Western Extension to the Dardanup Mineral Sands Project to include the Burekup Mineral Sands Deposit

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Doral Mineral Sands Pty Ltd

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Report 1310
January 2009

Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
22/9/2008	**Referral received**	
20/10/2008	**Intention to set EPS Level of Assessment advertised (no appeals)**	**4**
	EPA accepts scoping document (if one provided)	
2/12/2008	**Proponent's Final EPS document received by EPA**	**6**
5/1/2009	**EPA report to the Minister for the Environment**	**5**

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Contents

Page

1. Introduction and background

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for Environment on the proposal by Doral Mineral Sands Pty Ltd to mine the Burekup Mineral Sands Deposit (as the Western Extension to the Dardanup Mine) below the water table to a depth of approximately 14 metres below ground level.

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 was advised of the proposal in September 2008. Based on the information provided, the EPA considered that while the proposal had the potential to have an effect on the environment, the proposal, as described, could be managed to meet the EPA's environmental objectives. Consequently it was notified in *The West Australian* newspaper on 20 October 2008 that, subject to preparation of a suitable Environmental Protection Statement (EPS) document, the EPA intended to set the level of assessment at EPS.

The proponent has prepared the EPS document which accompanies this report (*Doral, 2008*). The EPS document sets out the details of the proposal, potential environmental impacts and appropriate commitments to manage those impacts. The EPA notes that the proponent has consulted with relevant stakeholders.

The EPA considers that the proposal can be managed to meet the EPA's environmental objectives, subject to the EPA's recommended conditions being made legally binding.

The EPA has determined, under Section 40 of the EP Act, that the level of assessment for the proposal is EPS, and this report provides the EPA advice and recommendations in accordance with Section 44 of the EP Act.

2. The proposal

The proposal is described in detail in the proponent's EPS document (*Doral, 2008*). The proposal is to extend the existing Dardanup Mine to allow mining of the Burekup Mineral Sands Deposit located approximately 20 kilometres east of Bunbury, Western Australia. Mining is to depths up to 14 metres below ground level and will require dewatering.

The key components of the proposal are summarised in Table 1 below:

Table 1: Summary of key proposal characteristics

Element	Description
Life of mine	3.5 to 5 years approximately
Total disturbance area	301 hectares
Area of native vegetation to be cleared	36.5 hectares
Mineable reserve	9.5 million tonnes
Overburden volume	5.8 million bulk cubic metres
Rate of extraction (overburden and ore)	6.4 million tonnes per year
Extraction method	Dry mining
Groundwater abstraction for dewatering	1095 megalitres per year
Dewater discharge	Re-use as process water at the Dardanup Mine

The potential impacts of the proposal are discussed by the proponent in the EPS document (Doral, 2008).

The regional location and proposal layout are shown in Figure 1.

3. Consultation

During the preparation of the EPS, the proponent has undertaken consultation with government agencies and key stakeholders. The agencies, groups and organisations consulted, the comments received and the proponent's response are detailed in the EPS (Doral, 2008).

A number of environmental issues were raised by the stakeholders during the consultation. Table 2 summarises the main issues raised and details the actions taken by the proponent to address the issues.

The EPA considers that the consultation process has been appropriate and that reasonable steps have been taken to inform the community and stakeholders on the proposed development.

Table 2: Summary of issues raised during stakeholder consultation

Issue raised	Stakeholder	Response
Effects on irrigation, school bus route	Shire of Dardanup	Irrigators will not be affected.
Dardanup mine and western extension should preferably be managed under one licence.	Department of Environment and Conservation	Application being developed.
A dewatering licence and permit to interfere with bed and banks will be required. DOW must be informed of any drop in water levels in the Conservation Category Wetland. Need to be informed of location of	Department of Water	Permit application will be developed. Doral will liaise with DOW and provide bore locations and water balance.

Issue raised	Stakeholder	Response
bores and where current water users are located.		
No environmental issues raised.	Public Meeting 13 October 2008	No response required.
No environmental issues raised.	Land Conservation District Committee	No response required.
How will noise impacts be managed? Duration of closure of Dowdells Line.	Dardanup and Districts Residents' Association	Noise will comply with noise regulations. Two week closure of Dowdells Line of no concern to group.
Agreement of alteration of location of channels provided adequate consultation and landholder agreement. Permission granted to use the irrigation drain as an emergency floodwater discharge point.	Harvey Water	Doral will meet Harvey Water's requirements. Doral to provide plan for agreement to use the irrigation channel as an emergency discharge point.
Interruption to irrigation water supply. Rehabilitation to ensure that soil structure is maintained. Dust, noise, radiation, blasting and groundwater level impacts.	Landowners	Doral will ensure irrigation supply and soil structure is maintained. Existing Dust Management Plan will be updated to include the Western Extension. Noise will be within noise regulations. Naturally occurring radioactive materials concentrate in tails but still relatively low, although higher than background. Diluted with non radioactive tails for disposal in pit. There is a legislative requirement to ensure background radiation or lower is achieved at rehabilitation.
Wetlands particularly important as was source of food and water. Also likely place for burials. Requested monitoring for bones around wetlands.	Gnaala Karla Booja Future Acts Committee	Wetlands have been excised from the project. Wetland health and water levels to be monitored. Creek diversion and reinstatement explained. Members satisfied. Education of mining group in case of burial sites. Agreed to notify group of any significant sites and cease work until assessed.

