### Environmental Impact Assessment Process Timelines

<table>
<thead>
<tr>
<th>Date</th>
<th>Progress stages</th>
<th>Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17/06/08</td>
<td>Level of Assessment set (date appeals process completed)</td>
<td></td>
</tr>
<tr>
<td>29/12/09</td>
<td>Proponent’s Final PER document received by EPA</td>
<td>80</td>
</tr>
<tr>
<td>11/01/10</td>
<td>Proponent Document Released for Public Comment</td>
<td>2</td>
</tr>
<tr>
<td>08/03/10</td>
<td>Public Comment Period Closed</td>
<td>8</td>
</tr>
<tr>
<td>29/10/10</td>
<td>Final Proponent response to the issues raised</td>
<td>34</td>
</tr>
<tr>
<td>1/12/10</td>
<td>EPA report to the Minister for Environment (including 2 weeks consultation on conditions)</td>
<td>4*</td>
</tr>
<tr>
<td>6/12/10</td>
<td>Publication of EPA report</td>
<td>1</td>
</tr>
<tr>
<td>20/12/10</td>
<td>Close of appeals period</td>
<td>2</td>
</tr>
</tbody>
</table>

### 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 has met its agreed timeline objective of 10 weeks for the completion of the assessment and provision of a recommendation to the Minister.

Dr Paul Vogel  
Chairman  
6 December 2010

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Assessment No. 1738
Summary and recommendations

This report provides the Environmental Protection Authority’s (EPA’s) advice and recommendations to the Minister for Environment on the proposal by Hamersley HMS Pty Ltd to develop and operate an iron ore mine consisting of open pits and associated infrastructure at the Hope Downs 4 Iron Ore Mine (HD4) within the Shire of East Pilbara.

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) Groundwater and surface water;
(b) Flora;
(c) Fauna; and
(d) 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) Principle 1; The precautionary principle;
(b) Principle 2: The principle of intergenerational equity;
(c) Principle 3: The principle of conservation and biological diversity and ecological integrity;
(d) Principle 4: The principle relating to improved valuation, pricing and incentive mechanisms; and
(e) Principle 5: The principle of waste minimisation.
Conclusion
The EPA has considered the proposal by Hamersley HMS Pty Ltd to develop and operate an open pit iron ore mining area and associated infrastructure at the Hope Downs 4 Iron Ore Mine within the Shire of East Pilbara.

Groundwater and Surface Water
To operate the proposed HD4 mine the orebody aquifer would require dewatering at a maximum rate of 20 Gigalitres per annum (GL/a). The calcrete and alluvial aquifers and their associated pools which overly the orebody aquifer are potentially weakly hydraulically connected and therefore could suffer loss of water during the operation of HD4. A precautionary approach has been taken as the connection, however slight, has the potential to result in loss of water from pools. The EPA has recommended a condition which ensures the proponent’s commitment to undertake monitoring is implemented and requires contingency measures be undertaken should any impacts be observed.

The proposal would result in an excess of water. The EPA supports the transfer of excess water to the existing Hope Downs 1 mine for reinjection into the aquifer once Hope Downs 1 is closed as this presents the best environmental outcome. However, the EPA recognises that this may not be possible as Hope Downs 1 may remain operational until 2023. The EPA considers excess water should be managed through discharge of excess water to Kalgan Creek until such time as the Hope Downs 1 mine ceases dewatering. Excess water should then be transferred from HD4 to Hope Downs 1 for aquifer reinjection. This is reflected in condition 6. Condition 6 also requires all excess water discharged off-site would meet the relevant ANZECC/ARMCANZ (2000) guidelines and ensures that there would be no impact to Fortescue Marsh whose environmental values are regionally and nationally significant.

The impacts to the surface flows associated with the realignment of Coondiner Creek would be minimised through the engineering design and revegetation of the realignment. The EPA considers that recommended condition 11 should be implemented to ensure the long-term success of the realignment.

The EPA notes there is limited beneficial use for groundwater in the area. The EPA has recommended a condition requiring the proponent to ensure that any discharge of water from the tailings storage facility, mine voids and waste dumps is monitored, managed, and treated if necessary to ensure that water quality is maintained.

Vegetation and Flora
The proposal requires the clearing of up to 5470 hectares (ha) within the 20,135 ha project area. No Threatened Ecological Communities would be impacted. The Declared Rare Flora (DRF) Lepidium catapycnon, six species of Priority flora, one potential Priority Ecological community (vegetation community C4) and fifteen other vegetation communities of local conservation significance would be impacted by the implementation of the proposal. Impacts include clearing, dewatering, discharge of excess water and
interruption of surface water flows. The EPA considers that the impacts are unlikely to be significant subject to the implementation of recommended conditions which minimise impacts to the DRF, Priority Flora and locally significant vegetation communities.

Fauna
The EPA notes that a number of conservation significant fauna have been recorded in the project area and some more species are thought likely to be present due to the existence of suitable habitat.

Impacts to suitable habitat for the Peregrine Falcon (*Falco peregrinus*), Black-footed Rock-wallaby (*Petrogale lateralis*) and Pilbara Leaf-nose Bat (*Rhinonicteris aurantia*) would be avoided thought the selection of infrastructure corridor Option 1 rather than Option 6. This is dependant on access to the Option 1 mining lease being agreed by a third party. A condition (condition 9) has been recommended which reflects the EPA’s preference for the selection of infrastructure corridor Option 1.

The EPA considers that impacts to terrestrial fauna species can be managed through the implementation of the proponent’s Fauna Management Plan and condition 10 which ensures fauna are not adversely impacted during the trenching works.

Closure and Rehabilitation
The EPA considers the framework for managing closure and rehabilitation provided in the initial Conceptual Closure Management Study to be adequate. The EPA encourages the proponent to continue to undertake research into improving closure and rehabilitation techniques. The EPA also urges the proponent to use its best endeavours to identify opportunities to backfill the pit voids to reduce the project footprint and reduce the possibility of saline, acidic and/or metalliferous pit lakes. The EPA has recommended conditions in order to ensure the long term success of closure and rehabilitation.

The EPA has concluded that it is unlikely that the EPA’s objectives would be compromised provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 4.

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 an iron ore mining area at the Hope Downs 4 Iron Ore Mine within the Shire of East Pilbara;
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 Hamersley HMS Pty Ltd to develop and operate the Hope Downs 4 Iron Ore Mine is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

(a) **Groundwater Drawdown** – ensuring dewatering of groundwater does not adversely affect the calcrete and alluvial aquifers, Coondiner Creek or any pools in the surrounding area.

(b) **Dewatering Discharge** – ensuring excess water meets water quality guidelines. If the Kalgan Creek Excess Water Management option is selected then condition 6 would also ensure that the discharge water does not reach Fortescue Marsh, the values of the Creek and its surrounding riparian vegetation are protected and contingency measures do not allow discharge to alternate creeks particularly Coondiner Creek.

(c) **Water Quality** – maintaining acceptable water quality.

(d) **Flora and Vegetation** – restricting the clearing of DRF. The condition requires the proponent to demonstrate impacts to conservation significant species and local conservation significant vegetation communities are further minimised during the final design of the project. The condition also prevents the introduction of new weed species and the spread and increase of the existing weed populations.

(e) **Infrastructure Corridor** – implementation of infrastructure corridor Option 1 thereby reducing impacts to flora and fauna.

(f) **Fauna** – protecting significant habitat, minimising impacts to fauna and protecting fauna from open trenches.

(g) **Acid Metalliferous Drainage** - long-term prevention, monitoring, contingency and remediation strategies for the management of any potential Acid or Metalliferous Drainage

(h) **Rehabilitation** – to achieve acceptable long-term rehabilitation of disturbed areas.

(i) **Final Closure and Decommissioning Plan** – appropriate planning and implementation of closure and decommissioning.
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3. Summary of identification of key environmental factors
4. Recommended Environmental Conditions and nominated Decision-Making Authorities
5. Summary of submissions and proponent’s response to submissions
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 applicable to the proposal by Hamersley HMS Pty Ltd to develop and operate an open pit iron ore mine and associated infrastructure at the Hope Downs 4 Iron Ore Mine (HD4) located approximately 30 kilometres (km) north west of Newman within the Shire of East Pilbara.

The project is being formally assessed due to potential impacts to groundwater, surface water, native vegetation and native fauna.

This proposal was originally referred to the EPA on 2 May 2008. A level of assessment was set at Public Environmental Review (PER) with an eight week public review period on 17 June 2008 under the Western Australian Environmental Protection Act 1986. The PER document was released for public review between 11 January 2010 and 8 March 2010.

The proposal was initially considered by the Commonwealth of Australia to be ‘a controlled action’ under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) based on the risk to threatened species, particularly the Dasyurus hallucatus (northern quoll). The proponent submitted a request for reconsideration on the basis that no evidence of northern quoll was recorded at the proposal area during targeted surveys and the site does not contain core habitat for the species. In July 2009, the Commonwealth revoked the original decision and the Proposal is now deemed ‘not a controlled action’.

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 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 HD4, located in the Pilbara region in the shire of East Pilbara (Figure 1). The proposal includes the development and operation of an above and below the water table greenfields iron ore mine and associated infrastructure. Ore from the HD4 proposal would be transported via a new railway to existing rail infrastructure near the existing Hope Downs 1 Iron Ore Mine then to port facilities on the
coast. The mine would operate between 25-30 years and have a potential throughput of up to 30 million tonnes per annum.

The four main components of the proposal consist of the Mining Area, Accommodation Area, Infrastructure Corridor and Excess Water Management Infrastructure (Figures 2 & 3). The designated Mining Area includes:

- four mining/pit zones;
- mineral waste rock dumps;
- material stockpiles;
- haul roads;
- storage and maintenance facilities;
- mine dewatering system (including bores, dewatering pipeline and intrafield pipeline, exchange dam, collector tanks and associated power supply infrastructure);
- realignment of Coondiner Creek;
- dry process plant with future upgrade to wet processing;
- residue storage facility;
- acid water treatment plant or other suitable acid water treatment option;
- operational infrastructure such as administration facilities, ancillary mining facilities, water use, supply and treatment facilities, and power and communications distribution networks.

The Accommodation Area is located to the south of the mining area. This area would contain a temporary construction camp and a permanent accommodation village and supporting infrastructure and facilities. An access road would also be constructed from the Great Northern Highway to the construction camp, accommodation village and mining area.

The proposed Infrastructure Corridor (Option 1 or Option 6) connects HD4 to the existing Hope Downs 1 iron ore mine and contains:

- a rail spur of up to 52 km in length for Option 1 and 65 km in length for Option 6;
- power lines;
- access road; and
- communications infrastructure.

Excess Water Management Infrastructure would consist of a service road and pipeline. The proponent has proposed two options to manage the excess water; either transfer to the existing Hope Downs 1 iron ore mine or discharge to Kalgan Creek, with Coondiner Creek as a contingency should there be significant impacts to Kalgan Creek.

The proposed locations and footprints of mine pits, waste dumps and associated infrastructure have not been finalised. All such elements of the proposal described above would be contained within the component
areas/polygons indicated in Figure 2. Figure 3 provides a conceptual mine layout.

The proponent's dewatering requirements and groundwater modeling are based on the current mine plan presented in the proponent's PER document. The proponent's document notes that the mine plan may change in the future. The EPA has based its assessment on the information provided by the proponent in its PER and Response to Submissions documents. Any substantial changes would require further consideration by the EPA.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Sections 2, 7 and 8 of the PER (Hamersley 2010a).

The EPA notes that while the project footprint described in the PER includes three water discharge pipeline options, the Response to Submissions document withdrew one of these options. The EPA has considered the remaining options within Sections 3.1 and 3.2 of this report and as a result has made a recommendation that discharge of excess water to Coondiner Creek or other creeklines should not be pursued as contingency measures should impacts to Kalgan Creek be demonstrated to be unacceptable. As a consequence the following proposal description differs from that provided by the proponent in its PER and Response to submissions documents (Hamersley 2010a & b).

Table 1: Summary of key proposal characteristics

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
</tr>
<tr>
<td>Project life</td>
<td>25-30 years (approximately)</td>
</tr>
<tr>
<td>Location</td>
<td>See Figure 2</td>
</tr>
<tr>
<td><strong>Project Area</strong></td>
<td>20,135 ha comprising:</td>
</tr>
<tr>
<td>Project Area</td>
<td>o mining area – 5805 ha</td>
</tr>
<tr>
<td></td>
<td>o infrastructure corridor – 9960 ha</td>
</tr>
<tr>
<td></td>
<td>o excess water discharge infrastructure – 2520 ha</td>
</tr>
<tr>
<td></td>
<td>o accommodation area – 1850 ha</td>
</tr>
<tr>
<td><strong>Disturbance Area</strong></td>
<td></td>
</tr>
<tr>
<td>Vegetation Clearing</td>
<td>Clearing up to 5470 ha comprising:</td>
</tr>
<tr>
<td></td>
<td>o mining area – 4000 ha</td>
</tr>
<tr>
<td></td>
<td>o infrastructure corridor – 1100 ha</td>
</tr>
<tr>
<td></td>
<td>o excess water discharge infrastructure – 180 ha</td>
</tr>
<tr>
<td></td>
<td>o accommodation area – 190 ha</td>
</tr>
<tr>
<td><strong>Mining Operation</strong></td>
<td></td>
</tr>
<tr>
<td>Mining method</td>
<td>Open cut</td>
</tr>
<tr>
<td>Dewatering rate</td>
<td>Up to 20 GL/a</td>
</tr>
<tr>
<td></td>
<td>Up to 140 m of drawdown to approximately 500m relative to sea level (RSL)</td>
</tr>
<tr>
<td>Discharge of excess water to Kalgan Creek</td>
<td>Discharge location:</td>
</tr>
<tr>
<td></td>
<td>o Approximately 16 km east of the mining area, downstream of Kalgan Pool</td>
</tr>
<tr>
<td></td>
<td>The maximum footprint of creekbed saturation shall not:</td>
</tr>
<tr>
<td></td>
<td>o exceed 29 km from point of discharge; and</td>
</tr>
<tr>
<td></td>
<td>o extend closer than 30 km from the Fortescue Marsh boundary</td>
</tr>
<tr>
<td>Element</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Discharge of excess water to Hope Downs 1</td>
<td>Length of water pipeline:</td>
</tr>
<tr>
<td></td>
<td>• approximately 16 km</td>
</tr>
<tr>
<td>Infrastructure Corridor</td>
<td>Length:</td>
</tr>
<tr>
<td></td>
<td>• up to 52 km for option 1 or 65 km for option 6</td>
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</tbody>
</table>

Since release of the PER, a number of modifications to the proposal have been made by the proponent. These include:

- Project area has increased from 18,910 ha to 20,135 ha. The total proposed clearing remains unchanged.
- The length of infrastructure corridor Option 1 has been revised from 45 km to 52 km.
- The options for excess water management have been reduced to two disposal options:
  - discharge to Kalgan Creek (downstream of Kalgan Pool), which includes disposal to Coondiner Creek as a contingency action should impacts to Kalgan Creek become unacceptable; or
  - transfer to Hope Downs 1.
- The option to manage excess dewatering water by discharging to Ophthalmia Dam is not being pursued by the proponent.
- The option to manage excess dewatering water by discharging to Mindy Mindy Creek is not being pursued by the proponent.

