Tutunup Titanium Minerals Mine

Cable Sands (WA) Pty Ltd

Report and recommendations
of the Environmental Protection Authority

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Summary and Recommendations

Cable Sands (WA) Pty Ltd propose to develop a titanium minerals mine at Tutunup, approximately 20 km east of Busselton. This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal.

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage on the 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.

Relevant environmental factors

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

(a) Vegetation – Busselton Wet Ironstone Threatened Ecological Community; and
(b) Declared Rare and Priority flora.

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

Conclusion

The EPA has considered the proposal by Cable Sands to develop a titanium minerals mine at Tutunup. The proposed mine has a life-span of approximately four years, which includes approximately 27 months of actual mineral production.

The mine would be situated adjacent to the critically endangered Busselton Wet Ironstone Threatened Ecological Community (TEC). The TEC contains nine species of Declared Rare Flora, four of which are considered to be critically endangered, and three of these four species are known to occur only at this site. In addition, the TEC contains four Priority flora species.

The proposed mining will require dewatering. Without appropriate management, associated groundwater drawdown could have a significant impact on the TEC and potentially lead to the extinction of one or more species of DRF. The EPA has therefore subjected the proposal to very detailed scrutiny.

During the course of the assessment, Cable Sands modified the proposal following consultation with the Department of Conservation and Land Management (CALM), the Water and Rivers Commission (WRC) and other experts. In particular, the setback between the mine and the TEC has been increased from 20 m to 70 m. The EPA recognises the high standard of work conducted by Cable Sands in its assessment of groundwater in and around the proposal area.

The challenge for Cable Sands has been to establish a management plan, including a buffer area, which provides assurance to the satisfaction of the EPA, with advice of CALM and the WRC, that the TEC will not be impacted by groundwater drawdown.

Cable Sands intends to manage groundwater drawdown through: the use of an artificial recharge system (ARS); ensuring there is a minimum 70 m setback between the mine void and the TEC; mining the southern portion of the deposit (i.e. that part closest to the TEC) during winter; and, rapid backfilling of the mined area closest to the TEC after mining, followed by re-establishment of natural groundwater levels.

Detailed technical advice has been obtained from CALM and the WRC. CALM has advised that the proposed 70 m setback should considerably enhance the level of protection for the adjacent TEC and threatened flora, and that the combination of the proposed 70 m setback and the groundwater management arrangement would be an appropriate mechanism for managing the risks of impact of the proposal on the DRF and TEC. The WRC advised that it considered the groundwater management measures proposed by Cable Sands to be robust and technically sound.

Based on this technical advice, the EPA has concluded that the proposal can be managed such that the EPA's environmental objectives would not be compromised for the TEC, DRF and Priority flora, provided there is satisfactory implementation by Cable Sands of the proponent's commitments and the recommended conditions set out in Appendix 4 and summarised in Section 4.

Recommendations

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

1. That the Minister notes that the proposal being assessed is for the development of a titanium minerals mine at Tutunup, approximately 20 km east of Busselton.

2. That the Minister considers the report on the relevant environmental factors as set out in Section 3.

3. That the Minister notes that the proposed mine is adjacent to the critically endangered Busselton Wet Ironstone Threatened Ecological Community, which contains nine species of DRF and four Priority flora species.

4. That the Minister notes that the proposed mining will require dewatering. Without appropriate management, associated groundwater drawdown could have a significant impact on the TEC and potentially lead to the extinction of one or more species of DRF. The EPA has therefore subjected the proposal to very detailed scrutiny.

5. That the Minister notes that the EPA holds the view that the combination of a revised setback distance between the proposal and the TEC and a groundwater management arrangement would be an appropriate mechanism for managing the risks of impact of the proposal on the TEC and associated plant species of special importance.

6. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4, including the proponent's commitments.

7. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Cable Sands to develop a titanium minerals mine at Tutunup is approved for implementation.

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

- that the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4; the commitments include:
    - Development of a Groundwater Management Plan and Operating Strategy, before mining, to the satisfaction of CALM and the WRC, to address:
        - Yarragadee abstraction and monitoring;
        - superficial aquifer artificial recharge system design and implementation;
        - monitoring of superficial groundwater in the vicinity of the Busselton Wet Ironstone Threatened Ecological Community;
        - monitoring of groundwater levels in other areas surrounding the mining area; and
        - actions to be taken in the event that adverse changes in groundwater levels or quality are detected.
    - Maintenance of an artificial recharge system (ARS) and continued monitoring of superficial groundwater levels in the area around the Busselton Wet Ironstone Threatened Ecological Community until monitoring shows groundwater levels have returned to normal with no further input from the ARS, based on regional seasonal fluctuation, and on advice from the WRC and CALM, with the objective of ensuring the ARS is maintained in an operable state until no longer required to control mining-related drawdown.
    - Development and implementation of a Vegetation Monitoring and Management Program before mining, to the satisfaction of CALM, to assess the health of the TEC, with the objective of maintaining the abundance, distribution and values of the TEC and associated rare flora.

- Provision of resources for enhanced management actions for the TEC and associated rare flora, and targeting of these resources to CALM's requirements to enhance the security and conservation status of the TEC and associated rare flora.

Contents

1. Introduction

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal by Cable Sands (WA) Pty Ltd (CSWA, 'the proponent') to develop a titanium minerals mine at Tutunup, approximately 20 km east of Busselton.

The proposal is being assessed as a Public Environmental Review (PER). The PER document (CSWA, 2001) was released for an eight week public review period between 17 December 2001 and 11 February 2002.

The Commonwealth Minister for the Environment and Heritage considered the proposal a 'controlled action' under Section 75 of the *Environment Protection and Biodiversity Protection Act 1999* due the proposal's potential to impact on threatened species and communities. Environment Australia accredited the WA EPA's assessment of the proposal under Section 87(1)(a) of the EPBC Act.

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

References are cited in Appendix 1 and a list of submitters appears in Appendix 2. Appendix 3 identifies the relevant environmental factors and summarises their management. Appendix 4 contains the recommended environmental conditions and commitments. 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

CSWA proposes to develop a titanium minerals mine at Tutunup, approximately 20 km east of Busselton. Figure 1 shows the location of the proposed mine, and Figure 2 gives the proposed mine layout.

The proposal has the following main components:

- disturbance of 120 hectares of mainly cleared agricultural land;
- construction of water and fines dams, and topsoil, tails and overburden stockpiles;
- dewatering and mining, using dry mining techniques at up to two million tonnes per annum (see Figures 3 and 4);
- abstraction of groundwater from the Yarragadee aquifer for process use;

- haulage of the Heavy Mineral Concentrate (HMC) in road-trains to the proponent's North Shore facility in Bunbury via Oates Rd, Tompsett Rd, Tutunup Rd, Ludlow-Hithergreen Rd and Bussell Highway (see Figure 5); and
- widening of Tompsett Rd at the intersection with Tutunup Rd to address safety requirements.

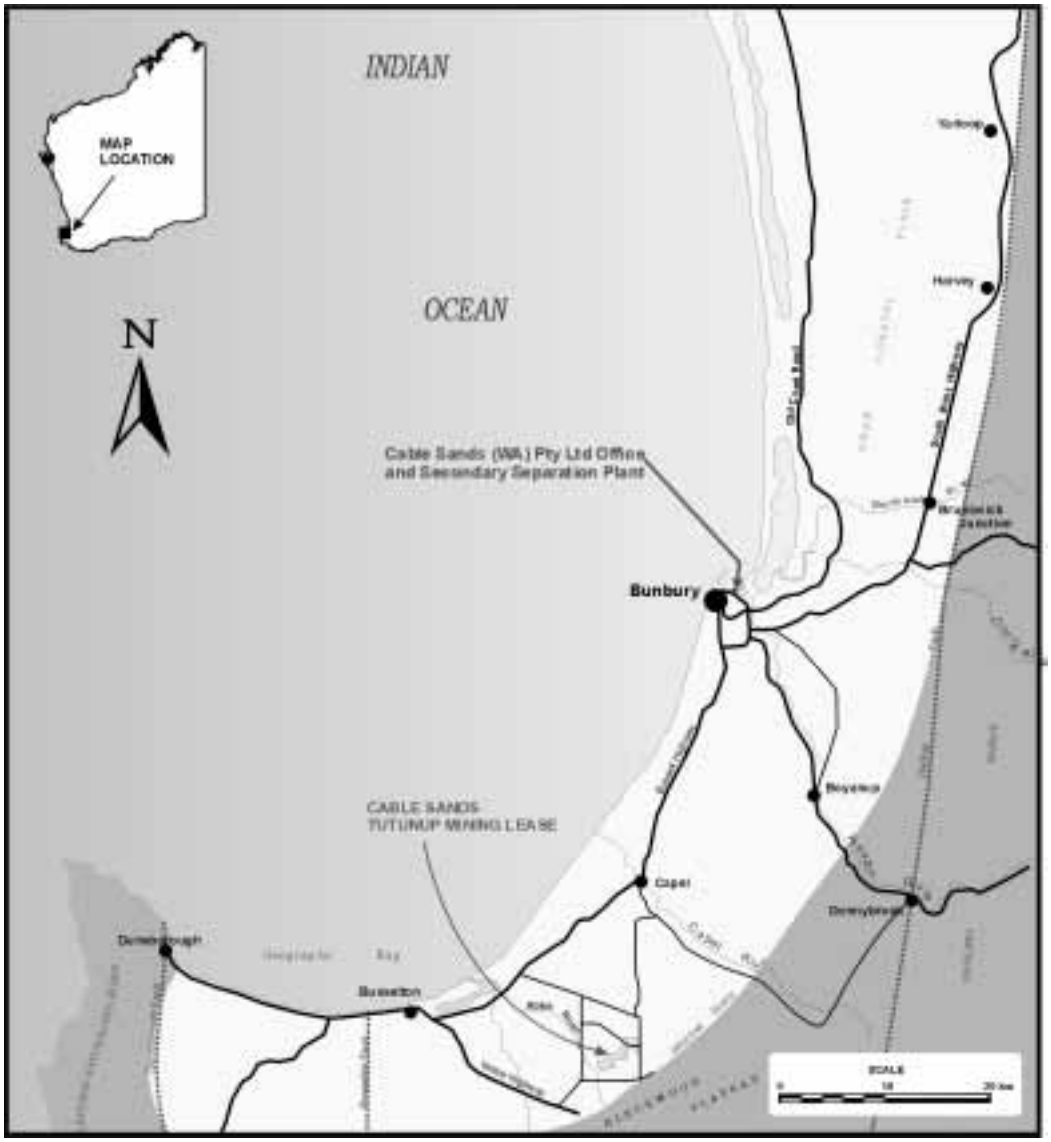


Figure 1: Location map (Source: CSWA, 2001)

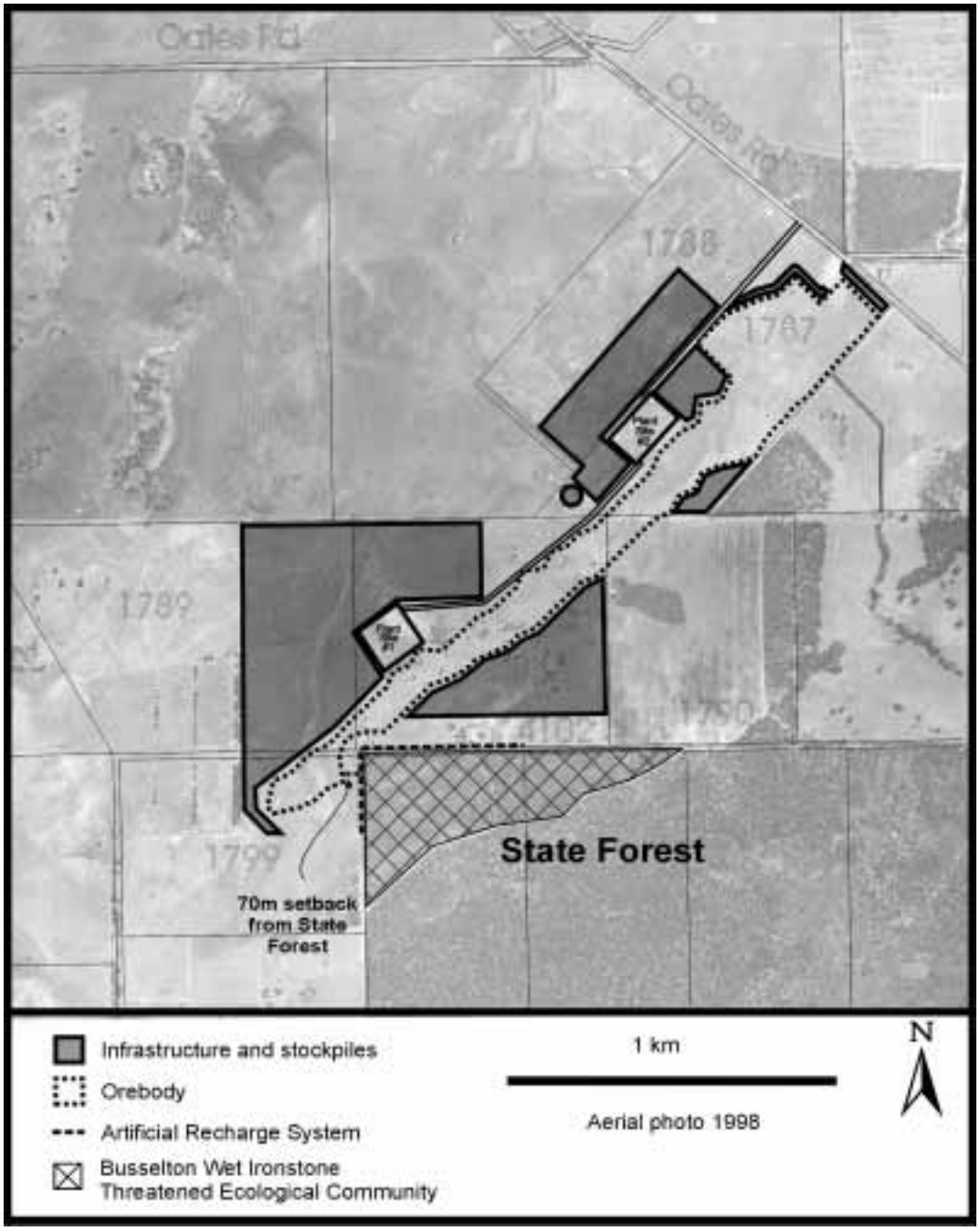


Figure 2: Mine layout (Source: CSWA, 2002)

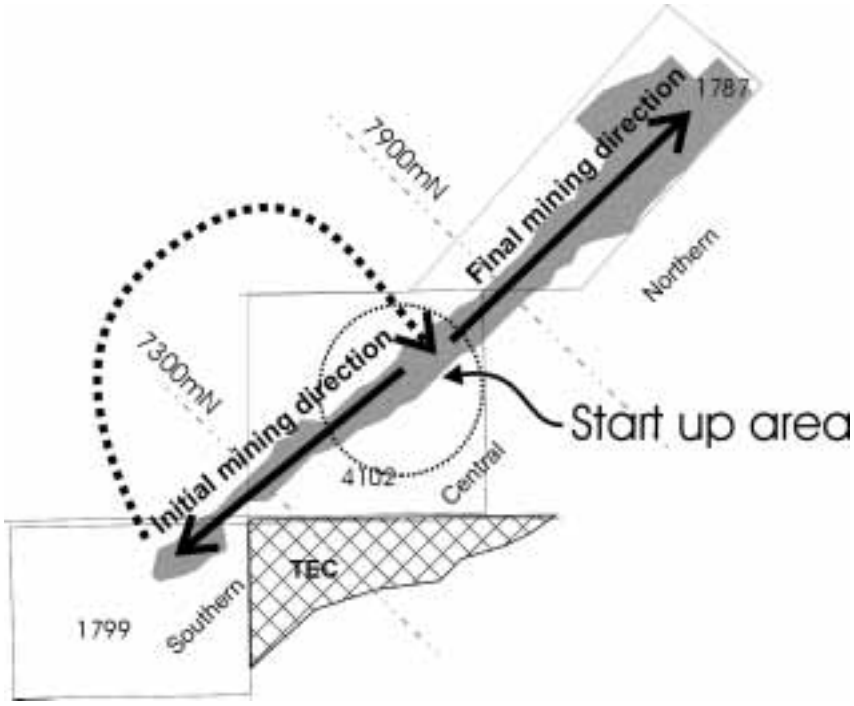


Figure 3: Conceptual mine plan (Source: CSWA, 2001 as amended, Nov 2002)

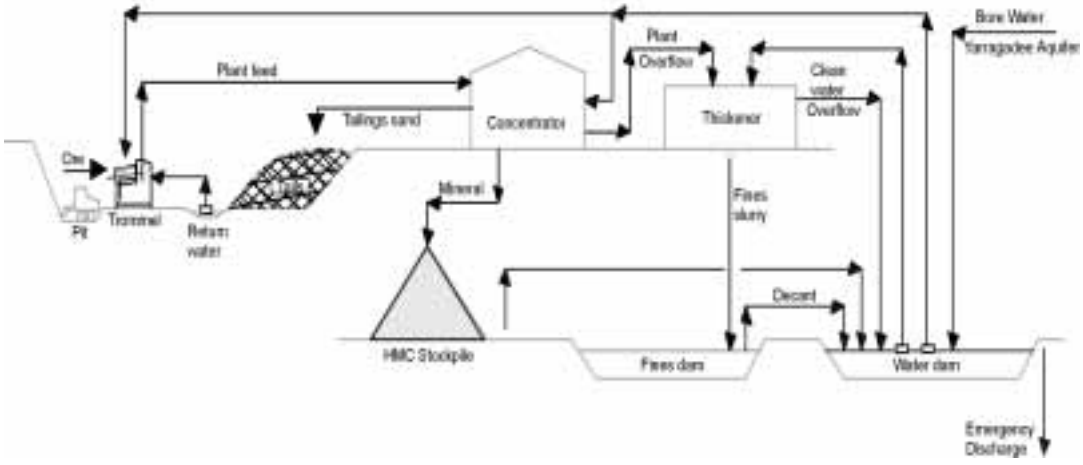


Figure 4: Process flow chart (Source: CSWA, 2001)

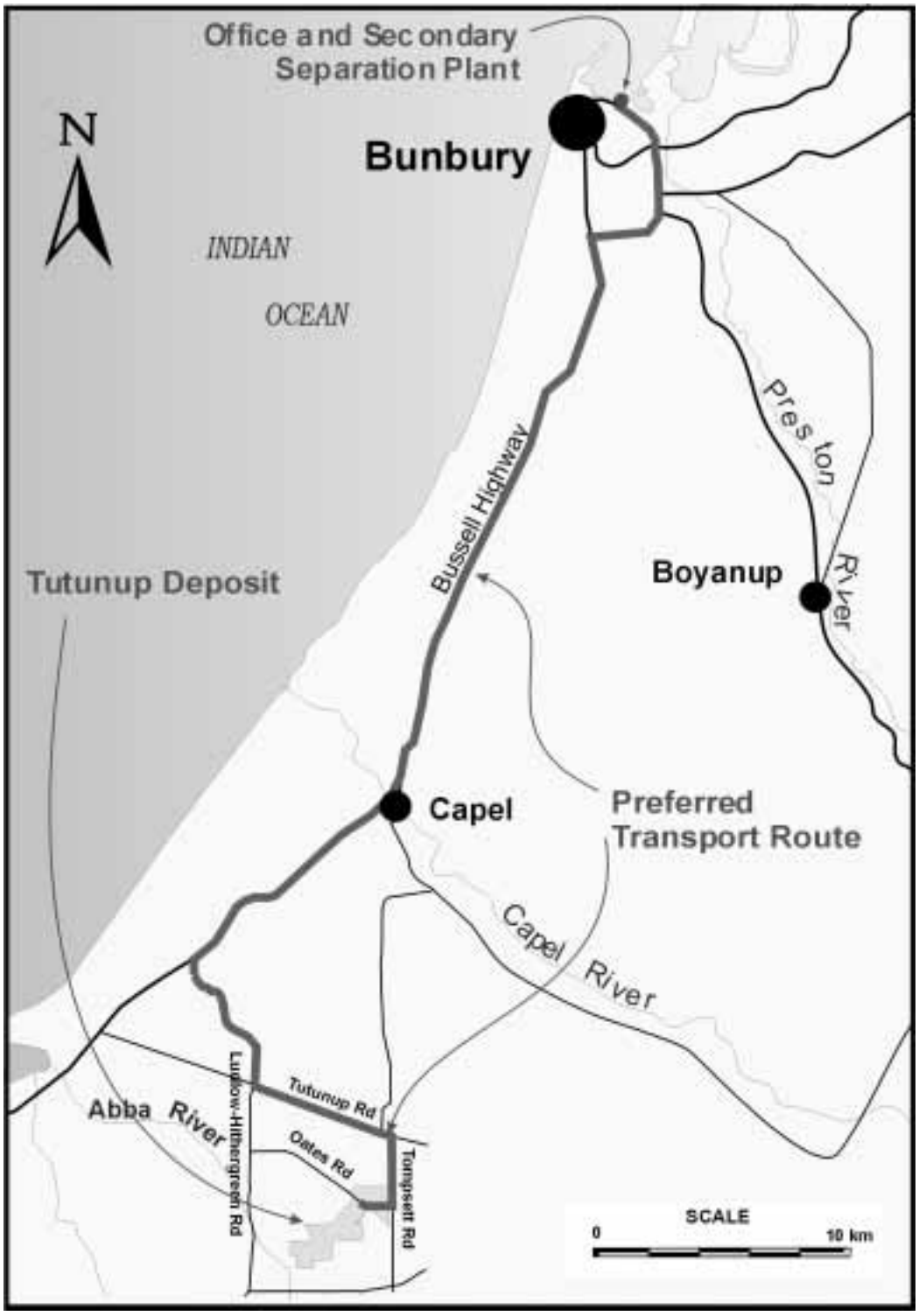


Figure 5: Heavy mineral concentrate transport route (Source: CSWA, 2001)

Groundwater drawdown from the mining will be managed by an artificial recharge system to be installed around the northern and western perimeter of the State Forest near the southern part of the deposit[1] (see Figure 2).

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in the PER document (CSWA, 2001).

Table 1: Summary of key proposal characteristics

ELEMENT	DESCRIPTION
Life of project • Mineral production • Mining (overburden and ore removal, backfilling)	(at 5 days per week[1]) • Approximately 27 months • Approximately 4 years
Mine operation	24 hours per day, up to 7 days per week[1]
Production • Size of ore body • Ore mining rate • Overburden • Heavy Mineral Concentrate produced	 • Approximately 2,303,000 tonnes • up to 2,000,000 tonnes per year • Approximately 1,600,000 bank cubic metres • Approximately 260,000 tonnes
Area of disturbance • Mine pit • Overburden stockpiles • Fines dams • Tailings dams • Topsoil/subsoil stockpiles • Infrastructure[2] • Artificial recharge system	 • 40 hectares • 20 hectares • 22 hectares (outside mine path) • 6 hectares (outside mine path) • 8 hectares • 22 hectares • 2 hectares
Depth of mine pit	Maximum 11 metres
Water supply • Source • Average daily requirement • Maximum annual requirement	 • Yarragadee aquifer, Capel-Ludlow subarea • 4,000 kilolitres • 1,500,000 kilolitres
Fuel • Maximum storage • Maximum usage	 • 50,000 litres • 2,300,000 litres per annum

[1] Mine operations will vary between 5, 6 and 7 days per week operation, depending on production requirements.

[2] Infrastructure disturbance area includes areas such as plant sites, water supply, roads, drainage lines. It also includes areas between other structures (e.g. clearance between two different types of stockpiles).

The proponent has made a number of modifications to the proposal since release of the PER document. These include:

- provision of a 70 metre setback/buffer between the mining area and the TEC (previously 20 m) (see Figure 2);
- project life now approximately 4 years in total and 27 months of mineral production;

[1] The groundwater in the area naturally flows northwest from the TEC towards the proposed mining area (see Figure 2). The artificial recharge system aims to maintain the natural water-level fluctuation of the superficial aquifer, in the vicinity of the TEC in the adjacent State Forest. (The significance of the superficial aquifer is discussed further in Section 3.2).
The artificial recharge system essentially involves the pumping of fresh groundwater, sourced from the Yarragadee Formation, to 16 cm diameter slotted pipes installed within trenches dug around State Forest nearest the mine pit (see Figure 2). The controlled flow of water into the system will act as a hydraulic 'barrier' to preserve and maintain the groundwater environment under the State Forest by restricting groundwater outflow from the superficial aquifer.

- the use of a backup direct watering system within the State Forest no longer being considered due to concerns raised in submissions on the proposal; and
- new proponent commitments to provide for a period of maintenance and monitoring of the artificial recharge system and groundwater levels after mining, and for management of the TEC in consultation with CALM (see Commitments 4 and 8 respectively, Appendix 4).

3. Relevant environmental factors

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage on the 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 relevant 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 noise and rehabilitation, 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 environmental factors relevant to the proposal require detailed evaluation in this report:

(a) Vegetation – Busselton Wet Ironstone Threatened Ecological Community; and
(b) Declared Rare and Priority flora.

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

Details on the relevant environmental factors and their assessment are contained in Sections 3.1 and 3.2. 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.

3.1 Vegetation – Busselton Wet Ironstone Threatened Ecological Community

Description

Busselton Wet Ironstone community

The Tutunup deposit occurs within the Abba Plain, a sub-unit of the Swan Coastal Plain. The Abba Plain is a fluviatile deposit that generally consists of poorly drained yellow duplex soils as well as shallow sands over ironstone caprock, or 'coffee rock' The coffee rock is present over most of the Tutunup deposit, averaging 2-3 m thick, and often exposed at the surface (CSWA, 2001). As shown in Figure 2, the area covered by the deposit, and almost all the area surrounding it, is cleared agricultural land.

