Marillana Iron Ore Project

Brockman Resources Limited

Report and recommendations of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia

Report 1376
December 2010

Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
3/3/09	**Level of Assessment set (date appeals process completed)**	
10/5/10	**Proponent Document Released for Public Comment**	**62**
8/6/10	**Public Comment Period Closed**	**4**
17/9/10	**Final Proponent response to the issues raised**	**14**
2/12/10	***EPA report to the Minister for Environment (including 2 weeks consultation on conditions)**	**11**
6/12/10	**Publication of EPA report**	**0**
20/12/10	**Close of appeals period**	**2**

STATEMENT ON TIMELINES

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

*In this case, the Environmental Protection Authority did not meet its agreed timeline objective of 10 weeks for the completion of the assessment and provision of a recommendation to the Minister. However, the timeline did include the additional and recently introduced step of consultation with the proponent and key decision making authorities on the draft conditions, which had a target timeline of two weeks.

Dr Paul Vogel
Chairman
2/12/10

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Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for Environment on the proposal to develop and operate the Marillana Iron Ore Project by Brockman Resources Limited.

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.

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;

(b) Fauna;

(c) Surface water and Groundwater; and

(d) Mine Closure and Rehabilitation.

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) The precautionary principle;

(b) The principle of the conservation of biological diversity and ecological integrity; and

(c) The principle of waste minimisation.

Conclusion

The EPA has considered the proposal by Brockman Resources Limited to develop and operate the Marillana iron ore project, a 700-750 Million tonne (Mt) iron ore mine, processing facility and associated infrastructure in the Pilbara Region of Western Australia.

The EPA notes that the project area is approximately 15 kilometres (km) south of the Fortescue Marsh, a wetland of national significance. The project area is intersected by Weeli Wolli Creek, which is a major Pilbara drainage system that discharges to the Marsh. Areas of the Marillana Sand Dunes Priority Ecological Community (PEC) are located within the project area.

The EPA also notes that the proposal would require clearing of 2985 hectares (ha) of native vegetation. However, no vegetation associated with Marillana Sand Dunes PEC would be cleared or excavated. Direct impacts to the known populations of the priority flora *Goodenia nuda* are also unlikely given the proposed infrastructure locations. The proponent has committed to maintaining a 30m buffer from the bank of Weeli Wolli Creek to protect riparian vegetation.

The EPA considers that impacts to vegetation associations in the project area are unlikely to be regionally significant given the widespread nature of the identified vegetation types within the Pilbara Region, and the location of the mine pits and infrastructure in relation to areas of significant vegetation.

The EPA also notes that current groundwater models suggest that dewatering would produce a cone of depression in the regional groundwater table which would extend towards the Fortescue Marsh, resulting in a drawdown of 1 metre below the southern boundary of the Marsh towards the end of the mine life.

As the Fortescue Marsh is believed to be a primarily surface-water fed system, the EPA considers that drawdown related to the proposal is unlikely to significantly impact the environmental values of the Marsh, however, the EPA has recommended a condition to ensure that impacts associated with drawdown are monitored and managed appropriately.

The EPA also notes that groundwater drawdown beneath areas of Weeli Wolli Creek within the mining tenement is likely to be more than 20 metres below pre-mining levels. It is expected that impacts to the potentially phreatophytic vegetation of Weeli Wolli Creek from the reduction in groundwater levels would be mitigated by seasonal flow events which occur each year, and by increased flow within the creek resulting from discharge of excess mining water upstream of the project area. The EPA has recommended a condition to ensure that impacts to riparian vegetation associated with drawdown are monitored and managed appropriately.

Due to the placement of the mine pit and infrastructure on the floodplain, there would be a reduction in the available area (and thus surface runoff) into Weeli Wolli Creek. These areas total approximately 0.4% of the Weeli Wolli Creek catchment area and represent only a small reduction in runoff. Reduction in runoff to the Fortescue Marsh is estimated at 0.04% (Brockman 2010a) and is unlikely to have a significant impact to the ecological values of the Marsh. Overland flow would be channelled into diversion drains around the mine pit and infrastructure, including waste rock dumps, and discharged back to Weeli Wolli Creek via sedimentation ponds, using natural drainage channels where possible.

It is noted that, based on the results of static testing, Brockman considers that the waste material would be inert and does not pose a threat to water quality or revegetation works. Planning for mine waste disposal has not therefore considered the potential for leachates to impact water quality. The EPA has recommended condition 11 to ensure that further testing is carried out to determine the leaching potential of waste material, and that appropriate risk assessment, prevention, management and monitoring strategies are developed prior to implementation of the proposal.

The EPA acknowledges Brockman's proposed management actions in relation to potential impacts to surface water and groundwater quality. However, given the environmental values of the receiving environment, particularly that the Fortescue Marsh is downstream of the project area, condition 10 has been recommended to

ensure that groundwater and surface water quality downstream of the project area is protected from contamination.

The EPA has also recommended conditions to ensure that weeds are managed and that the project area is rehabilitated and decommissioned appropriately following mining.

The EPA has provided other advice regarding the need to ensure that the power station included in the proposal complies with current best practice for air emissions, and the protection of the values of the Fortescue Marsh.

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

Recommendations

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

1. That the Minister notes that the proposal being assessed is for the development and operation of a 700-750 Mt Iron Ore mine and associated infrastructure;
2. That the Minister considers the report on the key environmental factors and principles as set out in Section 3;
3. That the Minister notes the EPA has concluded that it is likely that the EPA's objectives would be achieved, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarized in Section 4; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Conditions

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

(a) avoidance of impacts to the Marillana Sand Dune PEC;

(b) avoidance of clearing within 30m of the bank of Weeli Wolli Creek;

(c) monitoring of riparian vegetation along Weeli Wolli Creek and management of any impacts to the vegetation as a result of to groundwater drawdown;

(d) prevention of impacts to the Fortescue Marsh as a result of groundwater drawdown;

(e) management of surface water flows in the project area;

(f) maintenance of groundwater and surface water quality;

(g) management of acid and metalliferous drainage;

(h) prevention of the introduction or spread of weeds within the project area;

(i) rehabilitation; and

(j) closure and decommissioning.

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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 Brockman Resources Limited to develop and operate a 700-750 Million Tonne (Mt) iron ore mine and associated infrastructure.

The Marillana Iron Ore Project was referred to the EPA by Brockman Resources Limited (Brockman) on 4 February 2009, and a Level of assessment (LoA) of PER with a 4 week public review period was set. No appeals on LoA were received. The proponent's PER Document was released for public review on the 10th May 2010.

The project is being formally assessed as a result of its proximity to a number of conservation significant features in the region, notably the Fortescue Marsh, a wetland of national significance which occurs 15 kilometres (km) north of the project area. The project area also includes a section of Weeli Wolli Creek, a major Pilbara Drainage line which discharges to the Marsh, and the Marillana Sand Dune Priority Ecological Community (PEC).

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

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

2. The proposal

The proposal involves the development and operation of a 750 Mt iron ore mine, processing facility and associated infrastructure within mining leases M47/1414 and M47/1419. The project area is located approximately 100km north west of Newman in the Fortescue valley (Figure 1). The project area is approximately 15km south of the Fortescue Marsh, a wetland of national significance, (Figure 2) and is intersected by Weeli Wolli Creek, which is a major Pilbara drainage system that discharges to the Marsh.

The expected life of the proposal is 20 years. The mine would be developed using traditional open pit mining methods of excavating, load and haul and includes:

- an open cut iron ore mine producing 17-19 Mt of beneficiated ore per annum;
- dewatering at a peak rate of 32 Million Litres /day in the third year of mining;
- re-injection bores and infiltration ponds for disposal of excess water;
- above ground overburden and fine rejects (tailings) storage;
- in-pit disposal of waste rock after year two of operation;
- in-pit disposal of tailings after year seven of operations;
- crushing, screening and processing facilities;
- train loading facilities and construction of a rail loop connecting to the existing BHP Billiton Iron Ore railway facilities;

- accommodation camp and associated facilities, including waste water treatment plant and Class II landfill;
- offices, workshops, laboratory and supporting infrastructure including explosives facility and bulk fuel storage.

The main characteristics of the proposal are summarised in Table 1 below. The layout of key elements of the project are shown in Figure 3. A detailed description of the proposal is provided in Section 5 of the PER (Brockman 2010a).

Table 1: Summary of key proposal characteristics

Element	Description
General	
Proposed Commencement	2012
Project life span	Approximately 20 years
Area of Disturbance	Up to 2985 hectares (ha)
Mining	
Total pit area	Up to 1648 ha
Waste Rock disposal	Up to 587 ha above ground plus in-pit storage.
Fines rejects Storage	Up to 247 ha above ground plus in-pit storage.
Other infrastructure	Up to 503 ha
Dewatering	Approximately 120 Gigalitres over the life of the mine.
Dewatering rate	Peak dewatering of up to 32 ML/day.
Dewater disposal	• Use on-site for processing, dust suppression, and use at accommodation camp; • Managed Aquifer Recharge; and • Infiltration ponds. • No discharge to any creekline
Infrastructure	
Processing requirements	Crushing, screening and wet gravity beneficiation.
Workforce accommodation	On-site accommodation camp.
Water supply	• Pit Dewatering; • Off-take agreements where possible; and • On or off -tenement bores where necessary.
Power source	On site diesel-NG/LNG dual fuel generators.

The potential impacts of the proposal predicted by the proponent in the PER document (Brockman 2010a) and their proposed management are summarised in Table 1 (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.