The potential impacts of the proposal initially predicted by the proponent in the PER document (Hamersley 2010a) and its proposed management measures are summarised in Table ES 1 (Executive Summary) of the proponent’s document.

3. **Key environmental factors and principles**

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for Environment on the key environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as air quality, visual amenity, Aboriginal heritage and noise, are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.
Figure 1: Regional Location of the Proposed Hope Downs 4 Iron Ore Mine.
Figure 2: Hope Downs 4 Project Area
Figure 3: Conceptual Mine layout and Associated Infrastructure
It is the EPA’s opinion that the following key environmental factors for the proposal require detailed evaluation in this report:

(a) Groundwater and surface water;
(b) Flora;
(c) Fauna; 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 would 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) Principle 1: The precautionary principle;
(b) Principle 2: The principle of intergenerational equity;
(c) Principle 3: The principle of conservation and biological diversity and ecological integrity;
(d) Principle 4: The principle relating to improved valuation, pricing and incentive mechanisms; and
(e) Principle 5: The principle of waste minimisation.

3.1 Groundwater and Surface Water

Description
Ground and surface water can potentially be impacted from mining activities such as pit dewatering, lateral leakage as a result of excavation, contamination of surface and groundwater quality due to leachate from tailings storage facility/waste dumps and potential Acid and/or Metalliferous Drainage (AMD). In addition surface water could be impacted as a result of dewater discharge, realignment of Coondiner Creek and disruption of surface water flow. Sections 3.2 and 3.3 discuss the impacts to flora and fauna resulting from changes to surface and groundwater.

Groundwater drawdown
Approximately 80 per cent of the orebody is located below the groundwater table dewatering would be required to enable dry floor mining in the open-cut mine-pits. Dewatering could potentially result in impacts to nearby surface water pools, the associated alluvial aquifers and an area of calcrete to the north due to a lowering of the groundwater table.
Numerical groundwater modelling (MWH 2009) was undertaken to predict the impact of dewatering up to 20 GL/a on the groundwater levels in the vicinity of the mine zones. The model predicted that drawdown may have localised impact to the water level in adjacent geologies; however, it would be mostly isolated to the orebody aquifer due to the presence of the impermeable Mt McRae Shale preventing connectivity. The smaller calcrete and alluvial aquifers that overly portions of the orebody and regional aquifers have been identified in the PER document as perched aquifers that are weakly hydraulically connected to their underlying aquifers. The water chemistry and isotopic tracer investigations (Hamersley 2010b; Appendix 2) indicate that rainfall is the dominant source of water in most permanent pools around HD4 mining area. These permanent pools have a range of ecological, social and Aboriginal heritage values.

The proponent would determine potential impacts resulting from groundwater drawdown through:
- monitoring groundwater level and quality impacts to advance the groundwater model and verify the impact predictions to the pools;
- monitoring the extent of surface water expression at permanent pools using photographic evidence; and
- monitoring the depth of key larger pools using graduated water level indicator posts and/or electronic water level data loggers where practicable. Other means of water level measurement would be considered if these two means are not feasible (new commitment as a result of submissions).

The proposal is located 55 km from the Fortescue Marsh whose environmental values are regionally and nationally significant. The PER (Hamersley 2010a) states that dewatering has no potential to affect the Fortescue Marsh due to its distance from the mining area and the lack of connection with the affected aquifer.

The PER notes that there is no active groundwater abstraction in the area apart from the small quantities abstracted by the resource evaluation drilling program and for use at Rhodes Ridge camp. The Rhodes Ridge Camp is owned by the proponent and its joint venture partners and is located approximately 13.5 km to the west of the proposed mining area. Given the distance from the predicted drawdown zone the proponent considers that their water abstraction would not be impacted (Hamersley 2010f).

The proponent would also abstract the groundwater closer to the construction and permanent accommodation villages to provide potable (drinkable) water for the workers. The impacts of this abstraction have not been addressed by the proponent in its PER document as it considers this dewatering is minimal in comparison to that required for the operation of the mine.

**Dewater discharge**

Water produced from dewatering would be used on-site for dust control, processing requirements and general use. The PER document predicted that
a maximum onsite use of 2.5 GL/a of excess water would be used during dry processing of iron ore and 6 GL/a during wet processing of iron ore. Taking into consideration the worst case scenario of a maximum dewatering rate of 20 GL/a and low on-site use of 2.5 GL/a it is anticipated that the proposal would result in the production of up to 17.5 GL/a of excess water. This would be managed either through transfer to the existing Hope Downs 1 iron ore mine or alternatively discharged to nearby existing creek lines of Kalgan Creek (and possibly Coondiner Creek).

Should transfer of excess water from HD4 to Hope Downs 1 be pursued it would be used to meet operational and environmental water requirements. Operational water requirements include using excess water for dust suppression and environmental requirements involve discharging limited quantities of water via the existing ‘bubble pit’ to maintain Weeli Wolli Springs and/or the reinjection of excess water into the Hope Downs 1 aquifer when mining has ceased at Hope Downs 1 (approximately 2023) to assist in aquifer recovery (Hamersley 2010e).

Should the excess water be discharged to creek lines the proponent considers that the water quality of Kalgan and Coondiner Creeks would not be adversely impacted as groundwater quality (fresh to brackish, TDS 150 to 830 milligrams per litre (mg/L), pH 6.8 to 8.4) is within the range of current water quality levels in nearby surface pools (fresh, TDS 250 to 1200 mg/L, pH 7). In addition any water that is discharged off-site would meet the relevant ANZECC/ARMCANZ (2000) guidelines (Hamersley 2010a).

Modelling was undertaken to estimate the discharge footprint for each individual creek system using the worst case scenario of 17.5 GL/a discharge (Figure 4). Modelling indicated that impacts reach the following distances:

- **Kalgan Creek**
  - Impact would reach up to 29 km downstream from the point of discharge.
  - Impact would reach no closer than 90 km from the Fortescue Marsh.

- **Coondiner Creek**
  - Impact would reach up to 39 km downstream of the discharge point.
  - Impact would reach a distance of 32 km from the Fortescue Marsh.

The proponent proposes to minimise and manage impacts caused by excess water discharge by monitoring creek line erosion, flow rate and water quality. Should monitoring indicate that set trigger levels are met then contingency actions would be implemented. These contingency actions range from investigating why the trigger level was met to ceasing discharge while reviewing and changing discharge strategies. These strategies could involve discharging to an alternative point along the creek-line or moving discharge from Kalgan Creek to Coondiner Creek.

Impacts to fauna flora and vegetation from excess water discharge are discussed in the sections 3.2 and 3.3 below.
Figure 4: Maximum Discharge Footprints for Single Creek peak Scenarios
**Coordiner Creek Realignment**

The development of the most western pit (located within Mining Zone 1 of the mining area) would require excavation of a 2.5 km section of Coordiner Creek and the associated alluvial aquifer. This would result in a direct loss of alluvial groundwater into the mine pit (lateral leakage) and affect groundwater levels and subsurface flows. The impact of this alteration of alluvial groundwater is discussed below in the Vegetation and Flora section (Section 3.2).

In approximately the fifth year of mining a 2.5 km section of the creek would be realigned to maintain surface flows in the system. The new realignment of the creek could directly affect flow velocity and sediment suspension, leading to creek erosion and sedimentation. There is some risk of an increase in sediment load downstream of the realignment particularly after the first flow event. However, the proponent considers that the increase in sediment load would not be discernable as a significant increase above the naturally high background sediment levels observed during flow events in Coordiner Creek and other systems in the region.

The proponent has stated in the PER document that impacts to the ecosystems of Coordiner Creek, and Eagle Rock Pool and Eagle Rock Falls located downstream would be managed by:

- designing the Coordiner Creek realignment to minimise the amount of sediment suspended when the creek is flowing and withstand a 1 in 100 ARI storm event; and
- monitoring the water quality and flow parameters at reference sites, the Coordiner Creek realignment and the permanent pools downstream of the mining area. Should water quality be significantly different from reference sites the proponent would undertake a range of actions including the investigation of the cause, review of the integrity of on-site drainage management system and undertaking mitigation measures. Details of these measures were not provided.

**Water quality**

Geological surveys and orebody characterisation works have identified Potentially Acid Forming (PAF) materials in the wall rocks (waste rock) and not in the orebody. The proponent expects that Mining Zones 1 and 2 contain 0.35% and 0.57% of Mount McRae Shale which may be PAF, however, no drill hole samples greater than 0.1% were found below the water table. Mining Zone 3 is unlikely to produce any PAF material. Mining Zone 4 contains approximately 80 kilotonnes of waste material with sulphur grades greater than 0.1%. Incorrect storage of this material in waste dumps or exposure in pit walls may result in AMD leaching into the surface or groundwater. The potential for AMD in pit lakes is discussed in Section 3.4.

The proposal includes a dry processing plant which would be upgraded to a wet processing plant during the life of the project. As both the dry and wet processing plants only process ore material and not waste rock the proponent states that there would be a very low risk that PAF materials would be fed into the processing plant and stored in the tailings storage facility (TSF).
The following management measures were cited in the PER document and the attached Groundwater Management Plan (Hamersley 2010a & Attachment 2):

- Monitor dewatering water and water collected in-pit for acidity. Segregate and treat any acidic water encountered.
- Monitor the volume of water extracted, the depth to the groundwater table and groundwater quality. Contingency actions which consist of retesting and reporting to the Department of Environment and Conservation (DEC) should changes in groundwater quality become evident.
- Monitor surface water runoff from waste dumps containing PAF material.
- Monitoring bores would be installed around the TSF in accordance with the Rio Tinto Iron Ore Design Criteria. A residue storage facility management plan would be developed in accordance with the Department of Mines and Petroleum Guidelines on the Development of an Operating Manual for Tailings Storage.

Submissions

Key comments in submissions:

- Assessment of actual versus predicted impacts should be ongoing to determine whether effects on the creeks/pools are related to drawdown.
- Contingency measures such as augmentation of groundwater to support Eagle Rock Pool and the calcrete are required in the event that unacceptable impacts are observed from drawdown. The management plan should include triggers to be reviewed annually.
- There is a need to confirm the accuracy of predictions and other information regarding the flood extent, flood depth and velocity at Coondiner Creek, and to ensure the appropriate design and rehabilitation of the Coondiner Creek realignment.

Assessment

The relevant areas of consideration for this assessment are all areas which may be impacted by impacts from the dewatering of groundwater and the discharge of excess water.

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

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

The EPA notes the Department of Water (DoW) advice that the PER document and Hydrogeology Report (MWH 2009) provide reasonable predictions which are based on current knowledge and are likely to present the worst case scenario. In addition the DoW advised that the assumptions and results of the modelled excess water discharge footprint are acceptable and appropriate from a hydrologic and hydraulic perspective.
**Groundwater drawdown**
The EPA recognises the water chemistry and isotopic tracer investigations (Hamersley 2010b; Appendix 2) undertaken to identify whether there is a connection between surface water pools and the orebody aquifer and adjoining regional aquifers. The EPA supports the proponent’s plans to develop further numerical modelling for HD4 which would refine predictions and allow more accurate definition of the hydrological system.

The water chemistry and isotopic tracer investigations support the groundwater modelling which indicates that the surface water pools, alluvial aquifers and calcrete aquifer are weakly hydraulically connected to the underlying orebody and regional aquifers. This connection, however slight, has the potential to result in a loss of water from the pools, alluvial aquifers and calcrete aquifer due to dewatering of the orebody aquifer. Therefore the proponent’s commitment to undertake monitoring of groundwater levels and surface water expression and depth of surface water pools should be made into legally enforceable conditions (condition 5) to confirm the proponent’s conclusion that there would be no impacts as a result of dewatering. The recommended conditions include a requirement for contingency measures should impacts be identified.

The proposal is located 55 km from the Fortescue Marsh. Hydrology modelling indicates that the cone of depression would be restricted to north and south of the mine zone and would therefore not reach the Fortescue Marsh. Due to the distance from the mine and the lack of connection with the affected aquifer demonstrated by the limited north-south cone of depression it is considered that dewatering would not effect the Fortescue Marsh.

The EPA notes that the beneficial use of groundwater in the area is limited and are unlikely to be impacted by the implementation of the proposal.

**Dewater discharge**
The EPA notes that the proponent has decided to use wet processing of iron ore (Hamersley 2010b). This process would require 6 GL of water and result in less excess water than the 17.5 GL predicted in the PER document. The information provided to the EPA on the prediction of impacts to Kalgan Creek are based on 17.5 GL. In the absence of revised predictions and taking a precautionary approach the EPA considers that it is appropriate to continue to base its assessment on 17.5 GL excess water discharge as worst case.

The EPA’s preference for excess water management is to transfer it to Hope Downs 1 for reinjection into the local aquifer once the Hope Downs 1 mine is closed. Reinjection would enhance recovery of the groundwater system as required by Ministerial Statement 584 for Hope Downs 1 and would provide the best environmental outcome. However, the EPA recognises that timing may restrict the proponent’s ability to utilise this option.

The EPA notes that excess water transferred to Hope Downs 1 would be managed under the Ministerial Statement 584, related management plans and any existing and required licences.
The second option for excess water management is to discharge to Kalgan Creek with a contingency of discharging to Coondiner Creek if the 40% foliage loss trigger level is reached. The Adaptive Surface Water Management Plan (Hamersley 2010a Appendix 2) includes trigger levels and contingency actions for impacts of surface water flows on the Fortescue Marsh. Trigger level two is activated if the extent of permanent surface water flow resulting from the discharge of excess water alone reaches within 30 km of Fortescue Marsh. The resulting contingency actions include the ceasing of discharge to the creek. Should the Coondiner Creek option be used this trigger level may be exceeded from time to time as modelling indicates the maximum discharge impact would reach a distance of 32 km from the Fortescue Marsh. Therefore there is a risk of changing the values of the Fortescue Marsh through altering surface water flows/input. The acceptability of Coondiner Creek as a receiving environment for excess water discharge is further discussed in the Vegetation and Flora section below (Section 3.2).

The EPA considers that excess water should be managed through discharge of excess water to Kalgan Creek until such time as the Hope Downs 1 mine ceases dewatering. Excess water should then be transferred from HD4 to Hope Downs 1 for aquifer reinjection. This is reflected in condition 6. Condition 6 also ensures that the proponent’s commitment to meet the relevant ANZECC/ARMCANZ (2000) guidelines in any water that is discharged off-site is carried out and ensures that surface water flow as a result of the proposal does not extend closer than 30 km from Fortescue Marsh.

