



Report and recommendations of the Environmental Protection Authority



Dongara Titanium Minerals Project

Tronox Management Pty Ltd

Report 1478

June 2013

Public Environmental Review Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
24/09/07	Level of assessment published	
23/03/10	Environmental Scoping Document approved	131
14/05/12	Environmental Review Document (ERD) released for public review	112
11/06/12	Public review period for ERD closed	4
14/03/13	Final Proponent response to ERD issues raised	39
29/05/13	Provision of EPA Report to Minister	12
04/06/13	Publication of EPA Report (3 days after Report to Minister)	3 days
18/06/13	Close of appeals period	2

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

In this case, the Environmental Protection Authority met its timeline objective in the completion of the assessment and provision of a report to the Minister.



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Chairman

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Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for Environment on the proposal by Tronox Management Pty Ltd (Tronox), to develop and operate a mineral sands mine approximately 25 kilometres (km) south-east of Dongara in the Midwest region of Western Australia.

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

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

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

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

The proposal is also considered to be a 'Controlled Action' under sections 18 and 18A (threatened species and communities) of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The proposal is being assessed under the bilateral agreement between the Commonwealth and the State. The EPA's assessment report is forwarded to the Commonwealth Minister for Environment who will then make a separate decision from any State approval.

Key environmental factors and principles

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

- (a) Flora and Vegetation, and Terrestrial Fauna – the impacts on terrestrial and Groundwater Dependent Ecosystem (GDE) native vegetation, including wetlands, which would be cleared or impacted by dewatering. The native vegetation represents Carnaby's Cockatoo foraging habitat.
- (b) Offsets – to offset for significant residual impacts to Carnaby's Cockatoo habitat and wetlands.

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

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

- (a) Precautionary Principle;
- (b) Conservation of biological diversity and ecological integrity; and
- (c) Intergenerational equity.

Conclusion

The EPA has considered the proposal by Tronox to develop and operate a mineral sands mine.

The mine would impact up to 1,305 hectares (ha) of native vegetation within an overall mine development envelope of 5,304 ha. This includes approximately 1,200 ha of both terrestrial and GDE native vegetation which would be cleared, and up to 105 ha of GDE native vegetation impacted by dewatering. Native vegetation at the site is in pristine to excellent condition, contains several Priority flora species and represents habitat for Declared Rare Flora (DRF) species *Paracaleana dixonii* (Sandplain Duck Orchid). The native vegetation in the proposal area also supports foraging habitat for Carnaby's Cockatoo.

The proposal would significantly impact local populations of Priority flora species but it is not expected to alter their conservation status. No known individuals of the DRF species would be impacted by the proposal. The location and authorised extent of native vegetation clearing would be limited to that predicted by Tronox. This is a maximum total clearing area of 1,200 ha within the development envelope as described and spatially defined in the recommended Ministerial statement that the proposal can be implemented.

Tronox's hydrological modelling is considered to reasonably predict the extent of groundwater drawdown impacts. Tronox would be required to implement the proposal consistent with its predictions. The recommended Ministerial statement that the proposal can be implemented identifies Zone 1 (Figure 2 of Appendix 4) where impacts to the Zeus wetland and GDEs are predicted to occur. Zone 1 has a total area of 339 ha, of which 159 ha would be cleared for mining. Of the remaining 180 ha, Tronox would limit its dewatering impact to 105 ha. Condition 6 requires that no impacts to wetlands and GDEs are allowed outside of Zone 1. Condition 6 has also been prepared considering Tronox's proposed mitigation measure of an infiltration system. Condition 6 includes monitoring to demonstrate that impacts are contained within the areas predicted and contingency measures are required in the event mining activities are having a greater impact than predicted.

It is the EPA's opinion that a significant residual impact relating to the clearing of native vegetation which supports Carnaby's Cockatoo foraging habitat and wetlands remains when considering this proposal in the context of the cumulative impacts of existing clearing in the agricultural area. Offsets have been developed for the proposal to mitigate for these significant residual impacts and Tronox has proposed an offset program consisting of land

acquisition and habitat improvement. The EPA has recommended the offset program is formalised as a condition.

Rehabilitation and closure can be regulated and managed by the Department of Mines and Petroleum (DMP) under the *Mining Act 1978* to meet the EPA's objective. The EPA has provided other advice that it is expected that DMP will have regard to the outcomes of Tronox's review of previous rehabilitation undertaken at the Cooljarloo minesite. The proposed Improvement Plan will be considered further when the DMP evaluates mine closure planning in more detail, and comprehensively once Tronox submits a full mine closure plan in accordance with the DMP/EPA 2011 *Guidelines for preparing Mine Closure Plans* and the *Mining Act 1978*.

The EPA has therefore concluded that the proposal can be managed to meet the EPA's objectives provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 5.

Recommendations

That the Minister for Environment:

1. Notes that the proposal being assessed is for a mineral sands mine approximately 25 km south-east of Dongara in the Midwest region;
2. Considers the report on the key environmental factors as set out in Section 3;
3. Notes the EPA has concluded that the proposal can be managed to meet the EPA's objectives, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 5;
4. Imposes the conditions and procedures recommended in Appendix 4 of this report; and
5. Notes the EPA's other advice presented in Section 6 in relation to rehabilitation and closure.

Conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends are imposed if the proposal by Tronox to develop and operate a mineral sands mine is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

- (a) Native vegetation – limiting impacts on terrestrial and GDE native vegetation, including wetlands, to that predicted by the proponent. Monitoring is required to demonstrate that impacts are contained within the areas predicted and contingency management is also required in the event the mining activities are having a greater impact than predicted; and

- (b) Offsets – to offset for the significant residual impact to Carnaby's Cockatoo habitat and wetlands, the proponent shall undertake an offset program consisting of land acquisition and habitat improvement.

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1 Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the key environmental factors and principles for the proposal by Tronox Management Pty Ltd (Tronox), to develop and operate a mineral sands mine. The Dongara Titanium Minerals Project (DTMP) would be located approximately 25 kilometres (km) south-east of Dongara in the Midwest region of Western Australia (WA).

The original proponent for the proposal was Tiwest Pty Ltd; an equal share joint venture between Tronox Western Australia Pty Ltd and subsidiaries of Exxaro Australia Sands Pty Ltd. Tronox subsequently acquired Exxaro's share of the joint venture and in August 2012 provided the EPA with a nomination to change the proponent to Tronox Management Pty Ltd.

The proposal includes development of six mine pits, operating plant and supporting mine infrastructure (e.g. overburden dumps, tailings facilities) and other associated infrastructure (e.g. roads, water/power supply).

The DTMP was referred to the EPA on 4 September 2007 and a level of assessment of Public Environmental Review (PER) was set on 20 September 2007. On 4 November 2009 the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) notified the EPA that the proposal was considered to be a 'Controlled Action' under sections 18 and 18A (threatened species and communities) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). On 10 November 2009 the SEWPaC advised that the proposal would be assessed under the bilateral agreement with the State.

The DTMP was originally referred as a dry mining operation, however in October 2011 prior to submission of the draft PER document, the proposal was modified via section 43A of the *Environmental Protection Act 1986* (EP Act) to include dredge mining options, increase water demand and increase the mine footprint.

At present, capacity at Tronox's existing Chandala Processing Plant exceeds the production capacity of operations at its Cooljarloo mine. Heavy mineral concentrate (HMC) produced at Dongara would be further processed at the Chandala Processing Plant.

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

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

2 The proposal

The DTMP would be located approximately 25 km south-east of Dongara in the Midwest region of WA. The proposal area would be situated on six mining leases: M70/1195, M70/1196, M70/1197, M70/1198, M70/1199 and M70/1200 encompassed by a 5,304 ha development envelope. All mining leases with the exception on M70/1195 are on Unallocated Crown Land (See Figure 1). M70/1195 is entirely on freehold land used predominately for cattle grazing. An agreement for access to the freehold land is being sought by Tronox.

The DTMP would disturb, through clearing and groundwater dewatering, up to 1,420 hectares (ha) of land, which includes wetlands. The proposed mine involves the development of six mine pits in order to access a reserve of 85 million tonnes (Mt) of titanium bearing mineral ore, which generates approximately 4 Mt of HMC, over an approximate 7 – 15 year life of mine (See Figure 2).

In addition to the mine pits, the proposal requires development of overburden dumps, tailings facilities, haul roads, power supply, water supply bores, fuel storage, waste treatment plant, maintenance workshop and administration facilities.

A combination of dredge and dry mining methods are proposed. Dewatering of the superficial aquifer is required to allow access to ore bodies, and abstraction from the Yarragadee aquifer is required for process water.

Ore would be separated on site, and the resulting HMC would be transported via truck to the Chandala Processing Plant.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 2 of the PER (Tiwest Pty Ltd, Dongara Titanium Minerals Project – Public Environmental Review, May 2012).

Table 1: Summary of key proposal characteristics

Element	Description
Project development envelope	Up to 1,420 ha within an 5,304 ha development envelope (Figure 2)
Vegetation clearing area (Disturbance area)	Clearing of up to 1,315 ha being: <ul style="list-style-type: none"> • 1,200 ha of native vegetation; and • 115 ha of pasture (Figure 2)
Groundwater drawdown impact area (Zone 1)	Up to 105 ha within a 180 ha dewatering impact area, outside of clearing area within Zone 1 (Figure 3)