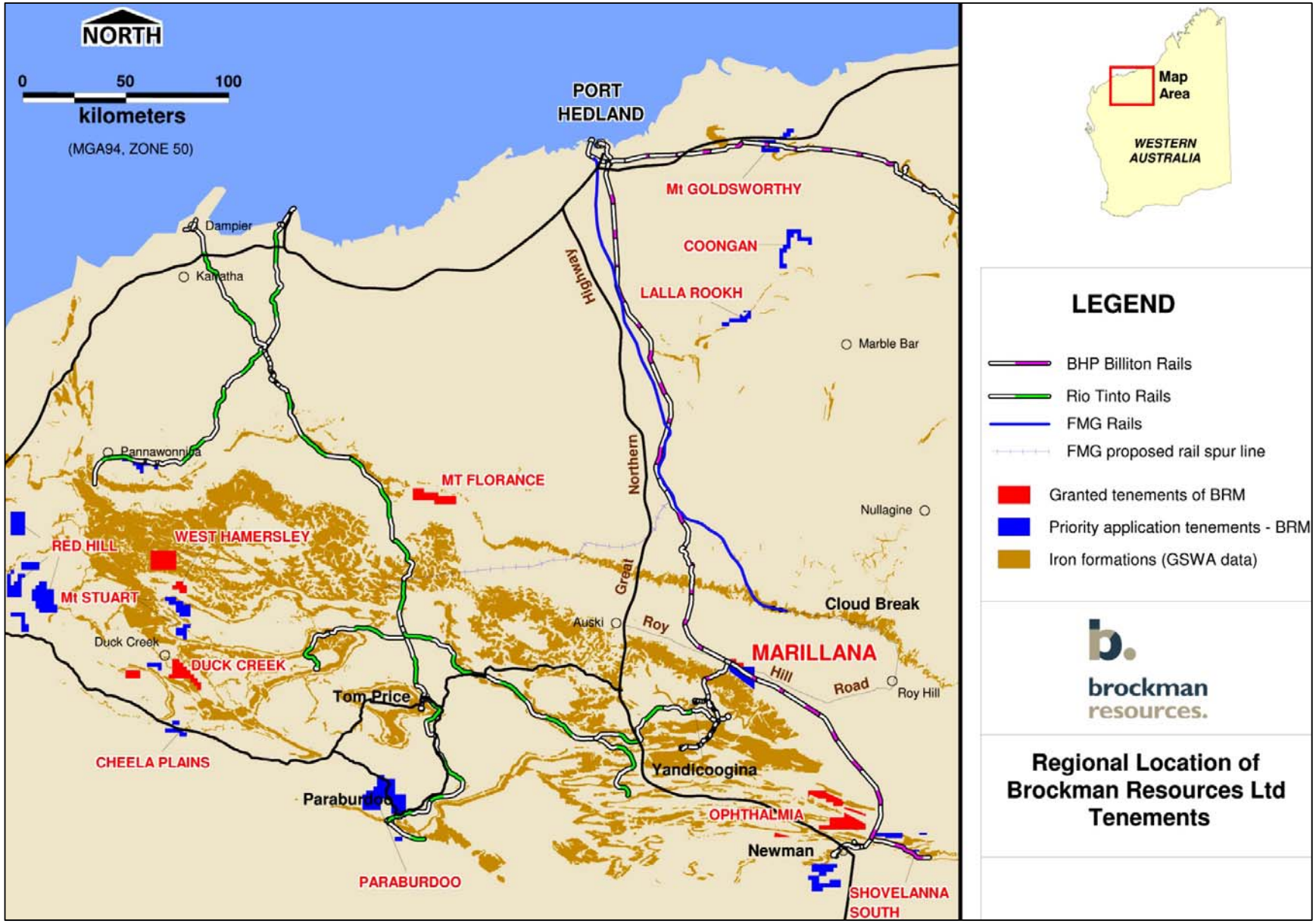

Figure 1: Regional Location

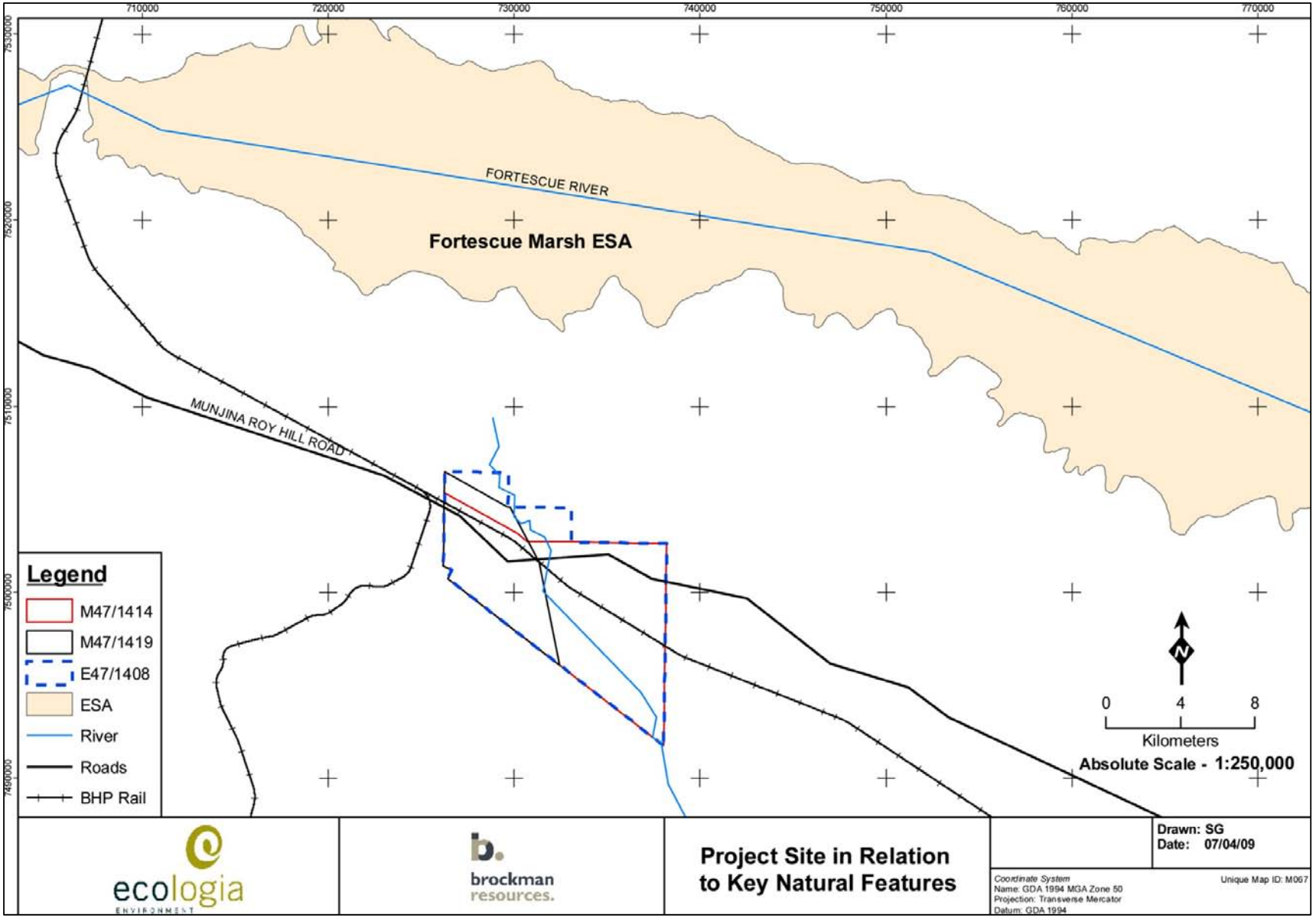

Figure 2: Project Location in relation to the Fortescue Marsh

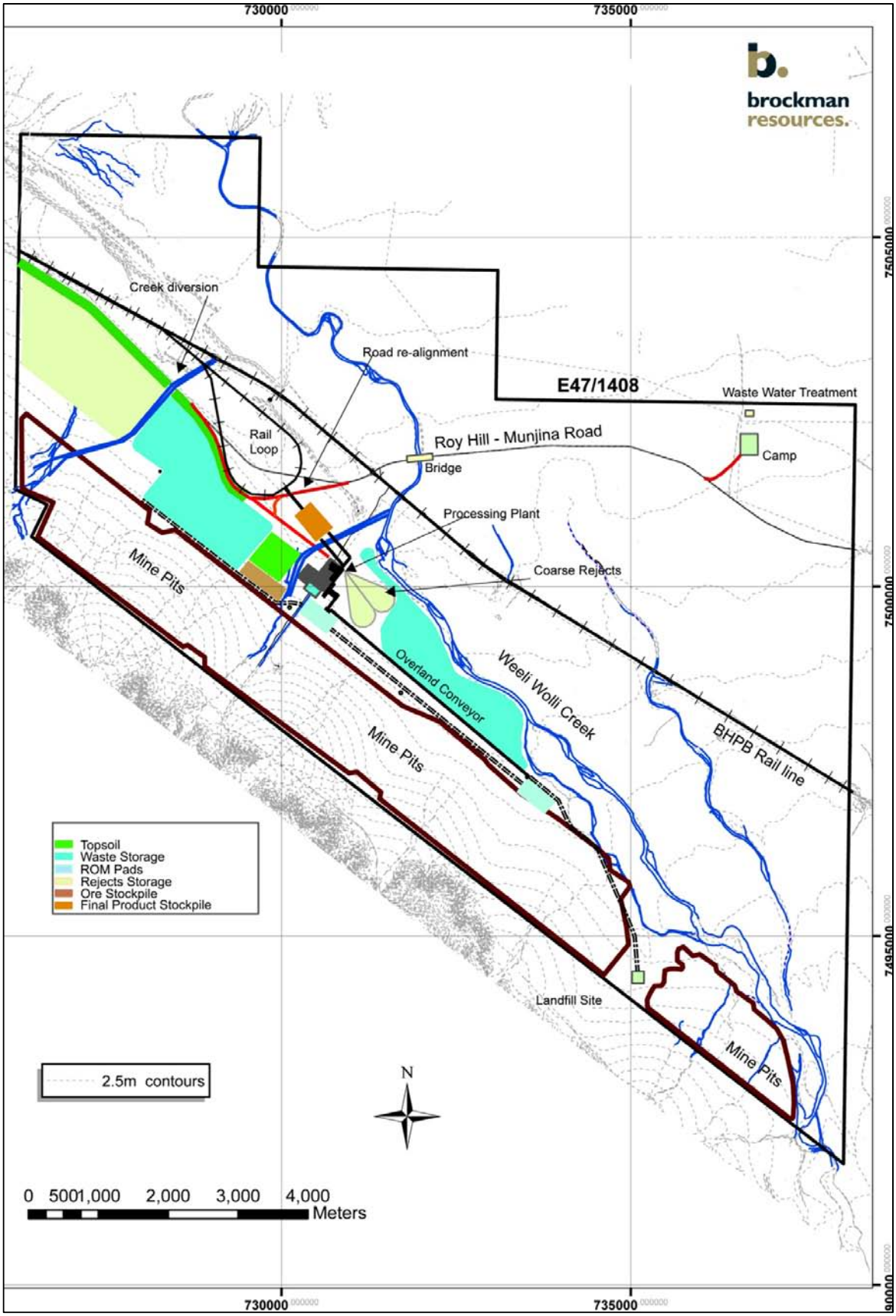

Figure 3: Site Layout

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 Water Supply, Air Quality and Aboriginal Heritage are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

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

(a) Flora and Vegetation;

(b) Fauna;

(c) Surface Water and Groundwater; and

(d) Closure and Rehabilitation.

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

Details on the key environmental factors and their assessment are contained in Sections 3.1 - 3.4. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

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

(a) The precautionary principle;

(b) The principle of biological diversity and ecological integrity; and

(c) The principle of waste minimisation.

3.1 Flora and Vegetation

Description

The proposal is located in the Fortescue valley floor in the Pilbara region. The project area is 15km south of the Fortescue Marsh, a wetland of national significance, and is intersected by Weeli Wolli Creek, a major Pilbara drainage system which discharges to the marsh.

The proposal would require clearing of up to 2985 ha of native vegetation. There is potential for the proposal to impact significant flora and vegetation values in the area directly through clearing of native vegetation, introduction or spread of weeds, and changes to surface water and groundwater flows. Impacts to flora and vegetation associated with changes to surface water and groundwater flows are addressed in section 3.3 – Surface Water and Groundwater.

The proponent has undertaken a two phase flora and vegetation survey in July and September (*ecologia* 2009) in accordance with Guidance Statement 51 (EPA 2004). The vegetation of the project area has been separated into eight main units as shown in Figure 4, and twelve sub-units. Of these, only the vegetation associated with the Marillana Sand Dunes (Units 6 and 7) are considered to be regionally significant. The Marillana Sand Dunes have been identified as a Priority Ecological Community (PEC). The potentially phreatophytic riparian vegetation of Weeli Wolli Creek (Unit 1) is considered important for maintaining water quality and the ecological function of an important waterway feeding into the Fortescue Marsh.

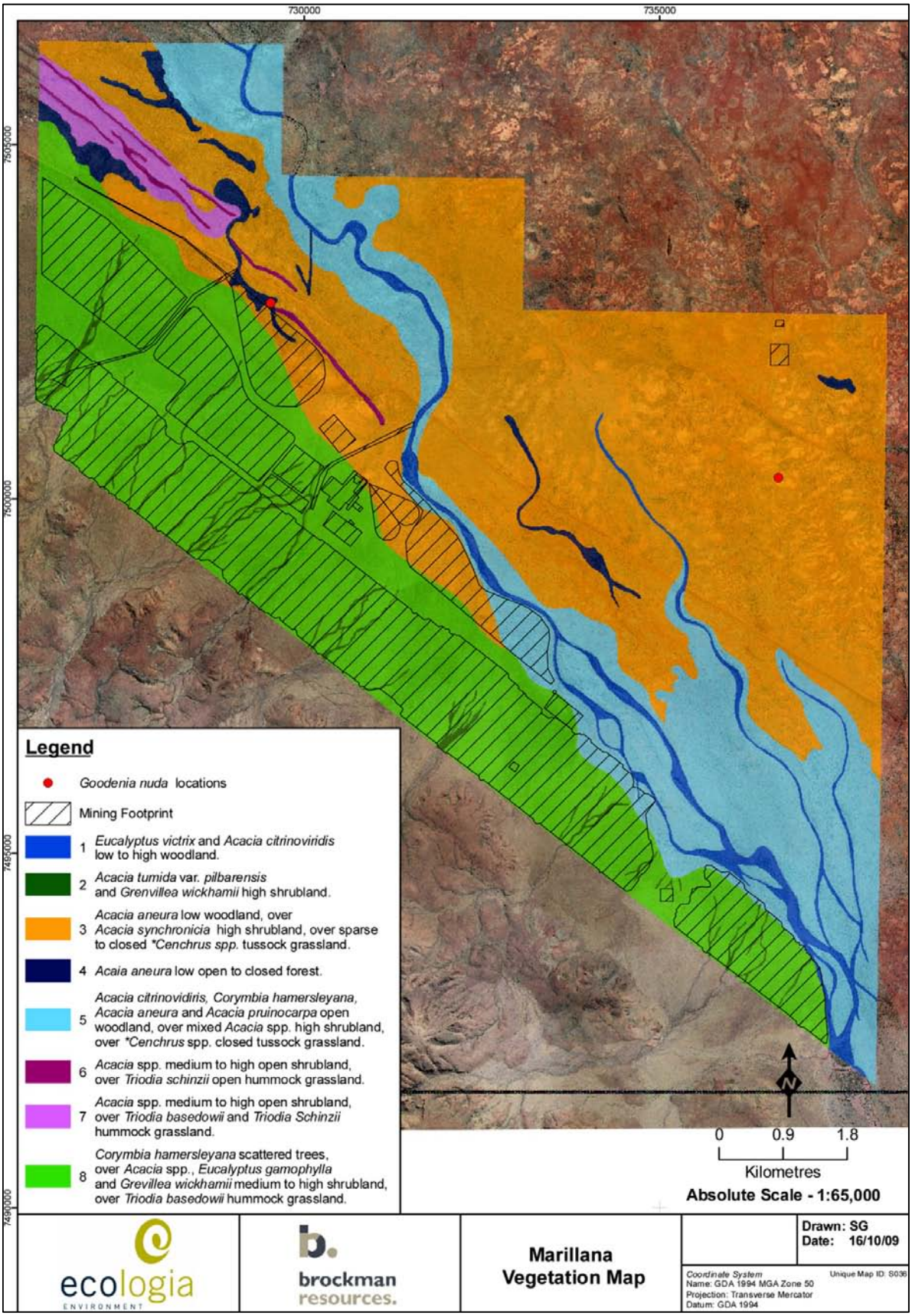

Figure 4: Vegetation types

No Declared Rare Flora (DRF) were recorded during the flora surveys, however, one Priority Flora, *Goodenia nuda* (P3) was recorded in low numbers in one location within the project area. No priority or declared weed species were found in the project area, however ten general or environmental weeds were recorded during the surveys.

The proponent has stated in the PER document that no vegetation associated with Marillana Sand Dunes would be cleared or excavated. Direct impacts to the known populations of *G. nuda* are also unlikely given the proposed infrastructure locations.

Section 5.5 of the proponent's Project Environmental Management Plan (PEMP) states that riparian vegetation associated with Weeli Wolli Creek would not be cleared. The Mining Byproducts Management Plan notes that flood bunding for waste rock dumps would be located a minimum 50m from the bank of the creek to provide a 30m non-disturbance zone to protect existing riparian vegetation and a 20 m access corridor. (Ausenco 2009).

The proponent has proposed management actions to protect the flora and vegetation values of the project area during the implementation of the proposal. These include:

- location of infrastructure to avoid known populations of *G.nuda* and to minimise clearing of riparian vegetation;
- demarcation of the Marillana sand dunes as no-go areas on site maps, placement of signage to notify employees and contractors of no-go areas;
- clearing procedures to ensure that clearing does not occur outside approved areas;
- education of site staff and contractors through the induction process of areas to be avoided and no-go areas; and
- weed management procedures including vehicle wash down, quarantine of infested areas, inspection and treatment of stockpiles and weed monitoring.

Submissions

The Department of Environment and Conservation (DEC) noted that the proposal is within close proximity of portions of the Marillana, Mulga Downs and Roy Hill Pastoral stations, which the Government has agreed to exclude from pastoral leases for conservation purposes in 2015.

The DEC also considered that clearer provision for the protection of the Marillana Sand Dunes PEC is required.

Assessment

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

The EPA considers that key environmental values related to flora and vegetation to be protected in the project area include:

- the Priority Flora, *Goodenia nuda* (P3);
- the Marillana Sand Dunes PEC;
- the vegetation of the Fortescue Marsh; and

- the riparian vegetation of Weeli Wolli Creek, which is considered to be important for maintaining water quality and the ecological function of an important waterway feeding into the Fortescue Marsh.

