
Nickel	0.18	1.3 x 10 ⁻³	0.72%	R6 – South Road (single residential dwelling)
Silver	0.18	1.3 x 10 ⁻³	0.72%	R26 – Quarry offices (single commercial receiver)

Consideration

The Department is generally satisfied that the Proponent has undertaken an adequate and appropriate level of air quality impact assessment, in accordance with established assessment guidelines and policies. The Department of Environment, Climate Change and Water, and the Greater Western Area Health Service have presented similar views in their respective submissions on the project.

It is apparent from the air quality impact assessment that the principal pollutant of concern in relation to the operation of the project is dust (including the composition of such dust in the case of heavy metals). The Department is satisfied that the Proponent has pursued all reasonable and feasible mitigation measures with the aim of minimising potential dust generation, and consequently, minimising potential off-site impacts. Key among these mitigation measures are reconfiguration of the site (as detailed in the Preferred Project Report), enclosure and ventilation management of crushing areas, active dust suppression in 'free areas' (those parts of the site not directly affected by development) and management of operational upsets within the tailings storage facility. Of these, the Department considers that dust suppression in free areas and management of the tailings storage area would be fundamental to achieving acceptable environmental outcomes.

It is important to note that while the incremental dust contributions from the project are expected to be within established ambient air quality criteria, the Broken Hill region in general experiences elevated background dust levels. It is not uncommon for air quality criteria to be exceeded, and this situation would continue, irrespective of whether the project proceeds or not. The project is unlikely to significantly alter this situation, and its contribution to cumulative ambient dust levels would be dominated by background dust levels.

As highlighted in the Proponent's air quality assessment, free areas have the potential to dominate dust emissions from the site under normal operating conditions. To minimise these contributions, the Proponent has committed to active application of dust suppressants to these areas on a regular basis.

A reduction in dust emissions of at least 80% has been assumed in the air quality modelling as a result of this approach. While the Department concurs with the Proponent that this level of dust suppression is achievable, it would require particular vigilance on the Proponent's part to ensure that dust suppressants are consistently applied to meet the minimum requirements of the particular manufacturer (or with greater frequency, if required).

Similarly, management of the tailings storage facility would require careful attention to ensure that in the event of upset operations, the dust generation potential of the facility is minimised for the duration of the upset. Table 2 highlights that short-duration (24-hour average) dust impacts during upset events at the tailings storage facility (Scenarios 3 and 4, compared with Scenarios 1 and 2) can result in a doubling of PM_{2.5} contributions from the project, and approximately 150% in the case of PM₁₀ (compared with normal operating emissions). While the dust increments in both cases remain comfortably below the relevant ambient air quality criteria, significant dust emissions during upset operations have the potential to exacerbate local air quality issues, particularly during concurrent elevated background dust events.

To ensure that dust generation and its consequent potential impacts are actively and effectively managed, the Department recommends that the Proponent be required to prepare and implement a comprehensive Dust Management Plan in consultation with the Department of Environment, Climate Change and Water. It would place a particular focus on both the active and reactive management of dust generation. Further, the Department recommends conditions requiring the Plan to detail contingency measures to be implemented in the event that an incident, whether an operational upset, meteorological conditions or other initiating factor triggers a scenario with potentially greater impacts than predicted or assumed in the air quality assessment.

Of fundamental importance to the success of the proactive and reactive dust management approaches recommended for inclusion in Dust Management Plan would be accurate, real-time dust and meteorological data. To this end, the Department has recommended conditions that reflect a dust and meteorological monitoring network consistent with that outlined by DECCW in its submission. This network includes monitoring of on-site point sources of dust (the ventilation shaft from Little Kitmore Pit and the process enclosure/ baghouse), no fewer than 10 ambient monitoring stations for total suspended particles, PM₁₀, lead and dust deposition, and a meteorological monitoring station to be located on-site. This monitoring network would enable the Proponent to identify emerging dust issues, or meteorological issues that may contribute to elevated dust impacts, in an early and proactive fashion, and to implement additional mitigation or contingency measures to address the situation.

The Department also considers it important to reflect key dust mitigation measures proposed by the Proponent in formal conditions of approval. Among these are sealing approximately 4.5 kilometres of internal roads, application of dust suppressant to 'free areas' (to achieve an 80% reduction in dust generation), enclosing aboveground conveyors and transfer points, design and construction of the ore crushing area to be enclosed and operating under negative pressure, and installation of video recording equipment to monitor the status of dust generation at the tailings storage facility. Subject to effective implementation of these measures, guided by a comprehensive Dust Management Plan and continuous dust monitoring, the Department is satisfied that the Proponent could operate the project to meet acceptable dust outcomes.

In the longer-term, the Department is concerned to ensure that the site is appropriately rehabilitated to ensure that it does not become a significant, uncontrolled source of dust following closure of the mine. As such, the Department has recommended that the conditions of approval reflect the rehabilitation objectives of the project, including prevention of dust emissions (particularly from free areas and the tailings storage facility) once mining has ceased.

The air quality assessment highlights that lead and other heavy metals would not exceed accepted ambient air quality standards. In the case of lead, ambient concentration contributions attributable to the project would not exceed 26% of the criterion, and for cadmium (the highest other heavy metal), no more than 15%. As heavy metals would generally be a component of dust emitted from the site, dust mitigation and management is fundamental to controlling both the environmental impacts of the dust itself, as well as the heavy metals that dust contains. The Department considers that the dust mitigation and management approach proposed by the Proponent and reflected in the recommended conditions of approval would effectively minimise dust and heavy metal impacts to an acceptable level.

4.2 Human Health Impacts

Issues

The principal human health concern associated with the project is exposure to lead (and less so, other heavy metals), and as such, the Environmental Assessment includes a human health risk assessment specifically focused on this issue. The Department notes that the risk assessment was not updated to reflect the revised project as described in the PPR and therefore represents a conservative assessment.

Scenarios and Receivers

The risk assessment considers three scenarios, each considered after 15 years of project operation:

- **Scenario 1** – evaluates off-site health risks from metals in dust arising from 'free areas' (those open areas not impacted by day to day mining and ore processing activities). This scenario was broken down into two sub-scenarios: **S1a**, which considered free areas in their current state; and **S1b**, which assumed application of dust control with 80% efficiency to current free areas;
- **Scenario 2** – assesses off-site health risks due to dust arising from project activities, including both mining and processing activities; and
- **Scenario 3** – assesses off-site health risks from the cumulative impact of dust from the 80% controlled free areas (**Scenario S1b**), plus dust from mining and processing activities (**Scenario 2**).

A number of affected receiver locations were identified around the project site, based on consideration of their proximity to the site, the historical lead health risk zones in Broken Hill used by the Greater Western Area Health Service and predicted dust deposition from the activities on the site (derived from the air quality impact assessment). Seventeen receiver locations were assessed, including 12 residential receivers and five schools). Receivers 3 (residential receiver at Eyre Street North) and 8 (residential receiver at Old South Road) are considered by the Proponent to be the most highly-impacted receivers, and therefore represent the 'worst case' scenario.