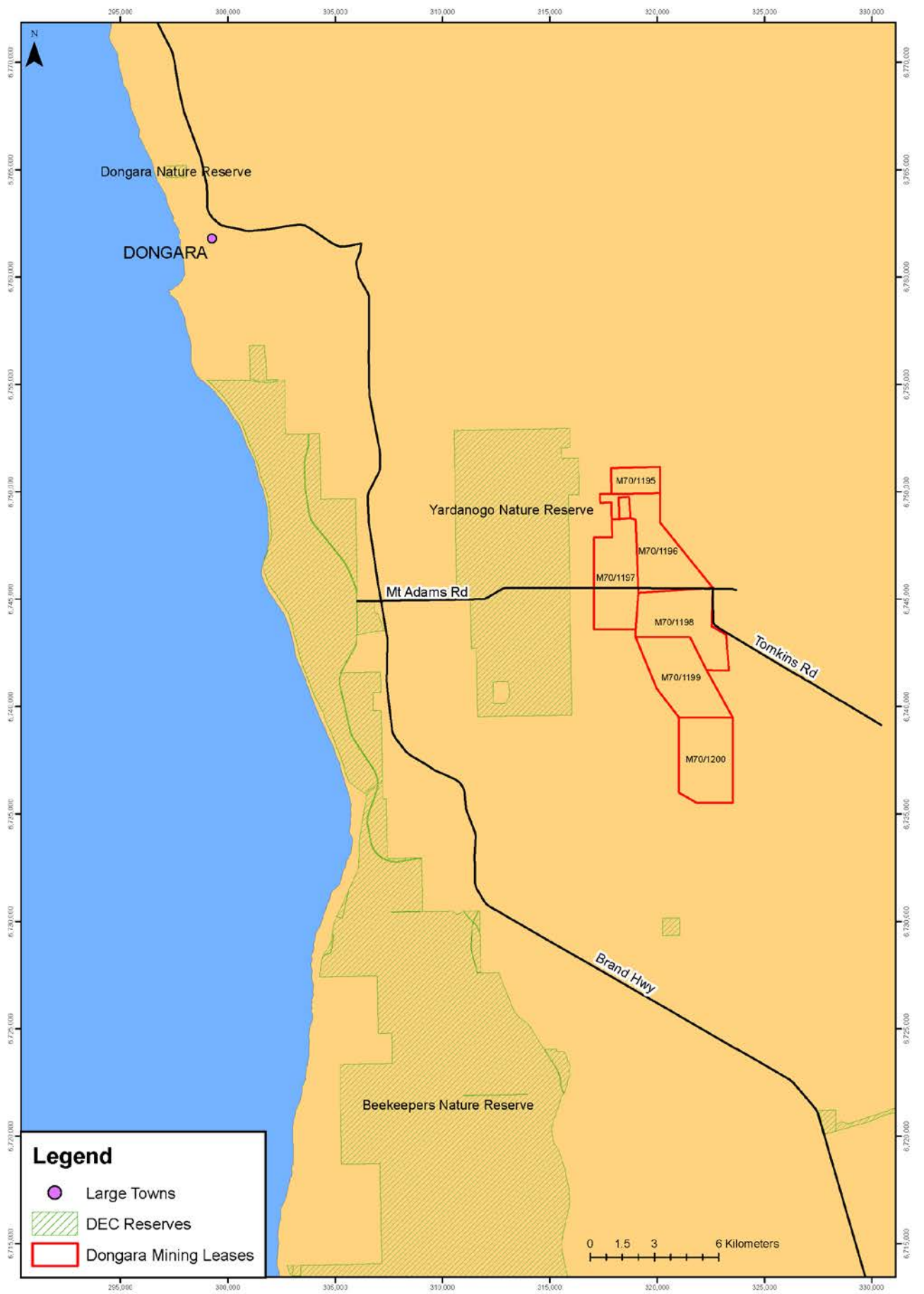


Figure 1: location of the proposal

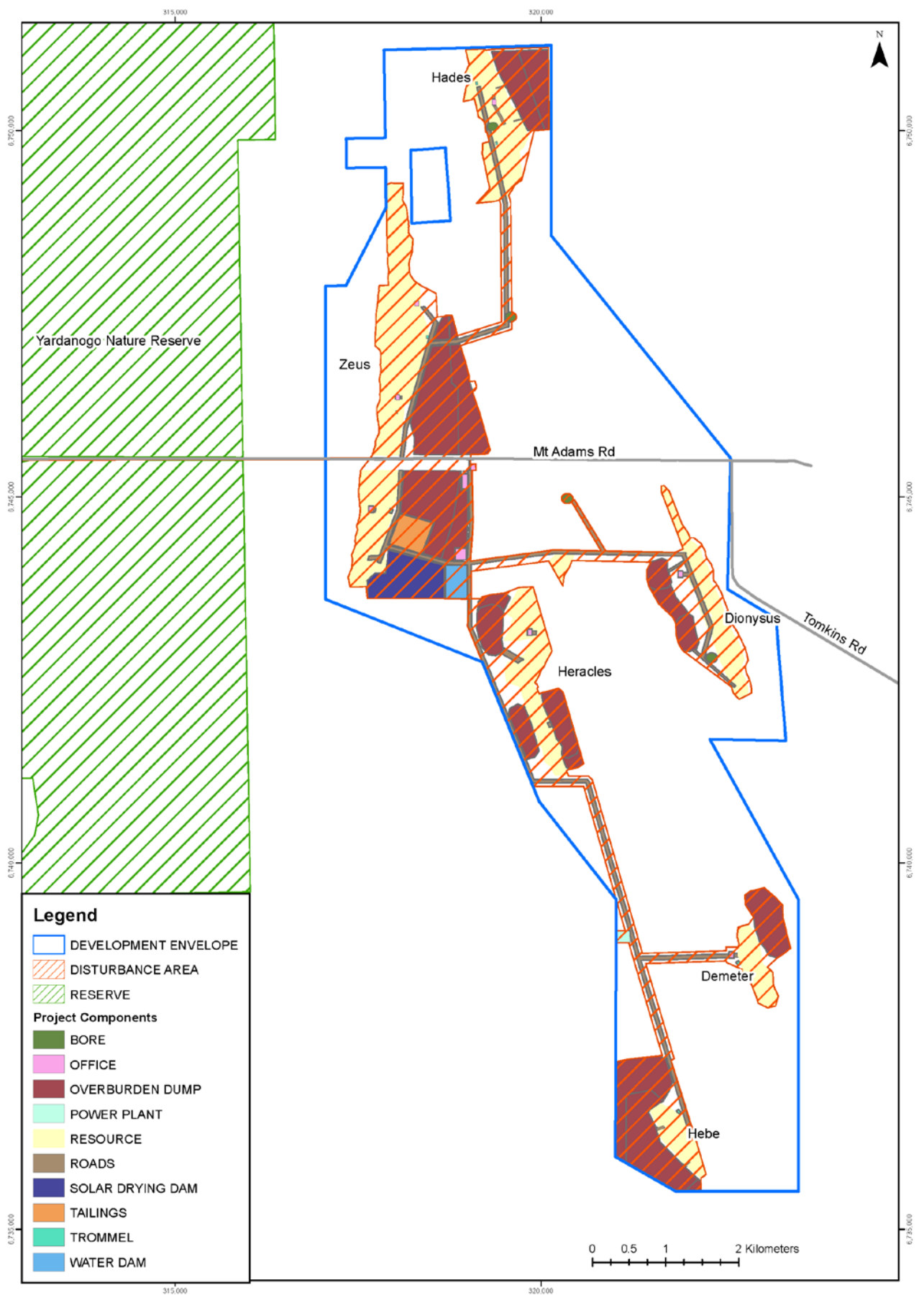


Figure 2: proposal components

Modifications made by Tronox to the proposal via section 43A of the EP Act are:

- the inclusion of the option to dredge mine four of the six ore bodies;
- an increase in water demand from approximately 2.5 gigalitres per annum (GL/a) to approximately 5 GL/a; and
- the proposal clearing area increased from 900 ha to 1,315 ha.

The EPA determined that the new activity (dredge mining) did not change the environmental factors identified during scoping of the assessment. The impacts associated with the changes to the proposal were addressed in the PER and assessed accordingly. Table 1, *Summary of key proposal characteristics*, has been prepared to include relevant changes made via section 43A of the EP Act.

The potential impacts of the proposal predicted by Tronox in the PER document (Tiwest Pty Ltd, Dongara Titanium Minerals Project – Public Environmental Review, May 2012), and their proposed management, are summarised in Table ES1 (Executive Summary) of the proponent's document.

3 Key environmental factors and principles

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

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as fauna, dieback and acid sulfate soils are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

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

- (a) Flora and Vegetation, and Terrestrial Fauna – the impacts on terrestrial and Groundwater Dependent Ecosystem (GDE) native vegetation, including wetlands, which would be cleared or impacted by dewatering. The native vegetation represents Carnaby's Cockatoo foraging habitat; and
- (b) Offsets – to offset for significant residual impacts to Carnaby's Cockatoo habitat and wetlands.

The above key environmental factors were identified from the EPA's consideration and review of all the preliminary key environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics set out in Table 1.

Details on the key environmental factors and their assessment are contained in Sections 3.1 – 3.2. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal, taking into consideration the environmental impact management proposed by Tronox. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

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

- (a) Precautionary Principle;
- (b) Conservation of biological diversity and ecological integrity; and
- (c) Intergenerational equity.

3.1 Flora and Vegetation, and Terrestrial Fauna

Description

The DTMP is located within the Geraldton Sandplains biogeographic region in accordance with the Interim Biogeographic Regionalisation for Australia (IBRA) classification system (Thackway and Cresswell, 1995). The Geraldton Sandplains biogeographic region is characterised as extensive proteaceous heaths and scrub-heaths rich in endemics, often with emergent mallees, on an undulating, lateritic sandplain mantling Permian to Cretaceous strata (Australian Natural Resource Atlas, 2009).

The proposal area is within the vicinity of three nature reserves: Yandanogo Nature Reserve (Class C) located approximately 1.5 km west, Beekeepers Nature Reserve (Class C) located approximately 10 – 15 km west (on the western side of Brand Highway), and a small un-named nature reserve (Class A) located approximately 6 km south-west of the proposal area.

The proposed mineral sands mine would be located in a greenfield site which is almost undisturbed.

Tronox has undertaken flora surveys within an area referred to as the Dongara Study Area (DSA) which is located within the Irwin Botanical District (Northern Sandplains Region) of the Southwest Botanical Province (Beard, 1990). The DSA covers an area of approximately 35,000 ha constituting a contiguous, largely intact block of native vegetation, extending approximately 10 km east and approximately 30 km south of the DTMP proposal area (Woodman, 2011).

Surrounding GDEs containing a series of wetlands occur along the western side of the proposal area. The wetlands are considered to be equivalent to Conservation Category Wetlands (CCW) (See Figure 3).