The EPA notes that impacts to other vegetation associations in the project area are unlikely to be regionally significant given the widespread nature of the identified vegetation types within the Pilbara Region.

Impacts to vegetation as a result of changes to Groundwater and Surface water flows are addressed in Section 3.3 – *Surface water and Groundwater.*

The EPA also notes that no vegetation associated with Marillana Sand Dunes is expected be cleared or excavated as a result of the proposal. Direct impacts to the known populations of *G. nuda* are also unlikely given the proposed location of the mine pits and infrastructure.

In order to ensure that the values of the Marillana Sand Dunes are protected, the EPA has recommended condition 5 requiring the proponent to ensure that the sand dune community is not impacted by the proposal.

The EPA notes that the proponent has included a 30m non-disturbance corridor along Weeli Wolli Creek in designing the layout of the mine site and infrastructure. As most riparian vegetation occurs within this area, the EPA considers that this is sufficient to protect the environmental values of the vegetation from direct impacts; however, the EPA has recommended condition 6-1 which defines the area which would not be impacted by the proposal and ensures that a 30m non-disturbance corridor along the Creek is maintained.

The proponent has prepared management plans to address potential indirect impacts to flora and vegetation related to dust emissions and the introduction and spread of weeds. The EPA has recommended condition 7 to ensure that weed populations are monitored and managed appropriately.

Summary

Having particular regard to the:

(a) location of the mine pits and infrastructure in relation to areas containing significant flora and vegetation;

(b) the vegetation types which are intended to be cleared being widespread in the Pilbara Region; and

(c) Brockman's proposed management actions in relation to indirect impacts including weeds and dust,

it is the EPA's opinion that it is likely that the EPA's environmental objectives for this factor can be achieved provided that conditions are imposed requiring the proponent to:

- avoid impacts to the Marillana Sand Dune PEC;
- maintain a 30m non-disturbance corridor along Weeli Wolli Creek; and
- avoid the spread or introduction of weed species in the project area.

3.2 Fauna

Description

The proposal has the potential to impact on fauna by direct loss and disturbance of habitat through clearing of native vegetation, dewatering, and excavation of the pit. There is also potential for noise, dust, light and vehicle strikes to impact vertebrate fauna in and near the project area, including the migratory bird species which utilise the nearby Fortescue Marsh.

Vertebrate Fauna

The proponent has conducted a two phase vertebrate fauna survey from 25 April to 7 May 2008 and 30 August to 10 September 2008, in accordance with EPA Guidance Statement 56 (EPA 2002).

Twenty three species of mammal, 82 species of bird, and 43 species of reptile were recorded within the survey area. Of these, two were considered to be conservation significant species. These were the Australian Bustard and the Rainbow bee-eater.

The Australian Bustard is a nomadic species which appears to be relatively common in the project area and may utilise the sandy spinifex grassland. The Rainbow bee-eater is considered to be common in the Pilbara and was found mostly along the Weeli Wolli Creek line within the project area.

Six other conservation significant species may occur in the project area. Of these, four are bird species. The Fork Tailed Swift and the Peregrine Falcon are likely to overfly or hunt in the project area, however neither of these species is likely to utilise habitats in the area for breeding. Breeding habitat for the Grey Falcon exists within the tenement; however this distinctive species was not observed in the project area and is unlikely to be present. The Night Parrot is considered to be unlikely to occur within the project area, although the species is thought to inhabit the fringing grassland of the Marsh.

The Pilbara Olive Python has the potential to occur within the tenement, as it may be attracted to Weeli Wolli Creek during periods when the Creek is in flood. The Northern Short tailed Mouse also has the potential to occur within the project area.

The key potential impact to fauna within the project area relates to loss and degradation of habitat through clearing of vegetation. The habitat type most affected would be sandy and stony spinifex plains. No significant species are expected to be restricted to these habitat types within the tenement. Significant habitat types which occur within the project area include the sand dunes and Weeli Wolli Creek.

Migratory Bird utilisation of the Fortescue Marsh occurs primarily during flood events. Noise levels at the marsh as a result of normal operations are expected to be below background levels due to the distance of the operations from the Marsh (15kms). Noise from blasting is predicted to reach the southern extent of the marsh at 89-109db, (Brockman 2010a) however the implementation of blasting controls would reduce this level considerably. There is a potential for noise levels associated with blasting to impact bird species utilising the marsh.

Brockman has proposed a monitoring and management program to minimise any impacts to birds as a result of blasting. Monitoring would be visual and would be conducted at the closest accessible point to the Marsh. If disturbance is noted in relation to blasting activities, management actions would include modification of

blasting practices to reduce noise, and scheduling of blasting outside of major rainfall events.

Light, noise, and dust emissions from the proposal would be managed by the proponent according to the Project Environmental Management Plan (PEMP) which details appropriate management actions including selection of the quietest practicable plant and machinery, implementation of noise monitoring programs, shielding of lighting to reduce glow, and use of narrow spectrum bulbs. Other management actions to be implemented in relation to fauna include vehicle restricted areas and speed limits, site inductions and employee training programs in appropriate fauna management.

Brockman has described a number of management actions which would be implemented to minimise impacts to vertebrate fauna associated with the proposal.

These include:

- Minimise clearing and conducting staged clearing over a period of time to allow fauna to move away from clearing activities towards adjoining habitats.
- Disturbed habitats would be rehabilitated progressively as soon as possible.
- Dead trees retained where possible.
- Maintenance of Weeli Wolli Creek habitat to provide habitat corridor.
- Selection of quietest possible plant and machinery.
- Regular maintenance of machinery.
- Noise emissions would comply with noise regulations.
- Noise monitoring programs.
- Blasting during daylight hours and controlled to minimise air blast and ground vibration issues.
- Minimisation of lighting as far as practicable.
- Use of narrow spectrum bulbs.
- Shielding of light and elimination of any light pointing upwards.

Invertebrate Fauna

The proponent conducted stygofauna, troglofauna and Short Range Endemic (SRE) sampling programmes in accordance with EPA Guidance Statement 54a.

Four species of stygofauna were collected, one of these was found both inside and outside the tenement area, and one was found only outside the tenement. The other two species were found only inside the tenement and were each represented by only one specimen. Both of these specimens were unable to be identified to species level.

The two identified stygofauna specimens detected during the survey were larger than the unidentified specimens, and have distribution ranges extending well outside the proposed area of development. Their large size and wide distribution pattern suggests an extensive stygobitic habitat comprising relatively large pore spaces. The proponent's view is that it seems likely that the smaller species will follow similar distribution patterns as they would be capable of dispersing through the aquifer to the same (or larger) degree as the larger specimens.

Six species of troglofauna were identified, as well as one tentative troglofauna species. Capture rates for troglofauna were lower than expected, however a species accumulation curve suggests that the majority of expected species were detected.

Due to difficulties with obtaining access to neighbouring tenements, the proponent was not able to sample extensively outside the project area.

Analysis of troglofauna sampling showed that troglofauna are likely to inhabit both the siliceous detritals and the haematite-rich detritals above the existing water table. These strata extend uninterrupted off-tenement both along the ranges and to the east towards the Marsh. Present day creeklines do not appear to bisect the strata and thus are unlikely to act as a barrier to fauna dispersal. Impacts of the pit and associated infrastructure are likely to represent a 12.8% loss of the habitat.

Six invertebrate groups known to contain SRE species were discovered, however none of the species detected were classically recognised SRE invertebrates. Three of the taxa discovered may potentially be considered as SRE, being two undescribed species of pseudoscorpion and a species of centipede, however in all three cases taxonomic knowledge is poor and a clear determination of SRE status will only be known after revisions of the groups are undertaken at a regional level.

The project area lacks typical SRE island habitats. Habitat types on which the three potential SRE species were collected are widespread both inside and outside the tenement.

Submissions

The DEC noted that the proposal is located within the lower catchment of Weeli Wolli Creek and the Fortescue Marsh, a unique and nationally significant wetland supporting very important habitat for waterbirds, and that impacts to waterbirds from noise and vibration would need to be managed, with particular regard to the effects of blasting noise on the behavior of waterbirds during flood periods.

The Department of Water (DoW) noted that there is the potential for the proposal to impact subterranean fauna and that significant troglofauna habitats may be affected by the lowering of groundwater moisture in the capillary zone.

Assessment

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

- protect Specially Protected (Threatened) and Priority Fauna and their habitats, consistent with the provisions of the *Wildlife Conservation Act 1950;*
- protect fauna listed on the Schedules of the *Environment Protection and Biodiversity Conservation Act 1999;* and
- maintain the abundance, species diversity, geographic distribution and productivity of fauna species and ecosystem levels through the avoidance or management of adverse impact and improvement in knowledge.

Vertebrate Fauna

The EPA notes that significant fauna species that have been identified in the area or have the potential to occur in the area are generally mobile and able to move outside the project area easily. The EPA considers that given there is suitable habitat outside the project area for these species it is likely that most would avoid the area during operations. The progressive nature of the project would encourage fauna to move away from the area of disturbance as mining progresses.

The EPA also notes that important habitats including the sand dunes and the vegetation of Weeli Wolli Creek would not be directly impacted by the proposal. It is expected that the area surrounding Weeli Wolli Creek would act as a corridor to

minimise impacts of habitat fragmentation and assist fauna to disperse away from areas of impact.

There is a potential for noise associated with blasting to disturb migratory bird species utilising the Fortescue Marsh during flood events. The EPA considers that the migratory bird monitoring and management program proposed by Brockman (Brockman 2010c) is appropriate and would minimise any impacts to birds as a result of blasting.

The EPA also considers that the management actions proposed in the proponent's PEMP are appropriate for the purpose of minimising impacts to fauna related to light spill, noise, dust emissions and vehicle strikes.

The EPA has concluded given the proponent's management measures the proposal can be managed to meet the EPA's objectives for vertebrate fauna.

Invertebrate Fauna
The EPA notes that the two identified stygofauna species collected by the proponent have distribution ranges which extend well outside the tenement. The EPA considers that it is likely that the two unidentified specimens would follow similar distribution patterns, and are therefore unlikely to be significantly impacted by the proposal.

The EPA also notes that impacts to troglofauna habitat as a result of the proposal are expected to represent less than 13% of the total available troglofauna habitat in the area. The EPA considers that this is unlikely to have a significant impact on the regional diversity of troglofauna species. It is also noted that the project area does not contain typical SRE habitats, and that no classically recognised SRE invertebrates were detected during targeted sampling events.

Given the distribution of species identified in the proponent's invertebrate sampling programmes and the distribution of invertebrate habitat within and outside the project area, it is expected that the proposal can be managed to meet the EPA's objectives for this factor in relation to invertebrate fauna.

Summary

Having particular regard to the:

(a) The distribution of significant vertebrate and invertebrate fauna species and habitat within and adjacent to the project area;

(b) the proponent's proposed monitoring and management actions in relation to impacts of blasting on waterbirds utilising the Fortescue Marsh; and

(c) the proponent's proposed management actions in relation to light spill, noise, dust emissions and vehicle strikes,

it is the EPA's opinion that it is likely that the proposal can be managed to meet the EPA's environmental objectives for this factor.

3.3 Surface Water and Groundwater

Description
Groundwater and surface water hydrology and quality can be impacted by mining activities including pit dewatering, alterations to surface water hydrology, storage of

mine waste materials, and seepage or runoff from domestic waste disposal and waste water treatment areas.

The key environmental values with the potential to be impacted by changes to groundwater and surface water hydrology or quality associated with this proposal are the ecological values of the Fortescue Marsh, a wetland of national significance, and Weeli Wolli Creek, a major Pilbara drainage system which discharges to the Marsh.

Pit Dewatering
Brockman proposes to dewater approximately 120 gigalitres over the life of the mine, at a peak rate of up to 31 megalitres a day in the third year of mining.

Brockman's groundwater modelling is limited by the number of bores used, with the exception of the ore body which is well defined. Hydrology is extrapolated between bores and there are assumptions about the hydraulic properties across the modelled area. The PER identifies only two monitoring bores between the Marillana Mining Lease and the Marsh. These bores are unlikely to adequately represent the hydraulic properties of the area.

The current modelling suggests that dewatering would produce a cone of depression in the regional groundwater table which would extend towards the Fortescue Marsh, resulting in a drawdown of 1m below the southern boundary of the Marsh towards the end of the mine life.

Current hydrological data suggests that the Marsh is primarily a surface water fed system, as opposed to a groundwater discharge area. Following flood events, a portion of the ponded surface water infiltrates to the aquifer, causing groundwater levels to rise to ground level beneath the Marsh. It is possible that where the groundwater level is lowered significantly, an increased amount of water would be required to fully saturate the soil profile, which could reduce the duration of surface water ponding.

Groundwater drawdown beneath areas of Weeli Wolli Creek within the mining tenement is likely to be more than 20 metres below pre-mining levels. The current depth to groundwater in the area varies between 18 to 30m.

There is a potential for reduced in groundwater levels beneath Weeli Wolli Creek to impact the potentially phreatophytic riparian vegetation of the creek. Vegetation in this area consists of *Eucalyptus victrix* (Coolibah trees) and *Acacia citrinoviridis* low woodland. Coolibah trees, although primarily dependant on surface water may also be dependent on groundwater, particularly during extended periods of drought. Loss of riparian vegetation around Weeli Wolli Creek could result in degradation of water quality discharging to the Fortescue Marsh.

It is expected that reduction in groundwater levels beneath Weeli Wolli Creek would be mitigated by seasonal flow events which occur numerous times per year, and by increased flow within the creek resulting from mining activities upstream of the project area.

Brockman has proposed a number of management actions which would be undertaken to minimise the impact of pit dewatering. These include:

- monitoring of local and regional groundwater levels and further investigation of key hydrogeological features;

- monitoring of riparian vegetation of Weeli Wolli Creek and implementation of contingency actions including artificial watering where impacts are detected;
- ongoing validation of prediction models and ongoing revised prediction;
- modification of pumping and aquifer re-injection as required;
- infilling of pits to facilitate full and rapid recovery of post-mining groundwater levels; and
- contributions to ongoing research programmes on the hydrogeological nature of the Fortescue Marsh.

