



Report and recommendations of the Environmental Protection Authority



Boonanarring Mineral Sands Mine

Image Resources NL

Report 1516

June 2014

Public Environmental Review Environmental Impact Assessment Process Timelines

| Date | Progress stages | Time (weeks) |
|----------|---|-----------------|
| 12/11/12 | Level of assessment set | |
| 11/04/13 | Final ESD approved | 21 |
| 08/01/14 | Environmental Review Document (ERD) released for public review | 39 |
| 12/02/14 | Public review period for ERD closed | 5 |
| 31/03/14 | Final Proponent response to ERD issues raised | 7 |
| 15/05/14 | EPA Meeting | 6 |
| 18/06/14 | Provision of the EPA Report to the Minister for Environment | 5 |
| 23/06/14 | Publication of EPA Report (three days after report to the Minister) | 3 days |
| 07/07/14 | Close of appeals period | 2 |

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 timeline objective in the completion of the assessment and provision of a report to the Minister.



Dr Paul Vogel
Chairman
18 June 2014

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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 Image Resources NL (Image Resources), to develop and operate an open cut mineral sands mine located between 12 to 24 kilometres (km) to the north-west of the Gingin township. The proposal would involve mining and processing to produce heavy minerals concentrate.

The expected mine life is 5.5 years and it will involve disturbance of up to 400 hectares (ha) within a 1,205 ha development envelope. The proposal would also include construction and operation of associated infrastructure (such as offices, workshops, fuel storage, roads, solar drying cells, and water bores), and a modification to the intersection of Brand Highway and Wannamal Road West.

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

Image Resources proposes to develop and operate an open cut mineral sands mine between 12 to 24km to the north-west of Gingin. The location of the proposal is shown on Figure 1. The proposal would involve mining and processing of mined material through primary and secondary concentration plants to produce heavy minerals concentrate, and potential further treatment of this concentrate through a relocatable dry mill.

The proposal has a mine life of approximately 5.5 years and will generate up to 17.2 million tonnes of ore during this time. The proposal will involve disturbance of up to 400 ha within a 1,205 ha development envelope. The general layout of the proposed mine and the development envelope are shown in Figure 2.

Mine pits would intercept the superficial aquifer and dewatering of up to 0.92 gigalitres per annum (GL/a) from the superficial aquifer is required to facilitate mining. The proposal would require up to 2 GL/a to meet processing requirements, and this would be sourced from the mine dewater and/or from abstraction from the Yarragadee aquifer.

Tailings material (sand and clay) will be returned, along with overburden and oversized material, to the mining void to backfill mined areas and re-establish landforms for rehabilitation.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 1 of the Boonanarring Mineral Sands PER (Image Resources, 2014).

Table 1: Summary of key proposal characteristics

| Summary of the Proposal | |
|--------------------------------|--|
| Proposal Title | Boonanarring Mineral Sands Mine |
| Proponent Name | Image Resources NL |
| Short Description | The proposal will involve conventional open cut dry mining of mineral sands, and the processing of material mined through primary and secondary concentration plants approximately 12 to 24 km north-west of the Gingin township. It includes the construction and operation of associated infrastructure (such as offices, workshops, fuel storage, roads, solar drying cells and water bores) and a modification to the intersection of Brand Highway with Wannamal Road West. |

| Element | Location | Proposed Extent |
|------------------------------------|---------------------|---|
| Physical Elements | | |
| Mine and associated infrastructure | Figure 2 | Clearing of no more than 50 ha of native vegetation within a 400 ha disturbance area in a 1,205 ha development envelope |
| Operational Elements | | |
| Dewatering (operational) | Superficial aquifer | Extraction of no more than 0.92 GL/a |

A total of 11 submissions were received during the public review period. The key issues raised relate to:

- potential impacts on the nature reserves and wetlands located adjacent to the proposal from hydrological changes;
- impacts to water supply on existing users in the area;
- investigations and plans for the management of acid sulphate soils;
- dust, including impacts on sensitive receptors and dust management;
- the proximity of sensitive receptors to the proposal and the predicted noise exceedances at some of the sensitive receptors; and
- radiation risk from mining mineral sands.

Issues raised were addressed in the Response to Submissions document received on 31 March 2014 (Appendix 5).

The potential impacts of the proposal initially predicted by the proponent in the PER document (Image Resources, 2014) and their proposed management are summarised in Table ES 1.2 (Executive Summary) of the proponent's document.

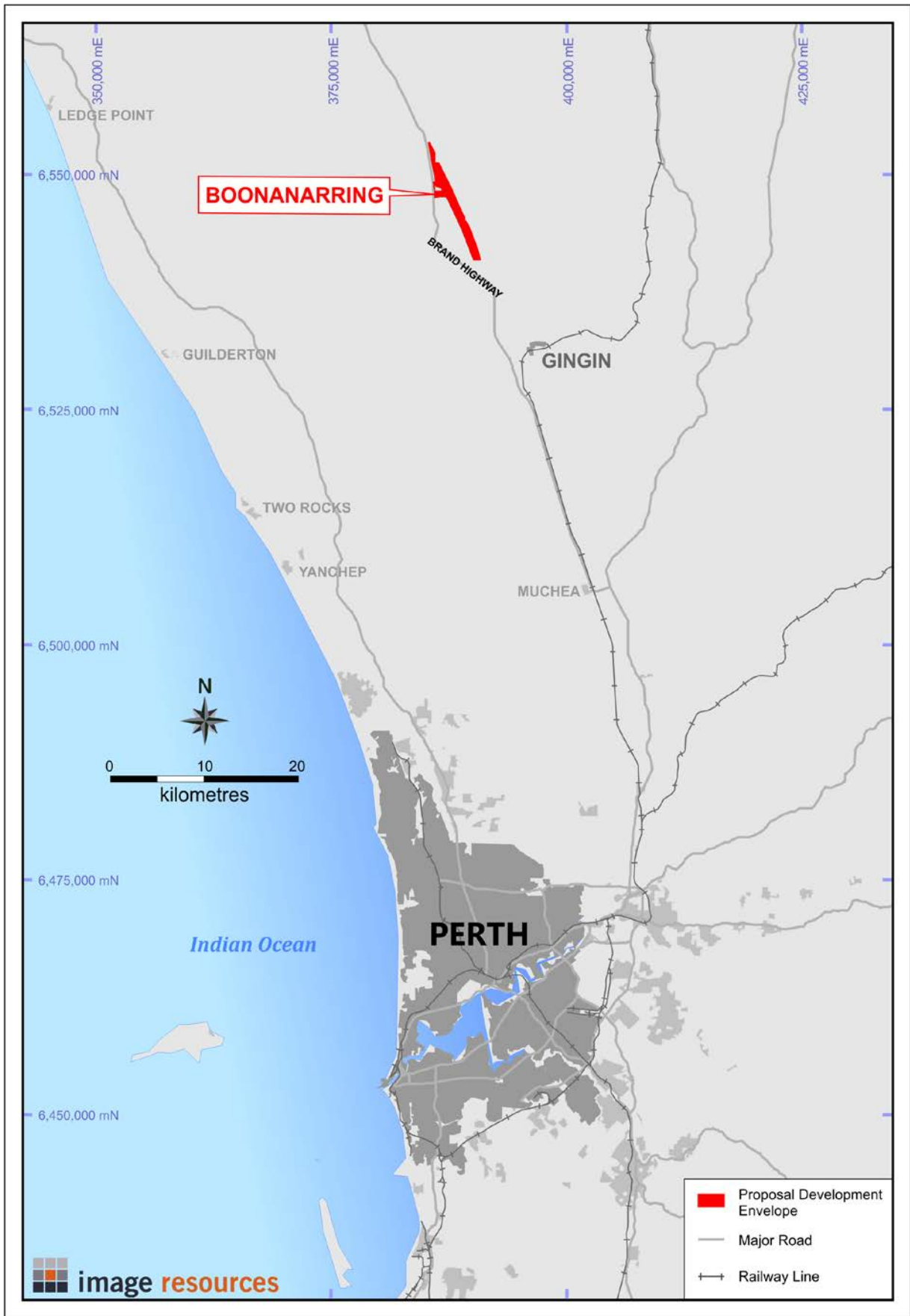


Figure 1: Location of the proposal indicating regional context



Figure 2: Mine development envelope and conceptual mine layout

3. Key environmental factors and principles

Section 44 of the *Environmental Protection Act 1986* (EP Act) 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 subterranean fauna and amenity (dust and noise), 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) Flora and vegetation;
- (b) Terrestrial fauna; and
- (c) Hydrological processes and inland waters environmental quality.

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 set out in Table 1.

Details on the key environmental factors and their assessment are contained in Sections 3.1 - 3.3. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal, taking into consideration environmental impact management by the proponent. 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 the conservation of biological diversity and ecological integrity;
- (d) Principles related to improved valuation, pricing and incentive mechanisms; and
- (e) Principle of waste minimisation.

