



Gidgegannup Granite Quarry

Boral Resources (WA) Ltd



**Report and recommendations
of the Environmental Protection Authority**



**Environmental Protection Authority
Perth, Western Australia**

**Report 1375
December 2010**

Environmental Impact Assessment Process Timelines

| Date | Progress stages | Time (weeks) |
|------------|---|--------------|
| 29/12/2008 | Level of Assessment set (date appeals process completed) | |
| 01/02/2010 | Proponent Document Released for Public Comment | 57 |
| 29/03/2010 | Public Comment Period Closed | 8 |
| 28/09/2010 | Final Proponent response to the issues raised | 26 |
| 02/12/2010 | *EPA report to the Minister for Environment (including 2 weeks consultation on conditions) | 9 |
| 06/12/2010 | Publication of EPA report | 1 |
| 20/12/2010 | Close of appeals period | 2 |

STATEMENT ON TIMELINES

Timelines for an assessment may vary according to the complexity of the project and are usually agreed with the proponent soon after the level of assessment is determined.

*In this case, the Environmental Protection Authority met its agreed timeline objective of 10 weeks for the completion of the assessment and provision of a recommendation to the Minister.

Dr Paul Vogel
Chairman
2/12/10

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Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for Environment on the proposal by Boral Resources (WA) Ltd to develop a granite quarry in Gidgegannup, which is expected to yield up to 500,000 tonnes of rock per annum.

Section 44 of the *Environmental Protection Act 1986* (EP Act) requires the EPA to report to the Minister for Environment on the outcome of its assessment of a proposal. The report must set out:

- the key environmental factors identified in the course of the assessment; and
- the EPA's recommendations as to whether or not the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may include in the report any other advice and recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in section 4A of the *Environmental Protection Act 1986*.

Key environmental factors and principles

The EPA decided that the following key environmental factors relevant to the proposal required detailed evaluation in the report:

- (a) Vegetation, Fauna and Fauna Habitats
- (b) Air Quality and Noise
- (c) Surface Water
- (d) Visual Amenity

There were a number of other factors which were relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

The following principles were considered by the EPA in relation to the proposal:

- (a) Precautionary Principle
- (b) Principle of Intergenerational Equity
- (c) Principle of Conservation of Biological Diversity and Ecological Integrity
- (d) Principles relating to improved Valuation, Pricing and incentive Mechanism
- (e) Principle of Waste Minimisation

Conclusions

The EPA has considered the proposal by Boral Resources (WA) Ltd to develop a granite quarry in Gidgegannup, which is expected to yield up to 500,000 tonnes of rock per annum.

Vegetation, Fauna and Fauna Habitats

The clearing of 31 ha of jarrah-marri forest is not expected to cause significant loss of this vegetation type as it is well represented outside the project area with 69.5% of pre-European extent remaining and 16% within reserves. This vegetation type is reserved in the nearby John Forrest National Park and Darling Range Regional Park.

The EPA notes that a site assessment has identified dieback within jarrah-marri forest on the upland area of the site. The EPA has recommended a condition requiring a dieback survey of the project area to identify existing areas of infestation to identify the baseline extent of dieback infestations within the project area. The condition would also require the proponent to ensure the proposal does not introduce new infestations of dieback in areas of native vegetation to be retained on site.

In regard to significant fauna and the loss of fauna habitats, the EPA notes that these habitats are well represented outside the project area in reserves such as John Forrest National Park and the Darling Range Regional Park. Overall implementation of this project is unlikely to significantly affect populations of fauna species including threatened Cockatoo species. However, the incremental loss of habitat that supports threatened fauna continues to increase pressure on these species. The proponent's commitment of conserving 48.35 ha of land in perpetuity within the project area should provide protection for habitats that support these and other fauna species.

Notwithstanding the above it will be necessary to relocate significant fauna species in advance of clearing. The EPA has recommended a condition for the relocation of species prior to clearing in accordance with an undertaking by the proponent. This condition would require suitably experienced fauna handling personnel to develop, undertake and report on the relocation program.

Air Quality and Noise

The proponent has developed management measures to ensure dust emissions from the project area do not exceed the PM₁₀ standard of 50 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) averaged over a 24 hour period at sensitive receptors such as residential properties. Dispersion modelling of predicted peak PM_{10 (24hr)} levels for air quality indicate that this standard should be achieved at all nearby residential properties.

The EPA considers that a condition should be applied to this proposal to ensure dust emissions leaving the eastern property boundary at the receiving residential boundary conform to the 50 $\mu\text{g}/\text{m}^3$ standard. Monitoring of the other boundaries to this standard is not considered necessary as they are adjacent to industrial areas or vacant land and can be managed under EP Act Part V licence conditions.

The EPA notes that construction and operational activities are likely to exceed the Environmental Protection (Noise) Regulations for daytime levels during start-up until the process plant has been excavated at least 10 m below ground level. Modelling indicates that the plant would comply with the noise regulations once the process plant is below this level. Until this occurs, the proponent plans to construct a noise attenuation bund along the east and northern sides of the process plant. The noise attenuation bund would ensure that the noise regulations are complied with at residential properties. Noise emissions from construction and operational activities would be regulated under the *Environmental Protection (Noise) Regulations 1997*.

Surface Water

The proponent plans to manage surface water by diverting and retaining all surface water in site stormwater dams or clay pits. While the EPA supports this management

action, there is concern regarding the potential for uncontrolled flows of surface water from stormwater dams and clay pits to Susannah Brook. The provision of a sediment trap dam and appropriate dam design to withstand significant rainfall events should ensure surface water flows from the project area do not impact Susannah Brook. Discharge of surface water from a proposal to the environment would require licensing under Part V of the *Environmental Protection Act 1986*.

Visual Amenity

The top of the eastern faces of the quarry would be visible to the north and north-west of the project area. The degree of visibility and the level of significance when compared to the overall viewscape of the scarp depends on the viewing location and on the distance from the project area.

The EPA has recommended a condition that requires the proponent to commence the rehabilitation of non-active benches that are visible to residential areas to the north-west and north of the project area. The condition would require rehabilitation to commence no later than 12 months after the benches are required for active mining. It is also recommended that the proponent develop a final decommissioning and rehabilitation plan.

The EPA has concluded that it is likely that the EPA's objectives would be achieved provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 4.

Recommendations

The EPA submits the following recommendations to the Minister for Environment:

1. That the Minister notes that the proposal being assessed is for the development of a granite quarry in Gidgegannup, which is expected to yield up to 500,000 tonnes of rock per annum.
2. That the Minister considers the report on the key environmental factors and principles as set out in Section 3.
3. That the Minister notes the EPA has concluded that it is likely that the EPA's objectives would be achieved, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 4.
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Boral Resources (WA) Ltd to develop a granite quarry in Gidgegannup, which is expected to yield up to 500,000 tonnes of rock per annum, is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

- (a) Trap and relocate significant fauna before clearing vegetation (condition 6).
- (b) Ensure dieback infestations and weeds are managed effectively (condition 7).
- (c) Monitor and report on dust emissions leaving the project area boundary into residential properties to ensure the PM₁₀ value of 50 µg/m³ averaged over a 24 hour period is not exceeded (condition 8).

- (d) Rehabilitate exposed quarry benches to an acceptable standard determined by the OEPA (condition 9).
- (e) Develop a Final Decommissioning Plan to ensure the rehabilitation of all disturbed areas within the project area (condition 10).
- (f) Conserve 48.35 hectares of native vegetation in perpetuity (condition 11).

It should be noted that other regulatory mechanisms relevant to the proposal are:

- Part V Works approvals and licence under the *Environmental Protection Act 1986*.
- Section 18 approval under the *Aboriginal Heritage Act 1972*.
- Environmental Protection (Noise) Regulations.

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1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the key environmental factors and principles for the proposal by Boral Resources (WA) Ltd to develop a granite quarry in Gidgegannup, which is expected to yield up to 500,000 tonnes of rock per annum (the Proposal).

The proposal was referred to the EPA in December 2008. On the 29 December 2008, the EPA decided that the proposal should be assessed at the level of Public Environmental Review with an 8 week public review period due to potential impacts to a number of significant environmental factors such as flora and vegetation, fauna, surface and groundwater, Aboriginal heritage, noise, air quality and visual amenity.

The proposal was also referred to the then Department of Environment, Water, Heritage and the Arts (DEWHA). DEWHA considered that the proposal should be a "controlled action" under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to potential impacts to Carnaby Cockatoo habitat. It also determined that the proposal could be assessed through the Western Australian assessment process under the Bilateral Agreement between the Commonwealth and the State.

The proponent developed an Environmental Scoping Document which highlighted the environmental issues related the proposal, studies and/or surveys that would be required and potential management actions that would be developed to mitigate environmental impacts. The EPA approved the scoping document on 9 July 2009.

The Public Environmental Review document, developed by the proponent, was released for public review from 1 February to 29 March 2010. The EPA received a total of 21 submissions which were provided to the proponent on 7 April 2010. On the 28 September 2010 the EPA determined that the proponent's Response to Submissions document, which addresses the issues raise in the submissions, was acceptable.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the key environmental factors and principles for the proposal. The conditions to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides Other Advice by the EPA and Section 6 presents the EPA's Recommendations.

Appendix 5 contains a summary of submissions and the proponent's response to submissions and is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

2. The Proposal

The Site is situated approximately 11 kilometres (km) north-east of the Midland town centre in the City of Swan and approximately 4 km from the Darling Scarp in the Darling Ranges (Figure 1).

The development of the quarry would cover a total area of approximately 42 hectares (ha), which is expected to yield 500,000 tonnes of rock per annum when the

proposed operation reaches maximum capacity. The pit, which would have a surface area of approximately 28 ha, is expected to yield approximately 25 million tonnes of hard rock. The remaining 14 ha would be utilised for supporting infrastructure and stockpiles. The quarry would be developed in three stages of increasing production over 20 years.

- Years 0 – 5: Temporary infrastructure - mobile crushing equipment.
- Years 6 – 19: Fixed infrastructure by 6th year. Gradual increase in production.
- Years 20 – 50: Fully operational - yielding 500,000 tonnes of rock per annum.

Processing infrastructure that would be required includes rock crushing and screening equipment, stockpiles and water storage dams. Other site infrastructure includes a site office, weighbridge, employee ablution facilities, fuel storage, workshop / vehicle servicing area and material / chemical storage facilities. Noise bunds would be constructed on the northern and eastern sides of the mobile plant setup area (Figure 2).

Boral proposes to operate the quarry from Monday to Saturday, between 5 am and 6 pm (excluding public holidays). Crushing and screening operations would be limited between 7am and 6pm. Boral may also seek approval to dispatch on Sundays, however, this would occur infrequently and would require community notification. The process plant would not be operated on Sunday and no blasting would occur on Sundays.

Water requirements would be met from existing on-site dams and clay pits. The on-site clay pits are recharged by groundwater and stormwater flows from the quarry site. Stormwater runoff would be harvested into existing on-site dams to eliminate the need to use mains supply for dust suppression. A potable water supply tank would be installed at the site and would be serviced by a tanker as required.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 2 of the PER (GHD, 2010).

An existing quarry (Red Hill Quarry), currently operated by Hanson Construction Materials Pty Ltd (Hanson), is situated approximately 500 m to the west of the site, whilst existing Midland Brick Company (Midland Brick) clay pits are located to the east and south. The Red Hill Disposal Site (waste disposal landfill) is situated to the south-east, on the opposite side of Toodyay Road.

Table 1- Summary of key proposal characteristics

| Element | Description |
|------------------------------------|--|
| General | |
| Life of project | Approximately 50 years |
| Maximum surface area of quarry pit | Not more than 28 hectares |
| Depth of quarry pit | 50 – 70 metres below natural ground level. |
| Total area of disturbance | 42 hectares of which 11 hectares has been previously cleared for clay quarrying. |
| Total area to be rehabilitated | All disturbed areas outside of the quarry pit. |
| Quarrying rate | Not more than 500,000 tonnes per annum. |
| Water supply | Stormwater and groundwater recharge from on-site dams and clay pits. |

The potential impacts of the proposal initially predicted by the proponent in the PER document (GHD, 2010) and their proposed management are summarised in Table ii of the Executive Summary of the proponent's document.

3. Key environmental factors and principles

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for Environment on the key environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as Aboriginal heritage, groundwater, hydrocarbons and chemicals, solid waste and transport are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA's opinion that the following key environmental factors for the proposal require detailed evaluation in this report:

- (a) Vegetation, Fauna and Fauna Habitats;
- (b) Air Quality, Noise and Vibration;
- (c) Surface Water; and
- (d) Visual Amenity.

The above key factors were identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the key environmental factors and their assessment are contained in Sections 3.1 - 3.5. The description of each factor shows why it is relevant to the proposal and how it would be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

The following principles were considered by the EPA in relation to the proposal:

- (a) Precautionary Principle
- (b) Principle of Intergenerational Equity
- (c) Principle of Conservation of Biological Diversity and Ecological Integrity
- (d) Principles relating to improved Valuation, Pricing and incentive Mechanism
- (e) Principle of Waste Minimisation