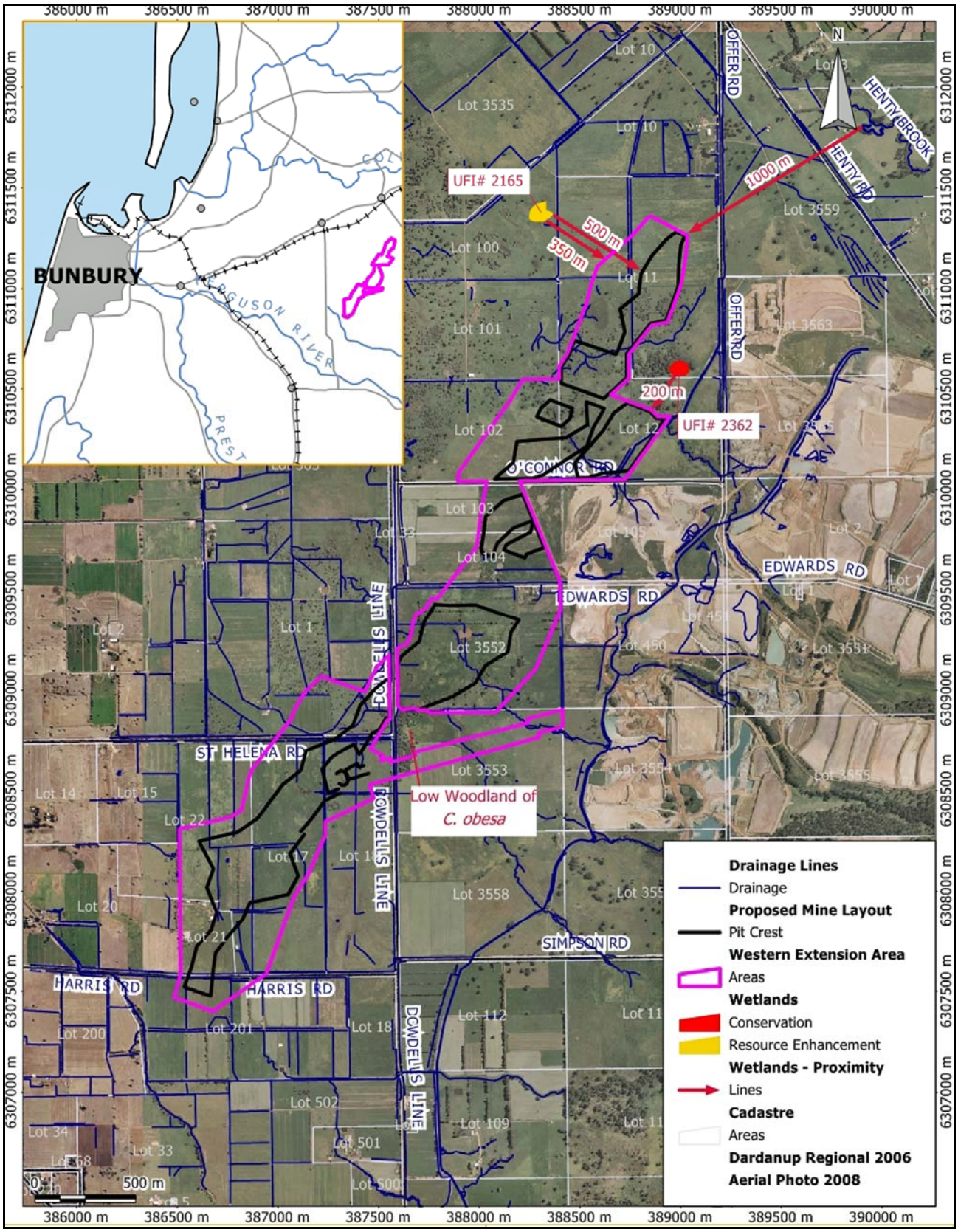

Figure 1: Project location

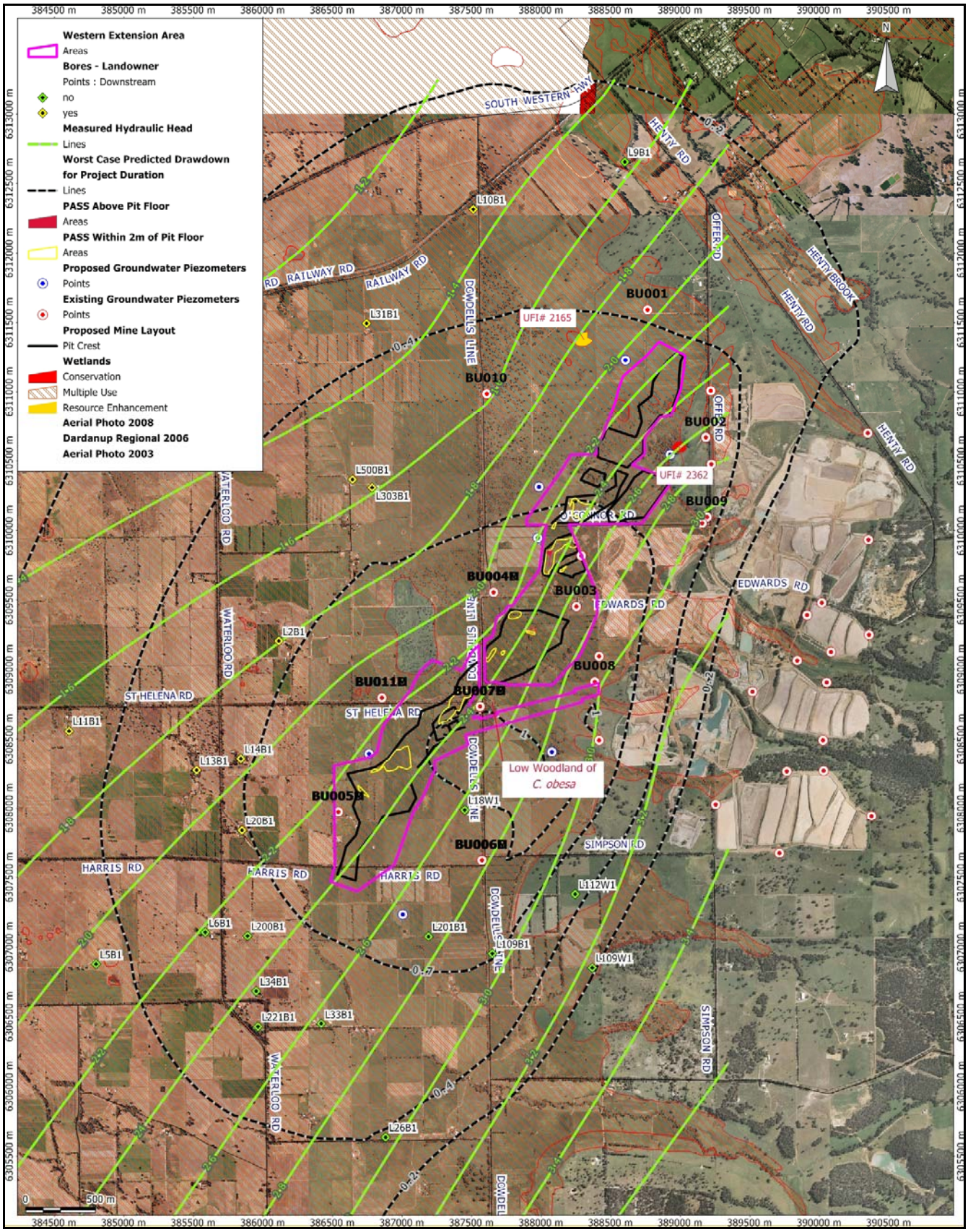

Figure 2: Groundwater drawdown

4. Key environmental factors

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

(a) Vegetation/Flora/Habitat

(b) Groundwater and Surface Water

(c) Rehabilitation

(d) Noise

The key environmental factors are discussed in Sections 4.1 – 4.4. The description of each factor shows why it is relevant to the proposal and how it will 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.

4.1 Vegetation/Flora/Habitat

Description

The proposal may impact the health of flora and vegetation as a consequence of:

- clearing;
- groundwater drawdown; and
- change to wetland hydrology due to pit excavation.

Vegetation

The proposal is within the Swan Coastal Plain Bioregion and is situated 2 km to the west of the North Whicher Scarp area. The western extension area occurs within the Guildford vegetation complex as defined by Heddle *et al* (1980). This vegetation complex has been largely cleared for agricultural activities and is under-represented in the conservation estate (Government of Western Australia, 2000). Only 4.4% of the original pre-European extent remain on the southern Swan Coastal Plain within the Greater Bunbury Region and only 0.4% is in Regional Open Space (EPA, 2003)

A total of nine vegetation communities were recorded in the western extension, seven of which occur in the proposed disturbance area. The majority of the communities are disturbed and range in condition from completely degraded to good.