The southern part of the proposal's titanium minerals sand deposit occurs adjacent to areas of the Busselton Wet Ironstone Threatened Ecological Community (TEC). The Department of Conservation and Land Management (CALM) considers this TEC the most important site for biodiversity conservation in WA's south-west. The TEC also forms part of the 'Shrublands on the southern Swan Coastal Plain ironstones', which are classified as 'Critically Endangered' by CALM, and 'Endangered' under the *Environment Protection and Biodiversity Conservation Act 1999.*

Approximately 97 % of the original area of Busselton Wet Ironstone has been cleared, resulting in many of the species within the TEC being listed as Declared Rare Flora (DRF) or Priority flora (Gibson *et al.*, 2000). The TEC contains nine species of DRF, four of which are considered to be critically endangered, and three of the four critically endangered species are known to occur only at this site. In addition, the TEC contains four Priority flora species.

The EPA recognises that the TEC is currently threatened by a number of factors, the most significance of these being dieback, wildfire and diminishing annual rainfall. *Phytophthora cinnamomi* (the plant pathogen that causes dieback) is considered by CALM to be the biggest threat to the survival of critically endangered flora species within the TEC, with some of the DRF taxa considered to be highly susceptible to the disease. The TEC is already affected to some degree with dieback.

Groundwater dependence

The Busselton Wet Ironstone TEC can be described as a seasonal wetland community due to the associated shallow seasonal inundation with fresh water. The inundation may result from ponding of rainfall over the relatively impermeable surface outcrops of ironstone and associated heavy soils and/or due to shallow groundwater approaching or reaching the surface in winter.

A superficial groundwater aquifer occurs 0.5-2 m below surface level, and is maintained predominantly by infiltrating rainfall. The shallow nature of this underlying groundwater table suggests the TEC is at least partly and possibly highly

groundwater dependant, particularly during the summer months (Loomes and Froend, 2002).

As the proposal will require dewatering, without appropriate management associated groundwater drawdown could have a significant impact on the TEC and potentially lead to the extinction of one or more species of DRF.

The proponent considers that the groundwater drawdown can be managed through: the use of an artificial recharge system (ARS); ensuring there is a minimum 70 metre buffer between the mine void and the TEC; mining the southern portion of the deposit (i.e. that part closest to the TEC) during winter; and, rapid backfilling of the mined area closest to the TEC after mining, followed by re-establishment of natural groundwater levels.

Submissions

The submissions for the proposal focused on:

- seeking more information and detail on the measures proposed to protect the TEC;
- the proposal potentially increasing the risk of dieback impacting the TEC;
- dependence or otherwise of the TEC on the superficial aquifer;
- potential impact on the TEC that contains numerous DRF, and the proponent failing to justify the risk to these flora species;
- the extremely high biological value of the TEC and the associated critically rare flora species that occur within the TEC; and
- the potential impact of groundwater drawdown on the TEC.

Assessment

The area considered for assessment of this factor includes the area covered by the southern portion of the mine pit, and the Busselton Wet Ironstone TEC that occurs in State Forest immediately east of the Tutunup deposit (see Figure 2).

The EPA's environmental objectives for this issue are:

- to maintain DRF and the abundance and diversity of species, and geographic distribution and productivity of vegetation communities; and
- to protect Threatened Ecological Communities consistent with the provisions of the EPBC Act.

The EPA notes the following in its assessment of this factor:

- The proponent has developed a groundwater model for the proposal using data collected since February 2001. The model includes the use of an artificial recharge system (ARS) that would return water to the superficial aquifer via a trench, pipe and pumping system to be installed around the perimeter of the TEC nearest the proposed mine pit. It is proposed that the ARS would prevent groundwater drawdown under the TEC, and therefore any impact to the TEC due to mining.

- The Water and Rivers Commission (WRC) has reviewed the ARS proposal in detail, and considers that it is robust and technically sound.
- The EPA has received advice from CALM, the agency responsible for management of Threatened Ecological Communities within WA, that the combination of the proposed 70 m setback and the groundwater management arrangement would be an appropriate mechanism for managing the risks of impact of the proposal on the DRF and TEC.
- The 70 m setback has the benefits of an increased physical separation of the mine and the TEC, and providing a greater area of undisturbed land adjacent to the TEC for rehabilitation post-mining[2].
- The TEC has extremely high biodiversity value, and the use of an artificial recharge system to mitigate the affects of groundwater drawdown is not entirely risk-free. Accordingly, it will need to be diligently managed.

The EPA also notes that the proponent has made the following commitments:

- To develop a Groundwater Management Plan and Operating Strategy, before mining, to the satisfaction of CALM and the WRC, to address:
    - Yarragadee abstraction and monitoring;
    - a superficial aquifer artificial recharge system design and implementation;
    - monitoring of superficial groundwater in the vicinity of the TEC;
    - monitoring of groundwater levels in other areas surrounding the mining area; and
    - actions to be taken in the event that adverse changes in groundwater levels or quality are detected.
- Maintenance of the ARS and continued monitoring of superficial groundwater levels in the area around the TEC until monitoring shows groundwater levels have returned to normal with no further input from the ARS, based on regional seasonal fluctuation, and on advice from the WRC and CALM, with the objective of ensuring the ARS is maintained in an operable state until no longer required to control mining-related drawdown.
- Development and implementation of a Vegetation Monitoring and Management Program before mining, to the satisfaction of CALM, to assess the health of the TEC, with the objective of maintaining the abundance, distribution and values of the TEC and associated rare flora.
- Provision of resources for enhanced management actions for the TEC and associated rare flora, and targeting of these resources to CALM's requirements to enhance the security and conservation status of the TEC and associated rare flora.

[2] Rehabilitation of this 70 m setback area to native plant species would act as a significant buffer between the TEC and the agricultural post-mining land use.

In considering the above, the EPA is of the opinion that, with detailed monitoring and contingency planning before mining, which can be assured and adequately enforced through management plans committed to by the proponent, the proposal can be managed to meet the EPA's environmental objectives for vegetation communities.

Summary

Having particular regard to:

(a) advice from CALM in relation to the proposed 70 m setback distance, and from the WRC that the ARS is robust and technically sound; and

(b) the proponent's commitments to prepare, before mining, a detailed Groundwater Management Plan and Operating Strategy and Vegetation Monitoring and Management Program to the satisfaction of CALM,

it is the EPA's judgement that the proposal can be managed to meet the EPA's environmental objectives for vegetation communities.

3.2 Declared Rare and Priority flora

Description

The proposal has potential to indirectly impact on DRF and Priority flora within the TEC located adjacent to the Tutunup deposit. As these rare flora are inextricably associated with the TEC, and the TEC has been considered in Section 3.1, these potential indirect impacts will not be discussed in this Section (S3.2), which relates only to the proposal's *direct* impact to DRF and Priority flora species.

CSWA evaluated two transport routes in the PER document. The road upgrading proposed by CSWA for its preferred transport route ('Route 1' in the PER) requires the taking of one individual of *Chamelaucium roycei*, a species gazetted as DRF under the *Wildlife Conservation Act 1950*, and Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*. There are eight known populations of *Chamelaucium roycei* in 'good' condition, and totalling approximately 800 individuals (CSWA, 2001).

The development of the mine and associated mine infrastructure will require the clearing of approximately 490 *Calothamnus* sp *Whicher* (Priority 1) plants, and one *Hakea oldfieldii* plant (Priority 1). Based on the current survey information, there are 13 known populations of *Calothamnus* sp *Whicher* totalling approximately 5700 individuals in 'good' condition, and 80 individuals of *Hakea oldfieldii* (CSWA, 2001).

Submissions

The submissions for the proposal focused on:

- seeking more information on the rare flora species that would be affected by the proposal, the potential impacts and mitigation measures to be taken by the proponent for protection and management of the rare flora, and details on the preferred transport route; and

- the proponent considering translocation of Priority species from the mining site, and providing more information on rehabilitation and propagation of Priority flora species in the post-mining landform.

Assessment

The area considered for assessment includes the area covered by the footprint of the proposal, and the area of the proposed transport route that impacts on DRF.

The EPA's environmental objective for this issue is to protect DRF and Priority flora, consistent with the provisions of the *Wildlife Conservation Act 1950*, and provisions of the EPBC Act.

Of the two transport routes evaluated by the proponent, the EPA prefers the selected route as it significantly avoids populations of rare flora species.

The EPA notes the following in its assessment of this factor:

- The proponent will include Priority flora species, including *Calothamnus* sp *Whicher* and *Hakea oldfieldii* in the native vegetation rehabilitation areas, and will attempt to propagate these species for rehabilitation.
- The development of the mine and infrastructure will require the removal of one plant of a DRF species and a number of plants of two Priority 1 species, but this is not considered significant given the known abundance and health of other populations of these species.
- The proponent, in consultation with CALM, will attempt to translocate the single *Chamelaucium roycei* plant located within the road upgrade area at the Tutunup Road – Tompsett Road intersection to a new location within the immediate vicinity.

Summary

Having particular regard to:

(a) the known abundance of the particular DRF and two Priority 1 species of plants which will be impacted, and

(b) the proposed management measures for Declared Rare and Priority flora,

it is the EPA's judgement that the proposal can be managed to meet the EPA's environmental objective for Declared Rare and Priority flora.

4. Conditions and Commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment and Heritage on the 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.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforceability, then form part of the conditions to which the proposal should be subject, if it is to be implemented.

4.1 Proponent's commitments

The proponent's commitments as set in the PER and subsequently modified, as shown in Appendix 4, should be made enforceable.

4.2 Recommended conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by CSWA to develop a titanium minerals mine at Tutunup is approved for implementation.

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

- that the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4; the commitments include:
    - Development of a Groundwater Management Plan and Operating Strategy, before mining, to the satisfaction of CALM and the WRC, to address:
        - Yarragadee abstraction and monitoring;
        - superficial aquifer artificial recharge system design and implementation;
        - monitoring of superficial groundwater in the vicinity of the Busselton Wet Ironstone Threatened Ecological Community;
        - monitoring of groundwater levels in other areas surrounding the mining area; and
        - actions to be taken in the event that adverse changes in groundwater levels or quality are detected.

- Maintenance of an artificial recharge system (ARS) and continued monitoring of superficial groundwater levels in the area around the Busselton Wet Ironstone Threatened Ecological Community (TEC) until monitoring shows groundwater levels have returned to normal with no further input from the ARS, based on regional seasonal fluctuation, and on advice from the WRC and CALM, with the objective of ensuring the ARS is maintained in an operable state until no longer required to control mining-related drawdown.
- Development and implementation of a Vegetation Monitoring and Management Program before mining, to the satisfaction of CALM, to assess the health of the TEC, with the objective of maintaining the abundance, distribution and values of the TEC and associated rare flora.
- Provision of resources for enhanced management actions for the TEC and associated rare flora, and targeting of these resources to CALM's requirements to enhance the security and conservation status of the TEC and associated rare flora.

It is also noted that other regulatory mechanisms relevant to the proposal are:

- environmental approvals required under the EPBC Act;
- clearance required under the *Wildlife Conservation Act 1950* for 'taking' of one DRF plant;
- Works Approvals and Licencing of the project under Part V of the *Environmental Protection Act 1986*;
- approvals required under the *Mining Act 1978*; and
- licencing under the *Rights in Water and Irrigation Act 1914.*

5. Conclusions

The EPA has considered the proposal by CSWA to develop a titanium minerals mine at Tutunup. The proposed mine has a life-span of approximately four years, which includes approximately 27 months of actual mineral production.

The mine would be situated adjacent to the critically endangered Busselton Wet Ironstone Threatened Ecological Community (TEC). The TEC contains nine species of Declared Rare Flora (DRF), four of which are considered to be critically endangered, and three of these four species are known to occur only at this site. In addition, the TEC contains four Priority flora species.

The proposed mining will require dewatering. Without appropriate management, associated groundwater drawdown could have a significant impact on the TEC and lead to the extinction of one or more species of DRF. The EPA has therefore subjected the proposal to very detailed scrutiny.

During the course of the assessment, CSWA modified the proposal following consultation with CALM, the WRC and other experts. In particular, the setback between the mine and the TEC has been increased from 20 m to 70 m. The EPA recognises the high standard of work conducted by Cable Sands in its assessment of groundwater in and around the proposal area.

The challenge for CSWA has been to establish a management plan, including a buffer area, which provides assurance to the satisfaction of the EPA, with advice of CALM and the WRC, that the TEC will not be impacted by groundwater drawdown.

CSWA intends to manage groundwater drawdown through: the use of an artificial recharge system (ARS); ensuring there is a minimum 70 m setback between the mine void and the TEC; mining the southern portion of the deposit (i.e. that part closest to the TEC) during winter; and, rapid backfilling of the mined area closest to the TEC after mining, followed by re-establishment of natural groundwater levels.

Detailed technical advice has been obtained from CALM and the WRC. CALM has advised that the proposed 70 m setback should considerably enhance the level of protection for the adjacent TEC and threatened flora, and that the combination of the proposed 70 m setback and the groundwater management arrangement would be an appropriate mechanism for managing the risks of impact of the proposal on the DRF and TEC. The WRC advised that it considered the groundwater management measures proposed by Cable Sands to be robust and technically sound.

Based on this technical advice, the EPA has concluded that the proposal can be managed such that the EPA's environmental objectives would not be compromised for the TEC, DRF and Priority flora, provided there is satisfactory implementation by CSWA of the proponent's commitments and the recommended conditions set out in Appendix 4 and summarised in Section 4.

6. Recommendations

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

1. That the Minister notes that the proposal being assessed is for the development of a titanium minerals mine at Tutunup, approximately 20 km east of Busselton.

2. That the Minister considers the report on the relevant environmental factors as set out in Section 3.

3. That the Minister notes that the proposed mine is adjacent to the critically endangered Busselton Wet Ironstone Threatened Ecological Community (TEC), which contains nine species of DRF and four Priority flora species.

4. That the Minister notes that the proposed mining will require dewatering. Without appropriate management, associated groundwater drawdown could have a significant impact on the TEC and potentially lead to the extinction of one or more species of DRF. The EPA has therefore subjected the proposal to very detailed scrutiny.

5. That the Minister notes that the EPA holds the view that the combination of a revised setback distance between the proposal and the TEC and a groundwater management arrangement would be an appropriate mechanism for managing the risks of impact of the proposal on the TEC and associated plant species of special importance.

6. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4, including the proponent's commitments.

7. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Appendix 1

References

CSWA (2001) *Tutunup Titanium Minerals Mine, Public Environmental Review*. Cable Sands (WA) Pty Ltd, December 2001.

CSWA (2002) *Tutunup Titanium Minerals Mine, Responses to the Summary of Submissions.* Cable Sands (WA) Pty Ltd, November 2002.

Gibson, N., Keighery, G. and Keighery, B. (2000) *Threatened Plant Communities of Western Australia, 1. The Ironstone Communities of the Swan and Scott Coastal Plains.* Journal of the Royal Society of Western Australia, 83: 1-11.

Loomes, R. and Froend, R. (2002) *Tutunup Project – Assessment of Groundwater Dependence of Ironstone Vegetation Community and Potential Impacts of Dewatering During Mining Operations*. Report prepared for Cable Sands (WA) Pty Ltd, August 2002.

Appendix 2

List of submitters

Government

Department of Conservation and Land Management
Department of Environmental Protection – Environmental Regulation Division
Department of Indigenous Affairs
Department of Mineral and Petroleum Resources
Environment Australia
Shire of Busselton
Water and Rivers Commission

Organisations and individuals

B & E Hastie
Barry Oates, Chair, Geographe Catchment Council
Charles Roche, Project Officer, Busselton-Dunsborough Environment Centre
D Sawyer
Wildflower Society of WA (Inc)

One confidential submission

Appendix 3

Summary of identification of relevant environmental factors

Appendix 3: Summary of identification of relevant environmental factors

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Vegetation communities	The proposal involves the direct clearing of approximately 0.05 ha of scattered native vegetation. The proposal area is adjacent to the Busselton Wet Ironstone vegetation community (in State Forest), which is recognised by CALM and Environment Australia as a critically endangered Threatened Ecological Community (TEC). Dewatering of the mine pit, and the associated groundwater drawdown, has the potential to indirectly impact on this TEC.	**CALM** • The proponent's measures to protect the Busselton Wet Ironstone Threatened Ecological Community (TEC) are premised on maintaining groundwater levels within the 'normal' seasonal range. This approach may be sound, but more information and detail is required on the existing environment, and on how the proponent proposes to manage the potential impacts to the rare flora and TEC. • The TEC and DRF adjacent to the proposed mine site are extremely susceptible to the plant pathogen that causes dieback, *Phytophthora cinnamomi*. The artificial recharge would be likely to amplify the impact and/or increase the spread of the disease. • There may be a need to increase the frequency of phosphite application to reduce the impact of dieback on the flora. The proponent should consider supporting this work. **Public** • Section 3.1 states that "the Southwest of Western Australia is an important mining, processing, agricultural, manufacturing, timber and tourism area". It needs to be remembered it is also one of 25 World Biodiversity hot spots. • The proponent acknowledges the dependence of the ironstone communities on the shallow groundwater and the possibility of impacting on the health of the communities. The 3D modelling performed by the proponent is not guaranteed, and, given the lack of knowledge of ironstone communities, it should not be regarded as definitive without further scientific support. • The mineral sands industry is in decline in the southwest. The industry seems determined to mine more sensitive sites until restrained by the authorities. The destruction and/or possible damage to very sensitive sites, in this case, endemic critically endangered declared rare flora far outweighs the short-term gains. • Modelling has shown that without artificial recharge, drawdown would propagate up to 450 m from the pit. With artificial recharge, drawdown would be restricted to 100 m from the pit. It is suggested that artificial recharge should be required for this project, a 100m buffer area be required adjacent to the TEC, and a vegetation-monitoring program developed in addition to the groundwater-monitoring program and a contingency plan be developed to address potential adverse impacts.	**Considered to be a relevant factor, and addressed under 'Vegetation - Busselton Wet Ironstone Threatened Ecological Community'.**

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
		• Would the proponent care if it were responsible for the extinction of a species? • How would the EPA be perceived should it sanction a project that resulted in the extinction of a known threatened species in an ecological community with only 3% of its original extent left? • The proposal poses an unacceptably high risk of spreading dieback. **Wildflower Society of WA** • The PER states that 'with no active management, drawdown of the superficial groundwater due to mining would propagate up to 450 m … and consequently extend under most areas of the TEC'. We believe this is too high a risk to take. The site is already under threat and stress so every effort should be made to not have any further threatening action occurring. • A precautionary principle approach should be adopted when threatened communities are involved. This would involve restricting mining so there is no impact on the TEC. We don't believe, as the project currently stands, that the EPA Objective can be met for Vegetation communities. **Shire of Busselton** A dieback management plan is required that incorporates dieback management for all Cable Sands sites. Haulage vehicles can travel between sites and transfer the disease, therefore strict dieback management to maintain the dieback free status of the adjacent State Forest is necessary, including contingency/management should monitoring indicate that dieback has been introduced.	
Declared Rare Flora (DRF), Priority flora and other flora of particular conservation significance	Clearing for the proposed mine site will require the removal of approximately 490 *Callothamnus* sp *Whicher* (Priority 1) plants, and one *Hakea oldfieldii* plant (Priority 1). Widening of Tompsett Road for the proposal requires the taking of one *Chamelaucium roycei* (DRF) plant.	**CALM** • There are a considerable number of DRF and Priority taxa that have significant populations immediately adjacent to the proposed mine, and along the proposed haulage route. These taxa may be increasingly threatened if impacts of the proposal, such as hydrological changes, amplification or spread of dieback, or other impacts, destroy or otherwise impact on these populations. More information is requested on the species that would be affected, the potential impacts of the proposal and the mitigation measures to be taken by the proponent. **Shire of Busselton** • The proponent should investigate translocation of Priority species from the mining site, and provide more information on rehabilitation of Priority flora species in the post-mining landform. The site should be rehabilitated to accommodate the Priority species and ironstone community.	**Considered to be a relevant factor.**

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
		Wildflower Society of WA • Removal of Priority flora should not be contemplated without some effort being made to propagate the species for re-establishment after mining. • The EMP for the Tutunup proposal does not address the important factors of DRF and Priority Flora, or Vegetation Communities. • With regard to the Priority flora *Callothamnus* sp. Whicher, the Society takes issue with the statement: 'removal of these plants would not significantly change the regional distribution of the species'. This would result in the removal of between 9% and 20% of the total known individuals. At the very least, this is good enough reason to develop a propagation plan and incorporate local species as part of any revegetation plan. • The EPA objective for DRF and Priority Flora and other flora of conservation cannot be met without changes to the proposal. • It is not clear from the PER which roads are to be 'upgraded'; more information is needed on this. Route 1 would seem to be the preferred option mainly because Tutunup Road is already a haulage route. **Public** • In view of the fact there are 5 Priority species along Oates or Tomsett Road, a detailed management plan should be prepared before any work can commence. It is a bit flippant to state 'most of the plants were recorded in the reserve'. • Based on the precautionary principle, the presence of critically endangered DRF means that the proposal should not proceed. Furthermore, the application of the principles of ecological sustainability and intergenerational equity when applied to this proposal would see it rejected on the limited extent of the vegetation communities and the occurrence of endemic flora adjacent to the site. • My main concern is with the potential impact on the TEC that contains numerous DRF. With only an estimated 3% of pre-European Busselton ironstone communities left uncleared, which subsequently has resulted in the associated floral communities being listed as DRF or Priority flora, then any threat, however small, must be precluded. • Geocatch consider that haulage Route 1 will minimise disturbance of significant flora to one plant. It is therefore suggested that Route 1 be used, not Route 2, and that the proponent liaise with CALM to investigate transplantation.	

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
		• The proponent has (1) failed to justify the risk to the DRF; (2) is using untried measures in an attempt to rectify almost guaranteed hydrological imbalances; (3) proposes insufficient monitoring; (4) makes no commitment to withdraw immediately should measures prove insufficient to guarantee the health of the DRF.	
Native terrestrial fauna	The proposal involves the direct clearing of approximately 0.05 ha of scattered native vegetation. The proposal area is adjacent to the Busselton Wet Ironstone vegetation community (in State Forest), which is recognised by CALM and Environment Australia as a critically endangered Threatened Ecological Community (TEC). Dewatering of the mine pit, and the associated groundwater drawdown, has the potential to indirectly impact on this TEC, which provides fauna habitat. The road haulage for the proposal has the potential to increase the number of fauna deaths caused by road-kills.	**Shire of Busselton** • The fauna survey does not consider the broader impact of the mining activity on the adjacent State forest that represents considerable fauna values, or address the issue of increased traffic in the area that may result in a higher rate of death and injury to fauna. A larger buffer area to the state forest is required to minimise the impacts of noise, lighting and other pollution on the fauna inhabiting this area. This may result in a smaller mining area. **Public** • We notice that Table 3.3 contains no night birds. If no night survey has been done then the impacts cannot be accurately ascertained. A study needs to be conducted before approval is given. • The transport hours stated of 6.00 am to 8 pm Monday to Saturday is a problem as a lot of fauna move across Tompsett Road at dusk and dawn, which for most of the year is around 7.30 pm and 5.30 am respectively. There is already a large number of trucks from the Iluka minesite using Tutunup Road, so another 115 return trucks a week will have a considerable impact on the fragile Rail reserve flora and fauna.	The EPA notes that: • the proposal will have minimal direct impact on fauna habitat; • the risk that the proposal will cause significant disturbance to fauna habitat within the TEC, that occurs adjacent to the proposal area is extremely low; • an adequate fauna survey was conducted for the proposal; and • the actual haulage being 75 return trucks per week for a total period of approximately 13 months. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**
Native terrestrial fauna – specially protected (threatened) fauna.	The proposal involves the direct clearing of approximately 0.05 ha of scattered native vegetation. The proposal area is adjacent to the Busselton Wet Ironstone vegetation community (in State Forest), which is recognised by CALM and Environment Australia as a critically endangered Threatened Ecological Community (TEC). Dewatering of the mine pit, and the associated groundwater drawdown, has the potential to indirectly impact on this TEC, which provides fauna habitat.	**Public** Ironstone communities in the area contain many rare, endangered and vulnerable flora and fauna. The proponent seems to have paid a lot of attention to this fact but the impact of mining adjacent to rare communities has not been sufficiently evaluated.	The EPA notes that: • the proponent has received expert advice on the potential for the proposal to impact on any species of specially protected (threatened) fauna, and it appears that no threatened fauna will be impacted by the proposal; and • the risk that the proposal will cause significant disturbance to fauna habitat within the TEC that occurs adjacent to the proposal area is sufficiently low that it is unlikely that the EPA objective for 'specially protected (threatened) fauna' would be compromised.