Exposure Estimation

Exposure pathways considered as part of the human health risk assessment include ingestion of soil, ingestion of indoor dust, and inhalation of indoor and/ or outdoor airborne dust. Of these, the major exposure pathway is via incidental ingestion of soil. The Proponent suggests that ingestion of tank water is an incomplete exposure pathway given the availability of reticulated potable water and Council's education campaign advising residents not to drink tank water or to utilise it in food preparation. Similarly, the Proponent quotes literature that supports the conclusion that exposure through home-grown produce is also an incomplete pathway as lead is not readily translocated to shoots of plants and uptake by root vegetables is small and slow.

Background environmental lead concentrations in Broken Hill have historically been considered in five 'lead risk zones'. Lead concentrations in each of these zones were tested from 2004 to 2008, following an extensive remediation program. The upper 95% confidence limits from this testing were conservatively applied as the background soil concentrations for the purpose of the human health risk assessment: 2,000 mg/kg in zone 1; 1,000 mg/kg in zones 2 and 3; and 500 mg/kg in zones 4 and 5.

In addition to background lead concentrations, additional lead would be contributed to local soils as a result of dust emissions from the project. Based on the air quality assessment undertaken for the project, the human health risk assessment considered soil lead concentration contributions over a 15-year period, and assuming no loss of lead, with the following general outcomes:

- For residential receivers:
 - o Scenario 1a – lead contributions varied from 82 µg/g (receiver 38 – Gypsum Street) to 1,646 µg/g (receiver 8 – Old South Road);
 - o Scenario 1b – lead contributions varied from 16 µg/g (receiver 38 – Gypsum Street) to 329 µg/g (receiver 8 – Old South Road);
 - o Scenario 2 – lead contributions varied from 7 µg/g (receiver 32 – Crystal Street) to 223 µg/g (receiver 8 – Old South Road);
 - o Scenario 3 – lead contributions varied from 35 µg/g (receiver 38 – Gypsum Street) to 552 mg/kg (receiver 8 – Old South Road). Contributions from free areas accounted for between 63% and 96% of soil lead concentrations;

- For non-residential (school receivers):
 - o Scenario 1a – lead contributions varied from 19 mg/kg (receiver 18 – Rainbow Pre-School) to 168 µg/g (receiver 11 – Alma Bugdlie Pre-School);
 - o Scenario 1b – lead contributions varied from 4 µg/g (receiver 18 – Rainbow Pre-School and receiver 17 – Broken Hill Public School) to 34 µg/g (receiver 11 – Alma Bugdlie Pre-School);
 - o Scenario 2 – lead contributions varied from 9 µg/g (receiver 18 – Rainbow Pre-School) to 28 µg/g (receiver 11 – Alma Bugdlie Pre-School);
 - o Scenario 3 – lead contributions varied from 13 µg/g (receiver 18 – Rainbow Pre-School) to 62 µg/g (receiver 11 – Alma Bugdlie Pre-School). Contributions from free areas accounted for between 49% and 67% of soil lead concentrations;

It is important to note from the above figures that soil lead concentration contributions from the project are dominated by emissions from free areas, and in particular, that application of an '80% control' scenario for these areas significantly reduces lead contributions.

Bioaccessibility

The risk assessment reinforces that all lead (and other heavy metals) in soils at receiver sites does not necessarily transfer to a receiver's blood, and the uptake of lead would depend both on bioaccessibility (the amount released during digestion) and absorption (the amount of released lead that is subsequently transported through the intestines into the blood stream).

As bioaccessibility can be site-specific, samples of mine dust from the site and drill core samples from the Western Mineralisation mine body were collected for bioaccessibility analysis. Analysis has indicated that the bioaccessibility of lead from surface dusts is 7.3%, and 1.4% from mine ore.

Risk Characterisation – Tolerable Daily Intake Analysis

The human health risk assessment presents lead intakes from all complete exposure pathways and compares these intakes with the published tolerable daily intake (TDI) for a range of receiver age groups. The outcomes of this analysis are summarised in Table 4 below.

Table 4: Predicted Total Lead Intake

Receivers	Measure	Receiver Age (Years)			
		0.5-3	3-13	13-18	18-70
Risk Zone 1	Mean Intake (µg/kg/d)	2.1	1.38	0.57	0.52
Receivers 1 to 4, and 8	Mean Intake as a % of TDI	60%	39%	16%	15%
	% Intake from Background	96%	97%	98%	98%
	% Intake from Project	4%	3%	2%	2%
Risk Zone 2	Mean Intake (µg/kg/d)	1.55	1.14	0.49	0.46
Receivers 10, 14, and 38 to 39	Mean Intake as a % of TDI	44%	33%	14%	13%
	% Intake from Background	99%	99%	99%	99%
	% Intake from Project	1%	1%	1%	1%
Risk Zone 3	Mean Intake (µg/kg/d)	1.58	1.16	0.5	0.47
Receivers 5 to 7	Mean Intake as a % of TDI	45%	33%	14%	13%
	% Intake from Background	96%	98%	98%	99%
	% Intake from Project	4%	3%	3%	1%
Risk Zone 4	Mean Intake (µg/kg/d)	1.29	1.0	0.46	0.44
Receivers 12 to 13, and 18	Mean Intake as a % of TDI	37%	29%	13%	1%
	% Intake from Background	99.6%	99.8%	99.8%	99.9%
	% Intake from Project	0.4%	0.2%	0.2%	0.1%
Risk Zone 5	Mean Intake (µg/kg/d)	1.28	1.0	0.46	0.44
Receivers 15 to 17, and 19 to 20	Mean Intake as a % of TDI	37%	29%	13%	13%
	% Intake from Background	99.9%	99.9%	99.9%	99.9%
	% Intake from Project	0.1%	0.1%	0.1%	0.1%

The data above highlights that with the exception of receivers aged 0.5 to three years in Risk Zone 1 (60%), expected lead intake is less than half of the daily tolerable intake. Further, it also indicates that total lead intake is dominated by existing, background lead levels and that contributions from the project are relatively low (less than 4% in all cases). This can be seen clearly in Figure 4, which presents the relative contributions of lead from background and project sources (as a percentage of TDI) for the most-affected receivers (0.5-3 years old) in each of the risk zones considered as part of the human health risk assessment.

Risk Characterisation – Blood Lead Levels

The human health risk assessment highlights that the National Health and Medical Research Council recommends that all Australians should have a blood lead level below 10 µg/dL. From data published by the Greater Western Area Health Service, the Proponent has identified that in 2008 a sample of 120 antenatal women living in Broken Hill were tested and found to have a mean blood lead concentration of 1.3 µg/dL, with a standard deviation of 1.03 µg/dL. The geometric mean of blood lead levels in children aged one to four during the period 2005-2008 was 5.6 µg/dL, with a standard deviation of 6 µg/dL.

Incremental blood lead level increases were modelled for children from age 0.5 to seven (noting that children are the most susceptible receivers, for Scenarios 1a (existing free areas with no dust control), 1b (existing free areas with 80% dust control) and 3 (project contributions plus free areas with 80% dust control). The results of the modelling for Receivers 3 (residential receiver at Eyre Street North) and 8 (residential receiver at Old South Road) (as the most lead-affected receivers) are summarised in Table 5.