**Coordiner Creek Realignment**

Eagle Rock Pool and Eagle Rock Falls located respectively 9 km and 11 km downstream of the Coondiner Creek realignment have ecological (locally significant vegetation communities and abundant terrestrial and aquatic fauna), social and Aboriginal heritage values.

The EPA considers the potential impacts to Coondiner Creek as a result of realignment could be ameliorated through engineering design, rehabilitation to reduce erosion and monitoring of water quality and flow. The implementation of recommended condition 12 should ensure long-term success of the realignment of Coondiner Creek through the maintenance of surface flows, thereby minimising impacts to the downstream environment including pools.

**Water quality**

The proponent’s Groundwater and Adaptive Surface Water Management plans require quarterly monitoring of water quality in bore holes and at the TSF. The proponent also proposes to manage and monitor waste dumps and TSF under the Conceptual Closure Management Study (Hamersley 2009b), Mineral Waste Management Plan and the Spontaneous Combustion and Acid Rock Drainage Management Plan (Hamersley 2010b Appendix 5). The EPA notes that contingency actions for surface and groundwater quality during operation and post closure are not clearly defined within the proponent’s documentation.
The EPA recommends that a condition 7 be imposed on the proponent to ensure that any discharge of water from the TSF, pit walls and waste dumps is monitored, managed and treated if necessary to ensure that surface and groundwater quality are maintained.

**Summary**

Having particular regard to the:

(a) hydrogeological modelling;

(b) the limited beneficial uses of ground water in the area;

(c) excess water discharge predictions for Kalgan and Coondiner Creeks; and

(d) design of the Coondiner Creek realignment,

it is the EPA’s opinion that the proposal can be managed to meet the EPA’s environmental objectives for this factor provided conditions are imposed requiring the proposal to:

(a) ensure there are no impacts to the calcrete and alluvial aquifers and the associated surface water pools and from drawdown of the orebody aquifer;

(b) ensure excess water does not impact the Fortescue Marsh;

(c) ensure the Coondiner Creek realignment maintains surface water flow; and

(d) maintain groundwater and surface water quality.

### 3.2 Vegetation and Flora

**Description**

The proposal has the potential to impact flora and vegetation by direct loss due to clearing of 5470 ha within the 20,135 ha project area. In addition indirect impacts are also anticipated due to dewatering of groundwater, discharge of the excess water to nearby creek lines (Kalgan Creek and possibly Coondiner Creek), interruption of surface water flow and spread of weeds.

**Clearing**

A number of flora and vegetation surveys were undertaken during 2008 and 2009 (Mattiske 2008a, b & c; 2009a, b & c). These surveys identified 924 flora taxa and defined and mapped 25 vegetation communities within the survey area.

The species *Lepidium catapycnon*, which is listed as Vulnerable under the EPBC Act and DRF under Schedule 1 of the *Wildlife and Conservation Act 1950* (WC Act), was located within the project area. The impact on this species would vary depending on which infrastructure corridor option is chosen. Six populations are located on infrastructure corridor Option 1 and three populations were identified along infrastructure corridor Option 6 (Hamersley 2010c). The proponent considers that it is likely that five populations within infrastructure corridor Option 1 can be avoided as these are
located within the portion of the corridor used by the powerline and not the rail line; however, one population may be impacted by the construction of the rail line. The removal of the three *L. catapycnon* populations along infrastructure corridor Option 6 is likely to be required if this option is chosen.

Of the eight Priority Flora identified during surveys, two species were recorded outside of the project area and would not be disturbed. All six of the Priority Flora recorded within the project area would be impacted by clearing. The Priority Flora recorded within the project area are listed in Table 2 below.

**Table 2: Priority flora identified within the Hope Downs 4 proposal area**

<table>
<thead>
<tr>
<th>Species</th>
<th>Mining &amp; Accommodation areas (populations)</th>
<th>Infrastructure Corridor Option 1 (populations)</th>
<th>Infrastructure Corridor Option 6 (populations)</th>
<th>outside of project footprint Mattiske 08-09 (populations)</th>
<th>proponent’s existing database (populations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goodenia sp. East Pilbara (P1)</td>
<td>37 (&lt;10 plants within each occurrence)</td>
<td>37 (&lt;10 plants within each occurrence)</td>
<td>400</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Rhagodia sp. Hamersley (P3)</td>
<td>1 (several scattered plants)</td>
<td>2 (several scattered plants within each)</td>
<td>1 (several scattered plants)</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Rostellularia adscendens var. latifolia (P3)</td>
<td>1 (number of individuals unknown)</td>
<td>1 (number of individuals unknown)</td>
<td>21</td>
<td>Over 110</td>
<td></td>
</tr>
<tr>
<td>Themeda ?sp. Hamersley Station (P3)</td>
<td>15 (10-50 plants within each)</td>
<td></td>
<td>54</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Goodenia purparescens (P3)</td>
<td>15 (&lt;10 plants within each)</td>
<td></td>
<td></td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Gymnanthera cunninghamii (P3)</td>
<td>2 (10-50 plants within each)</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Eremophila youngie subsp. Lepidota (P4)</td>
<td>3 (&lt;10 plants within each)</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

No Threatened Ecological Communities were identified during surveys for this proposal.

Of the 25 vegetation communities identified in the survey area 16 were considered to be of local conservation significance due to their high diversity and the fact that the majority are known to support plant species of conservation significance and/or range extension. The proposal is also likely to require some clearing of all 16 vegetation communities of local conservation significance.

Vegetation community C4 is considered to be similar to the (Priority 1) Weeli Wolli Spring Priority Ecological Community (PEC). This vegetation community
would be subject to clearing of a 0.2 ha portion of a 17.4 ha mapped area to construct a bridge crossing over Weeli Wolli Creek, should infrastructure corridor Option 6 be selected.

Vegetation community C1 is located along Coondiner and Kalgan Creeks. This community would be directly impacted due to the realignment of a 2.5 km section of Coondiner Creek required for the purpose of mining within Mining Zone 1.

To reduce the impacts of clearing the proponent proposes to:
- avoid areas containing vegetation communities of local conservation significance where possible;
- reduce disturbance widths in the infrastructure corridor near known stands of *L. catapyncon*, directly relocating topsoil, and where possible relocating individual specimens of *L. catapyncon* to areas for rehabilitation following construction; and
- avoid some occurrences of Priority Flora where possible during the final mine layout and rail and power line placement within the infrastructure corridor.

**Indirect Impacts**

Although not fully phreatophytic (groundwater dependent), some species of flora in vegetation communities C1, C2 and C4 are thought to access groundwater at different times of the year. These communities are located along creek lines and above the associated alluvial aquifers within the proposed HD4 drawdown zone. The proponent considers that these communities would not be significantly affected by dewatering as alluvial aquifers only have a limited connection with the orebody aquifer that would be dewatered, and alluvial aquifers would be recharged from seasonal surface water flows. However, impacts to the C1 vegetation community are expected from the dewatering and lateral leakage of the alluvial aquifer associated with Coondiner Creek.

The proponent proposes to manage impacts by developing and implementing a tree health monitoring program on undisturbed sections of Coondiner Creek adjacent to the realignment. If monitoring results indicate that dewatering has affected the health of riparian vegetation then contingency measures such as surface irrigation/supplementation and rehabilitation would be implemented (Hamersley 2010a & Appendix 2).

Vegetation community C1 is also likely to experience impacts if the Kalgan Creek excess water management option is selected. Impacts include:
- an alteration of vegetation communities including increased growth and spread of seedlings;
- increased localised physiological stress;
- localised death in areas of prolonged soil profile saturation;
- localised death of plant species that are adapted to changing flow conditions; and
vegetation stress and possible death, particularly of saplings, is likely to occur when discharge ceases and the creek flow regime reverts to pre-mining conditions.

The proponent would manage impacts by monitoring sections of Kalgan Creek vegetation throughout the operation to determine the impact of the discharge. The proponent would also implement two trigger levels (25% foliage loss and 40% foliage loss) and a number of related responses. If the 40% foliage loss trigger value is reached, then the proponent proposes that discharge may be moved to Coondiner Creek where both vegetation communities C1 and C4 would be impacted.

Mulga and spinifex vegetation communities would be impacted by the construction and operation of the proposed rail line which is likely to act as a surface water barrier or even divert surface flows. This may cause flooding of some areas up gradient of the rail line and reduce flows down gradient. To minimise impacts to Mulga communities along the infrastructure corridor the proponent proposes to design and determine the location of culverts and other drainage features in consultation with DEC using vegetation mapping and surface water flow modelling (Hamersley 2010 a & b).

None of the six weed species recorded during the surveys are listed as Declared Plants under the Agriculture and Related Resources Protection Act 1976. The weed Argenome ochroleuca (Mexican Poppy) is listed as a Declared Plant in other sections of WA but not East Pilbara; however, it is locally aggressive (Hamersley 2010a). Weeds are found in a range of vegetation communities including 12 of the 16 identified to be of local conservation significance. The proponent’s key management actions with regards to weeds are contained in the Weed Management Plan which includes the implementing of weed hygiene procedures for mining machinery entering and leaving the project area, identifying and mapping the extent and distribution of target weed species occurring within and adjacent to the project area, and eradicating weed occurrences prior to ground disturbance.

Submissions

Key comments in submissions:

- Discharge of excess water to creeks is likely to have local impacts to the volume of creek flow and therefore impacts to dependent ecosystems including the C4 vegetation community.
- Vegetation health of C1 and C4 community types in good or better condition within the drawdown footprint should be monitored.
- In consultation with the DEC the proponent should develop monitoring and management measures which include agreed environmental triggers and contingency measures for discharge of excess water to creeks.
- The weed Melinis repens (Natal Red Top) is known to occur along the powerline at Hope Downs 1 but is not currently recorded in the HD4 infrastructure corridor.
Assessment

The area considered for assessment is the 20,135 ha Hope Downs 4 project area identified in Figure 2. The EPA’s environmental objectives for this factor are to:

- protect DRF, Priority flora and other species on conservation significance, consistent with the provisions of the *Wildlife Conservation Act 1950*; and
- maintain the abundance, diversity, geographic distribution and productivity of flora and species and ecosystem levels through the avoidance or management of adverse impacts and improvement of knowledge.

Clearing

The proponent has yet to identify which infrastructure corridor option would be implemented. The proponent is also unable to confirm that it is possible to completely avoid the loss of one population of the DRF *L. catapycnon* along infrastructure corridor Option 1 and three populations along Option 6 as detailed engineering design has not been competed. The EPA notes that over 100 occurrences of *L. catapycnon* have been recorded in the proponent’s database, with some populations consisting of over 1000 individual plants. The EPA therefore considers that a loss of up to 3 populations of no more than 20 plants each should not significantly impact the conservation status of this species. Further impacts to the five populations of *L. catapycnon* located along the powerline section of Option 1 should be avoided during the construction of power lines by utilising design flexibility in pylon placement. Condition 8 has been recommended to ensure impacts to this DRF are restricted to one population for infrastructure corridor Option 1 and three populations for infrastructure corridor Option 6.

The HD4 proposal is likely to impact the potential PEC, vegetation community C4, through clearing if infrastructure corridor Option 6 is selected. The EPA considers that impacts to vegetation communities including vegetation community C4, conservation significant flora and fauna and the culturally important Weeli Wolli Creek (Table 3 and Section 3.3, Table 4) would be substantially reduced through the selection of Infrastructure corridor Option 1 rather than Option 6. The ability of the proponent to commit to using Option 1 is dependent on an access agreement being reached with BHP Billiton Iron Ore (BHP BIO) who is the owner of the tenement over which the majority of Option 1 is located. The EPA considers that recommended condition 9 should be implemented to ensure the proponent constructs and operates an infrastructure corridor along the Option 1 site if an access agreement is reached with BHP BIO.
**Table 3: Comparison of environmental impacts of corridor options**

<table>
<thead>
<tr>
<th></th>
<th>Option 1</th>
<th>Option 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire corridor project area</td>
<td>~6,240 ha</td>
<td>~7,620 ha</td>
</tr>
<tr>
<td>(not all of this area would be</td>
<td></td>
<td></td>
</tr>
<tr>
<td>disturbed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corridor length</td>
<td>52 km</td>
<td>65 km</td>
</tr>
<tr>
<td>vegetation communities of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>local significance</td>
<td>B1</td>
<td>C4 (similar to the Priority 1</td>
</tr>
<tr>
<td></td>
<td>C1, C2, C3</td>
<td>Weeli Wolli Spring PEC)</td>
</tr>
<tr>
<td></td>
<td>M1, M2, M3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S1, S2, S3, S4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>X2, X4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lepidium catapycnon</em> (DRF)</td>
<td>1 population (&lt;20 plants)</td>
<td>3 populations (&lt;20 plants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>within each occurrence)</td>
</tr>
<tr>
<td><em>Goodenia</em> sp. East Pilbara</td>
<td>37 populations (&lt;10 plants</td>
<td>37 populations (&lt;10 plants</td>
</tr>
<tr>
<td>(P1)</td>
<td>each occurrence)</td>
<td>each occurrence)</td>
</tr>
<tr>
<td><em>Rostellularia adscendens</em> var.</td>
<td>1 population (number of</td>
<td>1 population (number of</td>
</tr>
<tr>
<td><em>latifolia</em> (P3)</td>
<td>individuals unknown)</td>
<td>individuals unknown)</td>
</tr>
<tr>
<td><em>Rhagodia</em> sp. Hamersley (P3)</td>
<td>2 populations (several</td>
<td>1 population (several</td>
</tr>
<tr>
<td></td>
<td>scattered plants within</td>
<td>scattered plants)</td>
</tr>
<tr>
<td></td>
<td>each)</td>
<td></td>
</tr>
<tr>
<td>Number of native fauna species</td>
<td>72</td>
<td>98</td>
</tr>
<tr>
<td>species recorded in surveys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impacts from crossing of</td>
<td>continuous bridge structure</td>
<td>continuous bridge structure</td>
</tr>
<tr>
<td>Weeli Wolli Creek</td>
<td>of approximately 110 m</td>
<td>of approximately 240 m</td>
</tr>
</tbody>
</table>

Impacts to the identified Priority flora species appear to be minimal; however, the proponent has not demonstrated that all of these species (Table 2) are widely distributed regionally. Impacts to locally conservation significant vegetation communities are also anticipated. The proponent intends to reduce impacts where possible by avoiding some occurrences of Priority flora and areas containing vegetation communities of local conservation significance during the final mine layout and rail and power line placement within the infrastructure corridor. Condition 8 requires the proponent to demonstrate how they have reduced impacts to DRF, Priority flora and locally significant vegetation communities.