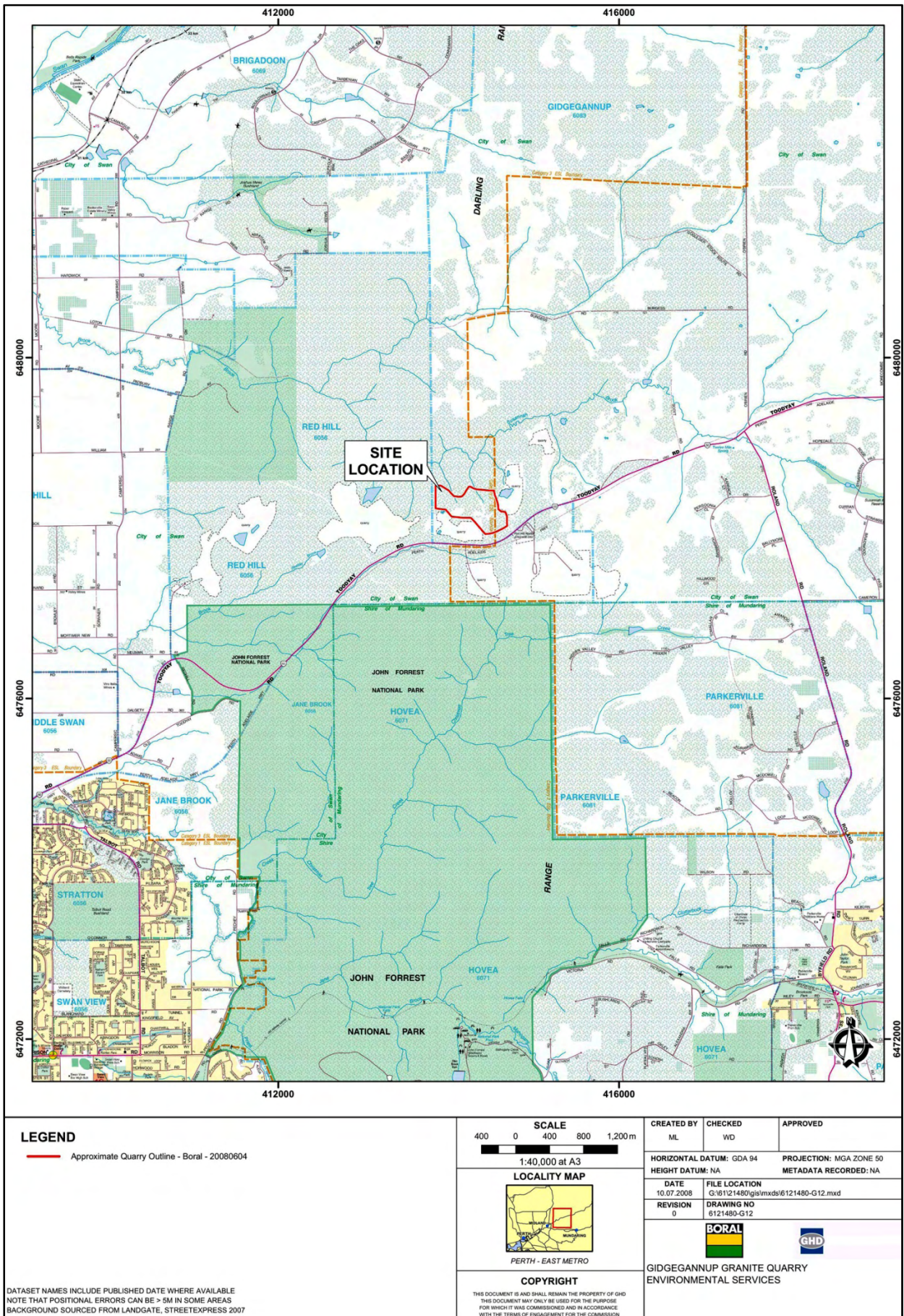


Figure 1: Site Location

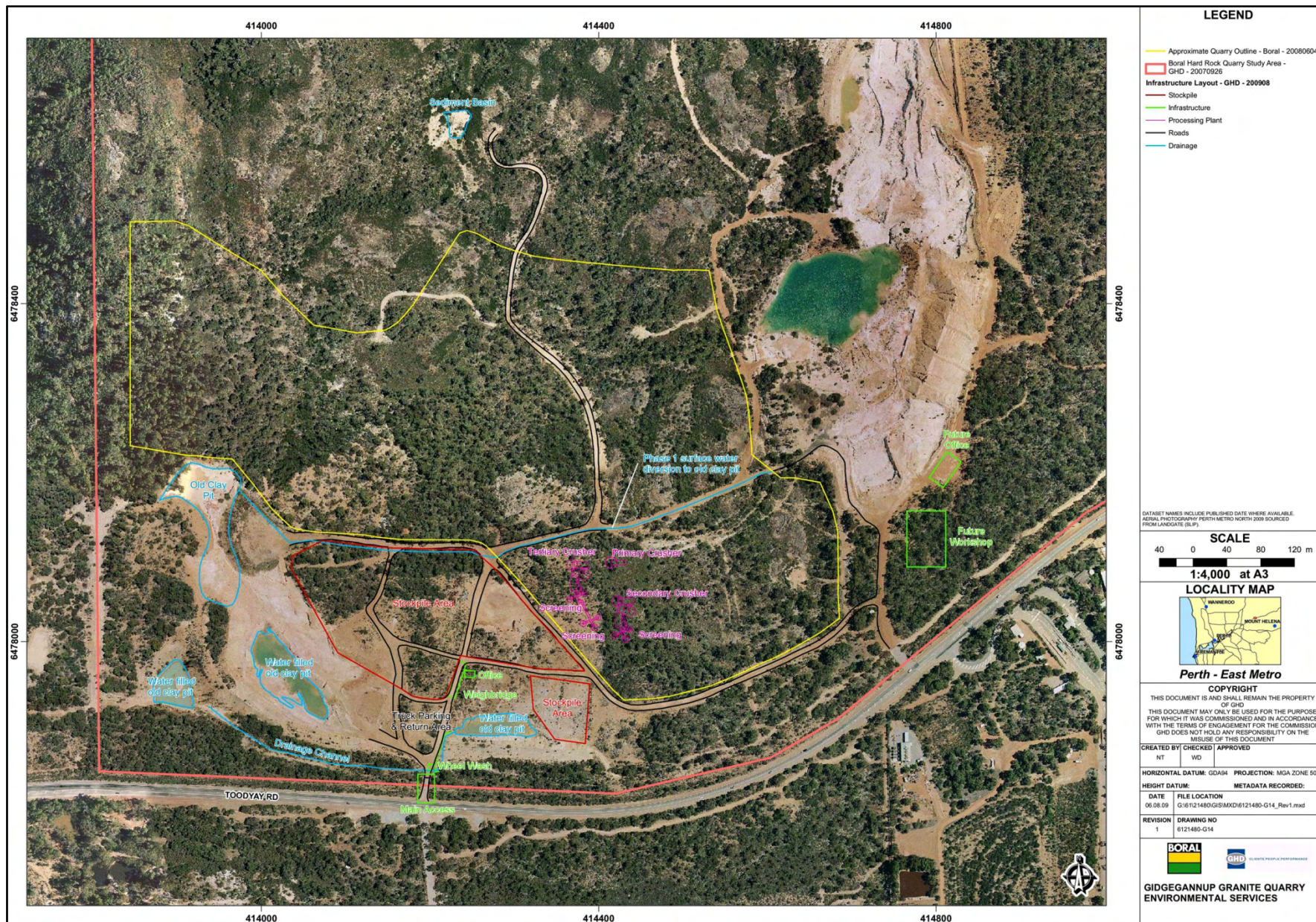


Figure 2: Proposed Site Layout

3.1 Vegetation, Fauna and Fauna Habitats

Description

The proposal would involve clearing 31 ha of native vegetation with resultant impacts on fauna and their habitats.

Vegetation

The site is situated on the Darling Range within the Dale Botanical Subdistrict of the Darling Botanical District. The remnant native vegetation community, according to Beard (1980), consists of Medium forest; Jarrah-Marri. The total current extent of this vegetation community within the Jarrah Forest IBRA region is approximately 1,660,000 ha which equates to 69.5% remaining of pre-European extent. Approximately 16% of this vegetation community is contained within IUCN class I-IV reserves (GHD, 2009b).

The proponent undertook a desktop assessment and site survey in October 2007. The site survey identified the following vegetation associations:

- Eucalypt/Woodland Forest (jarrah – marri forest on lateritic uplands, Marri Woodlands on lateritic clay soils and Wandoo Woodland on loamy lateritic slopes);
- mixed Heath on or adjacent to granite outcrops; and
- lithic Community on shallow soils over granite.

The distribution of these vegetation types is illustrated in Figure 3.

No threatened ecological communities (TECs) or Declared Rare Flora (DRF) species were identified; however, one Priority 4 species *Calothamnus rupestris* was recorded at 10 locations within the project area (Figure 4). All vegetation types and flora species surveyed were well represented outside the project area at a local and regional scale, including nearby conservation reserves such as John Forrest National Park and the Darling Range Regional Park.

Thirty-two weed species were recorded, of which one, Paterson's Curse (*Echium plantagineum*), is a Declared Plant (category P1) under the *Agriculture and Related Resources Protection Act 1976*. This prohibits movement of the plant and its seeds or contaminated machinery, livestock or fodder within the State.

The majority of the project area is thought to be *Phytophthora cinnamomi* (dieback) free however some plant deaths attributed to dieback infestation have been identified, particularly on the jarrah-marri forest on the lateritic upland area (GHD, 2009b).

Fauna

The site is transitional between the coastal plain and the Darling Range and supports some vertebrate coastal plain species as well as those of the northern scarp and a few species that are more commonly associated with the Wheatbelt. Diverse fauna habitats occur within a small area, with Wandoo, heaths of gravelly sands around granite outcrops and a seasonal watercourse all contributing to assemblage richness.

A Level 1 desktop and reconnaissance fauna survey was undertaken for the project area in October 2007. The proponent has also used information obtained for a Level 2 fauna survey conducted for Hanson's Red Hill Quarry in December 2006. The survey included a trapping program over 8 nights. The proponent considers that habitats assessed within the Hanson Red Hill Quarry are contiguous with the project area and the same species can be expected to occur in both areas (GHD, 2010).



Figure 4: Distribution of Significant Flora and Declared Weeds within the Project Area

Table 2 identifies conservation significant vertebrate species that are likely to be present within the project area based on surveys of both the project area and Hanson's Red Hill Quarry. The Quenda and the South-West Carpet Python were not found during the December 2006 survey but had been reported in the area previously.

Table 2 - List of Conservation Significant Fauna Likely to be Present

| | Name | Conservation Status |
|-----------------|--|---|
| Birds | Baudin's Black-cockatoo, <i>Calyptorhynchus baudinii</i> | Endangered (EPBC Act), Schedule 1 (Wildlife Conservation Act) |
| | Carnaby's Black-cockatoo, <i>Calyptorhynchus latirostris</i> | Endangered (EPBC Act), Schedule 1 (Wildlife Conservation Act) |
| | Forest Red-tailed Black-cockatoo, <i>Calyptorhynchus banksii</i> | Vulnerable (EPBC Act), Schedule 1 (Wildlife Conservation Act) |
| | Peregrine Falcon, <i>Falco peregrinus</i> | EPBC Act |
| | Rainbow Bee-eater, <i>Merops ornatus</i> | EPBC Migratory Species |
| | Barking Owl, <i>Ninox connivens</i> | Priority 2 (Wildlife Conservation Act) |
| | Masked Owl, <i>Tyto novaehollandiae</i> | Priority 3 (Wildlife Conservation Act) |
| Mammals | Chuditch, <i>Dasyurus geoffroi</i> | Vulnerable (EPBC Act), Schedule 1 (Wildlife Conservation Act) |
| | Brush-tailed Phascogala, <i>Phascogale tapoatafa</i> | Schedule 1 (Wildlife Conservation Act) |
| | Quenda, <i>Isodon obesulus fusciventer</i> , | Priority 5 (Wildlife Conservation Act) |
| | Western Brush Wallaby, <i>Macropus irma</i> | Priority 4 (Wildlife Conservation Act) |
| | Water Rat, <i>Hydromys chrysogaster</i> | Priority 4 (Wildlife Conservation Act) |
| Reptiles | South-West Carpet Python, <i>Morelia spilota imbricata</i> | Priority 4 (Wildlife Conservation Act) |
| | Southern Death Adder, <i>Acanthophis antarcticus</i> | Priority 3 (Wildlife Conservation Act) |
| | Dell's Skink, <i>Ctenotus delli</i> | Priority 4 (Wildlife Conservation Act) |

The surveys also found apparently large populations of Mardo (*Antechinus flavipes*), Dunnart (*Sminthopsis gilbertii*), Western Pygmy-possum (*Cercartetus concinnus*) and Honey Possum (*Tarsipes rostratus*). These species are considered locally significant due to their presence close to Perth.

One species of gecko, recorded as *Diplodactylus* aff. *Polyopthalmus*, was recorded during surveys of the Hanson Red Hill site in December 2006. The gecko was not found again in subsequent surveys in 2007. It was originally thought that the gecko was of uncertain taxonomic affinities and that there may be two or more species currently classified as *Diplodactylus polyopthalmus* at Red Hill, but there was insufficient information to distinguish between them or assign distribution limits (Harris and Bamford, 2007b + c). Genetic testing conducted by the WA Museum indicated that it was not an undescribed taxon but most likely to be *Diplodactylus*

polyophthalmus. The current distribution of the gecko extends from the Swan coastal plain and the Darling Range to the South West (GHD, 2010).

Invertebrates that are potential short range endemics (SRE) were searched for in the December 2006 survey and in opportunistic surveys in May and September 2007. One conservation significant species (local significance) of invertebrate, a millipede, *Dinocambala ingens*, was found and another conservation significant scorpion-fly, *Austromerope poultonii*, was expected to be present. Typically for a SRE invertebrate, *Dinocambala ingens* was found associated with a discontinuous habitat of granite outcrops and associated gravelly sands. A strong possibility exists that there may be other SRE invertebrates associated with this habitat. No systematic winter sampling of this area was undertaken, only an opportunistic search during a one day survey for the gecko *Diplodactylus polyophthalmus*. During the half day survey in September 2007, particular attention focussed on trapdoor spiders but no burrows were located (Harris and Bamford, 2007a).

Faunal assemblage

The vertebrate assemblage is typical of the Darling Scarp and is notable for the wide range of species so close to Perth, the presence of coastal plain species that are at the inland limit of their range in valleys of the western scarp, several species that are virtually restricted to the scarp and several species that are at the western limit of their range. Much of the assemblage is made up of widespread species (Harris and Bamford, 2007a).

The reptile assemblage is potentially significant as it contains Swan coastal plain, Darling Range and Wheatbelt species. The presence of sandy soils around the granite areas enables the site to support reptiles from the coastal plain and the Darling Scarp. An investigation into suitable areas of similar habitat outside of the Red Hill quarry area, particularly those in secure reserves, and the connectivity between areas, found that similar habitat was widespread but fragmented, almost certainly forming a continuous patchwork along the Avon River from Walyunga to the Avon Valley Park, with good representation in reserves. It is thought that the short distances between habitat patches along the Darling Scarp are unlikely to produce major genetic differences between populations of reptiles and SRE invertebrates. The total area of potential habitat identified in the report was 2011 ha of which 408.5ha (20.3%) was within or adjacent to the Red Hill quarry. This area may be the biggest continuous example of the fragmented habitat. It was also identified that urban development between John Forrest National Park and the Helena River, and between Red Hill and Walyunga would separate and isolate clusters of the habitat (Bamford, 2010).

The frog assemblage is notable for the presence of species restricted to the Darling Scarp e.g. the Bleating Frog, *Crinia pseudinsignifera*, occurs only along the scarp in the Perth area and Hooting Frog is confined to the scarp (Harris and Bamford, 2007a).

Fauna habitat

Most of the site vegetation is in good condition and retains good quality habitat value. Eight trees were identified as potentially containing suitable hollows for nesting by black cockatoos.

Harris and Bamford, 2007, found that the following habitats located within the project area were important for fauna and locally rare:

- Eucalypt woodlands, especially those including Wandoo;
- granite outcrops;

- heaths around granite outcrops;
- lower slopes of hills where water is concentrated; and
- temporary creeks including Susannah Brook.

These habitats are considered to be locally rare. While they form a distinctive part of the landscape of the western escarpment, they are typically fragmented and small in area (Harris and Bamford, 2007a). It is the proponent's view that in a regional context these habitats are not unique and are protected nearby within reserves.

The proposed quarry would impact mostly areas of granite outcrops with associated heaths on gravelly sands, and eucalypt woodlands. Most of the significant reptile species are associated with granite areas and/or gravelly sands and accompanying vegetation associated with granites and this habitat also potentially supports short range endemic species. The vegetation types associated with this habitat are considered to be well represented in the nearby John Forrest National Park and the Monadnock reserves in the south-west region of Western Australia (Raines & Bamford 2009).

Fauna corridors and habitat linkages are important to allow animals to move between areas of resource availability. While the proposal would cause fragmentation of some habitat, fauna movement would not be restricted and movement from the scarp to the Swan Coastal Plain would not be interrupted. In addition, the provision of a fauna corridor along the western boundary of the site would help maintain north – south movement (GHD, 2010).