Changes to Surface Water Hydrology

The project area is located on a floodplain within the Fortescue Marsh catchment, and is intersected by Weeli Wolli Creek, which contributes approximately 15% of the total catchment area of the Marsh. (WRC 2000)

The proposal has the potential to impact surface water resources by changing surface water flow patterns within the project area. Interruption of surface water flows has the potential to reduce surface water runoff volumes.

Due to the placement of the mine pit and infrastructure on the floodplain, there would be a reduction in the available area (and thus surface runoff) into Weeli Wolli Creek. These areas total approximately 0.4% of the Weeli Wolli Creek catchment area, which is considered small. Reduction in runoff to the Fortescue Marsh is estimated at 0.04% (Brockman 2010) and is unlikely to have a significant impact to the ecological values of the Marsh.

Overland flow would be channelled into diversion drains around the mine pit and infrastructure, including waste rock dumps, and discharged back to Weeli Wolli Creek via sedimentation ponds, using natural drainage channels where possible (Figure 5). The diversion of overland flow into diversion drains would potentially impact vegetation in the area downstream of these drains and south of Weeli Wolli Creek.

Vegetation in this area represents approximately 450 ha or 10.7% of Unit 3 in the project area (Figure 4), and is dominated by low Mulga woodland over tussock grass with some mulga low open to closed forest. These areas would be maintained where feasible by discharging diverted water over spreader mechanisms to encourage the flows to slow and disperse, mimicking pre-development drainage. Brockman has prepared a detailed surface Water Management Plan which describes strategies to minimise impacts to natural drainage systems, including:

- location of infrastructure to avoid natural drainage lines where possible;
- use of diversion drains, sedimentation ponds and spreader mechanisms to re-instate natural drainage patterns as closely as practicable downstream of the project area; and
- monitoring and maintenance of drainage structures.

Acid and Metalliferous Mine drainage

The majority of mine waste including overburden and fine rejects would be used to progressively backfill the mine pit, however some surface waste rock dumps and tailings storage would be required to dispose of mining waste produced in the initial stages of the proposal until backfilling is able to commence.

Seventy-eight Mt of material would be required to be stored in the surface Fines Reject Storage (FRS) area over the first seven years, after which the remaining 137 Mt is scheduled to be disposed of within the mine void. Brockman considers that the fine rejects are likely to be benign and therefore the FRS would not be lined, and water seepage back into the aquifer would assist in the final consolidation of the fine rejects.

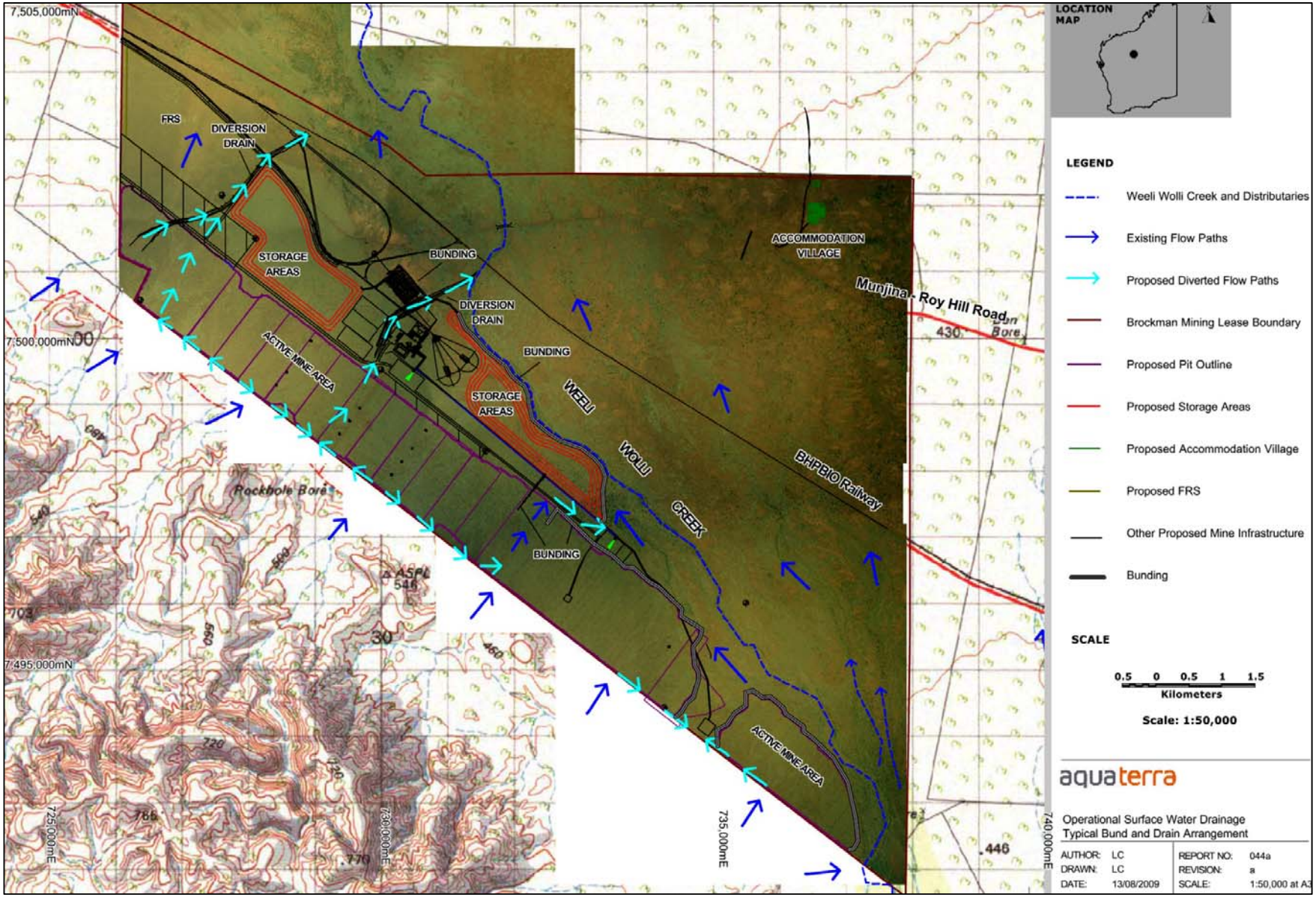

Figure 5: Surface water drainage

A total of 110 million bank cubic metres (Mbcm) of overburden would be disposed of in external waste rock dumps, with the remaining 451 Mbcm to be disposed of within the mined out areas of the pit.

There is a potential for mine waste including overburden, fine rejects and coarse rejects to produce Acid or Metalliferous Drainage (AMD). This has the potential to impact both groundwater and surface water quality, and subsequently to impact vegetation and fauna populations which are dependent on the contaminated water resource.

The proponent has conducted an assessment of the potential for AMD to impact surface water and groundwater quality in the area based on static testing (measure of the acid-base balance of the rock materials), and on a trace element analysis of the rock materials.

Brockman considers that the absence of large amounts of sulphide minerals in the waste material indicates that there is a low risk that there will be water quality problems caused by leachate from this material (Brockman 2010a). However, the chemical analysis indicates that levels of arsenic, antimony and selenium in the waste rock materials are above global background levels. Selenium is of particular concern, because only very low levels in water can cause impacts on bird and fish populations due to the ability of this element to be biomagnified within local food webs (Pers comm. Steve Appleyard).

Design factors proposed by Brockman which may assist in preventing contamination of surface water and groundwater resources by waste material include:

- bunding around all waste dumps and stockpiles to contain internal surface water runoff;
- design of drainage areas and settling basins to minimise contamination of surface water; and
- underdrainage and decant facilities to recover water from beneath the fine rejects storage area back to the processing plant.

Surface Water and Groundwater Quality

The project would require two packaged sewage plants and a minor Class II landfill to be established on site. The landfill and the waste water irrigation fields associated with the sewage plants are located on the floodplain and have the potential to impact surface water and groundwater quality if the sites are inundated.

There is the potential that a significant flood event (10 year ARI or more) may result in the surface irrigation disposal area becoming inundated. Brockman has carried out an assessment of the impact of inundation on the surface irrigation areas and considers that the risk of mobilising nutrients and coliforms is low due to the low floodwater velocities and the absence of surface water ponding associated with the irrigation fields. It is expected that nutrients would be taken up by vegetation on the irrigation fields, and would thus have relatively limited residence time within the soil profile.

There is also potential for residual nutrients and coliforms to be mobilised downward into the groundwater system in the event of inundation during a 1 in 10 ARI event. As groundwater would take up to 25 years to reach the Fortescue Marsh from the project area (Brockman 2010a), and this is far longer than the anticipated lifespan of nutrients within the groundwater system, impacts to the Marsh are not considered likely to occur.

The landfill location sits within the proposed rail loop. The location has been chosen by Brockman as it has a significant depth to groundwater and is more than 200m away from the nearest waterways. The landfill would be bunded by the rail loop which would protect the site from a 1 in 100 ARI flood event. Minor bunding around the landfill facility would ensure that incident rainfall drains away from the landfill area. In the unlikely event that the landfill becomes inundated, a groundwater monitoring program would be undertaken to identify any impacts to water quality.

Brockman has proposed a number of design and management actions which would be implemented to prevent impacts to groundwater and surface water quality as a result of the operation of landfill site and the waste water irrigation fields. These include:

- the surface irrigation disposal system would be operated in such a manner as to prevent spray drift or misting;
- discharge of effluent would be at a rate which equals or exceeds evaporation to ensure that pooling and run-off from the surface irrigation disposal area does not occur;
- the landfill would be located within the 1 in 100 ARI protection area within the rail loop; and
- diversion drainage structures would be used to divert stormwater flows away from the landfill area.

Submissions

Pit Dewatering

The DEC considered that the PER may understate the impact of groundwater impacts to the Fortescue Marsh.

One public submission expressed concern regarding cumulative impacts of dewatering on the Fortescue Marsh and surrounding areas from multiple mining operations in the region.

The DoW noted that the groundwater modelling presented in the PER is limited by the number of bores used, but considered that the limitation of the model can be managed by an appropriate monitoring and review program.

Changes to Surface water Hydrology

The Department of Mines and Petroleum (DMP) considered that flood management should incorporate a design of 1 in 100 years ARI event.

The DoW considered that the proponent had not demonstrated that the existing flood regime would not be detrimentally affected by the proposal.

Acid and Metalliferous Mine Drainage

The DMP noted that there appears to be no discussion on the testing of the physical characteristics of the waste material to ensure geophysically adverse material would be managed to minimise the erodability of the final landform.

The DEC noted that levels of arsenic, antimony and selenium in the ore/waste rock materials are above global background levels. The DEC considers that selenium is of particular concern, and that the proponents will need to do further work to determine whether there is a significant risk of leachate from rock materials from this site causing environmental harm.

Surface water and Groundwater Quality
The DEC considered that management issues potentially requiring additional management commitments and/or outcome based conditions include management of waste facilities.

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

- maintain the quantity and quality of groundwater so that existing and potential uses, including ecosystem maintenance, are protected; and
- to maintain the integrity, ecological function and environmental values of watercourses, and to ensure that alterations to surface expressions of groundwater do not adversely impact native vegetation or flow regimes.

Primary impacts to groundwater and surface water hydrology and quality with the potential to impact the environmental values of the Fortescue Marsh or Weeli Wolli Creek include pit dewatering, alterations to surface water hydrology, storage of mine waste materials, and seepage or runoff from domestic waste disposal and waste water treatment areas.

Pit Dewatering
The current modelling suggests that pit dewatering would result in about a 1m drawdown of groundwater levels below the southern boundary of the Fortescue Marsh, towards the end of the mine life.

The EPA notes that the Fortescue Marsh is primarily a surface-water fed system. The proponent considers that the predicted drawdown is unlikely to have a significant impact on the hydrology and ecological values of the Marsh. However, the proponent acknowledges that there is potential for reduction of groundwater levels below the Marsh to result in a reduction of the extent and duration of surface water ponding within the Marsh following rainfall events.

The EPA also notes that Brockman's groundwater modelling is limited by the number of bores used. Hydrology is extrapolated between bores and there are assumptions about the hydraulic properties across the modelled area. There is therefore potential for drawdown to be greater than the current predictions.

Given the ecological values of the Fortescue Marsh and the limitations of the modelling, the EPA considers that the predicted drawdown associated with the proposal represents a risk to the environment which may not meet the EPA's objectives for this factor unless it is managed. The EPA has therefore recommended condition 8 to mitigate this risk. This condition requires the proponent to ensure that no impacts to the Fortescue Marsh occur as a result of groundwater drawdown associated with the proposal.

Condition 8 also requires the proponent to install additional monitoring bores, conduct additional modelling and to monitor groundwater drawdown throughout the life of the proposal to ensure that the predictions of the model are validated and impacts can be detected early and hence mitigated appropriately.

The EPA notes that drawdown beneath Weeli Wolli Creek is likely to be greater than 20 metres over the life of the project. The proponent acknowledges that there is a potential for drawdown to impact the potentially phreatophytic vegetation along Weelli Wolli Creek, but considers that channel flow events which occur several times a year

would sustain the vegetation. Further, the proponent considers that the loss of the vegetation within the project area would not be regionally significant.

The EPA considers that it is likely that seasonal flow events combined with dewater discharge into Weeli Wolli Creek from operations upstream of the project area would sustain the riparian vegetation along the creek. However, groundwater dependant vegetation such as *Eucalyptus victrix* may be impacted by loss of groundwater during periods of extended drought.

The vegetation of Weeli Wolli Creek is considered to be ecologically important for maintaining the water quality and ecological function of the creek and subsequently the Fortescue Marsh. The EPA has therefore recommended Condition 6 to ensure that the condition of groundwater dependent vegetation is monitored, and appropriate management actions implemented in the event that impacts associated with dewatering are detected.

Changes to Surface Water Hydrology

The mine developments have the potential to reduce the effective catchment area of Weeli Wolli Creek by up to 0.4%. These changes are not significant to the overall hydrological system, particularly in comparison to the natural seasonal variations in catchment runoff (Aquaterra 2010).

The EPA notes that impacts to vegetation as a result of altered surface water flows would be managed by the proponent using drainage diversion and spreader mechanisms as far as possible. Given the low regional significance of the vegetation in the area which is likely to be affected, the EPA considers that impacts associated with these changes are unlikely to be significant.