During the submissions process the DEC sought further advice from the proponent so that it could determine whether vegetation communities M3 and M6 were the PEC ‘Brockman Iron cracking clay communities of the Hamersley Range’ (Priority 1). Subsequent to receipt of the information the DEC has advised that with moderate confidence it is satisfied that the M3 and M6 vegetation communities as a whole and as described by Mattiske are not examples of the Brockman Iron cracking clay communities. The EPA notes that vegetation communities M3 and M6 are represented outside of the proposal area and that less than 25% of the mapped extent for both communities lies within the proposal area. This would be further reduced if infrastructure corridor Option 1 is selected instead of Option 6. On this basis the EPA does not consider that impacts to these communities are likely to be significant.

The EPA notes that the realignment of Coondiner Creek would result in the loss of 2.5 km of riparian vegetation C1 adjacent to the creek. However, as a further 25 km and 4 km of this vegetation community would remain down
stream and up stream respectively of the realignment and it is located along a number of creeks in the area, the loss of 2.5 km is not considered significant.

**Indirect impacts**

The riparian vegetation communities C1, C2, and C4 are located along creeklines above alluvial aquifers. Species within these communities such as *Eucalyptus victrix* may access groundwater during the drier periods of the year.

The EPA considers that the C2 vegetation community is well represented locally outside of the impact zone and as a result potential affects from dewatering would not significantly impact this vegetation community.

The EPA notes the proponent’s advice which indicates that the C4 vegetation communities on Coondiner Creek are outside the model boundaries and it is therefore unlikely that drawdown of the orebody aquifer would reach these communities (Hamersley 2010f).

The orebody aquifer is located approximately 30 m below ground level (bgl). Current groundwater modelling indicates that the maximum drawdown of the orebody aquifer below the C4 community located to the south of the mining area would be less than 15 m over 14 years (Hamersley 2010f). This could result in a fall of ground water to approximately 45m bgl. Any roots of species such as the eucalyptus accessing the orebody aquifer may not be able to grow at a sufficient rate over 14 years to keep up with the predicted drawdown. The drawdown may also extend further than the maximum root depth for the eucalypt species present in vegetation community C4.

The EPA notes that the proponent considers that vegetation community C4 does not access the orebody aquifer and instead obtains water from alluvial aquifers which have limited connectivity to the orebody aquifer and are recharged by seasonal surface water flow. To ensure the proponent’s conclusion is correct and there would be no impact to the vegetation community C4 located to the south of the mining area the EPA considers that monitoring of the health of this potential PEC population should be undertaken and has recommended a condition 5 to achieve this.

Riparian vegetation within vegetation community C1, is likely to be impacted from changes to water regimes as a result of dewatering, lateral leakage of the Coondiner Creek alluvial aquifer and discharge of excess water into Kalgan Creek. The proponent proposes to monitor vegetation health using a similar program to that used at the Yandicoogina and Hope Downs 1 iron ore mines which involves tree health and aquatic ecosystem monitoring. Similarly the trigger levels (25% and 40% foliage loss) are in-line with the management triggers used at those mines.

The DEC has advised that it does not necessarily support the proponent’s conclusion that the monitoring at Hope Downs 1 has been successful in determining changes to creekline vegetation and considers monitoring improvements could be made. Although the proponent stated in the PER that
the DEC had agreed to the proposed trigger levels, the DEC has advised that its formal agreement has not yet been provided on the trigger levels for Hope Downs 1 or Yandicoogina, and the trigger levels and contingency measures require further development.

The EPA considers that there is uncertainty regarding the effectiveness of the proponent’s current monitoring, management and contingency methods. As a result recommended conditions 5 and 6 should be implemented to ensure the health of riparian vegetation is not adversely impacted by the proposal. These conditions require the implementation of appropriate monitoring, trigger levels and contingency actions to address the impacts and risks associated with dewatering and excess water discharge to creeks.

It is noted that the proponent has retained the option to discharge excess water to Coondiner Creek as a contingency measure should impacts to vegetation at Kalgan Creek reach the 40% foliage loss trigger level. The C4 vegetation community is found along Coondiner Creek with the closest downstream occurrence being located 9 km from the indicative discharge location (Hamersley 2010e). This is within the maximum predicted excess water discharge downstream impact of 39 km (Hamersley 2010a).

The EPA considers that the proponent should be allowed to discharge to Kalgan Creek. However, should impacts to this creek exceed trigger levels, contingency actions should not include discharge to other creek lines as proposed as similar impacts are likely to occur. In particular the contingency action to discharge to Coondiner Creek should not be pursued as this is likely to impact the potential PEC, vegetation community C4, which is located along the creek. This is reflected in condition 6 (Appendix 4).

To ensure impacts to mulga and spinifex communities are minimised it is recommended that condition 8 be implemented. This condition requires that a report be provided demonstrating that the final design and alignment of the infrastructure corridor incorporates the advice of the DEC and minimises impacts to mulga and spinifex communities.

To prevent the introduction of new weed species and the spread and increase of the existing weed populations the EPA considers that recommended condition 8 should be implemented.

Summary
The EPA considers the issue of Vegetation and Flora has been adequately addressed and the proposal can meet the EPA’s objective(s) for this factor provided that conditions are imposed requiring the proponent to:

- avoid impacts to the DRF _L. catapycnon_ along the powerline infrastructure corridor;
- demonstrate how impacts to DRF, Priority flora and local conservation significant communities have been further reduced;
- select infrastructure corridor Option 1 rather than Option 6 to minimise impacts to conservation significant flora;
monitor, manage and mitigate any impacts to riparian vegetation as a result of dewatering and excess water discharge.

3.3 Fauna

Description
The construction and operation of HD4 has the potential to directly impact terrestrial fauna through vegetation clearing, vehicle strikes along roads and entrapment in open trenches. There is also potential for the proposal to indirectly impact fauna through loss of habitat, changes to water regimes in drainage lines, increased predation, noise and a reduction in feeding areas and pathways linking areas used by fauna.

Terrestrial Fauna
A targeted survey (Biota 2009) was undertaken to determine whether the Dasyurus hallucatus (Northern Quoll), which is listed as Endangered under both the WC Act and EPBC Act, was located in the Hope Downs 4 project area. Despite an extensive trapping effort of 2460 Elliott trap-nights set over multiple seasons and years and motion-activated camera traps, no Northern Quolls were identified.

The total number of terrestrial fauna species recorded in the HD4 project area during the surveys (Ninox 2009a, b, c) comprised 169 species, consisting of 32 mammals (including a possible 4 feral species), 79 birds, 1 amphibian and 57 reptiles.

Ten primary habitat types were also identified within the survey area. The habitat types considered to be significant for vertebrate fauna include creekline communities (C1 and C4), mulga communities and spinifex communities. As outlined under the Flora and Vegetation section above these habitats are likely to be impacted by clearing.

The surveys identified five species of conservation significance within the survey area (mining & accommodation area and infrastructure corridor options 1 & 6). Table 4 lists these species and also a number of other species likely to occur but not identified during the surveys.

Table 4: Identified and potential conservation significant species and their occurrence within the project area.

<table>
<thead>
<tr>
<th>Species recorded during surveys of the HD4 project area</th>
<th>Conservation Status</th>
<th>Occurrence within project area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudomys chapmani (Western Pebble-mound Mouse)</td>
<td>Priority 4-DEC</td>
<td>- Mining area - One site in infrastructure corridor Option 1 - One site in infrastructure corridor Option 6</td>
</tr>
<tr>
<td>Merops ornatus (Rainbow Bee-eater)</td>
<td>JAMBA</td>
<td>Sandy banks of creeks and drainage lines throughout the project area</td>
</tr>
<tr>
<td>Falco peregrinus (Peregrine Falcon)</td>
<td>Schedule 4-WC Act</td>
<td>Potential roost areas identified in infrastructure corridor Option 6</td>
</tr>
<tr>
<td>Species</td>
<td>Conservation Status</td>
<td>Occurrence within project area</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>---------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td><em>Ardeotis australis</em> (Australian Bustard)</td>
<td>Priority 4-DEC</td>
<td>Wide ranging – any habitat</td>
</tr>
<tr>
<td><em>Apus pacificus</em> (Fork-tailed Swift)</td>
<td>JAMBA, CAMBA, ROKAMBA – EPBC Act</td>
<td>Aerial over site only</td>
</tr>
</tbody>
</table>

**Species likely to occur include the following mammals**

<table>
<thead>
<tr>
<th>Species</th>
<th>Conservation Status</th>
<th>Occurrence within project area</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Petrogale lateralis</em> (Black-Footed Rock-wallaby)</td>
<td>Vulnerable-EPBC Act Threatened-WC Act</td>
<td>Rocky ranges in infrastructure corridor Option 6</td>
</tr>
<tr>
<td><em>Liasis olivaceus barroni</em> (Pilbara Olive Python)</td>
<td>Vulnerable-EPBC Act Vulnerable-WC Act</td>
<td>- Eagle Rock Falls</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Two potential sites in infrastructure corridor Option 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- One potential site in infrastructure corridor Option 6</td>
</tr>
<tr>
<td><em>Rhinoniceris aurantia</em> (Pilbara Leaf-nosed Bat)</td>
<td>Vulnerable-EPBC Act Vulnerable-WC Act</td>
<td>- One potential site in infrastructure corridor Option 6</td>
</tr>
<tr>
<td><em>Sminthopis longicaudata</em> (Long-Tailed Dunnart)</td>
<td>Priority 3-DEC</td>
<td>Rocky breakaways and scree slopes in Option 6</td>
</tr>
</tbody>
</table>

The surveys identified eight different species of bat. Based on calls an additional species of bat, the *Chaerephon jobensis* (Northern Free-tailed Bat), may have been present but this was identified with a lower level of confidence. None of the species recorded was identified as the Pilbara Leaf-nosed bat which is listed as vulnerable under the EPBC Act.

Vehicle movement associated with the construction and operation of the proposal has the potential to cause the loss of individual fauna. Fauna most susceptible to this impact are the Australian Bustard due to its nomadic terrestrial wandering and slow moving species such as reptiles. This would include the Pilbara Olive Python.

Trenching to bury excess water pipelines would be conducted when required by adjoining tenement holders or for safety and environmental purposes. At worst case trenches would reach a length of 16 km for the Kalgan Creek excess water management option and either 52 km (Option 1) or 65 km (Option 6) if water is piped along the infrastructure corridor to Hope Downs 1. During construction, the trench would act as a linear barrier to the movement of terrestrial fauna and may entrap individuals potentially resulting in injury or death.

The implementation of the proposal could led to an increase in introduced species (feral fauna such as cats, foxes etc) through a number of actions including excess water discharge increasing the availability of water and the availability of domestic waste. An increase in feral fauna could adversely impact the composition of the types and number of native fauna species.

The proponent proposes to minimise impacts to terrestrial fauna and fauna habitat by:
- avoiding clearing of locally significant vegetation communities where possible;
- clearing vegetation in an outward manner allowing fauna to progressively move into areas beyond the disturbance footprint;
- implementing appropriate speed limits on roads;
- providing reflectors on all barbed wire fencing (if used) to deter bats;
- monitoring feral fauna numbers, investigating the cause of any increase and implementing corrective actions for example feral animal control; and
- restricting the time and length that a trench may be open/exposed, providing trench exit ramps and regular inspections for entrapped fauna.

**Aquatic Fauna**

Aquatic fauna sampling of permanent water bodies located in proximity to the mining area was undertaken in September/October 2008 and April 2009 by Wetland Research and Management (WRM 2009). A total of 102 microinvertebrate taxa, 188 macroinvertebrate taxa and 3 fish were recorded in the 24 sites sampled.

During surveys a species of fish, the *Leiopotherapon unicolor* (Spangled Perch) which is endemic to the Pilbara region, was collected in a permanent pool upstream of Eagle Rock Falls. This population of Spangled Perch is likely to be genetically distinct from those found downstream as the falls act as a major barrier to migration.

Of those species identified during the aquatic fauna surveys only one species is of conservation significance and is listed as a Priority 2 species under the WC Act. This species, the macroinvertebrate damselfly *Nosostricta Pilbara* (Pilbara Threadtail), was recorded upstream of Eagle Rock Falls, at Weeli Wolli Creek and Marillana Creek. Previously its known distribution covered only permanent waters fed by the Millstream aquifer, along the Fortescue River. It is considered one of the most restricted Odonates (dragonflies and damselflies) in Australia. However, within its range it is abundant (Watson and Theischinger 1983, cited in WRM 2009). The collection of the Pilbara Threadtail in this survey and the Pilbara Regional Aquatic Survey represents a range extension.

The proponent does not consider the Pilbara Threadtail damselfly to be at risk from the realignment of Coondiner Creek as this species is known from other creek systems in the region and it was located approximately 12 km downstream from the realignment. No further mention is made of the regionally restricted and potentially genetically distinct Spangled Perch in the proponent’s documentation.

**Submissions**

Key comments in submissions:

- Bat monitoring may have been undertaken using a methodology that does not adequately detect Pilbara Leaf-nosed Bat.

**Assessment**

The relevant area for the consideration of this factor is the project area as illustrated in Figure 2 and the surrounding areas. The EPA’s environmental objectives for this factor are to:
• protect Threatened Fauna and Priority Fauna species and their habitats, consistent with the provisions of the *Wildlife Conservation Act 1950*; and
• maintain the abundance, species diversity, geographic distribution and productivity of terrestrial fauna at species and ecosystem levels through the avoidance or management of adverse impacts and the improvement of knowledge.

**Terrestrial Fauna**

The EPA notes the extensive work undertaken by the proponent to determine whether the Northern Quoll is located in the project area. Given the survey results and the lack of core habitat in the proposal area the EPA consider that this species is unlikely to have significant populations in the project area.

The Western Pebble-mound Mouse constructs its pebble-mounds on the ridges and upper slopes of ranges. Direct impacts would be avoided along the infrastructure corridor options as the infrastructure would be concentrated in the lower levels of the landscape. Impacts to the Western Pebble-mound Mouse could be relatively high within the mining area as the pebble-mounds are constructed in the ranges proposed to be mined. The EPA notes that other suitable habitat was located within the survey area and the Western Pebble-mound Mouse is known throughout the Pilbara region. Therefore the EPA considers that the localised impact to this species is unlikely to reduce the known range or cause the species conservation status to change.

The EPA considers that the proposal is unlikely to cause regional impacts to the other conservation significant species such as the Long-tailed Dunnart, the Australian Bustard, the Fork-tailed Swift or the Rainbow Bee-eater as they have a wide distribution and therefore loss of a small portion of habitat is not considered to be significant.

It is also noted that the potential loss of Pilbara Olive Python and its habitat would be reduced by the implementation of the Fauna Management Plan which commits to avoiding sensitive fauna habitats particularly that of the Pilbara Olive Python and also requires the setting appropriate speed limits. The EPA considers that the implementation of these measures would reduce local impacts and contribute to ensuring that there is no significant regional impact to this species.