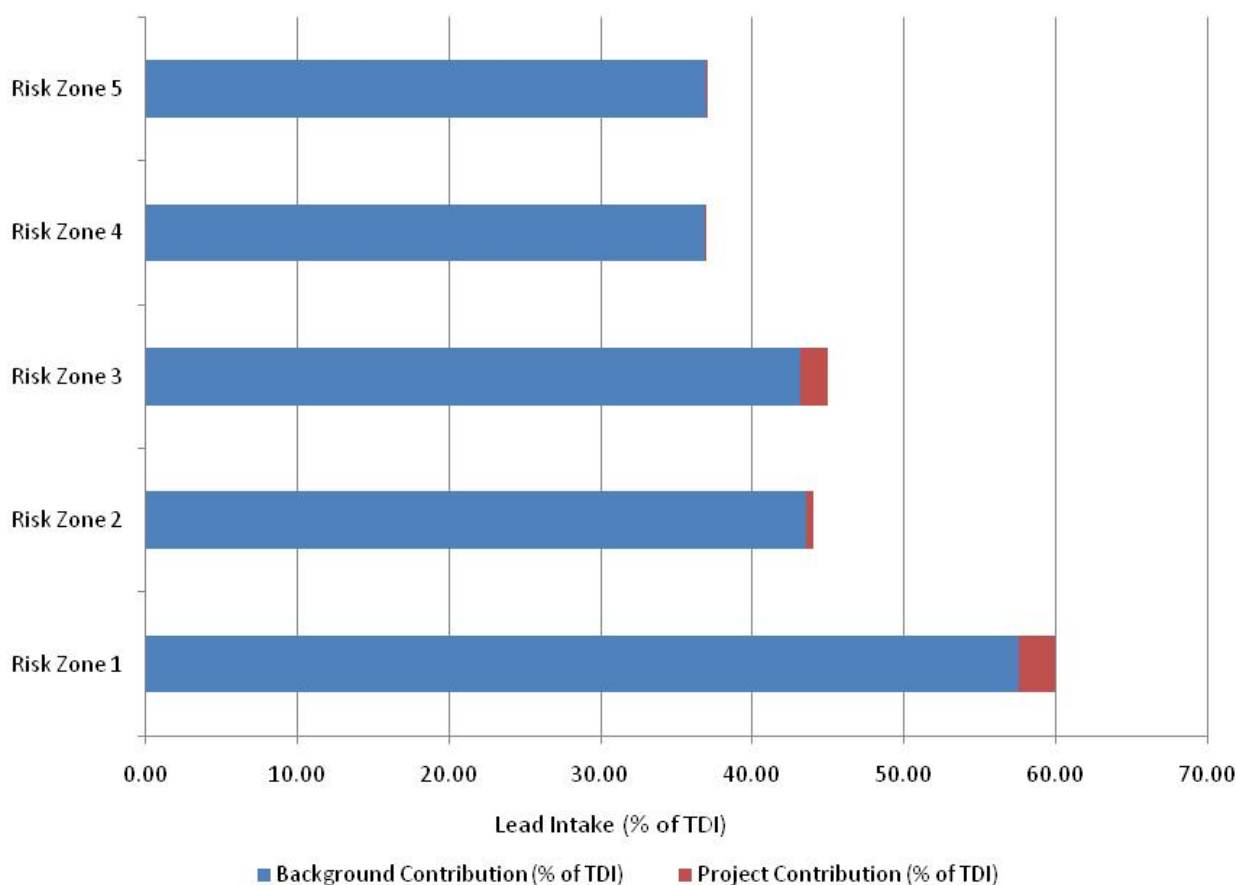


Figure 4: Relative Contributions to Lead Intake (0.5-3 Years)

Table 5: Predicted Incremental Increases in Child Blood Lead Levels

Receiver/ Scenario	Incremental Blood Lead Level Increases (µg/dL) by Child Age (Years)						
	0.5-1	1-2	2-3	3-4	4-5	5-6	6-7
Receiver 3							
Scenario 1a	0.87	1.07	0.99	0.93	0.88	0.82	0.76
Scenario 1b	0.18	0.22	0.2	0.19	0.18	0.17	0.16
Scenario 3	0.25	0.31	0.28	0.27	0.25	0.24	0.22
Receiver 8							
Scenario 1a	2.46	3.03	2.82	2.66	2.53	2.38	2.2
Scenario 1b	0.52	0.64	0.59	0.55	0.52	0.49	0.45
Scenario 3	0.61	0.75	0.69	0.65	0.61	0.57	0.53

The results presented in the table above reinforce that management of dust from 'free areas' would be fundamental in mitigating against elevated incremental increases in child blood lead levels. This can be seen through the significant reduction in predicted incremental blood lead levels between Scenarios 1a and 1b. With the application of dust mitigation measures to reduce dust generation from free areas by at least 80%, incremental increases in blood lead levels can be maintained below 0.75 µg/dL.

Consideration

The Department is generally satisfied that the Proponent has undertaken an appropriate level of human health risk assessment for the project, and has accommodated a reasonable level of conservatism in the assumptions applied to that assessment. In this regard, it is important to note that as the human health risk assessment also relied on a conservative assessment of air quality impacts (dust deposition) and conservative estimates of background lead levels, it is likely that the overall outcomes of the risk assessment reflect a significant level of 'cumulative conservatism'.

The human health risk assessment reinforces that dust from 'free areas' of the site are a key focus when considering the potential impacts of the project. Comparison of the outcomes of Scenarios 1a (no dust mitigation in free areas) and Scenario 1b (80% dust mitigation) suggest a five-fold reduction in deposited lead on surrounding land as a result of dust mitigation in free areas. As lead-containing dust would accumulate over time, it is important from a human health perspective to apply all reasonable and feasible mitigation measures to minimise the on-going contribution of deposited dust from the project to surrounding properties over time. As noted in the previous section of this report, the Department is satisfied that the Proponent has done this, and through compliance with the recommended conditions of approval would minimise dust emissions from the site (and by corollary, dust deposition on surrounding land). The Proponent goes to some effort in the Environmental Assessment to highlight that if the project does not proceed, the proposed 80% dust reduction from free areas would not be realised and greater dust deposition rates (including lead deposition rates) would be experienced than if the project does proceed (equivalent to the difference in the outcomes of Scenario 1a and Scenario 1b). While differing views could be held by stakeholders with respect to whether dust management measures should be implemented in free areas regardless of whether the project proceeds or not, the Department accepts the Proponent's point that active management of free areas as a component of the project would have a positive effect on the environment and public health relative to uncontrolled dust emissions from these areas. The significance of dust minimisation in free areas is further highlighted by the results of Scenario 3 modelling, which indicate that dust from these areas accounts for between 68% and 96% of all soil lead contributions from the project.

As noted with respect to the air quality impacts of the project, the Department is concerned to ensure that mitigation of dust generation from free areas of the site continues beyond the operational phase of the project. The Proponent has highlighted that active dust mitigation in these areas during the life of the project will reduce dust and associated lead impacts from the site to surrounding receivers compared with the current situation. The Department considers it important that the site not be returned to its current dust-generating condition at the conclusion of mining operations, and instead is rehabilitated in a manner that prevents dust emissions into the future, after closure. Preparation of a rehabilitation plan is standard practice for mining operations, and the Department has recommended, in addition to the preparation of such a plan for the site, that any approval that is granted for the project clearly articulates rehabilitation objectives, including prevention of on-going dust emissions from free areas and other dust sources (such as the tailing storage facility). In this manner, rehabilitation of the site would be focused on leaving a legacy of improved environmental performance, particularly in the context of current dust generation on the site.