The proponent has provided details of design measures including bunding and diversion drains which would be required to manage surface water flows. These flows would be diverted to sedimentation ponds, and would then connect into Weeli Wolli Creek or discharge upstream of the main creek and reach Weeli Wolli Creek via minor channels and overland flow.

The EPA notes that the mine plans have been developed to ensure that Weeli Wolli Creek and its tributaries are not directly impacted by the works. No diversion of Weeli Wolli Creek or its tributaries are required and with the exception of potential modification to road crossings at existing locations, there are no proposed works in the creek channels or on its banks.

The EPA has recommended condition 9 to ensure that no disturbances to Weeli Wolli Creek other than the proposed crossing would occur as a result of the proposal, and to ensure that surface water management is monitored and reviewed appropriately to ensure that mitigation and management techniques remain valid and incorporate any new research.

Acid and Metalliferous Mine Drainage

The EPA notes that to date the proponent has only provided the results of static testing in relation to Acid and Metalliferous Drainage associated with the proposal. The EPA considers that further ongoing testing would be required to ensure that adequate information is available to assess the potential impacts of the proposal related to storage of mine waste products both on the surface and in mined out pits. This could lead to contamination of surface water and groundwater resources which may interact with the Fortescue Marsh.

The EPA also considers that further geochemical testing would be required to inform the closure and decommissioning stages of the proposal.

The EPA notes that, based on the results of static testing, Brockman considers that the waste material is inert and does not pose a threat to water quality or revegetation works. Therefore, planning for mine waste disposal has not considered the potential for leachates to impact water quality.

The EPA has therefore recommended condition 11 to ensure that further testing is carried out to determine the leaching potential of waste material, and that appropriate risk assessment, prevention, management and monitoring strategies are developed prior to implementation of the proposal.

Surface Water and Groundwater Quality

Potential impacts to surface water and groundwater quality associated with the project include leachate from waste rock and tailings storage facilities, storage of chemicals and hydrocarbons, runoff from accommodation and infrastructure areas, and inundation of waste water irrigation fields and or landfill facilities.

The EPA notes that the project design includes a number of measures to minimise the impact of mining operations on surface water draining from the site and consequently on Weeli Wolli Creek and the Fortescue Marsh. These measures would include the use of buffer zones between mine developments and creek systems, minimisation of clearing, dry season construction where possible, bunding of hydrocarbon storage areas and separation of runoff from disturbed areas.

The EPA considers that the risk of mobilising nutrients and coliforms from the wastewater treatment irrigation fields during a flood event is low due to the low floodwater velocities and the absence of surface water ponding associated with the irrigation fields. It is expected that nutrients would be taken up by vegetation on the irrigation fields, and would thus have relatively limited residence time within the soil profile. The EPA notes that the volumes of water which would be involved in a flood event sufficient to inundate the fields would effectively dilute any nutrients and coliforms.

There is also potential for residual nutrients and coliforms to be mobilised downward into the groundwater system in the event of inundation during a 1 in 10 ARI event. As groundwater would take up to 25 years to reach the Fortescue marsh from the project area, and this is far longer than the anticipated lifespan of nutrients within the groundwater system, the EPA considers that impacts to the Marsh are not likely to occur.

The EPA notes that the landfill location sits within the proposed rail loop. The location has been chosen by Brockman as it has a significant depth to groundwater and is more than 200m away from the nearest waterways. The landfill would be bunded by the rail loop which would protect the site from a 1 in 100 ARI flood event. Minor bunding around the landfill facility would ensure that incident rainfall drains away from the landfill area. In the unlikely event that the landfill becomes inundated, the EPA considers that the proponent's proposed groundwater monitoring program would be appropriate to identify and manage any potential impacts to groundwater quality.

Storage of chemicals and hydrocarbons, and runoff from accommodation and infrastructure areas would be managed according to the proponent's Project Environmental Management Plan (PEMP).

Given Brockman's proposed management actions the EPA considers that the proposal is unlikely to significantly impact water quality. However, given the environmental values of the receiving environment, condition 10 has been recommended to ensure that groundwater and surface water quality downstream of the project area is protected from contamination.

Summary

Having particular regard to the:

(a) distance of the project area from Fortescue Marsh and the length of time required for groundwater drawdown to propagate towards the marsh:

(b) expected seasonal flow events in Weeli Wolli Creek;

(c) relatively small reduction in run off to Weeli Wolli Creek and the Fortescue Marsh; and

(d) proponent's proposed surface water drainage and contamination management measures,

it is the EPA's opinion that it is likely that the EPA's environmental objectives for this factor can be managed provided conditions are imposed requiring the proponent to:

- monitor and manage impacts to the potentially phreatophytic vegetation of Weeli Wolli Creek;
- monitor drawdown and manage impacts to vegetation associated with the Fortescue Marsh;
- monitor and maintain the quality of surface water and groundwater downstream of the project area;
- conduct additional ongoing geochemical testing and incorporate results into the management of acid and metalliferous drainage associated with waste rock dumps and tailings storage facilities; and
- avoid disturbance to surface water flows in Weeli Wolli Creek.

3.4 Rehabilitation and Closure

Description

Brockman has prepared a Conceptual Closure Plan (CCP). The aims of the CCP are to provide a strategic planning framework for the closure of the project by:

- identifying those aspects relating to decommissioning and closure which may impact on the environment, health and safety;
- providing a basis for consultation with responsible authorities and identified stakeholders regarding the post-mining land uses of the project area and the development of agreed completion criteria;
- developing management strategies to be implemented as part of the project's design, construction and operation to minimise impacts and site closure requirements;
- identifying preliminary closure costs to establish adequate financial provisions; and
- providing details of the management strategies to be implemented by Brockman to the appropriate responsible authorities and the community to confirm completion criteria are met.

The land would be returned to pastoral use after mining activities have ceased. Decommissioning would comprise the safe dismantling and removal of infrastructure, the appropriate disposal of waste materials and the return of disturbed areas to the pre-mining state or other agreed land use.

The proponent has prepared a mine backfill plan to guide the progressive backfilling and rehabilitation of the mine pit to reduce the depth of the void and minimise interactions with surface water. No permanent open water voids are expected to result from the proposal. Following final placement of waste material, topsoil would be returned to the final landform and revegetation would be undertaken using seed and stock of local provenance.

The top surface of the fine rejects storage area would be capped with a layer of mine waste in order to minimise dust generation and to provide support for topsoil for revegetation. Topsoil removed from the fine rejects storage facility would then be redeployed on the final surface of the facility to assist with rehabilitation.

Post-closure, a series of diversion drains would be constructed to redirect water around or through the mine site. These post closure diversion drains would include sections re-established over the backfilled pits. Minor events would be conveyed to Weeli Wolli Creek ensuring environmental flows are maintained.

Submissions

The DoW supports the current closure options, but would expect to see the closure plan continually updated as results from monitoring drawdown and hydrologic regimes become available.

Assessment

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

- ensure that mining is planned and carried out so to ensure a sustainable mine closure outcome is achieved, consistent with mining industry best practice as set out in the Australia and New Zealand Minerals and Energy Council / Minerals Council of Australia, 2000, *Strategic Framework for Mine Closure*; and
- ensure that self-sustaining native vegetation communities are returned after mining, which in species composition and ecological function are as close to possible to naturally occurring analogue sites;

The post mining objective for the project area is a return to pastoral land use. The post closure topography of the pit area will be formed by backfill placement into the mine voids. Most areas will be backfilled above the existing surface level, but there would be some sections that would be below or at the pre-mining level.

The EPA acknowledges that the proponent has committed to progressive backfilling, rehabilitation and post-closure monitoring. The EPA notes that the proponent has developed a set of conceptual closure objectives which would be revised and made more specific over the life of the project.

The EPA has recommended condition 12, which requires that rehabilitation achieve specific outcomes to ensure that, at closure, the waste dumps and other disturbed areas above ground are left in a safe, stable and non-polluting condition. This type of condition is a standard requirement for any mine in Western Australia.

Recommended condition 13 requires the proponent to prepare a Final Closure and Decommissioning Plan at least 5 years prior to the final completion of mining. This

requirement is again consistent with Australian and international mining industry best practice for sustainable mine closure.

Summary

The EPA considers the key environmental factor of Rehabilitation and Closure has been adequately addressed and the EPA's objectives for this factor can be met provided that the recommended conditions 12 and 13 are implemented.

3.5 Environmental Principles

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

4. Conditions

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

4.1 Recommended conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Brockman Resources Limited to develop and operate the Marillana Iron Ore Project is approved for implementation.

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

(a) avoidance of impacts to the Marillana Sand Dune PEC;

(b) avoidance of clearing within 30m of the bank of Weeli Wolli Creek;

(c) monitoring of riparian vegetation along Weeli Wolli Creek and management of any impacts to the vegetation as a result of to groundwater drawdown;

(d) prevention of the introduction or spread of weeds within the project area;

(e) prevention of impacts to the Fortescue Marsh as a result of groundwater drawdown;

(f) management of surface water flows in the project area;

(g) maintenance of groundwater and surface water quality;

(h) management of acid and metalliferous drainage;

(i) rehabilitation; and

(j) closure and decommissioning.

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

- *Explosive and Dangerous Goods Act 1961* – dangerous goods licence;
- *Dangerous Goods Safety Act 2004* – licence for the storage, handling and transport of dangerous goods;
- *Rights in Water and Irrigation Act 1914* – licence for abstraction (dewatering);

- Part V of the *Environmental Protection Act 1986* – various Works Approvals and an operating licence would be required for construction and operation of the project;
- *Environmental Protection (Noise) Regulations 1997* – for construction and operational noise; and
- *Mining Act 1978* – mining proposal is required to be approved by the Department of Mines and Petroleum;

4.2 Consultation

In developing these conditions, the EPA consulted with the proponent and the DEC, DoW and DMP in respect of matters of fact and matters of technical or implementation significance.

5. Other Advice

Power Generation

Brockman intends to install a duel fuel power plant with a capacity of approximately 40 MW and a maximum demand of 34 MW on site to cater for the power requirements of the project. The power supply has been designed such that it has adequate capacity for emergency standby, with a number of generators operating in parallel, and capable of being turned on and off in response to power demand.

The EPA notes that the proponent has committed to using best practice technology within the power plant in order to minimise impacts associated with air quality and greenhouse gasses, and that the adequacy of the proposed measures can be determined under Part V Works Approval and Licensing requirements.

Fortescue Marsh

The nearby Fortescue Marsh is the largest ephemeral wetland in the Pilbara measuring about 100km long and up to 10km wide. It has a unique water regime and supports a variety of plant and animal species of high conservation value. It also has significant sites and places of importance to Aboriginal people and is recognised as a nationally important wetland in the *Directory of Important Wetlands in Australia* (2001).

The EPA acknowledges that Brockman Resources Ltd has been involved with inter-agency groups and other companies working to improve knowledge regarding the Fortescue Marsh, and is committed to continuing to work with the EPA and other organisations towards developing strategic guidance and management of the Fortescue Marsh

6. Recommendations

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

1. That the Minister notes that the proposal being assessed is for the development and operation of a 700-750 Mt Iron Ore mine and associated infrastructure;
2. That the Minister considers the report on the key environmental factors and principles as set out in Section 3;
3. That the Minister notes the EPA has concluded that it is likely that the EPA's objectives would be achieved, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarized in Section 4; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Appendix 1

List of submitters

Organisations:
Department of Mines and Petroleum
Department of Environment and Conservation
BHP Billiton Iron ore
Department of Indigenous affairs
Department of Water

Individuals:
1 Private submission

Appendix 2

References

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2. Aquaterra (2010) *Marillana Surface Water Management Plan*, prepared by Aquaterra for Brockman Resources, February 2010.

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4. Brockman (2010a) *Marillana Iron Ore Project Public Environmental Review* Brockman Resources Ltd, May 2010.

5. Brockman (2010b) *Marillana Iron Ore Project Response to Public Submissions,* Brockman Resources Ltd, July 2010.

6. Brockman (2010c) *Marillana Iron Ore Project Supplement to Response to Public Submissions,* Brockman Resources Ltd, September 2010.

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8. *ecologia* (2009a) *Marillana Vegetation and Flora Assessment*, Prepared for Brockman Iron Pty Ltd, October 2009.

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11. *ecologia* (2009d) *Marillana Troglofauna Report*, Prepared for Brockman Iron Pty Ltd, February 2009.

12. *ecologia* (2009e) *Marillana Short range Endemic Invertebrate Report*, Prepared for Brockman Iron Pty Ltd, October 2009.

13. Email from Steve Appleyard, Department of Environment and Conservation Contaminated Sites branch to Vanessa Angus, Office of the Environmental Protection Authority, dated 18 October 2010.

14. EPA (2004a) *Terrestrial Flora and Vegetation Surveys for Environmental Impact in Western Australia.* Guidance Statement 51, Environmental Protection Authority, Perth, Western Australia, June 2004.