3.1 Flora and vegetation

The EPA's environmental objective for this factor is *to maintain representation, diversity, viability and ecological function at the species, population and community level.*

The proposal has the potential to impact flora and vegetation through clearing, dewatering and groundwater abstraction.

The proposal would require clearing of up to 50 ha of scattered degraded native vegetation within a 400 ha disturbance area, contained within a 1,205 ha development envelope. This includes clearing of remnant vegetation within the areas to be mined and clearing for access. The proposal's development envelope and conceptual disturbance are shown in Figure 2.

Development Envelope

No Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC) were recorded in the development envelope. Two Priority 3 species were recorded within the development envelope, and these included the Spear Grass *Austrostipa* sp. Cairn Hill (M.E. Trudgen 21176) found in paddocks in the northern part of the survey area and the rush *Lepidobolus densus*, which was recorded in the access track between Brand Highway and Bartlett's Well Nature Reserve. The areas where *Austrostipa* sp. Cairn Hill were recorded are not within the planned disturbance footprint. Disturbance to vegetation in the access corridor will also be avoided or minimised to only that required to provide a crossing. It is unlikely that the loss of individual plants would impact on the status of the species.

The proposal lies in the Drummond Botanical Subdistrict of the Darling Botanical District of the South Western Botanical Province of Western Australia. There are six vegetation units within the development envelope, including units of *Banksia* spp. low woodland and *Banksia* spp. – *Eucalyptus todtiana* low woodland, heaths with scattered *Eucalyptus todtiana* and *Corymbia calophylla*, and a *Leptospermum erubescens* heath in a small seepage area and degraded *Melaleuca preissiana* low woodland in a farm paddock.

The development envelope has been extensively cleared for agriculture, with small areas of vegetation exhibiting low species richness and vegetation values. There are pockets of relatively intact vegetation occurring along the road verges of Aurisch Road and Wannamal Road West and in the Bartlett's Well Nature Reserve access track corridor and small remnants of disturbed vegetation are scattered across the paddocks. Each individual remnant contains little diversity.

Surveys conducted along the Brand Highway and Wannamal Road West intersection identified vegetation similar to that in remnants in the wider development envelope, including an upper strata dominated by *Banksia* species and *Allocasuarina*.

The EPA notes that, on a worst case estimate, clearing of up to 50 ha of native vegetation would be required. This includes a loss of 1.3 ha of native vegetation in degraded condition and 21 ha of native vegetation in good or better condition within the verges of Wannamal Road West and Aurish Road and within the access track to Bartlett's Well Nature Reserve. The remainder to be cleared (up to 27.7 ha) includes individual scattered trees and grazed degraded understorey within paddocks, and a limited area of fringing *Banksia* woodland vegetation with weeds in the understorey in the Brand Highway road reserve. Clearing will be undertaken on an 'as needs' basis and is likely to be lower than the worst case estimated by the proponent.

The EPA considers that clearing the areas proposed is unlikely to be significant on a local or regional context. The EPA recommends that the location and authorised extent of clearing be limited to a maximum 50 ha within the 1,205 ha development envelope as described and spatially defined in the recommended statement that the proposal may be implemented.

Nature Reserves

Boonanarring Nature Reserve and Bartlett's Well Nature Reserve are located upgradient and to the east of the proposal, as shown in Figure 2. Surveys recorded 222 and 573 taxa for each respective reserve. The proponent will include a 50 m buffer between the operating pits and nature reserves to prevent any direct impacts on the two nature reserves resulting from the proposal.

The proponent has predicted that mining will require the abstraction of no more than 0.92 GL/a from the superficial aquifer as a result of mining (pit inflow). Groundwater-dependent flora and vegetation within the Bartlett's Well Nature Reserve and the Boonanarring Nature Reserve could potentially be impacted by lowering of the water table. However, hydrological studies have identified that the superficial aquifer located beneath the mine pits is at a depth of approximately 50 m and 30 m respectively where it extends beneath the edge of the reserves. Hydrological studies have also identified that the perched Mirrabooka aquifer sits below the nature reserves and above the superficial aquifer and is not hydraulically connected to the superficial aquifer.

With the inclusion of the 50 m buffer, a predicted drawdown of up to 1 m, predominantly 0.2 m to 0.5 m, is expected of the superficial aquifer in the area beneath the edge of the nature reserves. The EPA considers that a reduction of this magnitude (depth to groundwater being 50 m and 30 m respectively) is likely to pose negligible risk to the nature reserves.

The EPA recommends that the maximum annual abstraction rate from the superficial aquifer be specified in the Statement that the proposal may be implemented since this prediction, in part, underpins assumptions in relation to potential impacts on the nature reserves. Condition 6 has been recommended to ensure that the 50 m buffer to the nature reserves is applied and that monitoring of groundwater levels occurs. In the unlikely event that there is a hydrological connection between the perched Mirrabooka aquifer and the superficial aquifer, condition 6 requires management and contingency

measures to be implemented noting that the duration of mining is only 5.5 years and the landform is to be re-established following mining.

Summary

Having particular regard to:

- the proposal development envelope being mostly cleared agricultural land;
- no predicted impacts to any TECs or PECs;
- direct clearing not being significant in a local or regional context;
- the proposed management of a 50 m buffer between the pits and the nature reserves; and
- consideration of the EPA's (2013) EAG 9 *Application of a significance framework in the environmental impact assessment process*,

the EPA considers that the proposal can be managed to meet the EPA's objective for Flora and Vegetation provided that recommended condition 6, to ensure there are no impacts on the nature reserves as a result of lowering of groundwater levels below the reserves, is implemented, and the authorised volume of water from the superficial aquifer is not exceeded.

3.2 Terrestrial fauna

The EPA's environmental objective for this factor is *to maintain representation, diversity, viability and ecological function at the species, population and assemblage level.*

The proposal has the potential to impact terrestrial fauna predominantly from clearing.

Desktop and field surveys identified a total of 120 vertebrate fauna species potentially occurring within five kilometres of the development envelope, of which 17 were identified as conservation significant. Of the 17 species identified, three species were considered possible to occur within the development envelope, including the Rainbow Bee Eater, Chuditch, and the Carpet Python. Carnaby's Black Cockatoo also has the likelihood of occurring due to small areas of preferred feeding habitat and the location of the site being within breeding and non-breeding range.

The proposed development envelope has been extensively cleared for agriculture in the past 30 years. Potential impacts to terrestrial fauna are likely to be limited, given that the proposal development envelope is predominantly cleared, highly modified land, subject to frequent disturbance, and contains little intact, high value habitat. Remnant habitat is also widely represented in the surrounding undisturbed areas.

The only fauna habitat identified as having potential value within the development envelope is in the existing Wannamal Road West and Aurish Road verges and the Bartlett's Well Nature Reserve access track. The only

vegetation proposed for clearing in these areas is that required for movement of plant and equipment across the tracks.

Within the proposal development envelope, approximately one hectare of potential foraging habitat will be cleared for internal mine access roads across the road reserves of Wannamal Road West, Aurisch Road and Bartlett's Well access track. This is approximately 14% of *Banksia* woodland within the development envelope but amounts to 0.25% of this habitat type. The EPA notes that there is commitment to retain all ten potential existing and future nesting trees within the proposal development envelope. The EPA considers that the predicted impacts to Carnaby's Black Cockatoos are likely to be low due to minimal loss of habitat and the retention of the potential existing and future nesting trees.

Summary

Having particular regard to:

- the proposal development envelope being mostly cleared agriculture land;
- the proponent's commitment to retaining the ten potential existing and future nesting trees for Carnaby's Black Cockatoos within the proposed development envelope; and
- consideration of the EPA's (2013) EAG 9 *Application of a significance framework in the environmental impact assessment process*,

the EPA considers that the proposal can be managed to meet the EPA's objective for Terrestrial Fauna.

3.3 Hydrological processes and inland waters environmental quality

The EPA's environmental objectives for these factors are:

- Hydrological processes – *to maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.*
- Inland waters environmental quality – *to maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.*

The proposal would involve dewatering from the superficial aquifer to facilitate and support dry mining, and the abstraction of groundwater from the Yarragadee aquifer for processing, dust suppression and other production uses. An operational water demand of up to 2 GL/a is required, which would be sourced from recycling tailings water, the Yarragadee aquifer and mine dewater.

Conservation Category Wetlands

Predicted groundwater drawdown within the superficial aquifer shows a drawdown footprint of 0.2 m which extends approximately 1.8 km west of the mine where the Mindarra North West Wetlands chain is located (Figure 3). Almost all of the Conservation Category wetlands (CCW) are located outside of the predicted zone of influence associated with groundwater drawdown for the proposal. The only CCW that may potentially be impacted by groundwater drawdown is the unnamed wetland located adjacent to Drew Road. For the purposes of assessment, this wetland will be referred to as the 'Collard wetland'.