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
	The road haulage for the proposal has the potential to increase the number of fauna deaths caused by road-kills. Threatened species that may occur within the general proposal area include the Chuditch, Ring-tailed Possum, Carnaby's Black-Cockatoo, Baudin's Black-Cockatoo, Peregrine Falcon, Forest Red-tailed Black-Cockatoo and the Square-tailed Kite.		**It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**
Watercourses	The proposal will not intersect any significant watercourses. Abba River, which is the nearest significant watercourse, flows in a north-north-westerly direction, and is located approximately two km south-west of the proposal area at its closest point.	**Shire of Busselton** • The EPA objective for watercourses is to 'maintain the integrity, functions and environmental values of watercourses' and to 'maintain or improve the quality of surface water'. The proponent states that there will be 'no long term changes to watercourses or surface flows'. This is not specifically what the objective states, and is not an adequate response to potential off-site impacts. Through the stormwater management plan, the proponent should ensure that there are no off-site impacts to the Abba River such as increased sedimentation or other pollution. Management proposed for the site includes installing earth bunds to divert run-off around the site and allow it to discharge to the Abba River. • Even though the proponent state there are only agricultural drains in the area the effect excess water coming out of this area can have downstream is a proven fact. I refer to the floods of 1998 and 1999 where most of the rain fell in this eastern part of the Shire. A considerable amount of money is about to be spent on projects around the Abba River, and the water discharge from the proposed mine has the potential to have a huge impact on these projects as this area is at the top of the catchment.	The EPA notes that: • the nearest significant watercourse, the Abba River, is located some two km south-west of the proposal area; • the proponent will control surface water run-off from the mine site, and construct appropriate sediment management systems (e.g. detention basins and silt traps) to manage the quality of any surface water that is discharged from the minesite; and • given the above, the EPA considers that it is unlikely that the EPA objective for 'watercourses' would be compromised. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**
Groundwater quantity	The orebody will require de-watering ahead of the mining phase. The drawdown from the de-watering could propagate into the area of the TEC, and thereby potentially impact on the TEC itself. The drawdown from the proposal could also potentially impact on other users of the groundwater resource in the vicinity of the proposal area.	**Water and Rivers Commission (WRC)** • The WRC appreciates the open and cooperative approach that the proponent and its representatives have shown during the development of the PER. The PER satisfactorily addresses all water-related issues to the requirements of the WRC. • The WRC will be very interested in the development, management and success of the Artificial Storage and Recovery (ASR) process. The ASR technique appears to be technically sound and will prove an interesting case study for the rehabilitation of other mineral sand mines.	The EPA notes: • that the proposal area is located next to a TEC, which is assumed to rely on superficial groundwater for at least part of the year; • WRC's comments on the proposal; and • the proponent's response to public submissions.

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
	The Yarragadee, Leederville and superficial aquifers are used for agriculture, mining and domestic uses. The TEC adjacent to the proposal is assumed to rely on superficial groundwater for at least part of the year.	**Shire of Busselton** • The Shire requested that additional information be provided in the Groundwater Management Plan. • The proposed management of drawdown by artificial recharge does not address possible differences between the rate of water movement laterally through the strata following release from the recharge trenches and the rate of drawdown during pumping. For the artificial recharge management to work, the recharged water would need to compensate for the effect of any drawdown and prevent water stress. The decommissioning of this system should result in the removal of all infrastructure i.e. all concrete well liners and all PVC standpipes.\ **Public** • The statement in Section 3.6.1 of the PER that the majority of groundwater from the superficial aquifer remains unallocated needs to be justified. All residents in the area rely on this aquifer or the one below it for their water, be it domestic or agriculture. • The bottom paragraph of page 33 of the PER regarding survey and monitoring of nearby bores and dams needs to be included in Commitment 2 on page 34. What does the proponent consider to be a nearby resident? How far from the mine site?	**Considered a relevant environmental factor in so far as it relates to the TEC, and addressed under 'Vegetation - Busselton Wet Ironstone Threatened Ecological Community'.**
Mine planning, decommissioning, rehabilitation and landform	The proposal is situated on private agricultural land, and will require a short-term change in land use. Post-mining, the proponent aims to return the land use of the proposal area to being for agriculture. The post-mining landform and contours will be returned to pre-mining levels.	**CALM** • Regarding landform restoration and revegetation (p15 and p17, ss 2.4.3 and 2.4.4), at no point when describing the final soil profile is any consideration given to the requirements of trees. The establishment of shelterbelts on farmland was discussed and there are currently paddock trees. There should be some consideration given to tree requirements. • Section 2.4.3. The Cation Exchange Capacity (CEC) is not shown for the tailings sands or the blue sandy clay overburden. This section also refers to section 2.4.2 that describes the CEC process but does not show the CEC for the tailing sands or the blue sandy clays. **Department of Mineral and Petroleum Resources (MPR)** • Further information is required on: whether the landowners fully understand the implications of the proposal in terms of the expected outcomes; the consultation programme; the location of fines in the rehabilitated mine and in relation to property boundaries; pre-mining soil/water/plant root profiles, productivity criteria and cultural practices; and, content of fines in the ore and volume that will require disposal, the acid sulphate status of the soil, and the standing water table and its fluctuation throughout the year.	The EPA notes that: • the proposed 70 m setback from the TEC will provide an opportunity for rehabilitation of an area with original ironstone caprock to form a substantial post-mining buffer between the TEC and pasture area; • MPR had no objections to the proposal following the proponent's response to public submissions; • the proponent will incorporate rock-overburden in the post-mining soil profiles; • the proponent will use local provenance seed in areas of native vegetation rehabilitation, and will attempt to propagate Priority flora species in rehabilitation areas of native vegetation, including *Calothamnus* sp. *Whicher* and *Hakea oldfieldii*;

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
		• There is no detail on soil-water relations, how these are influenced by the existing soils/geology, the variability from season to season or the soil/water/plant relations that provide for the productivity of the land. It is suggested that there be more monitoring bores close to the mine area to be able to demonstrate that mining has not altered the hydrological regime. **Wildflower Society of WA** The PER concentrates on revegetation of farmland with exotic species. Some effort should also be made to propagate some of the local species especially the Priority flora (*Calothamnus* sp. *Whicher* and *Hakea oldfieldii*) for use in shelterbelts. If the proponent does not have the expertise, appropriate people should be consulted. **Public** • The current landowners have determined the post-mining land use as pasture. Consideration should be given to purchasing the site for conservation. Whilst this would preclude mining, the best long-term land use is conservation; this should be weighed against the short-term landuse of mining followed by pasture production. With 97% (Keighery and Trudgen 1992) of the soil type containing threatened ironstone communities already cleared the destruction of more of the remaining soil type by mining should be prevented. This is particularly important to the Abba Plains Biodiversity Project. • The pre-mining subsoil profile shows a lot of ironstone caprock. How will be reintegrated into the geographical profile? Is any ironstone at all going to be put back into the site after mining? The clearing of more ironstone is a terrible loss. Is Fig 2.5 correct in indicating that no ironstone is present in the post-mining soil profiles? • The proponent will to need use local provenance plantings in its vegetation rehabilitation process.	• all mining infrastructure will be removed following mining; and • the post-mining landform and contours will be returned to pre-mining levels. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION MANAGEMENT			
Particulates / Dust	Dust will be generated as a result of earthmoving operations and the movements of mobile equipment in and around the mine site.	**Department of Environmental Protection (DEP)** The proponent should commit to monitor dust at the boundary of the premises to ensure it does not become a health issue to the residents. **CALM** The wind figures quoted on page 48 of the PER are not likely to be appropriate (underestimate) for the site because they are based on Jarrahwood location – a small town located in the middle of the jarrah forest with very little clearing nearby. However, the proposed mine site is in a highly cleared location on Abba Plains. The maximum wind speeds would be expected to be significantly higher, thus there may be implications for carrying dust back into the ironstone area. **Shire of Busselton** Several residential dwellings are within close proximity of the proposed mine site. Measures should therefore be introduced to adequately protect these dwellings from noise, dust and visual impacts.	The EPA notes that: • the proponent has committed to apply appropriate dust management strategies for the proposal; and • on-site dust will also be managed under MPR mining lease conditions, and a DEP licence issued under the provisions of Part V of the *Environmental Protection Act 1986*. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**
Noise (from the mine site area)	The proposal is located within a semi-rural setting, with a number of residences being located in the vicinity of the mining operations. The nearest occupied residence will be approximately 300 m away from the mine. Mineral production will occur over about 27 months, with a minimum of three months development work beforehand. Rehabilitation is scheduled to be completed by winter 2006.	No comments.	The EPA notes that: • the proponent has made a commitment to prepare and implement a Noise Management Plan for the proposal to the satisfaction of the DEP; and • the proposal can be adequately managed to comply with *Environmental Protection (Noise) Regulations 1997*. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Noise — road transport	The proposal is located within a semi-rural setting, with a number of residences being located on the transport route for the trucks carrying the Heavy Mineral Concentrate (HMC). Transport of the HMC will occur over an estimated 27 month period, with an estimated maximum 75 return trucks per week during periods of haulage. The period of haulage will be approximately 13 months in total.	**Department of Environmental Protection** • More information is required with regard to transport noise, assessment against EPA noise Guidance notes and duration of trucking. **Public** • We live 27 metres from the Ludlow-Hithergreen Road, which is part of the haul road for this proposed mine. The proposal will add 30% more noise, vibration, loss of amenity, stress, loss of sleep and devaluation of property. Every time one of these road trains passes our house, we can hear it up to 2 kilometres away on either side of us, it causes excessive noise in the house and on the property. The associated vibration causes dust to fall from the roof through cracks around the ceiling and leave an occupier feeling very disturbed from this vibration. • The proponent estimates that there will be an average of around 115 truck journeys per week from the site. The impacts from this huge increase in traffic (compared to current volumes), combined with the dust factor, would be unbearable. • Clearing of the roadside vegetation to allow Tompsett Road to be widened to 9 metres is a big concern. • We recommend that HMC transportation Route 2 be used, as only 4.6 km of road would need to be upgraded to Ludlow-Hithergreen Road, which is already a heavy haulage route, and less people would be affected on the gravel section of the route.	The EPA notes that: • the proponent has made a commitment to prepare and implement a Noise Management Plan for the proposal to the satisfaction of the DEP; • the proponent has provided additional information to the DEP which demonstrates that the proposal will meet the *EPA Preliminary Draft Policy for Road and Rail Transportation Noise* for Tompsett and Oates Roads; road transport noise on Tutunup and Ludlow-Hithergreen Road will be addressed in the Noise Management Plan; • all of the preferred transport route (i.e. Route 1) will be bituminised, thereby reducing the noise and dust impacts from road transport; • the haulage for the proposal will be 75 return trucks per week for a total period of approximately 13 months. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Groundwater quality	The Yarragadee and superficial aquifers contain good quality groundwater that has low salinity and is mildly acidic. The groundwater is used for agriculture, mining and domestic uses.	No comments received.	The EPA notes that:
Surface water quality	The proposal will not intersect any significant watercourses. Abba River, which is the nearest significant watercourse, flows in a north-north-westerly direction, and is located approximately 2 km south-west of the proposal area at its closest point.	**Department of Environmental Protection** The proponent should commit to manage surface water through drainage and silt traps systems. **CALM** There is an acknowledgment that the flocculants to be used for the proposal may harm aquatic life if present in sufficiently high concentrations. The plan does not indicate what these quantities are, nor does it provide a hazard management plan for spills of the flocculant or any other chemicals on site.	The EPA notes that: • the proponent will divert surface water around the mine site, and put in place appropriate sediment reduction strategies to manage water quality; • flocculants will be stored in bunded areas, and their use on the mine site adequately managed by the containment facilities proposed; and • the surface water issues related to the proposal can be managed under the provisions of Part V of the EP Act. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a**

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
			'relevant environmental factor' requiring further evaluation by the EPA.
Solid waste	The groundwater and surface water in the proposal area is considered to be of good quality.	**Department of Environmental Protection** The DEP sought additional information on the proposed storage of chemicals and on the nature of secondary tailings.	The EPA notes that: • the proponent will contain all tailings and fines within dams constructed in accordance with MPR guidelines; and • the proposal will be licenced under the provisions of Part V of the EP Act. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**
SOCIAL SURROUNDINGS			
Aboriginal culture and heritage	The proposal has an overall disturbance-footprint of 100 hectares, mainly on cleared agricultural land. No listed Aboriginal sites occur in the proposal area.	**Department of Indigenous Affairs** • It is recommended that prior to any developments commencing, archaeological surveys and ethnographical consultations be conducted with local Aboriginal Communities and Native Title claimants. • There may be ethnographic sites that may not necessarily have any physical manifestation. For this reason, it is strongly suggested that consultations are conducted with local Aboriginal people prior to developments commencing.	The EPA notes that: • the proponent has now carried out archaeological surveys and ethnographical surveys for the proposal area, and several Aboriginal heritage sites were identified; and • the proponent has completed a Section 18 application under the *Aboriginal Heritage Act 1972* for the proposal, and the Department of Indigenous Affairs has provided advice that the proposal can proceed. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Register of the National Estate	The proposal has an overall disturbance-footprint of 100 hectares, mainly on cleared agricultural land. No sites listed on the Register of the National Estate or Municipal Register occur in the proposal area.	No comments received.	The EPA notes that: • the proponent conducted a search of the Register of the National Estate, and the Heritage Council of WA Register of Heritage Places, and has found that no sites occur in the proposal area. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**
Public health and safety — radiation	The mineral suite in titanium mineral deposits generally contains a small quantity of the mineral monazite. At Tutunup this averages < 1% of the heavy mineral concentrate. Monazite contains the radioactive elements uranium and thorium.	No comments received.	The EPA notes that: • management of radioactive materials is managed by MPR under the *Mines Safety and Inspection Regulations 1995*; • the proponent will develop and implement a Radiation Management Plan for the proposal, which is to be to the satisfaction of MPR, and • the proponent expects that post-mining radiation levels are likely to be similar, or below pre-mining levels. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**

Preliminary Environmental Factor	Proposal Characteristics/ Existing Environment	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Public health and safety — transport	The proposal involves haulage on Bussell Highway, and Ludlow-Hithergreen, Tutunup, Oates and Tompsett roads. Bussell Highway (which will be used for haulage of the HMC) is a main road, and is currently used for heavy haulage. Ludlow-Hithergreen and Tutunup roads are Shire managed and currently used for mineral sands haulage. Oates and Tompsett roads are gravel, with minimal heavy traffic.	No comments received.	The EPA notes that: • the proponent assessed several route options, and considered both relevant social and environmental factors in the assessment, including noise, dust and hours of transport; • all of the transport route (i.e. Route 1) will be bituminised; and • the proponent will upgrade the preferred haulage route between the minesite and Tutunup Rd to make it suitable for heavy haulage. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**
Visual amenity	The mining area will not be visible from major roads. Three residences will be able to see the mining operations for the duration of mining. However, on the completion of mining, the landform and contours will be returned to the pre-mining conditions.	No comments received.	The EPA notes that: • the proponent will retain existing vegetation as far as possible to screen the mining area from residences, and position lighting so as to minimise light spill to nearby residences; • the proposal is relatively short-term, with no infrastructure to be left post-mining that would cause any significant loss of visual amenity in the area; and • the landform and contours will be returned to the pre-mining conditions. **It is considered that the proposed management measures are appropriate. This factor is therefore not considered a 'relevant environmental factor' requiring further evaluation by the EPA.**

Appendix 4

Recommended Environmental Conditions and Proponent's Consolidated Commitments

Statement No.

RECOMMENDED ENVIRONMENTAL CONDITIONS

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

TUTUNUP TITANIUM MINERALS MINE, SHIRE OF BUSSELTON

Proposal: Development of a titanium minerals mine at Tutunup, approximately 20 km east of Busselton and 14 km south of Capel, as documented in schedule 1 of this statement.

Proponent: Cable Sands (WA) Pty Ltd

Proponent Address: P O Box 133
BUNBURY WA 6231

Assessment Number: 1384

Report of the Environmental Protection Authority: Bulletin 1085

The proposal referred to above may be implemented subject to the following conditions and procedures:

Procedural conditions

1 Implementation and Changes

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

1-2 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, is substantial, the proponent shall refer the matter to the Environmental Protection Authority.

1-3 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, is not substantial, the proponent may implement those changes upon receipt of written advice.

2 Proponent Commitments

2-1 The proponent shall implement the environmental management commitments documented in schedule 2 of this statement.

2-2 The proponent shall implement subsequent environmental management commitments which the proponent makes as part of the fulfilment of the conditions in this statement.

3 Proponent Nomination and Contact Details

3-1 The proponent for the time being nominated by the Minister for the Environment and Heritage under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment and Heritage has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.

3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.

3-3 The nominated proponent shall notify the Department of Environmental Protection of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

4-1 The proponent shall provide evidence to the Minister for the Environment and Heritage within five years of the date of this statement that the proposal has been substantially commenced or the approval granted in this statement shall lapse and be void.

Note: The Minister for the Environment and Heritage will determine any dispute as to whether the proposal has been substantially commenced.

4-2 The proponent shall make application for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement to the Minister for the Environment and Heritage, prior to the expiration of the five-year period referred to in condition 4-1.

The application shall demonstrate that:

- the environmental factors of the proposal have not changed significantly;
- new, significant, environmental issues have not arisen; and
- all relevant government authorities have been consulted.

Note: The Minister for the Environment and Heritage may consider the grant of an extension of the time limit of approval not exceeding five years for the substantial commencement of the proposal.

Environmental conditions

5 Compliance Auditing and Performance Review

5-1 The proponent shall prepare an audit programme in consultation with and submit compliance reports to the Department of Environmental Protection which address:

- the implementation of the proposal as defined in schedule 1 of this statement;
- evidence of compliance with the conditions and commitments; and
- the performance of the environmental management plans and programmes.

Note: Under sections 48(1) and 47(2) of the *Environmental Protection Act 1986*, the Chief Executive Officer of the Department of Environmental Protection is empowered to audit the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.

Usually, the Department of Environmental Protection prepares an audit table which can be utilised by the proponent, if required, to prepare an audit program to ensure that the proposal is implemented as required. The Chief Executive Officer is responsible for the preparation of written advice to the proponent, which is signed off by either the Minister or, under an endorsed condition clearance process, a delegate within the Environmental Protection Authority or the Department of Environmental Protection that the requirements have been met.

5-2 The proponent shall submit a performance review report every five years after the start of the operations phase, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority, which addresses:

- the major environmental issues associated with the project; the targets for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those targets;
- the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable;
- significant improvements gained in environmental management, including the use of external peer reviews;
- stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and
- the proposed environmental targets over the next five years, including improvements in technology and management processes.

6 Decommissioning and Closure Plan

6-1 Prior to the construction phase, the proponent shall prepare a Preliminary Decommissioning and Closure Plan for the mine, which provides the framework to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

Note: In the preparation of advice to the Minister, the Environmental Protection Authority expects that the advice of the following agencies will be obtained:

- Department of Conservation and Land Management;
- Department of Mineral and Petroleum Resources; and
- Water and Rivers Commission.

The Preliminary Decommissioning and Closure Plan shall address:

1 rationale for the siting and design of mine and infrastructure as relevant to environment protection, and conceptual plans for the removal or, if appropriate, retention of plant and infrastructure;

2 a conceptual rehabilitation plan for all disturbed areas and a description of a process to agree on the end land use(s) with all stakeholders;

3 a conceptual plan for a care and maintenance phase; and

4 management of noxious materials to avoid the creation of contaminated areas.

6-2 At least six months prior to the anticipated date of closure, or at a time agreed with the Environmental Protection Authority, the proponent shall prepare a Final Decommissioning and Closure Plan designed to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

Note: In the preparation of advice to the Minister, the Environmental Protection Authority expects that the advice of the following agencies will be obtained:

- Department of Conservation and Land Management;
- Department of Mineral and Petroleum Resources; and
- Water and Rivers Commission.

The Final Decommissioning and Closure Plan shall address:

1 removal or, if appropriate, retention of plant and infrastructure in consultation with relevant stakeholders;

2 rehabilitation of all disturbed areas to a standard suitable for the agreed final land use(s); and

3 identification of any contaminated areas, including provision of evidence of notification and proposed management measures to relevant statutory authorities.

6-3 The proponent shall implement the Final Decommissioning and Closure Plan required by condition 6-2 until such time as the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, that the proponent's closure responsibilities are complete.

6-4 The proponent shall make the Final Decommissioning and Closure Plan required by condition 6-2 publicly available, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

Procedures

1 Where a condition states "to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority", the Chief Executive Officer of the Department of Environmental Protection will obtain that advice for the preparation of written advice to the proponent.

2 The Environmental Protection Authority may seek advice from other agencies, as required, in order to provide its advice to the Chief Executive Officer of the Department of Environmental Protection.

Notes

1 The Minister for the Environment and Heritage will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environmental Protection over the fulfilment of the requirements of the conditions.

2 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 Number 1384)

The proposal involves the development of a titanium minerals mine at Tutunup, approximately 20 km east of Busselton and 14 km south of Capel (see Figure 1).

The proposal has the following main components:

- disturbance of 120 hectares of mainly cleared agricultural land;
- construction of water and fines dams, and topsoil, tails and overburden stockpiles;
- dewatering and mining, using dry mining techniques at up to two million tonnes per annum (see Figures 3 and 4);
- abstraction of groundwater from the Yarragadee aquifer for process use;
- haulage of the Heavy Mineral Concentrate (HMC) in road-trains to the proponent's North Shore facility in Bunbury via Oates Rd, Tompsett Rd, Tutunup Rd, Ludlow-Hithergreen Rd and Bussell Highway (see Figure 5); and
- widening of Tompsett Rd at the intersection with Tutunup Rd to address safety requirements.

The key characteristics of the proposal are described in Table 1 below.

Table 1: Summary of key proposal characteristics

ELEMENT	DESCRIPTION
Life of project • Mineral production • Mining (overburden and ore removal, backfilling)	(at 5 days per week[1]) • Approximately 27 months • Approximately 4 years
Mine operation	24 hours per day, up to 7 days per week[1]
Production • Size of ore body • Ore mining rate • Overburden • Heavy Mineral Concentrate produced	 • Approximately 2,303,000 tonnes • up to 2,000,000 tonnes per year • Approximately 1,600,000 bank cubic metres • Approximately 260,000 tonnes
Area of disturbance • Mine pit • Overburden stockpiles • Fines dams • Tailings dams • Topsoil/subsoil stockpiles • Infrastructure[2] • Artificial recharge system	 • 40 hectares • 20 hectares • 22 hectares (outside mine path) • 6 hectares (outside mine path) • 8 hectares • 22 hectares • 2 hectares
Depth of mine pit	Maximum 11 metres
Water supply • Source • Average daily requirement • Maximum annual requirement	 • Yarragadee aquifer, Capel-Ludlow subarea • 4,000 kilolitres • 1,500,000 kilolitres
Fuel • Maximum storage • Maximum usage	 • 50,000 litres • 2,300,000 litres per annum

[1] Mine operations will vary between 5, 6 and 7 days per week operation, depending on production requirements.

[2] Infrastructure disturbance area includes areas such as plant sites, water supply, roads, drainage lines. It also includes areas between other structures (e.g. clearance between two different types of stockpiles).