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

16. WRC (2000) *Surface water Hydrology of the Pilbara Region – Summary Report.* Water and Rivers Commission

Appendix 3

Summary of identification of key environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
BIOPHYSICAL			
Flora and vegetation	The proposal would require clearing of 2985 hectares of native vegetation, including the loss of some of the locally significant colluvial fan areas. Other impacts to flora and vegetation associated with the proposal include changes to surface water flows and impacts to phreatophytic vegetation arising from groundwater drawdown. The proponent has conducted a two-phase flora and vegetation survey in accordance with Guidance Statement 51. No Declared Rare Flora (DRF) species were recorded within the project area, however one Priority 3 Flora species (*G. nuda*) was recorded in low densities at two locations. Neither of these locations is expected to be impacted by the proposal. No Threatened Ecological Communities (TEC's) occur within the project area. One Priority Ecological Community (PEC), the Marillana Sand Dunes, occurs within the project	<u>Department of Environment and Conservation</u> • The proposal is within close proximity of portions of the Marillana, Mulga downs and Roy Hill Pastoral stations, which the government has agreed to exclude from pastoral leases for conservation purposes in 2015. • Clearer provision for the protection of the Marillana sand dunes Priority ecological Community is required. • The proponent should provide a clear commitment to avoid indirect impacts to the Fortescue Marsh 2015 area. • Impacts to phreatophytic vegetation in Weeli Wolli Creek need to be avoided in order to mitigate impacts to the integrity of the Fortescue Marsh 2015 area. <u>Department of Water</u> • Impacts to phreatophytic vegetation associated with Weeli Wolli creek are possible.	**Flora and Vegetation is considered to be a key factor for this assessment. See section 3.1 – Flora and Vegetation**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	area. The Fortescue Marsh, a wetland of national significance, is located approximately 15km to the north of the project area. There is a potential for flora and vegetation of the marsh to be impacted by changes to hydrology associated with the proposal.		
Fauna	Vertebrate Fauna surveys in the project area recorded 23 species of mammal, 82 species of bird, and 43 species of reptile. Of these, two bird species are considered to have conservation significance, however a further six conservation significant species are expected to occur in the area based on nearby surveys and habitat types available. Subterranean fauna sampling conducted by the proponent has collected four stygofauna species and six troglofauna species. Short Range Endemic (SRE) surveys revealed three taxa that may potentially be considered as SRE.	<u>Department of Environment and Conservation</u> • The proposal is located within the lower catchment of Weeli Wolli Creek and the Fortescue Marsh, a unique and nationally significant wetland supporting very important habitat for waterbirds. • Management issues potentially requiring additional management commitments and/or outcome based conditions include impacts of noise and vibration on waterbirds, protection of native fauna and management of feral animals. • The proponent should provide clearer and more specific commitments to monitor and address the effects of blasting noise on the behavior of waterbirds during flood periods. • The proponent should provide specific commitments to avoid the enhancement of feral animal activity in the fortes cue Marsh area. • The proponent should commit to the use of bat deflectors on any overhead power lines and avoidance of the use of barbed wire on fencing to avoid impacts to waterbirds and bats. <u>Department of Water</u> • There is the potential for the proposal to impact subterranean fauna. Significant troglofauna habitats may be affected by the lowering of groundwater moisture in the	**Fauna is considered to be a key factor for this assessment. See section 3.2 - Fauna**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	Potential impacts to fauna in areas within and surrounding the project area include • destruction or fragmentation of terrestrial and subterranean habitat; • alterations to surface water hydrology; • increased risk of fire; • vehicle strikes; • increases in feral animals; and • impacts associated with noise dust and light. There is potential for migratory birds using the Fortescue Marsh to be impacted by noise from blasting and changes to surface water hydrology.	capillary zone	
Surface Water	The project area is located within the Fortescue Marsh catchment and is intersected by Weeli Wolli Creek. The Fortescue Marsh is a nationally significant wetland which is predominantly surface-water fed, and receives 15% of its runoff from Weeli Wolli Creek. Weeli Wolli Creek is an ephemeral drainage system extending northwards through the project area.	<u>Department of Environment and Conservation</u> • The proposal is located within the lower catchment of Weeli Wolli Creek and the Fortescue Marsh, a unique and nationally significant wetland supporting very important habitat for waterbirds. • Surface water inflow to the Marsh may be affected by changes to groundwater levels. It is unclear whether the indirect as well as direct effects of the proposal on surface water have been fully considered. <u>Department of Mines and Petroleum</u> • Flood management should incorporate a design of 1 in 100 years ARI event.	**Surface Water is considered to be a key factor for this assessment. See section 3.3 – Surface Water and Groundwater**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	The proposal has the potential to impact surface water flows in and around the project area through diversion and interception of natural drainage lines. This could impact flora, vegetation, fauna and infrastructure in affected areas. The reduction in surface water runoff to the Fortescue Marsh as a result of the proposal is estimated to be 0.04%. Alterations to surface water flows also have the potential to impact vegetation including Mulga downstream of the project area. The proposal also has the potential to impact Surface water quality through spillage of chemicals or hydrocarbons, incorrect management of village landfill and wastewater treatment areas, and leachate from waste rock dumps. Management of Surface Water during flood events is required for the proposal given its location within the floodplain of Weeli Wolli Creek. Areas of the project are likely to be inundated	<u>BHP Billiton Iron Ore</u> • The document does not consider effects of changes to surface water regimes on existing BHP Billiton Infrastructure including the Newman rail line, bores and pastoral activities. • The document fails to consider cumulative impacts on the catchment. <u>Department of Water</u> • The proponent has not demonstrated that the existing flood regime would not be detrimentally affected by the proposal.	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	during a 1 in 10 ARI event.		
Groundwater	The proposal would include dewatering of around 120GL over the life of the project. Peak dewatering rates in year 2 of operations would be up to 31ML per day, decreasing to around 20ML/day in the fifth year and continuing to decrease over the life of the mine. There is a potential for groundwater drawdown to impact groundwater dependant vegetation along Weeli Wolli Creek. There is also potential for decreased groundwater levels below the Fortescue Marsh to reduce the duration of surface water ponding. The proponent's modelling shows that drawdown below the Fortescue Marsh would be approximately 1m after 20 years dewatering. Drawdown beneath Weeli Wolli Creek is expected to range between 10 and 20m. The proposal also has the potential to impact groundwater quality through disposal of dewater via Managed Aquifer Recharge, pollution resulting from	<u>Department of Environment and Conservation</u> • The PER may understate the impact of groundwater impacts to the Fortescue Marsh. • The relationship between surface water and groundwater levels during flood season should be clarified as it is critical to the assessment of potential impacts on the marsh. <u>Public Submissions</u> • One public submission expressed concern regarding cumulative impacts of dewatering on the Fortescue Marsh and surrounding areas. <u>BHP Billiton Iron Ore</u> • The document does not consider impacts of groundwater drawdown on existing licensed bores. <u>Department of Water</u> • The groundwater modelling is limited by the number of bores used. The DoW considers that limitation of the model can be managed by an appropriate monitoring and review program. • The groundwater management Plan adequately identifies the water management issues associated with developing and operating the project.	**Groundwater is considered to be a key factor for this assessment. See section 3.3 – Surface Water and Groundwater**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	chemical and hydrocarbon spills, and leachate from disposal of waste materials in waste rock dumps or in-pit disposal.		
Dewater Disposal	The proposal would require dewatering of up to 31ML per day. The majority of dewater would be utilised for processing, dust suppression and potable supplies, however a small excess is expected for the first three years of the mine life. The proponent has provided a detailed water balance indicating a surplus of up to 9ML/day in the first year, decreasing to 4ML/day in the third year, after which there is likely to be a shortfall. The proponent's preferred option for disposal of surplus dewater is Managed Aquifer Recharge (MAR) at a point sufficiently distant from the project area to avoid recirculation issues. A contingency option of an infiltration pond is also being further developed, but is not included in this assessment.	<u>Department of Water</u> • Managed aquifer recharge has been identified as the preferred option for excess water management. The DoW supports this approach, however experience from other projects has shown that re-injection can be technically difficult. The DoW would require contingency measures addressing this issue to be included in the license application for mine dewatering.	Impacts associated with managed aquifer recharge would be addressed by the proponent within their license application to the Department of Water. Impacts associated with other methods of dewater disposal, including infiltration ponds, would be addressed in a separate approval process if required. The proponent has stated that no dewater would be discharged to the environment as a result of this proposal. **Dewater Disposal is not considered to be a key factor for this proposal.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	Potential impacts of MAR include contamination of groundwater and elevated groundwater levels in the vicinity of the operations.		
Fire management	There would be an increased risk of fire in the project area as a result of vehicle movement and construction fabrication activities. Increased fire risk has the potential to impact flora and vegetation values in the project area.	No submissions were received in relation to fire management.	The proponent has detailed appropriate fire management strategies in section 5.6 its Project Environmental Management Plan (PEMP). Proposed management actions related to fire include: • training of emergency personnel to fight fires; • firefighting equipment located at campsites, worksites and in vehicles; • fire safety inspections and maintenance of equipment that could cause fires; and • construction and maintenance of adequate firebreaks. Given the proponent's proposed management actions, impacts associated with increased fire risk are considered to be unlikely to be significant. **Fire Management is not considered to be a key factor for this assessment.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
Water supply	Water for project requirements including processing, dust suppression and potable supplies would be supplied from mine dewatering and four potable bores. After year 9 of mining, it is anticipated that a supplementary water source would be required as dewatering rates fall. Supplementary requirements are estimated at 2ML/day in the first year increasing to 15ML/day by year 20. The proponent's preferred option is to source this supplementary water from nearby operations which are discharging surplus water. If this is not feasible, other options include on and off-tenement bores. These alternative supplies would be the subject of a separate assessment if required.	<u>Department of Water</u> • The PER states that an additional water source may be required by year 10 of mining. The additional source is to be subject to a separate impact assessment. The DoW recognises that there is some risk involved in this and recommends that the proponent continue to investigate alternative sources.	Water from dewatering is anticipated to meet the water supply needs of the proposal for the first 9-16 years of the mine life. Supplementary water supplies may be required after this. The proponent is continuing to investigate sources of supplementary water, with direct off-take from nearby projects with surplus water as the preferred option. Should there be a need for additional bores, separate approval from the Department of Water would be sought. **Water supply is not considered to be a key factor for this assessment.**
POLLUTION			
Wastewater treatment/ Domestic landfill	The proposal includes two packaged sewage treatment plants and a Class II landfill to dispose of domestic waste associated with the minesite and accommodation camp.	<u>Department of Environment and Conservation</u> • Management issues potentially requiring additional management commitments and/or outcome based conditions include management of waste facilities. <u>Department of Mines and Petroleum</u>	**Contamination of surface water and groundwater by waste disposal facilities is considered to be a key factor for this proposal. See section 3.3 – Surface Water and**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	Treated wastewater would be disposed of via two spray fields. There is a potential for the spray fields and the landfill site to result in contamination of surface water or groundwater, particularly in the event that the sites are inundated during a flood event.	• As the proposed village disposal area would be inundated during a 1 in 10 ARI event, it would be better managed by locating it outside the zone inundated during a 1 in 100 ARI event.	**Groundwater.**
Air Quality	There is a potential for greenhouse gasses and other atmospheric pollutants to be produced through fuel combustion for vehicles and plant associated with the proposal. Total annual consumption of diesel is estimated to be 54.5 million litres for power generation and the operation of mine machinery, and a further 40 million litres for the operation of the mine fleet. Based on this it is estimated that the project would emit 107.93 kilotonnes CO_{2-e} per annum during operation.	No submissions were received in relation to Air Quality.	As the total emissions exceed the NGER 2007 threshold, the proponent would report to the Department of Climate Change annually as required by the *NGER Act 2007*. Brockman aims to minimise and reduce emissions by incorporating minimisation targets into mine planning and establishing reduction targets once operations are underway. Mine planning has considered the use of energy efficient technology, the utilization of alternative energy sources, and implementation of a Greenhouse Gas Reduction program. Other atmospheric emissions would be reported to the National pollutant Inventory as

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
			and when they meet the reporting threshold values. Atmospheric pollutants are not expected to result in significant impact to public health or amenity due to the relative remoteness of the proposal area. **Air Quality is not considered to be a key factor in this assessment.**
Dust	A number of project related activities at the mine site would contribute to elevated dust concentrations in the immediate area. These activities include mining, crushing, stockpiling of ore, haulage, vehicle movements and clearing. Elevated dust levels have the potential to impact vegetation health, and the health and amenity of people in the area. The nearest sensitive receptor to the mine site is the accommodation camp, which is located 6km away from the main mine infrastructure. The next closest sensitive receptor is Marillana station, approximately 20km away.	No submissions were received in relation to Dust.	The proponent has described management actions which would be implemented to manage dust emissions related to the proposal. These include: • Limiting vehicle speeds; • Covering loads during haulage; • Use of dust suppression sprinklers on conveyor belts and stockpiles; • Use of sprinklers or water sprays around hoppers and other transfer points; and • Minimisation of stockpile heights and slopes to reduce wind entrainment. Monitoring would be undertaken by the proponent during construction and operation of the project to ensure that dust emissions do not exceed the NEPM levels for PM_{10}.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
			Based on the proponent's proposed management actions and the relative remoteness of the proposal area from residential areas, impacts associated with dust emissions from this proposal are unlikely to be significant. **Dust is not considered to be a key factor in this assessment.**
Waste Materials	There is a potential for acid or metalliferous drainage to be formed by waste rock and tailings generated by the project. These leachates have the potential to impact the quality of surface water and groundwater systems, and the ecosystems which they support. In addition to in-pit storage of waste products, two waste rock dumps (WRD) would be required; these would be located to the east and west of the processing plant, on the south bank of Weeli Wolli Creek. Fines rejects would be disposed in an above ground Fines Rejects Storage area,	<u>Department of Mines and Petroleum</u> • There appears to be no discussion on the testing of the physical characteristics of the waste material to ensure geophysically adverse material would be managed to minimise the erodability of the final landform. <u>Contaminated sites</u> • Levels of arsenic, antimony and selenium in the ore/waste rock materials are above global background levels. Selenium is of particular concern, because only very low levels in water can cause impacts on bird and fish populations due the ability of this element to be biomagnified within local food webs (particularly in environments which have high rates of annual evaporation like the Pilbara. • The proponents will need to do further work to determine whether there is a significant risk of leachate from rock materials from this site causing environmental harm. The best way of doing this would be through well controlled leaching tests (kinetic testing) to simulate long term effects of oxidation and wetting and drying on leachate quality. These tests generally take many months/years to carry out effectively and so should be carried out in conjunction with mining to develop long term management strategies for water	**Contamination of surface water and groundwater by waste material is considered to be a key factor for this proposal. See section 3.3 – Surface Water and Groundwater.**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	as well as in-pit storage. The proponent considers that the fines rejects would be inert and that storage areas are therefore not required to be lined. The proponent considers that, based on the negligible amounts of sulphide-minerals detected in the waste product, the mine-wastes to be produced during the Project should be geochemically benign, and pose no geochemical concerns for water-quality, and/or revegetation works.	quality post mine closure.	
SOCIAL SURROUNDINGS			
Aboriginal Heritage	There are no established Aboriginal communities in the vicinity; however the project area is subject to native title claims by two groups. Native title agreements are in place between Brockman and both of these groups. Surveys undertaken by the proponent with Native title groups have uncovered a number of archaeological sites; however these sites were not in areas proposed to be disturbed by the project.	<u>Department of Indigenous Affairs</u> • Brockman Resources has formed partnerships with both Native Title groups in the area and is committed to collaborating with these groups on the management of cultural heritage matters associated with the proposal • Aboriginal heritage Surveys have been undertaken across the proposal area with appropriate representatives from both Native Title groups. No significant sites were located within the proposal footprint. • DIA is concerned that impacts associated with groundwater drawdown may occur to Aboriginal Heritage sites in the broader area, including pools and sinkholes present along the Weeli Wolli Creek line.	Brockman has detailed procedures to prevent damage to cultural heritage sites in the event that any are uncovered during construction or operation of the project. These are detailed in the PER document, and include the immediate cessation of work, isolation of the site and informing of appropriate authorities, traditional owners and archaeological experts. DIA expects should sites identified during survey be