Native vegetation to be cleared comprises:

- 0.13 hectares (ha) rated as very good condition;
- 2.04 ha rated as good; and
- 25.15 rated as degraded (9.2 ha is completely degraded agricultural land).

The area to be cleared that rates as good or very good represents 0.15 % of the remaining Guildford complex. The proponent plans to offset this impact.

Flora

No Declared Rare Flora were located during the surveys, although several Priority species have previously been recorded in or near the area. The majority of these Priority flora are beyond the reach of either direct or indirect impacts from the proposal. Although historical records indicate two Priority species *Aponogeton hexatepalus* (P4) and *Grevillea rosieri* (P2) at two locations within the proposal area, they were not found in the Mattiske 2006 and 2007 surveys. No Threatened Ecological Communities (TECs) were identified in the proposal area or within the range of indirect impacts from the proposal.

Wetlands

The entire proposal area is within a palusplain wetland UFI13244 (Hill *et al* 1996) which is classified as a Multiple Use Wetland. The wetland has been significantly modified by rural activity and land clearing. The area is characterized by a network of agricultural drains and the predominant land use is for cattle grazing. Isolated pockets of vegetation remain in some paddocks and in road reserves. An area of significance is the *Casuarina obesa* pocket located south of the Dowdells Line and St Helena Road (Figure 1). The proposal has been designed to largely avoid this area but the conveyor and a pipeline will pass through it.

A Conservation Category Wetland (CCW) UFI2362 (sumpland) is located approximately 200 metres to the east of the proposal. This wetland has been classified as a seasonal sumpland that is reliant on direct fill by rainfall and surface water runoff. Groundwater is at a depth of greater than 15 metres. This wetland has healthy over-storey but the under-storey has been degraded due to cattle grazing. A number of agricultural drains have possibly altered seasonal surface water flows.

A Resource Enhancement Wetland (REW) UFI2165 (sumpland) is located 350 metres to the north west of the proposed disturbance area (500m from the proposed pit area). Waterlogged surface soils are due to the accumulation of surface water. Groundwater is at a depth of greater than 10 metres. The wetland is comprised of a *Melaleuca* over-storey over pasture grass with some *Eleocharis acuta* sedge (<5%). It has been significantly degraded due to the same agricultural activities as the CCW wetland.

The CCW and REW are perched wetlands as a result of heavy clay soils and are therefore not considered to be Groundwater Dependent Ecosystems (GDEs). Drawdown of groundwater due to mining operations may not significantly affect the vegetation/habitat of these wetlands. The remnant *Casuarina Obesa* area of the palusplain Multiple Use Wetland has a low to moderate dependence on groundwater and could possibly be impacted by groundwater drawdown (WRM, 2006). There is also a small area with some degree of groundwater dependency east of the *C. Obesa* remnant outside of the proposed mine footprint.

The CCW and REW wetlands, *C. Obesa* remnant vegetation and groundwater dependent vegetation will be protected by:

- maintaining a minimum 200 metre buffer of the CCW and REW wetlands from mining operations;
- minimizing the period for which pits are dewatered;
- backfilling the pit as soon as possible;
- timing dewatering within winter as far as practical to reduce wetland stress;
- monitoring wetland/GDE canopy health, soil moisture, groundwater quality and surface water quality;
- artificial recharge of affected areas and/or modification of practices; and

- flexibility in mining sequence and short term cessation of mining until conditions allow recommencement.

The proponent will manage temporary disturbance to creek bed and banks (see Section 4.2) in accord with the conditions specified on the permit obtained from the Department of Water. Rehabilitation works will reinstate creeks to their natural state. As a contingency, suitable quality water will be supplied to wetlands, if required, in keeping with the natural wetting and drying cycles of each wetland as identified by a monitoring program.

Habitat
From a fauna perspective some of the aquatic and wetland ecosystems and roadside verges provide modified functional ecosystems in the proposal area. The remaining area is highly degraded and would contain ecosystems characteristic of this level of disturbance.

Aquatic communities at all sites are dominated by cosmopolitan species typical of lowland rural regions. A total of eight bird species using the wetlands were observed. All species are common and none are listed under international (JAMBA/CAMBA) treaties. Groundwater impacts on the wetlands in the vicinity of the proposal would be related to the depth that the water level falls below the bed and timing of the seasonal cycles.

Roadside vegetation can provide linear corridors for movement of terrestrial fauna through the landscape. The roadside verges in the project area are narrow and discontinuous so their ability to function as movement corridors is restricted. Birds and bats can use these roadside verges for foraging and staging posts.

There is evidence that Baudin's Black Cockatoo and probably Carnaby's Cockatoo which are listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) occasionally visit the general area but it is unlikely that they are nesting in the proposal area (Coffey Environments, 2008). Although some trees that contain suitable hollows for nesting were recorded, other birds were using these hollows.

It is possible that the Western Ringtail possum which is listed as vulnerable under the EPBC Act 1999 and under the *Wildlife Conservation (Specially Protected Fauna) Notice 2008* could be present in the area but, considering the number of foxes and cats they are likely to be in low densities in open areas and only infrequently use isolated trees in paddocks.(Coffey Environments, 2008).

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

- maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities;
- protect Declared Rare and Priority Flora, consistent with the provisions of the *Wildlife Conservation Act 1950*;
- protect Threatened Fauna and Priority Fauna species and their habitats, consistent with the provisions of the *Wildlife Conservation Act 1950*; and
- maintain the integrity, functions and environmental values of wetlands.

The EPA notes that the flora and vegetation survey (Mattiske, 2007) undertaken for the assessment is consistent with EPA Guidance Statement No. 51 (2004). No Declared Rare Flora or Threatened Ecological Communities were found in the proposal area,

although two Priority species *Aponogeton hexatepalus* (P4) and *Grevillea rosieri* (P2) are on record at two locations within the proposal area. These were not found in the Mattiske 2006 and 2007 surveys but the proponent proposes to fence and quarantine the area where *A. hexatepalus* was previously recorded until further survey in winter confirms whether or not it is present.

The EPA notes that potentially impacted vegetation in the project area is within the Guildford vegetation complex of which only 4.4% of the original extent remains on the Swan Coastal Plain within the Greater Bunbury Region and only 0.4% is in existing or proposed Regional Open Space. This is well below the 30% target for reservation of vegetation complexes occurring within the Greater Bunbury Region.