Figures

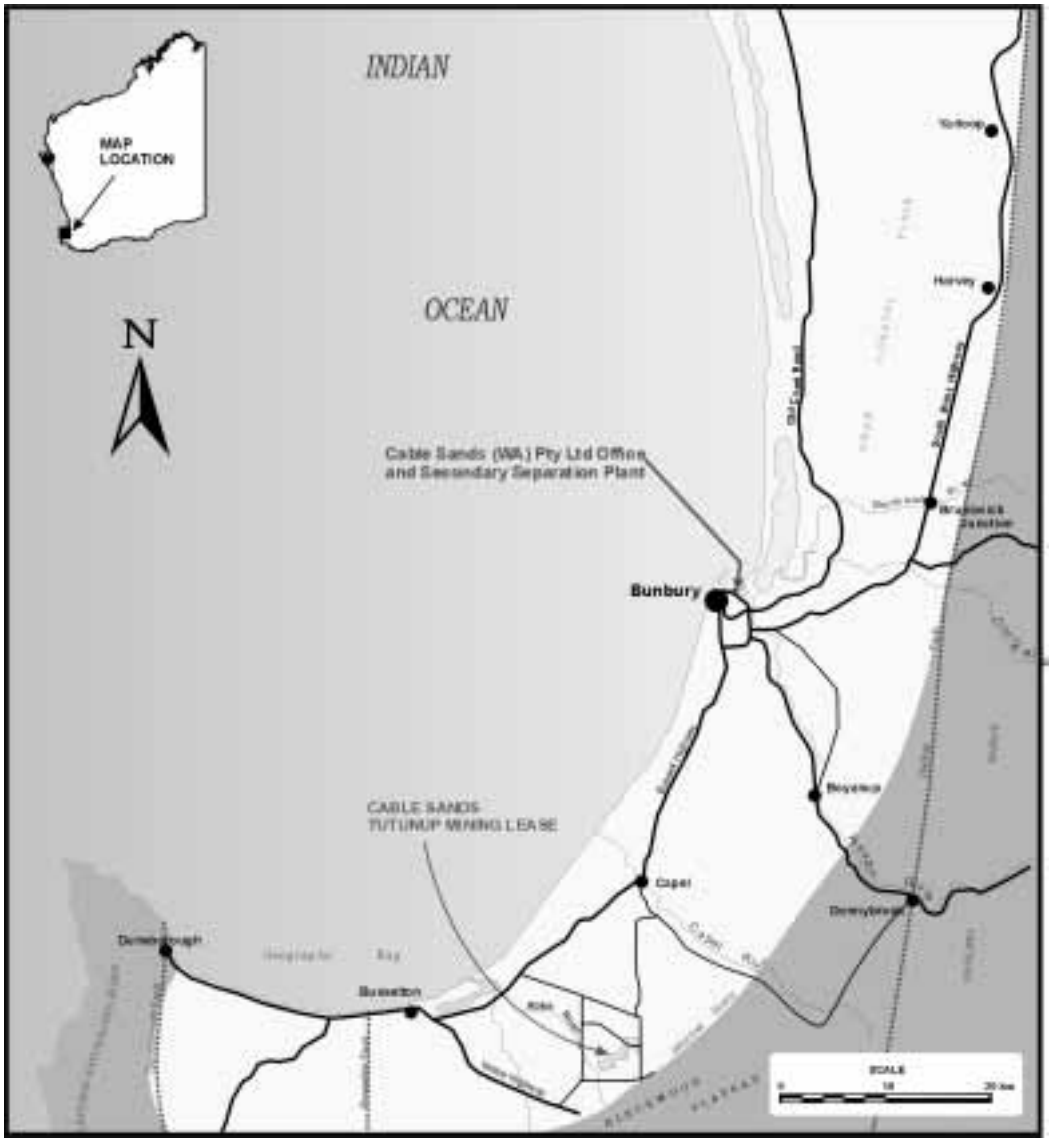


Figure 1: Location map (Source: CSWA, 2001)

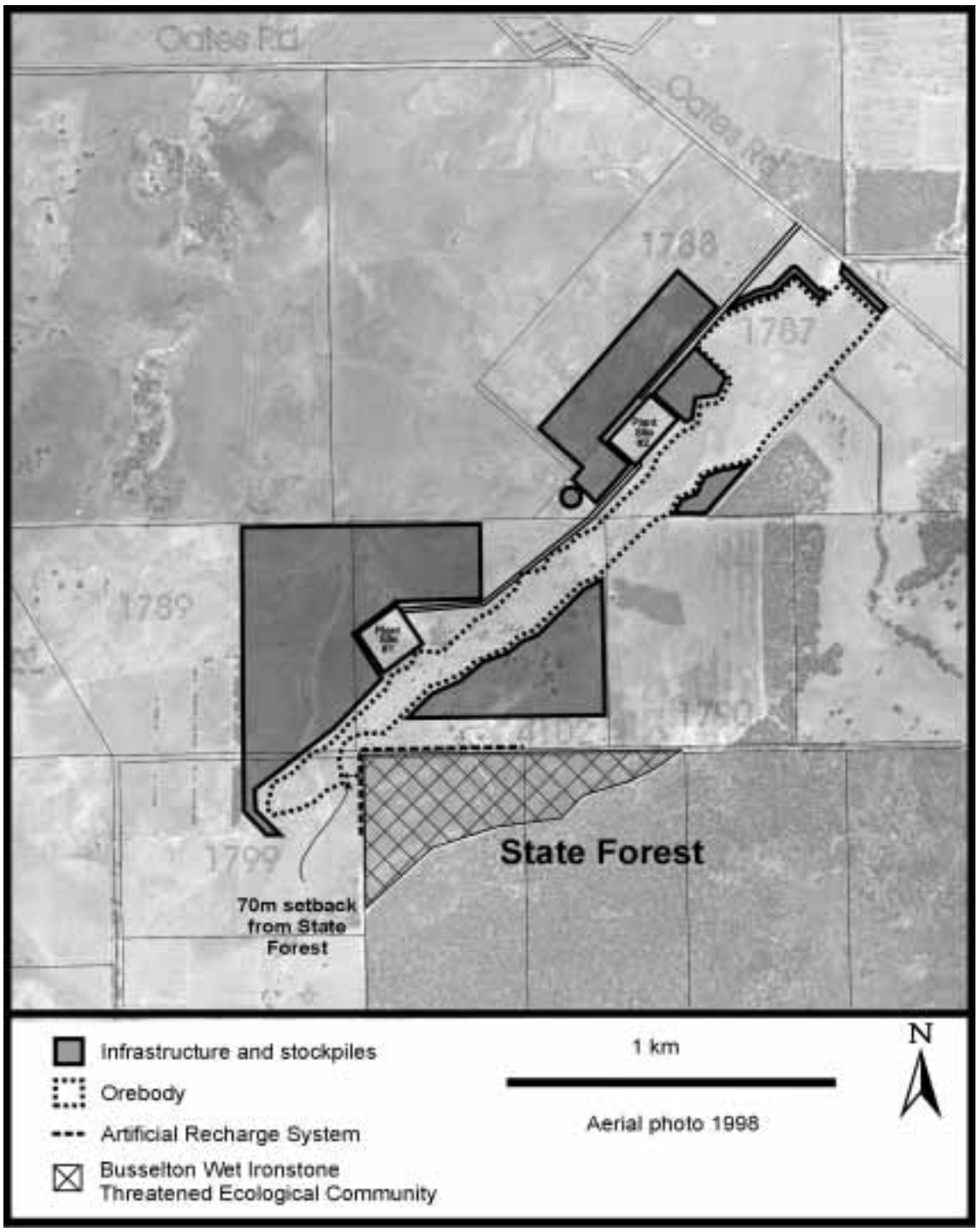


Figure 2: Mine layout (Source: CSWA, 2002)

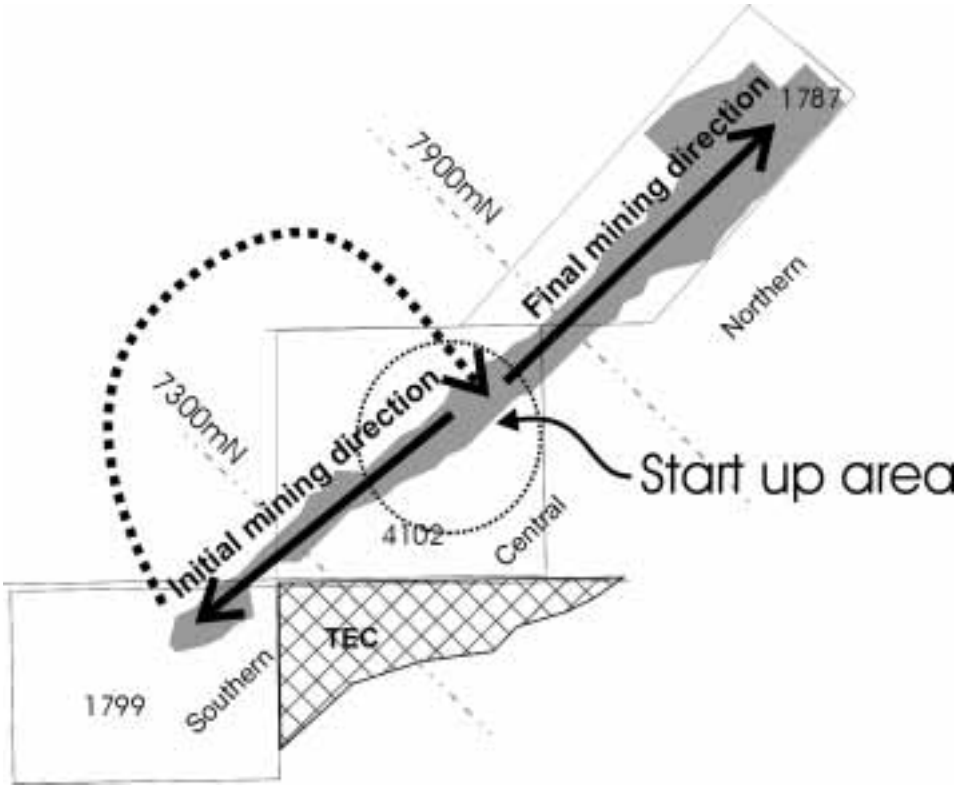


Figure 3: Conceptual mine plan (Source: CSWA, 2001-as amended, Nov 2002)

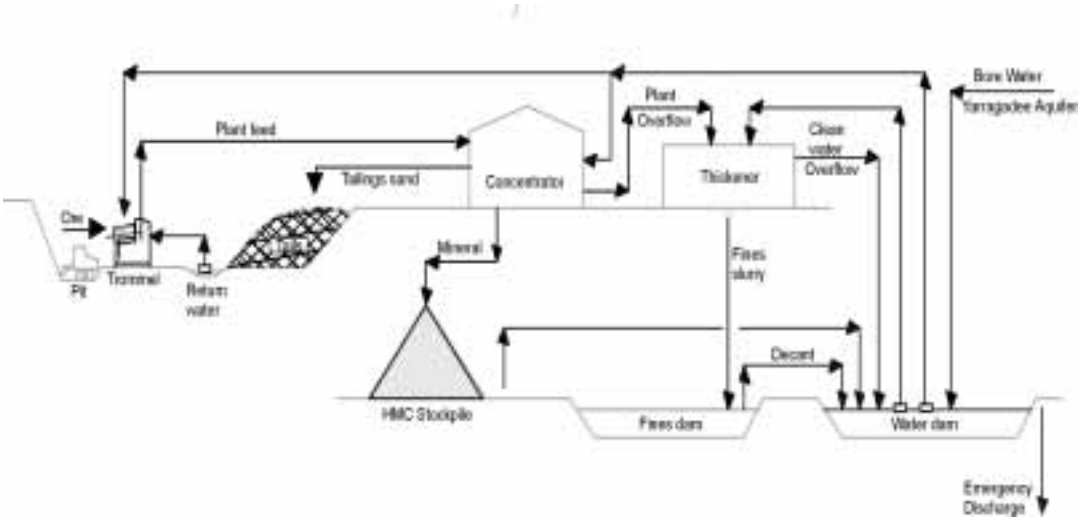


Figure 4: Process flow chart (Source: CSWA, 2001)

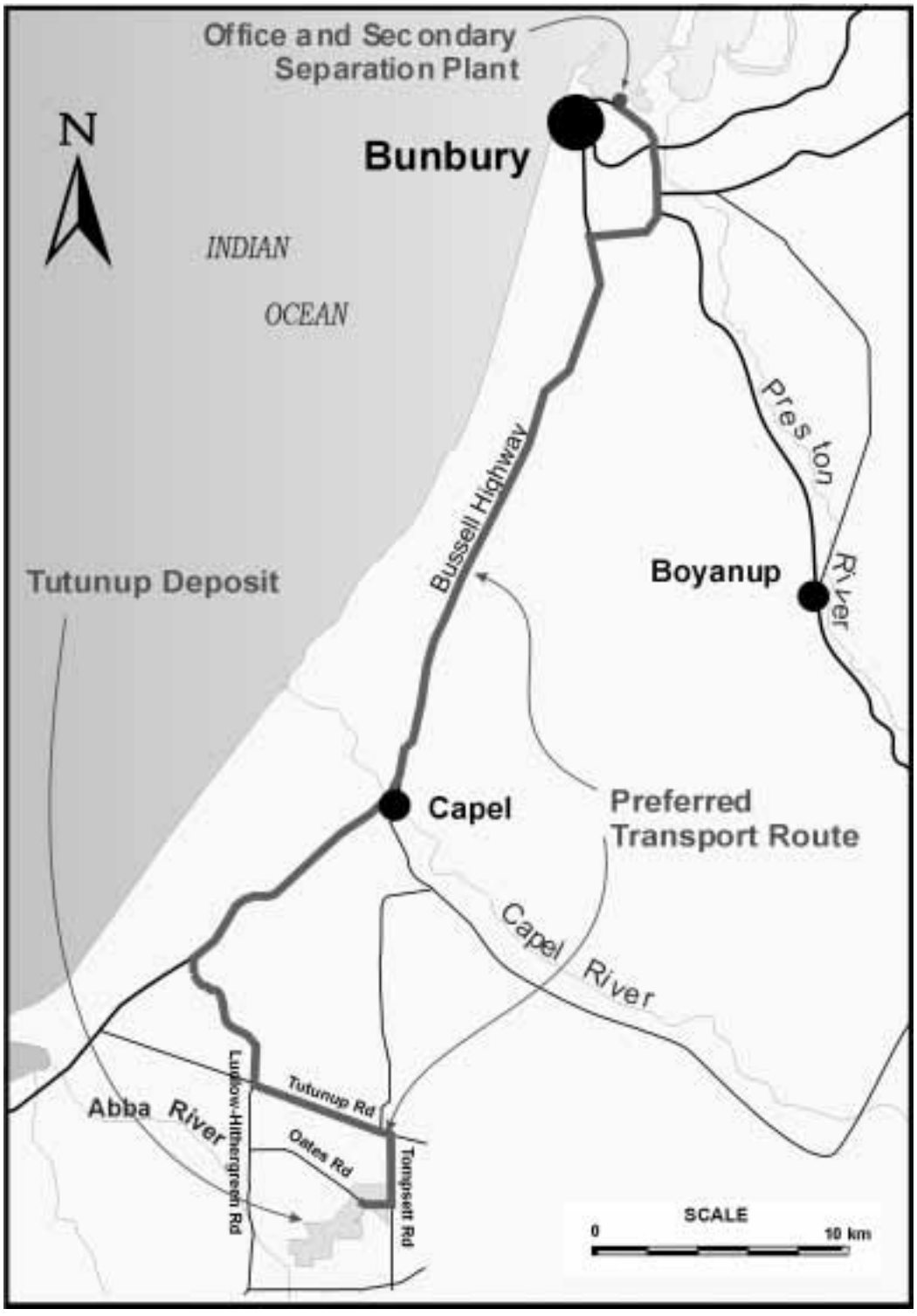


Figure 5: Heavy mineral concentrate transport route (Source: CSWA, 2001)

Schedule 2

Proponent's Environmental Management Commitments

December 2002

TUTUNUP TITANIUM MINERALS MINE

(ASSESSMENT NO. 1384)

Cable Sands (WA) Pty Ltd

Proponent's Environmental Commitments – Tutunup Titanium Minerals Mine Project (Assess. No. 1384)

TOPIC	ACTIONS	OBJECTIVES	TIMING	ADVICE FROM
Environmental Management	1. Develop an Environmental Management and Monitoring Plan (EMMP) for the Tutunup minesite to the requirements of the EPA on advice of CALM. Among other issues the EMMP will address: • Groundwater management; • Vegetation monitoring and management; • Site rehabilitation; • Dust management; • Noise management; and • Radiation management.	Provide a systematic framework for environmental management at the Tutunup minesite consistent with the Cable Sands Environmental Policy.	Before mining	MPR, WRC, CALM
Groundwater	2. Develop a Groundwater Management Plan and Operating Strategy to the requirements of the EPA on advice of CALM to address: • Yarragadee abstraction and monitoring; • Superficial aquifer artificial recharge system (ARS) design and implementation; • Monitoring of superficial groundwater in the vicinity of the Busselton Wet Ironstone Threatened Ecological Community located adjacent to the mining area (TEC); • Monitoring of groundwater levels in other areas surrounding the Tutunup project; and • Actions to be taken in the event that adverse changes in groundwater levels or quality are detected.	To have no discernible impact on groundwater quality or quantity. To maintain the abundance, distribution and values of the TEC and associated rare flora.	Before mining	WRC, CALM
	3. Implement the Groundwater Management Plan and Operating Strategy referred to in Commitment 2.	Achieve the objectives of Commitment 2.	Before and during mining	WRC, CALM
	4. Maintain artificial recharge system and continue monitoring of superficial groundwater levels in the area around the adjacent Busselton Wet Ironstone Threatened Ecological Community until monitoring shows groundwater levels have returned to normal with no further input from ARS, based on regional seasonal fluctuation, and on advice from WRC.	Ensure the ARS is maintained in an operable state until no longer required to control mining-related drawdown.	During and after mining	WRC, CALM

TOPIC	ACTIONS	OBJECTIVES	TIMING	ADVICE FROM
Surface water	5. Install water control measures (e.g. earth bunds and detention basins) as required around the mining area to control surface water entering and leaving the site during mining.	To have no discernible impact on surface water quantity or quality.	Before and during mining	WRC
Vegetation	6. Develop a Vegetation Monitoring and Management Programme to the requirements of the EPA on advice of CALM, to address: • Monitoring and assessing the health of the TEC and associated rare flora; and • Actions to be taken in the event the monitoring shows the likelihood of any impact to the TEC and associated rare flora.	To maintain the abundance, distribution and values of the TEC and associated rare flora.	Before mining	CALM
	7. Implement the Vegetation Monitoring and Management Programme developed through Commitment 6.	Achieve the objectives of Commitment 6.	Before, during and after mining	CALM
	8. Provide resources, to the maximum as agreed with CALM, for enhanced management actions for the TEC and associated rare flora and target these resources to CALM's requirements.	To enhance the security and conservation status of the TEC and associated rare flora.	Before, during and after mining	CALM
Mine planning and rehabilitation	9. Include progressive rehabilitation plans within the site EMMP.	To progressively rehabilitate site to agreed agricultural land use, and protect the values of the TEC with native vegetation buffers as appropriate.	Before and during mining	MPR, CALM,
Dust	10. Control dust generation from the minesite by: • Use of a water cart on unsealed internal roads and disturbed areas when required; • Stabilising stockpiles as required through the use of fines, sealants and/or vegetation; and • Mine planning to keep disturbed areas to a minimum, retain maximum vegetation and rehabilitate as soon as practical following mining.	To minimise dust impacts associated with earthmoving, stockpiling and rehabilitation.	Before, during and after mining	

TOPIC	ACTIONS	OBJECTIVES	TIMING	ADVICE FROM
Noise	11. Develop a Noise Management Plan, in consultation with the DEP addressing: • Noise control – mine planning and control at source; • Community relations; • Transport noise; • Complaint resolution procedures; and • Monitoring and reporting.	To minimise noise impacts on residents of neighbouring properties and on residents along the transport route. To comply with statutory noise requirements.	Before mining	
	12. Implement the Noise Management Plan developed under Commitment 11.	Achieve the objectives of Commitment 11.	During mining	
Public Health & Safety – Radiation	13. Develop a Radiation Management Plan.	To keep post-mining surface radiation similar to pre-mining levels.	Before mining	MPR
	14. Implement the Radiation Management Plan developed under Commitment 13.	Achieve the objectives of Commitment 13.	During mining	MPR
Public Health & Safety – Transport	15. Manage transport impacts through: • Upgrading Oates Rd and Tompsett Rd sections of the haulage route to a sealed standard; • Restricting hours of transport to 6am to 8pm Monday to Saturday; • Setting and complying with speed limits along Oates Rd, Tompsett Rd and Ludlow-Hithergreen Rd sections of the route; and • Providing awareness training for truck drivers on the school bus routes and stopping places, and avoiding truck movements during these times.	To minimise transport impacts on residents adjoining transport route.	During mining	Shire of Busselton
Visual amenity	16. Minimise the visual impact of the minesite on nearby residents through: • Retaining existing vegetation where possible to screen the minesite; • Vegetating topsoil stockpiles where possible to blend with the landscape; and • Directing lights to minimise light spill to neighbouring residences.	To reduce the visual impact of the minesite.	During mining	

ARS = Artificial recharge system
EMMP = Environmental Management and Monitoring Plan
TEC = Busselton Wet Ironstone Threatened Ecological Community located adjacent to the mining area
CALM = Department of Conservation and Land Management
DEP = Department of Environmental Protection
MPR = Department of Mineral and Petroleum Resources
WRC = Water and Rivers Commission

Appendix 5

Summary of Submissions and
Proponent's Response to Submissions

Tutunup Titanium Minerals Mine (Assessment No. 1384)

Cable Sands (WA) Pty Ltd

RESPONSES TO THE SUMMARY OF SUBMISSIONS

CONTENTS

ATTACHMENTS

General Introduction

The submissions received by the EPA following public review of the Tutunup Public Environmental Review (PER) document represented a range of opinions from the community and regulators on the suitability of the Tutunup titanium minerals mining proposal. The majority of submissions raised concerns regarding several main issues. These issues could be described under the general headings of;

- Risk to the adjacent Busselton Ironstone Threatened Ecological Community (TEC) and Declared Rare Flora (DRF) through drawdown of groundwater;
- Other risks to restricted flora;
- Operation of the Artificial Recharge System (ARS)
- Management of transport of heavy mineral concentrate (HMC) from the site;
- Management of surface water flows and discharge water;
- Landform restoration and rehabilitation objectives;
- Management of dust and noise;
- Heritage and consultation.

Responses to individual submissions are provided in the following sections. However, of all the issues raised, the key concerns were protection of the adjacent TEC and DRF, and the risk of failure of the ARS.

In formulating this response to submissions, Cable Sands has undertaken some further work to address these key concerns. More detailed designs for the ARS have been developed from the concept plan presented in the PER, incorporating feedback from the public submissions. Advice has been sought on the potential groundwater dependence of the vegetation, and incorporated into a quantitative risk assessment of all the pressures on the adjacent TEC.

The outcomes of this work have lead to the development of a package of best practice mining management, and offsets to further enhance protection and recovery of the TEC. Details of this work are provided in Sections 0 to 0, and Cable Sands believes that this clearly demonstrates that the project will meet the relevant EPA objectives of:

- Maintaining the abundance of species, and geographic distribution and productivity of vegetation communities;
- Protecting TEC's consistent with the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act);
- Protecting DRF consistent with the provisions of the *Wildlife Conservation Act 1950*, and listed threatened flora species consistent with the provisions of the EPBC Act; and
- Protecting other flora species of conservation significance (e.g. undescribed taxa, range extensions).

The package has been discussed in detail with CALM, the managers of the TEC site, and they have advised that "the conservation values of the TEC should be able to be protected" (see Attachment C).

Refinement of the artificial recharge system

A workshop and information day was held to provide an opportunity for government stakeholders to fully understand the ARS concept. Representatives from government regulators attended, along with Cable Sands' hydrogeological consultant. In parallel with this, the conceptual designs have been refined to develop working designs and incorporating feedback from other stakeholders.

As explained at the workshop, the conceptual model provided a "worst case" scenario of potential drawdown from mining operations, and with the ARS in place. Several reasons for actual drawdowns being less than that estimated by the model were outlined, including:

- The model construction employed the designation of fixed head cells to represent the ARS. These cells were arranged in a corner-to-corner diamond pattern, which allowed the drawdown to "leak" between the cells. The physical construction of the ARS will include continuous, overlapping water supply trenches, meaning that this "leakage" will not occur in practice.
- The artificial recharge system was designed on the premise that if all the water which drains into the pit is replaced through the recharge system, then there will be no net change upstream.
- The recharge system designs are extremely robust, with a capacity to deliver water far in excess of the estimated peak flows.
- Water levels within the ARS system itself can be elevated to ensure that water levels in the upstream (State Forest) area are maintained at the required levels.

In response to concerns raised regarding static target water levels, the detailed designs for the artificial recharge system have incorporated the ability to reflect normal seasonal variation in groundwater levels. Target water levels in each section of the ARS will be adjusted seasonally, in response to measured changes in water levels in distant monitoring piezometers.

The proposed backup system of direct watering in the State Forest area was a cause for concern in a number of the submissions (potential to exacerbate existing dieback, and physical disturbance during installation). Given these concerns, and continuing review of the ARS highlighting it's robustness, this backup system is no longer being considered.

The basis of the ARS has now been reviewed by at least four professional hydrogeologists, and all have agreed that the system is sound and robust:

- Ian Brunner, Principal Hydrogeologist, URS – who carried out the modelling work and designed the system;
- Seth Johnson, Hydrogeologist, Water and Rivers Commission (WRC), and Chris O'Boy, Acting Manager Groundwater Section, WRC – who reviewed the modelling and system designs; and
- Adrian Peck, AJ Peck & Assoc – who provided independent hydrological advice during the risk assessment workshops (described in Section 0), at the request of the Department of Conservation and Land Management (CALM).

Assessment of groundwater dependence of ironstone plants

In the PER, Cable Sands presented a precautionary approach to management of groundwater levels in the vicinity of the State Forest. That is, while there was no conclusive evidence that the vegetation was dependent on the groundwater, it was assumed that there was dependence for at least part of the year, and that therefore changes to groundwater levels could potentially impact on the vegetation.

In light of questions raised in the submissions, further advice was sought from researchers at Edith Cowan University (ECU) on the potential groundwater dependence of the ironstone vegetation[3]. Whilst, again ECU had no specific knowledge of the ironstone community, they were able to provide advice based on previous research on wetland and terrestrial phreatophytic (groundwater dependent) vegetation and the known hydrology of the site.

In their report, Loomes and Froend advised that the presence of shallow groundwater suggests that the community is partially to highly groundwater dependent. Dependence is likely to be greatest in summer due to absence of moisture available from rainfall, and that deeper rooted species are likely to be more dependent than shallower rooted species.

The risks to phreatophytic vegetation from changes in groundwater levels depend on the magnitude, rate and permanency of reduced water levels, with low risk where the magnitude is less than 0.25m, and the rate of change is less than 0.1m/yr. On this basis, the modelled worst case drawdown of 0.5m over 3 months places vegetation within that area at high risk. However, as noted above, these modelled levels of drawdown are a product of the model design, and actual drawdown would be much less, if it occurs at all. The ECU report also noted that if mining of this section of the pit was undertaken during the wetter months of the year, when vegetation was sourcing meteoric water (rainfall) and not groundwater dependent, the impact would be reduced to a minimum.

The greatest potential impact to species of the TEC would occur under the following conditions:

- Mining of the southern section in summer;
- Absence of summer rainfall;
- Failure of the artificial recharge system;
- Time taken to re-establish water levels; and
- Above to occur over days of high temperatures and evapotranspiration.

The possibility of this combination of conditions occurring has been avoided by scheduling mining of the southern section of the orebody for winter, and ensuring that the ARS system is robust in construction and operation.

The ECU researchers (Loomes & Froend) participated in the quantitative risk assessment workshops as part of the 'expert panel' (see Section 0).

[3] Loomes, R. & Froend, R. Tutunup Project – Assessment of groundwater dependence of ironstone vegetation community and potential impacts of dewatering during mining operations. Report prepared for Cable Sands, July 2002.

Quantitative risk assessment for the Threatened Ecological Community.

A quantitative risk assessment was undertaken to review and compare the risks to the TEC (from all causes) under current management with risks from mining or a future enhanced management (without mining) scenario. The following discussion is taken from the resulting risk report[4].

Two workshops were held with an 'expert panel'. The workshops were facilitated by a specialist risk analyst. The range of expertise included representatives from CALM (DRF management, dieback management), WRC (hydrology), Cable Sands (the mining proposal), and independent consultants (hydrology and plant physiology).

The purpose of the first workshop was for the concerned parties to agree on the risk assessment process and to identify the likelihood of significant change to groundwater levels. The purpose of the second workshop was to identify the potential risk events that may impact on the DRF and the likelihood and consequences of each event occurring.