Proposed Management

- An onsite area comprising 48.35 ha of remnant vegetation would be conserved. This area includes Susannah Brook and a vegetated corridor providing linkages to surrounding vegetation.
- Disturbed areas would be progressively rehabilitated with endemic native species and conservation significant flora would be re-established if possible, around the pit and/or in rehabilitated areas.
- A weed management plan would be implemented to control the spread of weeds through limiting initial disturbance areas, restricting vehicles to established trafficable areas and undertaking appropriate control spraying using non-residual herbicides.
- Weed control measures for Paterson's Curse would be implemented prior to commencement of any vegetation clearance.
- A comprehensive dieback survey would be completed by a qualified dieback interpreter prior to the commencement of clearing or ground disturbing activities, to determine the presence of dieback within the project area and Dieback management procedure implemented as required.
- A fauna trapping and relocation program to be undertaken prior to commencement of clearing. Fauna would be relocated to suitable areas to be confirmed with the Department of Environment and Conservation (DEC).
- A nesting box program would be developed in consultation with DEC to replace the loss of potential nesting hollows in any habitat trees.
- Large logs would be used to enhance habitat values around the edges of the quarry.
- The quarry pit perimeter would be bunded to deter fauna from approaching and falling over the quarry face.
- Speed limits would be restricted on haul roads.
- Rehabilitation would aim to provide alternative food sources for native fauna species, in particular black cockatoo species, through replanting of native prime

feed species, such as *Allocasuarina*, *Banksia*, *Ecualuptus*, *Grevillea* and *Hakea* species that currently occur at the Site.

Submissions

Submissions for this factor raised the following key issues:

- inadequate surveys of vegetation and groundwater on the site;
- concern about relevance of Hanson survey to this site and more in-depth site fauna surveys should have been undertaken over a more representative time period (ie capture all seasons, night and day);
- impact on Carnaby's Cockatoo and concern that the Carnaby's Cockatoo assessment was not sufficient;
- cumulative impact of this proposal and existing operations on loss of Carnaby's habitat;
- impact of development in the area on loss of fauna habitat and fragmentation including migration corridors, food sources, large nesting trees;
- adequacy of dieback management measures;
- rehabilitation of the proposed quarry and the existing clay pit, including concerns regarding quality of previous rehabilitation attempts in the clay pits; and
- offset areas would need to include appropriate nesting and foraging habitat.

Assessment

The area considered for the assessment of this factor is the project site and reserves within 10 km of the project area.

The EPA's environmental objective for this factor is to maintain the abundance, diversity, geographic distribution and productivity of flora and fauna species at ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

Vegetation

It is noted that the proposal would result in the loss of Priority 4 species *Calothamnus rupestris* which was recorded at 10 locations within the project area. This flora species is well represented outside the project area within reserves such as John Forrest National Park and the Darling Range Regional Park. It is unlikely that the project would have a significant impact on this flora species.

The clearing of 31 ha of jarrah-marri forest is not expected to cause significant impacts to this vegetation type as it is well represented outside the project area with 69.5% of pre- European extent remaining and 16% within reserves. This includes that this vegetation type is also reserved in the nearby John Forrest National Park and Darling Range Regional Park.

The proponent has committed to undertake a more comprehensive dieback assessment of the project area. The EPA notes that a site assessment has identified dieback within jarrah-marri forest on the upland area, however, no map was provided to show the location of infestations.

The EPA recommends that a condition be imposed requiring a dieback survey of the project area to identify existing areas of infestation within the project area. The condition would also require the proponent to ensure the proposal does not introduce or spread infestations of dieback on the site.

The EPA finds that with the management proposed by the proponent and the condition recommended by the EPA the proponent can manage the risk of weeds to an acceptable level.

Significant Fauna and Fauna Habitat

According to Table 3 of EPA Guidance Statement No 56 (EPA, 2004), the scale and nature of the proposal could have a high impact on the following:

- impacts to fauna protected under international agreements or treaties, Specially Protected or Priority Fauna as faunal assemblage includes species of high conservation significance;
- impacts to other fauna which are significant as many are species that have locally declined due to clearing on the Swan Coastal Plain, are unusual in an area so close to Perth, and are species normally found on the coastal plain or with limited distribution on the scarp;
- impact to ecological linkages as the project area is strategically placed between John Forrest National Park and the Darling Range Regional Park; and
- impacts to heterogeneity or complexity of the habitat and faunal assemblage as the project area has high habitat heterogeneity and a complex faunal assemblage.

These potential impacts would normally require a Level 2 fauna survey comprising multiple surveys conducted in each season appropriate to the bioregion and the faunal group. The EPA notes that the proponent has only conducted a Level 1 flora and fauna study of the project area which involved a desktop assessment and 1 day reconnaissance survey. However, the proponent has also used information from a Level 2 fauna survey conducted for Hanson's Red Hill quarry which is immediately west of the project area. The EPA considers that due to the close proximity of this proposal to Hanson's Red Hill quarry, the habitats assessed within the Hanson Red Hill Quarry are contiguous with the project area and the same species are likely to occur in both areas. Therefore, the results of the Level 2 fauna survey for Hanson's Red Hill Quarry have been applied to this assessment.

The EPA notes that the proposal could impact significant fauna species which are likely to occur in the project area. These species include; Carnaby's, Baudin's and Forrest Red-tailed Black-cockatoos, Peregrine Falcon, the Rainbow Bee-eater (Migratory species), Barking Owl, Masked Owl, Chuditch, Brush-tailed Phascogale, Quenda, Western Brush Wallaby, Water Rat, the South-West Carpet Python, Southern Death Adder, Dell's Skink and locally significant species.

Of the reptile species found on the adjoining site, the EPA notes that the 2006 fauna report by Harris and Bamford refers to the presence of the legless lizard *Pletholax gracilis*. Red Hill was also listed as a Darling Range location for this species by Bush et al. (1995). This species, until recorded from the Hanson Quarry project area, was only known from sands of the Swan Coastal Plain where it has undergone significant population and distribution decline. The fauna report also lists the presence of the snake species *Demansia psammophis*, another regionally declining species which was not recorded on any of the twelve Coastal Plain sites listed by How and Dell (1994); the gecko *Crenadactylus ocellatus* only recorded on one site; and *Diplodactylus granariensis* not recorded on the Coastal Plain but in one site on the Darling Range.

The only short range endemic, the millipede *Dinocambala ingens*, is likely to be found in conservation reserves on the scarp and is known from other sites from

Serpentine to north of Red Hill. Specific impact mitigation measures are therefore not required for this species.

Potential impacts to these species from the proposal are expected to be:

- loss of habitat, including foraging habitat;
- fragmentation of populations; and
- operational impacts which include vehicle movement.

These species have suffered impacts from habitat loss due to the extensive development on the Swan Coastal Plain.

The 2006 and 2010 fauna surveys undertaken by Harris and Bamford identified significant habitats located within the adjoining area. These habitats include:

- granitic outcrops, providing habitat for species such as Carpet Pythons, Ornate Dragons and possibly Dell's Skink;
- heaths of gravelly sands close to areas of exposed granite, important for many reptile, bird and mammal species, and potentially supporting short range endemic invertebrates;
- lower slopes of hills where water is concentrated, creating seasonal pools and dense vegetation. Such areas are important for a number of locally significant bird species; and
- temporary creeks, such as Susannah Brook, important for breeding by frogs and with potential downstream influences.

The EPA notes that these surveys only considered impacts from the proposed expansion of the Hanson Red Hill quarry which is currently being assessed by the EPA. That proposal would result in the loss of approximately 80 ha of habitat. Implementation of this (Boral's) proposal would result in an additional loss of 31 ha of habitat.

In regard to significant fauna and the loss of fauna habitats, the EPA notes that these habitats are well represented outside the project area in reserves such as John Forrest National Park and the Darling Range Regional Park. Overall implementation of this project is unlikely to significantly affect populations of significant fauna species including threatened Cockatoo species. However, the incremental loss of habitat that supports threatened fauna continues to increase pressure on these species over time. The proponent's commitment to conserving 48.35 ha of land in perpetuity within the project area would provide further protection for habitats that support these and other fauna species.

Notwithstanding the above the proponent has proposed to relocate significant fauna species in advance of clearing. The EPA recommends a condition be imposed for the relocation of species prior to clearing by suitably experienced fauna handling personnel.

The EPA also notes that the proponent has proposed to manage impacts to fauna by rehabilitation of the quarry area. Rehabilitation of a hard rock quarry is unlikely to be able to replicate the original vegetation species and density and the current rehabilitation plan contains no completion criteria for the percentage of original species to be re-instated. Granite outcrops would be permanently removed. Wandoo and eucalyptus woodland would not easily be recreated on the benches of the quarry with limited soil depth. However, rehabilitation of the quarry will be

necessary to reduce potential visual impacts from the proposal. This is discussed further in section 3.4.

Summary

Having particular regard to:

- The proposal will result in the loss of 31 hectares of vegetation supporting significant and other fauna species.
- The vegetation type has 69.5% of the pre-European extent remaining of which 16 % is in secure reserves.
- The vegetation type and fauna habitat are found in nearby conservation reserves including John Forrest National Park and Darling Range Regional Park.
- The loss of 31 hectares is unlikely to significantly impact populations of significant fauna including threatened Cockatoo species.
- The proponent will conserve 48.35 ha for conservation,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objectives for this factor provided a condition is imposed requiring the proposal to:

- (a) trap and relocate significant fauna before clearing vegetation (condition 6);
- (b) ensure dieback infestations and weeds are managed effectively (condition 7); and
- (c) conserve 48.35 hectares of native vegetation in perpetuity (condition 11).

3.2 Air Quality and Noise

Description

Air Quality

The proposed Quarry operations would consist of drilling and blasting of rock, loading and haulage of blasted rock to the processing plant for crushing, screening and stockpiling and loading of product for transport off-site. These processes, together with wind erosion of open or disturbed ground, would generate dust and could impact nearby residential properties.

A marked seasonal trend in dust emissions would be expected from the above sources due to changes in ground cover and soil moisture. Dust would be higher during summer when soil moisture is lower and ground cover is lower.

Historically, dust was not monitored in the area surrounding the proposal. It is common practice where background monitoring is not available to use the 75th percentile level from a 'representative' location to represent the background level. The DEC provides 75th percentile dust concentrations at three sites in metropolitan Perth; Caversham (north east metro); Dun Craig (north metro) and South Lake (south east metro). Using the above methodology and data from these three DEC monitoring sites, a background level of 20 $\mu\text{g}/\text{m}^3$ has been estimated and used during assessment of likely impacts from the proposed quarry (GHD, 2009a).

Potential health impacts are attributable to the concentration of respirable particles in ambient air. Respirable particles of dust have an aerodynamic equivalent diameter of 10 microns or less and are known as PM_{10} . These fine fractions of dust would have maximum impact under light winds and stable atmospheric conditions. These conditions are more likely to occur during the night and very early in the morning, and therefore, become significant only if operations extend outside typical operating hours (GHD, 2010).

The presence of larger suspended dust particles, greater than 35 micron, is likely to affect amenity by reducing visibility and by dust deposition. Amenity impacts are most marked in high wind conditions, when larger particles may be displaced and transported a significant distance before being deposited. Mitigation of amenity related dust impacts would in turn act to reduce health impacts due to dust emissions.

Figure 5 shows in orange contours the 50, 100 and 200 $\mu\text{g}/\text{m}^3$ PM_{10} (24 hr) levels. These contours include a background level of 20 $\mu\text{g}/\text{m}^3$ PM_{10} . The dark blue crosses represent the sensitive receptors (e.g. residential properties), while the red crosses represent the Hanson Red Hill Quarry staff buildings and Red Hill Disposal Site staff buildings. It can be seen from Figure 5 that the criterion of 50 $\mu\text{g}/\text{m}^3$ extends outside the quarry boundaries to the south, and encompasses two of the receivers, the Red Hill Disposal Site and Hanson Red Hill Quarry (staff buildings).

The management of dust at the quarry would be achieved through implementation of an Environmental Management Plan, incorporating a Dust Management Plan. Dust management actions have been developed to reduce dust from the largest contributing sources, these measures include:

- use of dust suppression measures (i.e. foaming agents and water sprays) on crushing, screening and conveying transfer points on the three crushing units;
- having water carts available for application of water or other dust suppressants to unsealed haul roads;
- enforcement of speed limits within the plant and stockpile areas (20 km/hr) and on haul and exit roads (40 km/hr);
- operation of water canon on plant and product stockpiles and other exposed surfaces;
- timing of blasting operations to reduce dust through consideration of meteorological conditions (wind speed and direction);
- clearing vegetation in a staged manner to reduce open, exposed areas;
- maintaining a buffer zone of vegetation or building bunds to act as a windbreaks to reduce wind speed;
- covering and/or wetting truck loads of product prior to leaving the proposed quarry;
- installation and use of a wheel wash to ensure minimal mud and dust deposited onto public roads (Toodyay Road); and
- undertaking progressive rehabilitation of quarried areas to reduce the total exposed area.

Noise and Vibration

Quarrying activities could result in noise and vibration impacts to nearby residential properties. The nearest sensitive receptor is a residence located approximately 850 m to the east of the project area.

A noise assessment was undertaken by Lloyd George Acoustics for two scenarios. The first scenario considered was start-up when all process plant would be on surface. The second scenario, future operations, is when the process plant would be at 20 m below current ground surface. The assessment indicated the following;

- Noise levels may exceed assigned daytime levels during start-up and future operations if no noise amelioration is implemented.
- Once the process plant has been excavated to 10 m below ground level, noise from this plant should comply with the *Environmental Protection (Noise) Regulations 1997* (Lloyd George Acoustics, 2009)

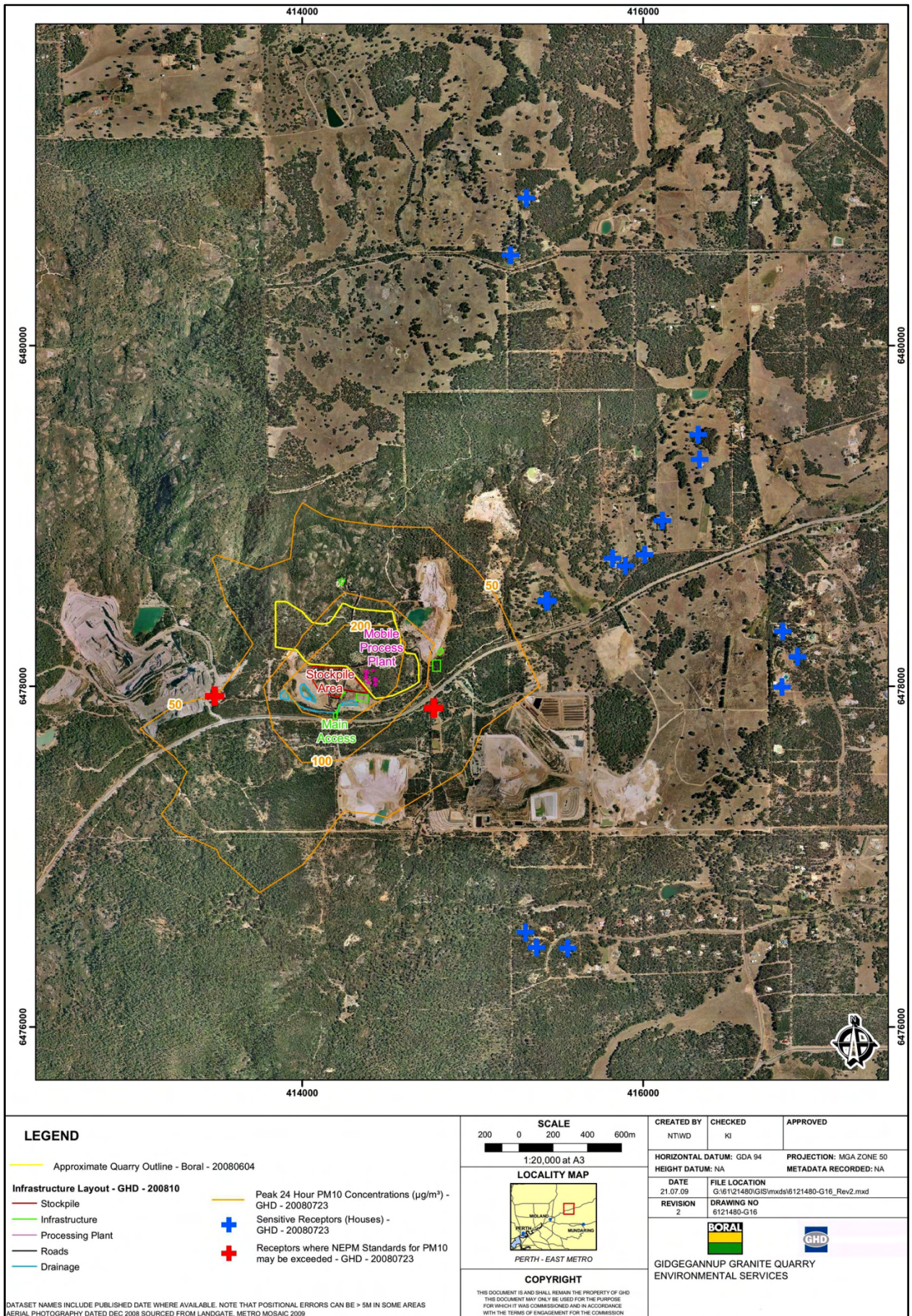


Figure 5: Predicted Peak 24 Hour PM₁₀ Concentrations

When the quarry is running at its peak capacity, it is anticipated that there would be one to two blasts per month on average. Based on the proposed annual extraction volume of 500,000 tonnes, it is anticipated that approximately 12 blasts would be required per year. Blasting vibrations can travel long distances through soils and rock. The maximum allowable charge mass per delay for each blast has been calculated to ensure that noise impacts on neighbouring premises comply with the *Environmental Protection (Noise) Regulations 1997*.