EPA Guidance 10 for *Level of Assessment for Proposals Affecting Natural Areas within the System 6 Region and Swan Coastal Plain Portion of the System 1 Region* states that " For those ecological communities where less than 10% remain, all areas are regionally significant, irrespective of the level of constraint on the land. Most communities in this category are communities typical of the eastern side of the Coastal Plain (principally the Pinjarra Plain), where the communities are highly fragmented and the remnants too numerous to be individually assessed at the strategic level. All of these remnants are regionally significant under the Rarity criterion, most containing threatened ecological communities…….[These areas are] covered by the following specific policy statement:
There is a presumption that all areas of remnant native vegetation containing threatened ecological communities or vegetation of the major landform elements of which less than 10% currently remains will be retained and conserved."

The proponent has argued that the proposal area does not contain threatened ecological communities and that, of the 36.52 ha of Guildford vegetation to be cleared, 25.15 ha is rated as degraded and 9.2 ha is rated as completely degraded agricultural land. In this context "degraded" means that the basic vegetation structure is severely impacted by disturbance and whilst there is scope for regeneration it is not to a state approaching good condition without intensive management. "Completely degraded" has a similar meaning to the term "parkland cleared". Since the proposal area is farmland, future intensive management for regeneration is unlikely.

The EPA notes that the area to be cleared rated as good or very good represents 0.15 % of the remaining Guildford complex, but the proponent plans to provide an offset by securing 20 ha of Guildford complex located on their Dardanup Mine. This area is currently unprotected and is not managed for environmental values. In addition, the proponent proposes to provide $250,000 over five years to manage the area and rehabilitate degraded sections. The proponent will replace the loss of 450 trees by planting 5000. The proponent also has in-principle support from the owners of the CCW wetland to place the wetland and a buffer in a conservation covenant. The understorey will be rehabilitated. Further details relating to rehabilitation of the total offset areas are discussed under Rehabilitation section 4.3.

The DEC has advised the EPA that the offset is acceptable and adequately provides the following outcomes:

- appropriate direct and indirect offsets;

- an environmental benefit from the provision of covenants and associated rehabilitation and management;
- like for like or better vegetation under proposed covenanting arrangements; and
- a net conservation benefit from the additional tree plantings, strategic corridor establishment and the 5 year $250,000 management funding commitment.

The EPA considers that there is also a significant risk to vegetation as a consequence of indirect impacts from mining operations. Groundwater drawdown may impact on the groundwater dependent *C. Obesa* remnant and the hydrology of the wetlands may be altered by pit excavations.

The proponent proposes to protect the CCW wetland by maintaining a 200m buffer around the wetland and the EPA notes that this buffer size meets the recommended size from the Department of Water. The EPA considers that maintenance of this buffer is imperative, particularly due to the risk of excavation breaching the integrity of underlying clay layer responsible for maintaining the perched wetland. Wetlands are discussed further in Section 4.2.

The EPA notes the proponent's intention to protect the wetland vegetation/habitat by:

- dewatering in winter as far as possible;
- providing artificial recharge to affected areas, as necessary, in keeping with the natural wetting and drying cycles of each wetland as identified by a monitoring program;
- re-establishing natural water flow characteristics as soon as possible by backfilling the pit and re-establishing the soil profile and landform;

and considers these measures to be appropriate. The EPA has recommended an outcome based condition (Condition 6) that would require the proponent to monitor wetland water levels in order to ensure that mining excavations and dewatering do not adversely affect wetland ecosystems.

Summary

The EPA considers the issue of Vegetation/Flora/Habitat has been adequately addressed and the proposal can meet the EPA's objectives for this factor provided that:

- the proponent's management procedures:
- condition 6 and 7 to maintain a 200 metre buffer around the CCW wetland UF12362 and to monitor and manage the health of vegetation in relation to groundwater levels; and
- the proponent's proposed offset;

are implemented.

4.2 Groundwater and Surface Water

Description

The proposal will require dewatering at a rate of up to 1095 megalitres per annum. Dewater discharge will be pumped to the Dardanup Mine for re-use as process water. Process water is stored in the process water pond which may occasionally be lowered by controlled release during winter months when dewater discharge exceeds process water requirements. The discharge point reports to either the Harvey Water Irrigation Channel or the Dowdells Line Drain.

The proposal has the potential to impact on surface water and groundwater in a number of ways:

- the groundwater level may be lowered affecting the production from landowner bores or water input to natural streams.
- groundwater may be acidified due to the oxidation of pyrite material following drawdown of the water table or disturbance of soil; and
- acidified groundwater may then dissolve metals and may contaminate streams or landowner bores with water that may inhibit plant growth or be toxic to biota;

Groundwater

The proposal is partly located within the proclaimed Dardanup Groundwater Management Sub Area of the Bunbury Groundwater Area and partly in an unproclaimed area.

There are 22 landowner production bores in the vicinity of the proposal. They are mainly used for stock watering and irrigation but a few are thought to be used for domestic purposes.

Limited groundwater resources occur within the superficial aquifer which overlies the regionally extensive Leederville aquifer. The superficial aquifer is separated from the Leederville aquifer by a horizon of grey clay and silts. Where this horizon is thin or absent there is upward leakage from the Leederville aquifer to the superficial aquifer. The superficial aquifer is recharged by rainfall infiltration. Discharge occurs as baseflow to surface drainage features, evapotranspiration and downward leakage.

The mine pit is within the superficial aquifer and is generally at least 4m above the underlying Leederville aquifer. At the closest point it is within 1m. This is significant in estimating the potential for the generation of acid sulphate in the Leederville sediments as a consequence of mining.

A survey (SWC, 2007b) of the proposal area for the presence of Acid Sulphate Soil (ASS) and Potential Acid Sulphate Soil (PASS) indicated that neither the overburden nor the orebody contain ASS or PASS material. However, PASS material occurs below the orebody within the sediments of the Leederville aquifer.

As a precautionary measure the proponent intends to carry out soil testing for acidity of the overburden and orebody for the first 3 months to ground truth the SWC (2007b) survey. Dewatering effluent will be managed in accord with *Dewatering Effluent and Groundwater Monitoring Guidance for Acid Sulphate Soil Areas (June 2006)* (DoE, 2006a).

The proponent will monitor 23 monitoring wells located around the proposal area, near the site boundary, to assess ground water quality and drawdown. Alkalinity, acidity, pH and electrical conductivity will be monitored and trigger levels will be based on 20% change to background levels. Contingencies will include groundwater remediation in consultation with the Department of Environment and Conservation (DEC), cessation of mining operations where necessary and supply of downstream water users with an alternative source of water.

Groundwater drawdown due to dewatering is predicted to be between 0.1 to 1.3m at landowner bores, depending on the distance from the dewatering point (Figure 2). Negligible impact from dewatering is predicted for landowner bores located beyond 2000m. The affect of drawdown on landowner bore yields will vary according to the placement of pump intakes. The proponent will manage impacts on bore yields by assisting in the maintenance of landowner bores.

Wetlands

The entire proposal area is within a palusplain wetland UFI13244 (Hill *et al* 1996) which is classified as a Multiple Use Wetland.

A Conservation Category Wetland (CCW) UFI2362 (sumpland) is located approximately 200 metres to the east of the proposal. A Resource Enhancement Wetland (REW) UFI2165 (sumpland) is located 350 metres to the north west of the proposed disturbance area (500m from the proposed pit area).