Consequences were measured in terms of the number of deaths of DRF individuals within each species of DRF identified within the area potentially impacted by the project. Information was also sought on the numbers of individuals of one species in a stand, required to maintain the viability of that species. To enable a comparison of risks associated with the mining project in relation to other management scenarios, the consequences and likelihood of a number of risk events were evaluated for the following scenarios:

- Scenario 1: Current management measures;
- Scenario 2: Enhanced management measures without mining (i.e. current management plus additional measures that could be implemented if additional resources were allocated); and
- Scenario 3: Enhanced management with mining (i.e. it was assumed that the additional management measures identified for scenario 2 would be implemented should mining proceed in addition to other measures implemented as part of the mine plan).

The information gathered from the workshops was input to a probabilistic risk model and estimates of risk and risk cost were derived for each of the three scenarios at selected confidence levels[5].

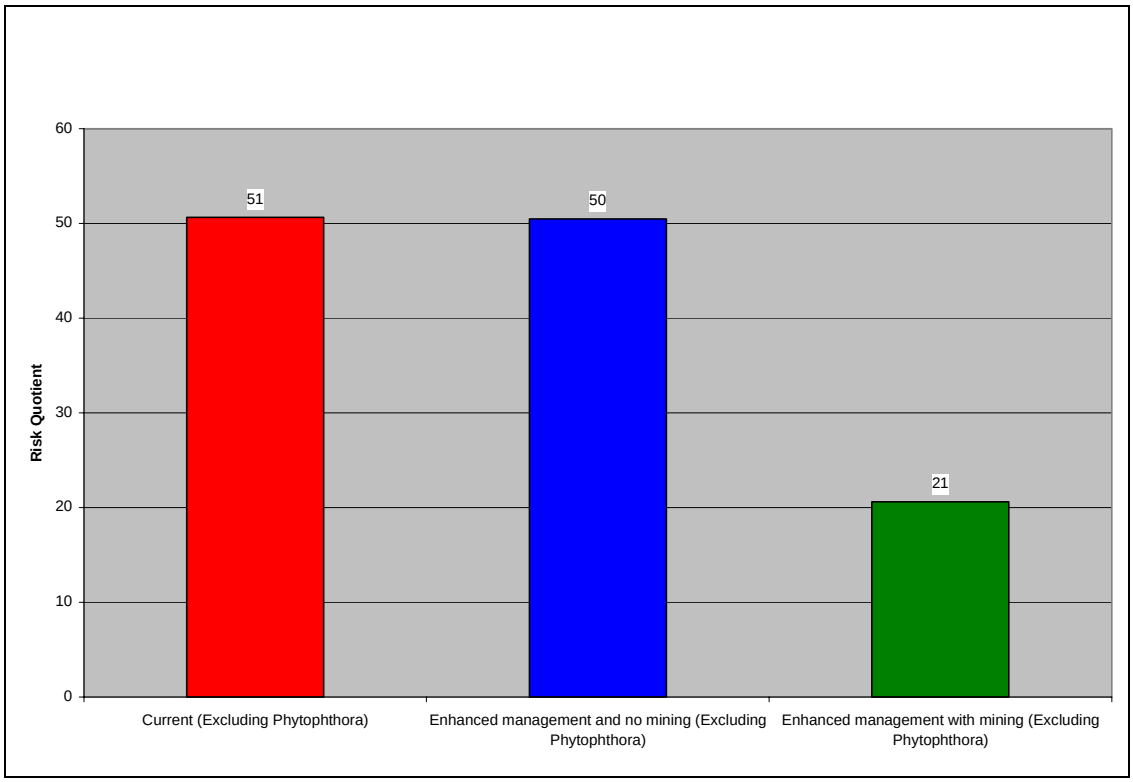
The report identified that *Phytophthora* was the major risk to the TEC, accounting for approximately 85% of the current risk. Potential benefits were identified from the application of phosphite, however subsequent information cast doubt on the benefit of this treatment for some species. The overall results presented here have therefore excluded the risk from *Phytophthora*, which also enables better differentiation of the remaining risks between the three scenarios.

[4] URS (Dr Adrian Bowden & Donna Pershke). Risk Assessment, Tutunup Mining Project. Report prepared for Cable Sands, August 2002.

[5] "Confidence levels" are used to describe the degree of uncertainty in the data. For example the 50% confidence level (CL50) represents the "best estimate", where you would expect 50% of results to be higher and 50% lower. The 5% confidence level (CL5) represents a very optimistic estimate (ie 95% of results would be higher), similarly CL95 represents a very pessimistic estimate. CL80 is often used as a conservative, planning guide.

The overall results of the assessment (shown in Figure 1) indicate that the enhanced management without mining scenario would pose approximately the same risk as the current management scenario, and the enhanced management with mining scenario would pose approximately 60% less risk, in terms of the number of DRF deaths.

Figure 1 Comparison of risk for the three selected scenarios

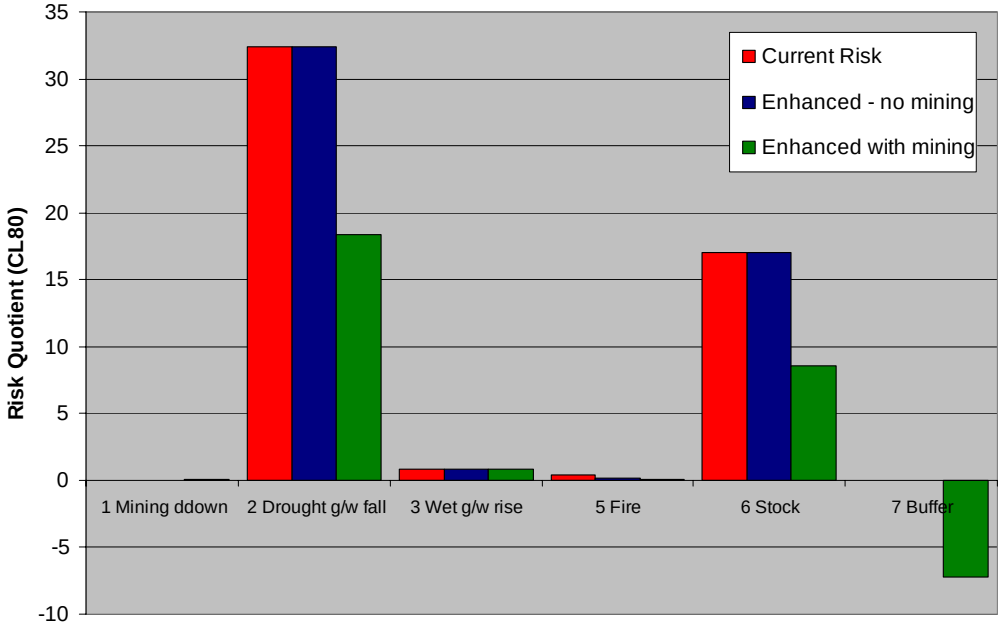


The enhanced management with mining scenario is less risky than the other two scenarios due to:

- the ability to mitigate, to some extent, the effects of drought through use of the artificial recharge system;
- establishment of a presence in the area that facilitates quick response to some risk events; and
- the positive impact that a buffer of native vegetation around the threatened community could have on the DRF at the edges of the community.

Figure 2 shows the risks posed by individual risk events.

Figure 2 Risk posed by risk events (excluding risk from *Phytophthora*).



After *Phytophthora,* the highest risk of individual DRF plant deaths is posed by drought and stock damage. Drought and stock damage account for over 95% of the total risk remaining if *Phytophthora* is removed from the equation. Groundwater rise poses comparatively very low risk (2%-4% of the total risk remaining after *Phytophthora*). Mining drawdown and fire present extremely low risks to individual DRF plants.

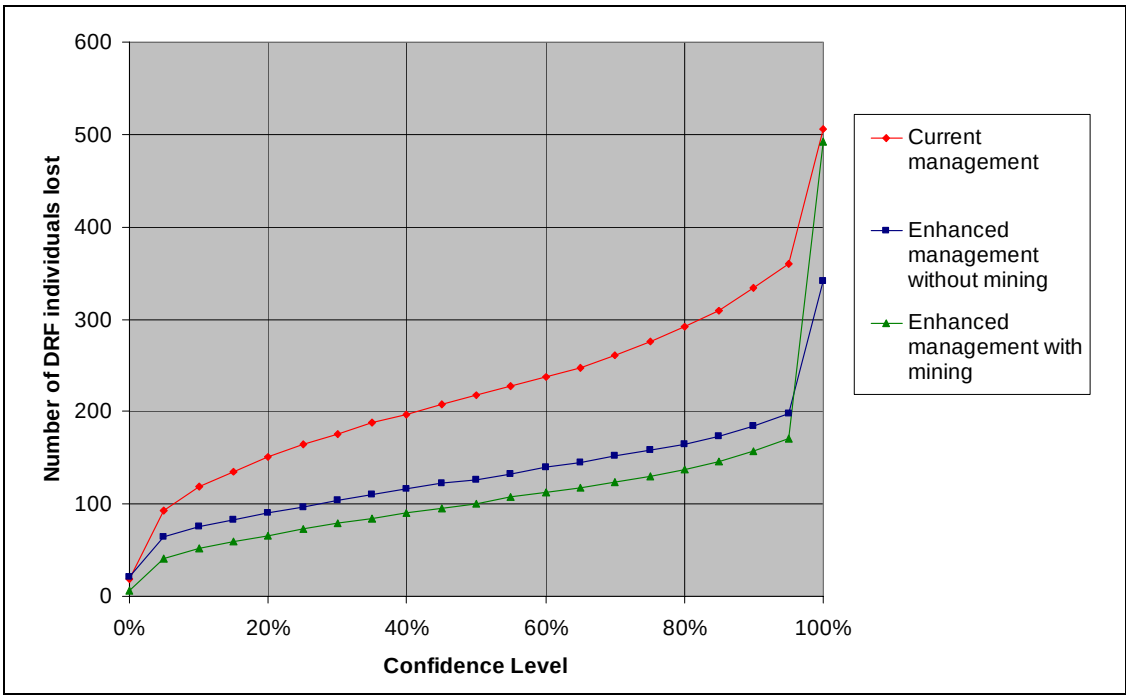
Figure 3 shows graphical estimates for each scenario of the losses that could be incurred over the next 10 years, in this case including *Phytophthora*.

Under current management conditions it is estimated that between around 93 (CL5) and 360 (CL95) individuals will be lost as a result of all identified risk events, with the best estimate (CL50) being 217 net losses.

Under enhanced management without mining it is estimated that between 64 (CL5) and 200 (CL95) individuals will be lost, with the best estimate (CL50) being 127 net losses.

Under enhanced management with mining it is estimated that between 41 (CL5) and 171(CL95) individuals will be lost with the best estimate (CL50) being 101 net losses.

Figure 3 Estimated losses of DRF individuals



An analysis of the viability of the DRF species present in the TEC was undertaken for each of the management scenarios. Based on information provided by the expert panel, a "threshold" number of individuals in a stand was determined, below which the population could be considered essentially non-viable.

No real difference was observed between the three management scenarios for the total risk to the viability of the DRF species. Several runs were performed using lower viability threshold values, but the model was not sensitive to the lower values, and differences could not be identified.

Phytophthora, stock damage and drought pose the greatest risk over the next 10 years to DRF species viability. Groundwater rise presents a very low risk by comparison, and fire and mining drawdown present negligible risk.

On the basis of the assumptions used in this assessment, the viability of four DRF species (*Chamelaucium roycei*, *Dryandra nivea* subsp. *uliginosa*, *Dryandra squarrosa* subsp. *argillacea*, and *Grevillea elongata*) is probably not threatened by damage to stands within the area under study.

There is around a 5% chance that *Brachysema papilio* will become non-viable over the next 10 years for all three scenarios.

Under current conditions, there is around a 15% chance that *Darwinia* sp *Williamson* will become non-viable over the next 10 years. However, under the enhanced management scenarios, with or without mining, the species will probably not be threatened.

Under the current management scenario, *Petrophile latericola* is expected to become non-viable over the next 10 years, and there is a 95% chance that it will become non-viable under the enhanced management scenarios, without or with mining.

Lambertia echinata subsp. *occidentalis* is considered already non-viable, based on the threshold figure (100 individuals) used in this assessment.

Best practice mining.

Using the information and outcomes developed through the quantitative risk assessment process, the mining proposal has been refined to present a case of best practice management, plus a package of funding towards enhanced management for the TEC (see Section 0).

Best practice mining includes a range of measures to protect the environment before, during and after mining. Many of these measures, addressing all aspects of mining, were outlined in the PER document. However, with specific reference to the TEC, the measures will include:

- Setback of the pit from the State Forest to a minimum of 70 m separation (see Attachment D), effectively incurring significant cost to the project through loss of access to mineral resource.
- Installation and operation of the ARS, including extensive monitoring of the system operation and surrounding groundwater levels, estimated to cost around **$370,000**.
- A commitment to maintain and monitor the ARS until it was shown that groundwater levels had returned to natural, regional levels, on advice from WRC.
- The ability to maintain groundwater levels in parts of the TEC protected by the artificial recharge system during any period of drought during mining.
- Interim vegetation protection screening around TEC, along existing boundary fence (eg shade cloth or brush matting). Estimated cost **$2,000**.
- Supplementary vegetation monitoring in the TEC, in addition to existing CALM annual monitoring programme. Estimated cost around **$10,000** per year.
- Developing a fire response action plan in consultation with CALM. Upgrading the water tanker and making it available for immediate fire response in the State Forest area. Using the 24 hour/7 days per week presence at the minesite to provide increased vigilance and early warning of fires in the State Forest area. Estimated cost **$10,000**.
- Ongoing consultation with landowners and neighbours, highlighting best practice mining, opportunities for continual improvement, and opportunities for co-operation in protection of the TEC.

Total cost (excluding lost revenue due to setback) approximately $400,000

Enhanced management offsets for TEC

During the risk assessment process a further range of measures were identified to provide enhanced protection of the adjoining TEC from non-mining pressures. Should mining be approved, Cable Sands is prepared to offer an additional offset package to further protect the ironstone communities. A range of offset options have been discussed with CALM, with the final distribution of the available funds being left to the discretion of CALM. A **total of $469,000** will be made available to assist with protection and enhancement of the threatened ironstone community. Options for the application of these funds could include one, or a mix, of:

- Alleviating the impacts of dieback through funding an increase in CALM phosphite spraying of the adjacent TEC area from once to twice per year, for 10 years. Estimated cost around **$55,000**.
- Funding towards routine annual phosphite spraying of all areas of the ironstone TEC.
- Installing fencing along the southwest (State Forest) side of the TEC, to restrict access to straying stock (eg 2 or 3 plain wires, elevated to allow kangaroo access). Estimated cost **$5,000**.

- Development of a 20m wide buffer along the northern boundary of the TEC, including fencing, weed control, seeding and planting with ironstone plant species. The buffer would be subdivided from the private land (Loc 4102) and transferred to CALM management. Estimated cost around **$20,000**.
- Development of a 100m wide vegetated buffer to the north and west of the TEC following mining, as discussed during the risk assessment workshops. This would extend the previous commitment to a 20m vegetated buffer following mining, and provide protection along both boundaries with the agricultural areas. The package would include purchase and subdivision of the necessary private property (subject to agreement with the current landowner), removal of the existing house on Loc 4102 (which is within the proposed buffer area), fencing, weed control, seeding and planting for initial establishment of ironstone species. A new access to Loc 4102 would also need to be created from the eastern section of Williamson Rd and entering the south east corner of the property. Continued public access along the existing track through the State Forest (along the southern boundary of the TEC) would then be a matter for CALM's consideration.

This 100m wide buffer was discussed and included in the risk assessment process, with the potential benefits included in the total risk profiles. This buffer area could also provide an alternative site for CALM's translocation trials with ironstone DRF species.

Estimated cost around **$160,000** (comprising $95,000 land and $65,000 rehabilitation).

- Underwriting routine CALM management of the Williamson Rd TEC (eg phosphite spraying, dieback mapping, vegetation monitoring).
- Funding towards research into propagation of threatened ironstone species.
- Funding towards translocation of threatened ironstone species.
- Funding towards development of recovery plans for threatened ironstone species.
- Funding towards dieback susceptibility screening and treatment options for DRF species in the TEC.

Responses to individual submissions are provided in the following sections.

Detailed Responses – Biophysical

Vegetation communities - Busselton Wet Ironstone Community

	Submission	*Response*
1.	The Proponent's measures to protect the Busselton Wet Ironstone Threatened Ecological Community (TEC) are premised on maintaining groundwater levels within the 'normal' seasonal range. This approach may be sound but more information and expert advice are required. The PER states that artificial drawdown will be limited to a maximum of 0.5 metres (p33, 2nd paragraph). It is not clear how this relates to the normal seasonal situation and what implications this has for plant water requirements. For example, Figure 5.2 shows groundwater contours with and without recharge in the mining situation but does not show 'normal' seasonal levels or the range on a seasonal basis. Cross-sectional profiles showing all these data would be useful to determine likely impacts of the proposal on the significant vegetation. (Department of Conservation and Land Management (CALM))	As noted in Section 0, actual drawdown, if any, is expected to be much less than the 0.5m estimated from the groundwater model. Operation of the ARS will control fluctuation of the water table in line with monitored seasonal variation. Monitoring of the piezometers installed in February 2001 has continued on a monthly basis (see Attachment A). This data shows that the seasonal variation ranges from around 0.9 m to 1.8 m, with most being around 1.2 m.
2.	Section 3.1 states that "the Southwest of Western Australia is an important mining, processing, agricultural, manufacturing, timber and tourism area". It needs to be remembered it is also one of 25 World Biodiversity hot spots.	Cable Sands recognises that the Southwest is a diverse environment and its activities need to be managed to protect these diverse values. In it's Environmental Policy, Cable Sands commits to the principles of sustainable development by ensuring that it operates "in a manner that protects the values of the natural and social environments in which it operates".
3.	The Proponent needs to explain the basis upon which the target artificial groundwater level will be determined. Will it be designed to mimic normal seasonal fluctuation or set at a notional level within the seasonal range? Would it be appropriate to use adjacent unaffected controls to calibrate an artificial target level in real time? (CALM)	The artificial recharge system is composed of eight sections, four along the western side of the TEC and four along the northern side (see Figure 2 of the draft Groundwater Management Plan – Appendix D of the PER). The water levels in each of these sections are controlled independently, with individual target levels based on topography and normal groundwater levels. The control system is based around a float switch set at the target level for each section. As noted in Section 0, the target levels will be varied to reflect seasonal variation, as measured in distant control piezometers (eg MB10 and MB11).
4.	With regard to Section 3.7.1 of the PER, at this stage it is surmised that there is a link between plant water use and groundwater. When will the relationship between the groundwater and plant water use be determined? (CALM)	See Section 0 for a review of groundwater dependence of ironstone species.

	Submission	*Response*
5.	Section 3.6.3 of the PER indicates some recharge occurs into the Leederville aquifer from the superficial aquifer. Therefore drawdown of the Leederville aquifer may impact on the superficial aquifer. Will drawdown of the Yarragadee aquifer lead to drawdown of the Leederville aquifer and hence the superficial aquifer? Is this an issue in this case? Do the figures in Table 3.1 allow for environmental water flows. (CALM)	URS tested and reviewed the performance of the Yarragadee production bore following its installation early in 2001 (URS 2001a). They concluded that any drawdown from abstraction would be limited to the Yarragadee aquifer and not propagate to the overlying Leederville or superficial formations. They also noted that local geophysical logs indicate that the Leederville formation has a high clay content, and is therefore unlikely to transmit drawdown impacts to the shallow aquifer systems. Yes, allocation information in Table 3.1 (provided by WRC) does take into account environmental flows.
6.	Further information is sought on the following. • Historical seasonal groundwater levels. • Details on the target artificial groundwater level and rationale. • Extent of modification to the 'natural' groundwater level and implications for plant water relations, including of short-term fluctuations. • How will the minimum water table levels, that trigger a back-up watering system, be determined, and what is the likely time lag in rectifying identified water table problems? • Will the monitoring regime give adequate early warning to allow effective intervention? • If a direct watering system is required in summer, how will this impact the ironstone plant community and component DRF and Priority taxa that are unaccustomed to significant surface water in summer? Potential impact from physical disturbance during installation is also unclear. • What is the likely impact of summer watering on the spread of, and /or amplification of the impact of dieback in the TEC and on the component DRF and Priority flora? (CALM)	Groundwater monitoring records are shown in Attachment A. Refer to Section 0 Refer to Sections 0 and 0. Water levels will be monitored on a daily basis during critical periods, dropping back to weekly when the system is demonstrated to be stable (see Section 5 of the draft Groundwater Management Plan). This will allow immediate identification and repair of any problems with the artificial recharge system. During the risk assessment workshops, the hydrologists agreed that a drop in water levels within the ARS would take 5 to 10 days to propagate into the State Forest area. This provides more than adequate time to rectify any foreseeable problems. Also, as noted in Section 0, a drop in water level in isolation is not likely to result in an impact on the vegetation, as a range of other contributing stresses would also need to occur at the same time. Given the concerns raised in submissions, the use of a backup direct watering system within the State Forest is no longer being considered. The risk assessment showed that potential causes of failure of the ARS were extremely unlikely to occur, and could be rectified within a short time (within hours or 1 or 2 days). Scheduling of mining in the southern section for winter avoids the period of greatest stress on the water table occurring during a season when drawdown could affect vegetation.

	Submission	*Response*
7.	Groundwater is predicted to recover within 0.1 metres, 9 months after backfill (p33 of the PER). Is this the longer-term prognosis as well? (CALM)	The long-term prognosis is a full recovery of the water table. Modelling continued to 7½ years and showed no residual drawdown in or adjacent to the mining area.
8.	The Proponent's stated rehabilitation objective (p15 of the PER) is to create at least one metre of free draining subsoil in the central and southern zones, but this does not exist in the natural profile. These areas would presumably currently have 1-2 metres of ironstone at these depths that could impede superficial flow. What impact will the free draining reconstructed soil profile have on rate/quantity of superficial water flow? What impact will this free draining material have on the movement of the groundwater through the rehabilitation site and on water flow out of the adjoining ironstone TEC? (CALM)	The hydraulic conductivity of the ironstone caprock was assessed as part of the groundwater modelling, and found to be in the order of 0.6 m/day, compared to about 0.7 m/day in the other superficial formations. This means that the ironstone does not currently significantly impede superficial flow. The modelling also clearly showed that the post-mining groundwater levels were not sensitive to the nature of the backfill material. The meter of free-draining subsoil is designed to provide improved pasture growth in these areas. If the extended 100m buffer option proceeds, then areas of the pit within the buffer area would have ironstone rock returned close to the surface to mimic the current "soil" layers (albeit in a broken-up form).

	Submission	*Response*
9.	Including a no mining buffer between mining and the TEC boundary will provide opportunity for additional levels of safety. Omission of a buffer requires detailed justification, which has not been provided. (CALM)	The ARS is positioned directly between the area of the TEC and the mine pit, for the specific purpose of preventing any potential superficial aquifer draw-down from mining affecting the groundwater below the TEC. The hydrological experts on the risk assessment panel agreed that there was an extremely low probability that the system would not achieve it's design goals. However, given the level of concern raised, the mine pit has been set back from the State Forest to provide a minimum of 70 m separation. CALM have responded positively to this additional setback (see Attachment C). In addition to the ARS, additional precautions are being taken to ensure that the mining excavation has minimal effect upon the TEC. Mining in close proximity to the TEC is planned to be undertaken during the winter period in order to coincide with the season when rainfall is directly watering the vegetation. Other compromises in conventional mining practices have also been made, including the relocation of overburden and topsoil stockpiles away from the boundaries of the TEC. Conventionally these stockpiles would surround the pit, however, in the case of Tutunup they have been relocated at least 100m away from the TEC. This 100m buffer zone of stockpiling has been done to minimise the potential for wind blow material spreading onto the TEC. This change places significant material movement and financial burden upon the mining process at the South-Western end of the pit, but the strategy was thought necessary to maximise the protection of the TEC area. Given the above precautionary approach employed by Cable Sands to mining in the area adjacent to the TEC the company believes that the TEC will be protected from any potential effects from mining activities and the EPA objectives will be met.
10.	Figure 5.2 of the PER indicates that, with no mitigation, drawdown will propagate 450 metres from the pit. With mitigation, drawdown will be limited to a maximum of 100 metres from the pit. There are opportunities to reduce or eliminate groundwater drawdown within the TEC by including a buffer between mining and the TEC. The Proponent should justify why this has not been considered. A precautionary approach would be to aim for no drawdown under the TEC unless there was a high level of confidence that there would be no negative impact on the TEC. (CALM)	Refer to response to Submission #9.