Based on worst case predictions and on the assumption that the Collard wetland is dependent on the superficial aquifer, the wetland is located within a predicted area of groundwater drawdown ranging from 0.2 m to 0.3 m over an 18 month period. However, additional modelling undertaken indicates that the Collard wetland is unlikely to be impacted at all when the most likely mine life, sand tailings recharge and representative drain elevations are taken into account in the modelling.

Investigations have also indicated that the Collard wetland may be in a discharge area for the Bassendean Sands directly east of the wetland, and that a clay layer beneath the wetland and under the Bassendean Sands is sufficient to retard vertical infiltration from the superficial aquifer. Based on this, the Collard wetland is more likely to be recharged by the Bassendean Sand dune to the east of the wetland rather than from the underlying superficial aquifer.

The proponent considers the risk of the Collard wetland being adversely impacted by dewatering of the superficial aquifer to be very low. However, to ensure that the Collard wetland would not be adversely impacted, the proponent has explored a groundwater reinfiltration system as a risk mitigation measure. Initial studies indicate that infiltration of 100 kilolitres per day along a 1.5 km long drain would reduce the potential drawdown footprint within the superficial aquifer in the area of the Collard wetland to less than 0.1 m. The EPA notes that further studies of this scheme would be supported by site investigations prior to commencement of mining.

The Department of Water (DoW) has also provided advice that modelled drawdown from the superficial aquifer poses low risk to the Environmental Protection Policy (EPP) wetlands west of the mine, the Collard wetland, and the patches of remnant *Banksia* woodland west of the mine.

To ensure that the Collard wetland is not significantly impacted by this proposal, the EPA has recommended condition 7, which restricts the drawdown to no more than 0.5 m near the western boundary of the development envelope. This is based on the proponent's modelling of the groundwater reinfiltration pits, which are predicted to limit the drawdown in the area of Collard wetland to 0.1 m.

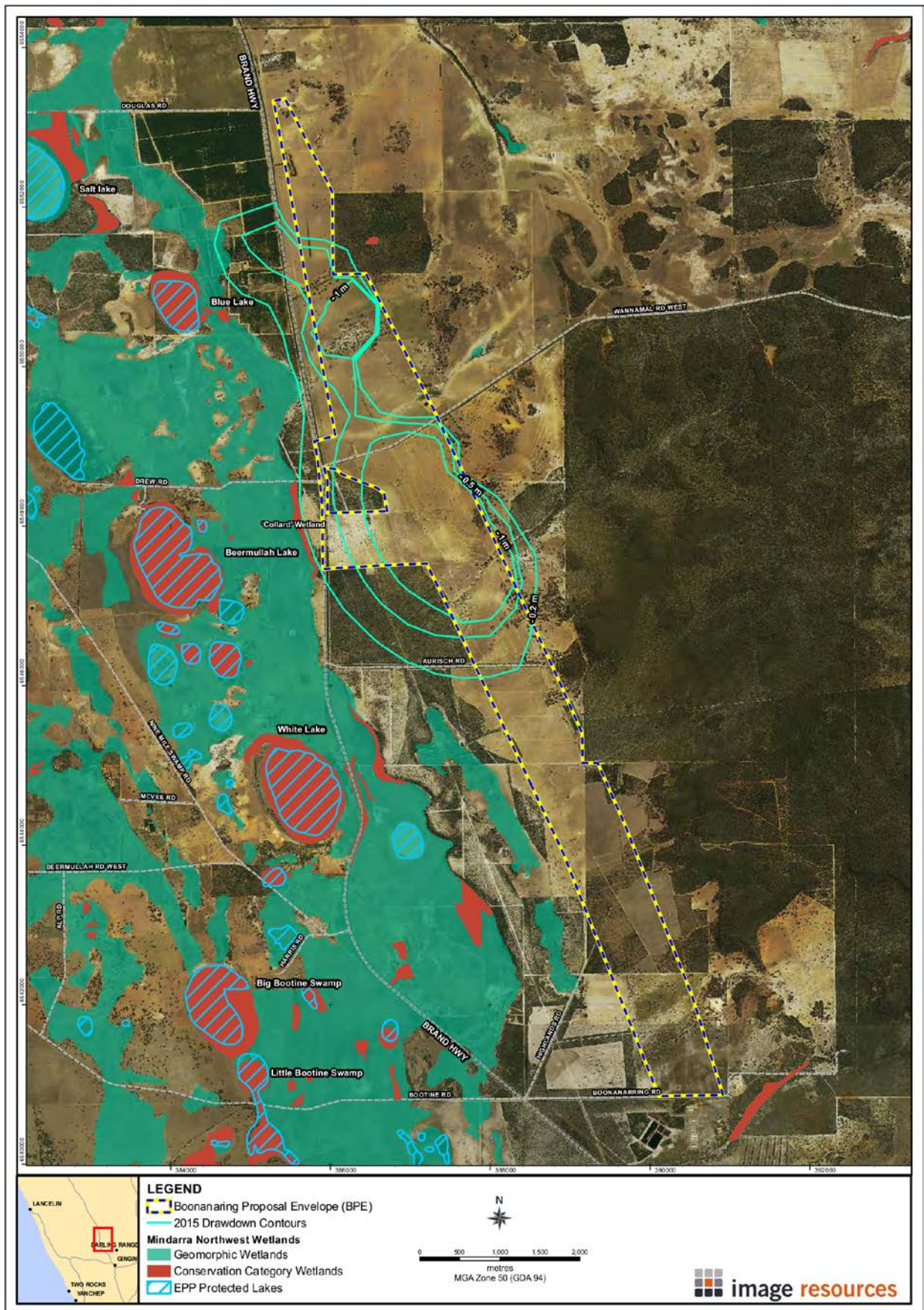


Figure 3: Predicted groundwater drawdown in the superficial aquifer as potentially relevant to nearby wetlands in 2019

Groundwater Quality

Potential impacts to groundwater quality include the infiltration of higher salinity level groundwater from the Yarragadee aquifer into the superficial aquifer and the potential disturbance of Acid Sulfate Soils (ASS). Modelling has indicated that there will be steady and progressive mixing of residual salinity, such that the margins would be similar to the baseline salinity of the superficial aquifer.

Preliminary investigations identified the potential presence of ASS in the mining path, which could be exposed from mining operations and impact on groundwater quality. The proponent has committed to undertake detailed ASS investigations and plans, coordinated with grade control activities before beginning mining. This enables areas and accurate volumes of ASS to be identified, treated and managed appropriately, to mitigate potential risks to the environment.

The Department of Environment Regulation (DER) advised that, given the proponent's commitment to undertake detailed investigations and to develop management plans before commencement of each mining operation and the relatively low rate of pumping required to dewater the mine pits, it is satisfied that ASS disturbance will be manageable and that the watertable drawdown is unlikely to cause adverse impacts on wetlands in the area.

The EPA notes that the ASS Plan would be regulated under the *Mining Act 1978* through inclusion in the Mine Closure Plan, which is required to be submitted to the DMP for approval.

Water Allocation

The proposal would require groundwater abstraction from the superficial aquifer as a result of inflow into mine pits and abstraction from the deeper Yarragadee aquifer to meet processing requirements.

The DoW is responsible for water allocation under the *Rights in Water and Irrigation Act 1914* (RIWI Act). The proposal is located within the boundaries of the Gingin Groundwater Allocation Plan which was released for public comment in August 2013 (DoW 2013). The allocation plan explains how the DoW will maintain a reliable groundwater supply for agriculture, horticulture, the industry, urban development and the environment in the longer term. The plan also describes DoW's approach to reduce risks to future groundwater supply and the environment by applying updated allocation limits and local licensing rules.

The DoW has advised that, if the proposal is to proceed, it will need to temporarily exceed allocation limits for water resources for the short duration of the project (5.5 years) subject to the proponent being able to demonstrate that any potential impacts on wetlands, other environmental features, the resource and other existing groundwater users can be adequately managed.

Although 0.92 GL/a of water is required to be dewatered from the superficial aquifer, approximately 0.95 GL/a would be returned through sand tailings recharge. Further to this, there are nine gigalitres of unused Public Water Supply reserve that may offset the proposed Yarragadee allocation and the DoW has advised that this can be managed under the RIWI Act.

In issuing a licence for the duration of mining, the DoW will require a detailed operating strategy to be prepared under the requirements of the RIWI Act to meet the DoW's groundwater management objectives. Operating strategies address:

- the sources to be used;
- the licensee's land use, water abstraction regime, and the methods and infrastructure used to abstract and distribute the water;
- monitoring and reporting requirements;
- methods used to manage impacts on the aquifer, the environment and other water users;
- contingency plans, describing how the licensee will alter its operations to cope with unforeseen circumstances or mitigate adverse impacts resulting from the operation; and
- water efficiency measures employed.

The EPA considers that impacts from temporary exceedance of water allocation limits of the superficial aquifer are unlikely to be significant based on the overall water balance, requirements for a detailed operating strategy, the short duration of the allocation, and the potential offsetting of the allocation from the nine gigalitres of unused Public Water Supply. The EPA recommends that the maximum annual authorised extent of abstraction rates for the superficial aquifer are specified in the Statement that the proposal is implemented.