Drawdown may not affect water availability to the CCW and REW wetland vegetation as it relies on perched water present due to the underlying heavy clay soils. However, there is potential for the integrity of the perched water system to be breached due to excavation of the mine pit. There is a *C. obesa* vegetation remnant of the general Multiple Use Wetland which has a low to moderate dependence on groundwater and could possibly be affected by drawdown (SWC, 2007). The proponent will manage potential impacts by maintaining a 200m buffer around the CCW and REW wetlands, timing dewatering operations in peak risk areas to coincide with the winter months, backfilling as soon as possible to reinstate the aquifer, and use of artificial recharge where necessary.

Surface Water

Any ephemeral creeks that transverse the proposal area will be temporarily diverted and will require a permit to interfere with bed and banks from the Department of Water.

Henty Brook is situated 1 km northeast, outside of the proposal area. Water from Henty Brook is used for stock watering, commercial vineyard irrigation and domestic purposes. Groundwater modeling (Parsons Brinkerhoff, 2007) predicted a maximum 0.2 m drawdown groundwater level impact at Henty Brook due to the proposed mining operations. This is unlikely to directly affect stream flow.

Mine drainage water and dewater is to be captured and directed to the Dardanup Mine for re-use as process water and storage in the process water pond. During winter months excess water will be released from the process water pond to the Harvey Water Irrigation drain or the Dowdells Line Drain. Under emergency conditions, created by heavy rainfall flooding the mine pit, dewater may be discharged more directly, via a catchment sump, to the Harvey Water Irrigation drain or the Dowdells Line Drain. Before water is discharged from either point it will be monitored for quality and must meet water quality criteria. Management of discharge is agreed in consultation with the Water Corporation and the Department of Agriculture. These control measures are currently used for the existing Dardanup Mine and monitoring and trigger levels are specified in a DEC Licence.

Assessment

The EPA's environmental objectives for the factor of Groundwater and Surface Water are to:

- maintain the quantity and quality of groundwater so that existing and potential uses, including ecosystem maintenance, are protected;
- maintain the integrity, functions and environmental values of wetlands.
- maintain the quality of surface water so that existing and potential uses, including ecosystem maintenance, are protected

Groundwater drawdown

Landowner bore yields and water availability to groundwater dependent ecosystems (GDEs) may be impacted by dewatering operations if not carefully managed (Figure 2).

The proponent has outlined a number of management actions to deal with the drawdown impacts on landowner bore yields and GDEs. These are to:

- monitor 23 monitoring wells located around the proposal area, near the site boundary;
- manage impacts on landowner bore yields by assisting in the maintenance of landowner bores (yield may be affected where bore intakes are too high);
- time dewatering operations in peak risk areas (such as wetlands and groundwater dependent ecosystems) to coincide with the winter months; and
- use artificial recharge where necessary.

The EPA considers these management actions are appropriate and expects that they would be effective.

Groundwater contamination

The EPA notes that the Leederville aquifer which underlies the proposed mine pit contains PASS material and therefore presents a risk of acid release if it is oxidized due to groundwater drawdown. The mine pit is generally at least 4m above the Leederville aquifer; however at the closest point it is within 1m. The EPA therefore considers, on advice from the DEC, that the most significant risk posed to water by the proposal is the risk that groundwater will be acidified and contaminated with metals.

The DEC has advised that, if the proposal were to be implemented, the levels of dissolved oxygen and oxidising agents in groundwater beneath the pit should be monitored in order to manage dewatering operations so as to avoid activation of the PASS material.

The proponent proposes to monitor 23 monitoring wells located around the proposal area and near the site boundary for alkalinity, acidity, pH and electrical conductivity. In the case that trigger levels (based on 20% change to background levels) are exceeded the proponent will:

- cease mining operations where necessary;
- remediate groundwater in consultation with the DEC; and
- provide an alternative source of water to potentially affected landowners.

The EPA understands from the proponent's groundwater modelling that dewatering during mining operations creates a pressure gradient centered at the dewatering point and therefore tends to capture any acidified groundwater. Post mining any groundwater contamination would form a plume in the direction of the natural groundwater flow which is to the north west parallel to, but not towards, Henty Brook.

The EPA considers that the issue of groundwater contamination is a significant one requiring implementation of an appropriate Ministerial condition to specify requirements to avoid acidification of PASS material and, if it were to be acidified in spite of this, to avoid offsite impacts.

Wetlands

The EPA notes that CCW and REW wetlands are perched wetlands as a result of heavy clay soils and are therefore reliant on direct fill by rainfall and surface water runoff. Groundwater drawdown due to mining operations is predicted to be 0.8m (at CCW wetland) and 0.4m (REW wetland) but may not affect the perched wetlands.

The EPA considers that there is a significant risk to the wetland hydrology due to the mine pit excavations, which could potentially drain perched water if a critical area of the underlying clay layer is breached. The proponent intends to manage the risk to wetlands by:

- maintaining a 200m buffer between the mine pit and CCW wetland;
- timing dewatering operations to coincide with the winter months;
- using artificial recharge where necessary; and
- backfilling the mine pit and rehabilitating to re-establish the hydrological regime as soon as possible.

The EPA considers on advice from DOW that the 200m buffer around the CCW wetland (the closest of the two wetlands) is of upmost importance and that requirements for the protection of wetland hydrology should be included into Ministerial conditions if the proposal is to be approved for implementation.

Surface Water

The EPA considers that it is unlikely that stream flow in Henty Brook would be affected by the predicted 0.2m drawdown. However, the EPA notes that Henty Brook is ephemeral and, in the absence of detailed knowledge of the hydrology, there may be a low risk that the existence of permanent summer time pools could be affected, which may in turn affect the survival of some aquatic fauna. The potential impact on Henty Brook summer-time aquatic refugia has not been investigated by the proponent and the EPA therefore considers that this should be addressed by means of an outcome based condition, if the proposal is approved.

The EPA notes that, except under heavy rainfall conditions, mine drainage and dewater is to be reused as process water at the Dardanup Mine. Excess process water or emergency dewater discharge will be released via storage ponds to the Harvey Water Irrigation drain or the Dowdells Line Drain. Management of discharge is agreed in consultation with the Water Corporation and the Department of Agriculture and Food. Monitoring requirements and trigger levels for process water discharge are specified in the current DEC Licence. The EPA considers that the discharge water should meet guidelines relating to the end-use of the receiving water as provided by Australian and New Zealand Environment and Conservation Council and Agriculture and Resource

Management Council of Australia and New Zealand (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

Summary

The EPA considers the factor of Groundwater and Surface Water has been adequately addressed and the proposal can meet the EPA's objectives for this factor provided that the proponent's management procedures and Condition 7 which requires the proponent to:

- ensure groundwater drawdown does not impact on landowner bore yields, the hydrology of wetlands and Henty Brook;
- ensure that groundwater drawdown does not activate underlying PASS material in the Leederville aquifer; and
- ensure that any groundwater contamination does not affect the health of CCW UFI2362 and REW UFI2165 wetlands and Henty Brook ecosystems and does not impact on the beneficial use of landowner bores;

are implemented.