It is apparent from the human health risk assessment that lead exposure is dominated by background sources and that in a relative sense, lead contributions from the project are low (assuming adequate dust mitigation, particularly in free areas). Considering for example, the most potentially affected receiver (receiver 8 – Old South Road) for Scenario 3, it is apparent that lead in soil contributions from the project are a maximum of approximately 28% of background concentrations (ie 552 mg/kg compared with a background concentration conservatively assumed to be 2,000 mg/kg). At the lower end, receiver 38 – Gypsum Street receives as little as 3.5% of total soil lead contributions from the project (relative to a background concentration of 1,000 mg/kg). Further, these lead contributions are cumulative at the end of the 15-year life of the project, and assume no attenuation of lead levels over that time. Contributions from the project would, therefore, be lower in reality (taking into account that maximum lead contributions are not achieved for 15 years and there may be some attenuation of lead over that time), and consequently, lower compared with assumed background levels.

On this basis, lead impacts on surrounding receivers can be seen as dominated by existing lead in the environment, and contributions from the project contribute a low additional amount. The Department highlights that as part of its assessment of the project, it is cognisant of the fact that lead impacts must be considered from a project-specific perspective (ie the net contribution to lead impacts attributable to the project) as well as cumulative impacts and whether project specific impacts, regardless of their scale, can be accommodated within the surrounding environmental context (ie would any contribution from the project, regardless of how low, be considered to be unacceptable because of the elevated background conditions). On both points the Department considers that the predicted impacts of the project are acceptable. From a project-specific perspective, the Department is satisfied that the lead contributions from the project itself can be managed within acceptable levels. As highlighted above, key to this would be effective dust management on-site. This, combined with a reasonably conservative assessment, supports a conclusion that the incremental contributions of the project to environmental lead (particularly lead in soil) would not be significant. In a cumulative context, the risk characterisations based on tolerable daily intake and presented in the Environmental Assessment indicate that the mean intake of children would not exceed 60% of the TDI (children 0.5 to three years in Risk Zone 1). Lead intakes are markedly lower in other Risk Zones (no greater than 45% of TDI in other Risk Zones for children aged 0.5 to three years) and significantly lower for higher age groups. These figures indicate a reasonable comfort margin between predicted impacts and TDI values, supporting a conclusion that cumulative lead issues would also be acceptable.

It could be argued that one way to deal with total lead impacts (in a cumulative sense) would be to reduce background lead levels through a program of remediation of land surrounding the project site. In its submission, DECCW indicated that this may be an alternative or complement to the dust/lead emissions mitigation measures proposed on the project site. It is important to note that although this is an option, the Proponent has no proposed environmental remediation as part of its project. Given that the Proponent has demonstrated that the impacts of the project are acceptable when considered from both project-specific and cumulative perspectives, the Department considers there to be little basis to require environmental remediation as part of the project. Further, it is also noted that the Proponent has not been assigned responsibility for the historical lead contamination that has occurred (under the *Contaminated Land Management Act 1997*) and is not compelled to address historical environmental contamination as part of this or other planning application.

The Department has applied a similar consideration to the modelling data for blood lead levels. The two most-affected receiver locations are expected to experience incremental blood lead concentration increases of 0.75 µg/dL (receiver 8) and 0.31 µg/dL (receiver 3) for the most sensitive age group (one to two years old). These increases are not considered significant, in net terms, when compared with the maximum recommended concentration published by the National Health and Medical Research Council (10 µg/dL). In a cumulative sense, these incremental increases are not considered significant when added to the most recent geometric mean blood lead levels for local children (5.6 µg/dL), although a standard deviation of 6 µg/dL for these data does suggest a smaller subset of children may experience, either already or as a result of the incremental increase attributable to the project, blood lead levels above 10 µg/dL. However, based on the relatively small increment associated with emissions from the project (and the conservatism of those estimates) and the dominance of existing blood lead concentrations and background environmental lead contributions, the Department does not consider that impacts from the project should be considered unacceptable. Notwithstanding, on-going lead issues in the community are recognised as an important issue, and require comprehensive action to address lead contributions from the background environment.

The Environmental Assessment highlights a number of measures that have been and are currently being pursued, including historical remediation and community education programs (by both Council and the Western Area Health Service). Complete responsibility for such on-going education should not rest solely with the Proponent, but the Department does consider that the Proponent has a contribution to make in this regard. Such a contribution, however, must be reasonable and proportional to the lead levels attributable to the project currently under assessment. The Department has therefore recommended that a condition of approval be imposed on the project that requires the Proponent to contribute to the development of a single, coordinated Lead Awareness and Impact Management Strategy. The aim of the Strategy would be to coordinate the efforts and resources of the key parties to maximise the benefits of community education and information about the potential impacts of lead. In particular, the Department recommends that the Strategy:

- include a clear delineation of responsibilities between the parties, including any agreement reached in relation to implementation, funding and coordination;

- include provision for on-going public education campaigns about the health risks associated with lead, including lead hygiene, lead and children, tank water lead risks and soil lead contamination risks;
- outline a communication strategy, focused on audience-appropriate media, schools and other appropriate mechanisms for dissemination of information about lead;
- include provision for on-going public health monitoring, particularly in relation to child blood lead levels, and tracking of this data over time; and
- details of a central point of contact for information about lead, including lead health issues, lead contamination, mine dust monitoring and risk assessment data.

The Department considers that a Lead Awareness and Impact Management Strategy would be an effective means of reducing background lead contributions by educating the local community on simple measures that can be taken to avoid or minimise lead intake. The Strategy can also include provision for blood lead level monitoring, as advocated by the Western Area Health Service in its submission. While such testing should not be the responsibility of the Proponent, given its relatively low contribution to environmental lead, it could reasonably contribute support to an on-going monitoring program.

As a complement to the Lead Awareness and Impact Management Strategy and blood lead level testing, and to update the assessment undertaken to date, the Department also recommends that the Proponent be required to update the human health risk assessment undertaken for the project with real monitoring data obtained during its implementation. It is recommended that the updated assessment be completed within one year of the commencement of operation, and every five years thereafter. The Department suggests that an update risk assessment is important for three reasons:

1. to confirm and refine the outcomes and recommendations of the original human health risk assessment, and if necessary, to take further action should predicted impacts be greater than those determined through the Environmental Assessment;
2. to keep the local community informed in a transparent manner about the impacts of the project; and
3. to inform and complement the Lead Awareness and Impact Management Strategy, noting that the outcomes of the updated risk assessment would contribute to determining priorities for community information and education about lead issues.

In conclusion, while the Department accepts that the project would contribute lead to the environment, and that such lead would also contribute to human health impacts, it does not consider the scale of impacts directly attributable to the project to be significant or unacceptable. Lead is an on-going and historical issue for Broken Hill, and the most effective means of reducing cumulative lead impacts on the community is to disrupt the connection between environmental lead and human lead intake. This may be achieved through remediation of land in future, but in the interim, the Department considers the most effective approach is through comprehensive community information and education about the potential impacts of lead. The Proponent should bear some responsibility for community information and education, but should do so in close collaboration with the Greater Western Area Health Service and Council to ensure an appropriate distribution of responsibilities and maximisation of funding, resources and effort to provide an optimal benefit to the local community. As noted previously, the Department has also recommended rehabilitation objectives for the project which include long term management of dust from the site.