The quarry process plant would operate from Monday to Saturday, between 5 am and 6 pm (excluding public holidays). Crushing and screening operations would be limited between 7am and 6pm. Noise management measures include;

- an 8.5 m height bund would be constructed on the northern and eastern sides of the processing plant area to achieve compliance at the start-up stage;
- 'quiet' alarms such as Smart Alarms that emit a noise only 5 dB above ambient noise and/or low frequency 'croaker' alarms would be used;
- internal roads would be designed to eliminate the need for reversing of road trucks where practicable; and
- equipment and machinery, specifically their mufflers, would be maintained (GHD, 2010).

Where mobile equipment must be located near surface level, activities would be managed to avoid works during westerly wind conditions, wherever possible. It may be necessary for unplanned emergency works to be completed outside of the normal work hours. Works outside of normal hours would only be required when an event, such as bushfire or severe storm, pose a risk to safety or the environment. Should unplanned emergency works be required, Boral would notify the CEO of the DEC as soon as practicable, in accordance with Section 75(1) of the *Environmental Protection Act 1986*.

In order to manage noise, vibration and potential fly rock from blasting, charges would be designed to keep noise and vibration below the allowable limits and to ensure the safety of nearby land users. Vibration and airblast would be measured on an on-going basis and blast parameters would be modified accordingly by the blast services provider. Measurements would be reported back to the proponent's Stakeholder Reference Group. The blast services provider would carry out specific risk assessments and trial blasts to quantify necessary clearance distances. Firing would be away from Toodyay Road, and would be managed to ensure that fly-rock does not pose a risk to road traffic or surrounding land users. The blasting risk assessment completed by Orica Mining Services indicates that no significant impact from blasting would be experienced. The trigger levels that have been assigned for vibration and airblast are 0.3mm/s and 95% dBL respectively (Orica, 2008). A minimum of three blast monitoring locations would be established at the closest neighbouring properties to measure airblast overpressure and blast vibration limits. The proposed monitoring locations are as following:

- between the starter pit and Lot 51 Toodyay Road;
- between the starter pit and Red Hill Disposal Site weighbridge and offices; and
- between the starter pit and the Red Hill Disposal Site Gas and Power – Power Station No. 1.

Submissions

The majority of submissions for this factor raised issues with respect to:

- the need for noise management plans during the construction phase;

- concern regarding construction noise;
- concern regarding out-of-hours construction work;
- noise from non-Boral vehicles accessing the site would need to conform to Boral's noise management plan;
- concern about noise management for temporary infrastructure, ie mobile crushing, screening;
- concern regarding dust impacts on neighbours;
- cumulative impacts on air quality;
- removal of vegetation would limit ability of area to contain dust; and
- the need for ongoing dust monitoring.

Assessment

The areas considered for the assessment of this factor are the project area and nearby residential properties.

The EPA's objectives for this factor are to:

- ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards;
- to protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring the noise levels meet statutory requirements and acceptable standards; and
- to ensure that risk from the proposal is as low as reasonably achievable and complies with acceptable standards and EPA criteria.

Air Quality

The EPA notes that quarrying activities would create dust and could impact nearby residential properties if not managed effectively. The closest residential receptor is approximately 850 m east of the proposed quarry.

The proponent has developed management measures to ensure dust emissions from the project area do not exceed the PM₁₀ standard of 50 micrograms per cubic metre (µg/m³) averaged over a 24 hour period at sensitive receptors such as residential properties. Dispersion modelling of predicted peak PM_{10 (24hr)} levels for air quality indicate that that this standard should be achieved at all nearby residential properties as shown in Figure 5.

The EPA notes that the staff buildings at the Red Hill Disposal Site and Hanson Red Hill Quarry could be impacted by dust levels from the project area which exceed 50 µg/m³ averaged over a 24 hour period. However, since these two locations are within industrial sites which undertake activities that produce dust emissions, it would not be appropriate to apply the PM₁₀ standard of 50 µg/m³ at the boundary adjacent to these properties.

The EPA considers that a condition should be applied to this proposal to ensure dust emissions leaving the eastern property boundary at the receiving residential boundary conform to the 50 µg/m³ standard. Monitoring of the other boundaries to this standard is not considered necessary as they are adjacent to industrial areas or vacant land and can be managed under EP Act Part V license conditions.

Noise

Noise generated from construction and operational activities could impact nearby residential properties.

The EPA notes that construction and operational activities are likely to exceed the Environmental Protection (Noise) Regulations for daytime levels during start-up until the process plant has been excavated at least 10 m below ground level. Modelling indicates that the plant would comply with the noise regulations once the process plant is below this level. Until this occurs, the proponent plans to construct a noise attenuation bund along the east and northern sides of the process plant. The noise attenuation bund, which forms part of the proposal, would ensure that the noise regulations are complied with at residential properties. The EPA supports this management measure.

Noise emissions from construction and operational activities are regulated under the Environmental Protection (Noise) Regulations. Sections 7 and 8 of the noise regulations relate to the regulation of operational noise, section 11 for airblast levels due to blasting and section 13 for management of construction noise. Since the proposal would be required to conform to the noise regulations, it is not considered necessary for the EPA to impose a condition to regulate noise emissions.

Summary

Having particular regard to the:

- (a) management measures put in place to ensure dust emissions from the project area do not exceed $50 \mu\text{g}/\text{m}^3$ averaged over a 24 hour period at residential property boundaries;
- (b) construction a noise attenuation bund along the east and northern sides of the process plant; and
- (c) restriction of operation hours for the processing plant of 7am to 7pm Mondays to Saturdays (excluding public holidays),

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objectives for this factor provided a condition is imposed requiring the proponent to:

- monitor and report on dust emissions leaving the project area boundary into residential properties to ensure the PM_{10} value of $50 \mu\text{g}/\text{m}^3$ averaged over a 24 hour period is not exceeded (condition 8).

3.3 Surface Water

Description

The proposal could impact surface water quality by increased sediment loads or hydrocarbon/chemical contamination to Susannah Brook if stormwater runoff from the project area is not managed effectively.

The footprint of the quarry falls within the Susannah Brook Catchment. Susannah Brook is an ephemeral stream that drains the Darling Scarp and flows into the upper Swan River at Herne Hill. The average annual flow into the Swan River is approximately 5.9 GL per year. Monitoring of the brook by the Swan River Trust from 1996 – 2006 indicated that phosphorus and nitrogen levels were low and met short and long-term targets (SRT, 2006).

The quarry proposal (including existing clay pits) reduces the catchment for Susannah Brook from 59.32 km² to 58.90 km², a 0.7% reduction. Downstream flow signatures are not expected to be significantly altered by the minor loss of catchment area of the quarry operations. The pit would be excavated to a depth approximately 25 m above the base of Susannah Brook (GHD, 2010).

All stormwater from the quarry would be directed to on-site water filled clay pits or storage dams. Stormwater at the site is currently routed to two western holding dams by a series of bunds and pipes. A third clay pit can be utilised during quarry operations to capture sediment and storm events. The stormwater dams would act as sediment basins and it is not expected that excessive sediment would be released to Susannah Brook from the project area. The most western stormwater dam has an existing emergency overflow that would allow controlled release if required. Other clean surface runoff water which does not flow into these dams flows to a constructed sediment trap dam, which has a membrane and filter bed.

Stormwater dams would be designed to hold all onsite surface water run-off. Boral does not expect to need to release water into Susannah Brook from these dams. However, if such a release is necessary, it would need to meet water quality standards and the appropriate approvals or changes to existing approvals would be sought. These requirements, as well as those relating to stormwater management, washdown areas and water quality and quantity monitoring would be finalised as part of the final site layout.

Most of the stormwater drains would be designed for an Average Recurrence Interval (ARI) of 10 years, plus an appropriate freeboard. Stormwater drains and pipes at the main entrance would be designed for an ARI of 20 years in order to safeguard against having stormwater run down the entrance road and on to Toodyay Road (GHD, 2008).

Boral has undertaken water quality monitoring along Susannah Brook within the project area to obtain baseline water quality information. Boral plans to continue this monitoring for the life of the project on a monthly basis from first flows until flow ceases. Figure 6 shows the monitoring locations. Trigger levels for water quality have been developed to identify when management action is required for surface water entering Susannah Brook from the project area. A key indicator for water monitoring is total suspended solids (TSS) (Boral, 2010). Values for evaluation and reporting are as follows:

- Low: < 5 mg/L
- Moderate: 6 – 10 mg/L
- High: 11 – 25 mg/L
- Very High: > 25 mg/L

Further management practices that would be implemented in order to mitigate any potential stormwater runoff impacts include:

- A wheel wash facility would be installed at the entrance of the Site to ensure that sediment is not transported off site by vehicle wheels;
- Material stockpiles would be contained within a sediment fence; and
- An oily water separator would be installed at the workshop. Waste oil would be removed off-site for recycling or disposal and clean water discharged to the on-site dams.

Submissions

The majority of submissions for this factor expressed concern regarding surface water discharged from the project area to Susannah Brook may have a significant impacts on water quality. Concern was also raised regarding surface water draining from site into the main road drain on Toodyay Road and the lack of clarity regarding water storage quantities and usage.

Assessment

The area considered for the assessment of this factor is the Susannah Brook Catchment area.

The EPA's environmental objectives for this factor are to:

- maintain the quantity of surface water so that existing and potential environmental values, including ecosystem maintenance, are protected; and
- ensure that the quality of water emissions (surface, ground, and marine) does not adversely affect environmental values or the health, welfare and amenity of people and land uses, and meets statutory requirements and acceptable standards.

Susannah Brook is an important ephemeral stream that contributes an average of 5.9 GL or 2.3% of the total inflow into the Swan River. The water quality of Susannah Brook is generally very good with low levels of nitrogen and phosphorus (SRT, 2006). The Susannah Brook Catchment area can be divided into three sections;

- lower – located on the Swan Coastal Plain where the predominant land use is horticulture;
- middle – located on the Darling Scarp where the land use is a mix of remnant native vegetation, quarries and pastoral; and
- upper – located in the Darling Range where the majority of land has been cleared for agricultural use.

The project area is located within the middle section of the catchment where a loss of 28 ha of native vegetation due to the quarry pit represents a 0.5 % reduction in the total catchment area of 59.32 km². The EPA considers that this loss in catchment is unlikely to have a significant impact on the flow values for Susannah Brook.

The proponent plans to manage surface water by diverting and retaining all surface water to on site stormwater dams or clay pits. While the EPA supports this management action, there is concern regarding the potential for uncontrolled flows of surface water from stormwater dams and clay pits to Susannah Brook. The provision of a sediment trap dam and appropriate dam design to withstand significant rainfall events should ensure surface water flows from the project area do not impact Susannah Brook.

The EPA also notes that the discharge of surface water from a proposal to the environment requires licensing under Part V of the EP Act. Generally, conditions require the proponent contain contaminated surface water on the premises. If surface water is discharged from the premises, the proponent must demonstrate that it complies with a certain quality to prevent environmental harm. The proponent would therefore be required to monitor, sample and report any surface water discharge from the site.

The EPA concludes that this factor can be adequately managed by licensing under Part V of the EP Act.



Figure 6: Surface Water Monitoring Locations

Summary

Having particular regard to the:

- (a) containment of surface water within the project area;
- (b) sediment traps to mitigate potential sedimentation of Susannah Brook if surface water is released from site; and
- (c) requirement for surface water discharged to be licensed under Part V of the EP Act,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective(s) for this factor.

3.4 Visual Amenity

Description

The proposal would result in visual amenity impacts to the north and west of the site.

The proponent commissioned GHD to undertake a landscape and visual assessment of the proposed quarry with particular focus on where the quarry face reaches the highest elevation in the landscape. The assessment involved the following steps:

- GIS modelling for viewshed or 'seen area' analysis using 3 m contour intervals to assess visibility or non visibility consequent on surface topography;
- Field reconnaissance of the immediate landscape setting and regional setting to 'ground truth' the viewshed analysis, interpret results and assess landscape and visual characteristics; and
- Research the City of Swan land use database to determine current and proposed land use change to inform the viewshed/seen area analysis.

The proposal would result in a quarry face on the eastern side that would cut into higher elevation terrain, the top of which would be visible from additional positions in the surrounding landscape than is the case with the existing quarry void. The maximum visible quarry face would be approximately 14.8 m high for areas to the north-west within the Swan Valley and 10.9 m for areas to the north (Figure 7). The most visible upper bench would not be used for operations and should be available for rehabilitation shortly after development (GHD, 2010). Quarry walls facing east and south are unlikely to be rehabilitated, as they present no visual impact to surrounding sensitive areas.

The quarry would be visible from a number of residences, to the north and north-west as shown in Figure 7. Seen Area 1 comprises forested landscape in the control of the existing quarry operators and adjacent neighbouring agricultural land (due north of the proposed quarry expansion). The area is well vegetated, hence the degree of visual accessibility in a southerly direction is uncertain. Seen Area 2 consists of a diverse landscape of forests and open farmland with scattered tree cover on significantly undulating terrain. To the north of the proposed quarry, the tree cover serves a critical function in providing foreground and ridge top barriers to open visibility to the south. However, landscape mitigation intervention may be required to screen areas with open visibility to the site within Seen Area 2. The quarry would also be seen from some areas within Seen Area 3 (GHD, 2010).

Proposed Management

The quarry would be developed in stages including topsoil draping and rehabilitation utilising the stockpiled overburden and topsoil. Boral would prioritise rehabilitation of

exposed faces visible from the north and, to a lesser extent the west. Upper benches of the quarry would be progressively rehabilitated and landscaped to reduce visible impacts. Where practicable, existing exposed faces of the clay extraction area would be rehabilitated and planted to reduce visual impact (GHD, 2010).