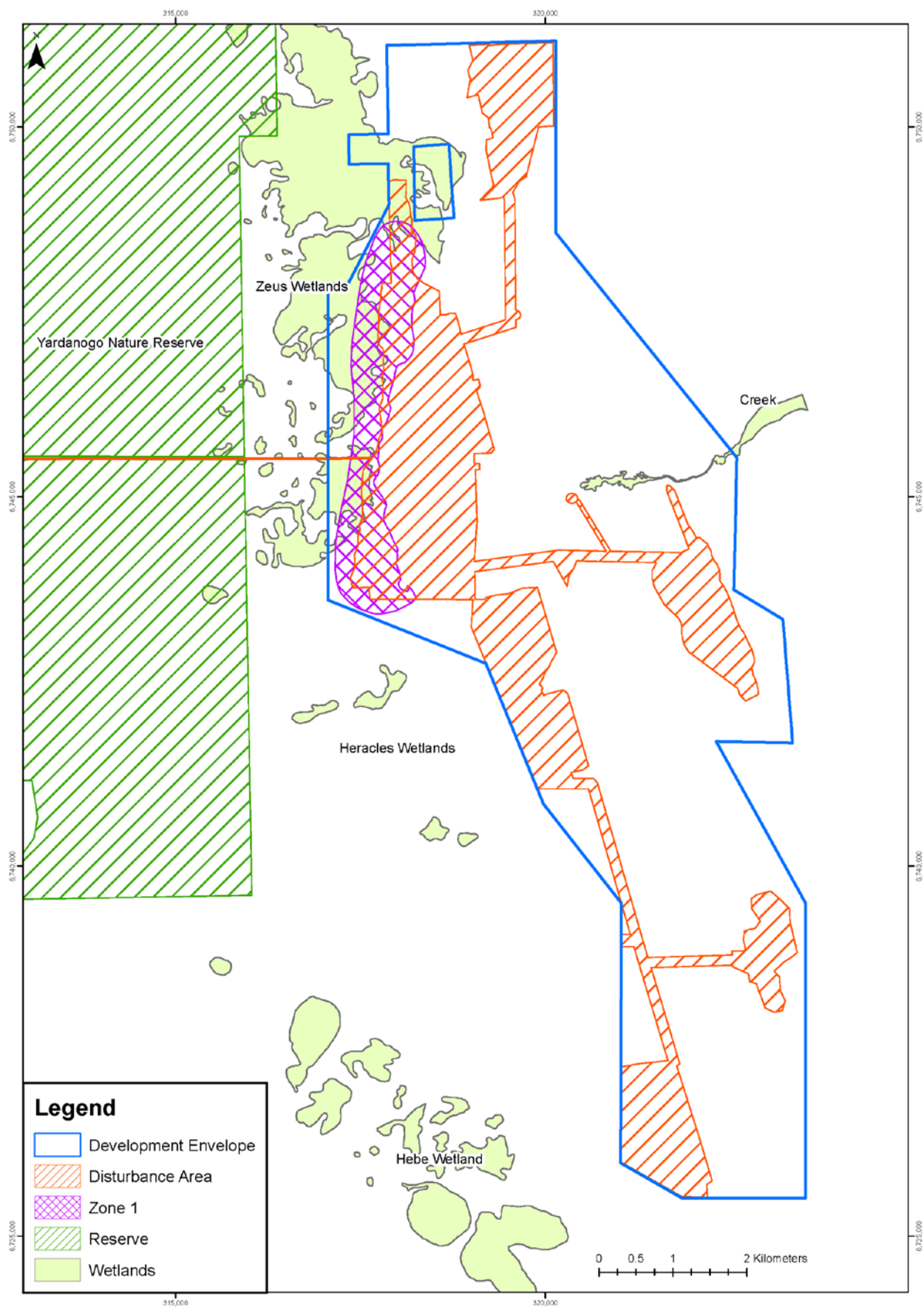


Figure 3: location of wetlands

Native vegetation at the site is in pristine to excellent condition and contains several conservation significant flora species. The native vegetation in the proposal area also supports foraging habitat for Carnaby's Cockatoo.

Approximately 1,200 ha of native vegetation and 115 ha of pasture would be cleared for the proposal. Dry mining requires dewatering which would result in drawdown impact to an additional 105 ha of wetlands and GDE native vegetation.

Submissions

Key matters in submissions focused on:

- the quantity of high quality vegetation to be cleared (i.e. containing significant flora species and that it supports Carnaby's Cockatoo foraging habitat);
- the extent of impact to high value wetlands;
- concerns raised over the confidence in the groundwater model predictions for dewatering impact on GDEs;
- dredge mining being the preferred option as it would have less impact on GDEs; and
- the need for specific management actions to deal with potential impacts to Carnaby's Cockatoo.

Assessment

The EPA's environmental objectives for these factors are:

- Flora and Vegetation – to maintain representation, diversity, viability and ecological function at the species, population and community level; and
- Terrestrial Fauna (as it relates to fauna habitat) – to maintain representation, diversity, viability and ecological function at the species, population and assemblage level.

Vegetation clearing and loss of habitat:

The proposed clearing of 1,200 ha of native vegetation inside the development envelope includes both terrestrial and GDE native vegetation.

Native vegetation in the proposal area is largely undisturbed, is in pristine to excellent condition, and supports Carnaby's Cockatoo foraging habitat. No infestations of dieback have been identified within the proposal area and weeds are only prevalent in disturbed areas adjacent to farming properties.

Three vegetation systems, comprising eight vegetation associations were recorded in the DSA. Vegetation associations 378 and 392, belonging to the Eridoon Vegetation System, would be impacted directly (by clearing) and indirectly (by dewatering drawdown) by the proposal. Another vegetation association, 379, belonging to the Tathra Vegetation System, would also be impacted directly by clearing.

Vegetation associations 378 and 392 have greater than 30% pre-European extent remaining and have some representation in the conservation reserve system. Vegetation association 379 currently has below 30% pre-European extent (23.9%); however the majority that remains is secure within the conservation reserve system.

The quantity of vegetation associations 378, 392 and 379 that would be impacted as a result of the proposal equates to 2.4%, 4.6% and 0.01% of the remaining extents respectively.

Twenty floristic community types (FCTs) were recorded within the DSA. Of these, six are considered to be associated with GDEs.

Of the twenty FCTs recorded, eight would be impacted by the proposal, all directly by clearing, with four also impacted indirectly by dewatering drawdown.

FCTs 5a and 10a would be most impacted by the proposal. Both have a significance ranking of 4, which is: *moderately restricted in the region or Declared Rare Flora species have been recorded in the FCT and Priority flora species are known to occur in the FCT* (Woodman, 2011). However, impact to these FCTs is considered low at 8.9% and 8.8% respectively.

Twenty five conservation significant flora species were identified within the DSA. This includes six Priority 4, twelve Priority 3, three Priority 2, three Priority 1 and one Declared Rare Flora (DRF).

Of the twenty five conservation significant flora species identified, twelve Priority flora species would be impacted by the proposal either from clearing, dewatering drawdown or both. Of the twelve Priority flora species being impacted, approximately half would have a high impact to local populations.

The DRF Sandplain Duck Orchid (*Paracaleana dixonii*) has a fragmented distribution range of approximately 250 km between the Moore River National Park in the south, and the proposal area in the north. A total of five populations were identified within the DSA; which represents approximately half of the total known populations and individuals of the species. Within the proposal area, FCTs 5a and 6c are habitat for the species; however impact to these habitat FCTs would be less than 10%. No recorded individual plants would be impacted by the proposal.

The location and authorised extent of clearing would be limited to that predicted by Tronox. This is a maximum area of 1,315 ha, being 1,200 ha of native vegetation and 115 ha of pasture, within the development envelope. This maximum area of clearing is described and spatially defined in the recommended statement that the proposal can be implemented.

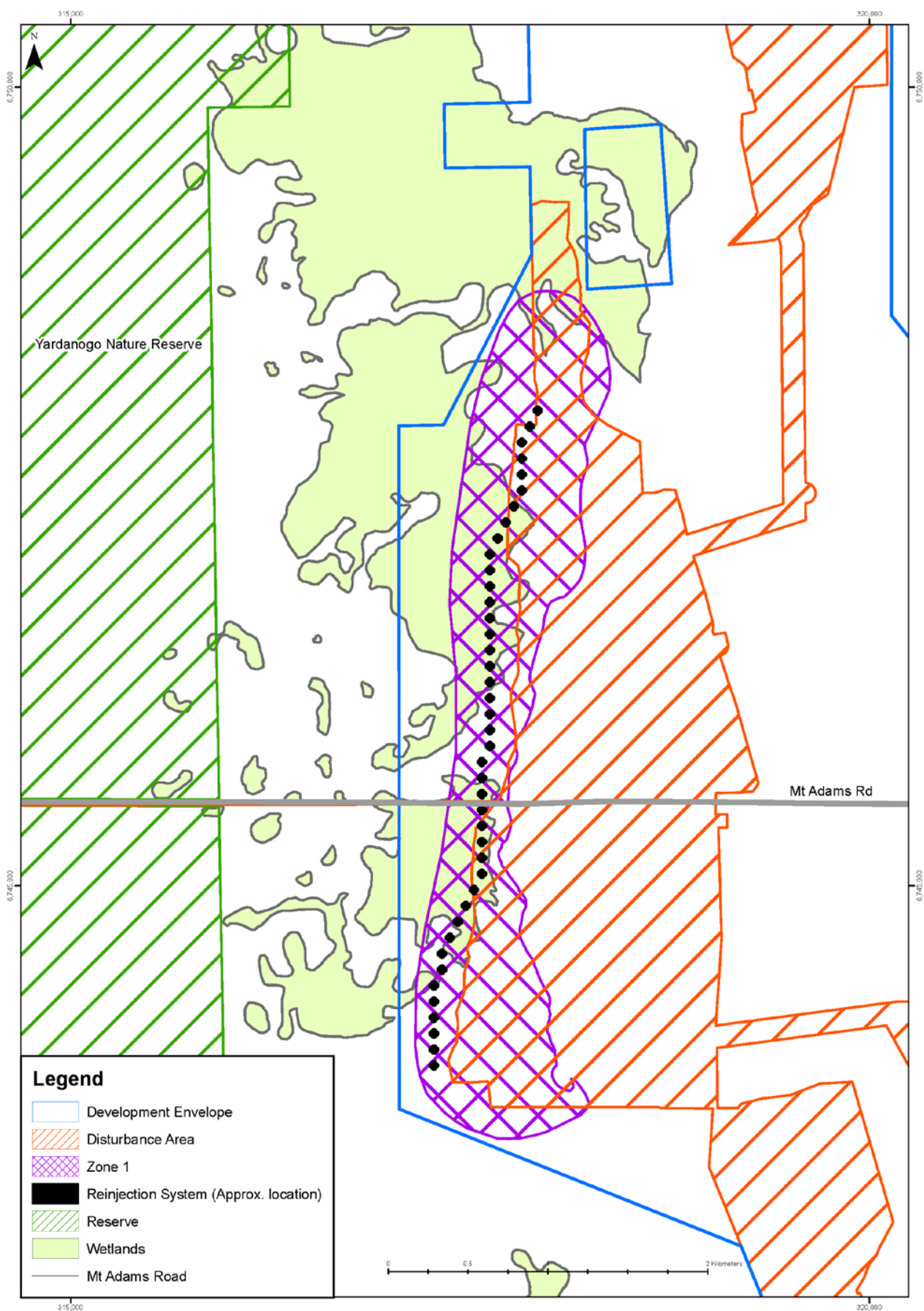


Figure 4: location of infiltration system

The main threats to Carnaby's Cockatoo are loss and fragmentation of habitat as a result of clearing and dieback. A large flock was seen feeding in and around the proposal area during fauna surveying. Potential nesting sites within the vicinity of the proposal area were also identified during surveying, but the species was not noted to be present in the area during breeding periods, suggesting the area constitutes foraging habitat.