The EPA recommends condition 10-1, to ensure that the proponent's Fauna Management Plan is implemented. The Fauna Management Plan also contains other measures to reduce impacts on fauna such as feral fauna monitoring and control.

The PER commits to undertaking trenching management, however, this is not reflected in the Fauna Management Plan. Therefore it is recommended that a condition 10 be imposed to ensure terrestrial fauna are not adversely impacted during the construction of trenches.
The DEC has advised that there is a residual concern that the bat survey undertaken may not maximise the detection of the presence of Pilbara Leaf-nosed Bat populations. The EPA is therefore taking a precautionary approach and considers that, although not recorded during surveys, the Pilbara Leaf-nosed Bat which is listed as Vulnerable under the EPBC Act could be present.

The infrastructure corridor Option 6 fauna report (Ninox 2009c) notes that there is suitable habitat for the Peregrine Falcon, Black-footed Rock-wallaby and Pilbara Leaf-nosed Bat within the larger hills and ranges along the western portion of infrastructure corridor Option 6. These areas are unlikely to be directly impacted by the construction of the infrastructure corridor; however, indirect impacts to these species could occur as a result of changes to water regimes in drainage lines, noise, reduction in feeding areas and pathways onto lower slopes and flats.

The EPA considers that infrastructure corridor option 6 should be avoided due to the possible impacts to potential fauna habitat including that of the Peregrine Falcon, Black-footed Rock-wallaby and Pilbara Leaf-nosed Bat. This preference is reflected in condition 9 which was discussed in the Flora and Vegetation section above. As the selection of the alternative infrastructure corridor option depends on the approval of a third party the EPA recommends that condition 10-4 be implemented to ensure the Fauna Management Plan is revised to include methods to minimise indirect impacts to potential populations of Peregrine Falcon, Black-footed Rock-wallaby and Pilbara Leaf-nosed Bat should infrastructure corridor Option 6 be developed.

**Aquatic Fauna**

The Spangled Perch is widely distributed throughout the Kimberly and Pilbara regions. This species is able to tolerate brackish water and relatively high temperatures. Due to its wide distribution and resilience, indirect impacts resulting from the realignment of Coondiner Creek and dewatering are unlikely to cause significant regional impacts.

Recommended condition 5 manages impacts from dewatering on pools, condition 6 ensures there is no discharge of excess water to Coondiner Creek while conditions 11 and 12 manage the construction and rehabilitation of the Coondiner Creek realignment and its potential impacts. These conditions would ensure that the impacts to the Priority 2 Threadtail Damselfly habitat located upstream of Eagle Rock Falls are able to be managed. Taking into consideration the minimisation of impacts to habitat within the proposal’s impact zone and the fact that other areas of habitat are located within the region it is likely that impacts to this species would not be significant.

**Summary**

Having particular regard to:

(a) the threatened, specially protected and priority fauna which occur or are likely to occur in the project area that are regionally widespread;
(b) indirect impacts to Peregrine Falcon, Black-footed Rock-wallaby and Pilbara Leaf-nosed Bat which potentially occur along infrastructure corridor Option 6;

(c) the proponent’s management plan which reduces direct impacts to fauna;

it is the EPA’s opinion that the proposal can be managed to meet the EPA’s environmental objective(s) for this factor provided conditions are imposed requiring the proposal to:

(a) ensure the proponent’s management plan is implemented;

(b) require trenching management to be undertaken;

(c) select infrastructure corridor Option 1 rather than Option 6 to minimise impacts to fauna including conservation significant fauna;

(d) minimise and manage indirect impacts to Peregrine Falcon, Black-footed Rock-wallaby and Pilbara Leaf-nosed Bat should infrastructure corridor option 6 be selected; and

(e) ensure long term health of surface water creeks and pool habitat.

3.4 Closure and Rehabilitation

Description
Open cut techniques would be used to mine the Hope Downs 4 proposal within the four designated Mining Zones. The proposed mining activities would involve the clearing of approximately 5470 ha of native vegetation. There is the potential for unstable landforms, erosion, contamination, and altered ground and surface water regimes and the unsuccessful return of vegetation to result.

Closure
The proponent has developed a Conceptual Closure Management Study which provides a framework for managing closure and rehabilitation requirements over the life of the project. The Conceptual Closure Management Study would be updated over the life of the project to ensure that it reflects the changes to the project status, research outcomes and stakeholder expectations.

During decommissioning all infrastructure would be removed or buried. However, dependent on future developments in the area some components such as sealed roads and rail may be retained.

Approximately 285 million cubic metres of waste rock would be generated during the 30 year mine life. It is proposed that waste rock would be deposited in waste dumps. Surface water runoff from adjoining landforms would be directed away from waste dumps, such that the top surface of waste dumps would receive only incident rainfall. Each PAF material lift would be surrounded with 5 m of inert waste rock and the top of waste dumps containing PAF material would be covered with store and release covers to a
depth of 4 m. These covers limit infiltration of rain water. The maximum slope and length of each waste dump would be dependent on the erodibility of the waste material with the steepest slopes having maximum gradients of 20 degrees.

A TSF would be constructed in accordance with the Department of Mines and Petroleum Guidelines for the Safe Design and Operating Standards for Tailings Storage. The outer walls of the residue storage facility would have an angle of no greater than 20 degrees. Upon completion of processing operations and the achievement of suitable density of the residue material, the surface of the facility is planned to be capped with a 2 m layer of inert waste material.

Based on its waste material calculations the proponent has stated that it is unable to undertake backfilling of all mine voids above the water table as there would be a shortfall of 44 Million tonnes. This shortfall would be further increased due to the need to encapsulate any PAF materials exposed in the final pit walls (Hamersley 2010c).

Without backfilling the remaining pit voids would fill with water from the surrounding groundwater aquifer as groundwater levels start to rise once dewatering ceases. Groundwater levels are likely to recover to approximately 60 m below original levels. The proponent’s model predictions have lead to the assumption that the pit lakes would act as groundwater sinks. Evaporation would increase salinity in the pit lake from 400 mg/L to 1300 mg/L in approximately 40 years. The proponent expects this trend to continue indefinitely at a rate of 34 mg/L per annum.

The initial results of ongoing acid based accounting for sulphides indicate that there is potential for pit lakes to become acidic and metalliferous, i.e. may contain metals and metalloids such as arsenic leached from surrounding rocks. Analysis of Mining Zone 4 indicates that 1% of the final pit wall would contain black shale which would be situated above the post mining water table. A similar analysis would also be undertaken by the proponent for Mining Zones 1 and 2 (Hamersley 2010c).

The proponent considers that the risk of an acidic pit lake developing would be reduced due to the buffering capacity of the groundwater (average pH 8) and the end tipping of inert material over the black shale exposures on the pit wall. This would limit surface water runoff contact with the black shale and reducing oxygen penetration.

As the pit lakes are potential groundwater sinks the increasing salinity, potential acid and/or metalliferous contamination is likely to remain within the lakes and not contaminate surrounding groundwater.

The proponent is currently undertaking research into the following:
- Landform design/erodibility to define the erodibility characteristics of identified material wastes across the proponent’s Pilbara operations and to
use this information to develop practicable final landform design criteria that would satisfy stability requirements.

- final void water quality modelling is being undertaken for the Tom Price mine with the assistance of a post doctoral researcher from the University of Western Australia.
- Research into bioremediation of acidic pit lakes at Tom Price mine site.
- Research into the implementation of constructed wetlands in final pit voids.

**Rehabilitation**

The proponent proposes to rehabilitate all areas disturbed for mining and infrastructure including waste dumps, TSF, mine voids, plant sites and roads.

The proponent’s preliminary determination of post-closure land use is that where possible all land disturbed by the proposal would be returned to Unallocated Crown Land that is contiguous with surrounding vegetation. This would be reviewed throughout the life of the proposal and determined in consultation with key stakeholders as part of the final mine design plan.

Where possible rehabilitation would be undertaken progressively. The most significant of this progressive rehabilitation is the new creek section constructed for the Coondiner Creek realignment which would be a permanent feature in the landscape. The Coondiner Creek realignment would be planted with native riparian vegetation to enhance erosion control and bank stabilisation.

The majority of rehabilitation would occur subsequent to decommissioning and closure. Topsoil and cleared vegetation would be stockpiled and returned to landforms and disturbed areas, and local native provenance seed material would be used.

Rehabilitated areas would be monitored and compared to existing vegetation at adjacent control sites. Specific completion criteria, closure measures and schedules are yet to be developed. However, the proponent has committed to submitting a Progressive Rehabilitation Schedule prepared in consultation with the DEC addressing the objectives, targets, timing, and monitoring of rehabilitation.

**Submissions**

Key comments in submissions:

- The proponent should continue investigations to determine appropriate methods to manage the PAF material in waste rock with regards to storage and exposure at closure.
- Closure criteria should state that post closure landforms are non-polluting.
- Very little detail has been provided in relation to the Tailing Storage Facility and the potential safety and environmental risks of this facility. An acceptable Geotechnical Design Report should be provided to the Department of Mines and Petroleum (DMP) or the Department of State Development prior to the Tailing Storage Facility being constructed.
• Pit lakes of increasing salinity and possibly increasing concentrations of metals could be a threat to local fauna populations in particular bird species.
• Rehabilitation trials should be conducted to determine the best landform design.

**Assessment**
The relevant area for the consideration of this factor is the project area as illustrated in Figure 2. The EPA’s environmental objectives for this factor are to:

• ensure that closure and rehabilitation achieves stable, non pollution and functioning landforms which are consistent with surrounding landscape and other environmental values; and
• ensure that self-sustaining native vegetation communities are returned after mining, which, in species composition and ecological function are close as possible to naturally occurring analogue sites.

**Closure**
A Conceptual Closure Management Study was provided which contains a framework for managing closure and rehabilitation requirements over the life of the project. The EPA acknowledges that the proponent has committed to progressively plan for closure and rehabilitation, commencing from the early stages of project development.

The EPA recognises the research undertaken on behalf of the proponent into store and release cover for PAF-containing waste dumps. The EPA also notes the ongoing research into final void water quality modelling, bioremediation and pit void wetlands which would inform the final decommissioning and closure of this proposal.

The Response to Submissions document (Hamersley 2010b) notes that the proponent has commissioned a Landform Design Study to assist with the development of practicable final design criteria that would satisfy stability requirements. This study includes a literature search, workshop and gap analysis. The DMP has requested the proponent undertake rehabilitation trials to determine the best landform design and submit a Geotechnical Design Report to further determine the safety and environmental risks of the TSF. The EPA has recommended conditions 12-1 and 13 to ensure the DMP are consulted with regards to the landform design of the waste dump and geotechnical design of the TSF.

The proponent has not carried out kinetic geochemical and leachate testing to date; however; the proponent has committed to undertaking leachate testing in the future. The EPA recognises that the levels of environmental risk can only be assessed by undertaking leaching tests on relevant rock types and then using the leachate data in geochemical models to predict the water quality. The EPA considers that the implementation of condition 11 would ensure that the proponent provides a report, prior to ground disturbing activities, to identify any AMD, the extent of the potential hazard and the
impacts, along with strategies for prevention, monitoring, contingencies and remediation. This condition also ensures that kinetic testing is carried out.

The pit voids are not proposed to be backfilled. The EPA notes that the pit lakes have the potential to become increasingly saline and metalliferous. This is likely to pose a long term threat to wildlife that might use these features as a source of food or water. These toxicants could also accumulate through the food chain. The EPA encourages the proponent to use its best endeavours to identify opportunities to backfill some of the pit voids as this strategy would ultimately reduce the overall project footprint and reduce the possibility of acidic or metalliferous pit lakes particularly in Mining Zone 4 and to a lesser extent Mining Zones 1 and 2.

To ensure the long-term success of mine closure, verify that groundwater quality of regional aquifers would not be impacted and minimise long term impacts to fauna, condition 13 is recommended. This condition requires the proponent to prepare a Final Closure and Decommissioning Plan at least 5 years prior to the final completion of mining on advice of the DMP. This requirement is consistent with Australian and international mining industry best practice for sustainable mine closure. Condition 13 also requires management action should the water quality of pit lakes exceed trigger values for highly disturbed ecosystems as outlined in ANZECC/ARMCANZ 2000.

Rehabilitation
It is acknowledged that the proponent has committed to undertaking progressive rehabilitation and to rehabilitate all areas disturbed by the proposal. The EPA notes that completion criteria, closure measures, monitoring schedules and reporting requirements are yet to be developed and/or finalised.

To ensure the long term success of mine rehabilitation is achieved the EPA recommends that condition 12 be implemented. This condition requires that rehabilitation techniques are used to achieve specific outcomes.

Summary
Having particular regard to the:

(a) proponent’s Conceptual Closure Management Study;

(b) effort of the proponent to reduce AMD through covering of exposed black shale on the pit wall with inert material and store and release covers; and

(c) commitment to undertake progressive rehabilitation,

it is the EPA’s opinion that the proposal can be managed to meet the EPA’s environmental objective(s) for this factor subject to the implementation of conditions for rehabilitation and final closure and decommissioning.

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 Environmental Protection Act
(1986). Appendix 3 contains a summary of the EPA’s consideration of the principles.

4. Conditions
Section 44 of the Environmental Protection Act 1986 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 Hamersley HMS Pty Ltd to develop and operate the Hope Downs 4 Iron Ore Mine is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

a) Groundwater Drawdown – ensuring dewatering of groundwater does not adversely affect the calcrite and alluvial aquifers, Coondiner Creek or any pools in the surrounding area.

b) Dewatering Discharge – ensuring excess water meets water quality guidelines. If the Kalgan Creek Excess Water Management option is selected then condition 6 would also ensure that the discharge water does not reach Fortescue Marsh, the values of the Creek and its surrounding riparian vegetation are protected and contingency measures do not allow discharge to alternate creeks particularly Coondiner Creek.

c) Water Quality – maintaining acceptable water quality.

d) Flora and Vegetation – restricting the clearing of DRF. The condition requires the proponent to demonstrate impacts to conservation significant species and local conservation significant vegetation communities are further minimised during the final design of the proposal. The condition also prevents the introduction of new weed species and the spread and increase of the existing weed populations.

e) Infrastructure Corridor – implementation of infrastructure corridor Option 1 thereby reducing impacts to flora and fauna.

f) Fauna – protecting significant habitat, minimising impacts to fauna and protecting fauna from open trenches.

g) Acid Metalliferous Drainage - long-term prevention, monitoring, contingency and remediation strategies for the management of any potential Acid or Metalliferous Drainage

h) Rehabilitation – to achieve acceptable long-term rehabilitation of disturbed areas.
i) Final Closure and Decommissioning Plan – appropriate planning and implementation of closure and decommissioning.

4.2 Consultation

In developing these conditions, the EPA consulted with the proponent and the Department of Environment and Conservation, the Department of Water and the Department of Mines and Petroleum in respect of matters of fact and matters of technical or implementation significance. Minor changes, which did not change the intent or scope, were made to conditions 5, 6, 8, 10, 12 and 13.