Summary

Having particular regard to:

- the limited duration of mining being in the order of 5.5 years;
- Boonanarring Nature Reserve and Bartlett's Well Nature Reserve being supported by the perched Mirrabooka aquifer;
- the superficial aquifer occurring at depths of 30-50 m below the Nature Reserves;
- proposed groundwater reinfiltration system;
- the proponent's commitment to undertake detailed ASS investigations;
- RIWI Act licence requirements regulated by the DoW which include the setting of licence limits and development of operating strategies; and

- consideration of the EPA's (2013) EAG 9 *Application of a significance framework in the environmental impact assessment process*,

the OEPA considers that the proposal can be managed to meet the EPA's objectives for Hydrological Processes and Inland Waters Environmental Quality provided that the maximum annual authorised extent of abstraction rates for the superficial aquifer are specified in the Statement (Appendix 4) and condition 7 relating to the management of groundwater levels to ensure wetlands are not impacted as a result of mining operations is implemented.

3.4 Environmental principles

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

4. Conditions

Section 44 of the EP Act 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 Image Resources to develop the Boonanarring Mineral Sands Mine is approved for implementation.

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

- (a) Flora and vegetation in nature reserves – to ensure there are no impacts to the Bartlett's Well and Boonanarring Nature Reserves through lowering of the groundwater levels below the nature reserves. Monitoring is required to demonstrate that impacts are contained within the areas predicted and contingency measures are required to ensure protection of the nature reserves; and
- (b) Groundwater quantity and quality – to ensure the Collard wetland would not be impacted from dewatering of the superficial aquifer attributable to mining. Monitoring is required to demonstrate that impacts are contained within the areas predicted and contingency measures are required to ensure confidence that the wetland would be protected.

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

- *Environmental Protection Act 1986* – Works Approval and Licence.
- *Mining Act 1978* – Mining Proposal.
- *Rights in Water and Irrigation Act 1914* – Groundwater Abstraction Licences.
- *Radiation Safety Act 1975* – Registration.

4.2 Consultation

In developing these conditions, the EPA consulted with the proponent and the Department of Parks and Wildlife, the DoW, and the DMP 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 6 and 7.

5. Other advice

Acid sulfate soils

Section 3.3 “Hydrological processes and inland waters environmental quality” describes the potential for ASS material occurring in the proposal area. To ensure that ASS would not impact groundwater quality from mining disturbances, the EPA considers it critical that the proponent consult with the DER prior to and during detailed ASS investigations and development of an ASS management plan.

The ASS Plan would be regulated under the *Mining Act 1978* through inclusion with the Mine Closure Plan, and is required to be submitted to the DMP for approval prior to commencement of mining.

Amenity (Noise)

The factor of Noise was reviewed, but after consideration it was determined not to warrant further assessment as a key environmental factor.

The EPA’s environmental objective for Amenity (Noise) is to ensure that impacts to amenity are as low as reasonably practicable.

The proponent has undertaken a Noise Impact Assessment, which has shown exceedances of noise regulations at four locations during construction and operation of the mine. Comments received during the public review period also expressed concern in relation to noise impacts on sensitive receptors.

As part of its response to submissions, the EPA notes that Image Resources is currently investigating mitigation options to manage the impact of noise on receptors. These include negotiations with sensitive receptors and revising the planned operations, such as only conducting night operations within the pits.

The EPA notes that of the four residences predicted to be impacted, only two residences are continually occupied. The DER advised that implementing amenity/leasing agreements with the impacted residences may be the only practical measure to ensure compliance with noise regulations, and Image Resources is currently undertaking discussions and negotiations with these residents.

The noise modelling will also be revised to account for equipment and operational changes. This will be submitted to the DER together with a management plan for assessment as part of the Works Approval and Licence application under Part V of the EP Act.

Mine closure and rehabilitation

After processing, tailings material, overburden and oversized material will be returned direct to the mining void as backfill. The EPA notes that the proposed mine will be progressively rehabilitated and that Image Resources has committed to undertake a baseline soil and overburden characterisation study, which would inform the Mine Closure Plan as required under the *Mining Act 1978*. The Mine Closure Plan will address progressive rehabilitation of the site and rehabilitation to return disturbed areas of the proposal to pre-mining landscape values.

Consistent with Environmental Protection Bulletin No.19 *EPA involvement in mine closure* and based on advice received from the DMP, the EPA considers that the factor of Rehabilitation and Closure can be effectively regulated by the DMP under the *Mining Act 1978* and through the joint DMP/EPA *Guidelines for Preparing Mine Closure Plans*.

6. Recommendations

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

1. That the Minister notes that the proposal being assessed is to develop a conventional open cut mineral sands mine, concentration plant and associated infrastructure between 12 to 24 km north-west of Gingin;
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 that the EPA has concluded 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 notes the EPA's other advice presented in Section 5; and
5. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

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Appendix 1

List of submitters

Organisations:

Department of Environment Regulation

Department of Mines and Petroleum

Department of Parks and Wildlife

Department of Water

Gingin Water Group Inc.

Groundwater Consulting Services

Wildflower Society of WA

Individuals:

4 individual submissions

Appendix 2

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Outback Ecology (2013). Image Resources NL Boonanarring Project: Desktop Acid Sulphate Soil (ASS) Risk Assessment. Prepared for Image Resources NL.

Outback Ecology (2013). Image Resources NL Boonanarring Project: Baseline Soil and Overburden Characterisation. Prepared for Image Resources NL.