It is the EPA's opinion that a significant residual impact relating to the clearing of native vegetation which supports Carnaby's Cockatoo foraging habitat and wetlands remains when considering this proposal in the context of the cumulative impacts of existing clearing in the agricultural area. This is discussed in Section 3.2 Offsets.

Drawdown on groundwater dependent ecosystems:

The wetlands occurring within the GDE immediately west of the proposed mine; known as Zeus, Heracles and Hebe for the purposes of the assessment, are predominately characterised by their groundwater hydrology and the fact that they are rainfall recharged. Investigations and groundwater monitoring indicates that the wetlands are not subject to prolonged periods of inundation and are consistent with the classification of damplands; which are defined as seasonally waterlogged basins (DEC, 2007).

The Zeus wetland is the largest in the DSA at approximately 1,030 ha, followed by Hebe at approximately 492 ha and Heracles at approximately 32 ha (See Figure 3).

The hydrological connectivity between the wetlands and the superficial aquifer is variable and complex as the soil profile contains discontinuous layers of vertical impedance resulting in 'patchy' infiltration and perching. Water levels in the wetlands can be either an expression of perched groundwater or an expression of the watertable in the superficial aquifer.

The wetlands themselves are considered to be equivalent to CCW, and the surrounding GDE is almost undisturbed with native vegetation in pristine to excellent condition.

For the purposes of the assessment, all native vegetation in areas with a groundwater depth of less than 10 metres (m) was considered to be GDE. The total area of GDE mapped in the DSA is 4,407 ha.

Initial groundwater modelling of drawdown associated with dry mining undertaken for the PER predicted 373 ha of GDE would be subject to a moderate to large dewatering impact; which largely occurred in the Zeus wetland. Dry mining is considered to be the worse-case scenario for predicted impacts to the wetlands and GDE.

Comments were received during the public review period in regard to the sensitivity of the groundwater model and the extent of the predicted drawdown impacts on wetlands and GDEs. As part of its response to submissions, Tronox undertook additional works to clarify the sensitivity of the groundwater

model which included a peer review, and an evaluation of additional management measures that could be applied to reduce dewatering impact on wetlands and GDEs.

The sensitivity analysis included:

- testing the sensitivity of outputs to variation in key model parameters (e.g. hydraulic connectivity, connection between aquifers, rainfall infiltration etc.); and
- testing the sensitivity of outputs due to changes in the mine plan (e.g. alternating mining between pits, increased speed of mining, reinjection system etc.).

Outputs of each phase were reviewed against the base-case being the dry mining scenario presented in the PER.

The results of the peer review concluded that the groundwater model was a sound representation of the regional conditions at the proposal area. Sensitivity testing concluded that changing model parameters does not increase the extent of the predicted drawdown impacts.

The review of changes to the mine plan determined one mitigation measure, reinjection of water via infiltration ponds, to be a feasible option which significantly reduces drawdown impacts. The reinjection system involves 42 infiltration trenches approximately 0.5 m deep, 1 m wide and 3 m long, to be located approximately 250 – 300 m west of the Zeus pit (see Figure 4). The revised prediction for drawdown impact on the Zeus wetland and GDEs has been reduced from 373 ha to 105 ha. This represents a reduction of approximately 72%.

The recommended statement that the proposal can be implemented identifies Zone 1 (Figure 2 of Appendix 4) where impacts to the Zeus wetland and GDEs are predicted to occur. Zone 1 has a total area of 339 ha, of which 159 ha would be cleared. Of the remaining 180 ha, Tronox would limit its dewatering impact to 105 ha. The EPA has recommended condition 6 which requires that no impacts to wetlands and GDEs are allowed outside of Zone 1. Condition 6 has also been prepared considering Tronox's proposed mitigation measure of an infiltration system. Condition 6 includes monitoring to demonstrate that impacts are contained within the areas predicted and contingency measures in the event the mining activities are having a greater impact than predicted.

The cumulative impact of clearing and dewatering of wetlands is also a significant residual impact requiring offsets. This is discussed in Section 3.2 Offsets.

Summary

Having particular regard to:

- (a) the high impact to local populations of Priority flora species is not expected to alter their conservation status;

- (b) the clearing of native vegetation, GDEs containing wetlands, DRF habitat; and which supports Carnaby's Cockatoo foraging habitat; and
- (c) the significant residual impact that remains when considering the cumulative impacts of existing clearing in the agricultural area,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objectives for these factors provided conditions are imposed requiring:

- the impacts on terrestrial and GDE native vegetation to be limited to that predicted by the proponent;
- monitoring to demonstrate that impacts are contained within the areas predicted and contingency management is also required in the event the mining activities are having a greater impact than predicted; and
- an offset for the significant residual impact on the cumulative impact of clearing Carnaby's Cockatoo foraging habitat and wetlands (discussed further in Section 3.2 below).

3.2 Offsets

Description

As discussed in Section 3.1 Flora and Vegetation, and Terrestrial Fauna, the proposal would result in the loss of 1,200 ha of pristine to excellent condition native vegetation including GDEs and CCW wetland from clearing, and impacts to an additional 105 ha of the wetland and GDE vegetation from dewatering.

The native vegetation to be cleared represents habitat for DRF species and foraging habitat for Carnaby's Cockatoo.

Submissions

Key matters in submissions focused on:

- the clearing of native vegetation and impacts of dewatering on GDEs poses a significant residual impact; and
- that any proposed offsets need to account for the loss of Carnaby's Cockatoo foraging habitat and significant vegetation and flora species.

Assessment

The EPA's environmental objective for this factor is:

- Offsets – to counterbalance any significant residual environmental impacts or uncertainty through the application of offsets.

While the proposal area would be rehabilitated post-mining, there would be the temporary impact of the loss of habitat available for fauna, specifically Carnaby's Cockatoo. Rehabilitation does not restore full ecological function and may not result in the return of important conservation significant flora species; hence there would also be permanent losses. This is particularly

pertinent when considering the historic and high extent of clearing already undertaken in the surrounding agricultural area.

To address significant residual impacts, Tronox has proposed an offset to protect and enhance at least 2,610 ha of land (i.e. twice the impacted area). This would be achieved through a combination of land acquisition and improvement activities.

Tronox has also proposed that land acquired would be ceded to the Department of Environment and Conservation (DEC) for management. Additionally, Tronox would contribute to the cost of ongoing management of land(s) as agreed with the DEC. Any land acquired must contain the following essential habitat qualities:

- contains Carnaby's Cockatoo foraging habitat (e.g. appropriate vegetation communities);
- is able to be afforded a higher level of protection; and
- is located within the feeding range of the local population of Carnaby's Cockatoo.

Furthermore, the following habitat properties would be desirable qualities for any land acquired:

- is located within 50 km of the proposal;
- contains habitat for *Paracaleana dixonii* and *Stawellia dimorphantha*;
- contains habitat for Western Ground Parrots;
- is contiguous or in close proximity to other Carnaby's Cockatoo foraging habitat, nesting habitat and conservation estate;
- has a low perimeter to area ratio; and
- has high general biodiversity/conservation values.

The enhancement component of the offset would vary dependent on whether the acquired land(s) need improvement. If so, this component of the offset is to be focussed on that site. If not, improvement activities are to be undertaken on a different site.

Prior to the acquisition of land(s) or improvement activities, Tronox are required to consult with the DEC on the preparation of a habitat acquisition and improvement program. Specific details of land acquisitions will remain confidential until completed.

The EPA has recommended the offset program is formalised as a condition. Condition 7 requires Tronox to develop a habitat acquisition and improvement program to offset the significant residual impact to Carnaby's Cockatoo habitat and wetlands.

Summary

The EPA considers the key environmental factor of offsets has been adequately addressed and the proposal can be managed to meet the EPA's objective for this factor provided that conditions are imposed requiring the proponent to:

- offset for the significant residual impact to Carnaby's Cockatoo habitat and wetlands, by undertaking an offset program consisting of land acquisition and habitat improvement.

3.3 Environmental principles

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

4 Matters of National Environmental Significance

This proposal was determined by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) as likely to have a significant impact on threatened species and communities listed under the EPBC Act (EPBC2009/5032); in particular the Endangered Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and the Vulnerable Arrowsmith Stilt-lily (*Stawellia dimorphantha*).

This proposal is being assessed by way of an accredited process with the EPA under a bilateral agreement made under section 47 of the EPBC Act. The bilateral agreement allows the Commonwealth Government Minister for Environment to rely on the PER process of the State Government of WA in assessing this action under the EPBC Act.

The assessment report on the proposed action prepared by the EPA and provided to the WA Minister for Environment is forwarded to the Commonwealth Minister for Environment who will then make a decision as to whether or not the proposal should be approved under the EPBC Act. This is separate from any WA approval that may be required.

Surveys and investigations undertaken for the PER assessment identified several species protected under the EPBC Act as being present, or having the potential to be present, within the proposal area.

Species identified as being present within the proposal area are:

- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – Endangered;
- Sandplain Duck Orchid (*Paracaleana dixonii*) – Endangered; and
- Arrowsmith Stilt-lily (*Stawellia dimorphantha*) – Vulnerable.

Having regard to the Endangered Carnaby's Cockatoo, it is endemic to the southwest of WA, occurring between Kalbarri and Cape Arid extending inland

to the Wheatbelt. It requires three key habitat types; nesting, foraging and roosting. As noted in Section 3.1, the main threats to Carnaby's Cockatoo are the loss and fragmentation of habitat, as a result of clearing and dieback. A large flock was seen feeding in and around the proposal area during fauna surveying. Potential nesting sites within the vicinity of the proposal area were also identified during surveying, but the species was not noted to be present in the area during breeding periods, suggesting the area constitutes foraging habitat.