4.3 Noise and Vibration Impacts

Issues

Construction Noise

The Preferred Project Report presents a construction noise impact assessment for the reconfigured project, which demonstrates that construction works on the site would comfortably meet the construction noise management levels specified in the *Interim Construction Noise Guideline* (DECC, 2009) at all receivers. It also demonstrates that in the majority of cases, construction noise impacts are well below existing background noise levels. On this basis, the Proponent argues that if out-of-hours construction activities were to be permitted (from 7:00am to 7:00pm, seven days), rather than being restricted to standard construction hours, there is unlikely to be a significant noise impact at affected receivers.

Noting that the *Interim Construction Noise Guideline* (DECC, 2009) requires all out-of-hours construction works to be fully justified before any extended hours would be considered for approval, the Proponent has highlighted the relatively remote location of the project relative to population

centres outside Broken Hill from which it may draw construction staff. As a significant proportion of the construction labour force would be sourced from outside Broken Hill, the Proponent argues that construction from 7:00am to 7:00pm, seven days per week, is necessary to optimise the efficiency of the construction period for workers temporarily locating to Broken Hill, and for those commuting from other centres on a daily/ weekly basis.

Operational Noise

The Preferred Project Report presents an operational noise assessment for the reconfigured project, in accordance with the *NSW Industrial Noise Policy* (EPA, 2000). The assessment considered 14 representative receiver locations around the site, under day and night scenarios, with the results of the assessment summarised in Table 6.

Table 6: Predicted Noise Impacts

Receiver	Daytime		Night time		
	Criterion (dB(A))	Impact under Calm Weather (dB(A))	Criterion (dB(A))	Impact under Calm Weather (dB(A))	Impact under Adverse Weather (dB(A))
A1 – Piper Street North	38	<35	35	<35	<35
A2 – Piper Street Central	38	<35	35	<35	<35
A3 – Eyre Street North	44	37	39	37	38
A4 – Eyre Street Central	44	<35	39	<35	<35
A5 – Eyre Street North	44	<35	39	<35	<35
A6 – Bonanza and Gypsum Streets	48	<35	39	<35	<35
A7 – Carbon Street	35	<35	35	<35	<35
A8 – South Road	48	<35	39	<35	<35
A9 – Crystal Street	46	<35	39	<35	<35
A10 – Garnet and Blende Streets	42	<35	35	<35	<35
A11 – Crystal Street	46	<35	39	<35	<35
A12 – Crystal Street	46	39	39	<35	39
A13 – Eyre Street North 2	38	37	35	<35	<35
A14 – Piper Street North	35	<35	35	<35	<35

The predicted noise impacts in the table above demonstrate that operation of the project would not exceed relevant noise criteria at any receiver, irrespective of whether operations occur at night or during the day. In most cases, noise impacts are predicted to be low (below 35 dB(A)).

Modelling of potential sleep disturbance impacts, however, indicated a 1dB(A) exceedance of the sleep disturbance criterion (49 dB(A)) at the two receivers considered on Crystal Street (A11 and A12) during calm weather conditions. Under adverse weather conditions, the Proponent predicts that sleep disturbance criteria could be exceeded by up to 8 dB(A) at receiver A10, 6 dB(A) at receiver A2, 4 dB(A) at receiver A7 and 3 dB(A) at receiver A3. The Proponent highlights that adverse weather conditions would only occur on 30% of winter nights. The Proponent argues that these levels of exceedances are minimal and unlikely to be perceptible in reality. It has also identified that sleep disturbance impacts, and exceedance of the sleep disturbance criterion are principally the result of trucks 'banging and clanging' during the night time period. The Proponent has argued that given the expected limited number of such events on any night (between five and ten), potential impacts could be effectively mitigated through driver training.

Blasting Noise and Vibration

The Environmental Assessment considers potential noise and vibration impacts associated with blasting activities for both underground and aboveground mining operations. As the exact need and location for blasting has yet to be definitively determined, the assessment 'back calculates' maximum blast charges that could be utilised so as to ensure that explosion overpressure and peak particle velocity criteria would not be exceeded. The Proponent has committed to ensuring that these maximum charges are not exceeded, and accordingly, adverse impacts from blasting activities are not expected at surrounding receivers.

Rail Noise and Vibration

Noise modelling presented in the Environmental Assessment indicates that rail movements associated with the project would generate a median L_{Amax} of 80 dB(A) at 30 metres from the rail line (the closest

residence), and a median of 72 dB(A) at 75 metres from the rail line (the closest residential area). Both of these predictions comply with the recommended maximum noise levels for an existing/redeveloped rail line (85 dB(A)) and for a new rail line (80dB(A)), as specified in the *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (DECC, 2007).

The project is predicted to meet the day time residential criterion for rail pass-by vibration ($0.2\text{--}0.4\text{ ms}^{-1.75}$) by an order of magnitude ($0.4\text{ ms}^{-1.75}$ at the nearest residential receiver).

Road Traffic Noise

Modelling of noise generated by traffic associated with the project indicates that during the day time period (7:00am to 10:00pm), the project would increase existing traffic noise from 65 dB(A) to 67 dB(A), which is within the allowable 2dB(A) increase accommodated by *Environmental Criteria for Road Traffic Noise* (EPA, 1999). Outside of these hours, maximum cumulative road traffic noise is predicted to be 51 dB(A), which complies with the 55 dB(A) criterion.

Consideration

Construction Noise Impacts

The Department is satisfied that the Proponent has undertaken an adequate level of assessment of the potential construction impacts of the project, and has demonstrated that construction works could be conducted without exceeding applicable construction noise management levels.

The Department also accepts the Proponent's justification for extended construction hours (beyond standard construction hours specified in the *Interim Construction Noise Guidelines*), on the basis of the location of the project and the need for construction employees to relocate or commute for the duration of the construction period. A further benefit of additional construction hours would be a shortened construction period (relative to its duration if standard construction hours were adhered to), and consequently, a minimised period during which crushed ore would be transported by road. On balance, therefore, the Department is satisfied that additional construction hours would have a net positive amenity impact, particularly in light of compliance with construction noise management levels. The Department therefore recommends that general construction works be approved on the site between 7:00 am and 7:00 pm, seven days per week. The Department also recommends that the conditions of approval reflect appropriate construction noise management levels, being 40 dB(A) during standard construction hours, and 35 dB(A) during extended construction hours (including nights, Sundays and public holidays).

Operational Noise Impacts

As with construction noise impacts, the Department is satisfied that the Proponent has demonstrated that the project could be operated to meet acceptable operational noise outcomes. In most cases, operational noise impacts are predicted to be comfortably below criteria specified under the *NSW Industrial Noise Policy*.

On the basis that noise modelling has indicated that noise criteria can be met at all times (day and night) and under all meteorological conditions, the Department supports the Proponents request for approval to operate 24-hours, seven days per week. However, in order to mitigate against the risk of sleep disturbance at night, it is recommended that the conditions of approval restrict impulsive noise at night, and as such, the Department recommends that:

- crushing only occurs between 7:00am and 7:00pm on any day;
- shunting of concentrate wagons only occurs between 7:00am and 6:00pm on any day; and
- production rock blasting only occurs between 6:45am and 7:15pm on any day.