5. 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 an iron ore mining area at the Hope Downs 4 Iron Ore Mine within the Shire of East Pilbara;

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 Environment and Conservation
Department of Indigenous Affairs
Department of Mines and Petroleum
Department of Water
Appendix 2

References


Hamersley (2009b) *Hope Downs 4 conceptual closure management study*. Rio Tinto, 6 October 2009


Hamersley (2010f) *Hope Downs 4 Iron Ore Project – Responses to EPA Meetings Outcomes and additional queries*. Hamersley HMS Pty Ltd, letter, 19 October 2010


Mattiske (2009b) *Flora and Vegetation on the Hope Downs 4 Mine Pipeline Corridor to Ophthalmia Dam*. Mattiske Consulting Pty Ltd, June 2009
Mattiske (2009c) *Flora and Vegetation on the Creeklines (Coordiner, Kalgan, Mindy Mindy and Unnamed) associated with Hope Downs 4.* Mattiske Consulting Pty Ltd, July 2009

MWH (2009) *Hope Downs 4 Hydrogeology – Part of the Hope downs 4, 5, and 6 BFS.* MWH, March 2009


Ninox (2009c) *A Vertebrate Fauna Survey of the Proposed Hope Downs 4 Option 6 Infrastructure Corridor, Near Newman, Western Australia.* Ninox Wildlife Consulting, August 2009

Ninox (2010) *Addendum: The Short Range Endemic Invertebrate Fauna Recorded During the Second Sampling Period Within the Proposed Hope Downs 4 Option 6 Infrastructure Corridor, Near Newman, Western Australia.* Ninox Wildlife Consulting, January 2010


Appendix 3

Summary of identification of key environmental factors and principles
<table>
<thead>
<tr>
<th>Preliminary Environmental Factors</th>
<th>Proposal Characteristics</th>
<th>Government Agency and Public Comments</th>
<th>Identification of Key Environmental Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOPHYSICAL</td>
<td>Dewatering</td>
<td>Government Agencies</td>
<td>Impacts of dewatering on calcrete and alluvial aquifers (including the surface water pools they support) are considered to be a relevant environmental factor and would be considered in Section 3.1.</td>
</tr>
</tbody>
</table>
| Groundwater                       | As 80% of the ore body occurs below the current groundwater table mining of Hope Downs 4 would require dewatering to enable dry floor mining. Based on the current mine plan the approximate maximum depth of drawdown within the mining area is expected to be 140 m below the current groundwater and would require dewatering of 20GL per annum. This would result in a cone of depression (lowering of the groundwater table) which has the potential to cause sinkhole formation and impact hydrology, surface water pools and the ecosystems they support and groundwater dependent vegetation. | The proponent’s hydrological model suggests that there may be an effect on the water levels at Eagle Rock Pool four years after commencement of mining. Monitoring and management of potential impacts should include:  
  - Monitoring of the water levels at permanent/semi-permanent pools to be conducted using depth gauges as well as photography in order to determine whether changes to these levels could be linked to dewatering activities.  
  - A management plan should be developed to augment groundwater in the calcrete and eagle Rock Pool if they are impacted by dewatering. The management plan should include triggers to be reviewed annually.  
  - Assessment of actual versus predicted impacts should be ongoing to determine whether effects on the creeks/pools are related to drawdown.  
  - A map detailing the locations of all the monitoring bores.  
  - Collect baseline data from both the existing and proposed additional monitoring bores prior to the commencement of mining and dewatering.  
  - Contingency measures are required in the event that unacceptable impacts are observed from drawdown. | The lowering of groundwater may cause the formation of sinkholes in the area of the orebody aquifer. Public access would not be possible to this area and no vegetation or habitat of particular conservation significance is at threat from the formation of sinkholes. |
<p>|                                   |                          | The proponent claims that based on the monitoring of Weeli Wolli Creek for the Hope Downs 1 proposal there would be no significant impacts to tree health along creek lines due to the groundwater drawdown by the Hope Downs 4 proposal; however, no supporting evidence has been provided. | |
|                                   |                          | The PER does not include estimates for construction and potable water supply which is essential to the context of the life-of-mine water balance. | |</p>
<table>
<thead>
<tr>
<th>Preliminary Environmental Factors</th>
<th>Proposal Characteristics</th>
<th>Government Agency and Public Comments</th>
<th>Identification of Key Environmental Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excavations</strong></td>
<td><strong>Excavations</strong></td>
<td>No submissions were received.</td>
<td></td>
</tr>
<tr>
<td>- Excavating mine pits may intercept perched aquifers (above the deeper aquifers being dewatered) such as creek alluvium and cause localised declines in water contained in these aquifers from lateral leakage into the mine pits. This has the potential to impact surface water pools and the ecosystems they support and groundwater dependent vegetation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Surface water</strong></td>
<td><strong>Management of excess water</strong></td>
<td>Government Agencies</td>
<td>Considered to be a key environmental factor.</td>
</tr>
<tr>
<td>- The implementation of the proposal would result in the discharge of up to 20 GL/a of dewatered groundwater. The excess water management includes the short term discharge of dewatering to Kalgan Creek under “exceptional circumstances”. In the longer term discharge options are as follows, 1. Ophthalma Dam; 2. Hope Downs 1; or 3. nearby creeks. Discharge of dewatering water to nearby creeks would impact the riparian vegetation and ecosystems they support.</td>
<td>Government Agencys: Ophthalma Dam is the preferred option for excess water management. The proposed volume, rate, and number and duration of discharge events of excess water are unclear in the PER. Discharge of excess water to creeks is likely to have local impacts to the volume of creek flow and therefore impacts to dependent ecosystems including the C4 vegetation community that has similarities to the Weeli Wolli Spring community (Priority 1). In consultation with the Department of the Environment and Conservation (DEC) the proponent should develop monitoring and management measures which include agreed environmental triggers and contingency measures for discharge of excess water to creeks. This proposal should not increase ongoing environmental impacts at Hope Downs 1 by adding to or continuing the impacts of discharge of the operation into Weeli Wolli Creek.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

No commitment has been made to pursue the lower impact.
<table>
<thead>
<tr>
<th>Preliminary Environmental Factors</th>
<th>Proposal Characteristics</th>
<th>Government Agency and Public Comments</th>
<th>Identification of Key Environmental Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>options for excess water management.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Realignment of Coondiner Creek</strong></td>
<td><strong>Government Agencies</strong></td>
<td>There is a need to confirm the accuracy of predictions and other information regarding the flood extent, flood depth and velocity at Coondiner Creek, and to ensure the appropriate design and rehabilitation of the Coondiner Creek realignment.</td>
<td>Considered to be a key environmental factor.</td>
</tr>
<tr>
<td>The development of the proposed Mining Zone 1 would require the excavation of a section of Coondiner Creek. Therefore a 2.5 km section of the creek would be realigned to maintain surface flows in the system.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interruption of surface water drainage</strong></td>
<td><strong>Government Agencies</strong></td>
<td>The corridors intersect sheet-flow dependent mulga communities therefore consultation should be undertaken with the DEC in regard to the location of borrow pits, environmental culverts and other drainage designs, as well as rehabilitation strategies to ensure that sheet-flow is maintained during and after construction.</td>
<td>Impacts to the alteration of surface drainage on mulga habitat are considered to be a key environmental factor.</td>
</tr>
<tr>
<td>The development of mine pits, rail and associated infrastructure would result in changes to surface water drainage patterns due to disturbance to minor ephemeral tributaries and creeks and interruption of sheet-flow this would impact down gradient vegetation including Mulga.</td>
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<tr>
<td><strong>Flora and Vegetation</strong></td>
<td><strong>Government Agencies</strong></td>
<td>The alignment of the infrastructure corridor should be selected to minimise impacts on species, communities and habitats of local and regional conservation significance.</td>
<td>Considered to be a key environmental factor.</td>
</tr>
<tr>
<td>The project area covers 18,910 ha and clearing of up to 5470 ha of native vegetation would be required during the construction and operation of this proposal.</td>
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<tr>
<td><strong>Vegetation Communities</strong></td>
<td><strong>Government Agencies</strong></td>
<td>The PER notes that the C4 community and some species of flora in the C1 and C2 communities are thought to access groundwater at different times of the year; however, there appears to be little</td>
<td>Considered to be a key environmental factor.</td>
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<td>Surveys defined and mapped seventeen vegetation communities within the</td>
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<td>Preliminary Environmental Factors</td>
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<td>mining and accommodation areas. These include communities of local significance such as Mulga and creekline communities. One community may potentially be a Priority Ecological Community (PEC). None of the vegetation communities were considered to be Threatened Ecological Communities (TEC) under the EPBC Act</td>
<td>consideration of the potential impacts of groundwater drawdown and discharge on these communities. Vegetation health of C1 and C4 community types in good or better condition within the drawdown footprint should be monitored. The proponent should avoid impacts on species, communities and habitats of local and regional conservation significance (in particular the C4 community) in the management of dewatering and discharge. Confirmation of the presence or absence of the ‘Brockman Iron cracking clay communities of the Hamersley Range’ (Priority 1) in vegetation communities M6 and M3 within the project footprint is required. The PER makes a statement relating to the clearing of locally significant vegetation communities not significantly impacting regional biodiversity. This statement should be supported by reference to relevant research. Consideration should be given to the management of cumulative impacts on the Fortescue Marsh as well as significant riparian ecosystems. Information/studies should be provided to support the PER’s statement that riparian vegetation in the Pilbara region is generally able to adapt to changes in water table depth as a result of natural fluctuations.</td>
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<tr>
<td>Declared Rare and Priority Flora The Declared Rare Flora (DRF) <em>Lepidium catapycnon</em> and ten species of Priority flora occur within the project area. Impacts to these</td>
<td>Government Agencies The current Threatened Ecological Community (TEC) lists available on the DEC website should be utilised to identify TECs.</td>
<td>Considered to be a key environmental factor.</td>
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<tr>
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<td>species from clearing are likely.</td>
<td>Weeds Vegetation surveys identified six weed species including Mexican Poppy, Buffel Grass and Bipinnate Beggatrick within the project area. No East Pilbara Declared Plants were identified during the vegetation surveys.</td>
<td>Government Agencies The weed Natal Red Top (<em>Melinis repens</em>) is known to occur along the powerline at Hope Downs 1 but is not currently recorded in the Hope Downs 4 infrastructure corridor. Hygiene measures are needed to prevent the spread of this weed into the Hope Downs 4 project area.</td>
<td>Considered to be a key environmental factor.</td>
</tr>
<tr>
<td>Fire The introduction of mine operations has the potential to introduce new ignition sources that could lead to fire that could have an impact on the local vegetation and fauna habitat.</td>
<td>No submissions were received.</td>
<td>The EPA considers the fire management measures that would be implemented as part of the proposal are sufficient to minimise the risk of fire occurring as a result of the proposal.</td>
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</tr>
<tr>
<td>Dust Dust produced during the construction and operation of the proposal has the potential to be deposited on vegetation and may prevent photosynthesis and plant respiration.</td>
<td>Government Agencies There is the potential for dust to impact native flora.</td>
<td>An assessment was conducted on the impacts to DRF and Priority Flora from dust resulting from the implementation of the proposal. This assessment concluded that impacts to the following Priority Flora within the project area would be low. Due to a number of factors the assessment on the impacts of dust on DRF and Priority Flora (Hamersley 2010a Appendix 6) was unable to predict the impacts of dust on the following</td>
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<td></td>
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<td></td>
<td>species:</td>
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<td></td>
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<td></td>
<td>• <em>Lepidium Catapycnon</em> (DRF)</td>
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<td></td>
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<td></td>
<td>• <em>Goodenia</em> sp. East Pilbara (P1)</td>
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<td></td>
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<td></td>
<td>• <em>Goodenia purpurascens</em> (P3)</td>
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<tr>
<td>Fauna and Habitat</td>
<td>The implementation of the proposal would result in the direct disturbance of 5470 ha of terrestrial fauna habitat. Within the project area, surveys identified: • ten primary habitat types; • Aquatic fauna comprising</td>
<td>Government Agencies The PER included unsupported statements relating to the low conservation significance of the habitat that would be cleared and the method of clearing that allows fauna the opportunity to move beyond the disturbance footprint.</td>
<td>Considered to be a key environmental factor.</td>
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<td>Impacts to <em>L. Catapycnon</em> and <em>Goodenia</em> sp. East Pilbara due to the distance of the populations from the mine area. Approximately six locations of <em>G. purpurascens</em> consisting of less than ten plants each may be impacted within the mine area. The worst case impacts would equates to a loss of 6% of the number of individuals identified by the proponent within the region. This is not considered to be a significant impact. No further assessment is required.</td>
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<td>of 3 fish (Western Rainbow Fish, Spangled Perch and Hyrtl’s Tandan), 188 macroinvertebrate taxa and 102 microinvertebrate taxa; and terrestrial fauna comprising of 32 mammals, 79 birds, 1 amphibian, 57 reptiles and 4 feral animals.</td>
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<tr>
<td><strong>Scheduled and Priority Fauna</strong></td>
<td>The proposal would potentially impact six State and Federally listed species including: o Western Pebble-mound Mouse <em>Pseudomys chapmani</em> (P4); o Peregrine Falcon <em>Falco peregrinus</em> (Schedule 4); &amp; o Rainbow Bee-eater <em>Merops ornatus</em> (JAMBA).</td>
<td>Government Agencies Bat monitoring may have been undertaken using a methodology that does not adequately detect Pilbara Leaf-nosed Bat (<em>Rhinonicteris aurantia</em>).</td>
<td>Considered to be a key environmental factor.</td>
</tr>
<tr>
<td><strong>Short Range Endemic (SRE) Fauna</strong></td>
<td>Six groups of invertebrate fauna containing potential SRE species were recorded during the targeted surveys. One species of millipede which is likely to be a</td>
<td>Government Agencies The results to the most recent SRE survey were not available with the PER.</td>
<td>The results of the 2009 survey were provided in the Response to Submissions document (Hamersley 2010b. Appendix 3). The potential <em>Antichiroups</em> sp. was determined not to be a SRE; however, two other potential SRE were identified</td>
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<td>Member of <em>Antichiroups</em> sp. [juv.] was identified as a potential SRE in the proponent's PER document.</td>
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<td>the pseudoscorpion (genus <em>Beierolpium</em>) and the snail (<em>Bothriembryon</em> sp.).</td>
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<td><strong>Subterranean Fauna</strong>&lt;br&gt;Surveys identified 20 taxa of stygofauna both inside and outside of the mines drawdown impact zone. Of these taxa only the single specimens of Rotifera and Oligochaete Phreodrilidae were identified within the impact areas. The proponent considers that Rotifera are common in surface and groundwater throughout Australia. The Phreodrilidae has been recorded at the nearby Hope Downs 1 and is common throughout the Pilbara (Hamersley 2010a). The Troglobitic survey</td>
<td><strong>Government Agencies</strong>&lt;br&gt;Many stygofauna species could not be identified to species or morphospecies level. Accordingly no conclusion was presented on their distribution outside the project area in the stygofauna sampling survey report. This was not adequately reflected in the PER.</td>
<td>DEC has confirmed that these subterranean fauna which are only located within the impact zone are more wide spread in the region and therefore are not at significant risk from impacts resulting from the implementation of the proposal. Based on the information provided by DEC impacts to subterranean fauna are not considered to be significant. No further assessment required. Not considered to be a key environmental factor.</td>
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<td>identified 7 troglobitic and potentially-troglobitic orders. Of these an individual Diplura <em>Japygidae</em> sp. was only located within the impact area but may be the same species recorded elsewhere in the Pilbara. The proponent considers that the Diplura <em>Japygidae</em> sp. is typically of low abundance. In addition Diplurans are considered to be among the more vagile subterranean fauna species. Considering that the other troglobitic fauna recorded have a demonstrated range of over 10 to 30 km² it is therefore considered that this taxa is likely to occur outside the impact area (Hamersley 2010 a &amp; b)</td>
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**POLLUTION**