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 |
|-----------------------------------|---|---|---|
| LAND | | | |
| Flora and vegetation | <p>Proposal would involve clearing of up to 50 ha within a 400 ha disturbance area.</p> <p>Majority of the development envelope is cleared agricultural land. No Threatened Ecological Communities, Priority Ecological Communities or Threatened flora species were recorded within the proposal.</p> <p>However, the Bartlett's Well and Boonanarring Nature Reserves are located directly east of the proposal and may potentially be impacted through groundwater drawdown.</p> | <p>Department of Parks and Wildlife:</p> <ul style="list-style-type: none"> Both nature reserves are important components of the State's conservation reserve system, and there should be no impacts on the two nature reserves from implementing the proposal. <p>Public submissions:</p> <ul style="list-style-type: none"> Concerns raised in relation to clearing of native vegetation for the proposal. Change of hydrology could also hasten the death of vegetation. Uncertainty on the adequacy of a fifty metre buffer. | <p>Considered to be a key environmental factor and discussed in Section 3.1 Flora and vegetation.</p> |
| Subterranean fauna | <p>Potential impacts to subterranean fauna and habitat due to clearing, excavation and dewatering activities associated with the proposal.</p> <p>Results of the investigations undertaken for subterranean fauna determined that the potential habitat for these fauna appears to be limited to the superficial aquifer, and is not a restricted habitat on the Swan Coastal Plain. This habitat type is considered to be widespread, common and extensively interconnected.</p> <p>The presence of troglofauna is also considered to be unlikely due to a lack of suitable geologies.</p> | <p>No submissions received on this factor.</p> | <p>While there is reasonable likelihood on the presence of stygofauna in the proposal area, they are considered likely to be few in number and extend to areas outside of the proposal area.</p> <p>Not considered to be a key environmental factor.</p> |
| Terrestrial fauna | <p>Proposal would involve up to 400 ha of disturbance, and could potentially impact on fauna habitat values.</p> | <p>Public submissions:</p> <ul style="list-style-type: none"> Concerns that the proposed clearing areas provide habitat for fauna. | <p>Considered to be a key environmental factor and discussed in Section 3.2 Terrestrial</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|--|--|--|---|
| | The development envelope is extensively cleared. However, there is the potential for suitable habitat for foraging by Carnaby's Black Cockatoos. | | fauna. |
| WATER | | | |
| Hydrological processes and Inland Waters Environmental Quality | <p>Dewatering and abstraction of the superficial and Yarragadee aquifers are required to support mining.</p> <p>There is the potential for the abstraction of water to impact on the nature reserves and wetlands located adjacent to the proposal.</p> <p>The proposal would also require temporary over allocation of groundwater resources.</p> <p>Acid forming materials are present in soils on site. Exposure of acid forming material to oxygen has the potential to contaminate soils and groundwater.</p> | <p>Department of Environment Regulation:</p> <ul style="list-style-type: none"> Given the relatively low rate of pumping required to dewater the mine pits, the DER is satisfied that ASS disturbance will be manageable. Detailed ASS investigations and management plans should be undertaken prior to commencement of mining. <p>Department of Mines and Petroleum:</p> <ul style="list-style-type: none"> It is noted that management of ASS risk would be detailed in the relevant management plans to be submitted to the DMP for review. <p>Department of Parks and Wildlife:</p> <ul style="list-style-type: none"> Results of monitoring programs should inform the management response actions, including trigger levels for reinfiltration of groundwater. Studies on hydrogeological processes should be independently peer reviewed. Surface water drainage should not impact on the nature reserves. <p>Department of Water:</p> <ul style="list-style-type: none"> The DoW will need to over-allocate groundwater resources to provide water licences. Approval on volumes would be limited to five years, with consideration for extension subject to compliance monitoring and reporting. Modelled drawdown from superficial aquifer | <p>Considered to be a key environmental factor and discussed in Section 3.3 Hydrological processes and inland waters environmental quality and Section 5 Other Advice.</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|--|--|---|
| | | <p>dewatering poses low risk of impact on three key groups of assets:</p> <ul style="list-style-type: none"> ○ EPP wetlands west of the mine; ○ The Collard wetland; and ○ Two patches of remnant Banksia woodland west of mine. <ul style="list-style-type: none"> ● Strong management mechanisms are required, including ensuring no measurable drawdown at the wetlands from mining as modelled in the PER. ● Further works are required to establish the relationship between the Collard wetland and the superficial aquifer. <p>Public submissions:</p> <ul style="list-style-type: none"> ● Concerns that dewatering of the mine will deplete the bore water supply. ● Drawdown impacts on the wetlands and nature reserves are concerning. ● Reliance of the wetlands on the superficial aquifer is not well understood. ● Management of ASS is inadequate. Development of ASS often occurs in the long term and may occur well after the proposed mine has been decommissioned. | |
| AIR | | | |
| Air quality | <p>Dust emissions would be produced from the proposal during construction and operation activities including excavation of topsoil and overburden, vehicle movements, replacement of overburden, and dozing.</p> <p>This could potentially impact on sensitive</p> | <p>Department of Environment Regulation:</p> <ul style="list-style-type: none"> ● The Baseline Air Quality Assessment report is considered insufficient for a reliable estimation to capture seasonal effects ● Dust management strategies should state specific dust mitigation measures. | <p>Dust generation within the proposal area would be controlled through management and mitigation detailed in the proponent's Dust Management Plan.</p> <p>Proposed management measures</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|---|---|--|
| | receptors and vegetation cover. | <p>Public Submissions:</p> <ul style="list-style-type: none"> Concerns on the impact of dust on health, in particular the impact on drinking water in the catchment and the rainwater tanks. Further development of dust management controls is required. Proposed dust management will be insufficient and have major impacts on nearby receptors. | <p>include:</p> <ul style="list-style-type: none"> a 50 m buffer between operating pits and the nature reserves; minimising area of disturbance; sealing access road and regular watering of unsealed surfaces; stabilising the surface; using biodegradable stabilising agents and growing of temporary crops to minimise erosion; and progressive rehabilitation of site. <p>The Dust Management Plan will be further developed during the Part V EP Act process and the Mining Proposal approval process under the <i>Mining Act 1978</i>.</p> <p>Further, dust and other point source emissions are required to be monitored and managed under the Part V licence required by the DER under the EP Act.</p> <p>Not considered to be a key environmental factor.</p> |
| PEOPLE | | | |
| Amenity | <p>Impacts to Amenity associated with construction and operation of the proposal include:</p> <ul style="list-style-type: none"> noise and vibration; and light disturbance. <p>This could contribute to disturbance to nearby receptors. The nearest sensitive receptor is</p> | <p>Department of Environment Regulation:</p> <ul style="list-style-type: none"> The Noise Impact Assessment indicates that there is a predicted exceedance of the assigned noise level at four of the closest neighbouring residences. Implementing amenity/leasing agreements with potentially impacted residences may be the only | <p>Not considered to be a key environmental factor and discussed in Section 5 Other Advice.</p> |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|---|--|---|
| | within 1 km of the proposal area. | <p>practicable measure to ensure noise compliance.</p> <p>Public submissions:</p> <ul style="list-style-type: none"> • Concerns that noise regulations are exceeded at nearby receptors from mining associated activities. • More substantive noise and light management and mitigation measures are required to ensure there is no major impact on the amenity of neighbouring properties. | |
| Heritage | <p>The proposal could potentially impact indigenous heritage through physical disturbance to land, dewatering, and discharges of surplus water.</p> <p>There are no registered sites within the proposal development envelope and site surveys did not identify any sensitive areas that will be disturbed.</p> | No submissions received on this factor. | <p>The proponent is aware of their obligations to report any sites discovered during construction and obtain permits. Indigenous Heritage can be managed under the <i>Aboriginal Heritage Act 1972</i>.</p> <p>Not considered to be a key environmental factor.</p> |
| Human health | <p>The proposal will be mining mineral sands, which contain radioactive elements including uranium and thorium. This could potentially impact on human health.</p> <p>The nearest sensitive receptor is located within 1km northeast of the proposal.</p> | <p>Department of Mines and Petroleum:</p> <ul style="list-style-type: none"> • Management of radiation risk will be detailed in relevant management plans and should be submitted to the DMP for review. <p>Public submissions:</p> <ul style="list-style-type: none"> • Radiation risks associated with mineral sands mining are concerning. | <p>A Radiation Management Plan will be submitted to the DMP for assessment and approval, as required by the <i>Radiation Safety Act 1975</i>, which would address monitoring and management of radiation levels. The proponent has commenced consultation with the DMP in relation to this plan.</p> <p>Not considered to be a key environmental factor.</p> |
| INTEGRATING FACTORS | | | |
| Offsets | The proponent will avoid, minimise and rehabilitate impacts such that there is not likely | No submissions received on this factor. | Advice received in regard to residual impacts concluded that no direct |

| Preliminary Environmental Factors | Proposal Characteristics | Government Agency and Public Comments | Identification of Key Environmental Factors |
|-----------------------------------|---|---|--|
| | to be a significant residual impact as a result of implementation of the proposal. | | <p>environmental impacts require offsetting. There is the potential for indirect impacts on the adjacent Nature Reserves and wetlands, however these impacts are to be managed by the inclusion of conditions 6 and 7. See Section 3 Key environmental factors and principles.</p> <p>Not considered to be a key environmental factor.</p> |
| Rehabilitation and closure | <p>The mine site will be progressively rehabilitated to return disturbed areas to pre-mining landscape values. Tailings material, along with overburden and oversized material will be returned to the mine void as backfill behind the advancing mine face.</p> <p>A Mine Closure Plan will be prepared, which will be assessed and approved by the DMP.</p> | <p>Public submissions:</p> <ul style="list-style-type: none"> • Concern raised over the success of rehabilitation and closure. • Any market turndowns for mineral sands could put pressure on the company, and resultantly put rehabilitation at risk. | <p>This proposal is subject to the <i>Mining Act 1978</i>. In accordance with <i>Environmental Protection Bulletin 19</i> (EPA 2013), the EPA considers that Rehabilitation and Closure can be managed through the Mine Plan required under the <i>Mining Act 1978</i>.</p> <p>Not considered to be a key environmental factor and discussed in Section 5 Other Advice.</p> |

| PRINCIPLES | | |
|--|-----------------|--|
| Principle | Relevant | 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> <i>In application of this precautionary principle, decisions should be guided by –</i> <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></p> | Yes | Vegetation, flora, fauna habitat, and wetland values could potentially be impacted by the proposal. The proponent has undertaken investigations and developed management measures to avoid impact to the environment. The EPA is satisfied there is an understanding of the environmental factors potentially impacted by the proposal and there is confidence in the proponent's predictions. |
| <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 | The proposal would result in loss of native vegetation and potentially impact on fauna habitat. Flora and Vegetation and Terrestrial Fauna are relevant environmental factors that have been discussed in the EPA's Report and Recommendations. |
| <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 | Site specific studies have been undertaken to determine the presence of significant flora, fauna and ecological communities to determine direct and indirect impacts. Flora and Vegetation, and Terrestrial Fauna are environmental factors that have been discussed in the EPA's Report and Recommendations. |
| <p>4. Principles relating to improved valuation, pricing and incentive mechanisms <i>(1) Environmental factors should be included in the valuation of assets and services.</i> <i>(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.</i> <i>(3) 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> <i>(4) 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> | Yes | The proponent would bear the cost of any potential pollution, containment, monitoring, management, decommissioning, rehabilitation and closure. |
| <p>5. The principle of waste minimisation <i>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</i></p> | Yes | Waste (tailings) would be returned to the pit as part of rehabilitation. Other waste would be disposed of according to relevant regulations and legislation. |

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, 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 Water | Groundwater abstraction licences under the <i>Rights in Water and Irrigation Act 1914</i> |
| 2. Minister for Environment | <i>Wildlife Conservation Act 1950</i> <i>Taking of protected flora and fauna</i> |
| 3. Director General Department of Environment Regulation | Works Approval and Licence under Part V of the <i>Environmental Protection Act 1986</i> |
| 4. Director General Department of Mines and Petroleum | <u>Mines Safety</u> Mine Safety under the <i>Mines Safety and Inspection Act 1994</i> District Inspector, Resources Safety Branch <u>Mining Proposal</u> Mining proposal under the <i>Mining Act 1978</i> Director Environment Division <u>Dangerous Goods</u> Storage and handling of hazardous materials under the <i>Dangerous Goods Safety Act 2004</i> Chief Dangerous Goods Officer |
| 5. Shire of Gingin | Building and planning approval |

Note: In this instance, agreement is only required with DMAs #1 and #2 since these DMAs are Ministers.