Consistent with the requirements of the *NSW Industrial Noise Policy* and the recommended conditions of approval provided by the Department of Environment, Climate Change and Water, the Department has recommended conditions to reflect stringent noise limits for receivers surrounding the project site, during the day, evening and night periods. The recommended conditions also include standard airblast overpressure and peak particle velocity criteria to be applied to blasting activities to ensure protection of structural integrity and human comfort.

To provide an overarching framework for the management of potential noise impacts generated by the project, the Department recommends adoption of the Proponent's commitment to prepare a formal Noise Management Plan. The Plan should be prepared in consultation with DECCW, and include mitigation measures, monitoring and management protocols to ensure that the noise and vibration limits specified in the approval are met.

Road and Rail Noise and Vibration

The Proponent has demonstrated that additional road and rail movements associated with operation of the project will meet acceptable noise and vibration outcomes at the nearest residential receiver. The Department is satisfied that additional mitigation and management measures imposed through conditions of approval are not necessary to address road and rail noise and vibration.

4.4 Traffic and Transport Impacts**Issues**

During operation of the project, all zinc and lead concentrates would be transported from the site by rail. However, until processing facilities are constructed and commissioned on-site, there would be a need to transport crushed ore by road to the Endeavour Mine, near Cobar. The Proponent estimates that this phase of the project would last approximately 18 months.

Site Access

The sealed site entry from Eyre Street is the main site access point and is proposed to be used by the majority of mine-related traffic. The Proponent indicates that based on AUSTROAD standards, sight distances at this intersection are adequate, taking into account local speed limits. A recently-approved local development application requires that this access point be modified to allow heavy vehicles to enter and exit without crossing the centreline of Eyre Street.

Additional assessment presented in the Preferred Project Report indicates that current road geometry is sufficient to accommodate 26-metre B-Doubles without crossing the centreline of Eyre Street, subject to minor modifications to the adjacent footpaths. In order to prevent trucks queuing into Eyre Street, the Proponent has proposed a truck waiting area inside the Eyre Street access point.

There may be a need for limited heavy vehicles to enter the site via South Road during construction. This site access point is characterised by poor lines of sight, and the Proponent has committed to development and implementation of a safe entry procedure as part of a formal traffic management plan should this site access be required. Alternatively, the Proponent identified in the Preferred Project Report that access to the site via Holten Drive may be a possibility. However, it would only be pursued if South Street proves to be unfeasible, and subject to further consultation with the Roads and Traffic Authority.

There would be no access to the site via MacGillvray Drive (via Iodide Street and Crystal Street) or at Thompson Shaft.

Car Parking

The Environmental Assessment indicates that there are currently 66 car parking spaces on the site, which exceeds the minimum 55 carparking spaces required under Council's Development Control Plan.

Construction Traffic Impacts

The Proponent estimates that traffic generated by construction works on the site would include two truck deliveries (four movements per day), with the majority of movements (80%) entering and leaving the site via the Eyre Street access point. In addition to this, there is expected to be two buses and up to eight light vehicles transporting construction staff to and from the site around change-over times (7:00am and 7:00pm) and two courier deliveries per day. The Proponent has argued that this level of traffic generation and its impacts on the surrounding road network would be minimal for the following reasons:

- a small volume of construction traffic would be generated;
- heavy vehicles would generally be restricted to the approved B-Double route through Broken Hill;
- construction traffic impacts would be short-term, as the construction period is only anticipated to last for 12 months; and
- construction traffic would generally be restricted to day shift hours between 7:00am and 7:00pm.

Until ore processing facilities are constructed and commissioned on-site, the Proponent intends to export crushed ore from the site by road (over a period of approximately 18 months). These activities are expected to generate 21 heavy vehicle movements (for crushed ore transport) and 11 light vehicles/ truck movements (for maintenance and deliveries) per day on the surrounding road network.

During the peak hours, it is estimated that there would be two heavy vehicle movements and one light vehicle/ truck movement. Given the low levels of traffic generated by road transport of crushed ore, the Proponent argues that there would not be a significant impact on the surrounding road network.

Operational Traffic Impacts

During operation, zinc and lead concentrates would be transported from the site by rail, and would therefore not affect the local or regional road networks. However, the site would still generate road traffic associated with the delivery of materials to the site (for example, explosives, chemicals, maintenance materials) and employee transport. The Proponent estimates that there would be a total of 202 vehicle movements (including 30 heavy vehicle movements) per day during operation. During peak hours, traffic generation is expected to be 86 movements, with 15 of these representing heavy vehicles.

Based on these estimates, and existing traffic volume data for the surrounding road network, the Proponent has assessed the impacts of the project during peak hours and on a daily basis, as summarised in Table 7 and Table 8, respectively. Total vehicle movements are shown, with heavy vehicle contributions in parentheses (for peak hour flows in Table 7).

Table 7: Predicted Peak Hour Traffic Impacts

Road	Existing Traffic	Project Contribution	Total with Project	Project Contribution (%)
Eyre Street (West of Comstock Street)	173 (7)	56 (7)	229 (14)	32%
Comstock Street	-	13 (5)	-	-
Holten Drive	153 (21)	10 (3)	163 (24)	6.5%
South Road	659 (24)	49 (6)	708 (6)	7.4%
Bonanza Street (South of Eyre Street)	571 (25)	7 (1)	577 (26)	1.2%
Menindee Road	195 (-)	10 (3)	205 (-)	5.1%

Table 8: Daily Traffic Impacts

Road	Existing Traffic	Project Contribution	Total with Project	Project Contribution (%)
Eyre Street (West of Comstock Street)	2471	132	2603	5.3%
Comstock Street	-	28	-	-
Holten Drive	2186	23	2209	1.1%
South Road	9414	115	9529	1.2%
Bonanza Street (South of Eyre Street)	8157	17	8174	0.2%
Menindee Road	2786	23	2809	0.8%

The Proponent notes that, with the exception of Eyre Street, the project is expected to have a minimal impact on traffic volumes. Further, it argues that while a 32% increase in traffic movements is expected on Eyre Street during peak hours, this is within acceptable limits and would not adversely affect the capacity or safety of this road.

Rail Transport

Broken Hill currently experiences between three and nine rail movements each day (43 movements per week), comprising up to two passenger trains (six per week) and between three and seven freight trains (37 per week).

The project would increase rail movements by no more than one per week, from 43 weekly movements to 44.

Consideration

Site Access

The Department accepts the site access hierarchy proposed by the Proponent, noting that the Eyre Street access would be utilised in the majority of cases, with South Road employed in limited cases, and Holten Drive only considered where South Road is deemed to be unfeasible (for example, based on safety or access geometry considerations).

In the case of the Eyre Street access point, the Proponent has demonstrated that only minor modifications would be required to footpaths. The Department recommends that the Proponent be required to engage with and address the requirements of Council and the RTA in designing and undertaking these footpath modification works. The Department also supports the Proponent's proposal to include a truck waiting area inside the Eyre Street site access to avoid the need for truck queuing into the road reserve, and recommends that this commitment be reflected as a condition of approval.