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<tr>
<th>POLLUTION</th>
<th>Dust</th>
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<tr>
<td>Air Quality – Dust</td>
<td>Dust and air emissions would be generated from construction and operation of the mine and haul and access roads. These activities have the potential to adversely impact the workforce with adverse health effects; and surrounding vegetation from</td>
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<tr>
<td>Air Quality - Greenhouse Gas and other air emissions</td>
<td>Greenhouse gas (GHG) emissions would occur from blasting, the operation of mine infrastructure, equipment and transport. The emission is estimated to be 270,000 tonnes of carbon dioxide equivalent (t CO₂-e) per year with emissions during construction of up to 305,000 t CO₂-e.</td>
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<td>Waste/Water quality</td>
<td>Mining has the potential to cause the release of acid and metalliferous waste into the surrounding environment. Sulphides which are the main cause of Acid or Metalliferous Drainage (AMD) would be present within waste material and pit walls within the pit zones.</td>
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<td>Preliminary Environmental Factors</td>
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<tr>
<td><strong>Chemical and Dangerous Goods Transport and Storage</strong></td>
<td>Exploration has not intercepted any fibrous mineral (asbestos) in the ore zone or immediate vicinity and the cadmium and selenium concentrations are considered to be low. Incorrect storage of tailings could result in leakage and pollution of groundwater.</td>
</tr>
<tr>
<td><strong>Chemical and Dangerous Goods Transport and Storage</strong></td>
<td>Hydrocarbons (including vehicle fuels), chemicals and explosives would be transported to and used at the proposed mine site. Poor management of these could lead to contamination of the environment.</td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td>Noise would be generated as a result of blasting and excavation at the mine, ore processing and vehicle and rail movements.</td>
</tr>
<tr>
<td><strong>SOCIAL SURROUNDINGS</strong></td>
<td>Aboriginal heritage surveys continue to be conducted in</td>
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<td><strong>Heritage/Aboriginal heritage</strong></td>
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<td>Preliminary Environmental Factors</td>
<td>Proposal Characteristics</td>
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| and near the project area. So far approximately 226 heritage sites have been located. The majority of these sites are stone tool scatters which have a low archaeological significance. However, quarry sites, rock shelter sites and modified or scarred trees have also been identified. Watercourses in the region are considered to be of general cultural importance. Significant ethnographic sites exist along Coondiner Creek downstream of the proposal area. Known heritage sites are also located downstream of the proposed Weeli Wolli Creek rail crossing. The implementation of the proposal is likely to disturb identified archaeological sites and affect the general cultural values of watercourses. | consultation, including the provision of information and investigation into the preferred options, be undertaken with the relevant Aboriginal community with regards to:  
- the potential effects on Aboriginal heritage cause by dewatering at Hope Downs 4;  
- the methods and options for excess water disposal;  
- the possible effects on the Coondiner Creeks system; and  
- the cultural values of whichever creek would have excess water discharged into it. | relevant indigenous stakeholders in relation to potential cultural heritage impacts associated with the proposal. The proponent would avoid locating infrastructure on significant heritage sites where practicable. When this is not possible the proponent would consult with the relevant traditional owners and seek approval to disturb heritage sites under Section 18 of the Aboriginal Heritage Act 1972 prior to ground disturbing activities. The ethnographic value of watercourses is liked to their health. The impacts of dewatering, discharge and realignment of Coondiner Creek are considered to be significant and are addressed under the Groundwater and surface water section (3.1) and the Flora section (3.2). This factor does not require further EPA evaluation. |
<p>| Visual amenity | The during the operation of the Hope Downs 4 proposal the mine pits, waste dumps and associated infrastructure are likely to be visible to | No submissions were received. | Visual amenity is not considered to be a key environmental factor as visual impacts are likely to be minimal and the proponent would |</p>
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<tr>
<th>Preliminary Environmental Factors</th>
<th>Proposal Characteristics</th>
<th>Government Agency and Public Comments</th>
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<tr>
<td>some degree from Mount Newman, recreational areas within 5km, Great Northern Highway and an access track to Eagle Rock Falls during the mine operations.</td>
<td></td>
<td>undertake management and mitigation measures to reduce visual impact in the short and long term.</td>
<td>Not considered to be a key environmental factor.</td>
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**OTHER**

**Rehabilitation and closure**

The project area would be decommissioned and rehabilitated.  

**Government Agencies**

The PER indicates that there would be insufficient material to backfill the mine pits above the water table this would result in pit lakes of increasing salinity and possibly increasing concentrations of metals, which could be a threat to local fauna populations in particular bird species.  

The Decommissioning and Closure Plan should be developed at least 5 years prior to closure.  

Rehabilitation trials should be conducted to determine the best landform design.  

Rehabilitation and closure is considered to be a key environmental factor and is addressed in the Report.

**PRINCIPLES**

<table>
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<tr>
<th>Principle</th>
<th>Relevant Yes/No</th>
<th>If yes, Consideration</th>
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| 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 environment provided background information to assess risks and identify measures to avoid or minimise impacts.  
  - The assessment of these impacts and management is provided in Section 3 of this report.  
  - Conditions have been recommended as considered necessary. |
<table>
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<tr>
<th>PRINCIPLES</th>
<th>Principle</th>
<th>Relevant Yes/No</th>
<th>If yes, Consideration</th>
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</table>
| 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 benefit of future generations.* | Yes | The proposal would result in the loss of 5,470 hectares of vegetation and fauna habitat and has the potential to impact diversity. Vegetation and habitat are relevant environmental factors discussed in this report. |
| 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 | The proposal would result in the clearing of native vegetation and fauna habitat, and the realignment of Coondiner Creek and potential discharge to nearby creek lines. These impacts have the potential to affect biological diversity/integrity. Vegetation communities and flora and fauna are key environmental factors discussed in 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.* | Yes | The proposal would require decommissioning and rehabilitation. The proponent should bear the cost of any potential pollution, containment, monitoring, management, rehabilitation and closure. |
| 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 | Considering this principle, the EPA notes the following:  
- Potentially acid forming waste would be encapsulated in the waste rock dumps. This is discussed in Section 3 of this report.  
- Tailings storage facility would be created to treat and contain tailings. This is discussed in Section 3 of this report.  
- Other waste products would be created as a result of implementation of the proposal, and would be disposed of according to relevant regulations and legislations. |
Appendix 4

Identified Decision-making Authorities and Recommended Environmental Conditions
Identified Decision-making Authorities

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

Section 45(1) requires the Minister for Environment to consult with decision-making authorities (DMAs), 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:

<table>
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<tr>
<th>Decision-making Authority</th>
<th>Approval</th>
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<tbody>
<tr>
<td>1. Minister for Mines and Petroleum</td>
<td>Mining Act 1978</td>
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<tr>
<td>2. Minister for Water</td>
<td>Rights In Water and Irrigation Act - Water abstraction licences</td>
</tr>
<tr>
<td>3. Minister for Indigenous Affairs</td>
<td>Aboriginal Heritage Act – Section 18 clearances</td>
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<tr>
<td>4. Minister for State Development</td>
<td>State Agreement Act</td>
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</tbody>
</table>
● Environmental Protection (Clearing of Native vegetation) Regulations 2004  
● Licence to take (Wildlife and Conservation Act 1950) |
| 6. Department of Water | Rights In Water and Irrigation Act - Water abstraction licences |
| 7. Department of Minerals and Petroleum | Mining Act 1978 |

Note: In this instance, agreement is only required with DMAs 1-4 since these DMAs are Ministerial DMAs
RECOMMENDED ENVIRONMENTAL CONDITIONS

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

HOPE DOWNS 4 IRON ORE MINE
SHIRE OF EAST PILBARA

Proposal: The proposal is to construct and operate an iron ore mining area and associated infrastructure at the Hope Downs 4 Iron Ore Mine located approximately 30 kilometres north west of Newman within the Shire of East Pilbara. The proposal consists of a designated mining area, two infrastructure corridor options, excess water discharge infrastructure and an accommodation area and the realignment of a 2.5 kilometre section of Coondiner Creek.

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

Proponent: Hamersley HMS Pty Limited

Proponent Address: 152-158 St George’s Terrace, PERTH WA 6000

Assessment Number: 1738

Report of the Environmental Protection Authority: Report 1374

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 (CEO) 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 CEO 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 CEO of the Office of the Environmental Protection Authority.

4-2 The proponent shall submit to the CEO of the Office of the Environmental Protection Authority the compliance assessment plan required by condition 4-1 at least six months prior to the first compliance report required by condition 4-6, or prior to implementation, whichever is sooner.

The compliance assessment plan shall indicate:

1 the frequency of compliance reporting;

2 the approach and timing of compliance assessments;

3 the retention of compliance assessments;

4 the method of reporting of potential non-compliances and corrective actions taken;

5 the table of contents of compliance assessment reports; and

6 public availability of compliance assessment reports.

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

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

4-5 The proponent shall advise the CEO of any potential non-compliance within seven days of that non-compliance being known.
4-6 The proponent shall submit to the CEO 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 assessment report.

The compliance assessment report shall:

1. be endorsed by the proponent’s Managing Director or a person 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 Groundwater Drawdown

5-1 The proponent shall ensure that the dewatering of groundwater as a result of abstraction and excavation of aquifers required to implement the proposal does not adversely affect the C4 vegetation community located to the south of the mining area as indicated in Schedule 1, Figure 5; Coondiner Creek; the calcrete and alluvial aquifers; or any of the pools in the surrounding area (namely Eagle Rock Pool, Eagle Rock Falls, Stuarts Pool, Kalgan Pool, Mindy Mindy Creek Pool(s), Three Pools, Bella Pool, Cliff Pool and/or Steer Pool) or their associated vegetation.

5-2 To verify that the requirements of condition 5-1 are met the proponent shall:

1. identify all sites and parameters to be monitored and the monitoring methodologies, including methods which will determine whether a decline in condition and cover of riparian vegetation and pool levels and is attributable to the implementation of the proposal or to other causes in the event that trigger levels under condition 5-2 are exceeded, to the satisfaction of the CEO of the Office of the Environmental Protection Authority on advice from the Department of Water, prior to the commencement of dewatering;

2. submit baseline monitoring of groundwater levels, permanent pool water levels and native vegetation condition and cover at all sites identified under Condition 5-2 1 prior to the commencement of dewatering;
3. provide trigger levels for water levels in permanent pools and condition and cover of riparian vegetation at all sites identified under 5-2 1 for the approval of the CEO of the Office of the Environmental Protection Authority on advice of the Department of the Environment, prior to the commencement of dewatering;

4. provide contingency actions to remediate any potential impacts resulting from groundwater abstraction and lateral leakage from the Coondiner Creek alluvial aquifer into mine pit(s) prior to the commencement of dewatering for the approval of the CEO of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation and the Department of Water;

5. from the commencement of dewatering, monitor groundwater levels (mAHD), and the extent of surface water expression and depth for permanent pools at the agreed sites identified in 5-2 1;

6. from the commencement of dewatering, monitor the condition and cover of riparian vegetation at each of the agreed sites; and

7. undertake monitoring required in 5-2 1, 5-2 5 and 5-2 6 to the satisfaction of the CEO of the Office of the Environmental Protection Authority in consultation with the Department of the Environment and Conservation and Department of Water.

5-3 The proponent shall submit annually the results of monitoring required by condition 5-2 to the CEO of the Office of the Environmental Protection Authority as part of the compliance assessment report required by condition 4-6.

5-4 In the event that the monitoring required by condition 5-2 5 and 5-2 6 indicate an exceedance of trigger levels for surface water expression and water depth for permanent pools and/or condition and cover of riparian vegetation respectively, as determined under condition 5-2 3:

1. the proponent shall report to the CEO of the Office of the Environmental Protection Authority within 7 days of the exceedance being identified;

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

3. if determined by the CEO of the Office of the Environmental Protection Authority that any exceedance is a result of activities undertaken in implementing the proposal, the proponent shall submit actions to be taken to remediate the exceedance within 21 days of the determination being made to the CEO; and

4. the proponent shall implement contingency actions required under 5-4 3 upon approval to implement those actions from the CEO of the Office of
the Environmental Protection Authority until such time as the CEO
determines that the remedial actions may cease.

5-5 The proponent shall make the monitoring reports required by condition 5-2
publicly available in a manner approved by the CEO of the Office of the
Environmental Protection Authority.

6 Dewater Discharge

6-1 The proponent shall ensure that any dewater discharged to the environment
does not exceed ANZECC/ARMCANZ* default trigger values for the
protection of marine and freshwater ecosystems.

Where the proponent can demonstrate through adequate baseline
monitoring that natural background levels of the receiving environment
exceed ANZECC/ARMCANZ* default trigger values, revised trigger values
can be implemented on approval of the CEO of the Office of the
Environmental Protection Authority.

6-2 The proponent shall manage excess water through discharge to Kalgan
Creek until such time as dewatering at the Hope Downs 1 iron ore mine
ceases. At this time the proponent shall then cease discharge to Kalgan
Creek and transfer water to Hope Downs 1 for aquifer reinjection unless it
can be demonstrated to the satisfaction of the CEO of the Office of the
Environmental Protection Authority that discharge to Kalgan Creek can
continue.

6-3 The proponent shall ensure that, as a result of the discharge of excess water
to Kalgan Creek, permanent surface water flow does not extend closer than
30 kilometres to the boundary of Fortescue Marsh (defined by coordinates
802197.30E and 7498223.30N (MGA zone 50)).

6-4 To verify that the requirements of condition 6-3 are met the proponent shall
undertake monitoring to the satisfaction of the CEO of the Office of the
Environmental Protection Authority in consultation with the Department of
the Environment and Conservation and submit the results annually as part of
the compliance assessment report required by condition 4-6.