4.3 Rehabilitation

Description

The proponent plans to backfill the pit and reconstruct the soil profile and land form. Areas of native vegetation will be re-established and agricultural productivity restored to levels at least equal to those which currently exist. The offset land will also be rehabilitated.

Pit Backfilling and Soil Profile Construction

- The pit volume would progressively be filled with a heterogeneous mixture of sand tailings, dried clay tailings and oversize. The return of clay fines material and subsoil (silty sand) would emulate the pre-mining hydraulic properties of the region.
- Backfilling would be such that, once the subsoil and topsoil have been replaced, slight mounding (100-200mm) of the overall profile should be evident to allow for some settlement.
- There would be no overall change in topography.

Establishment of Native Vegetation

Native vegetation would be established for:

- areas where screening of plant operations is desirable;
- amenity plantings;
- roadside plantings and enrichment of existing roadside vegetation;
- establishment or enhancement of wildlife corridors and key ephemeral creeks;
- areas where pasture is not desirable or unlikely to be sustainable;

Species used would be drawn from those recorded in the vegetation and flora surveys.

Advice would be obtained from DEC in regards to practical steps to prevent or restrict dieback disease from areas to be revegetated with native vegetation.

Weed Control

- Weed control measures including herbicide application or topsoil skimming (turning over the tip few centimeters after weed germination) will be carried out when necessary.
- Maximum level of weeds would not be more than that typical of the region.

Rehabilitation of Wetlands and Riparian Zones

The CCW Wetland rehabilitation program will be designed in consultation with the DEC with the following key commitments:

- Fencing will be constructed and maintained around the CCW and the buffer zone to prevent disturbance and grazing by cattle.
- A two hundred (200) metre buffer from the geomorphic wetland boundary of the wetland will be maintained and rehabilitated and managed in perpetuity.
- A conservation covenant will be established for the CCW.
- Where possible, local provenance species will be included in the rehabilitation of the understorey.
- Weed control will be ongoing for the CCW and buffer zone.

The REW Wetland rehabilitation program will be developed in consultation with the DEC and will include the following implementation commitment:

- Fencing will be constructed and maintained around the REW to prevent disturbance and cattle grazing.

For the low woodland of *C. obesa*:

- Fencing will occur at the intersection of Dowdell's Line Drain and St Helena Road to manage disturbance and cattle grazing.
- The disturbance corridors (for the purpose of services and the conveyor) in the southern section of the low woodland of C. obesa will be rehabilitated post mining using seed of local provenance.

For the beds and banks of creeks:

- Site specific plans for the rehabilitation of all creek-lines will be developed in association with all beds and banks permits.
- Restoration works to beds and banks will restore riparian areas to pre-mining contours and vegetation cover.

Rehabilitation of Offset Land

The offset package is to:

- secure and rehabilitate approximately 20ha of Guildford Vegetation Complex;
- provide $250,000 over 5 years to manage the area;
- offset the approximately 450 trees to be cleared with the planting of 5,000 trees within the offset site

Implementation of the rehabilitation program for the offset site will include:

- rehabilitation of the degraded and parkland cleared areas with trees;
- rehabilitation of understorey where possible; and
- fencing and weeding;

Tree species for rehabilitation of this area are expected to be predominantly Marri trees with some Jarrah and Banksia trees.

Assessment

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

- ensure that closure and rehabilitation achieves stable, non-polluting functioning landforms which are consistent with the surrounding landscapes and other environmental values; and
- ensure that self-sustaining native vegetation communities are returned after mining, which, in species composition and ecological function are close as possible to naturally occurring analogue sites.
- ensure that soil and groundwater contamination does not pose a long term risk to ecosystem health or beneficial use of surface water bodies and groundwater.

The EPA considers that the proponent has developed a comprehensive framework for rehabilitation and closure to address the issue of returning disturbed vegetation and landforms to pre-mining condition and to rehabilitate areas being offered as an environmental offset.

However, the EPA considers that the proponent's proposed management measures do not adequately address remediation of acid sulphate contamination should PASS material underlying the mine pit be activated by mining operations.

The EPA considers that all aspects of rehabilitation including this additional issue should be addressed through implementation of an appropriate Ministerial condition.

Summary

The EPA considers the issue of Rehabilitation for the proposal can meet the EPA's objectives for this factor provided that the proponent's management procedures and Condition 8 which requires the proponent to:

- re-establish pre-mining soil profile and landform,
- repair wetland perched water containment, if breached;
- progressively re-establish vegetation comparable to pre-mining conditions; and
- remediate acid sulphate soil and groundwater contamination if generated by mining operations;

is implemented.

4.4 Noise

Description

The proposal area is situated primarily on pastoral land but there are farm houses and residential buildings nearby.

Noise modelling (SVT, 2008) predicts that under worst case conditions noise levels at some residences would exceed the *Environmental Protection (Noise) Regulation 1997* (Noise Regulation) assigned levels by up to 7 dB(A) during the day time. However, these exceedances occur during the construction period and the Noise Regulation assigned levels are not applicable to the pre-mine construction period during the day time.

The proponent plans to install 10m high noise barriers to enable the assigned levels to be achieved during mining. Noise modelling predicts that worst case noise levels with the barriers in place will just meet the Noise Regulation assigned levels for both day and night.

Allowing for the uncertainty associated with noise modelling the proponent has proposed the following procedures if the assigned noise levels are exceeded:

- attenuation of machinery where practical; and
- temporary shut down of noise generating operations during certain persistent wind conditions.

Assessment

The EPA's environmental objective for this factor is to protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that noise levels meet statutory requirements and acceptable standards.

The EPA notes that the proponent expects that at some residences noise levels assigned under the Noise Regulation would be exceeded during the pre-mine construction period (approximately six months). Construction would be in the day time only. The EPA understands that, as long as the pre-establishment work is carried out in a prescribed way, the assigned noise levels are not applicable during this period.

The DEC has advised that, in practice, it is difficult to differentiate the construction period from the mining period. In particular, the establishment of noise bunds is classed as construction, but stockpiling of overburden is mining. The two activities are similar in nature and appearance but are different in purpose. In the case of the Western Extension proposal, most noise bund construction will take place during the pre-mining period, but some noise bunds would be constructed later. The EPA considers that the construction sequence and timing should be set out, along with a procedure for consultation with affected residents, in a Ministerial condition, if the proposal is to be approved.

The EPA notes that the proponent's noise modelling predicts that, once the construction phase is completed, operations would comply with the Noise Regulation assigned levels. However, the EPA, on advice from the DEC, considers that there is potential for the Noise Regulation assigned levels to be exceeded during the mining phase if mobile equipment used for mining differs in sound power level from the assumed levels used for noise modelling. On this basis the EPA considers that the sound power level of all equipment should be tested prior to use and, if in excess of the assumed levels, attenuated prior to use.