Submissions

The submissions raised issues regarding this factor with respect to:

- concern regarding visibility of quarry and the “scar” it would leave on the Darling Scarp when viewed from the Swan Valley;
- the proponent undervaluing visual amenity to residents locally and in Swan Valley;
- insufficient detail and modelling of visual impacts;
- concern that rehabilitation would be inadequate in screening the quarry long term;
- concern that the quarry would be as visible as existing quarries on the Scarp;
- concern regarding how the acoustic relief bund would be vegetated and whether this is permanent; and
- concerns regarding the visibility of stockpiles from Toodyay Road.

Assessment

The areas considered for the assessment of this factor are residential properties surrounding the project area that may be visually impacted by the quarry.

The EPA objective for this factor is to ensure that visual amenity is considered and measures are adopted to reduce adverse visual impacts on the surrounding environment as low as reasonably practicable.

A number of public submissions indicated concern that the proposal could significantly impact the visual amenity of the Darling Scarp when viewed from the Swan Valley. To mitigate impacts, the proponent plans to revegetate exposed benches that would be visible from the Swan Valley and to the north of the project area.

The EPA supports this management action by the proponent, noting that it is estimated a maximum of 15 m of the quarry face would be visible from Seen Area 3 and 11 m from Seen Area 2 (Figure 7). The EPA has therefore recommended a condition that requires the proponent to commence the rehabilitation of non-active benches that are visible to residential areas to the north-west and north of the project area. The condition would require rehabilitation to commence no later than 12 months of the benches not being required for active mining.

Existing clay quarries within the project area are also visible from the Swan Coastal Plain (specifically the Swan Valley) and to the north. The proponent has indicated that they would rehabilitate the exposed faces of these clay quarries where practical. The EPA considers that since the clay quarries are within the project area and the proponent has taken over full ownership and operational control of these resources, rehabilitation exposed faces of non-active clay quarries should also be a priority.

The EPA has recommended a condition requiring the proponent to develop a Final Decommissioning Plan to ensure all areas disturbed through implementation of the proposal (except the final quarry pit), including any existing clay quarries are rehabilitated using local flora species.

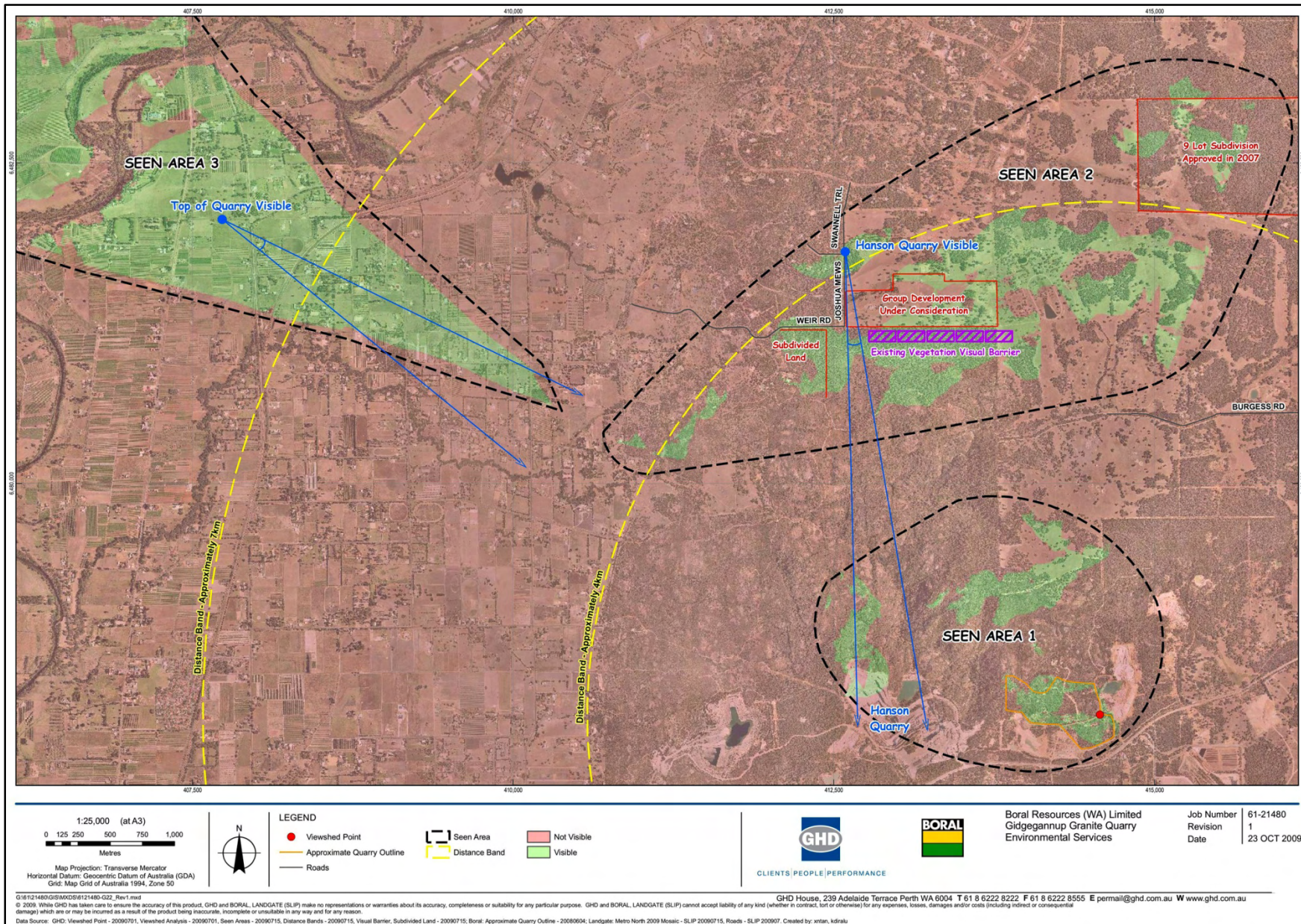


Figure 7: Viewshed Analysis: Seen Areas and Distance Bands

Summary

Having particular regard to the:

- (a) proponent's commitment to rehabilitating quarry benches visible in the Swan Valley and to the north and north-west of the project area;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided conditions are imposed requiring the proposal to:

- rehabilitate exposed quarry benches to an acceptable standard (condition 9); and
- develop a Final Decommissioning Plan to ensure the rehabilitation of all disturbed areas within the project area (condition 10).

3.5 Environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the *Environmental Protection Act (1986)*. Appendix 3 contains a summary of the EPA's consideration of the principles.

4. Conditions

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for Environment on the key environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

4.1 Recommended conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Boral Resources (WA) Ltd to develop a granite quarry in Gidgegannup, which is expected to yield up to 500,000 tonnes of rock per annum, is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

- (a) trap and relocate significant fauna before clearing vegetation (condition 6);
- (b) ensure dieback infestations and weeds are managed effectively (condition 7);
- (c) monitor and report on dust emissions leaving the project area boundary into residential properties to ensure the PM₁₀ value of 50 µg/m³ averaged over a 24 hour period is not exceeded (condition 8);
- (d) rehabilitate exposed quarry benches to an acceptable standard determined by the OEPA (condition 9);
- (e) develop a Final Decommissioning Plan to ensure the rehabilitation of all disturbed areas within the project area (condition 10); and
- (f) conserve 48.35 hectares of native vegetation in perpetuity (condition 11).

It should be noted that other regulatory mechanisms relevant to the proposal are:

- Part V Works approvals and licence under the *Environmental Protection Act 1986*

- Section 18 approval under the *Aboriginal Heritage Act 1972*
- Environmental Protection (Noise) Regulations

4.2 Consultation

In developing these conditions, the EPA consulted with the proponent and the Department of Environment and Conservation in respect of matters of fact and matters of technical or implementation significance. Minor changes, which did not change the intent or scope, were made to conditions 7 and 8.

5. Recommendations

The EPA submits the following recommendations to the Minister for Environment:

1. That the Minister notes that the proposal being assessed is for the development of a granite quarry in Gidgegannup, which is expected to yield up to 500,000 tonnes of rock per annum;
2. That the Minister considers the report on the key environmental factors and principles as set out in Section 3;
3. That the Minister notes the EPA has concluded that it is likely that the EPA's objectives would be achieved, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 4; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Appendix 1

List of submitters

Government Organisations

City of Swan

Department of Environment and Conservation (Noise Regulation Branch)

Department of Sustainability, Environment, Water, Population and Communities
(Commonwealth)

Office of the Environmental Protection Authority (Terrestrial Ecosystems Branch)

Non-government Organisations:

BGC (Australia) Pty Ltd

Gidgegannup Progress Association Inc

Jane Brook Catchment Group

Stoneville and Parkerville Progress Association Inc

Swan Valley Nyungah Community

Swan Valley Ratepayers and Residents Group

Individuals:

10 individual submissions

Appendix 2

References

AIC (2009), *Ethnographic Heritage Survey Report of the Proposed Hanson Quarry Development at Red Hill, Western Australia*, A Martin & A Lyneham of Australian Interaction Consultants, Prepared for Hanson Construction Materials Pty Ltd. March 2009.

Bamford, (2010), *Assessment of a Rare Habitat for an unusual Reptile Assemblage and SRE Invertebrates for Hanson Construction's Red Hill Quarry*, M Bamford, July 2010

Boral (2010), *Gidgegannup Granite Quarry – Public Environmental Review – Response to Submissions*, Boral Resources (WA) Pty Ltd, September 2010.

EPA (2004), *Guidance Statement 56, Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia*, Environmental Protection Authority, June 2004.

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GHD (2008), *Report for Gidgegannup Granite Quarry – Surface and Groundwater*, prepared for Boral Resources (WA) Ltd, GHD, June 2008.

GHD (2009a), *Report for Gidgegannup Granite Quarry – Dust Assessment*, prepared for Boral Resources (WA) Ltd, GHD, August 2009.

GHD (2009b), *Report for Gidgegannup Granite Quarry – Flora and Fauna*, prepared for Boral Resources (WA) Ltd, GHD, June 2009.

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Harris and Bamford (2007a), *Hanson's Red Hill Quarry, Assessment of Fauna Values*, Ian Harris and Mike Bamford, April 2007. Prepared for Hanson Construction Materials Pty Ltd.

Harris and Bamford (2007b), *Hanson's Quarry (Search for Gecko)*, Ian Harris and Mike Bamford, June 2007.

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Lloyd George Acoustics (2009), *Noise Impact Assessment – Gidgegannup Granite Quarry*, prepared for GHD on behalf of Boral Resources (WA), Lloyd George Acoustics, July 2009.

Orica (2008), *Risk Assessment Blasting Operations – Boral Gidgegannup Granite Quarry WA*, Orica Quarry Services, December 2008 (amended October 2009)

Raines & Bamford (2009), *Hanson's Red Hill Quarry Significant Habitats*, J A Raines and M J Bamford. December 2009. Prepared for Hanson Construction Materials Pty Ltd.