The Sandplain Duck Orchid (*Paracaleana dixonii*), listed as Endangered, has a fragmented distribution range of approximately 250 km between the Moore River National Park in the south, and the proposal area in the north. As discussed in Section 3.1, a total of five populations were identified within the DSA for the proposal; which represents approximately half of the total known populations and individuals of the species. Within the proposal area, FCTs 5a and 6c are habitat for the species; impact to these habitat FCTs would be less than 10%. No individual plants would be impacted by the proposal.

For Arrowsmith Stilt-lily (*Stawellia dimorphantha*), listed as Vulnerable, its known range extends 90 km north-west and 30 km east-west between Eneabba to just north of Dongara. Populations of the species are known to occur within the Yardanogo Nature Reserve. The species was identified in seven FCTs within the DSA, from 423 locations. Four of the seven FCTs (4, 5a, 5b and 16a) containing approximately 67% of the individual plants identified (from 284 locations) would be impacted by the proposal through clearing and dewatering drawdown. Three of the habitat FCTs (3, 16b and 17a) containing 143 individual plants would not be impacted by the proposal.

In addition to the above, the proposal area contains suitable habitat for the Western Ground Parrot (*Pezoporus wallicus flaviventris*) (Endangered) and the Rainbow Bee-eater (*Merops ornatus*) (Marine, Migratory JAMBA).

Fauna surveys undertaken in the proposal area did not record any individuals of the Western Ground Parrot; either visually or aurally. The Western Ground Parrot is a cryptic species with a current distribution range restricted to the south coast near Albany and Esperance. One sighting was recorded from the nearby Mt Adams Road in 1992, but there have been no confirmed sightings since.

The Rainbow Bee-eater was recorded from the Mt Adams Road, west of the proposal area, and is likely to occur within the proposal area. The Rainbow Bee-eater has a widespread distribution throughout mainland Australia and occurs in a range of habitat types.

Impact from the proposal on EPBC Act listed species is not expected to result in an unacceptable or unsustainable impact on the conservation status of listed species. There are, however, significant residual impacts in relation to the cumulative impacts of clearing of native vegetation.

The EPA has recommended to the WA Minister for Environment that the location and authorised extent of vegetation clearing and impact from dewatering be limited to a total disturbance area of 1,305 ha of vegetation within the development envelope.

It should be noted the EPA has also recommended a condition for offsets, in the form of land acquisition and habitat improvement activities, to mitigate for the residual impacts to Carnaby's Cockatoo foraging habitat and wetlands. It is also desirable that any land acquired contains habitat for the flora species *Paracaleana dixonii* and *Stawellia dimorphantha*, and for Western Ground Parrots.

5 Conditions

Section 44 of the EP Act requires the EPA to report to the Minister for Environment on the key environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented.

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Tronox to develop the Dongara Titanium Minerals Project, is approved for implementation.

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

- (a) Vegetation – limiting impacts on terrestrial and GDE native vegetation including wetlands to that predicted by the proponent. Monitoring is required to demonstrate that impacts are contained within the areas predicted and contingency management is also required in the event the mining activities are having a greater impact than predicted; and
- (b) Offsets – to offset for the significant residual impact to Carnaby's Cockatoo habitat and wetlands, the proponent shall undertake an offset program consisting of land acquisition and habitat improvement.

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

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

5.2 Consultation

In developing these conditions, the EPA consulted with Tronox, the DEC, the Department of Mines and Petroleum (DMP) and the Department of Water in respect of matters of fact and matters of technical or implementation significance. Minor changes, which did not change the intent or scope, were made to condition 7.

6 Other advice

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

The EPA's environmental objective for Rehabilitation and Closure is:

- to ensure that premises can be closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed outcomes and land uses, and without unacceptable liability to the State.

Comments were received during the public review period in regard to rehabilitation and closure (specifically around completion criteria), required additional works and past rehabilitation success. As part of its response to submissions, Tronox undertook a review of rehabilitation works carried out at its Cooljarloo mine to provide context and support for its proposed rehabilitation measures at the proposed Dongara mine.

The Cooljarloo rehabilitation review contained background information on the Cooljarloo mine, a description of the planning and operational process/procedures in place, and an assessment of rehabilitation success against current completion criteria.

Tronox concluded from its review that criteria were generally being met; however some criteria require attention, for example, understorey density and species richness.

As part of its rehabilitation framework, Tronox has developed an Improvement Plan which outlines required investigations and ongoing research aimed at addressing gaps in knowledge and areas of poor performance (planning and operational). The plan is ongoing and is intended to deliver continuous improvement across all aspects of rehabilitation.

In addition to development of site specific completion criteria, the primary management strategy proposed to be undertaken at the proposed Dongara mine is progressive backfilling of voids using overburden and tailings throughout the life of mine. Progressive backfilling reduces clearing areas required for infrastructure, ensures voids do not remain at the completion of mining, minimises the time topsoil is stored and provides opportunities for mulch to be harvested and directly returned.

Rehabilitation and closure can be regulated and managed by the DMP under the *Mining Act 1978* to meet the EPA's objective. It is expected that the DMP will have regard to the outcomes of Tronox's review of previous rehabilitation undertaken at the Cooljarloo minesite. The proposed Improvement Plan will be considered further when the DMP evaluates mine closure planning in more detail and comprehensively once Tronox submits a full mine closure plan in accordance with the DMP/EPA 2011 *Guidelines for preparing Mine Closure Plans* and the *Mining Act 1978*.

Appendix 1

List of submitters

Organisations:

Department of Environment and Conservation
Department of Indigenous Affairs
Department of Mines and Petroleum
Department of Water
Radiological Council
Wildflower Society of Western Australia

Individuals:

C. Jenkins

Appendix 2

References

Australian Natural Resource Atlas (ANRA) (2009), *Biodiversity Assessment – Geraldton Sandplains*:

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Thackway, R. and Cresswell, I.D. (1995), An Interim Biogeographic Regionalisation for Australia (IBRA): *A framework for setting priorities in the National Reserves System Cooperative Program*. Reserve System Unit, Australian Nature Conservation Agency, Canberra.

Tiwest (2012), *Dongara Titanium Minerals Project – Public Environmental Review*, prepared by Strategen for Tiwest Pty Ltd, May 2012.

Tronox (2012b), *Dongara Titanium Minerals Project – Response to Submissions*, prepared by Strategen for Tronox Management Pty Ltd, November 2012.

Tronox (2012a), *2012 Review of Rehabilitation: Tronox Cooljarloo*, prepared by Strategen for Tronox Management Pty Ltd, October 2012.

Woodman (2011), *Dongara Titanium Minerals Project: Flora and Vegetation Impact Assessment*, prepared for Tiwest Pty Ltd, November 2011.

Appendix 3

Summary of identification of key environmental factors and principles

Preliminary Environmental Factors	Activities and Potential impacts	Government Agency and Public Comments	Identification of Key Environmental Factors
Flora and Vegetation	<p>Clearing of up 1200 ha of pristine to excellent terrestrial and groundwater dependent ecosystem (GDE) vegetation.</p> <p>Dewatering drawdown impact to an additional 105 ha of the GDE vegetation.</p> <p>Conservation significant flora species present in the proposal area.</p> <p>Impact to 3 vegetation associations, 8 floristic community types and 12 Priority flora species.</p>	<p>Submissions for this factor include:</p> <ul style="list-style-type: none"> • The project is located in the Mount Lesueur – Eneabba area, a biodiversity hotspot. The area supports a large number of species-rich communities. • The majority of the vegetation is in pristine to excellent condition. • Concern raised over the quantity of high value native vegetation to be cleared. • Concern raised over likely and potential impacts to priority flora species. • The mine impacts, or potentially impacts, high quality groundwater dependent vegetation. • Concern raised over the cumulative impacts from vegetation clearing for the proposal. • There is a need to limit the amount of clearing to a maximum defined extent. 	<p>Considered to be a key environmental factor and discussed in Section 3.1 Flora and Vegetation, and Terrestrial Fauna.</p>
Fauna	<p>Clearing and dewatering drawdown impact to Carnaby's Cockatoo foraging habitat.</p> <p>Potential presence of conservation significant fauna species in the proposal area.</p> <p>Loss of habitat, and potential individual fauna deaths from vegetation clearing activities,</p>	<p>Submissions for this factor include:</p> <ul style="list-style-type: none"> • The proposal would have residual impact on Carnaby's Cockatoo foraging area; specific management actions and monitoring measures are required for this species. • The proposal has the potential to impact conservation significant fauna species. • The proposal area contains suitable habitat for the 	<p>The potential impacts on foraging habitat for Carnaby's Cockatoo is discussed in Section 3.1 Flora and Vegetation, and Terrestrial Fauna.</p> <p>Fauna surveys did not identify nesting areas for Carnaby's Cockatoo.</p> <p>Surveys completed did not record any individuals of the Western Ground Parrot. However, the proponent has committed to</p>

	dewatering, vehicular movements and mining activities.	<p>Western Ground Parrot; surveys prior to ground clearing should be undertaken and specific management and monitoring measures should be undertaken for this species.</p> <ul style="list-style-type: none"> • Translocation of fauna requires licensing under the <i>Wildlife Conservation Act 1950</i>. 	<p>pre-mining, during mining and post mining surveys for the Western Ground Parrot.</p> <p>Management and mitigation measures to be detailed in the proponent's Fauna Management Plan.</p> <p>Management and mitigation measures for fauna species on-site include:</p> <ul style="list-style-type: none"> • Staged clearing in mining areas to allow fauna to vacate; • Minimisation of clearing, and restriction of clearing to designated areas; • Restricting machinery, vehicles and personnel to designated areas; • Set speed limits on-site; • Installation of warning signs on internal roads; • Prohibition of feeding, hunting or keeping fauna on-site; and • Proper disposal of food scraps and waste. <p>Translocation of fauna, and/or taking of any protected fauna species to be managed by the Department of Environment and Conservation under the requirements of the <i>Wildlife Conservation Act 1950</i>.</p>
Dieback and Weeds	Introduction of dieback has the potential to significantly impact the native vegetation type in the proposal area; being predominately proteaceous heath and scrub.	<p>Submissions for this factor include:</p> <ul style="list-style-type: none"> • Dieback introduction and spread represent a substantial threat to the area impacted by mining and the eventual rehabilitation of the area. • Concern raised over the risks associated with introducing dieback to the proposal area, and the 	<p>Surveys undertaken have not identified dieback at the site.</p> <p>Incidence of weeds is only present in disturbed areas adjacent to farming properties.</p>