In the event that the Holten Drive access is required for construction traffic, the Department recommends that the Proponent be required to consult further and address the requirements of the RTA, as agreed between the parties during discussions as part of the assessment process (refer to section 3.1 of this report).

General construction traffic management and safety would be subject to the recommended Traffic Management Plan (refer below).

Carparking

The Department is satisfied that satisfactory provision of carparking has been made on the site (66 spaces), in excess of that required under Council's Development Control Plan (55 space) and only slightly less than that recommended by the Roads and Traffic Authority (72 spaces). The Department recommends that the Proponent be required to maintain existing carparking levels as part of the project.

Construction Traffic

The Department concurs with the outcomes of the Proponent's construction traffic impact assessment, and in particular, that the generally low levels of construction-related traffic are unlikely to significantly affect the capacity or safety of the surrounding road network. Notwithstanding, it would be important for construction traffic to be carefully managed, given the mix of traffic (both construction vehicles and trucks transporting initial volumes of crushed ore) and potential safety issues around the South Road access point. As such, the Department recommends that the Proponent be required to prepare and implement a Traffic Management Plan during the construction phase of the project. The Plan would be developed in consultation with Council and the RTA.

Consistent with issues raised in Council's submission on the project, the Department recommends that the Proponent be required to undertake dilapidation reports for local roads prior to and at the conclusion of construction, and to repair any damage attributable to construction of the project.

Operational Traffic

The Department is satisfied that the Proponent has undertaken an adequate and appropriate level of assessment of operational traffic impacts associated with the project. A key aspect of the mitigation approach proposed by the Proponent is transport of ore concentrates by rail during operation, and the Department supports this approach as a good practice initiative. It is recommended that the conditions of approval clearly specify that ore concentrates are to be transported by rail during operation, unless a case-specific exemption is granted by the Director-General (for example, in the case of emergency or incident that temporarily renders the rail access to the site inoperable).

While the traffic modelling undertaken by the Proponent indicates a 32% traffic increase on Eyre Street and a 7.4% increase on South Road during peak hours, the Department highlights that these figures are for total traffic (including passenger vehicles and light trucks). Heavy vehicle movements represent only a fraction of this increase. Further, when considered on a daily basis, traffic generation associated with the project equates to no more than a 5.3% increase on any road. In this context, the Department considers that the operational traffic impacts of the project are acceptable and would not generate a significant road safety, capacity or amenity issue.

Rail Transport

The project would have a minimal impact on weekly train movements through Broken Hill, with no more than one additional freight rail movement expected per week (increasing total rail movements from 43 to 44 per week). The Department is satisfied that this impact is acceptable and that the existing rail network has sufficient capacity to accommodate this increase.

4.5 Other Issues

The assessment raised a number of other relevant issues, which are addressed in Table 8, below.

Table 8: Assessment of Other Relevant Issues

Issue	Consideration	Conclusion
Heritage	- The project site includes a number of historically significant structures that have contributed to Broken Hill's industrial heritage and tourism significance. - Significant heritage items on the site include: - State Heritage Register: BHP chimney ruins of first offices; - Register of National Estate: Line of Lode and Kintore Shaft; - NSW National Trust Register: No 4 and No 7 Winding Houses and Headframes; - NSW National Trust Industrial Archaeology Sites List: Broken Hill South Mine, Kintore Shaft Group (No 4 and No 7 Winding Houses and Headframes), BHP Mine (Delprat Shaft) and North Broken Hill Ltd mine remains; - Broken Hill LEP: 61 items within the surface areas of the site. - The project has been designed to be sensitive to the importance of the heritage items on the site, with new infrastructure to be located in the vacant area to the south west of the old mill building. - Ten heritage buildings are to be adaptively re-used, including three to be renovated and used for administrative offices and a further five to be repaired and used for storage. The electrical workshop would be used as maintenance offices and fixed plant workshop, while the changehouse would be retrofitted as a crib room, training room, first aid centre and underground office. - The Proponent has committed to preparation of a Conservation Management Plan for the project.	- The Department is satisfied that the project would not adversely affect the heritage significance of the site, and through occupation during the 15-year life of the project will ensure on-going care and maintenance of the heritage values of the site. - The Department supports the Proponent's commitment to the preparation and implementation of a Conservation Management Plan for the project, and recommends a condition of approval reflecting this commitment.
Surface and Groundwater	- The area surrounding the project site is generally characterised as having low quantity and quality groundwater, which is reflected in the lack of groundwater extraction infrastructure. - The Environmental Assessment indicates that the risk of the project impacting on groundwater is negligible because: - previous experience indicates that significant depressurisation associated with mining in low permeability formations is constrained to the immediate vicinity of the mining operations; - the Globe Vauxhall shear zone runs parallel to the western boundary of the site, and	- The Department concurs with the Proponent that the project is unlikely to have a significant impact on groundwater. - To ensure that this prediction is accurate in reality, the Department has recommended that the Proponent be required to develop and implement a Groundwater Monitoring Program, including contingency measures in the event that impacts are detected. The program would be developed in consultation with NOW. - The Department is satisfied that the surface water impacts of the project could be managed within acceptable levels, subject to the implementation of the Surface

Issue	Consideration	Conclusion
	separates the site from proximal bores; - historical underground mine workings in the area are likely to have already depressurised deep water bearing horizons; - potential contamination of groundwater is limited given existing relatively high concentrations of heavy metals; - Broken Hill ore lacks pyrite and contains only traces of protoxide, so acid waters from oxidation and tailings oxidation are not generated; - drilling has not intercepted significant water-bearing structural features, and indicated that mining will affect rock of low fracture density, low permeability and low porosity. The Environmental Assessment includes a detailed Surface Water Management Plan, including design of surface water management infrastructure.	Water Management Plan presented in the Environmental Assessment. The Department recommends that the Proponent be required to implement this plan as a condition of approval, including any updates to the plan required as a result of final detailed design of the project.
Waste Management	- Approximately 250,000 tonnes of waste rock will be generated per annum. - Waste rock would be returned to underground voids as they become available. If no voids are available at a particular time, the waste rock would be: - placed in underground drives waiting for voids to become available; - used as rehabilitation material on-site; and/ or - stored in Kintore Pit awaiting back-loading into underground voids upon availability. - Waste rock with suitable engineering properties may also be used for road base on site, fill material for earth bunding or for rehabilitation upon closure of the site. - Approximately 620,000 tonnes of tailings would be generated per annum. - Tailings from ore processing would be thickened and separated into two streams. The coarser stream (approximately 50% of the tailings) would be returned to the mine void to backfill voids and stopes. The finer stream (approximately 50% of the tailings) would be directed to the existing tailings storage facility (TSF1) for containment and settling, and once TSF1 is filled, to the disused Blackwood Pit (TSF2). TSF1 has capacity for 960,000 tonnes of tailings (4.25 years), while TSF2 would be able to accommodate 3.12 million tonnes (8.75 years).	- The Department is satisfied that there would be minimal environmental impact from the Proponent's proposed strategies for waste management. - Nevertheless, to ensure the appropriate management of waste generated by the project, the Department has recommended that the Proponent be required to: - minimise the waste generated by the project; and - prepare and implement a detailed Waste Management Plan for the project in consultation with I&I NSW.