The DEC has also advised that night-time mining operations at the southern end of the proposal, west of the Dowdells Line Drain, need to be carefully managed. There may be times when the assigned noise levels are exceeded, if more that four machines are operating at once. The EPA therefore considers that a night-time limitation of four pieces of mobile equipment should be imposed for operations in this area of the mine.

Summary

The EPA considers the issue of Noise for the proposal can meet the EPA's objectives for this factor provided that the proponent's management procedures and Condition 9 which requires the proponent to:

- establish, in consultation with the DEC, the schedule and period of each phase of construction work, the design and justification for construction of noise bunds, a process to notify the affected community and a procedure to minimise the noise impacts during construction; and
- ensure compliance with the *Environmental Protection (Noise) Regulations 1997* by ensuring that the noise power level of each piece of equipment does not exceed the noise power level used for the submitted noise modelling, and by monitoring noise levels at potentially affected residences.

is implemented.

5. Conclusions

The EPA has considered the proposal by Doral Mineral Sands Pty Ltd to mine the Burekup Mineral Sands Deposit (as the Western Extension to the Dardanup Mine) below the water table to a depth of approximately 14 below ground level.

The EPA notes that the proposal has the potential to

- directly remove native vegetation by clearing 36.5ha of Guildford complex vegetation of which only 4.4% remains and for which there is a presumption against clearing;
- indirectly impact on a CCW wetland, a REW wetland, groundwater dependent ecosystems and Henty Brook;
- indirectly impact on the beneficial use of landowner bores; and
- exceed assigned noise levels during the construction phase.

The EPA also notes that the proponent has proposed an offset for vegetation impacts and that the DEC has advised that the offset would provide a net environmental benefit.

The EPA has concluded that the proposal can be managed to meet the EPA's environmental objectives, provided there is satisfactory implementation by the proponent of the offset and the recommended conditions set out in Appendix 2.

6. Recommendations

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

1. That the Minister notes that the proposal being assessed is for mining the Burekup Mineral Sands Deposit (as the Western Extension to the Dardanup Mine) below the water table to a depth of approximately 14m below ground level;

2. That the Minister considers the report on the key environmental factors as set out in Section 4;
3. That the Minister notes that the EPA has concluded that the proposal can be managed to meet the EPA's environmental objectives, provided:
    - there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 2; and
    - the proposed environmental offset is implemented;
4. That the Minister imposes the conditions and procedures recommended in Appendix 2 of this report and arranges for implementation of the environmental offset.

Appendix 1

References

Department of Environment (2006). *Dewatering Effluent and Groundwater Monitoring Guidance for Acid Sulphate Soil Areas (June 2006*, Perth, Western Australia.

Doral (2008). *Proposal for Western Extension to the Dardanup Mineral Sands Project to Include the Burekup Mineral Sands Deposit.* Environmental Protection Statement.

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Environmental Protection Authority (2006) *Guidance for the Assessment of Environmental Factors in Accordance with the Environmental Protection Act 1986*: *Level of Assessment for Proposals Affecting Natural Areas within the System 6 Region and Swan Coastal Plain Portion of the System 1 Region.* No.10, June 2006.

Government of Western Australia (2000). *Bush Forever Volume 2. Directory of Bush Forever Sites.* Department of Environment Protection, Perth, Western Australia.

Mattiske Consulting Pty Ltd (2006). *Flora and Vegetation Assessment of the Burekup Area.* Unpublished report prepared for Iluka Resources Limited.

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Parsons Brinkerhoff (2007). *Burekup Deposit Modelling of Groundwater Level Impacts.* Unpublished report prepared for Iluka Resources Limited.

Soil Water Consultants (2007b) *Final Report: Acid Sulphate Soil Survey for the Proposed Burekup Minesite.* Unpublished report prepared for Iluka Resources Limited.

Soil Water Consultants (2007c) *Final Report: Groundwater Dependent Ecosystem Assessment for the Proposed Burekup Minesite.* Unpublished report prepared for Iluka Resources Limited.

Wetlands Research & Management (2006). *Burekup Project Baseline Aquatic Biology and Water Quality Study.* Unpublished report prepared for Iluka Resources Limited

Appendix 2

Recommended Environmental Conditions

RECOMMENDED ENVIRONMENTAL CONDITIONS

Statement No.

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

WESTERN EXTENSION TO THE DARDANUP MINERAL SANDS PROJECT TO INCLUDE THE BUREKUP MINERAL SANDS DEPOSIT

Proposal: The proposal is to mine the Burekup Mineral Sands Deposit (as the Western Extension to the Dardanup Mine) located approximately 20 kilometres east of Bunbury. Mining is to extend below the water table to approximately 14 metres below ground level and will require dewatering.

Proponent: Doral Mineral Sands Pty Ltd

Proponent Address: Lot 7 Harris Road, Picton, WA 6229

Assessment Number: 1768

Report of the Environmental Protection Authority: 1310

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 assessed by the Environmental Protection Authority 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 the 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 (CEO) of the Department of Environment and Conservation 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 within 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 CEO of the Department of Environment and Conservation 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 Department of Environment and Conservation.

4-2 The proponent shall submit to the Chief Executive Officer of the Department of Environment and Conservation, the compliance assessment plan required by condition 4-1 at least 6 months prior to the first compliance report required by condition 4-6. 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 reporting of potential non-compliances and corrective actions taken;

5 the table of contents of compliance reports; and

6 public availability of compliance 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 Department of Environment and Conservation.

4-5 The proponent shall advise the Chief Executive Officer of the Department of Environment and Conservation of any potential non-compliance as soon as practicable.

4-6 The proponent shall submit a compliance assessment report annually from the date of issue of this Implementation Statement addressing the previous twelve month period or other period as agreed by the Chief Executive Officer of the Department of Environment and Conservation. The compliance assessment report shall:

1 be endorsed by the proponent's Managing Director or a person, approved in writing by the Department of Environment and Conservation, delegated to sign on the Managing Director'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 CEO of the Department of Environment and Conservation Performance Review Reports at the conclusion of the second, fourth, sixth and eighth years after the commencement of mining below the water table and then, at such intervals as the CEO of the Department of Environment and Conservation may regard as reasonable, which address:

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 the 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 where practicable; and

3 significant improvements gained in environmental management which could be applied to this and other similar projects.

6 Flora, Vegetation and Aquatic Ecosystems

Wetland Buffer

6-1 The proponent shall maintain a buffer of at least 200 metres around the Conservation Category Wetland UFI2362.

Indirect impacts on Flora, Vegetation and Aquatic Ecosystems

6-2 At all times, the proponent shall ensure that mining excavations and dewatering do not reduce water availability so as to adversely affect flora, vegetation and aquatic ecosystem health, by monitoring:

1. groundwater levels and vegetation health in the vicinity of mining operations;
2. perched water levels, soil moisture and vegetation health in Conservation Category Wetland UFI2362 and Resource Enhancement Wetland UFI2165;
3. soil moisture levels and vegetation health in the low woodland of *Casuarina obesa* near Dowdells Line; and

4. changes to the existence of permanent pools in Henty Brook over summer;

This monitoring shall be carried out before, during and for at least 12 months after dewatering and mining has ceased, on a monthly basis or at a monitoring frequency that is to the satisfaction of the Department of Environment and Conservation.