	<p>The spread of weeds at the site has the potential to significantly affect the values of the proposal area and surrounds.</p>	<p>potential for it to spread to the near-by Yardanogo Nature Reserve.</p>	<p>Spread of weeds and dieback prevention to be controlled through management and mitigation measures detailed in the proponent's Weed and <i>Phytophthora cinnamomi</i> Management Plan.</p> <p>Management and mitigation measures to control the spread of weeds and prevent the introduction of dieback include:</p> <ul style="list-style-type: none"> • Implementation of weed and dieback hygiene measures; • Restricting vehicles to designated areas; • Pre-clearing planning and site selection; and • Minimisation of clearing area. <p>Additionally, weed ingress management is to be addressed as part of the rehabilitation works and regulated under the <i>Mining Act 1978</i>.</p> <p>Not considered to be a key environmental factor.</p>
Hydrological processes	<p>Dewatering is required to allow access to ore bodies.</p> <p>Abstraction from the superficial and Yarragadee aquifers for on-site water supply.</p> <p>Potential mounding from operation of tailings facilities.</p> <p>Potential impact to groundwater quality from exposing acid sulphate soils to oxygen, and from hydrocarbon</p>	<p>Submissions for this factor include:</p> <ul style="list-style-type: none"> • Dredge mining is a preferred option for mining as it poses a lower risk to GDEs. • Errors were noted in the calculations used for the pump test, test parameters and the length of pump testing. • Concerns raised over the confidence in the groundwater model predictions for impact to GDEs. • Concerns raised over the extent of impact to high quality wetlands. 	<p>The potential impact of dewatering on GDEs and flora and vegetation is discussed in Section 3.1 Flora and Vegetation, and Terrestrial Fauna.</p> <p>Groundwater management, including a monitoring program for water quality and levels, to be detailed in the proponent's Adaptive Groundwater Management Plan.</p> <p>Abstraction and dewatering quantities would be set and Licensed. Mine dewater would not be discharged to the environment.</p>

	spills.	<ul style="list-style-type: none"> • If the proposal is approved, impact to wetlands should be set to a maximum defined limit. • A Groundwater Drawdown Monitoring and Management Plan should be developed for the proposal. • A query whether mine dewater would be discharged to the environment. 	Groundwater abstraction and dewatering to be managed and regulated by the Department of Water under the requirements of the <i>Rights in Water and Irrigation Act 1914</i> (Licensing and Operating Strategy).
Acid Sulfate Soils	<p>Acid forming materials are present in soils on site.</p> <p>Exposure of acid forming material to oxygen during mining has the potential to contaminate soil and groundwater.</p> <p>Storage of acid sulfate soil (ASS) mineral waste has the potential to cause contamination through mobilisation of acid.</p>	<p>Submissions for this factor include:</p> <ul style="list-style-type: none"> • Detailed information on acid sulfate soil investigations is required for the Mining Proposal. • Waste characterisation should be undertaken prior to mining and be managed accordingly. • A contingency plan to ensure potential water quality changes associated with dewatering do not adversely affect environmental receptors (i.e. wetlands). 	<p>Planning, management and mitigation measures are to be detailed in the proponent's Acid Sulfate Soil Management Plan.</p> <p>Further soil investigations in proximity to the Zeus deposit will be undertaken prior to mining. Monitoring of soil and groundwater quality will be ongoing.</p> <p>ASS to be managed and regulated by the Department of Mines and Petroleum under the requirements of the <i>Mining Act 1978</i> (Mining Proposal).</p> <p>Not considered to be a key environmental factor.</p>
Radioactive material	<p>Potential contamination of soil and groundwater through inappropriate handling and storage of heavy mineral concentrate (HMC).</p> <p>Potential contamination of soil and groundwater from accidental spillage of HMC during transportation.</p>	<p>Submissions for this factor include:</p> <ul style="list-style-type: none"> • Having regard to radiation safety, requirements associated with the <i>Mines Safety and Inspection Act 1995</i> and the <i>Radiation Safety Act 1975</i> must be adhered to for the proposal. • Once mining ceases, the site will remain registered under the <i>Radiation Safety Act 1975</i> until the Radiological Council approves the release of the site and terminates the registration. 	HMC will be managed on-site in accordance with the proponent's Radiation Management Plan which conform with the Australian Radiation Protection and Nuclear Safety Authority (ARPANSA) Guidelines. The Plan will operate within the existing framework of the Tiwest Northern Operation Radiation Management Plan, which also covers the Cooljarloo minesite and Chandala Processing Plant.

	Emissions of radiation has the potential to adversely affect ecological values and human health.	<ul style="list-style-type: none"> Amendments to the existing Northern Operations Radiation Management Plan require approval from the Radiological Council. 	<p>Radiation safety to be managed by the Department of Mines and Petroleum under the requirements of the <i>Mines Safety and Inspection Act 1994</i>, and transportation of HMC to be regulated by the Radiological Council under the <i>Radiation Safety (Transportation of Radioactive Substances) Regulations 2002</i>.</p> <p>Not considered to be a key environmental factor.</p>
Dust	<p>Potential dust generation from:</p> <ul style="list-style-type: none"> Construction activities; Mining activities; Haulage; Vehicles on unsealed roads; Wind erosion in cleared areas; and Material lift-off from stockpiles. <p>Dust can adversely impact environmental values e.g. blanket vegetation, and create a nuisance for nearby land users.</p>	<p>Submissions for this factor include:</p> <ul style="list-style-type: none"> A detailed dust management plan which provides monitoring techniques, trigger levels for management controls and designated responsibilities for management actions should be developed. 	<p>Dust generation within the proposal area to be controlled through management and mitigation measures detailed in the proponent's Dust Management Plan.</p> <p>Management and mitigation measures for dust include:</p> <ul style="list-style-type: none"> Use of water trucks in dust prone areas; Not undertaking earthworks in high wind conditions; Speed limits on internal roads and tracks; Retention of vegetated areas; and Progressive clearing and rehabilitation of mining areas. <p>Not considered to be a key environmental factor.</p>
Indigenous Heritage	<p>The proposal area is located within the Amangu Native Title Claim area recognised under the <i>Native Title Act 1993</i>.</p> <p>Three sites of Aboriginal</p>	<p>Submissions for this factor include:</p> <ul style="list-style-type: none"> The proponent is obligated to abide by the requirements of the <i>Aboriginal Heritage Act 1972</i>. The Cultural Due Diligence Guideline is a useful document for decision-making associated with 	<p>Heritage surveys have been conducted over the proposal area.</p> <p>The Dongara Project Agreement was reached following consultation with the Amangu Native Title Claimant group for</p>

	heritage significance are within the vicinity of the proposal area.	works to be undertaken for the proposal.	<p>the protection of heritage and compensation to the Claimant group. The Agreement includes key measures such as:</p> <ul style="list-style-type: none"> • Procedures for surveys, supervision of ground disturbance and protocols to apply in the event sites/matters of heritage significance are identified; • Training of staff in heritage and cultural matters of significance; and • Ongoing consultation with the Claimant group. <p>The disturbance of any identified heritage sites to be managed and regulated by the Department of Indigenous Affairs under the requirements of the <i>Aboriginal Heritage Act 1972</i>.</p> <p>Not considered to be a key environmental factor.</p>
Amenity	<p>Land at the proposal site is comprised of intact native vegetation in pristine to excellent condition.</p> <p>The area surrounding the proposal area is predominantly pastoral and reserve lands.</p>	<p>Submissions for this factor include:</p> <ul style="list-style-type: none"> • Concern raised that the PER does not adequately address traffic movements. • A query of where the gravel and basic raw materials for the proposal would be sourced. 	<p>The nearest receptors to the proposal area are residents approximately 2.5 km away and the town of Dongara approximately 25 km away.</p> <p>Having regard to truck movements, there will be approximately 10 return trips per day to the Chandala Processing Plant. The proponent is consulting with the Shire of Irwin with regard to an upgrade of the Mt Adams Road to access the minesite. It is also noted that the Brand Highway is a route designed to accept trucking movements of this scale. The potential impacts of increase traffic movements are not considered to be significant.</p>

			<p>Construction materials to be sourced from within the mine footprint, or off lease sources.</p> <p>Impact to visual amenity will be managed primarily by staged clearing, and progressive rehabilitation to the agreed post mining land use as soon as possible.</p> <p>Not considered to be a key environmental factor.</p>
Rehabilitation and Closure	<p>Unsuitable or poorly constructed post-closure landforms potentially preventing establishment of a self-sustaining ecosystem.</p> <p>Ongoing contamination from mining activities prevents establishment of a self-sustaining ecosystem and creates enduring legacy issues.</p> <p>Failure to establish a self-sustaining ecosystem results in the permanent loss of environmental values.</p>	<p>Submissions for this factor include:</p> <ul style="list-style-type: none"> Concerns raised over the ability to adequately rehabilitate mineral sands mines. Concerns raised over completion criteria and targets for rehabilitation. Landform stability is critical to the establishment of self-sustaining ecosystems. Key information for rehabilitation and closure, including completion criteria, needs to be provided as part of the Mining Proposal. A query of where mulch for rehabilitation would be sourced. 	<p>Not considered to be a key environmental factor and discussed in Section 6 Other Advice.</p> <p>Progressive rehabilitation, including backfilling of voids using overburden and tailings, would be undertaken throughout the life of mine. Mulching would only occur within the mine footprint prior to clearing, and would not extend beyond the maximum limit of native vegetation clearing (1200 ha).</p> <p>Specific actions, including rehabilitation criteria, are to be detailed in the proponent's Rehabilitation Management Plan and Closure Management Plan.</p> <p>Rehabilitation and closure to be managed and regulated by the Department of Mines and Petroleum under the requirements of the <i>Mining Act 1978</i>.</p>
Offsets	Significant residual impact from the clearing of 1200 ha and dewatering impact to 105 ha of pristine to excellent native vegetation containing	<p>Submissions for this factor include:</p> <ul style="list-style-type: none"> The proposal poses significant residual impacts to Carnaby's Cockatoo and restricted, endemic flora species of conservation significance. 	<p>Considered to be a key environmental factor and discussed in Section 3.2 Offsets.</p>