SRT (2006), *Susannah Brook – Fact sheet*, Swan River Trust, 2006

Appendix 3

Summary of identification of key environmental factors and principles

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|---|--|---|
| BIOPHYSICAL | | | |
| Surface Water | <p>The site is located to the south and west of Susannah Brook. Susannah Brook is approximately 20 km in length and the catchment covers an area of approximately 5500 ha. This relatively unregulated freshwater stream originates at Stoneville, flowing westerly into the upper Swan Estuary near Herne Hill.</p> <p>The proposed quarry footprint of 42 ha would impact on one of the ephemeral streams that drain into Susannah Brook. This would reduce the catchment by approximately 0.7%.</p> <p>The average annual flow of Susannah Brook is 5.9 GL which equates to approximately 2.3% of total inflow into the Swan River (Swan River Trust, 2007).</p> <p>Stormwater runoff from the site may result in changes to water quality to Susannah Brook, such as increased sediment loads or hydrocarbon/chemical contamination, if not correctly managed. All stormwater from the site would be directed to on-site water filled clay pits or storage dams.</p> <p>Stormwater at the site is currently routed to two western holding dams by a series of bunds and pipes. A third clay pit can be utilised during quarry operations to capture sediment and storm events. The stormwater dams would act as sediment basins. The most western stormwater dam has an existing emergency overflow that would allow controlled release if required.</p> <p>Other clean surface runoff water which does not flow into these dams flows to a constructed sediment trap dam, which has a membrane and</p> | <p><u>Public submissions</u></p> <ul style="list-style-type: none"> • Surface water discharged from the project area to Susannah Brook will have significant impacts on water quality. • Concern regarding surface water draining from site into the MRD on Toodyay Rd. • Lack of clarity regarding water storage quantities and usage. | <p>Considered a key environmental factor. See section 3.3.</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|--|--|---|
| Groundwater | <p>filter bed.</p> <p>Groundwater within the project area is contained in a series of perched isolated aquifers within the ferruginous lateritic soils and weathered regolith profiles. These aquifers are recharged by rainfall and generally produce greatest yields during winter. An assessment of the water supply bores in an area within 3 km of the quarry site shows that groundwater depth in the abstraction bores are generally shallow (~10 – 16 m deep).</p> <p>Regional groundwater levels for the basement aquifer show that the groundwater levels are generally in the range of 60 m below the surface. Groundwater levels are thought to broadly correlate to topographic surface levels. The Quarry will intercept this groundwater table during the later stages of the quarry life.</p> <p>Surface water infiltration can form a localised perched aquifer with water yield capacity highly variable and responsive to seasonal variability.</p> <p>Areas containing secondary porosity (fractured rock patterns) are likely to comprise a minor local aquifer within the quarry area.</p> <p>Data reported by the Department of Water indicates that average total dissolved solids (TDS) in the area was 2090 mg/L and ranged from a lowest concentration (175 mg/L) to the east of the quarry site, to the highest concentration (3,283 mg/L) to the north west of the quarry site. Insitu groundwater data collected during the drilling program in the vicinity of the Red Hill Disposal Site indicated that pH ranged from a minimum of 4.3 to a maximum of 6.5 and electrical conductivity (EC) from 930 mS/cm to 4300 mS/cm.</p> | <p><u>Public submissions</u></p> <ul style="list-style-type: none"> • impacts of the quarry pit on local groundwater and therefore on bores on nearby properties. • concern that no on-site groundwater surveys have been done. • concern that proponent has not demonstrated an understanding of local geology which directly affects groundwater hydrology. • concern there is insufficient information to assess impact of quarrying on local groundwater. • concern that insufficient hydrological studies have been completed. | <p>In order to mitigate any potential impacts to groundwater, the following management practices will be implemented;</p> <ul style="list-style-type: none"> • Groundwater monitoring will be undertaken to ensure that the groundwater depth and quality is well understood in the area of proposal, prior to development of each cell. • A groundwater management plan will be developed to contain potential seepages originated within the Quarry and prevent potential contamination of groundwater and downstream surface waters. • During operations, the acidification potential will continue to be assessed as the geology is proved. • Contingency procedures will be developed to address the potential that the Quarry will encounter a preferred flow path or shatter zone. <p>Not considered a key environmental factor. No further evaluation required by the EPA.</p> |
| Vegetation and | The proposal would require the clearing of 31 ha of | <u>Public submissions</u> | Considered a key environmental |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|---|--|---|
| Flora | <p>native vegetation.</p> <p>The Site consists of three vegetation associations:</p> <ul style="list-style-type: none"> • Eucalypt/Woodland Forest (Jarrah – Marri forest on lateritic uplands, Marri Woodlands on lateritic clay soils and Wandoo Woodland on loamy lateritic slopes) • Mixed Heath on or adjacent to granite outcrops and • Lithic Community on shallow soils over granite. <p>Vegetation extent and status for Beard (1980) Vegetation Associations within the Site:</p> <ul style="list-style-type: none"> • Vegetation Association - 3 • Vegetation Description - Medium forest; Jarrah-Marri • Pre- European Extent (ha) in Jarrah Forest IBRA region - 2390534.7 • Current Extent (ha) in Jarrah Forest IBRA region - 1661219.5 • % Remaining - 69.5 • % Pre-European Extent in IUCN Class I-IV Reserves - 16.3 <p>No threatened ecological communities (TECs) or Declared Rare Flora (DRF) species have been recorded at the Site.</p> <p>One Priority 4 species <i>Calothamnus rupestris</i> has been recorded at a 10 locations within the Site. Vegetation found at the Site is well represented at a local and regional scale, including nearby conservation reserves such as John Forrest National Park and the Darling Range Regional Park.</p> <p>Thirty-two weed species have been recorded, of which one, Paterson's Curse (<i>Echium</i></p> | <ul style="list-style-type: none"> • The management and ongoing protection of offset and buffer areas from future mining; • Adequacy of dieback management measures; • Rehabilitation of the proposed quarry and the existing clay pit, including concerns re quality of previous rehabilitation attempts in the clay pits; • Concern re fragmentation and overall loss of habitat, especially migration corridors, food sources, large nesting trees; • Inadequate surveys of vegetation and groundwater on the site; • Cumulative impact of development in the area on loss of fauna habitat. • Impact of quarrying on underlying aquifers and vegetation reliant on this water source and • Topsoil management. | <p>factor. See section 3.1.</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|---|---|---|
| | <p><i>plantagineum</i>), is a Declared Plant.</p> <p>The majority of the Quarry area is thought to be Dieback free however some plant deaths attributed to Dieback infestation have been identified, particularly on the Jarrah-Marri forest on the lateritic upland area.</p> <p>Boral has identified a 48.35 ha area which could be conserved to provide a 'like for like or better' offset for the flora and vegetation which will be cleared for the proposed quarry. The area covers a wide range of vegetation types, from granite rock herbfields, through dense shrublands on shallow soils over granite, to Wandoo and Marri woodland. A narrow and intermittent riparian zone along the Susannah Brook is also included.</p> | | |
| Fauna | <p>The site contains a number of different fauna habitats: Lateritic uplands and associated outcrops; Granite outcrops and associated areas where runoff collects; large trees, fallen logs; and dense heath.</p> <p>A reconnaissance fauna survey was undertaken in conjunction with the botanical survey by a qualified zoologist, with regard to the Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia – Guidance Statement No. 56 (EPA, 2003).</p> <p>In December 2006, Harris and Bamford (2007) conducted a level 2 assessment of the fauna values at the Hanson Red Hill Quarry. Hanson's Red Hill Quarry is located within 500 m of the proposed Boral Gidgegannup Granite Quarry site. The level 2 fauna assessment included a trapping program over 8 nights. The habitat assessed within the Hanson Red Hill Quarry is considered to be contiguous with the proposed Quarry site.</p> | <p><u>Public submissions</u></p> <ul style="list-style-type: none"> • Disruption to migration routes and food sources. • Concern that fauna research undertaken to date is insufficient. • More in-depth site fauna surveys should have been undertaken over a more representative time period (ie capture all seasons, night and day). • Concern about relevance of Hanson survey to this site. • Existing information does not correlate to local residents observations regarding fauna in the area. • Impact of quarry noise and vehicles on animals. • Concern about migration corridor being insufficient. • Impact on Carnaby's Cockatoo (especially breeding and foraging habitat). | <p>Considered a key environmental factor. See section 3.1.</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|---|--|---|
| | <p>A total of 12 bird, 2 mammal, 1 reptile and 1 amphibian species were recorded during the level 1 field survey conducted by GHD, none were of conservation significance.</p> <p>No threatened fauna species have been recorded at the Site, however a number of conservation significant species have previously been recorded the vicinity of the Site, including Carnaby's Cockatoo (Endangered). There are eight trees which may be suitable for nesting by Carnaby's Cockatoo within the quarry footprint. Most of these are large Marri's.</p> <p>Harris and Bamford (2007) identified a number of additional conservation significant species which may potentially occur within the area, however were not recorded during surveys of the Hanson Red Hill Quarry. These included:</p> <ul style="list-style-type: none"> ○ Scorpion-fly (<i>austromerope poultoni</i>) – Priority 2 ○ Dell's Skink (<i>ctenotus dellii</i>) – Priority 4 ○ South-west Carpet Python (<i>morelia spilota subsp. imbricata</i>) – Schedule 4, Priority 4 ○ Southern Death-adder (<i>acanthophis antarcticus</i>) – Priority 4 ○ Barking Owl (<i>ninox connivens</i>) – Priority 2 ○ Masked Owl (<i>tyto novaehollandiae</i>) – Priority 3 ○ Crested Shrike-tit (<i>falcunculus frontatus</i>) – Priority 4 ○ Peregrine Falcon (<i>falco peregrinus</i>) – Schedule 4 ○ Brush-tailed Phascogale (<i>phascogale tapoatafa</i>) ○ Western False Pipistrelle (<i>falsistrellus mackenziei</i>) – Priority 4 ○ Water-rat (<i>hydromys chrysogaster</i>) – Priority 4 | <p><u>DSEWPC</u></p> <ul style="list-style-type: none"> • Concern that the Carnaby Cockatoo assessment not sufficient. • Offset areas would need to include appropriate nesting and foraging habitat. • Cumulative impact of this proposal and existing operations on loss of Carnaby's habitat. <p><u>OEPA</u></p> <ul style="list-style-type: none"> • Concerns regarding a number of errors in technical information provided in the PER. | |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|---|--|---|
| | <p>Other fauna that could be present that is of local significance include the Mardo (<i>antechinus flavipes</i>), Dunnart (<i>sminthopsis gilberti</i>), Western Pygmy Possum (<i>cercartetus concinnus</i>) and the Honey Possum (<i>tarsipes rostratus</i>).</p> <p>The gecko, <i>diplodactylus aff.polyophthalmus</i>, was also recorded by Harris and Bamford (2007) at the Hanson Red Hill Quarry. At present <i>diplodactylus polyophthalmus</i> remains an intact species and its current distribution extends from the Swan coastal plain and the Darling Range in to the South West.</p> | | |
| Fauna Habitats | <p>Harris and Bamford (2007) identified one habitat type within the adjacent Hanson Red Hill Quarry site, which was considered to be regionally significant. This habitat type comprises isolated areas of heaths of gravelly sands close to areas of exposed granite, which support a rich fauna assemblage (Harris and Bamford, 2007). Raines and Bamford (2009) completed a further assessment of this habitat type in 2009. Vegetation associated with this habitat is associated with the Darling Scarp vegetation complex, defined by Matiske and Havel (1998). The vegetation types associated with this habitat type are considered to be well represented in the nearby John Forrest National Park and the Monadnock reserves in the south-west region of Western Australia (L. Matiske pers. comm., in Raines and Bamford, 2009). Although a targeted assessment of this habitat type has not been completed at Boral's proposed Gidgegannup Granite Quarry site, it is considered likely that this habitat occurs within the Project area.</p> <p>A second habitat of possible significance identified by Raines and Bamford (2009) at Hanson's Red Hill Quarry is associated with the M3 soil type,</p> | <p><u>Public submissions</u></p> <ul style="list-style-type: none"> • Concern re loss of habitat, especially migration corridors, food sources, large nesting trees. • Cumulative impact of development in the area on loss of fauna habitat. <p><u>OEPA</u></p> <ul style="list-style-type: none"> • Questions regarding the value of Appendix D of the PER (Bamford report on significant fauna habitats) as it has been deemed by the EPA to not provide sufficient clarity and certainty that habitats occur in protected areas outside the project area. | <p>Considered a key environmental factor. See section 3.1.</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
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| | mapped in the Environmental Geology Series (1987) 1:50,000 series. The M3 soil type is mapped along Strelley Brook, approximately 1.2 km south-west of the Site, and will not be impacted by Boral's proposed quarry. | | |
| POLLUTION | | | |
| Hydrocarbons and Chemicals | <p>There is no known existing contamination or pollution at the Site. However, spills of hydrocarbons and chemicals that may arise out of the servicing of machinery could result in contamination of land, groundwater or surface water.</p> <p>Process chemical use at the proposed quarry is limited to the use of a foaming agent, Polocitris, for dust suppression in the crushing plant. This chemical has been chosen its proven effectiveness in controlling dust emissions during crushing and screening processes and low environmental impact.</p> <p>The following additional chemicals and hydrocarbons will be used on the site;</p> <ul style="list-style-type: none"> • hydraulic oil from front end loaders, excavators and trucks; • diesel for heavy equipment and trucks; • engine lubricants for heavy equipment; and • grease for heavy equipment. | No submissions on this factor. | <p>Management action include:</p> <ul style="list-style-type: none"> • All hydrocarbons will be stored in accordance with Australian Standard AS1940. • All servicing of mobile equipment will take place in a designated service area with appropriate pollution control. • Spill kits will be available at all locations where hydrocarbons are stored or used. • Any minor spills will be cleaned up immediately and disposed of to a suitable landfill. <p>Not considered a key environmental factor. No further evaluation required by the EPA.</p> |
| Solid Waste | <p>It would be expected that some waste would be produced during the construction phase and during operations from the maintenance workshop and vehicle servicing area and general refuse from the staff buildings.</p> <p>Incorrect waste disposal can result in environmental impacts and lead to health and safety issues. Potential impacts may include:</p> <ul style="list-style-type: none"> • pollution or contamination of soil, groundwater | <p><u>Stoneville and Parkerville Progress Association Inc</u></p> <ul style="list-style-type: none"> • Concern regarding the proposed use of water bottles for potable drinking water, as there is no potable drinking water supply on site. • This would result in plastic waste and packaging being generated and going to land-fill. | <p>The proponent has indicated that drinking water would be supplied via a potable water tank to be installed at site, serviced by a tanker as required.</p> <p>Solid waste will be collected in containers sealed from the weather and disposed of at the most suitable landfill, disposal or recycling facility. All solid waste will be removed from</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|---|---|---|
| | <p>or surface water resources;</p> <ul style="list-style-type: none"> impacts to native fauna or degradation of fauna habitat; and reduced aesthetics. | | <p>the Site and disposed of to an appropriate recycling or disposal facility.</p> <p>Not considered a key environmental factor. No further evaluation required by the EPA.</p> |
| Noise and Vibration | <p>The nearest sensitive receptors are the Red Hill Disposal Site staff building and Hanson Quarry staff building. These sites are located approximately 500 m from the Site, and noise impacts are expected to be negligible.</p> <p>The closest noise sensitive premise is a house located approximately 850 m to the east of the Quarry.</p> <p>The following noise impacts already exist in the area; traffic noise along the Toodyay Road; blasting noise from the Hanson's Quarry; process noise from the Hanson's Quarry; and process noise from Red Hill Waste Management Facility.</p> <p>A noise assessment was undertaken by Lloyd George Acoustics for two scenarios. The first scenario considered was start-up when all process plant will be on surface. The second scenario, future operations, is when the process plant will be at 20 m below current ground surface. The assessment indicated the following;</p> <ul style="list-style-type: none"> Noise levels may exceed assigned daytime levels during start-up and future operations if no noise amelioration is implemented. Once the process plant has been excavated to 10 m below ground level, noise from this plant will comply with the Environmental Protection (Noise) Regulations 1997. To achieve compliance at the start-up stage will | <p><u>Dept of Environment and Conservation</u></p> <ul style="list-style-type: none"> The proponent needs to revise their management measures to ensure compliance with noise regulation 13(3), ie to submit a noise management plan and obtain an approval from the City of Swan at least 7 days before the planned out-of-hours construction work. The proponent should develop a construction noise management plan, distinct from quarry operation activities, to demonstrate noise can be minimised. <p><u>Public submissions</u></p> <p>The submission(s) raised issues regarding the proposal with respect to:</p> <ul style="list-style-type: none"> Impacts of planned out-of hours construction work and the need for noise management plan 7 days before hand. Management of construction noise; including the need for a specific management plan demonstrating how noise from bund construction will be minimised. Noise levels during stage 1, with specific questions raised. Concern about noise management for temporary infrastructure, ie mobile | <p>Considered a key environmental factor. See section 3.2.</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|--|--|--|
| | <p>require an 8.5 m high bund on the north and east sides of the process plant, or similar alternative.</p> | <p>crushing, screening.</p> <ul style="list-style-type: none"> • Working hours and the impact of noise outside of “normal” working hours, especially early mornings and weekends. • Noise from non-Boral vehicles accessing the site. • Blast management including specific questions regarding exclusion zones and traffic management as well as relevant noise, vibration and dust limits. • Impact of quarry noise on lifestyle. • general objection to light impacts from activities undertaken before sunrise. • objection regarding any operations on a Sunday. | |
| <p>Transport Impacts</p> | <p>At the peak of quarrying operations (500,000 tpa) there will be an additional 12 truck movements per hour using Toodyay Road, equating to 6 coming in empty and 6 going out loaded. This is based on an average load size of 30 tonnes per truck, 48 working weeks per year and 5.5 days per week operation.</p> <p>The addition of 12 trucks per hour will mean that the Quarry will effectively increase the traffic on Toodyay Road by 2% based on February 2007 figures. The percentage impact will be lower by the expected opening of the quarry in 2010. Trucks will not be permitted to use local roads for through access.</p> | <p>The submission(s) raised issues regarding the proposal with respect to:</p> <ul style="list-style-type: none"> • Lack of detail on how increased truck traffic on Toodyay Road from this proposal will be managed. • Concern regarding the increase in volume of trucks using Toodyay Road and associated safety hazards. • Cumulative effect of additional truck traffic to vehicles servicing other industries in the area and also using Toodyay Road. • Inability of Toodyay Road to cope with existing traffic loads both in terms of insufficient lanes up hill and down hill as well as road surface quality. • Concern that traffic impact will extend into more hours of the day due to Boral’s proposed work hours. • Concern that local roads will be used | <p>At maximum production, the Quarry will result in an additional 12 trucks movements per hour on Toodyay Road (6 coming, 6 going).</p> <p>Based on February 2007 figures, this is a 2% increase in traffic on Toodyay Road.</p> <p>Not considered a key environmental factor. No further evaluation required by the EPA.</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|--|---|--|
| | | <p>for haulage by trucks for non local deliveries (ie as “short cuts”).</p> <ul style="list-style-type: none"> • Diversion of stormwater from entering Toodyay Road. • Concern projected traffic figures are underestimated, and do not take into account light vehicles (eg associated with site personnel) or ad hoc deliveries or traffic associated with the proposed Port Bouvard Gidgegannup townsite development. <p>A number of these submissions suggest that the Government needs to upgrade Toodyay road, preferably prior to any further development which may contribute additional traffic load, especially truck traffic. The additional issue of the lack of a truck arrestor bed on this road was also raised.</p> | |
| Air Quality | <p>Air emissions from the proposed quarry operations will consist of dust from operation of the crushing and screening plant, truck movements along haul roads and wind erosion from active quarry areas and product stockpiles.</p> <p>A dust emissions assessment was undertaken by GHD. The impacts of dust emissions fall under two distinct categories, being health and amenity.</p> <p><u>Health</u> - Potential health impacts are attributable to the concentration of respirable particles in ambient air. Respirable particles of dust have an aerodynamic equivalent diameter of 10 microns or less and are known as PM10. These fine fractions of dust would have maximum impact under light winds and stable atmospheric conditions. These conditions most frequently occur overnight and very early in the morning, and therefore, become</p> | <p><u>Public submissions</u> The submissions raised issues regarding the proposal with respect to:</p> <ul style="list-style-type: none"> • concern that NEPM standards not applicable; • dust impacts on neighbours; • cumulative air quality; • removal of vegetation will limit ability of area to contain dust; and • health issues associated with dust (radiation, crystalline silica). <p><u>BGC</u></p> <ul style="list-style-type: none"> • the adequacy of the dataset used for air modelling; and • the need for ongoing dust monitoring. | Considered a key environmental factor. See section 3.2. |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|---|--|---|
| | <p>significant only if operations extend outside typical operating hours.</p> <p><u>Amenity</u> - The presence of larger suspended dust particles, greater than 35 micron, is likely to affect amenity by way of reducing visibility (whilst in the air column) and by soiling of materials via dust deposition. Amenity impacts are most marked in high wind conditions, when larger particles may be displaced and transported a significant distance before being deposited and so soiling surfaces. Mitigation of amenity related dust impacts would in turn act to reduce health impacts due to dust emissions.</p> <p>There are a number of existing land uses in the area surrounding the Quarry with potential to generate dust and affect ambient air quality, including the existing Hanson Red Hill Quarry, Red Hill Disposal Site, cropping and grazing and hobby farms.</p> <p>A marked seasonal trend in dust emissions would be expected from the existing emissions sources due to changes in ground cover and soil moisture. Dust would be higher during summer when soil moisture is lower and ground cover from cropping or pasture is lower. Forested areas, such as those which surround the proposed quarry, would have low dust emissions except after fire when large areas of exposed ground may be present.</p> | | |
| SOCIAL SURROUNDINGS | | | |
| Visual Amenities | <p>Most sensitivity receptors, especially the roads in the area, are characterised by substantial roadside vegetation and frequent built structures of various sorts (houses, stables, farm sheds, etc) which in practice tend to limit visibility towards the Scarp, or further eastward up through the incised valleys that</p> | <p>The submissions raised issues regarding the proposal with respect to:</p> <ul style="list-style-type: none"> • Concern regarding visibility of quarry and the “scar” it will leave Darling Scarp when viewed from the Swan Valley. | <p>Considered a key environmental factor. See section 3.4.</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|--|---|--|
| | <p>allow limited views towards the quarry site.</p> <p>The existing quarry can be seen in the distance with unaided vision from the north-west, however the quarry is not dominant in the landscape.</p> <p>There are many visually incongruous and negatively impacting elements within the Swan Valley itself.</p> | <ul style="list-style-type: none"> • The proponent has undervalued visual amenity to residents locally and in Swan Valley. • Insufficient detail and modelling of visual impacts. • Concern that rehabilitation will be inadequate in screening the quarry long term. • Concern that the quarry will be as visible as existing quarries on the Scarp. • Concern regarding how the acoustic relief bund will be vegetated and whether this is permanent. • Concerns regarding the visibility of stockpiles from Toodyay Road. | |
| Aboriginal Heritage | <p>Boral commissioned Australian Interaction Consultants (AIC) to undertake ethnographic and archeological surveys at the site in 2007. The surveys included consultation with representatives of the Perth Metropolitan Nyungah Community. A number of registered Aboriginal heritage sites are known to exist within close proximity to the proposed quarry. The surveys identified one new site Gidgegannup Petroglyph 2 and Wirdarchi Sleeping Site (Site 24882). Other previously registered sites identified within the property include:</p> <ul style="list-style-type: none"> • Gidgegannup Gnamma Hole and Lizard Trap (Site ID 21080) • Gidgegannup Isolated Artifacts (Site 21076) • Gidgegannup Petroglyph (Site 21077) • Gidgegannup Scarred Tree (Site 21078) • Gidgegannup Rockshelter (Site 21079) • Red/01 Engraving (Site 21170) <p>The Gidgegannup Petroglyph 2 is kidney shaped</p> | <p>The submissions raised issues regarding the proposal with respect to:</p> <ul style="list-style-type: none"> • disturbance and destruction of specific sites; • protection of spiritual and cultural significance of area; • restricted access to indigenous people; and • concern that negotiation between Boral and traditional owners is inequitable. <p>The Swan Valley Nyungah Community acknowledged that “Boral has been a very good company to meet and talk with and be consulted by, and they have taken concerns seriously”. However they raise an overall objection to the proposal at this location and suggested that West Toodyay would be a more suitable site for the quarry.</p> | <p>Boral has submitted an application under Section 18 of the <i>Aboriginal Heritage Act 1972</i> seeking permission to disturb the Gidgegannup Gnamma Hole and Lizard Trap site. All other registered sites would be avoided and not disturbed.</p> <p>To manage potential impacts to heritage sites, all site personnel and contractors would be informed of their obligations and responsibilities under the <i>Aboriginal Heritage Act 1972</i>. Stakeholders including Aboriginal representatives would be regularly consulted throughout the life of the quarry.</p> <p>Not considered a key environmental factor. No further evaluation required by the EPA.</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|--|---|--|--|
| | <p>and deeply incised into the granite in a way that is contrary to the natural weathering patterns surrounding it. It is similar in nature and design to the other petroglyph (Gidgegannup Petroglyph - site 21077). Gidgegannup Petroglyph comprises of an oval or egg shaped motif situated on a granite tor amidst a larger cluster of outcrops. It has a maximum dimension of about 50 cm and is delineated by a distinctive groove and faces in a westerly direction. These two sites are considered to be significant as they are believed to be ancient engravings or markers that point to a place of high importance. Nyungah Elders have identified that these markers point towards a registered site within Hanson's property referred to as the Ancestral Owl Stone (Site 26057).</p> <p>The Wirdarchi Sleeping Site consists of a rock hollow within a granite boulder, containing two quartz manuports.</p> <p>The footprint of the original quarry would have directly impacted Gidgegannup Petroglyph 2 and Wirdarchi Sleeping Site. However, as a result of consultation with representatives from the Nyungah community, the design was refined to avoid direct impact and provides a buffer zone of 50 m around these two sites. These buffer zones will be marked out and be excluded from any development or disturbances associated with the quarry expansion.</p> <p>The registered heritage site, Gidgegannup Gnamma Hole and Lizard Trap, would be directly impacted by the proposed quarry expansion. The site comprises of a flat piece of granite that has been placed at the mouth of a shallow depression in the granite to block the flow of water up to its own height. This creates a shallow pool in the depression of the rock. While it is obvious that the</p> | | |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|--|---------------------------------------|---|
| | feature is of human construction, it has not been determined who created it or when it happened (AIC, 2009). | | |