RECOMMENDED ENVIRONMENTAL CONDITIONS
STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(Environmental Protection Act 1986)

BOONANARRING MINERAL SANDS MINE

Proposal: Open cut dry mining of mineral sands and the processing of mined material through primary and secondary concentration plants and dry minerals separation. It includes the construction and operation of associated infrastructure and a modification to the intersection of Brand Hwy with Wannamal Road West.

Proponent: Image Resources NL
Australian Company Number 57063977579

Proponent Address: Suite 4a, 5 Mumford Place
BALCATTWA WA 6021

Assessment Number: 1947

Report of the Environmental Protection Authority: 1516

Pursuant to section 45 of the *Environmental Protection Act 1986* it has been agreed that the proposal described and documented in Table 1 and Table 2 of Schedule 1 may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

Note: Words and expressions used in this Statement shall have the same respective meanings as in the Act or as provided for in Schedule 2 of this Statement.

1 Proposal Implementation

1-1 When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Table 2 in Schedule 1, unless amendments to the proposal and the authorised extent of the proposal has been approved under the EP Act.

2 Contact Details

2-1 The proponent shall notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence

within twenty eight (28) days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

3 Time Limit for Proposal Implementation

3-1 The proponent shall not commence implementation of the proposal after the expiration of five (5) years from the date of this Statement, and any commencement, within this five (5) year period, must be substantial.

3-2 Any commencement of implementation of the proposal, within five (5) years from the date of this Statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of five (5) 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 CEO.

4-2 The proponent shall submit to the CEO the Compliance Assessment Plan required by condition 4-1 at least six (6) months prior to the first Compliance Assessment 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 CEO.

4-5 The proponent shall advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.

4-6 The proponent shall submit to the CEO the first Compliance Assessment Report fifteen (15) months from the date of issue of this Statement addressing

the twelve (12) month period from the date of issue of this Statement and then annually from the date of submission of the first Compliance Assessment Report, or as agreed by the CEO.

The Compliance Assessment Report shall:

- (1) be endorsed by the proponent's CEO or a person delegated to sign on the CEO'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 Public Availability of Data

5-1 Subject to condition 5-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal the proponent shall make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)) relevant to the assessment of this proposal and implementation of this Statement.

5-2 If any data referred to in condition 5-1 contains particulars of:

- (1) a secret formula or process; or
- (2) confidential commercially sensitive information;

the proponent may submit a request for approval from the CEO to not make this data publicly available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publicly available.

6 Flora and Vegetation in Nature Reserves

6-1 The proponent shall ensure that groundwater dewatering and abstraction associated with the activities does not cause any loss or degradation of defined environmental values within Bartlett's Well and Boonanarring Nature Reserves and that no mining or excavation is undertaken within 50 metres from the development envelope boundary that is located adjacent to the Nature Reserves as shown in Figure 2 and delineated by the coordinates specified in Table 4 of Schedule 3.

- 6-2 The proponent shall prepare a Nature Reserve Vegetation and Groundwater Monitoring and Response Plan to the requirements of the CEO on the advice from the Department of Parks and Wildlife, as part of the proposal's Water Resource Operating Strategy to be approved by the DoW. The Nature Reserve Vegetation and Groundwater Monitoring and Response Plan shall:
- (1) identify the environmental values to be protected;
 - (2) when implemented, substantiate whether condition 6-1 is being met;
 - (3) identify the location of monitoring and control sites;
 - (4) detail the design of a survey to acquire baseline data from the monitoring and control sites;
 - (5) detail the proposed monitoring methodology;
 - (6) detail the proposed frequency and timing of monitoring;
 - (7) identify criteria to trigger implementation of management responses and contingency measures to prevent loss or degradation of the defined environmental values within the Bartlett's Well and Boonanarring Nature Reserves; and
 - (8) identify further management responses and contingency measures to be implemented in the event that the criteria identified required by condition 6-2(7) have been reached.
- 6-3 Prior to the commencement of groundwater dewatering and/or abstraction associated with the proposal, the proponent shall commence monitoring in accordance with the Nature Reserve Vegetation and Groundwater Monitoring and Response Plan required by condition 6-2 and continue implementation until otherwise agreed by the CEO.
- 6-4 Prior to the commencement of groundwater dewatering and/or abstraction associated with the proposal, the proponent shall provide the baseline data results required by condition 6-2(4) and 6-3 to the CEO.
- 6-5 In the event that monitoring required by condition 6-3 indicates criteria required by condition 6-2(7) have been reached the proponent shall:
- (1) immediately implement management and/or contingency measures identified by condition 6-2(8) and continue implementation until the criteria are being met, or until otherwise agreed by the CEO;
 - (2) investigate to determine the likely cause of the criteria being reached; and
 - (3) submit details of management and/or contingency measures implemented as required by condition 6-5(1) and the findings of the investigation required by condition 6-5(2) to the CEO and the Department of Parks and Wildlife within 21 days of identification that the criteria have been reached.

- 6-6 The proponent may review and revise the Nature Reserve Vegetation and Groundwater Monitoring and Response Plan to the requirements of the CEO on the advice of the Department of Parks and Wildlife.
- 6-7 The proponent shall review and revise the Nature Reserve Vegetation and Groundwater Monitoring and Response Plan as and when directed by the CEO.
- 6-8 The proponent shall implement the latest approved revision of the Nature Reserve Vegetation and Groundwater Monitoring and Response Plan.

7 Groundwater Quantity and Quality

- 7-1 The proponent shall ensure that groundwater dewatering and abstraction associated with the proposal does not cause any loss of environmental values to the Collard wetland as shown in Figure 3, and does not result in drawdown of the groundwater level relative to the seasonal baseline by more than 0.5 metres at the monitoring site as shown in Figure 3 and delineated by the coordinates specified in Table 5 of Schedule 3.
- 7-2 The proponent shall prepare a Groundwater Monitoring Plan to the requirements of the CEO, for inclusion in the Water Resource Operating Strategy to be approved by the DoW. The Groundwater Monitoring Plan shall:
 - (1) when implemented, substantiate whether condition 7-1 is being met;
 - (2) detail the design of a survey to acquire baseline groundwater levels at the monitoring site as shown in Figure 3 and delineated by the coordinates specified in Table 5 of Schedule 3;
 - (3) detail the proposed monitoring methodology at locations the monitoring site as shown in Figure 3 and delineated by the coordinates specified in Table 5 of Schedule 3;
 - (4) detail the proposed frequency and timing of monitoring at the monitoring site as shown in Figure 3 and delineated by the coordinates specified in Table 5 of Schedule 3;
 - (5) identify criteria to trigger implementation of management and/or contingency measures to prevent the lowering of the baseline groundwater level, required by condition 7-2(2), by more than 0.5 metres; and
 - (6) identify and test management and/or contingency measures to be implemented in the event that criteria identified required by condition 7-2(5) have been reached.
- 7-3 Prior to the commencement of groundwater dewatering and/or abstraction the proponent shall commence monitoring in accordance with the Groundwater Monitoring Plan required by condition 7-2 and continue implementation until otherwise agreed by the CEO.

- 7-4 Prior to the commencement of groundwater dewatering and/or abstraction associated with the proposal, the proponent shall provide the baseline data results required by condition 7-2(2) and 7-3 to the CEO.
- 7-5 In the event that monitoring required by condition 7-3 indicates criteria required by condition 7-2(5) have been reached the proponent shall:
- (1) immediately implement management and/or contingency measures identified by condition 7-2(5) and continue implementation until the criteria are being met, or until otherwise agreed by the CEO;
 - (2) investigate to determine the likely cause of the criteria being reached; and
 - (3) submit details of management and/or contingency measures implemented as required by condition 7-5(1) and the findings of the investigation required by condition 7-5(2) to the CEO within 21 days of identification that the criteria have been reached/exceeded.
- 7-6 The proponent may review and revise the Groundwater Monitoring Plan to the requirements of the CEO.
- 7-7 The proponent shall review and revise the Groundwater Monitoring Plan as and when directed by the CEO.
- 7-8 The proponent shall implement the latest approved revision of the Groundwater Monitoring Plan.