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	There is a potential for sites which have not yet been identified to occur within the project footprint. There is also potential for the project to indirectly impact cultural heritage values, in particular the heritage values of areas along Weeli Wolli Creek, through dewatering or changes to surface water flows.		required to be impacted at a later time, section 18 Notice would be lodged. As there are no permanent pools along Weeli Wolli Creek, impacts to Aboriginal Heritage associated with groundwater abstraction are unlikely to occur Due to the lack of identified Aboriginal Heritage sites within the project disturbance area, the project is not expected to result in significant impacts top Aboriginal Heritage. **Aboriginal Heritage is not considered to be a key factor in this assessment.**
Visual Amenity	The minesite would be visible from Munjina-Roy Hill road. No other sensitive receptors for visual impact were identified by the proponent. There would be no alteration to the peaks of ranges, however additional features such as overburden stockpiles and infrastructure added to the plains would alter the aesthetics of the natural landforms.	No submissions were received in relation to Visual amenity	Brockman have attempted to minimise visual through placement of infrastructure and design of stockpiles and waste dumps to mimic local landforms. Vegetative screens and revegetation of stockpiles and waste dumps would also be used to minimise visual impacts of the proposal. Given the proposed management actions, the fact that surrounding area is being

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
			utilised for mining activities and the relative remoteness of the minesite, the visual impact of the proposal is not expected to be significant. **Visual Impact is not considered to be a key factor in this assessment.**
Noise/Vibration	Noise and vibration would be generated by operating plant and machinery, and by basting operations. Impacts to fauna from noise and vibration are addressed in the Fauna section above. The nearest sensitive receptor to the mine site is the accommodation camp, which is located 6km away from the main mine infrastructure. The next closest sensitive receptor is Marillana station, approximately 20km away.	Submissions regarding impacts to fauna as a result of noise and vibration are included under "fauna" above. No submissions were received in relation to noise or vibration impacts to human amenity.	**Impacts to Fauna as a result of Noise and vibration are addressed under Section 3.2 - Fauna.** The nearest residence to the mine site is Marillana station, located approximately 20km away. The proponent has outlined management actions to reduce impacts from noise and vibration to human amenity, including the selection of the quietest practicable plant and machinery, and design and layout of infrastructure and stockpile locations to minimise noise emissions. Noise monitoring programs would be implemented. Given the relative isolation of the project area and the proposed management actions, Impacts to human amenity

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
			related to the proposal are unlikely to be significant. **Noise and Vibration are not considered to be key factors for this assessment**
OTHER			
Mine Closure and Rehabilitation	Aspects of the proposal which would require decommissioning and rehabilitation include: • plant and processing infrastructure; • offices, workshops and the accommodation village; • water supply and sewage infrastructure; • power supply infrastructure; • fuel and bulk storage facilities; • landfill and contaminated sites; • borrow pits, roads and tracks; • surface water diversions; • waste dumps and other landforms; and • mine pits. The proponent has prepared a conceptual closure plan. The plan includes assessment and remediation of contaminated sites, and	<u>Department of Water</u> • The DoW supports the current closure options. The DoW would expect to see the closure plan continually updated as results from monitoring drawdown and hydrologic regimes become available.	**Mine Closure and Rehabilitation are considered to be a key factor for this assessment. See section 3.4 – Mine Closure and Rehabilitation**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	rehabilitation of all disturbed areas. A mine backfill plan has been prepared by the proponent. Mine voids would be progressively backfilled during the operation of the proposal to reduce the depth of voids and minimise surface interactions with groundwater.		

PRINCIPLES		
Principle	**Relevant Yes/No**	**If yes, Consideration**
1. The precautionary principle		
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.*	Yes	In considering this principle, the EPA notes the following: • Investigations of the biological and physical environments provided background information to assess risks and identify measures to avoid or minimise impacts. • The assessment of the adequacy of these impacts and management is provided in Section 3 of this report. • Conditions have been recommended where considered necessary.
2. The principle of intergenerational equity		
The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the	No	

benefit of future generations.		
3. The principle of the conservation of biological diversity and ecological integrity		
Conservation of biological diversity and ecological integrity should be a fundamental consideration.	Yes	In considering this principle, the EPA notes the following: • Scientific studies have contributed to the understanding and management of impacts of mining operations on biodiversity and ecological integrity of the area. • The above impacts have been assessed and provided in Section 3 of this report.
4. Principles relating to improved valuation, pricing and incentive mechanisms		
(1) Environmental factors should be included in the valuation of assets and services. *(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *(3) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.* *(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.*	No	
5. The principle of waste minimisation		
All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.	Yes	In considering this principle, the EPA notes the following: • The proposal would generate residue and waste rock. • Potentially acid forming waste would be encapsulated in the waste disposal facilities. • Other waste products would be created as a result of implementation of the proposal, and would be disposed of according to relevant regulations and legislation.

Appendix 4

Identified Decision-making Authorities
and
Recommended Environmental Conditions

Identified Decision-making Authorities

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

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

Decision-making Authority	Approval
1. Minister for Water	Water extraction licence
2. Department of Environment and Conservation	• Works Approval and Licence • *Environmental protection (Clearing of Native vegetation) Regulations 2004*
3. Shire of East Pilbara	Planning approval
4. Minister for Indigenous affairs	*Aboriginal heritage Act 1972* – s18 clearances
5. Minister for Mines and Petroleum	*Mining Act 1978*
1. Minister for Lands	*Land Administration Act*

Note: In this instance, agreement is only required with DMAs #1, 4, 5 and 6 since these DMAs are Ministers.

RECOMMENDED ENVIRONMENTAL CONDITIONS
11 November 2010

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

MARILLANA IRON ORE PROJECT, SHIRE OF EAST PILBARA

Proposal: The proposal is to construct and operate a 750 Million tonnes (Mt) iron ore mine, processing facility and associated infrastructure using traditional open pit mining methods of excavating, load and haul approximately 100km north west of Newman

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

Proponent: BROCKMAN RESOURCES LIMITED0

Proponent Address: 117 STIRLING HIGHWAY
NEDLANDS, WA 6009

Assessment Number: 1781

Report of the Environmental Protection Authority: Report 1376

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

1 Proposal Implementation

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

2 Proponent Nomination and Contact Details

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

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

3 Time Limit of Authorisation

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

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

4 Compliance Reporting

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

4-2 The proponent shall submit to the Chief Executive Officer of the Office of the Environmental Protection Authority, the compliance assessment plan required by condition 4-1 at least 6 months prior to the first compliance report required by condition 4-6, or prior to ground-disturbing activities, 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 reporting of potential non-compliances and corrective actions taken;

5 the table of contents of compliance reports; and

6 public availability of compliance reports.

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

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

4-5 The proponent shall advise the Chief Executive Officer of the Office of the Environmental Protection Authority of any potential non-compliance within 7 business days of that non-compliance being known.

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

1 be endorsed by the proponent’s Managing Director or a person, approved in writing by the Office of the Environmental Protection Authority, delegated to sign on the Managing Director’s behalf;

2 include a statement as to whether the proponent has complied with the conditions;

3 identify all potential non-compliances and describe corrective and preventative actions taken;

4 be made publicly available in accordance with the approved compliance assessment plan; and

5 indicate any proposed changes to the compliance assessment plan required by condition 4-1.

5 Marillana Sand Dune Community

5-1 The proponent shall implement the proposal so that it does not adversely affect the Marillana Sand Dune community shown as vegetation units 6 and 7 in Figure 2 of schedule 1.

5-3 The proponent shall monitor, prior to disturbance and at intervals during the operation of the project, the health and condition of the Marillana Sand Dune community shown as vegetation units 6 and 7 in Figure 2 of schedule 1. This monitoring is to be carried out to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice from the Department of Environment and Conservation.

5-4 Should any monitoring site show a 25 per cent (or greater) decline in health or condition, the proponent shall provide a report to the Chief Executive Officer of the Office of the Environmental Protection Authority within 21 days of the decline being identified which:

1 describes the decline;

2 provides information which allows determination of the likely root cause of the decline; and

3 if likely to be caused by activities undertaken in implementing the proposal, states the actions and associated timelines proposed to remediate the decline.

5-5 The proponent shall, on approval of the Chief Executive Officer of the Office of the Environmental Protection Authority, implement the actions identified in 5-4 (3) and continue to implement such actions until the Chief Executive Officer of the Office of the Environmental Protection Authority determines that the remedial actions may cease.

6 Weeli Wolli Creek Riparian Vegetation

6-1 The proponent shall ensure that no clearing is undertaken within 30 metres of the bank of Weeli Wolli Creek as defined in Schedule 2, unless required for the construction of drainage diversion structures or creek crossings. Areas required for the construction of drainage diversion structures or creek crossings should be reported to the Office of the Environmental Protection Authority prior to clearing.

6-2 The proponent shall ensure that groundwater abstraction and dewatering required to implement the proposal do not adversely impact the riparian vegetation of Weeli Wolli Creek.

6-3 To verify that the requirement of condition 6-2 is met the proponent shall:

1. monitor soil moisture levels within the riparian vegetation area; and
2. monitor the health and cover of vegetation within the riparian vegetation area, particularly *Eucalyptus victrix*.

6-4 Monitoring undertaken as required by condition 6-3 is to be carried out according to a monitoring schedule and using methods developed to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice from the Department of Environment and Conservation, prior to the commencement of dewatering.

6-5 Monitoring undertaken as required by condition 6-3 is to continue until such time as groundwater levels below Weeli Wolli Creek have returned to pre-mining levels, or until such time as the Chief Executive Officer of the Office of the Environmental Protection Authority determines that monitoring and management actions may cease.

6-6 Should any monitoring site show a 25 per cent (or greater) decline in health or cover, the proponent shall provide a report to the Chief Executive Officer of the Office of the Environmental Protection Authority within 21 days of the decline being identified which:

1 describes the decline;

2 provides information which allows determination of the likely root cause of the decline; and

3 if likely to be caused by activities undertaken in implementing the proposal, states the actions and associated timelines proposed to remediate the decline.

6-7 The proponent shall, on approval of the Chief Executive Officer of the Office of the Environmental Protection Authority, implement the actions identified in condition 6-6 (3) and continue to implement such actions until the Chief Executive Officer of the Office of the Environmental Protection Authority determines that the remedial actions may cease.

7 Weeds

7-1 The proponent shall ensure that:

1 No new species of weeds (including both declared weeds and environmental weeds) are introduced into the proposal area as defined in Schedule 1 as a result of the implementation of the proposal.

2 Prior to ground-disturbing activities the proponent shall undertake a baseline weed survey to determine the species and extent of weeds (including both declared weeds and environmental weeds) present within the proposal area as defined in Schedule 1 to the requirements of the Chief Executive Officer of the Office of the Environmental Protection Authority.

3 Prior to ground-disturbing activities the proponent shall establish at least three reference sites on undisturbed land within 1 kilometre of the proposal (not impacted by the proposal). Reference sites are to be chosen in consultation with the Department of Environment and Conservation. The reference sites are

to be monitored every 2 years, with a baseline survey to be conducted at the concurrently with the survey required by condition 7-1 (2).

4 The species and extent of weed cover within the proposal area shall not exceed that identified in the baseline survey identified in condition 7-1(2) or exceed that existing on comparable, nearby land, determined by reference sites required by condition 7-1(3) which have not been disturbed during implementation of the proposal.

8 Groundwater – Fortescue Marsh

8-1 The proponent shall ensure that groundwater abstraction and dewatering required to implement the proposal do not adversely impact the hydrology or vegetation health of the Fortescue Marsh.

8-2 To verify that the requirement of condition 8-1 is met the proponent shall:

1. monitor groundwater levels and quality between the mine site and the Fortescue Marsh;
2. in the event that groundwater monitoring demonstrates that drawdown associated with the proposal extends beyond the northern boundary of the tenement, the proponent shall:
    a. monitor surface water levels at the southern boundary of the Marsh;
    b. monitor the health and cover of vegetation on the southern boundary of the marsh.

Monitoring is to be carried out according to a monitoring schedule and using methods developed to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice from the Department of Environment and Conservation and the Department of Water prior to the commencement of dewatering.

The Southern Boundary of the Fortescue Marsh is defined in the DEC Clearing Regulations - Environmentally Sensitive Areas (ESA) dataset (2004).
Monitoring is to commence prior to commencement of dewatering and is to be carried out in such a way as to establish baseline data regarding the hydrology and vegetation health of the Fortescue Marsh prior to the extension of the cone of drawdown associated with the proposal beyond the northern boundary of the project area.

Monitoring is to continue for the duration of mining and for such longer time until the Chief Executive Officer of the Office of the Environmental Protection Authority determines that monitoring and management actions may cease.

8-3 The proponent shall, within one year of the commencement of dewatering, provide a report to the Chief Executive Officer of the Office of the Environmental Protection Authority which has been prepared in consultation with the Department of Environment and Conservation and the Department of Water. The report shall detail the following:

1. verification of the groundwater model presented in the Public Environmental Review against actual data;

2. recalibration of the model and implications of any deviations from the model on the Fortescue Marsh;

3. details of baseline data on the hydrology and vegetation of the southern boundary of the Fortescue Marsh collected in accordance with condition 8-2;

4. appropriate trigger values developed to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice from the Department of Environment and Conservation to determine compliance with condition 8-1, and discussion of the selection of the trigger levels in relation to the EPA's objectives;

5. a detailed strategy developed to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice from the Department of Environment and Conservation to avoid and mitigate any impacts to the Fortescue Marsh detected by the monitoring program required by condition 8-2.