	Submission	*Response*
11.	Parts of Loc 1799, 1789 and 4102: the area immediately adjoining the western and northern side of the TEC once supported ironstone community. The mining proposal states that there is very little topsoil in this area and that the ironstone caprock will need to be ripped and removed to access the ore body. During the rehabilitation process the ironstone layer cannot be recreated/replaced. Any opportunity to reconstruct/translocate the ironstone community back onto this land is therefore foregone. This location has potential for ecosystem reconstruction given its proximity to the existing TEC, with potential to provide a buffer and minimise edge effects. (CALM)	Ripping and disturbance of the ironstone layer is only required in the area directly over the orebody (14.5 ha or less than 9% of the total area of the lots mentioned), and a narrow strip where the ARS will be installed (nominal 2 m wide). Other mining areas (eg stockpiles, infrastructure) will have surface disturbance only, with the ironstone layer remaining intact. As noted in Section 0, the option exists for a 100m buffer to be established around the TEC following mining. The final land use of the remaining areas will be determined according to the landowner's requirements.
12.	Regardless of whether mining proceeds, the establishment of a vegetated buffer around the existing TEC is highly desirable, particularly if the post mining land use is to return to traditional agricultural pursuits. (CALM)	As noted in Section 0, if mining is approved, Cable Sands will establish a 20 m wide vegetated buffer along the southern boundary of Loc 4102, with the option to extend this to 100m along the northern and western boundaries of the TEC.
13.	In Section 5.1.3.2 of the PER, it is stated that 'with no active management, drawdown of the superficial groundwater due to mining would propagate up to 450 m … and consequently extend under most areas of the TEC'. We believe this is too high a risk to take. The taxpayers through CALM have already spent significant money, as have another mining company (at the time Westralian Sands), purchasing part of the very small amount of this community type still surviving so it can be managed for conservation. The site is already under threat and stress (as detailed on pg 38 of the PER) so every effort should be made to not have any further threatening action occurring. (Wildflower Society of WA)	The risk assessment work described in Section 0 has shown that the best-practice mining operations present an extremely low risk to the TEC, and the EPA objectives can be met. Added management available through the mining process would lead to a reduction in the total risk currently faced by the TEC. That is, the 'no mining' situation poses a *greater* risk to the TEC than the 'with mining' situation. CALM have provided advice that the conservation values of the TEC should be able to be protected (see Attachment C).
14.	A precautionary principle approach should be adopted when threatened communities are involved. This would involve restricting mining so there is no impact on the ironstone threatened ecological communities. We don't believe, as the project currently stands, that the EPA Objective can be met for Vegetation communities. (Wildflower Society of WA)	

	Submission	*Response*
15.	The Proponent acknowledges the dependence of the ironstone communities on the shallow groundwater and the possibility of impacting on the health of the communities. The 3D modelling performed by the Proponent is not guaranteed and given the lack of knowledge of ironstone communities it should not be regarded as definitive without further scientific support. More specifically:	The link between the ironstone plants and the shallow groundwater is assumed based on the precautionary principle and consultants advice (see Section 0). The modelling and ARS has been designed by reputable hydrological consultants, reviewed by the WRC, and further reviewed during the risk assessment workshops. All agree that it is technically sound (see Sections 0 and 0 and submissions #53 & 54).
	• A maximum drawdown is stated at 0.5m, how would this reduction affect the health on the entire vegetation community. What happens if this maximum is exceeded?	As noted in Section 0, a drawdown of 0.5 m could affect the vegetation, but only during seasons of dependence on groundwater (ie summer). Mining in this area has been scheduled to avoid this time.
	• How can the affect of the hydrological changes be determined before it is too late? • If detrimental affects are observed what plans do the Proponent have to rectify the situation, including a rapid decommissioning of the mine.	The ARS and other measures noted in the response to submission #9 have been designed to prevent significant hydrological changes by maintaining groundwater levels within the range of normal seasonal variation. Daily monitoring of the system will allow immediate corrective actions to be taken if problems were detected.
	• What guarantees can the Proponent provide "to ensure the artificial recharge system is adequately robust and fail-safe"?	The ARS has been rigorously designed by a highly regarded hydrological consultant in close consultation with the WRC, and thoroughly reviewed during the risk assessment process. It is the express opinion of these professional bodies that the system will be effective in meeting its' designed goals (see Sections 0 and 0 and submission #54).
	• Insufficient monitoring. Especially frequency of water table monitoring. Lack of flora health monitoring over the extent of the ironstone community. As yet, no monitoring of moisture content throughout ironstone community over life of mine which should be compared to baseline data from a minimum of three years.	Frequency of water table monitoring is provided in the draft Groundwater Management Plan (Appendix D of PER). This includes monthly monitoring of baseline levels and daily monitoring during periods of stress on the water table. The WRC believes this is comprehensive and will enable evaluation of the ARS (see submission #54). Discussions are continuing with CALM to develop a complementary vegetation monitoring programme.
16.	The mineral sands industry is in decline in the southwest. The industry seems determined to mine more sensitive sites until restrained by the authorities. The destruction and/or possible damage to very sensitive sites, in this case, endemic critically endangered declared rare flora far outweighs the short-term gains.	The mineral sands industry has been an important contributor to the South West economy for many years and expects to remain so for many more years. Continued improvements in environmental management techniques are underpinned by a commitment to operate in an environmentally responsible manner.

	Submission	*Response*
17.	Modelling has shown that without artificial recharge, drawdown would propagate up to 450m from the pit. With artificial recharge, drawdown would be restricted to 100m from the pit. Drawdown of groundwater for the project may adversely affect the health of the TEC in the State Forest adjacent to the project. There appears to be no contingency plan should adverse impacts arise. Some suggestions are: • Artificial recharge be required for this project. • At least a 100m buffer area be required adjacent to the TEC. • A vegetation-monitoring program be developed in addition to the groundwater-monitoring program and a contingency plan be developed to address potential adverse impacts. (Geocatch)	The risk assessment has shown that the best-practice mining operations present extremely low risk to the adjacent TEC. The Company has committed to the installation and operation of the ARS (see Commitments 2, 3 & 4) Refer response to submission #9. Discussions are continuing with CALM to develop such a vegetation monitoring programme, in particular to be complementary to existing monitoring (see Commitments 6 & 7). Contingency plans to address all identified potential causes of failure of the ARS were identified as part of the risk assessment.
18.	With regard to the TEC, the PER states that 'the groundwater strategies outlined result in minimal risk of drawdown impacting on this vegetation'. This risk is considered to be unacceptable.	Australian Standard risk management principles have been used in assessing potential areas of risk for the Tutunup project, and ensuring that adequate management systems are in place to minimise these risks and meet EPA objectives. The risk of drawdown impacting on the vegetation has been assessed by the expert panel as extremely low, with proactive management resulting in a reduction to the risk faced by the TEC. That is, the 'no mining' situation poses a *greater* risk to the TEC than the 'with mining' situation.
19.	The lack of foresight for the need of monitoring the surrounding threatened vegetation communities, and the lack of a contingency plan for any negative impacts on them, shows a lack of regard for the values needed to conserve threatened species.	The TEC is currently managed and monitored by CALM as part of its programmes for management of threatened species and communities. Discussions are continuing with CALM representatives to develop complementary vegetation monitoring strategies (see Commitments 6 & 7).
20.	At what percentage of original extent does an ecological community need to be for it to be totally protected from a foreseeable risk?	This is a CALM policy issue
21.	Would the Proponent care if it were responsible for the extinction of a species?	As stated in Cable Sands' Environmental Policy, the Company is committed to operating in a manner which protects the values of the natural and social environments in which it operates. Cable Sands does not believe that any species will become extinct as a result of the Tutunup proposal, and would not be proposing to mine if it believed the mine was likely to cause extinctions.

	Submission	*Response*
22.	How would the EPA be perceived should it sanction a project that resulted in the extinction of a known threatened species in an ecological community with only 3% of its original extent left?	The EPA will consider all relevant factors when making its recommendations to the Minister for the Environment and Heritage.

Vegetation communities – dieback

	Submission	*Response*
23.	A dieback management plan is required that incorporates dieback management for all Cable Sands sites. Haulage vehicles can travel between sites and transfer the disease, therefore strict dieback management to maintain the dieback free status of the adjacent State Forest is necessary, including contingency/management should monitoring indicate that dieback has been introduced. (Shire of Busselton)	As noted by CALM in submission #25, the TEC is already infected with dieback. The risk assessment workshops showed that Phytophthora was by far the greatest single current risk to the health of the TEC. Effective dieback management programmes are based on identification of specific areas requiring protection (either dieback free or in need of special protection) and applying hygiene and access control measures for these areas. Cable Sands has such programmes (CALM approved) in place at appropriate locations around its other minesites. These programmes have proven effective in protecting the identified 'protectable' areas. Haulage vehicles will only be travelling on internal mine access roads between Oates Road and the plant sites where HMC is stockpiled. No haulage vehicles will be entering or even approaching the TEC. The earthmoving equipment that is working in the mining area will be washed down before being transported to the site and again prior to being demobilised from the site. No mining vehicles or equipment will be working within the TEC area. There is currently no restriction in public access to the TEC area via Williamson Road. Dieback management strategies appropriate for the TEC area are discussed further in response to submission #25 and #26 below.
24.	The proposal poses an unacceptably high risk of spreading dieback.	Dieback management strategies appropriate for the TEC area are discussed further in response to submission #25 and #26 below.

	Submission	*Response*
25.	The ironstone TEC adjacent to the proposed mine site is extremely susceptible to, and is already infected to some degree with, the plant pathogen that causes dieback, *Phytophthora cinnamomi*. This organism is most active in warm moist conditions. Artificial recharge in response to drawdown caused by the proposed mine is most likely to be required during summer, as this is the period of highest stress on the watertable. The warm to hot weather at this time in combination with artificial watering which enhances soil moisture levels significantly (i.e. direct watering) would be likely to amplify the impact and/or increase the spread of the disease. Many of the taxa that are components of the community are also extremely susceptible to the disease. In particular, some of the Declared Rare Flora (DRF) taxa that are only known from the one population in the wild adjacent to the proposed mine site are highly susceptible to the disease, and may be threatened with extinction of the only known populations, if further impacted by the disease. (CALM)	As noted in Sections 0 & 0, the period of greatest stress on the water table is when the pit is open. This has been timed to occur during winter when the plants would normally be receiving rainfall. In response to concerns raised, the backup direct watering system within the TEC area is no longer being considered. It should also be remembered that the TEC is naturally subjected to some periods of elevated soil moisture during summer, as approximately 10-11% of the average annual rainfall is experienced between November and March.
26.	Disturbance to the hydrology of the TEC may result in an increase in the stress level to the flora that is currently affected by dieback disease, and thus may exacerbate the impact of the disease on these plants. Surface watering may also cause increased spread of the dieback disease pathogen. There may thus be a need to increase the frequency of phosphite application to reduce the impact of this disease on the flora. The proponent should consider supporting this work. (CALM)	The risk assessment has shown that there is extremely low risk of disturbance to the hydrology below the TEC causing stress to the flora. However, as noted in Section 0, Cable Sands has committed to providing funding if mining is approved, which, at CALM's discretion, could be used for additional application of phosphite to assist in alleviating some of the current dieback stress (see Commitment 8).

Declared Rare Flora, Priority flora and other flora of conservation significance

	Submission	*Response*
27.	A considerable number of DRF and Priority taxa have significant populations immediately adjacent to the proposed mine site. These taxa may be increasingly threatened if impacts of the proposed mine site such as hydrological changes, amplification or spread of dieback, or other impacts destroy or otherwise impact the populations adjacent to the proposed mine site. The Proponent states (in 5.3.4.3) that the single *C. roycei* on the road verge will be translocated. This must be done in accordance with an approved Translocation Proposal. However, it appears unlikely that a plant growing in the wild will be successfully translocated as the root systems of native plants are very extensive, and are not generally tolerant of transplantation. This is also not the preferred option for flora conservation. This issue needs to be addressed as part of the requirement for permission to be given under the *Wildlife Conservation Act 1950* for the taking of DRF. It needs to be noted also that while a single plant may be present, this represents a natural site for the species and seed may be present which, with suitable stimulation, could regenerate a larger population of this DRF. (CALM)	The *C. roycei* plant is located very close to the existing road shoulder, and consequently cannot be avoided if the intersection is to be made safe for the proposed traffic. Any translocation attempt would obviously only be made with the approval of, and in consultation with, CALM. Cable Sands acknowledges that the prospects for successful translocation of this individual are limited but believes that an attempt is warranted in good faith. If a similar habitat is provided for the translocation destination (eg in the immediate vicinity), a natural site will again be provided for the species. As one of the ironstone endemic species, *C. roycei* would also be targeted for propagation and planting in the proposed buffer in Loc 4102.
28.	The Proponent should investigate translocation of Priority species from the mining site. Additionally, the proposed rehabilitation of the site does not address the removal of the ironstone substrate from the site and the subsequent impact this will have on the ironstone community that still persists on the proposed mining site including the removal of the Priority species (*Callothamnus* sp.). Although highly modified, the Proponent should rehabilitate the site to accommodate the Priority species and ironstone community, however the removal of the ironstone may prevent this. (Shire of Busselton)	As noted above the prospects for successful translocation of mature plants growing into a solid rock substrate are very limited. This is particularly so for the *Callothamnus*, most of which are around 2 m tall. In this case, Cable Sands believes that propagation of new plants (preferably using seed and/or cuttings taken from this site) for planting in the proposed buffer along the southern boundary of Loc 4102 is a more effective solution. Some existing scattered individuals and groups of plants will remain undisturbed within Loc 4102.

	Submission	*Response*
29.	There are references to *Calytrix acutifolia* on page 23 of the PER. The Proponent made no mention of the advice provided by Greg Keighery of CALM that these plants on loc 4102 are not "*C. acutifolia*" but as a result of taxonomic review are to become a new species, likely to be a Priority 2. This information was previously provided to the Proponent. (CALM)	The information on possible review of *C.acutifolia* was received after submission of the draft PER to the EPA. Of the total of approximately 100 plants located within Loc 4102, 18 will be disturbed by mining. The majority (around 85 plants) have been fenced (by Cable Sands) with rabbit-proof fencing, and all mining infrastructure relocated away from this area (see Section 5.3.4.1 of the PER). This fencing has allowed the plants to regenerate to a point where they have flowered and could be positively identified, which was not possible in their previously heavily grazed state.
30.	The preferred transport route proposes the widening and sealing of a section of Oates Rd (p39). Will this increase/concentrate greater surface runoff of rainfall into the roadside drains or require larger capacity drains? This may have implications for roadside populations of Critically Endangered flora (*Grevillea maccutcheonii* and *G. elongata*) that are located approx 1.5 km downstream. Current roadside drain flow is east to west. (CALM)	The detailed road design is being prepared by a professional road design consultancy to the appropriate Australian Road Standard. Their advice is that the slight widening and sealing of Oates Road will not result in any significant change in the amount of water collected in the roadside drainage system. Drainage will continue to flow from east to west, following the natural ground contours.
31.	Removal of Priority flora should not be contemplated without some effort being made to propagate the species for re-establishment after mining. This is all the more important as the health of populations of species such as *Hakea oldfieldii* is unknown (Table 3.2). A monoculture would not be appropriate but a mix of local species incorporating the Priority flora. (Wildflower Society of WA)	The proposed buffer along the southern boundary of Loc 4102 will include ironstone species. Priority flora such as *Hakea oldfieldii, Callothamnus* sp Whicher, and the provenance of *Calytrix acutifolia* growing on Loc 4102 will be targeted for propagation for this buffer.
32.	In view of the fact there are 5 Priority species along Oates or Thomsett Road, a detailed management plan should be prepared before any work can commence. It is a bit flippant to state 'most of the plants were recorded in the reserve'.	A detailed road design is currently being drawn up for the approval of Busselton Shire. This will then lead to the preparation of a Management Plan (as a component of the project EMMP) for the road upgrade. Issues such as protection of the Priority species will be a key component of this management plan.
33.	With regard to Table 3.2 (p24), unknown population data should be completed to assist with informed decision-making. (CALM)	The status of "unknown" was the best information available through CALM (information supplied by Kim Williams, Program Leader Nature Conservation, SW Region). The Priority ratings are defined as "poorly known species". CALM are continuing to locate new populations of the ironstone species, including an additional group of 70 adult (10 year old) individuals of *Lambertia echinata* subsp. *occidentalis* within a few hundred meters of the previously known group.

	Submission	*Response*
34.	It is of concern that, in Section 4.1 of the PER, (i) DRF and Priority Flora and (ii) Vegetation Communities were identified as being areas of high environmental risk but there is no commitment to address these issues in the Environmental Management Plan for the Tutunup minesite. This is a major deficiency in the PER and needs to be addressed. It would be inadequate to say they might be addressed under, say, groundwater management. Vegetation communities are important enough to be detailed separately. (Wildflower Society of WA)	The major mining-related risks to the DRF, Priority flora and the TEC are indirect, principally through potential impacts on hydrology. Therefore these risks are addressed through the Groundwater Management Plan (GMP, see draft in Appendix D of PER). A management plan is also being developed for the road upgrade (see response to Submission #32). The structure of Cable Sands EMMP's includes a co-ordinating 'road map' document which directs the reader to the various component management plans. In this way, the section on vegetation issues is related to the management strategies in the GMP and road upgrade management plan.
35.	With regard to the Priority flora *Callothamnus* sp. Whicher, the Wildflower Society of WA takes issue with the statement: 'removal of these plants would not significantly change the regional distribution of the species'. This would result in the removal of between 9% and 20% of the total known individuals (pg 24). At the very least, this is good enough reason to develop a propagation plan and incorporate local species as part of any revegetation plan. The State and Commonwealth have committed to no net loss of vegetation as part of the Natural Heritage Trust partnership agreement. The minister for the environment has also signed off on the National Objectives and Targets for Biodiversity Conservation 2001-2005. These are relevant with respect to this matter.	As noted in the response to submission #31, C. sp Whicher will be targeted for propagation for the buffer planting. Targeted searches for this species in the immediate area located more than twice the number of plants previously recorded by CALM. Given the lack of knowledge of this species (P1 = poorly known) it is reasonable to believe that more widespread searches would locate even greater numbers.
36.	The Wildflower Society of WA believe there will be a significant impact on Priority flora both at the mine and haulage road and that the EPA objective for DRF and Priority Flora and other flora of conservation significance cannot be met without changes to the project.	Cable Sands believes that through sensitive mine planning, careful design of the upgrading of Oates and Tompsett Roads and propagation of Priority species there will be minimal impact on Priority flora and the EPA objective will be met. The risk assessment has shown that the mining proposal will result in a reduction in the risks faced by the TEC.
37.	It is not clear from this PER, which roads are to be "upgraded". The Wildflower Society of WA would like further information to be provided on this. The Wonnerup/Tutunup road is already a haulage route for Iluka Resources. This was the subject of much consultation between the Wildflower Society, EPA and the Westralian Sands over the period 1996-98. There are at least 5 DRF and 7 Priority flora along the road. Only very minor pruning was allowed, further clearing of the road reserve was not allowed but some reconstruction was allowed. Additional sealing of the road shoulders was allowed and great care taken with the location of several new culverts. Major care was taken with dieback control and a temporary wire fence was erected on both sides of the road up against the vegetation and no contractors or vehicles were	Route 1 has been selected as the HMC haulage route. Upgrading works are restricted to the section of Oates Rd east of the minesite exit (1 km) and Tompsett Road between Oates and Tutunup Roads (2.6 km). Cable Sands does not propose any further widening or upgrade works on Tutunup Road. As noted in response to submission #32 a Management Plan will be prepared for the road upgrading works, based on the detailed design work now under way. Some of the suggestions for control of the works made in the submission may be appropriate to include in this Management Plan

	Submission	*Response*
	allowed into the vegetation. There was a $2000 reward paid to contract employees if all the requirements were met. The work was carried out by Brietry Contractors and they won a contracting award for the way the job was done. A full environmental management plan was done for the road reconstruction (Westralian Sands Limited Technical Report WSL-TR-97/63) and we believe any work done on roads in the area should be to this standard. On no account should Tutunup Road be widened. The details provided for the Tutunup Road-Tompsett Road intersection is very inadequate. It is not even to scale. In its assessment of the Reconstruction of the Wonnerup-Tutunup Road through an area of regionally significant vegetation, the EPA set a level of (cont.) (Continued) only 'informal review with public advice'. This was appealed and although the appeal was dismissed. This was on the basis that the issues were managed because of the DRF in the area and that the company undertook to consult with the community including the Society in an adequate environmental management plan. The final paragraph of the letter from the then Minister for the Environment Cheryl Edwards is worth quoting: 'The investigation of your appeal has highlighted the matter of management and protection of DRF and Priority species on roads. The Shire of Busselton is responsible for the Wonnerup-Tutunup Road and I have requested that the DEP assist the Shire in developing an environmental management system to manage and monitor impacts of road construction, maintenance and on-going road use in consultation with Westralian Sands, CALM and local interest groups including the Wildflower Society of WA'. The 'impacts from road upgrading' section of the PER needs to be redone providing more detail of the work proposed along the route. As it currently stands we don't believe the EPA objectives can be met Not with standing all the above, Route 1 would seem to be the preferred option mainly because Tutunup Road is already a haulage route.	

	Submission	*Response*
38.	Based on the precautionary principle ("...if there are threats of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as reason for postponing measures to prevent environmental degradation." (FMP 2002)), the presence of DRF means that the proposal should not proceed. Furthermore, the application of the principles of ecological sustainability and intergenerational equity when applied to this proposal would see it rejected on the limited extent of the vegetation communities and the occurrence of endemic flora adjacent to the site. To support the application of these principles I refer to Table 3.2 that clearly identifies *Brachysema papilio, Darwinia* sp Williamson, *Grevillia maccutchoenii* and *Lambertia echinata* subsp. *Occidentalis* as DRF, critically endangered. These DRF have only one known population, any disturbance to vegetation or hydrology in the Tutunup area should be prevented to ensure their survival.	The application of the precautionary principle means that 'measures to prevent environmental degradation' (eg groundwater management etc) should not be delayed due to 'the lack of full scientific certainty' (ie how important are groundwater levels to health of the vegetation?). Cable Sands has committed to a range of measures to protect the TEC and DRF based on this precautionary principle. The management measures outlined will protect the TEC during the life of the mine, and measures such as the buffer in Loc 4102 will enhance the sustainability of this community in the longer term. The population of *G.maccutcheonii* is over 2 km north west of the proposed minesite, and will not be disturbed by the proposal. The other critically endangered DRF species mentioned, although closer to the proposed mining area, are protected through the application of "Best Practice" management measures in the mining proposal (see Section 0).
39.	My main concern is with the potential impact on the TEC that contains numerous DRF. With only an estimated 3% of pre-European Busselton ironstone communities left uncleared, which subsequently has resulted in the associated floral communities being listed as DRF or Priority flora, then any threat, however small, must be precluded. The presence of DRF should be enough to reject the proposal by using the precautionary principle alone considering that some of these flora are known only from this location.	Refer to response to submission #38. The risk assessment has shown that the 'no mining' situation poses a *greater* risk to the TEC than the 'with mining' situation. CALM have provided advice that the conservation values of the TEC should be able to be protected (see Attachment C).
40.	Route 1 will minimise disturbance of significant flora to one plant. It is therefore suggested that Route 1 be used, not Route 2, and that the Proponent liaise with the Department of Conservation and Land Management to investigate transplantation. (Geocatch)	Agreed. This is Cable Sands preferred route. Management of the one affected DRF plant will be carried out in consultation with CALM as noted under submission #27.
41.	The Proponent has (1) failed to justify the risk to the DRF; (2) is using untried measures in an attempt to rectify almost guaranteed hydrological imbalances; (3) proposes insufficient monitoring; (4) makes no commitment to withdraw immediately should measures prove insufficient to guarantee the health of the DRF.	The risk to DRF has been managed through a structured process of risk identification, assessment, treatment, monitoring and review according to Australian Standard 4360:1999 – Risk Management, and shown to be extremely low. The risk assessment has shown that the 'no mining' situation poses a *greater* risk to the TEC than the 'with mining' situation. WRC have assessed the groundwater management strategies and monitoring proposed by Cable Sands, and determined that they are technically sound (see submission #54).

Native terrestrial fauna

	Submission	*Response*
42.	The fauna survey does not consider the broader impact of the mining activity on the adjacent State forest that represents considerable fauna values, or address the issue of increased traffic in the area that may result in a higher rate of death and injury to fauna. A larger buffer area to the state forest is required to minimise the impacts of noise, lighting and other pollution on the fauna inhabiting this area. This may result in a smaller mining area. (Shire of Busselton)	The mining project is short-term (around two years of production). Experience has shown that fauna may migrate during this time and will return to the area (if they leave at all) on completion of mining. Vehicles operating within the mining area are restricted to a speed limit of 30 km/hr. This mandatory speed limit is applicable to all vehicles on site and is enforced for safety reasons. At these low speeds it is very unlikely that fauna injuries will significantly increase due to mining operations. Night-time operations within the mining area are restricted to within the mine pit area wherever possible to reduce the potential for noise and light impacting on neighbours, including fauna (refer to draft Noise Management Plan in Appendix E of the PER).
43.	We notice that Table 3.3 contains no night birds. If no night survey has been done then the impacts cannot be accurately ascertained. A study needs to be conducted before approval is given.	Whilst the specific survey undertaken for Cable Sands Tutunup project did not include a night survey, the consultants used (Hart Simpson & Associates) have extensive experience in this area, having conducted previous surveys (including night surveys) nearby for other companies and organisations. It is their opinion, based on this experience and an assessment of the available habitat, that the impact from development of the minesite is not significant locally or regionally.
44.	Ironstone communities in the area contain many rare, endangered and vulnerable flora and fauna. The Proponent seems to have paid a lot of attention to this fact but the impact of mining adjacent to rare communities has not been sufficiently evaluated.	Refer to responses to Sections 0 to 0 and submissions #42 and #43.
45.	The transport hours stated of 6.00 am to 8 pm Monday to Saturday is a problem as a lot of fauna move across Thomsett Road at dusk and dawn, which for most of the year is around 7.30 pm and 5.30 am respectively. There is already a large number of trucks from the Iluka minesite using Tutunup Road, so another 115 return trucks a week will have a considerable impact on the fragile Rail reserve flora and fauna.	Any increase in traffic movement along public roads in rural areas may impact on fauna crossing these roads. However, the restrictions in trucking hours also limit the risks to fauna. The 6am starting time is after dawn for much of the year (5:30 am according to the submission). Some trucks may be travelling around sunset for part of the year, however, fauna can continue to move around throughout the night without risk from haulage trucks. The figure of 115 return truck journeys per week was contained in the Notice of Intent (NOI) for the project (October 2000). Since that time the mining schedule has been revised, and current estimates are around 25 truck movements per day (1 return journey = 2 truck movements) during periods of haulage (see section 7.4.3 of the PER), that is, around 75 return trucks per week, or 35% less than the NOI estimate.