Table 1: Summary of the Proposal

| | |
|--------------------------|---|
| Proposal Title | Boonanarring Mineral Sands Mine |
| Short Description | <p>Conventional open cut dry mining of mineral sands, and the processing of material mined through primary and secondary concentration plants and dry minerals separation approximately 12 to 24 kilometres northwest of the Gingin township on M70/1194, M70/1311, G70/250 and E70/3041.</p> <p>It includes the construction and operation of associated infrastructure (such as offices, workshops, roads, fuel storage, solar drying cells and water bores) and a modification to the intersection of Brand Highway with Wannamal Road West.</p> |

Table 2: Location and authorised extent of physical and operational elements

| Column 1 | Column 2 | Column 3 |
|------------------------------------|------------------------------------|---|
| Element | Location | Authorised Extent |
| Mine and associated infrastructure | Figure 2 and Table 4 of Schedule 3 | Clearing of no more than 50 ha of native vegetation within a 400 ha disturbance area in a 1,205 ha development envelope |
| Dewatering | Superficial aquifer | Extraction of no more than 0.92 GL/a |

Figures (attached)

Figure 1 Locality map

Figure 2 Boonanarring Mineral Sands Mine Development Envelope and conceptual layout

Figure 3 Groundwater Monitoring Locations for the Mindarra North West Wetlands

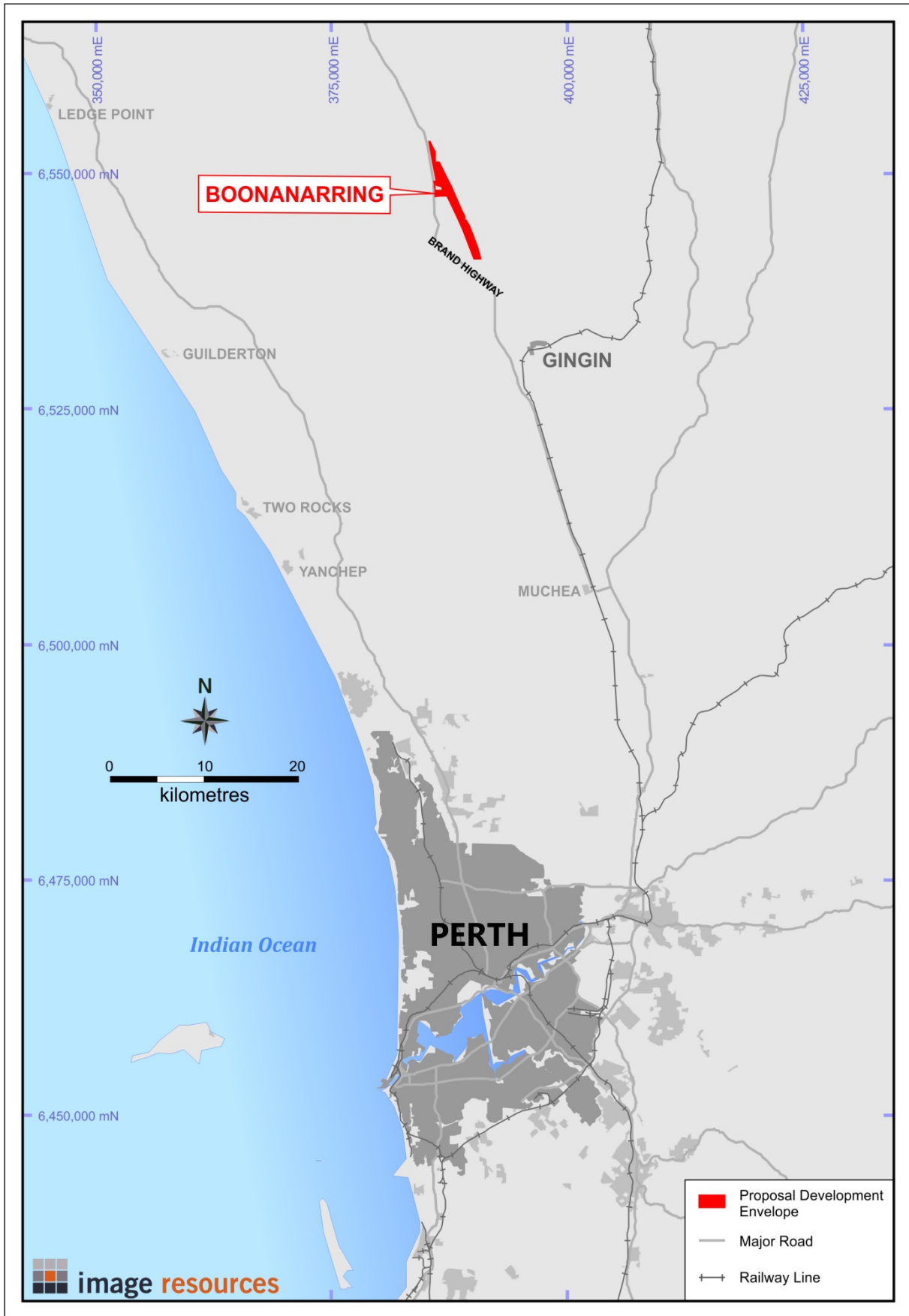


Figure 1: Locality map

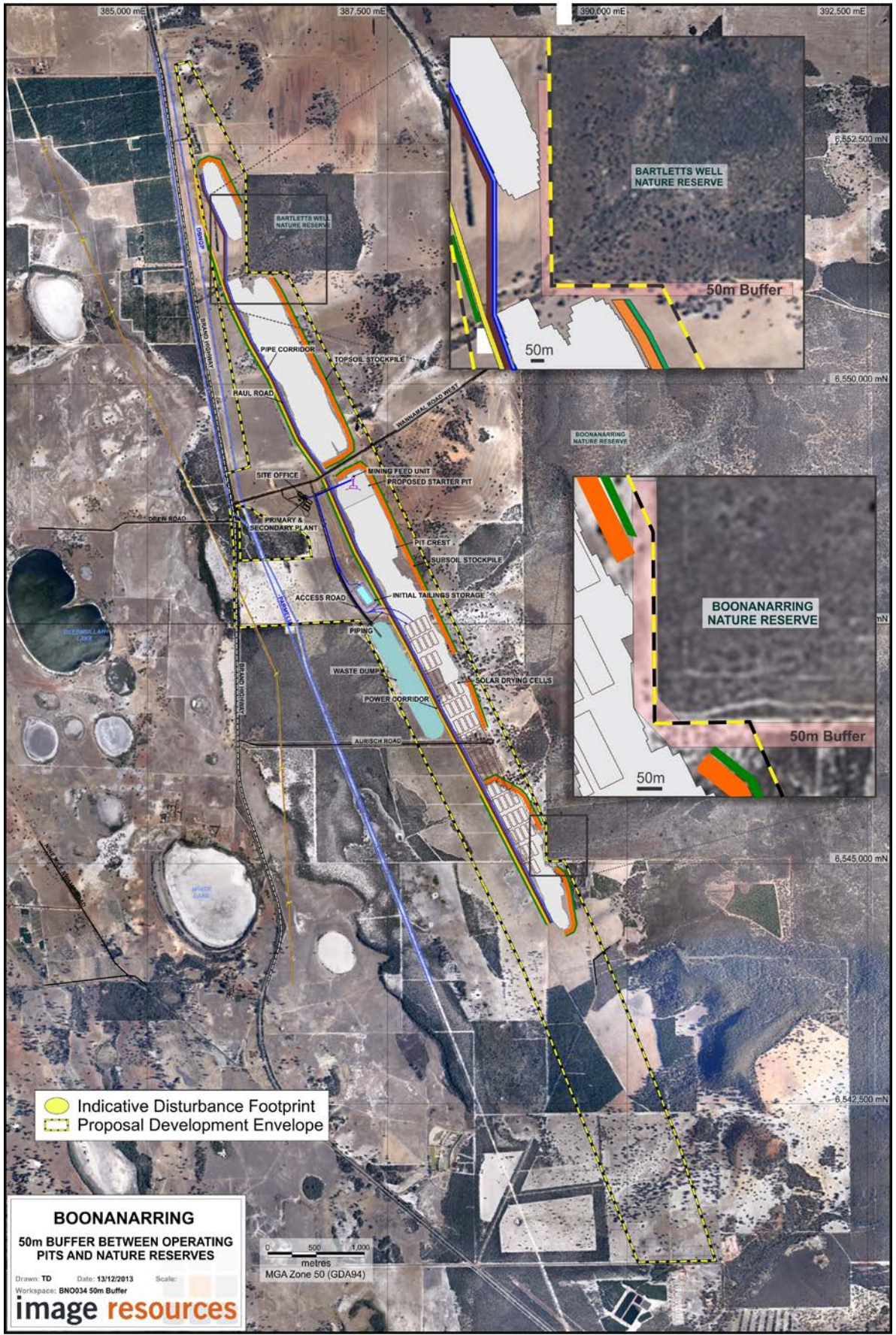


Figure 2: Boonanarring Mineral Sands Mine Development Envelope and conceptual layout