8-4 Prior to providing the report required by Condition 8-3 to the Chief Executive Officer of the Office of the Environmental Protection Authority, the proponent shall have the report peer reviewed by an independent expert acceptable to the Office of the Environmental Protection Authority and chosen in consultation with the Department of Environment and Conservation and the Department of Water

8-5 In the event that monitoring required by condition 8-2 indicates an exceedance of the trigger levels determined in condition 8-3 (4):

1. the proponent shall immediately implement mitigation measures indicated by the mitigation strategy required to be developed by condition 8-3;

2. report to the Chief Executive Officer of the Office of the Environmental Protection Authority within 7 days of the exceedance being identified;

3. provide evidence which allows determination of the cause of the exceedance;

4. if determined by the Chief Executive Officer of the Office of the Environmental Protection Authority to be a result of activities undertaken in implementing the proposal, the proponent shall submit actions to be taken including those required to be developed by condition 8-3; and

5. implement actions including those required to be developed by condition 8-3 upon approval of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice from the Department of Environment and Conservation and shall continue until such time the Chief Executive Officer of the Office of the Environmental Protection Authority determines that the remedial actions may cease.

8-6 The proponent shall submit annually the results of monitoring required by condition 8-2 to the Chief Executive Officer of the Office of the Environmental Protection Authority.

8-7 The proponent shall make publicly available the monitoring reports required by condition 8-2 in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

9 Surface Water Flows

9-1 The proponent shall not cause disturbances to Weeli Wolli Creek which could lead to alterations in surface water flows to the Fortescue Marsh.

9-2 The proponent shall implement the proposal in accordance with the Marillana Surface Water Management Plan (Aquaterra 2010) provided as Appendix S of Marillana Iron Ore Project Public Environmental Review (Brockman Resources, 2010) or subsequent revisions approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

9-3 The proponent shall review and revise the Marillana Surface Water Management Plan required by condition 9-1 when requested by the Chief Executive Officer of the Office of the Environmental Protection Authority, to ensure that the mitigation and management techniques remain valid and incorporate any relevant new research.

9-4 The proponent shall make the Marillana Surface Water Management Plan required by Condition 9-1 publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

10 Groundwater and Surface Water Quality

10-1 The proponent shall ensure that run-off and/or seepage from the mine and infrastructure do not cause the quality of surface water or groundwater within or adjacent to the proposal area to exceed the trigger values for a slightly to moderately disturbed ecosystem provided for in Table 3.4.2 of Chapter 3 of the Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000) *Australian Water Quality Guidelines for Fresh and Marine Waters* and its updates, taking into consideration natural background water quality.

10-2 The proponent shall monitor the quality of surface water and groundwater upstream and downstream of the mine and infrastructure to ensure that the requirements of condition 10-1 are met. This monitoring is to be carried out using methods consistent with Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000) *Australian Guidelines for Water Quality Monitoring and Reporting*, and its updates, and to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority.

10-3 The proponent shall commence the water quality monitoring required by condition 10-2 prior to ground-disturbing activities to collect baseline data.

10-4 The proponent shall submit annually the results of monitoring required by condition 10-2 to the Chief Executive Officer of the Office of the Environmental Protection Authority.

10-5 In the event that monitoring required by condition 10-2 indicates that the requirements of condition 10-1 are not being met, the proponent shall:

1. report such findings to the Chief Executive Officer of the Office of the Environmental Protection Authority within 21 days of the decline in water quality being identified;

2. provide evidence which allows determination of the root cause of the decline in water quality; and

3 if determined to be a result of activities undertaken in implementing the proposal, state the actions and associated timelines proposed to be taken to remediate the water quality.

10-6 The proponent shall, on approval of the Chief Executive Officer of the Office of the Environmental Protection Authority, implement the actions identified in 10-5 (3) and continue to implement such actions until the Chief Executive Officer of the Office of the Environmental Protection Authority determines that the remedial actions may cease.

10-7 The proponent shall make the monitoring reports required by condition 10-2 publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

11 Acid and Metalliferous Drainage

11-1 Prior to ground-disturbing activities the proponent shall use geochemical testing to characterise the leaching potential of waste material and provide a report with a detailed risk assessment, using national and international standards*, for any potential Acid or Metalliferous Drainage (as defined in section 2.1 of the Managing Acid and Metalliferous Drainage, February 2007 developed by the Australian Government) to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority to:

1 identify the extent of the acidity and metal contamination hazard associated with the proposal;

2 identify the potential environmental receptors that could be impacted on exposure to this hazard; and

3 demonstrate that the proposed use and storage of waste material is unlikely to impact environmental values in or near the project area, including the Fortescue Marsh.

11-2 Prior to mining any material with the potential to generate Acid or Metalliferous Drainage, the proponent shall develop and implement long-term prevention, monitoring, contingency and remediation strategies for the management of any potential Acid or Metalliferous Drainage to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation and the Department of Mines and Petroleum.

11-3 The proponent shall continue to implement the action required by condition 11-2 until such time as the Chief Executive Officer of the Office of the Environmental Protection Authority determines that the actions may cease.

11-4 The proponent shall continue to undertake geochemical testing for potential Acid or Metalliferous Drainage as part of the long-term monitoring strategies required by Condition 11-2 using national and international standards* to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority, until such time as it is determined by the Chief Executive Officer of the Office of the Environmental Protection Authority that monitoring may cease.

11-5 In the event that monitoring required by condition 11-2 indicates that environmental values are being impacted by Acid or Metalliferous Drainage, the proponent shall:

1. report such findings to the Chief Executive Officer of the Office of the Environmental Protection Authority within 21 days of the decline in water quality being identified;

2. provide evidence which allows determination of the root cause of the decline in water quality; and

3. if determined to be a result of activities undertaken in implementing the proposal, state the actions and associated timelines proposed to be taken to remediate the water quality.

11-6 The proponent shall, on approval of the Chief Executive Officer of the Office of the Environmental Protection Authority, implement the actions identified in 11-5 (3) and continue to implement such actions until the Chief Executive Officer of the Office of the Environmental Protection Authority determines that the remedial actions may cease.

11-6 The proponent shall make the monitoring reports required by condition 11-2 publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

11-7 The proponent shall report the results and assessment of efficacy of the long-term prevention, monitoring, contingency and remediation strategies required by condition 11-2 as part of the compliance assessment report required by condition 4-6 to the Chief Executive Officer of the Office of the Environmental Protection Authority.

*Note: The national and international standards referred to in condition 11 are the *Managing Acid and Metalliferous Drainage*, February 2007 developed by the Australian Government, Department of Industry Tourism and Resources, the *Global Acid and Metalliferous Drainage (GARD) Guide*, December (2008) developed by the International Network for Acid Prevention (INAP) and the Australian and New Zealand Environment Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000) *Australian Water Guidelines for Fresh and Marine Waters and its updates*.

12 Rehabilitation

12-1 The proponent shall undertake progressive rehabilitation over the life of the proposal to achieve the following outcomes:

1. The waste rock dumps and other final landforms shall be non-polluting and shall be constructed to ensure that their stability, surface drainage, resistance to erosion and ability to support local native vegetation are similar to undisturbed natural analogue landforms as demonstrated a methodology acceptable to the Chief Executive Officer of the Office of the Environmental Protection Authority;

2. Waste rock dumps and other areas disturbed through implementation of the proposal (excluding mine pits), shall be progressively rehabilitated with vegetation composed of native plant species of local provenance;

3. The percentage cover and species diversity of living self sustaining native vegetation in all rehabilitation areas shall be comparable to that of undisturbed natural analogue sites as demonstrated by a methodology acceptable to the Chief Executive Officer of the Office of the Environmental Protection Authority; and

4. Weed management for the rehabilitation areas shall be carried out as per condition 7.

12-2 The proponent shall provide rehabilitation completion criteria for the approval of the Chief Executive Officer of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation within five years of ground-disturbing activities for the proposal.

12-3 Rehabilitation activities shall continue until such time as the requirements of condition 12-1 and 12-2 are met, for a minimum of five years following mine completion demonstrated by inspections and reports to the satisfaction of the Chief Executive Officer of the Office of the Environmental Protection Authority, on advice of the Department of Mines and Petroleum.

13 Final Closure and Decommissioning Plan

13-1 At least five years prior to mine completion, the proponent shall prepare and submit a Final Closure and Decommissioning Plan to the requirements of the Chief Executive Officer of the Office of the Environmental Protection Authority, on advice of the Department of Environment and Conservation and Department of Mines and Petroleum.

13-2 The Final Closure and Decommissioning Plan shall be prepared consistent with:

1. ANZMEC/MCA (2000) *Strategic Framework for Mine Closure Planning*; including any subsequent revisions, and

2. Department of Industry Tourism and Resources (2006) *Mine Closure and Completion* (Leading Practice Sustainable Development Program for the Mining Industry), Commonwealth Government, Canberra, including any subsequent revisions.

13-3 The Final Closure and Decommissioning Plan shall provide detailed technical information on the following:

1. The final closure of all areas disturbed through implementation of the proposal ensuring that they are safe, stable and non-polluting;

2. decommissioning of all plant and equipment;

3. disposal of waste materials;

4. final rehabilitation of waste rock dumps and other areas;

5. management and monitoring following mine completion;

6. inventory of all contaminated sites and proposed management;

13-4 The proponent shall close, decommission and rehabilitate the proposal in accordance with the Final Closure and Decommissioning Plan.

13-5 The proponent shall make the Final Closure and Decommissioning Plan required by condition 13-1 publicly available in a manner approved by the Chief Executive Officer of the Office of the Environmental Protection Authority.

Notes

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

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 No. 1781)

The proposal is to construct and operate a 750 Million tonnes (Mt) iron ore mine, processing facility and associated infrastructure within mining leases M47/1414 and M47/1419. The project area is located approximately 100km north west of Newman in the Fortescue valley.

The proposal would be developed using traditional open pit mining methods of excavating, load and haul. The mine would produce 17-19 Mt of beneficiated ore per annum.

The location of the various project components is shown in Figure 1.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in section 5 of the proponent's document, *Marillana Iron Ore Project Public Environmental Review*, prepared by *ecologia* Environment, Perth, Western Australia (May 2010).

Table 1: Summary of Key Proposal Characteristics

Element	Description
General	
Proposed Commencement	2012
Project life span	20 years
Area of Disturbance	2985 hectares (ha)
Mining	
Total pit area	1648 ha
Waste Rock disposal	587 ha above ground plus in-pit storage.
Fines rejects Storage	247 ha above ground plus in-pit storage.
Dewatering	120 Gigalitres over the life of the mine.
Dewatering rate	Peak dewatering of up to 32 ML/day.
Dewater disposal	• Use on site for processing, dust suppression, and use at accommodation camp; • Managed Aquifer Recharge; and • Infiltration ponds. • No dewater discharge to any creekline.
Infrastructure	
Processing requirements	Crushing, screening and wet gravity beneficiation
Workforce accommodation	On-site accommodation camp
Water supply	• Pit Dewatering; • Off-take agreements where possible; and • On or off -tenement bores where necessary.
Power source	On site diesel-NG/LNG dual fuel generators.

Figures (attached)

Figure 1 Location of all project components. (See figure 3 above).
Figure 2 Vegetation map. (See figure 4 above)

Schedule 2

MGA94 Zone 50 Co-ordinates defining the southern bank of the Weeli Wolli Creek channel

737,369.52 7,492,260.91

737,375.99 7,492,452.81

737,342.59 7,492,745.45

737,337.01 7,492,952.48

737,255.40 7,493,192.55

737,214.35 7,493,371.66

737,199.81 7,493,462.92

737,138.95 7,493,582.58

737,035.95 7,493,762.83

736,919.64 7,493,883.92

736,825.48 7,494,023.91

736,777.88 7,494,156.38

736,806.55 7,494,298.29

736,821.76 7,494,421.18

736,766.17 7,494,502.53

736,675.45 7,494,591.07

736,632.16 7,494,680.43

736,574.22 7,494,762.35

736,439.62 7,494,839.02

736,347.16 7,494,872.37

736,293.33 7,494,866.52

736,250.02 7,494,860.67

736,165.75 7,494,861.84

736,073.29 7,494,880.57

735,957.42 7,494,915.38

735,815.80 7,494,982.68

735,668.64 7,495,038.92

735,559.33 7,495,051.80

735,533.26 7,495,039.27

735,469.36 7,495,001.12

735,376.83 7,495,017.21

735,293.22 7,495,054.07

735,245.82 7,495,079.83

735,189.05 7,495,116.11

735,144.57 7,495,170.53

735,118.46 7,495,274.25

735,112.36 7,495,332.26

735,083.53 7,495,457.01

735,037.29 7,495,562.99

734,969.48 7,495,704.73

734,911.41 7,495,808.03

734,873.71 7,495,867.06

734,800.87 7,495,963.34

734,756.25 7,496,011.90

734,677.01 7,496,027.96

734,610.80 7,496,092.65

734,560.37 7,496,189.32

734,513.26 7,496,310.28

734,459.83 7,496,394.23

734,339.50 7,496,456.55

734,220.03 7,496,497.81

734,151.04 7,496,551.08

734,100.86 7,496,679.85

734,025.08 7,496,771.93

733,984.12 7,496,830.46

733,964.22 7,496,859.72

733,925.60 7,496,911.22

733,868.25 7,496,975.59

733,795.68 7,497,043.47

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733,660.92 7,497,292.15

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733,531.83 7,497,506.72

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733,488.86 7,498,174.04

733,419.99 7,498,292.30

733,312.31 7,498,401.14

733,164.84 7,498,483.07

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732,512.92 7,498,872.82

732,436.08 7,498,987.44

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732,330.34 7,499,198.18

732,265.97 7,499,394.81

732,153.74 7,499,567.53

732,037.14 7,499,680.11

731,913.68 7,499,804.46

731,809.35 7,499,889.07

731,677.25 7,499,928.51

731,610.54 7,499,920.32

731,564.90 7,499,936.71

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731,357.11 7,500,359.16

731,361.72 7,500,500.07

731,353.52 7,500,589.79

731,392.85 7,500,697.48

731,458.39 7,500,856.64

731,524.47 7,501,055.54

731,561.38 7,501,160.95

731,646.83 7,501,303.74

Appendix 5

Summary of Submissions and Proponent's Response to Submissions