6-3 The proponent shall submit on a six monthly basis the results of the monitoring required by condition 6-2 to the Department of Environment and Conservation.

6-4 In the event that the requirements of condition 6-2 are not met or are not likely to be met, the proponent shall provide artificial recharge with water of similar quality, or immediately provide alternate proposed management measures to the CEO of the Department of Environment and Conservation.

7 Groundwater

7-1 At all times, the proponent shall ensure that the limit of groundwater drawdown in the proposal area and in the vicinity of the proposal area does not approach the underlying potentially acid-forming substrate to the extent that acidic waters are generated, by monitoring:

1. dissolved oxygen; and
2. other oxidising agents including nitrate, sulphate and ferric ions;

on a daily basis for a period of three months after the groundwater level is within 3 metres of the potentially acid forming substrate and thereafter to the requirements of the CEO of the Department of Environment and Conservation.

7-2 At all times the proponent shall ensure that groundwater drawdown does not adversely impact on the yield of landowner bores, by monitoring of landowner bores on a quarterly basis.

7-3 At all times, the proponent shall ensure that groundwater contaminated as a consequence of mining operations does not impact on:

1. the health of Conservation Category Wetland UFI2362, Resource Enhancement Wetland UFI2165 and Henty Brook ecosystems;
2. the beneficial use of Henty Brook; and
3. the beneficial use of landowner bores down-gradient of the source of contamination;

by monitoring:

1. dewater prior to discharge to ensure that the receiving water does not change its compliance status with the Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC & ARMCANZ,2000) relevant to the receiving water beneficial use(s);

2. bores located near the mine-site boundary, on a monthly basis, to provide early warning of migrating contaminated groundwater, with trigger levels for

intervention set at an allowable variation from background levels of 20% alkalinity, acidity, pH and electrical conductivity; and

3. bores located near the receptors listed above, on a quarterly basis for the first year and thereafter at a frequency that is to the satisfaction of the Department of Environment and Conservation, to ensure groundwater in the vicinity does not change its compliance status with the appropriate guidelines provided by ANZECC & ARMCANZ(2000).

7-4 The proponent shall submit annually the results of the monitoring required by condition 7-1, 7-2 and 7-3 to the CEO of the Department of Environment and Conservation and the Department of Water.

7-5 The proponent shall provide proposed management measures to the CEO of the Department of Environment and Conservation in the event that the requirements of conditions 7-1, 7-2 and 7-3 are not met or are not likely to be met.

8 Closure and Rehabilitation

8-1 Prior to commencement of productive mining, the proponent shall conduct surveys of the proposal area to collect baseline information, including photographic records, on the following:

1 Pre-mining soil profiles;
2 Groundwater levels;
3 Surface water flows;
4 Vegetation complexes; and
5 Landscape and landforms.

8-2 As mining progresses, the proponent shall commence rehabilitation of the mined area in accordance with the following:

1. Re-establishment of vegetation in the rehabilitation area to be comparable with that of the pre-mining vegetation such that the following criteria are met within three years following the cessation of productive mining:

   (1) Species diversity is not less than 70 percent of the known original species diversity;
   (2) Priority flora are re-established with not less than 50 percent success after three years and 65 percent success after five years; and
   (3) Weed coverage less than 10 percent.

2. Re-establishment of the soil profile to ensure repair of any damage to wetland perched water containment and to emulate the pre-mining hydraulic properties of the area generally.

3. Remediation of acid sulphate soil and contaminated groundwater generated by mining operations.

4. A schedule of the rate of rehabilitation acceptable to the CEO of the Department of Environment and Conservation.

8-3 In liaison with the Department of Environment and Conservation, the proponent shall monitor progressively the performance of rehabilitation against the criteria in condition 8-2.

8-4 The proponent shall submit annually a report of the rehabilitation performance monitoring required by condition 8-3 to the CEO of the Department of Environment and Conservation and shall address in the report the following:

1. Progress towards meeting the criteria required by condition 8-2 and milestone criteria; and
2. Contingency management measures in the event that criteria are unlikely to be met.

9 Noise

Construction Phase

9-1 The proponent shall establish, in consultation with the DEC:
1. the program for each phase of construction work;
2. the design and justification for construction of noise bunds;
3. a process to notify the affected community of expected higher noise levels during construction; and
4. a procedure to minimise the noise impacts during construction.

Construction and Mining Phases

9-2 The proponent shall ensure compliance with the *Environmental Protection (Noise) Regulations 1997* by:

1. ensuring that the noise power level of each piece of equipment does not exceed the noise power level assumed for the noise modelling in the submitted Environmental Protection Statement (Doral, 3 December 2008); and

2. monitoring noise levels at potentially affected residences using methods acceptable to the Department of Environment and Conservation.

9-3 The proponent shall submit annually the results of the noise monitoring required by condition 9-2 to the CEO of the Department of Environment and Conservation.

9-4 The proponent shall provide proposed management measures to the CEO of the Department of Environment and Conservation in the event that the requirements of conditions 9-2 are not met or are not likely to be met.

Procedures

1. Where a condition states “on advice of the Environmental Protection Authority”, the Environmental Protection Authority will provide that advice to the Department of Environment and Conservation for the preparation of written notice to the proponent.

2. 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 the Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment and Conservation over the fulfilment of the requirements of the conditions.

4. Where a condition lists advisory bodies, it is expected that the proponent will obtain the advice of those listed as part of its compliance reporting to the Department of Environment and Conservation.

5. 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*.

Schedule 1

The Proposal (Assessment No. 1768)

General Description

The proposal is to mine the Burekup Mineral Sands Deposit (as the Western Extension to the Dardanup Mine) located approximately 20 kilometres east of Bunbury. Mining is to extend below the water table to approximately 14 metres below ground level and will require dewatering.

The proposal and potential impacts are described in the document, *Proposal for a Western Extension to the Dardanup Mineral Sands Project to Include the Burekup Mineral Sands Deposit*, Environmental Protection Statement (December, 2008).

Summary Description

A summary of the key proposal characteristics is presented in Table 1.

Table 1 – Summary of Key Proposal Characteristics

Element	Description
Life of mine	3.5 to 5 years approximately
Total disturbance area	301 hectares
Area of native vegetation to be cleared	36.5 hectares
Mineable reserve	9.5 million tonnes
Overburden volume	5.8 million bulk cubic metres
Rate of extraction (overburden and ore)	6.4 million tonnes per year
Extraction method	Dry mining
Groundwater abstraction for dewatering	1095 megalitres per year
Dewater discharge	Re-use as process water at the Dardanup Mine
Water supply	No additional requirement

Figures

Figure 1 – Regional Location Plan (see figure 1 page 4 above)