| PRINCIPLES | | |
|--|-----------------|--|
| Principle | Relevant Yes/No | If yes, Consideration |
| <p>1. The precautionary principle <i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</i></p> <p><i>In application of this precautionary principle, decisions should be guided by –</i></p> <ul style="list-style-type: none"> <i>(a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i> <i>(b) an assessment of the risk-weighted consequences of various options.</i> | Yes | <p>The proposal has the potential to impact vegetation and fauna habitat, particularly the habitat of significant fauna species such as black cockatoos. Therefore, monitoring and management measures should be implemented to mitigate the impact and observe the effectiveness of management measures taken.</p> <p>Vegetation and fauna habitat is a relevant environmental factor in this EPA assessment report.</p> <p>The EPA has recommended conditions to mitigate impacts.</p> |
| <p>2. The principle of intergenerational equity <i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p> | Yes | <p>The proposal would result in the permanent reduction of a natural resource (granite).</p> <p>Visual amenity is a relevant environmental factor in this EPA assessment report.</p> <p>The EPA has recommended conditions to mitigate impacts</p> |
| <p>3. The principle of the conservation of biological diversity and ecological integrity <i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p> | Yes | <p>The proposal would result in the loss of approximately 31 ha of native vegetation and has the potential to affect biological diversity and ecological integrity. Vegetation and fauna habitat is a relevant environmental factor addressed in this report.</p> |
| <p>4. Principles relating to improved valuation, pricing and incentive mechanisms</p> | Yes | <p>The proponent should be required to manage particulate emissions (dust), noise emissions, and liquid and solid wastes generated by the proposed development, as well as the final rectification of the site at</p> |

| PRINCIPLES | | |
|--|------------------------|--|
| Principle | Relevant Yes/No | If yes, Consideration |
| <p>(1) <i>Environmental factors should be included in the valuation of assets and services.</i></p> <p>(2) <i>The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.</i></p> <p>(3) <i>The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.</i></p> <p>(4) <i>Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.</i></p> | | <p>decommissioning at the end of the useful life of the plant and equipment.</p> <p>The proponent should bear the costs associated with meeting their obligations in this regard.</p> |
| <p>5. The principle of waste minimisation <i>All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.</i></p> | Yes | <p>The proposal would generate particulate, liquid and solid wastes. Hence, the proponent would be expected to address the waste hierarchy and minimise the generation of waste, and promote the reuse of waste and process bi-products.</p> |

Appendix 4

Identified Decision-making Authorities and Recommended Environmental Conditions

Identified Decision-making Authorities

Section 44(2) of the *Environmental Protection Act 1986* (EP Act) specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA's recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities (DMAs), and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified for this consultation:

| Decision-making Authority | Approval |
|---|--|
| 1. Minister for Indigenous Affairs | Section 18 application under the Aboriginal Heritage Act |
| 2. Department of Environment and Conservation | Part V works approval and licence under the <i>Environmental Protection Act 1986</i> |
| 3. City of Swan | Local government approvals |

Note: In this instance, agreement is only required with DMA #1 since this DMA is a Minister.

RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE *ENVIRONMENTAL PROTECTION ACT 1986*)

GIDGEGANNUP GRANITE QUARRY, GIDGEGANNUP, CITY OF SWAN

Proposal: The proposal is to develop a granite quarry in Gidgegannup, which is expected to yield up to 500,000 tonnes of rock per annum.

The proposal is further documented in Schedule 1 of this statement.

Proponent: Boral Resources (WA) Ltd

Proponent Address: 63-69 Abernethy Road
BELMONT WA 6104

Assessment Number: 1771

Report of the Environmental Protection Authority: Report 1375

The proposal referred to in the above report of the Environmental Protection Authority may be implemented. The implementation of that proposal is subject to the following conditions and procedures:

1. Proposal Implementation

1-1 The proponent shall implement the proposal as documented and described in schedule 1 of this statement subject to the conditions and procedures of this statement.

2. Proponent Nomination and Contact Details

2-1 The proponent for the time being nominated by the Minister for Environment under sections 38(6) or 38(7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal.

2-2 The proponent shall notify the Chief Executive Officer of the Office of the Environmental Protection Authority of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change.

3. Time Limit of Authorisation

3-1 The authorisation to implement the proposal provided for in this statement shall lapse and be void five years after the date of this statement if the proposal to which this statement relates is not substantially commenced.

3-2 The proponent shall provide the Chief Executive Officer of the Office of the Environmental Protection Authority with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement.

4. Compliance Reporting

4-1 The proponent shall prepare and maintain a compliance assessment plan to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority.

4-2 The proponent shall submit to the Chief Executive Officer of the Office of the Environmental Protection Authority the compliance assessment plan required by condition 4-1 at least six months prior to the first compliance report required by condition 4-6, or prior to implementation, whichever is sooner.

The compliance assessment plan shall indicate:

- 1 the frequency of compliance reporting;
- 2 the approach and timing of compliance assessments;
- 3 the retention of compliance assessments;
- 4 the method of reporting of potential non-compliances and corrective actions taken;
- 5 the table of contents of compliance assessment reports; and
- 6 public availability of compliance assessment reports.

4-3 The proponent shall assess compliance with conditions in accordance with the compliance assessment plan required by condition 4-1.

4-4 The proponent shall retain reports of all compliance assessments described in the compliance assessment plan required by condition 4-1 and shall make those reports available when requested by the Chief Executive Officer of the Office of the Environmental Protection Authority.

4-5 The proponent shall advise the Chief Executive Officer of the Office of the Environmental Protection Authority of any potential non-compliance within seven days of that non-compliance being known.

4-6 The proponent shall submit to the Chief Executive Officer of the Office of the Environmental Protection Authority the first compliance assessment report fifteen months from the date of issue of this Statement addressing the twelve month period from the date of issue of this Statement and then annually from the date of submission of the first compliance assessment report.

The compliance assessment report shall:

- 1 be endorsed by the proponent's State Manager - Quarries or a person delegated to sign on the State Manager's behalf;
- 2 include a statement as to whether the proponent has complied with the conditions;
- 3 identify all potential non-compliances and describe corrective and preventative actions taken;

- 4 be made publicly available in accordance with the approved compliance assessment plan; and
- 5 indicate any proposed changes to the compliance assessment plan required by condition 4-1.

5 Performance Review and Reporting

- 5-1 The proponent shall submit to the Chief Executive Officer of the Office of the Environmental Protection Authority a Performance Review Report at ten (10) yearly intervals after the start of implementation which addresses:
1. the major environmental risks and impacts; the performance objectives, standards and criteria related to these; the success of risk reduction/impact mitigation measures and results of monitoring related to management of the major risks and impacts;
 2. the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology; and
 3. improvements gained in environmental management which could be applied to this and other similar projects.

6 Fauna Habitat

- 6-1 Prior to commencement of the proposal, the proponent shall develop a mitigation program, in consultation with the Department of Environment and Conservation, for the potential impacts from implementation of the proposal to fauna habitat for significant species including the foraging habitat for Black Cockatoos.
- 6-2 The proponent shall develop and implement a monitoring program for the duration of the proposal, in consultation with the Department of Environment and Conservation, to monitor the outcomes of the mitigation program required by conditions 6-1, in relation to significant fauna.
- 6-3 Prior to undertaking vegetation clearing, the proponent shall employ suitably trained fauna handling personnel, to identify, remove and relocate significant fauna species from areas of disturbance in consultation with the Department of Environment and Conservation.
- Note: Suitably experienced fauna handling personnel should at least five years relevant field experience in carrying out fauna relocations in the south west of Australia to the satisfaction of the Office of the Environmental Protection Authority.
- 6-4 The fauna handling personnel shall obtain the appropriate licenses as required for fauna relocation under the *Wildlife Conservation Act 1950*.
- 6-5 The proponent shall report the findings of the monitoring program referred to in condition 6-2 in the compliance assessment report required by Condition 4-6 and to the Chief Executive Officer of the Department of Environment and Conservation.

7 Dieback and Weeds

- 7-1 The proponent shall ensure that dieback disease (*Phytophthora* species) is not introduced as a direct or indirect result of implementation of the proposal into uninfected areas of the project area defined by the “red coloured line” in Figure 1.
- 7-2 Prior to commencement of the proposal, the proponent shall undertake a survey of the project area to identify and map the location of any dieback infestations.
- 7-3 At the completion of the survey identified in condition 7-2, the proponent shall provide the results and map of dieback infestations to the Chief Executive Officer of the Office of the Environmental Protection Authority.
- 7-4 The proponent shall use the map produced from the survey required by condition 7-2 as a baseline map of previously identified dieback infestations when determining compliance with condition 7-1.
- 7-5 No new species of weeds (including both declared weeds and environmental weeds) shall be introduced into the project area as a result of the implementation of the proposal.
- 7-6 Prior to commencement of the proposal, the proponent shall undertake a survey of the project area to identify and map the location of any known weed infestations.
- 7-7 The proponent shall use the map produced from the survey required by condition 7-6 as a baseline map of previously identified weed infestations when determining compliance with condition 7-5.
- 7-8 The proponent shall use the maps produced from the surveys required by condition 7-2 and 7-6 to produce a Hygiene Management Plan in consultation with the Department of Environment and Conservation, to ensure compliance with 7-1 and 7-5.
- 7-9 The proponent shall report on measures taken to achieve the requirements of conditions 7-1 and 7-5 in the compliance assessment report required by Condition 4-6.