Issue	Consideration	Conclusion
	All waste generated on the site would be managed to avoid generation, maximise recovery and reuse, reduce toxicity in products and materials and to ensure appropriate disposal.	
Rehabilitation	- The Proponent intends to rehabilitate the site to enable it to be used for cultural tourism following closure of the mine. - Rehabilitation of the site would seek to preserve the following characteristics: - the historical heritage value of individual buildings and times within the project area and the site as a whole; - the significance of the mine site to the people of Broken Hill for its role in the history and development of Broken Hill; - the importance of the site as representing 125 years of mining, including educational opportunities provided by demonstrating the changes in mining technology over time; - the definitive character in the visual identity of Broken Hill; - the previous operation of an underground tourist mine (Delprat Shaft) within the project area; - the previous operation of a surface mining tour through the South Mine; - the conduct of previous public functions (mechanical workshop) and - the economic benefits associated with the operation of a commercial venture at the site. - The Proponent has committed to the development of a conceptual mine closure plan if the project is approved. The plan would be updated, finalised and implemented upon closure of the site.	- The Department is satisfied that the Proponent's rehabilitation and final land use strategies outlined in the Environmental Assessment are achievable and are compatible with surrounding land uses. Once rehabilitated, availability of the site for tourism will facilitate on-going economic and employment benefits for Broken Hill. - As part of the rehabilitation of the site, the Department considers it important to focus on reducing on-going impacts from the site, particularly in relation to dust generation (and associated lead emissions). As such, the Department has recommended that the conditions of approval clearly indicate the rehabilitation objectives for the site, including prevention of dust emissions from the site following cessation of mining operations and closure of the site. - The Department has recommended conditions requiring the Proponent to prepare and implement a comprehensive Rehabilitation Environmental Management Plan for the site to the satisfaction of I&I NSW, and in consultation with DECCW, NOW and Council.

5. RECOMMENDED CONDITIONS

The Department has prepared recommended conditions of approval for the project (see Appendix B), and summarised these conditions in Appendix A. These conditions are required to:

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

Key conditions of approval include comprehensive dust mitigation, monitoring and management measures, including continuous monitoring of suspended and deposited dust, and lead. This monitoring would be fundamental to the on-going proactive and reactive management of potential dust

impacts associated with the project, and would inform updates to the human health risk assessment for the project.

While the project represents only a relatively small contribution to local soil lead levels over the life of its operation, the Department considers it important for the Proponent to take some responsibility, in coordination and consultation with the Greater Western Area Health Service and Council, for community education and information dissemination about lead issues. A coordinated, comprehensive approach involving all parties would ensure that responsibilities are coordinated, and the benefits of resources are maximised to address existing background lead issues in the Broken Hill area.

The Proponent has been consulted on the draft conditions of approval and has accepted the conditions in their current form.

6. CONCLUSION

The Department has assessed the project application, Environmental Assessment, submissions on the project and the Proponent's response to these submissions, including its Preferred Project Report, in accordance with the relevant statutory requirements.

The Department recognises that a significant mineral resource remains below the site, and through its environmentally-sensitive extraction, considerable economic and employment benefits can be realised for Broken Hill, the State and the nation. The Proponent has demonstrated that the key issue associated with the project, dust generation, can be effectively managed within acceptable environmental limits, and as a corollary, that human health impacts associated with the emission and uptake of lead can be similarly constrained to tolerable levels. Notwithstanding, effective management and minimisation of dust and health impacts would require particular vigilance, and the Department has recommended a comprehensive suite of stringent conditions aimed at ensuring that predicted acceptable outcomes are achieved in reality.

The Department considers that, on balance, the project's significant benefits outweigh its residual environmental and community risks, particularly in light of the recommended conditions of approval. Consequently, the Department recommends that the Rasp Zinc-Lead-Silver Project be approved, subject to strict conditions of approval.

7. RECOMMENDATION

It is RECOMMENDED that the Director-General, as delegate for the Minister:

- **consider** the findings and recommendations of this report;
- **approve** the project application, subject to conditions, under section 75J of the *Environmental Planning and Assessment Act 1979*; and
- **sign** the attached project approval (see Appendix B).

 28/1/11

David Kitto
Director
Major Development Assessment



Richard Pearson
Deputy Director-General

30/1/11



Chris Wilson
Executive Director
Major Project Assessment

29.1.11


Sam Haddad
Director-General

31/1/2011

APPENDIX A – SUMMARY OF CONDITIONS OF APPROVAL

Aspect	Condition	Requirement
Schedule 2: Administrative Conditions		
<i>Obligation to Minimise Harm</i>	1	The Proponent shall work to prevent harm occurring to the environment.
<i>Terms of Approval</i>	2-4	The Proponent shall carry out the development in accordance with the EA, Response to Submissions, Preferred Project Report and the conditions of approval.
<i>Limits on Approval</i>	5-7	Limit extraction to a total of 750,000 tonnes per annum, and a total of 8,450,000 tonnes, until 31 December 2026, and require that all concentrates be transport by rail during operation.
Schedule 3: Specific Environmental Conditions		
<i>Air quality</i>	1-11	Ambient and point source criteria for air quality, key dust mitigation measures, ambient and point source air quality monitoring, meteorological monitoring and dust management measures
<i>Lead Awareness and Public Health</i>	12-13	Contribution to a coordinated Lead Awareness and Impact Management Strategy with the Department of Health and Council, and periodic updates to the human health risk assessment for the project
<i>Noise and Vibration</i>	14-19	Construction noise goals and construction hours, operational noise limits and operational hours, blasting overpressure and peak particle velocity criteria, and noise management measures
<i>Soil and Water</i>	20-22	Prohibition on the pollution of waters, requirement to ensure adequate water supply and requirement to implement a Water Management Plan
<i>Traffic and Transport</i>	23-27	Carparking requirements, footpath modification design and funding requirements, truck waiting requirements, provisions relating to the safe use of the Holten Drive access point, and requirement to record and repair construction-related damage to local roads.
	28	Preparation of a Traffic Management Plan to safely and efficiently manage construction traffic.
<i>Heritage</i>	29	Preparation of a Conservation Management Plan for the site.
<i>Visual Amenity</i>	30	Lighting requirements for the project.
<i>Waste Management</i>	31-32	Provisions to minimise and manage waste generation.
<i>Rehabilitation</i>	33-34	Details of site rehabilitation objectives and requirement to prepare a Rehabilitation Environmental Management Plan for the site, for implementation at the conclusion of operation.
Schedule 4: Environmental Management and Monitoring	1-2	Environmental Management Strategy/ Environmental Management Plans.
	3-4	Requirement to undertake an annual review of the performance of the project
	5	Requirement to report incidents.
	7-8	Requirement to undertake regular independent environmental audits.
	9	Requirement to publicly report environmental management plans/programs/strategies, and monitoring results.

APPENDIX B – CONDITIONS OF APPROVAL

APPENDIX C – PROPONENT'S RESPONSES TO SUBMISSIONS

See attached CD-ROM.

APPENDIX D – PREFERRED PROJECT REPORT

See attached CD-ROM.

APPENDIX E – ENVIRONMENTAL ASSESSMENT

See attached CD-ROM.

APPENDIX F – SUBMISSIONS

See attached CD-ROM.