	wetlands and Declared Rare Flora habitat; which also supports Carnaby's Cockatoo foraging habitat.		
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PRINCIPLES	Relevant	Consideration
<p>1. The Precautionary Principle</p> <p><i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by: (a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and (b) an assessment of the risk-weighted consequences of various options.</i></p>	Yes	<p>In considering this principle, the EPA notes that vegetation, flora, fauna habitat and wetland values would be impacted by the proposal.</p> <p>An assessment of the adequacy of the investigations and proposed management frameworks is provided in Section 3.1 of this report. The EPA is satisfied there is an understanding of the environmental factors potentially impacted by the proposal and there is confidence in the proponent's predictions. The recommended conditions of approval address the uncertainty with regard to predictions by defining limits, monitoring and management, to ensure the proposal is implemented as proposed. Offsets for the significant residual impacts to Carnaby's Cockatoo foraging habitat and wetlands, have regard for the regional cumulative impacts. The offset program consists of land acquisition and habitat improvement. The EPA has recommended the offset program as a condition of the proposal being approved for implementation. The proposal can be managed to meet the EPA's objectives.</p>
<p>2. The Principle of Intergenerational Equity</p> <p><i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p>	Yes	<p>In considering this principle, the EPA notes there was initially some uncertainty in regard to the proposed rehabilitation works.</p> <p>The proponent has reviewed its current practices and proposed a program to improve on the current identified limitations to rehabilitation success as discussed in Section 6 of this report. Rehabilitation will be regulated and managed under the <i>Mining Act 1978</i> to ensure rehabilitation of the site achieves acceptable criteria and to implement the proposed improvement program, to meet the EPA's objectives. As noted above, the proponent has developed offsets and the EPA has recommended the offset program as a condition of the proposal being approved for implementation.</p>
<p>3. The Principle of the Conservation of Biological Diversity and Ecological Integrity</p> <p><i>Conservation of biological diversity and</i></p>	Yes	<p>In considering this principle, the EPA notes that the proposal would impact an area of high environmental values; in its vegetation, flora, fauna habitat and wetlands.</p> <p>The proposal to mine would result in the direct loss or degradation of a portion of</p>

<i>ecological integrity should be a fundamental consideration.</i>		these values. The proposal has been judged as being able to be managed to meet the EPA's objectives for flora and vegetation, and terrestrial fauna. There remains a significant residual impact to Carnaby's Cockatoo habitat and wetlands when the regional cumulative impacts are considered. As discussed above, an offset program consisting of land acquisition and habitat improvement to address these significant residual impacts has been developed, and is a recommend condition of approval.
<p>4. Principles relating to Improved Valuation, Pricing and Incentive Mechanisms.</p> <p>(1) <i>Environmental factors should be included in the valuation of assets and services.</i></p> <p>(2) <i>The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.</i></p> <p>(3) <i>The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.</i></p> <p>(4) <i>Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.</i></p>	N/A	
<p>5. The Principle of Waste Minimisation</p> <p><i>All reasonable and practicable measures</i></p>	N/A	

<i>should be taken to minimize the generation of waste and its discharge into the environment.</i>		
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Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
BIOPHYSICAL			
			[Factor - specific aspect/ impact] considered to be a relevant environmental factor
POLLUTION			
SOCIAL SURROUNDINGS			

PRINCIPLES		
Principle	Relevant Yes/No	If yes, Consideration
1. The precautionary principle <i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</i> <i>In application of this precautionary principle, decisions should be guided by –</i> (a) <i>careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i> (b) <i>an assessment of the risk-weighted consequences of various options.</i>		

2. The principle of intergenerational equity <i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i>		
3. The principle of the conservation of biological diversity and ecological integrity <i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i>		
4. Principles relating to improved valuation, pricing and incentive mechanisms (1) <i>Environmental factors should be included in the valuation of assets and services.</i> (2) <i>The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.</i> (3) <i>The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.</i> (4) <i>Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.</i>		
5. The principle of waste minimisation <i>All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.</i>		

Appendix 4

Identified Decision-making Authorities and Recommended Environmental Conditions

Identified Decision-making Authorities

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

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

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

Decision-making Authority	Approval
Minister for Water	<i>Rights in Water and Irrigation Act 1914</i> <ul style="list-style-type: none"> • Water extraction licence(s)
Minister for Aboriginal Affairs	<i>Aboriginal Heritage Act 1972</i> <ul style="list-style-type: none"> • Section 18 approval
Minister for Environment	<i>Wildlife Conservation Act 1950</i> <ul style="list-style-type: none"> • Taking of protected flora and fauna
Director General, Department of Environment and Conservation	<i>Environmental Protection Act 1986</i> <ul style="list-style-type: none"> • Works Approval and Licence
Director Environment Division, Department of Mines and Petroleum	<i>Mining Act 1978</i> <ul style="list-style-type: none"> • Mining proposal
State Mining Engineer, Department of Mines and Petroleum	<i>Mines Safety and Inspection Act 1994</i> <ul style="list-style-type: none"> • Mines safety
Chief Dangerous Goods Officer, Department of Mines and Petroleum	<i>Dangerous Goods Safety Act 2004</i> <ul style="list-style-type: none"> • Storage and handling of hazardous materials
Secretary, Radiological Council	<i>Radiation Safety Act 1975</i> <ul style="list-style-type: none"> • Storage and use of radioactive substances • Registration

Note: In this instance, agreement is only required with DMAs #1 – 3 since these DMAs are Ministers.

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

Dongara Titanium Minerals Project, Shire of Irwin

Proposal: The proposal is to develop and operate a mineral sands mine approximately 25 kilometre (km) south-east of the township of Dongara in the Midwest Region of Western Australia.

Proponent: Tronox Management Pty Ltd
ABN 59 009 343 364

Proponent Address: Tronox Management Pty Ltd
1 Brodie Hall Drive
BENTLEY WA 6102

Assessment Number: 1698

Report of the Environmental Protection Authority Number: 1478

This Statement authorises the implementation of the Proposal described and documented in Columns 1 and 2 of Table 2 of Schedule 1. The implementation of the Proposal is subject to the following implementation conditions and procedures and Schedule 2 details definitions of terms and phrases used in the implementation conditions and procedures.

1 Proposal Implementation

1-1 When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Column 3 of Table 2 in Schedule 1, unless amendments to the proposal and the authorised extent of the Proposal has been approved under the EP Act.

2 Contact Details

2-1 The proponent shall notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within 28 days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

3 Time Limit for Proposal Implementation

- 3-1 The proponent shall not commence implementation of the proposal after the expiration of 5 years from the date of this statement, and any commencement, within this 5 year period, must be substantial.
- 3-2 Any commencement of implementation of the proposal, within 5 years from the date of this statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of 5 years from the date of this statement.

4 Compliance Reporting

- 4-1 The proponent shall prepare and maintain a compliance assessment plan to the satisfaction of the CEO.
- 4-2 The proponent shall submit to the CEO the compliance assessment plan required by condition 4-1 at least six months prior to the first compliance assessment report required by condition 4-6, or prior to implementation, whichever is sooner.

The compliance assessment plan shall indicate:

- (1) the frequency of compliance reporting;
 - (2) the approach and timing of compliance assessments;
 - (3) the retention of compliance assessments;
 - (4) the method of reporting of potential non-compliances and corrective actions taken;
 - (5) the table of contents of compliance assessment reports; and
 - (6) public availability of compliance assessment reports.
- 4-3 The proponent shall assess compliance with conditions in accordance with the compliance assessment plan required by condition 4-1.
 - 4-4 The proponent shall retain reports of all compliance assessments described in the compliance assessment plan required by condition 4-1 and shall make those reports available when requested by the CEO.
 - 4-5 The proponent shall advise the CEO of any potential non-compliance within seven days of that non-compliance being known.
 - 4-6 The proponent shall submit to the CEO the first compliance assessment report 15 months from the date of issue of this Statement, or as agreed by the CEO, addressing the 12 month period from the date of issue of this Statement and then annually from the date of submission of the first compliance assessment report.

The compliance assessment report shall:

- (1) be endorsed by the proponent's General Manager or a person delegated to sign on the General Manager's behalf;
- (2) include a statement as to whether the proponent has complied with the conditions;

- (3) identify all potential non-compliances and describe corrective and preventative actions taken;
- (4) be made publicly available in accordance with the approved compliance assessment plan; and
- (5) indicate any proposed changes to the compliance assessment plan required by condition 4-1.

5 Public Availability of Data

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

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

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

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

6 Vegetation

6-1 The proponent shall ensure that groundwater dewatering and abstraction does not cause any loss of groundwater dependent vegetation beyond the boundary of Zone 1 as shown in Figure 2 and delineated by the coordinates specified in Schedule 2, and impact to groundwater dependent vegetation inside Zone 1 is limited to that specified in Schedule 1, Table 2.

6-2 To verify that condition 6-1 is being met, the proponent shall develop a Groundwater Dependent Vegetation Monitoring and Management Plan to the satisfaction of the CEO.

The Groundwater Dependent Vegetation Monitoring and Management Plan shall include:

- (1) identification of potential impact monitoring and control sites;
- (2) the design of a survey to acquire baseline data from the boundary of Zone 1 and control sites, and include health and abundance parameters;
- (3) definition of health and abundance parameters;
- (4) definition of environmental parameters to be monitored, including groundwater drawdown;
- (5) definition of monitoring frequency and timing;
- (6) identification of criteria to measure decline in health; and

- (7) details of management actions and strategies to be implemented should the criteria defined pursuant to condition 6-2 (6) indicate a decline in health of the groundwater dependent ecosystem outside the boundary of Zone 1, or beyond the limit specified in Table 2, referred to in condition 6-1
- 6-3 The proponent shall implement the approved Groundwater Dependent Vegetation Monitoring and Management Plan required by condition 6-2 prior to the start of dewatering until advised otherwise by the CEO.
- 6-4 Prior to the commencement of dewatering, the proponent shall implement the baseline monitoring survey required by condition 6-2 (2) for all sites identified in condition 6-2 (1) and submit the results to the CEO within 1 month of completion.
- 6-5 In the event that monitoring required by condition 6-3 indicates a decline in health compared with the control sites identified in condition 6-2, the proponent shall provide a report to the CEO within 21 days of the decline being identified which:
 - (1) describes the decline or change;
 - (2) provides information which allows determination of the likely root cause of the decline or change; and
 - (3) if considered likely to be the result of activities undertaken in implementing the proposal, proposes the actions and associated timelines to remediate the decline or change.
- 6-6 The proponent shall implement the actions identified in condition 6-5 (3) until the CEO determines that the remedial actions may cease.

7 Residual Impacts and Risk Management Measures

- 7-1 Prior to the commencement of ground disturbing activities, the proponent shall develop a habitat acquisition and improvement program to offset the significant residual impact to Carnaby's Cockatoo habitat and wetlands, to the requirements of the CEO.