8 Dust Monitoring and Management

- 8-1 The proponent shall only detonate explosives on the premises when wind directions favour the carriage of dust away from residential areas to the east of the quarry, unless undertaken in accordance with the *Mines Safety and Inspection Regulations 1995*.
- 8-2 For the duration of the project, including construction activities, the proponent shall measure dust emissions* at the eastern boundary of the project area that is adjacent to sensitive receptors within Lot 51, which is identified in Figure 3, to ensure that dust emissions do not exceed ambient PM₁₀ level of 50 micrograms per cubic metre averaged over a 24 hour period.

* - Dust monitoring should be conducted in accordance with Australian Standard AS/NZS 3580.1.1:2007 *Guide to siting air monitoring equipment*, to ensure the accuracy of data collected.

- 8-3 In the event that dust emission levels are in excess of the maximum allowable PM₁₀ level defined by condition 8-2, the proponent shall notify the Chief Executive Officer of the Office of the Environmental Protection Authority within seven days of the exceedence.
- 8-4 The proponent shall within fourteen days of the exceedence of the maximum allowable PM₁₀ level defined by condition 8-2 being recorded, provide a report to the Chief Executive Officer of the Office of the Environmental Protection Authority outlining the causes for the exceedence and management measures being implemented to ensure compliance with the requirements of condition 8-2.
- 8-5 The proponent shall report the results of measurement required in condition 8-2 in the compliance assessment report required by Condition 4-6.
- 8-6 The proponent shall maintain a complaints register for the duration of the proposal and immediately investigate and alleviate any dust complaints.

9 Rehabilitation of Quarry Walls

- 9-1 The proponent shall commence rehabilitation of non-active benches of exposed faces visible from residential properties to the north and to the north-west of the project area defined in Figure 2 as 'Seen Area 2' and 'Seen Area 3' within 12 months of the benches not being required for active mining.
- 9-2 The proponent shall revegetate the benches identified in Condition 9-1 with vegetation composed of native plant species of local provenance (defined as seed or plant material collected within 10 kilometres of the proposal).
- 9-3 Rehabilitation activities shall continue until such time as the exposed faces are obscured by vegetation when viewed from Seen Areas 2 and 3, to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority.
- 9-4 The proponent shall report the progress of conditions 9-1 and 9-2 in the compliance assessment report required by Condition 4-6.

10 Decommissioning and Closure

- 10-1 At least two years prior to the anticipated date of closure, or at a time approved by the CEO of the Office of the Environmental Protection Authority, the proponent shall submit a Final Decommissioning Plan designed to ensure that the site is suitable for future land uses, for approval of the Chief Executive Officer of the Office of the Environmental Protection Authority.

The Final Decommissioning Plan shall set out procedures and measures for:

1. decommissioning of all plant and equipment;
2. rehabilitation of all areas disturbed through implementation of the proposal (except the final quarry pit), including any existing clay quarries within the project area defined by the "red coloured line" in Figure 1. Vegetation should be composed of native plant species of local provenance (defined as seed or plant material collected within 10 kilometres of the proposal); and
3. inventory of all contaminated sites and proposed management; and

4. final closure of all areas disturbed through implementation of the proposal so that they are safe, stable and non-polluting.
- 10-2 The proponent shall implement the Final Decommissioning Plan required by Condition 10-1 until such time as the Minister for the Environment determines, on advice of the Chief Executive Officer of the Office of the Environmental Protection Authority, that the proponent's decommissioning responsibilities have been fulfilled.
- 10-3 The proponent shall make the Final Decommissioning Plan required by Condition 10-1 publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

11 Conservation of Native Vegetation

- 11-1 Prior to the commencement of clearing, the proponent shall ensure that not less than 48 hectares of native vegetation, identified within the area shaded green in Figure 3 of this Statement, is protected in perpetuity by an instrument or instruments approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

Notes

1. Where a condition states "on advice of the Office of the Environmental Protection Authority", the Office of the Environmental Protection Authority will provide that advice to the proponent.
2. The Office of the Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment and Conservation.
3. The Minister for Environment will determine any dispute between the proponent and the Office of the Environmental Protection Authority over the fulfilment of the requirements of the conditions.
4. The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the *Environmental Protection Act 1986*.
5. Section 13 of the *Environmental Protection (Noise) Regulations 1997* has provision to manage noise emitted from construction activities.

Schedule 1

The Proposal (Assessment No. 1771)

The Site is situated approximately 11 km north-east of the Midland town centre in the City of Swan and approximately 4 km from the Darling Scarp in the Darling Ranges.

The development of the quarry would cover a total area of approximately 42 ha, which is expected to yield up to 500,000 tonnes of rock per annum. The pit, which would have a surface area of not more than 28 ha, is expected to yield approximately 25 million tonnes of hard rock. The remaining 14 ha would be utilised for supporting infrastructure and stockpiles. The quarry would be developed in three stages of increasing production over 20 years, as shown below.

Years 0 – 5: Temporary infrastructure - mobile crushing equipment.
Years 6 – 19: Fixed infrastructure by 6th year. Gradual increase in production.
Years 20 – 50: Fully operational - yielding 500,000 tonnes of rock per annum.

Processing infrastructure that would be required includes rock crushing and screening equipment, stockpiles and water storage dams. Other site infrastructure includes a site office, weighbridge, employee ablution facilities, fuel storage, workshop / vehicle servicing area and material / chemical storage facilities. Noise bunds would be constructed on the northern and eastern sides of the mobile plant setup area.

Water requirements would be met from existing on-site dams and clay pits. The on-site clay pits are recharged by groundwater and stormwater flows from the quarry site. Stormwater runoff would be harvested into existing on-site dams to eliminate the need to use town mains supply for dust suppression. A potable water supply tank would be installed at the site and will be serviced by a tanker as required.

The location of the various project components is shown in Figure 4.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 2 of the public environmental review document, *Gidgegannup Granite Quarry – Public Environmental Review*, prepared by Boral Resources (WA) Ltd, Belmont, Western Australia (January 2010).

Table 1: Summary of Key Proposal Characteristics

| Element | Description |
|------------------------------------|--|
| Life of project | Approximately 50 years |
| Maximum surface area of quarry pit | No more than 28 hectares |
| Depth of quarry pit | 50 – 70 metres below natural ground level. |
| Total area of disturbance | Approximately 42 hectares of which approximately 11 hectares has been previously cleared for clay quarrying. |
| Total area rehabilitated | All disturbed areas outside of the quarry pit. |
| Quarrying rate | Not more than 500,000 tonnes per annum. |
| Water supply | Stormwater and groundwater recharge from on-site dams and clay pits. |

Figures (attached).

Figure 1: Defined Project Area

Figure 2: Visual Amenity Map (see Figure 7 of main report)

Figure 3: Location of Proposed Conservation Area

Figure 4: Project Layout (see Figure 2 of main report)

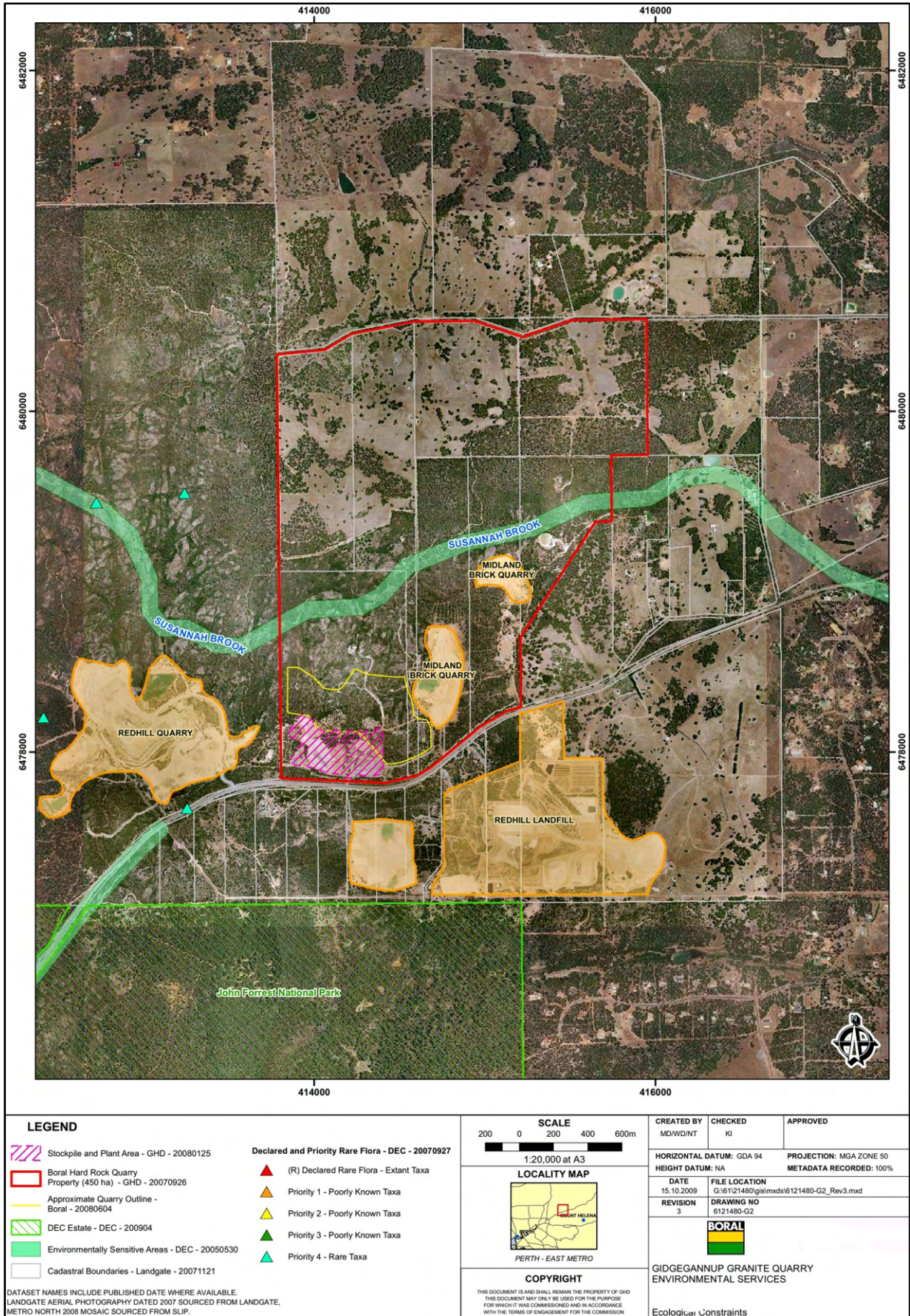
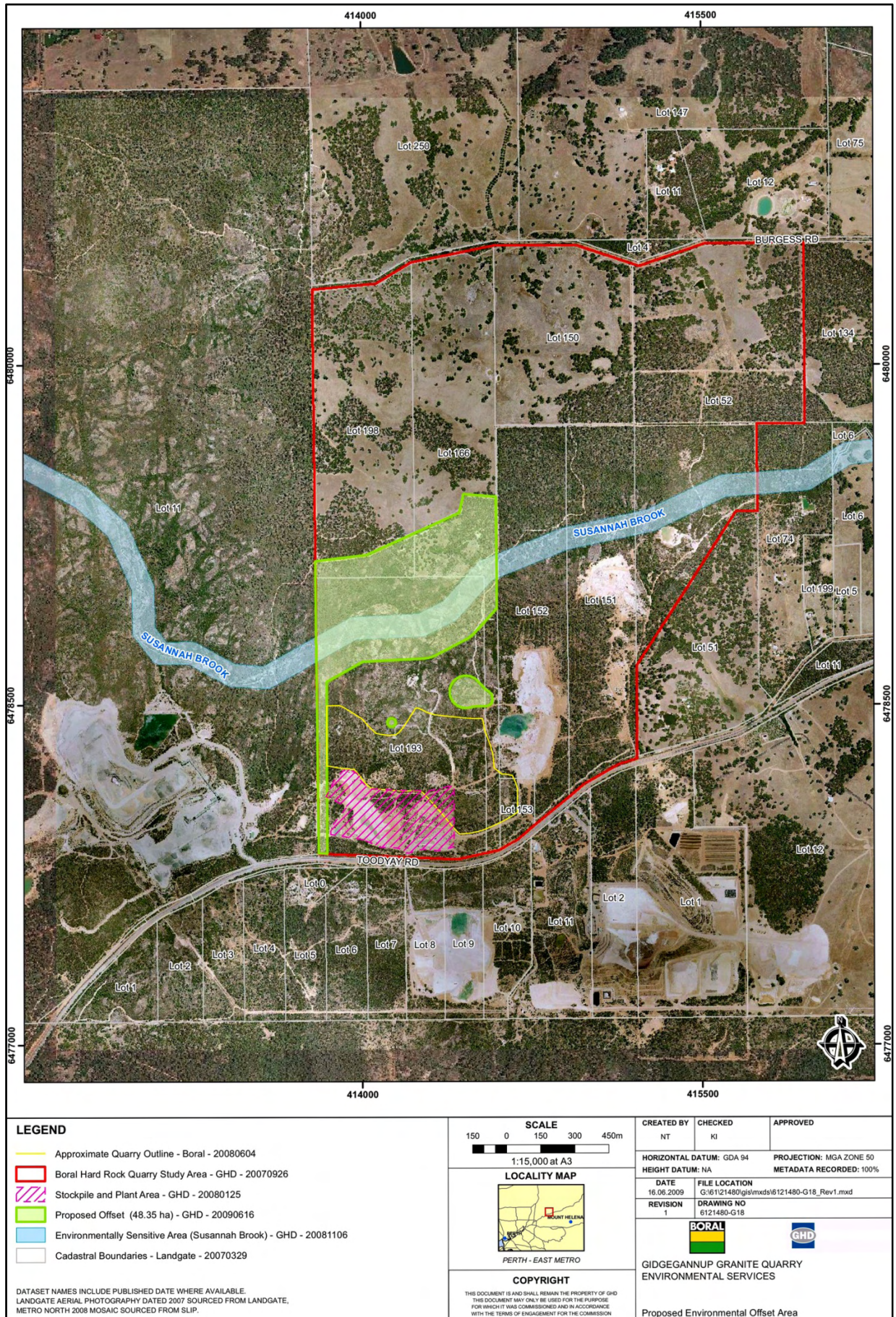


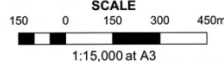
Figure 1: Defined Project Area



LEGEND

- Approximate Quarry Outline - Boral - 20080604
- Boral Hard Rock Quarry Study Area - GHD - 20070926
- Stockpile and Plant Area - GHD - 20080125
- Proposed Offset (48.35 ha) - GHD - 20090616
- Environmentally Sensitive Area (Susannah Brook) - GHD - 20081106
- Cadastral Boundaries - Landgate - 20070329

DATASET NAMES INCLUDE PUBLISHED DATE WHERE AVAILABLE.
 LANDGATE AERIAL PHOTOGRAPHY DATED 2007 SOURCED FROM LANDGATE.
 METRO NORTH 2008 MOSAIC SOURCED FROM SLIP.



LOCALITY MAP



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| | | GIDGEGANNUP GRANITE QUARRY ENVIRONMENTAL SERVICES |
| Proposed Environmental Offset Area | | |

Figure 3: Location of Proposed Conservation Area

Appendix 5

Summary of Submissions and Proponent's Response to Submissions