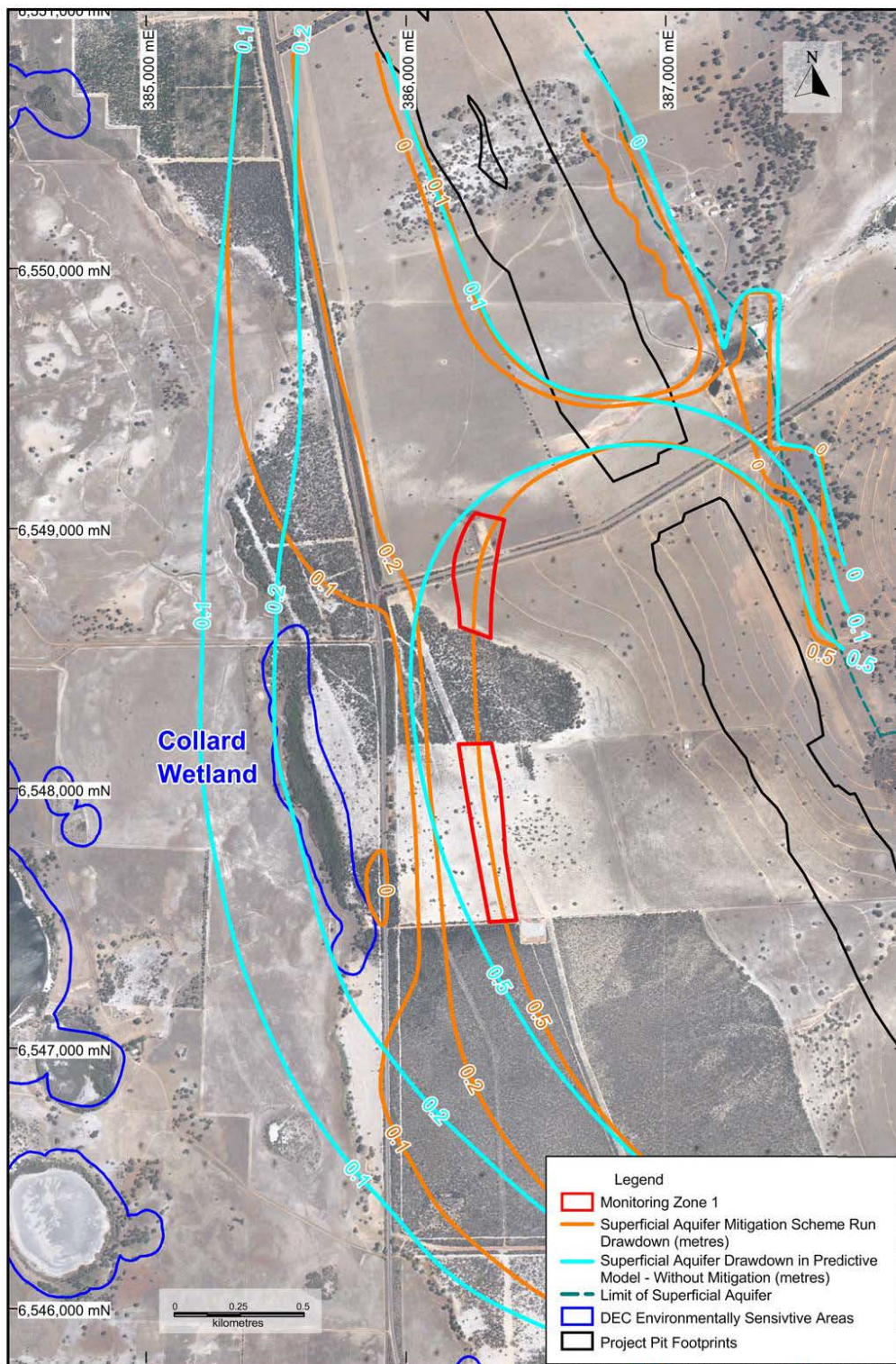


Figure 3: Groundwater Monitoring Locations for the Mindarra North West Wetlands

Table 3: Abbreviations

| Abbreviation | Definition |
|--------------|--|
| CEO | The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the <i>Environmental Protection Act 1986</i> , or his delegate. |
| DoW | Department of Water |
| EPA | Environmental Protection Authority |
| EP Act | <i>Environmental Protection Act 1986</i> |
| GL/a | Gigalitres per annum |
| ha | hectare |
| m | metre |

Schedule 3

All co-ordinates are in whole metres, listed in Map Grid of Australia Zone 50 (MGA Zone 50), datum of Geodetic Datum of Australia 1994 (GDA94).

Table 4: Project Co-ordinates

| Coordinate No | Easting | Northing |
|----------------------|----------------|-----------------|
| 1 | 388506 | 6544768 |
| 2 | 387823 | 6546223 |
| 3 | 387399 | 6547132 |
| 4 | 387205 | 6547535 |
| 5 | 386526 | 6547498 |
| 6 | 385909 | 6547459 |
| 7 | 385901 | 6548158 |
| 8 | 385900 | 6548252 |
| 9 | 385871 | 6548545 |
| 10 | 385839 | 6548860 |
| 11 | 385800 | 6549060 |
| 12 | 386062 | 6549136 |
| 13 | 385722 | 6550954 |
| 14 | 385291 | 6553328 |
| 15 | 385431 | 6553363 |
| 16 | 385546 | 6553141 |
| 17 | 386022 | 6552185 |
| 18 | 386033 | 6551161 |
| 19 | 386447 | 6551162 |
| 20 | 387277 | 6549501 |
| 21 | 387716 | 6548549 |
| 22 | 388858 | 6546066 |
| 23 | 389153 | 6545404 |
| 24 | 389157 | 6545028 |
| 25 | 389342 | 6545030 |
| 26 | 389688 | 6544253 |
| 27 | 390527 | 6542114 |
| 28 | 390919 | 6540865 |
| 29 | 390112 | 6540848 |
| 30 | 388915 | 6543895 |
| 31 | 388506 | 6544768 |

Exclusion area within overall boundary

| | | |
|----|--------|---------|
| 32 | 386711 | 6548184 |
| 33 | 386674 | 6548403 |
| 34 | 386586 | 6548474 |
| 35 | 386144 | 6548646 |
| 36 | 386077 | 6548708 |

| | | |
|----|--------|---------|
| 37 | 385925 | 6548736 |
| 38 | 385960 | 6548561 |
| 39 | 385964 | 6548162 |
| 40 | 386711 | 6548184 |

Table 5: Groundwater Monitoring Locations

| Polygon | Easting | Northing |
|----------------|----------------|-----------------|
| 1 | 386189.7933 | 6548899.801 |
| 1 | 386215.7677 | 6548974.056 |
| 1 | 386238.6334 | 6549019.307 |
| 1 | 386265.9519 | 6549059.239 |
| 1 | 386377.6666 | 6549033.274 |
| 1 | 386356.2934 | 6548933.295 |
| 1 | 386340.4119 | 6548838.724 |
| 1 | 386329.0574 | 6548727.017 |
| 1 | 386325.4457 | 6548614.3 |
| 1 | 386325.7178 | 6548576.737 |
| 1 | 386207.2333 | 6548621.968 |
| 1 | 386203.4567 | 6548687.405 |
| 1 | 386181.5475 | 6548817.098 |
| 1 | 386185.5879 | 6548869.718 |
| 1 | 386189.7933 | 6548899.801 |
| 2 | 386201.6343 | 6548169.01 |
| 2 | 386329.7088 | 6548172.15 |
| 2 | 386359.4103 | 6548033.938 |
| 2 | 386372.546 | 6547895.586 |
| 2 | 386382.375 | 6547756.144 |
| 2 | 386402.0743 | 6547626.431 |
| 2 | 386414.7812 | 6547548.187 |
| 2 | 386426.2182 | 6547492.468 |
| 2 | 386320.2591 | 6547485.199 |
| 2 | 386291.547 | 6547640.598 |
| 2 | 386259.347 | 6547819.581 |
| 2 | 386221.2595 | 6548050.024 |
| 2 | 386201.6343 | 6548169.01 |

Notes

The following notes are provided for information and do not form a part of the implementation conditions of the Statement:

- The proponent for the time being nominated by the Minister for Environment under section 38(6) of the EP Act is responsible for the implementation of the proposal unless and until that nomination has been revoked and another person is nominated.
- If the person nominated by the Minister, ceases to have responsibility for the proposal, that person is required to provide written notice to the Environmental Protection Authority of its intention to relinquish responsibility for the proposal and the name of the person to whom responsibility for the proposal will pass or has passed. The Minister for Environment may revoke a nomination made under section 38(6) of the EP Act and nominate another person.
- To initiate a change of proponent, the nominated proponent and proposed proponent are required to complete and submit *Post Assessment Form 1 – Application to Change Nominated Proponent*.
- The General Manager of the Office of the Environmental Protection Authority was the Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the Environmental Protection Act 1986 at the time the Statement was signed by the Minister for Environment.
- The unnamed wetland located adjacent to Drew Road is referred to in condition 7 of the Statement as the Collard wetland. The Collard wetland is shown in Figure 3.

Appendix 5

Summary of Submissions and Proponent's Response to Submissions

On CD in hardcopies of this report and at www.epa.wa.gov.au