Watercourses, and other water issues

	Submission	*Response*
46.	The EPA objective for watercourses is to "maintain the integrity, functions and environmental values of watercourses" and to "maintain or improve the quality of surface water. The Proponent states that there will be "no long term changes to watercourses or surface flows". This is not specifically what the objective states, and is not an adequate response to potential off-site impacts. Through the stormwater management plan, the Proponent should ensure that there are no off-site impacts to the Abba River such as increased sedimentation or other pollution. Management proposed for the site includes installing earth bunds to divert run-off around the site and allow it to discharge to the Abba River. (Shire of Busselton)	Cable Sands will not be discharging to the Abba River. Refer to response to submission #81.
47.	Even though the Proponent state there are only agricultural drains in the area the effect excess water coming out of this area can have downstream is a proven fact. I refer to the floods of 1998 and 1999 where most of the rain fell in this eastern part of the Shire. A considerable amount of money is about to be spent on projects around the Abba River, and the water discharge from the proposed mine has the potential to have a huge impact on these projects as this area is at the top of the catchment.	The mining operations will not change the total amount of water flowing through the catchment as this is controlled by rainfall. Surface flows from upstream of the minesite will be temporarily diverted around the operations, and allowed to continue in their normal flow patterns, after ensuring that any excess sediments are removed. The mining proposal will not add to the amount of water naturally flowing out of the project area.
48.	There are actually two bridges not one on Thomsett Road. Also, Thomsett Road is now higher than the level of our driveway; therefore in winter all the water from that section of Thomsett Road uses our driveway as a drain. To build it up would be disastrous for us. In the floods of 1998 and 1999 most of the gravel from the road ended up being washed away down the catchment. Having an even greater expanse of gravel road with the potential to be washed away again would cause a bigger downstream problem.	Cable Sands is aware of the second 'bridge' (culvert) near the submitters residence. The upgrade of Tompsett Road is to include the sealing of the carriageway, therefore any concerns regarding gravel washing away are no longer relevant. (Early discussions with the submitter, and the NOI, included reference to upgrading Tompsett road to an all weather gravel road, rather than the sealed standard now proposed). The design and construction of the road upgrade will be carried out in accordance with Australian Road Standards and all issues regarding proper run-off drainage will be addressed in accordance with that standard.

Groundwater quantity

	Submission	*Response*
49.	The Groundwater Management Plan (GMP) includes estimated peak and average abstraction rates, estimated draw-down and impacts and provides management of draw-down and contingency should impacts not be adequately addressed by artificial recharge. Additional information would assist the GMP, including monitored groundwater levels in the superficial aquifer before operation, particularly summer groundwater levels. Although estimated peak abstraction rates are suggested, there is no indication of the pump rate. The recovery rate of the aquifer following pumping should also be monitored, as there may be scope to pump at a rate that will minimise the drawdown. (Shire of Busselton)	Abstraction of process water supplies will be from the deep Yarragadee aquifer. The ARS is designed to address potential drawdown of the Superficial aquifer due to excavation of the mine pit. The Yarragadee and Superficial aquifers are not directly connected and consequently are managed separately in the GMP. This strategy meets the requirements of the WRC. (see submission #53). Groundwater monitoring results for the superficial aquifer are attached (Attachment A), including monitoring over 2 summer periods. Baseline data from the Leederville and Yarragadee aquifers is also being recorded as per the draft GMP (Appendix D of PER). Pumping and recovery tests of the Yarragadee bore were conducted as part of the URS assessment of the bore as a potential production water source (see Section 5.1 of PER).
50.	The proposed management of drawdown by artificial recharge does not address possible differences between the rate of water movement laterally through the strata following release from the recharge trenches and the rate of drawdown during pumping. For the artificial recharge management to work, the recharged water would need to compensate for the effect of any drawdown and prevent water stress. The decommissioning of this system should result in the removal of all infrastructure i.e. all concrete well liners and all PVC standpipes. (Shire of Busselton)	As noted above, abstraction and artificial recharge relate to separate aquifers and are managed separately. Inputs to the superficial groundwater modelling included both lateral and vertical hydraulic conductivities, based on measured rates. Decommissioning of the artificial recharge system is detailed in the GMP and includes removal of all surface infrastructure and PVC standpipes. Concrete well liners will be removed or broken up to 500 mm below ground level and backfilled to the surface.
51.	The statement in Section 3.6.1 that the majority of groundwater from the superficial aquifer remains unallocated needs to be justified. All residents in the area rely on this aquifer or the one below it for their water, be it domestic or agriculture. All use windmills, bores or wells, so is this water usage allocated or unallocated? How many unlicensed bores are in the area?	As outlined in Table 3.1 of the PER, 7.2 Million kL is unallocated from a total available resource of 11.2 MkL ie 65%. WRC policy is that abstraction of water from the unconfined superficial aquifer is exempt from licencing requirements when used for domestic or stock purposes. Other uses such as irrigation, or abstraction from the lower aquifers, require a licence. When calculating available resources in the superficial aquifer, WRC include an allowance for each freehold lot for unlicenced domestic or stock use. Hence the figures in Table 3.1 do account for the existing widespread unlicenced use of the superficial aquifer.

	Submission	*Response*
52.	The bottom paragraph of page 33 of the PER regarding survey and monitoring of nearby bores and dams needs to be included in Commitment 2 on page 34. What does the Proponent consider to be a nearby resident? How far from the mine site?	This commitment to surveying existing nearby agricultural and domestic water supplies, and maintaining adequate water supplies to nearby residents should any adverse changes due to mining be detected, is implicit in point 5 of Commitment 2 – "Actions to be taken in the event that adverse changes in groundwater levels or quality are detected". Groundwater modelling has shown that any potential for drawdown of the superficial aquifer is restricted to an area within about 450 m of the pit. This figure (450 m) could be used as a loose guideline when determining "nearby residents". Baseline testing has now been completed for all superficial and Leederville bores located on nearby properties, with the landowners/occupiers provided with copies of the results.
53.	The WRC appreciates the open and cooperative approach that the Proponent and its representatives have shown during the development of the PER. The document satisfactorily addresses all water-related issues to the requirements of the Commission.	Likewise, Cable Sands appreciates the assistance given by WRC during this process. Cable Sands will continue to liaise with WRC during the process of finalising the Groundwater Management Plan and implementation of the artificial recharge system.
54.	The WRC will be very interested in the development, management and success of the Artificial Storage and Recovery (ASR) process. The ASR technique appears to be technically sound and will prove an interesting case study for the rehabilitation of other mineral sand mines. The water and vegetation-monitoring program is comprehensive enabling the Proponent to adequately track and evaluate the success of the ASR technique.	
55.	On the cessation of mining and commencement of the ASR, the WRC would like to be updated on the progress via monthly correspondence and through the Annual Environment Report (AER). It will be important that the WRC is informed about the status of the ASR process to ensure there are no significant impacts on the rare flora and water resources.	Groundwater monitoring results and discussion on the performance of the artificial recharge system will be included in the Annual Hydrological Review (a component of the AER). Interim updates on monitoring results can be provided to WRC on a more frequent basis (eg monthly or quarterly).

Mine planning, decommissioning, rehabilitation and landform

	Submission	*Response*
56.	The PER concentrates on revegetation of farmland with exotic species. Some effort should also be made to propagate some of the local species especially the Priority flora (*Calothamnus* sp. Whicher and *Hakea oldfieldii*) for use in shelterbelts. If the Proponent does not have the expertise, appropriate people should be consulted. (Wildflower Society of WA)	As noted in the response to submission #31, these species will be targeted for propagation for the buffer planting. Cable Sands has experience with propagation of native species, both in-house and through consultants and contractors.
57.	Regarding landform restoration and revegetation (p15 and p17, ss 2.4.3 and 2.4.4), at no point when describing the final soil profile is any consideration given to the requirements of trees. The establishment of shelterbelts on farmland was discussed and there are currently paddock trees. There should be some consideration given to tree requirements. (CALM)	The proposed post-mining soil profile described in Section 2.4.3 of the PER will also provide an adequate root zone for trees. The proposed post-mining profile is actually likely to be more favourable to trees than the current situation with rock near the surface.
58.	Section 2.4.3. The Cation Exchange Capacity (CEC) is not shown for the tailings sands or the blue sandy clay overburden. This section also refers to section 2.4.2 that describes the CEC process but does not show the CEC for the tailing sands or the blue sandy clays. (CALM)	'Blue sandy clay' is indicated as 'clayey sand' in Table 2.2. As tailings sands are derived from the Yoganup sand, the CEC of the tailings sand is expected to be similar to that of the Yoganup sand provided in Table 2.2. While the clayey sand has a higher CEC than the Yoganup sand, the latter generally has a more favourable cation balance (less sodic).
59.	The current landowners have determined the post-mining land use as pasture. Consideration should be given to purchasing the site for conservation. Whilst this would preclude mining, the best long-term land use is conservation; this should be weighed against the short-term landuse of mining followed by pasture production. With 97% (Keighery and Trudgen 1992) of the soil type containing threatened ironstone communities already cleared the destruction of more of the remaining soil type by mining should be prevented. This is particularly important to the Abba Plains Biodiversity Project.	In order to make the best use of limited resources, organisations looking at buying land for conservation, or attaching conservation covenants will generally only look at existing native vegetation in good condition. All of the areas to be disturbed by mining have already been cleared and pastured and used for grazing for many years. The proposed buffer along the southern boundary of Loc 4102 (see response to submission #12), while not proposing to recreate the ironstone community, will provide a degree of protection to the adjacent TEC.
60.	The pre-mining subsoil profile shows a lot of ironstone caprock. How will be reintegrated into the geographical profile? Is any ironstone at all going to be put back into the site after mining? The clearing of more ironstone is a terrible loss. Is Figure 2.5 correct in indicating that no ironstone is present in the post-mining soil profiles?	In Figure 2.5 the term "rock overburden" is synonymous with the generic term ironstone caprock, and shows how this type of material is to be reincorporated into the profile following mining activities. No new clearing of ironstone areas is proposed, as all the mining area has previously been cleared and pastured for grazing.

	Submission	*Response*
61.	The Proponent will need to use local provenance plantings in its vegetation rehabilitation process.	As agreed with the landowners, the mining area will be rehabilitated using pasture species to achieve the required final landuse (agriculture/grazing). The use of local provenance planting is only appropriate in the proposed buffer area along the southern boundary of Loc 4102 (see response to submission #12).
62.	Prior to approving this project, the Department of Mineral and Petroleum Resources (MPR) need to be satisfied, by meetings or in writing, that the landowners fully understand the implications of the proposal in terms of the expected outcomes. Agriculture WA and/or independent consultants should provide comment on the proposed rehabilitation soil reconstruction process and proposed outcomes. The Proponent needs to document all its consultation and how it proposes to keep stakeholders informed of operations, incidents, progress and progress towards meeting completion criteria.	Cable Sands has entered into commercial, in-confidence mining agreements with each of the 4 affected landowners. These agreements include clauses relating to expectations for final outcomes including ground levels, soil profiles, topsoil replacement, replacement of fencing, seeding, fertilising and maintenance to achieve the agreed end land use. They also include dispute resolution procedures. Informal discussions are recorded as diary or file notes, with minutes kept from formal meetings
63.	A plan should be provided that shows the exact location of fines in the rehabilitated mine and in relation to property boundaries. (MPR)	Figure 2.5 in the PER specifically shows where the fines will be located within the backfilled pit, and Figure 2.2 shows the location of the pit and initial, temporary fines dam in relation to the property boundaries.
64.	There are no pre-mining soil/water/plant root profiles to demonstrate pre-mining interactions and provide a basis for completion criteria. (MPR)	Examples of current soil profiles are shown in Figure 2.4 of the PER. The conceptual post-mining soil profiles (Figure 2.5) have been designed to provide a suitable substrate for the desired final landuse as agricultural pastures.
65.	There are no pre-mining productivity criteria given on which to base revegetation performance. (MPR)	Pre-mining productivity has been assessed by a consultant from AgWA. This study was referred to in Section 2.4.1 of the PER, however results had not been finalised at the time of publication of the PER. The results of this study will be used in setting benchmarks for productivity in rehabilitated pastures.
66.	There are no details on pre-mining cultural practices against which to demonstrate that completion criteria have been met. Perhaps these will be detailed in the Environmental Management Program (EMP), but that is not stated anywhere. (MPR)	The AgWA pasture productivity report referred to above includes an overview of current cultural practices.
67.	Will the Environmental Management Plan be a Ministerial Condition and, if so, will it have to be approved prior to final approval of this project? (MPR)	The key components of the EMMP (Noise and Groundwater Management Plans) were provided in draft form as Appendices to the PER to facilitate final approval of the project.

	Submission	*Response*
68.	More information is needed on the content of fines in the ore and volume that will require disposal. (MPR)	The quantity of fines to be processed in association with the ore extracted from the mine is approximately 168,000 bcm of material. This equates to 12.9% of the ore zone processed.
69.	What is the acid sulphate status of the soil? (MPR)	As noted in Section 6.4.3 of the PER, there is no acid-forming potential at the Tutunup minesite. The average total sulphur in the ore zone is 0.009%, well below the guideline value of 0.03% oxidisable sulphur (Acid Sulphate Soils Manual, Stone *et al* 1998). Total sulphur in the overburden is higher (average 0.056%), however this is expected to be fully oxidised due to its pedological and geomorphic history. There is no history of acid sulphate soils associated with mineral sands mines along the same shoreline (Yoganup Shoreline) on the Swan Coastal Plain.
70.	The section on Surface and Groundwater does not provide sufficient detail on the standing water table and its fluctuation throughout the year. It is stated that parts of the mining area are saturated or flooded at times. (MPR)	Monitoring records are shown in Attachment A. These records cover an exceptionally dry period (2001), and information from landowners is that water levels reach the surface in many areas during a 'normal' winter, as has been observed in the 2002 winter. Response to rainfall is very rapid as evidenced by the small peak in December 2001, and rapid rise in winter 2002.
71.	There is no detail on soil-water relations, how these are influenced by the existing soils/geology, the variability from season to season or the soil/water/plant relations that provide for the productivity of the land. It is suggested that there be more monitoring bores close to the mine area to be able to demonstrate that mining has not altered the hydrological regime. (MPR)	There are already 8 nests of piezometers upstream of the minesite and 3 nests downstream (see Figure 5.1 of the PER). WRC considers that the monitoring programme is adequate (see submission #54)

Detailed Responses – Pollution Management

Particulates / Dust

	Submission	*Response*
72.	The wind figures quoted on page 48 of the PER are not likely to be appropriate (underestimate) for the site because they are based on Jarrahwood location – a small town located in the middle of the jarrah forest with very little clearing nearby. However, the proposed mine site is in a highly cleared location on Abba Plains. The maximum wind speeds would be expected to be significantly higher, thus there may be implications for carrying dust back into the ironstone area. (CALM)	Wind roses for Jarrahwood (15 km ESE) and Busselton (20 km WNW) are attached (Attachment B). Winds at Busselton, on the coast, do tend to be stronger, with summer afternoon sea breezes predominantly from the NW rather than the SW. However, the Company's dust management is based on control at source, whatever the wind conditions. Through use of the measures outlined in Section 6.1.4 of the PER, the Company has successfully controlled dust generation at it's other operating minesites. Dust monitoring will be used to confirm that controls are adequate.
73.	Several residential dwellings are within close proximity of the proposed mine site. Measures should therefore be introduced to adequately protect these dwellings from noise, dust and visual impacts. (Shire of Busselton)	Measures to protect neighbours from noise, dust and visual impacts are listed in Sections 6.2.4, 6.1.4 and 7.5.4 of the PER respectively. Similar measures employed at other Cable Sands sites have proved effective in protecting neighbouring residents.
74.	The Proponent should commit to monitor dust at the boundary of the premises to ensure it does not become health issue to the residents. (Department of Environmental Protection (DEP))	Cable Sands will monitor dust at the boundary of the premises in line with other operating sites. That is, a minimum of 4 measurements each summer, between September and May, comparing 'upwind' and 'downwind' particulate concentrations on each occasion.

Noise/dust/vibration — road transport

	Submission	*Response*
75.	We live 27 metres from the Ludlow-Hithergreen Road, which is part of the haul road for this proposed mine. As noted, there is already mine haulage on this road. There has been no public environmental review of this existing road haulage, we as affected residents have never been consulted by any of the mining companies, Shire Councils or MRWA prior to permits being issued for this road haulage.	Cable Sands has consulted the submitter during the process of developing the Tutunup project, including discussions on the proposed haulage and measures to minimise potential impacts. Cable Sands is also aware of ongoing discussions between the submitter, Iluka Resources, the Shire of Busselton and MRWA regarding issuing and renewal of extra mass permits for haulage on Ludlow-Hithergreen Road.
	This mine will add 30% more noise, vibration, loss of amenity, stress, loss of sleep and devaluation of property.	Ludlow-Hithergreen Road is a gazetted heavy haulage route. Considerable good-will upgrading work has been carried out on this road to improve the quality of the road surface, and hence reduce the potential for generation of noise and vibration. Cable Sands has made a commitment to contribute towards ongoing maintenance of the road during the life of the Tutunup mine. Further measures to limit the potential for annoyance to residents are outlined in Section 6.3.4 of the PER.
	Every time one of these road trains passes our house, we can hear it up to 2 kilometres away on either side of us, it causes excessive noise in the house and on the property. The associated vibration causes dust to fall from the roof through cracks around the ceiling (caused by the continual vibration) and leave an occupier feeling very disturbed from this vibration.	
	These road trains destroy the enjoyment of our property through visual pollution, noise nuisance, and vibration. They also have the effect of making our property unsaleable.	Cable Sands is supportive of a review of the haulage timetables to allow investigation into options for less annoyance during “quiet times”.
	No independent studies have been carried out on the effect of this noise and vibration or the effect of low frequency sound on us, we do know that it causes us great distress, and any further extension of what we are already suffering would be unacceptable to us.	
	Possible solutions:	
	• As this mineral field is large and has a potential life of 20 years and more, that a dedicated haul road be built to service the mines.	Ludlow-Hithergreen Road is a gazetted heavy haulage route and has been for some time. In the case of Cable Sands Tutunup project, the short mine life (2-3 years, rather than 20 years) means that construction of a new dedicated haul road is not a viable proposition. Construction of an alternative route would also involve a similar range of environmental and social concerns.
	• As we are the most affected residents that our property be purchased and that we be relocated, a solution that we view with distaste as this is our home.	Purchase and relocation is not Cable Sands preferred option, particularly given that there are several other houses within 50 m of the proposed haulage route. Other management measures discussed with the submitter include screening with vegetation and/or fencing, and double glazing of windows.

	Submission	*Response*
76.	The Proponent estimates that there will be an average of around 115 truck journeys per week from the site. The impacts from this huge increase in traffic (compared to current volumes), combined with the dust factor, would be unbearable. Section 5.3.2 states that the life of the mine will be approximately 34 months – that's a lot of dust generated on the access roads as well as the mine site itself.	Refer to response to submission #79. As noted in response to submission #45, truck numbers will be less than the 115 per week estimated for the NOI.
77.	The DEP required further information with regard to dozer sound levels, transport noise, assessment against noise Guidance notes and duration of trucking.	Further information is being provided at part of consultation with the DEP to finalise the Noise Management Plan. An acoustic assessment of the haulage route has been completed by consultants, including assessment against EPA guidance notes[6]. Based on the consultants recommendations, a speed limit of 70 km/hr along Oates and Tompsett Roads, and delaying the start of haulage on Saturday mornings to 7am will allow full compliance with the EPA Guidance note number 14 (road and rail transport noise).
78.	Clearing of the roadside vegetation to allow Tompsett Road to be widened to 9 metres is a big concern, as much effort has gone into planting vegetation adjoining Thomsett Road to decrease dust problems, to provide privacy and to try and deal with the water problems.	The requirement for clearing of the road verges is minimal in most areas. The Shire of Busselton have agreed that clearing should be minimised, in most cases to the 6½ m seal width plus 1 m shoulders. Clearing will not be required in the vicinity of this particular residence, with the existing vegetation being retained to maintain privacy. Some pruning may be required. Concerns with dust generation along Tompsett Road are negated by sealing of the road as outlined in the PER document. The road design is being carried out in accordance with Australian Road Standards and the Busselton shires' local regulation. The physical road design is being undertaken by a professional road design consultancy to achieve an appropriate outcome to drainage issues.
79.	Our house is situated in the front of our property right where the trucks will be slowing down to enter Tutunup Road and also revving up when they enter Tompsett Road on their return journey. Therefore, as well as a dust problem we have a potential noise and vibration problem as well. This will go on for approximately 34 months. A huge ask on anyone's patience. We recommend that HMC transportation route 2 be used, as only 4.6 km of road would need to be upgraded to Ludlow Hithergreen Road, which is already a heavy haulage route, and less people would be affected on the gravel section of the route.	Concerns with dust have been alleviated through Cable Sands commitment to seal the Oates Road and Tompsett Road sections of the haul route (Section 6.3.4 of the PER). Sealing will also reduce noise and vibration concerns by providing a smoother surface. Driver education and speed restrictions will further reduce the potential for noise annoyance. The period of haulage is limited to the period of HMC production, that is, around 25 months. A similar number of homes are affected by either route 1 or route 2 (see Figure 5.4 of the PER). However, due to concerns with protection of critically endangered flora on the western section of Oates Road, route 1 was selected as the preferred route.

6 Herring Storer Acoustics. Acoustic assessment - haulage route for mineral sands deposit, Tutunup, October 2002.

Surface water quality

	Submission	*Response*
80.	Section 6.5 of the PER (p55, 56). There is an acknowledgment that the flocculants to be used may harm aquatic life if present in sufficiently high concentrations. The plan does not indicate what these quantities are, nor does it provide a hazard management plan for spills of the flocculant or any other chemicals on site. (CALM)	Flocculants will be stored within bunded areas, as at other Cable Sands minesites, which control and contain any spills from the storage vessel and dilution system. Spill control and cleanup procedures, applicable to any of the chemicals on site, are contained within the EMS system. Before use the neat flocculant is mixed with water (within the bunded area) to produce a 0.5 to 1.2% solution. This is then further diluted when mixed into the thickener tank resulting in a final concentration of about 0.02 to 0.05%, almost all of which will then bind to the surface of clay particles and not be bioavailable. From the Material Safety Data Sheet, the LC50 of a 1% aqueous solution is >1000/mg/L/96 hours (essentially non-toxic) for Rainbow trout and Sheepshead minnow, and 280/mg/L/48 hours (slightly toxic) for Daphnia magna.
81.	It is noted that surface water will be discharged to the Abba River, and then to Geographe Bay. Management of surface water is not adequately addressed. The Proponent should commit to manage surface water through drainage and silt traps system to ensure surface water does not have any impact on the water quality in the river. (DEP)	Surface water will not be directly discharged to the Abba River. As noted on p21 and shown in Figure 2.6 of the PER the Abba River is over 2 km SW of the deposit at its closest point. Management of undefined surface flows diverted around the minesite and excess stormwater collected from within the minesite is detailed in Sections 5.2.4 and 6.5.4 of the PER. Sediment reduction strategies such as detention basins and silt traps will be integrated into these systems. Diverted surface flows and excess water discharged from the minesite (if any) will be allowed to disperse into existing diffuse surface flows on the downstream side of the minesite after passing through appropriate sediment traps. Further filtering will occur during subsequent flow across agricultural pastures, along with dilution by flows from other parts of the catchment. Hence, the water which eventually reaches the Abba River will be of similar quality to that which currently flows into the River.

Solid waste

	Submission	*Response*
82.	All chemicals including fuel used for this project must be stored within a bunded area under cover. (DEP)	Cable Sands will comply with the standard chemical storage conditions, as applied in DEP licences for its other operating minesites. This includes storage of quantities greater than 250 L within bunded areas meeting specified minimum standards.
83.	Where do the 'secondary tailings' originate? Will they be compatible with the geology of the Tutunup site?	The secondary tailings are predominantly silica sand which is separated from the heavy mineral concentrate (HMC) during secondary processing at the Company's North Shore Processing Plant. They have not been chemically altered. During the life of the Tutunup minesite the North Shore Plant will be processing HMC from Tutunup, and hence a large part of the secondary tailings will originate from the Tutunup site. Any secondary tailings from processing of HMC from other sites will be of similar composition and therefore compatible with the Tutunup material.

Detailed Responses – Social Surroundings

Aboriginal culture and heritage

	Submission	*Response*
84.	It is recommended that prior to any developments commencing, archaeological surveys and ethnographical consultations be conducted with local Aboriginal Communities and Native Title claimants.	Cable Sands continues to have discussions with local Aboriginal people and Native Title claimants in the areas of the Company's projects, including the development of Aboriginal Traineeship programmes. An archaeological and ethnographical survey has been completed for the Tutunup site. The survey identified one artefact cluster and three isolated artefacts. No ethnographic sites were identified
85.	In addition, if any heritage sites identified during the survey process cannot be avoided by the development then it will be necessary for a section 18 permit to be obtained from the Minister on advice from the Aboriginal Cultural Material Committee.	This requirement for a Section 18 permit for any sites identified during operations has been acknowledged in Section 7.1.4 of the PER (p59). A Section 18 application was submitted in response to the artefacts located in the pre-mining survey. The Aboriginal Cultural Material Committee determined that the site was not a site under section 5 of the *Aboriginal Heritage Act 1972*, and that the Company had no further obligations to satisfy under the Act for the project to proceed.
86.	It is noted that on pg 59 of the PER, it is stated that there is a low potential for unrecorded Aboriginal heritage sites to exist in the project area due to factors such as previous disturbance and topography. This assumption may be incorrect as there could in fact still be complete and/or remnants of archaeological site in the project area. There may also be ethnographic sites that may not necessarily have any physical manifestation. For this reason, it is strongly suggested that consultations are conducted with local Aboriginal people prior to developments commencing. (Department of Indigenous Affairs)	As noted above, and archaeological and ethnographic survey has been completed. The Aboriginal consultants involved also commented on the high level of existing disturbance.