The program shall comprise a land acquisition component of not less than 2000 hectares and a contribution of funding, to the management of the land acquired, for its long-term conservation.
- 7-2 Within 12 months of commencing ground disturbing activities the proponent shall implement the habitat acquisition and improvement program required by condition 7-1.
- 7-3 Revisions to the habitat acquisition and improvement program may be approved by the CEO.
- 7-4 The proponent shall implement revisions of the habitat acquisition and improvement program required by condition 7-3.
- 7-5 Should the proponent be required to provide an offset under condition of the approval of the Australian Government under the *Environment Protection and*

Biodiversity Conservation Act 1999, the proponent may write to the CEO seeking a reduction in the offset required under condition 7-1.

Table 1: Summary of the Proposal

Proposal Title	Dongara Titanium Minerals Project
Short Description	<p>The proposal is to mine and concentrate titanium bearing (and other valuable) mineral sands.</p> <p>The mine is to be located approximately 25 km south-east of the township of Dongara in the Midwest Region of Western Australia, on mining leases M70/1195, M70/1196, M70/1197, M70/1198, M70/1199 and M70/1200.</p> <p>Key components of the mine include:</p> <ul style="list-style-type: none"> • access roads • power station • solar drying dams • pipeline corridors • stockpiles and dumps • mine pits • ore processing plant • construction and operations support infrastructure • water bores

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

Column 1	Column 2	Column 3
Element	Location	Authorised Extent
Project development envelope	Figure 1	Up to 1420 ha within a 5304 ha development envelope
Vegetation clearing area	Figure 1	Clearing of up to 1315 ha being: <ul style="list-style-type: none"> • 1200 ha of native vegetation; and • 115 ha of pasture
Groundwater drawdown impact area (Zone 1)	Figure 2	Up to 105 ha within a 180 ha dewatering impact area, outside of clearing area within Zone 1

Figures (attached)

Figure 1: Project disturbance footprint and disturbance boundary

Figure 2: Groundwater drawdown maximum impact area

Table 3: Abbreviations

Abbreviation	Term or Phrase
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the <i>Environmental Protection Act 1986</i> , or his delegate.
EPA	Environmental Protection Authority

EP Act	<i>Environmental Protection Act 1986</i>
DEC	Department of Environment and Conservation
ha	hectare
km	kilometre

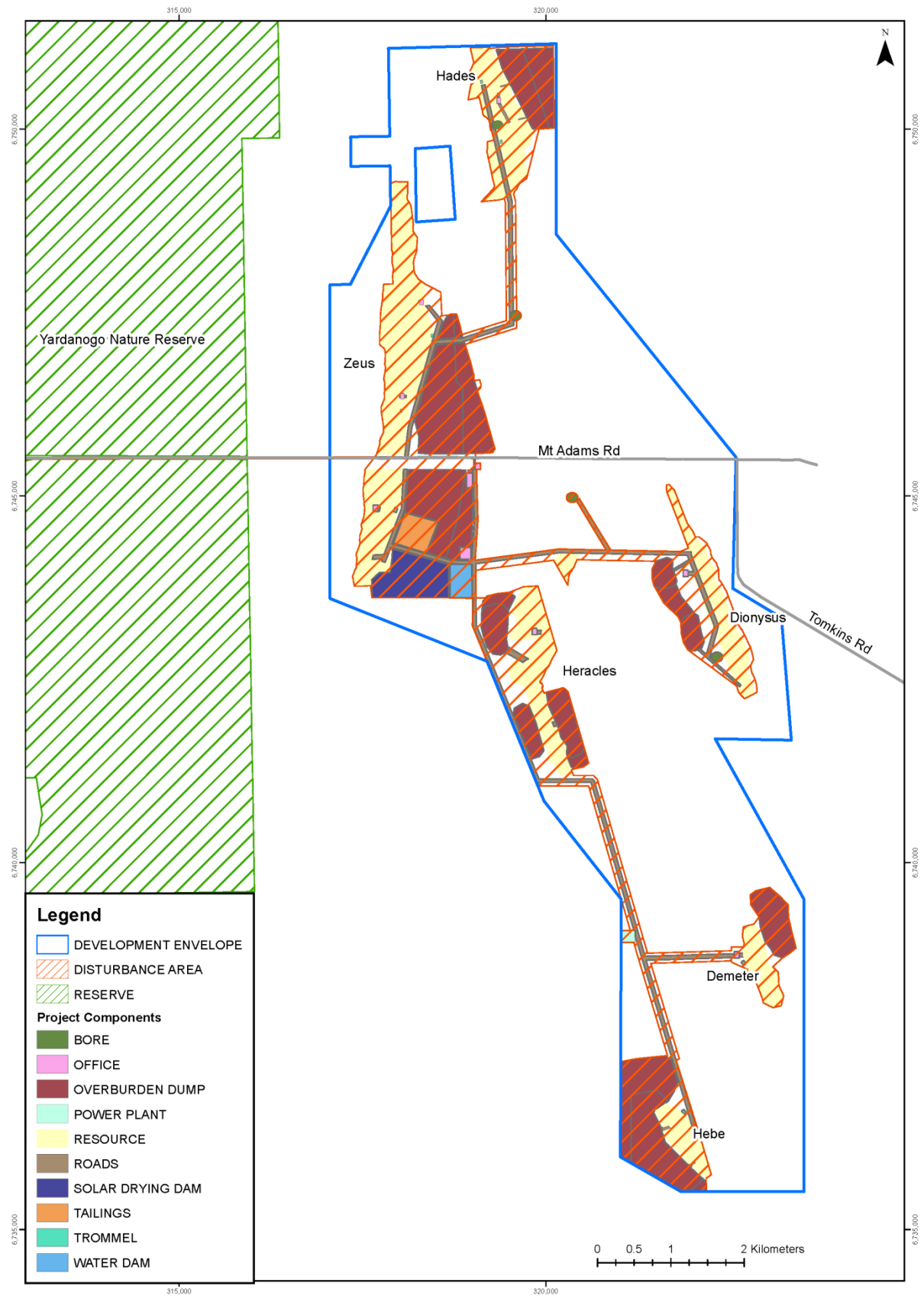


Figure 1: Project disturbance footprint and disturbance boundary

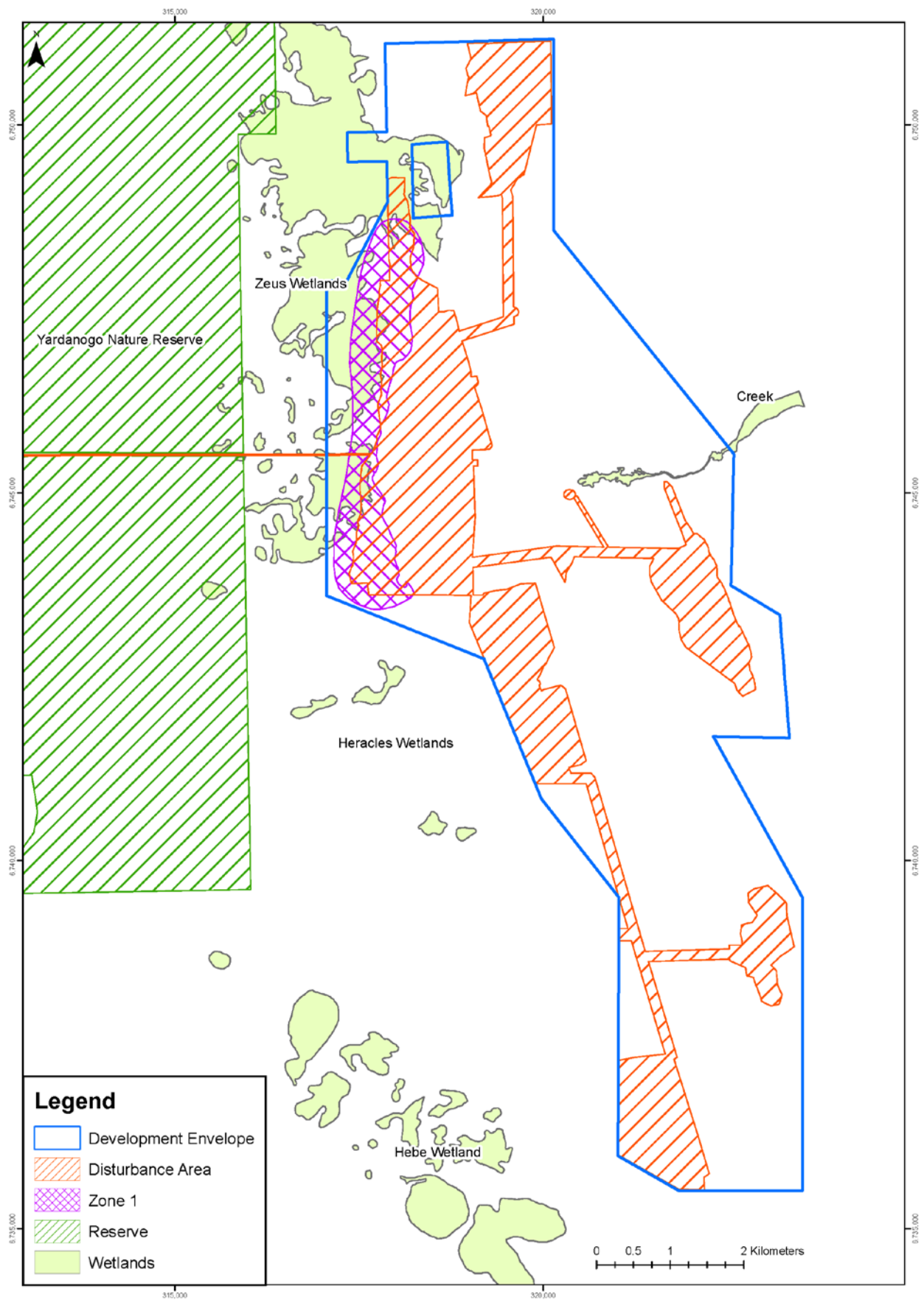


Figure 2: Groundwater drawdown maximum impact area

Schedule 2

DONGARA TITANIUM MINERALS PROJECT, SHIRE OF IRWIN

Coordinates for Development Envelope and Zone 1

Co-ordinates defining the Development Envelope and Zone 1 are held by the Office of the EPA.

Notes

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

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

Appendix 5

Summary of Submissions and Proponent's Response to Submissions