Detailed Responses – Other

	Submission	*Response*
87.	Section 1.4 of the PER describes the legal framework for the development of the site. This refers to the referral of the site to the Commonwealth due to the presence of the TEC and the requirements of the EPBC Act. It should be noted that this site also falls within the catchment of a Ramsar listed wetland and therefore this could also constitute a trigger for referral if a significant impact on the ecological character of the declared Ramsar wetland was likely. Potential for significant impact is however acknowledged as unlikely. (CALM)	The project is being concurrently assessed under the EPBC Act through accreditation of the WA EPA's process. As noted by CALM the potential for a significant impact on the Wonnerup wetlands is unlikely. The controlling provisions of the EPBC Act, as determined by Environment Australia, are Sections 18 and 18A (Listed threatened species and communities, see Appendix C of the PER)
88.	With regard to Commitment 7, the Wildflower Society of WA considers that any rehabilitation plan has to take into account comments it made for rehabilitation and decommissioning, and native vegetation and flora.	Please refer to responses to submissions #31, 34, 35 and 56
89.	The Wildflower Society of WA is very surprised that the Ruabon-Tutunup Rail Reserve Preservation Group has not been consulted. This was a landcare group formed as a result of the interest in the natural heritage of the rail and road reserve along the Wonnerup-Tutunup Road. The Wildflower Society has also been interested in the area and, although there is not a local branch, there are some members in the area and the Busselton Naturalists Club has members with an interest in the local flora. At this stage, the Wildflower Society would say that community consultation has been inadequate.	Several of the individual neighbours and residents consulted during preparation of the PER are members of the Ruabon-Tutunup Group, and also the Busselton Naturalists Club. An offer was made to a representative of the Ruabon-Tutunup Group to provide a presentation to the Group, however, to the best of our knowledge, they have not met during this time. The project was also discussed at a meeting of the Busselton Shire Council's Environment Forum which includes representatives from a range of organisations in the area. Through the Shire's Environmental Officer, an offer was made to provide a presentation to this Forum or the organisations represented, but to date this has not been taken up.
90.	More detail is needed on items 2-5 (inclusive) of Commitment 2.	These items list the contents of the Groundwater Management Plan. A complete draft of this plan was provided as Appendix D of the PER.

Proponents Environmental Management Commitments – Revised

The table of Proponents Commitments included in the PER has been upgraded and revised to reflect the responses to the public submissions. The complete, revised list of commitments is provided below.

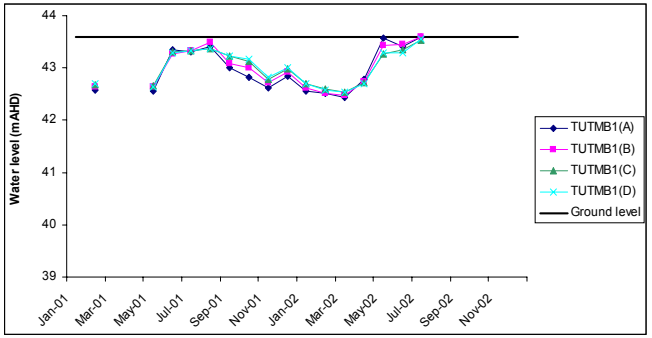
TOPIC	ACTIONS	OBJECTIVES	TIMING	ADVICE FROM
Environmental Management	1. Develop an Environmental Management and Monitoring Plan (EMMP) for the Tutunup minesite to the requirements of the EPA on advice of CALM. Among other issues the EMMP will address: • Groundwater management; • Vegetation monitoring and management; • Site rehabilitation; • Dust management; • Noise management; and • Radiation management.	Provide a systematic framework for environmental management at the Tutunup minesite consistent with the Cable Sands Environmental Policy.	Before mining	MPR, WRC, CALM
Groundwater	2. Develop a Groundwater Management Plan and Operating Strategy to the requirements of the EPA on advice of CALM to address: • Yarragadee abstraction and monitoring; • Superficial aquifer artificial recharge system (ARS) design and implementation; • Monitoring of superficial groundwater in the vicinity of the Busselton Wet Ironstone Threatened Ecological Community located adjacent to the mining area (TEC); • Monitoring of groundwater levels in other areas surrounding the Tutunup project; and • Actions to be taken in the event that adverse changes in groundwater levels or quality are detected.	To have no discernible impact on groundwater quality or quantity. To maintain the abundance, distribution and values of the TEC and associated rare flora.	Before mining	WRC, CALM
	3. Implement the Groundwater Management Plan and Operating Strategy referred to in Commitment 2.	Achieve the objectives of Commitment 2.	Before and during mining	WRC, CALM
	4. Maintain artificial recharge system and continue monitoring of superficial groundwater levels in the area around the adjacent Busselton Wet Ironstone Threatened Ecological Community until monitoring shows groundwater levels have returned to normal with no further input from ARS, based on regional seasonal fluctuation, and on advice from WRC.	Ensure the ARS is maintained in an operable state until no longer required to control mining-related drawdown.	During and after mining	WRC, CALM
Surface water	5. Install water control measures (e.g. earth bunds and detention basins) as required around the mining area to control surface water entering and leaving the site during mining.	To have no discernible impact on surface water quantity or quality.	Before and during mining	WRC

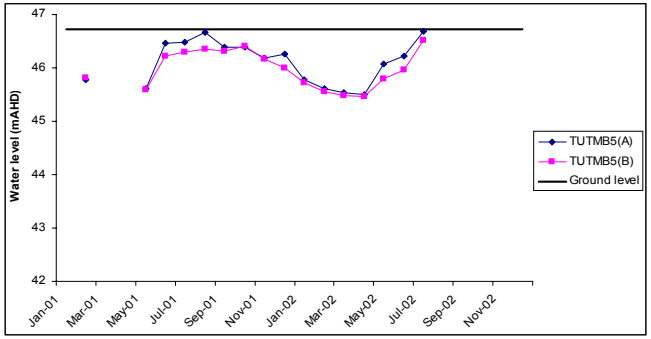
TOPIC	ACTIONS	OBJECTIVES	TIMING	ADVICE FROM
Vegetation	6. Develop a Vegetation Monitoring and Management Programme to the requirements of the EPA on advice of CALM, to address: • Monitoring and assessing the health of the TEC and associated rare flora; and • Actions to be taken in the event the monitoring shows the likelihood of any impact to the TEC and associated rare flora.	To maintain the abundance, distribution and values of the TEC and associated rare flora.	Before mining	CALM
	7. Implement the Vegetation Monitoring and Management Programme developed through Commitment 6.	Achieve the objectives of Commitment 6.	Before, during and after mining	CALM
	8. Provide resources, to the maximum as agreed with CALM, for enhanced management actions for the TEC and associated rare flora and target these resources to CALM's requirements.	To enhance the security and conservation status of the TEC and associated rare flora.	Before, during and after mining	CALM
Mine planning and rehabilitation	9. Include progressive rehabilitation plans within the site EMMP.	To progressively rehabilitate site to agreed agricultural land use, and protect the values of the TEC with native vegetation buffers as appropriate.	Before and during mining	MPR, CALM,
Dust	10. Control dust generation from the minesite by: • Use of a water cart on unsealed internal roads and disturbed areas when required; • Stabilising stockpiles as required through the use of fines, sealants and/or vegetation; and • Mine planning to keep disturbed areas to a minimum, retain maximum vegetation and rehabilitate as soon as practical following mining.	To minimise dust impacts associated with earthmoving, stockpiling and rehabilitation.	Before, during and after mining	
Noise	11. Develop a Noise Management Plan, in consultation with the DEP addressing: • Noise control – mine planning and control at source; • Community relations; • Transport noise; • Complaint resolution procedures; and • Monitoring and reporting.	To minimise noise impacts on residents of neighbouring properties and on residents along the transport route. To comply with statutory noise requirements.	Before mining	
	12. Implement the Noise Management Plan developed under Commitment 11.	Achieve the objectives of Commitment 11.	During mining	

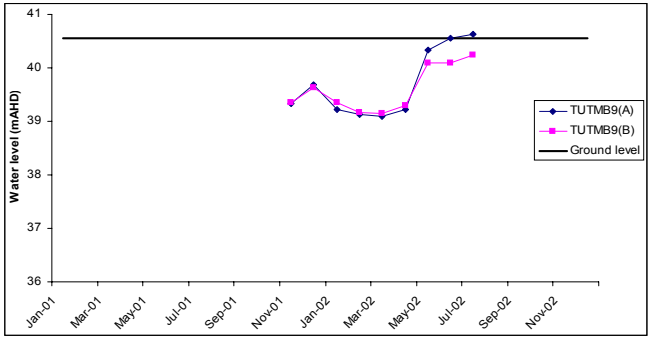
TOPIC	ACTIONS	OBJECTIVES	TIMING	ADVICE FROM
Public Health & Safety – Radiation	13. Develop a Radiation Management Plan.	To keep post-mining surface radiation similar to pre-mining levels.	Before mining	MPR
	14. Implement the Radiation Management Plan developed under Commitment 13.	Achieve the objectives of Commitment 13.	During mining	MPR
Public Health & Safety – Transport	15. Manage transport impacts through: • Upgrading Oates Rd and Tompsett Rd sections of the haulage route to a sealed standard; • Restricting hours of transport to 6am to 8pm Monday to Saturday; • Setting and complying with speed limits along Oates Rd, Tompsett Rd and Ludlow-Hithergreen Rd sections of the route; and • Providing awareness training for truck drivers on the school bus routes and stopping places, and avoiding truck movements during these times.	To minimise transport impacts on residents adjoining transport route.	During mining	Shire of Busselton
Visual amenity	16. Minimise the visual impact of the minesite on nearby residents through: • Retaining existing vegetation where possible to screen the minesite; • Vegetating topsoil stockpiles where possible to blend with the landscape; and • Directing lights to minimise light spill to neighbouring residences.	To reduce the visual impact of the minesite.	During mining	

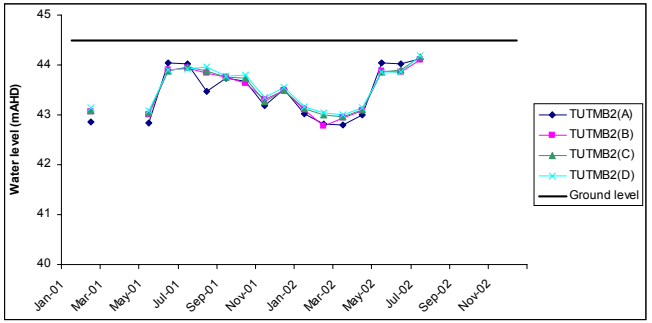
ARS = Artificial recharge system
EMMP = Environmental Management and Monitoring Plan
TEC = Busselton Wet Ironstone Threatened Ecological Community located adjacent to the mining area
CALM = Department of Conservation and Land Management
DEP = Department of Environmental Protection
MPR = Department of Mineral and Petroleum Resources
WRC = Water and Rivers Commission

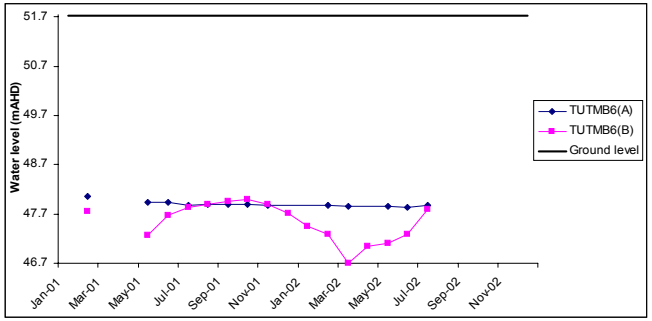
Attachment A. Tutunup superficial groundwater levels

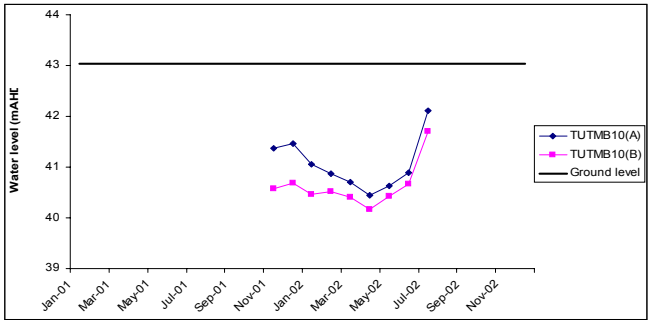


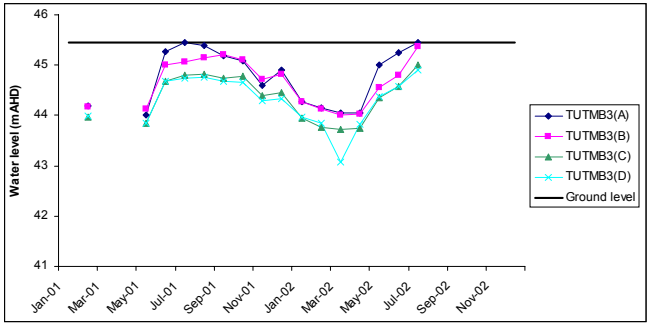


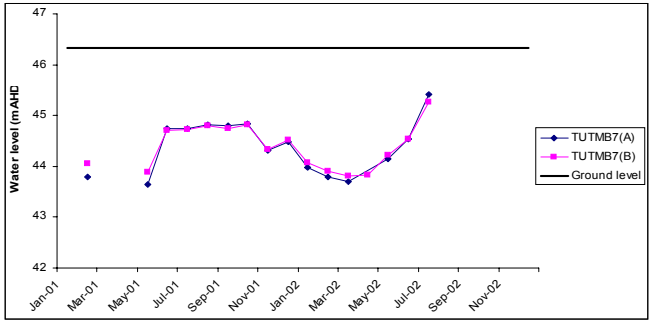


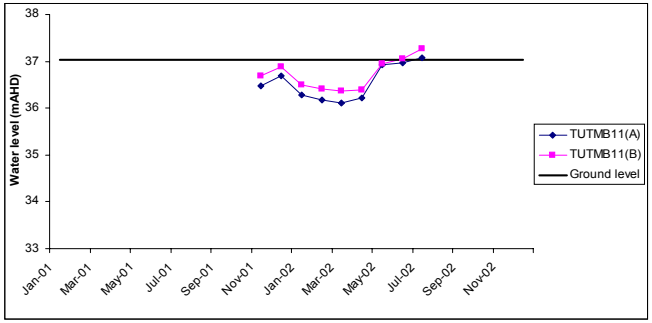


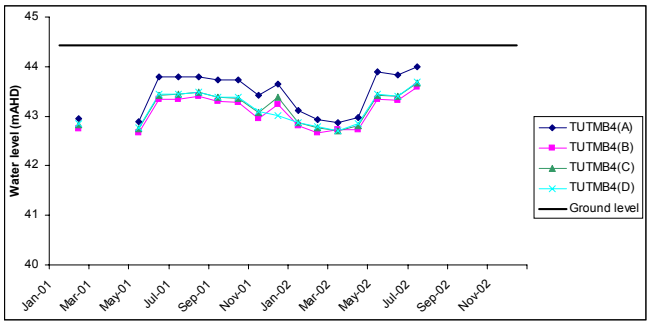


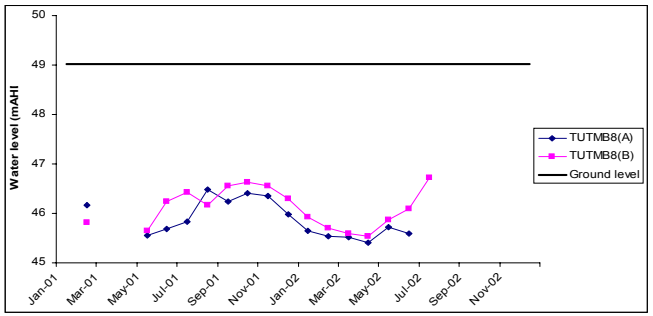










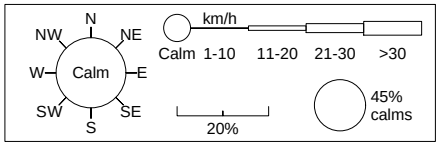


Note Locations of monitoring piezometers are shown in the Groundwater Management Plan (draft in Appendix D of PER).

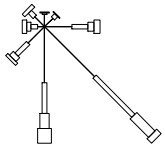
(A) is shallowest of each nest of piezometers.

Attachment B. Wind Roses - data between 1957 and 1975 for BUSSELTON SHIRE

Site Number 009515 • Locality: BUSSELTON • Opened Jan 1877 • Still Open
Latitude 33°39'44"S • Longitude 115°20'38"E • Elevation 4m



9 am January 589 observations



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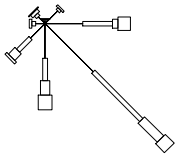

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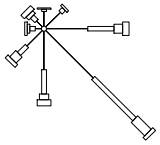

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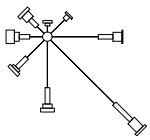

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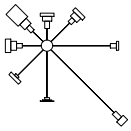

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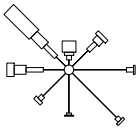

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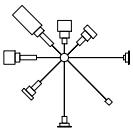

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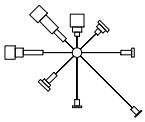

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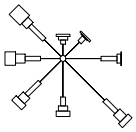

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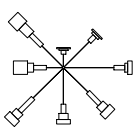

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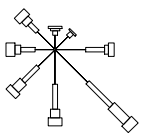
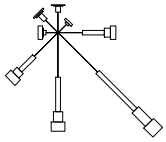


9 am December 521 observations



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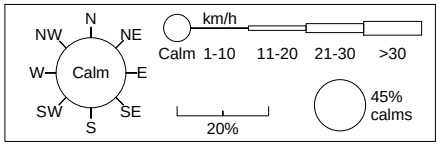
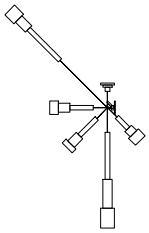
Wind Roses using available data between 1957 and 1975 for

BUSSELTON SHIRE

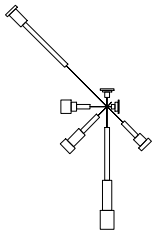
Site Number 009515 • Locality: BUSSELTON • Opened Jan 1877 • Still Open
Latitude 33°39'44"S • Longitude 115°20'38"E • Elevation 4m



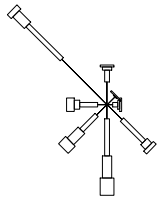
3 pm January 587 observations



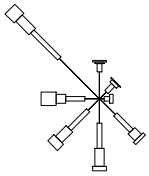
3 pm February 534 observations



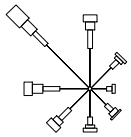
3 pm March 588 observations



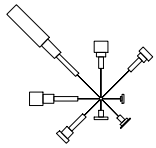
3 pm April 556 observations



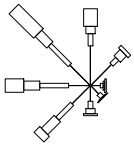
3 pm May 574 observations



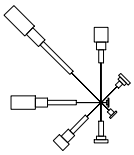
3 pm June 555 observations



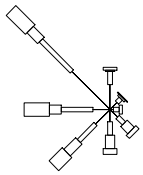
3 pm July 579 observations



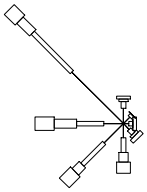
3 pm August 572 observations



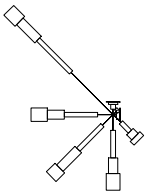
3 pm September 565 observations



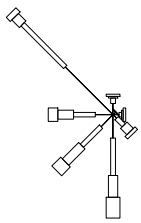
3 pm October 588 observations



3 pm November 567 observations



3 pm December 515 observations



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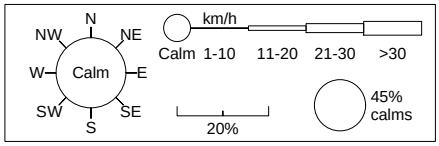
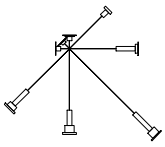
Wind Roses using available data between 1975 and 2002 for JARRAHWOOD

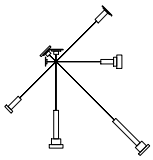
Site Number 009842 • Locality: BUSSELTON • Opened Jul 1975 • Still Open
Latitude 33°47'55"S • Longitude 115°39'47"E • Elevation 130m



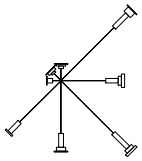
9 am January 776 observations



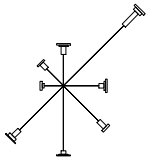
9 am February 731 observations



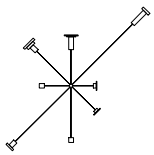
9 am March 781 observations



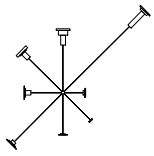
9 am April 723 observations



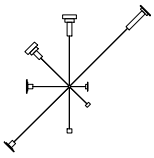
9 am May 739 observations



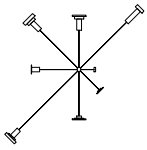
9 am June 737 observations



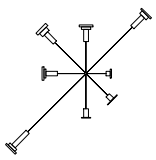
9 am July 752 observations



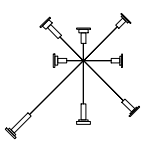
9 am August 798 observations



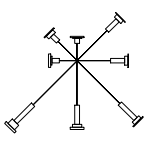
9 am September 774 observations



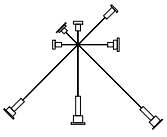
9 am October 817 observations



9 am November 795 observations



9 am December 781 observations



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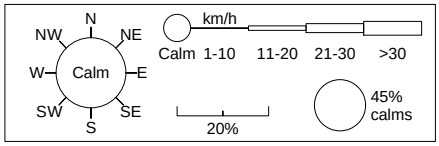
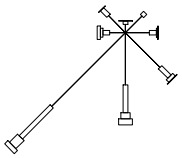
Wind Roses using available data between 1975 and 2002 for

JARRAHWOOD

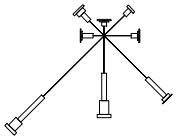
Site Number 009842 • Locality: BUSSELTON • Opened Jul 1975 • Still Open
Latitude 33°47'55"S • Longitude 115°39'47"E • Elevation 130m



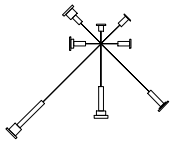
3 pm January 754 observations



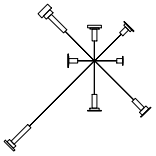
3 pm February 708 observations



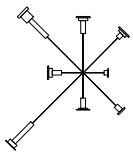
3 pm March 763 observations



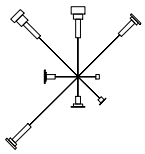
3 pm April 741 observations



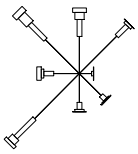
3 pm May 764 observations



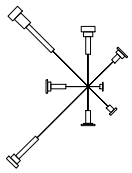
3 pm June 750 observations



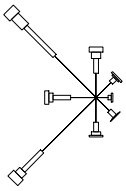
3 pm July 775 observations



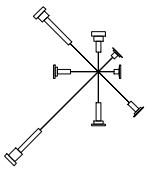
3 pm August 801 observations



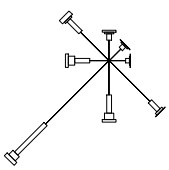
3 pm September 772 observations



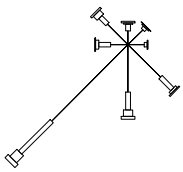
3 pm October 811 observations



3 pm November 779 observations



3 pm December 761 observations



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Attachment C.

Your Ref:
Our Ref: 046087F2002V01
Enquires: Dr K Atkins
Phone: 9442 0302
Fax: 9386 1286
Email: kylied@calm.wa.gov.au

DEPARTMENT OF
Conservation
AND LAND MANAGEMENT
Conserving the nature of WA

FAXED
KO 14/11/02

Mr Gary Crockford
General Manager
Cable Sands (WA) Pty Ltd
PO Box 133
BUNBURY WA 6231

Dear Mr Crockford

TUTUNUP MINE PROJECT

Thank you for your letter of 17 October 2002 as a follow up to the meeting of 16 October with Jim Sharp and Gordon Wyre, and in which you detail the additional protection measures and conservation offsets in relation to this project.

This Department is of the view that the proposed 70 metre wide buffer should considerably enhance the level of protection for the adjacent Threatened Ecological Community (TEC) and threatened flora. Coupled with the high level of confidence by a number of expert hydrologists that the artificial recharge system will be able to perform to the required standard, this buffer, along with the enhanced management offsets, gives sufficient comfort to this Department that the conservation values of the TEC should be able to be protected.

Accordingly, this Department does not object to the project as now proposed.

While some level of risk may be associated with any artificial recharge system, this Department considers that such risks can be managed by a monitoring and management program implemented during, and subsequent to, the life of the project. The Department will maintain close contact with Cable Sands over such a program.

Future agreement on issues of detail will be required. This will need to include details of the monitoring systems, the operation of the artificial recharge system, and width of the revegetated buffer following mining.

Yours sincerely

Keiran McNamara
ACTING EXECUTIVE DIRECTOR

14 November 2002
KA:KD KEIRAN 2002/LETTERS/TUTUNUP ADDITIONAL OFFSETS

cc Bernard Bowen, Chairman Environmental Protection ~~Authority~~

Attachment D