6-5 Should monitoring demonstrate that the permanent surface water flow
extends closer than 30 kilometres to the boundary of the Fortescue Marsh
then the proponent will report this to the CEO of the Office of the
Environmental Protection Authority within seven days of identification in
accordance with condition 4-5.

6-6 The proponent shall ensure that excess water discharge required to
implement the proposal does not adversely affect Kalgan Creek or its
surrounding riparian vegetation, as defined in Table 10 of the “Hope Downs
4 Iron Ore Project—Public Environmental Review, Issue Date: January 2010”
and Schedule 1, Figure 4.
To verify that the requirements of condition 6-6 are met the proponent shall:

1. identify all sites and parameters to be monitored and the monitoring methodologies to the satisfaction of the CEO of the Office of the Environmental Protection Authority on advice from Department of the Environment and Conservation and the Department of Water, prior to the commencement of excess water discharge;

2. submit baseline monitoring of water levels and native vegetation health and abundance at all sites identified under Condition 6-7 1 prior to the commencement of excess water discharge;

3. provide trigger levels for condition and cover of riparian vegetation associated with Kalgan Creek as defined in Table 10 of the “Hope Downs 4 Iron Ore Project—Public Environmental Review, Issue Date: January 2010” and Schedule 1, Figure 4, for the approval of the CEO of the Office of the Environmental Protection Authority on advice of the Department of the Environment and Conservation, prior to the commencement of excess water discharge;

4. provide contingency actions to remediate any potential impacts resulting from excess water discharge prior to the commencement of discharge for the approval of the CEO of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation and the Department of Water. These contingency actions shall not include discharge of excess water to Coondiner Creek or any other creek;

5. from the commencement of discharge of excess water, monitor surface water quality as defined under ANZECC/ARMCANZ*, levels and flow at each of the agreed sites;

6. from the commencement of discharge of excess water, monitor the condition and cover of riparian vegetation at each of the agreed sites; and

7. monitoring required in 6-7 5 and 6-7 6 should be carried out to the satisfaction of the CEO of the Office of the Environmental Protection Authority in consultation with the Department of the Environment and Conservation and the Department of Water and include methods which will allow determination of whether an impact is attributable to the implementation of the proposal or to other causes, in the event that trigger levels under condition 6-7 3 are reached.

The proponent shall submit annually the results of monitoring required by conditions 6-4 and 6-7 to the CEO of the Office of the Environmental Protection Authority as part of the compliance assessment report required by condition 4-6.
In the event that the monitoring required by condition 6-7.5 and 6-7.6 indicate an exceedance of trigger levels for condition and cover of vegetation determined under condition 6-7.3:

1. the proponent shall report to the CEO of the Office of the Environmental Protection Authority within 7 days of the exceedance being identified;

2. provide evidence which describes the decline of condition and/or cover and allows determination of the cause of the exceedance;

3. if the exceedance is determined by the CEO 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 to remediate the exceedance within 21 days of the determination being made to the CEO; and

4. the proponent shall implement contingency actions required under 6-9.3 upon approval to implement those actions from the CEO of the Office of the Environmental Protection Authority until such time as the CEO determines that the remedial actions may cease.

The proponent shall make the monitoring reports required by conditions 6-4 and 6-7 publicly available in a manner approved by the CEO of the Office of the Environmental Protection Authority.


** Water Quality **

The proponent shall ensure that run-off and/or seepage from the tailings storage facility and waste material landforms does not lead to the quality of surface water or groundwater within or adjacent to the proposal area exceeding 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 of the receiving environment.

The proponent shall monitor the quality of surface water and groundwater upstream and downstream of the tailings storage facility and waste material landforms to ensure that the requirements of condition 7-1 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 CEO of the Office of the Environmental Protection Authority.

7-3 The proponent shall commence the water quality monitoring required by 7-2 before ground disturbing activities in order to collect baseline data.

7-4 The proponent shall submit annually the results of monitoring required by condition 7-2 to the CEO of the Office of the Environmental Protection Authority as part of the compliance assessment report required by condition 4-6.

7-5 In the event that monitoring required by condition 7-2 indicates that the requirements of condition 7-1 are not being met, the proponent shall:

1 report such findings to the CEO of the Office of the Environmental Protection Authority within 7 days of the decline in water quality being identified;

2 provide evidence which describes the decline of water quality and allows determination of the cause of the decline; and

3 if the decline in water quality is determined by the CEO of the Office of the Environmental Protection Authority to be a result of activities undertaken in implementing the proposal, the proponent shall submit the actions to be taken to remediate the decline within 21 days of the determination being made to the CEO; and

4 the proponent shall implement the actions identified in 7-5 3 upon approval to implement those actions from the CEO of the Office of the Environmental Protection Authority until such a time as the CEO determines that the remedial actions may cease.

7-6 The proponent shall make the monitoring reports required by condition 7-4 publicly available in consultation with the CEO of the Office of the Environmental Protection Authority.

8 Flora and Vegetation

8-1 The proponent shall ensure that the loss of the Declared Rare Flora species *Lepidium catapycnon* shall not exceed one population consisting of no more than 20 plants due to the construction and operation of infrastructure corridor option 1 as identified in Schedule 1, Figure 6.

8-2 In the event that infrastructure corridor option 6 is implemented under condition 9-2 then the proponent shall ensure that the loss of the Declared Rare Flora species *Lepidium catapycnon* shall not exceed 3 populations consisting of no more than 20 plants each due to the construction and operation of infrastructure corridor option 6 as identified in Schedule 1, Figures 6 and 7.
Prior to ground disturbance activities, the Proponent shall submit to the CEO of the Office of the Environmental Protection Authority, a report detailing how the design of the project has reduced impacts within the 5470 hectares of allowed clearing and infrastructure construction on the following conservation values:

- Declared Rare Flora;
- Priority flora; and
- Local conservation significant vegetation communities B1, C1, C2, C3, C4, S1, S2, S3, S4, M1, M2, M3, M4, X2, X4 and X5, as defined in Table 10 of the “Hope Downs 4 Iron Ore Project-Public Environmental Review, Issue Date: January 2010” and of Schedule 1, Figures 4, 5, 6 and 7.

This report shall incorporate the advice of the Department of Environment and Conservation with regard to the final alignment and design of the infrastructure to minimise impacts to the abovementioned local conservation significant vegetation communities.

The proponent shall undertake weed management to ensure that:

1. No new species of weeds (including both declared weeds and environmental weeds) shall be introduced into the proposal area as a result of the implementation of the proposal.

2. The cover of weeds (including both declared weeds and environmental weeds) within the proposal area does not exceed that existing on comparable, nearby land, determined by 8-4 3 which has not been disturbed during implementation of the proposal.

3. Three reference sites on nearby land are chosen in consultation with the Office of the Environmental Protection Authority and established within the proposal area and outside the impact area. The reference sites are to be monitored every 2 years to determine whether changes in weed cover and type are as a result of project implementation or broader regional changes.

9 Infrastructure Corridor

The proponent shall implement the proposal using infrastructure corridor option 1 located on tenement AML70/244, as identified in schedule 1.

9-2 In the event that written evidence is provided to CEO of the Office of the Environmental Protection Authority demonstrating that access rights to tenement AML70/244 have been declined then condition 9-1 does not apply and the proposal can be implemented using infrastructure corridor option 6.

10 Fauna

The proponent shall implement the proposal in accordance with the “Hope Downs 4 Environmental Management Plan; Fauna Management Plan
Section 4.6, Author: Strategen, Date: October 2010”, or subsequent revisions approved by the CEO of the Office of the Environmental Protection Authority on the advice of the Department of Environment and Conservation. The objectives of this plan are to protect significant habitats, minimise impact to individual fauna and minimise the effect of feral animals on native fauna.

10-2 In the event that infrastructure corridor option 6 is implemented under condition 9-2 then the proponent shall submit a revised Fauna Management Plan to the CEO of the Office of the Environmental Protection Authority for approval. This management plan will include measures to minimise and manage the indirect impacts of:

- noise;
- reduction in feeding areas; and
- interception of pathways onto lower slopes and flats,

on the conservation significant species Petrogale lateralis, Rhinonicteris aurantia and Falco peregrinus resulting from the construction and operation of infrastructure corridor option 6. This revised report shall be prepared with advice of the Department of Environment and Conservation with regards appropriate management measures.

10-3 The proponent shall ensure that open trenches associated with construction of the excess water pipeline are cleared of trapped fauna by fauna-rescue personnel at least twice daily. Details of all fauna recovered shall be recorded, consistent with 10-7. The first daily clearing shall take place no later than three hours after sunrise and shall be repeated between the hours of 3:00 pm and 6:00 pm.

The open trenches shall also be cleared, and fauna details recorded, by fauna-rescue personnel no more than one hour prior to backfilling of trenches.

Note: “fauna-rescue personnel” means employees of the proponent whose responsibility it is to walk the open trench to recover and record fauna found within the trench.

10-4 The fauna-rescue personnel shall obtain the appropriate licences as required for fauna rescue under the Wildlife Conservation Act 1950.

10-5 Open trench lengths shall not exceed a length capable of being inspected and cleared by the fauna-clearing personnel within the required times as set out in condition 10-3.

10-6 Ramps providing egress points and/or fauna refuges providing suitable shelter from the sun and predators for trapped fauna are to be placed in the trench at intervals not exceeding 50 metres.

10-7 The proponent shall produce a report on fauna management within the excess water discharge pipeline trench at the completion of pipeline construction. The report shall include the following:
details of all fauna inspections;

2. the number and type of fauna cleared from trenches;

3. fauna mortalities; and

4. all actions taken.

The report shall be provided to the CEO of the Office of the Environmental Protection Authority and the Department of Environment and Conservation no later than 21 days after the completion of pipeline installation, and shall be made publicly available in a manner approved by the CEO.

11 Acid and Metalliferous Drainage

11-1 Prior to ground-disturbing activities the proponent shall 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) within the area of the maximum disturbance boundary defined in Figure 2, to the satisfaction of the CEO of the Office of the Environmental Protection Authority to identify:

1. the extent of the acidity and metal contamination hazard associated from related mining activities at the area of the proposal; and

2. the potential environmental receptors that could be impacted on exposure to this hazard.

11-2 Prior to the mining of any material with the potential to generate Acid or Metalliferous Drainage, the proponent shall have in place long-term prevention, monitoring, contingency and remediation strategies for the management of any potential Acid or Metalliferous Drainage to the satisfaction of the CEO 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 undertake static and kinetic 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 CEO of the Office of the Environmental Protection Authority.

11-4 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 CEO of the Office of the Environmental Protection Authority.
Note: The national and international standards are the *Managing Acid and Metalliferous Drainage*, February 2007 developed by the Australian Government, Department of Industry Tourism and Resources, and the *Global Acid and Metalliferous Drainage (GARD) Guide*, December 2008, developed by the International Network for Acid Prevention (INAP).

12 Rehabilitation

12-1 The proponent shall undertake rehabilitation to achieve the following outcomes:

1 Waste dumps and tailings storage facilities shall be designed in consultation with the Department of Mines and Petroleum. These structures and other areas disturbed through implementation of the proposal including the Coondiner Creek realignment shall be non-polluting and shall be constructed so that their stability, surface drainage, resistance to erosion and ability to support local native vegetation comparable to natural analogue landforms[1] as shown by a methodology acceptable to the CEO of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation and the Department of Mines and Petroleum.

2 Areas disturbed through implementation of the proposal, shall be progressively rehabilitated with vegetation composed of native plant species of local provenance (defined as seed or plant material collected within 100 kilometres of the proposal).

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 CEO of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation.

4 Weed management for the rehabilitation areas shall be carried out as per condition 8-4.

Note: 
(i) The natural analogue sites referred to in condition 12-1 shall be selected prior to ground disturbing activities to the requirements of the CEO of the Office of the Environmental Protection Authority on advice of the Department of Mines and Petroleum and the Department of Environment and Conservation.

12-2 The proponent shall provide rehabilitation completion criteria for the approval of the CEO of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation and Department of Mines and Petroleum within five years of implementation of the proposal.

12-3 Rehabilitation activities shall continue until such time as the requirements of condition 12-1 and 12-2 are demonstrated by inspections and reports to be
met, for a minimum of five years following mine completion to the satisfaction of the CEO 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 requirement of the CEO 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:

- ANZMEC/MCA 2000, *Strategic Framework for Mine Closure Planning*; and
- Department of Industry Tourism and Resources 2006 *Mine Closure and Completion* (Leading Practice Sustainable Development Program for the Mining Industry), Commonwealth Government, Canberra;

and shall provide detailed technical information on the following:

- Final closure of all areas disturbed through implementation of the proposal so that they are safe, stable and non-polluting;
- Decommissioning of all plant and equipment;
- Disposal of waste materials;
- Final Rehabilitation of waste dumps; tailings storage facilities and other areas (outside the mine pit(s));
- Management and monitoring following mine completion; and
- Inventory of all contaminated sites and proposed management.

13-3 The proponent shall ensure that the formation of pit lakes as a result of decommissioning and closure of mine voids does not adversely impact fauna or cause impacts to regional groundwater.

13-4 To verify the requirements of 13-3 are met the proponent shall:

1. develop trigger levels for pit lake water chemistry in accordance with trigger values for highly disturbed ecosystems 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, for approval by the CEO of the Office of the Environmental Protection Authority on advice of the
Department of Environment and Conservation, Department of Water and Department of Minerals and Petroleum.

2. monitor the quality of water in the Hope Downs 4 Iron Ore Mine pit voids to the requirements of the CEO of the Office of the Environmental Protection Authority on advice of the Department of Environment and Conservation, Department of Water and Department Minerals and Petroleum.

3. continue monitoring until such time as it can be demonstrated to the satisfaction of the CEO of the Office of the Environmental Protection Authority that there are no ongoing acid and or metalliferous impacts to water quality.

13-5 In the event that the monitoring required by condition 13-4 indicates an exceedance of trigger levels for water quality as determined by condition 13-4:

1. the proponent shall report to the CEO of the Office of the Environmental Protection Authority within 7 days of the exceedance being identified;

2. provide a report to the CEO of the Office of the Environmental Protection Authority within 21 days of the exceedance being identified that:
   - describes the water quality
   - provides information which allows determination of the likely cause of the exceedance of trigger levels; and
   - states the actions and associated timelines proposed to remediate water quality in the pit lake/s.

13-6 The proponent shall, on approval of the CEO of the Office of the Environmental Protection Authority, and on advice of the Department of Environment and Conservation implement the actions identified in 13-5 and continue to implement such actions until the CEO determines that the remedial actions may cease.

13-7 The proponent shall make the results of the monitoring program referred to in 13-4, the trigger levels referred to in 13-4, and the report referred to in 13-5 publicly available in a manner acceptable to the CEO of the Office of the Environmental Protection Authority.

13-8 The proponent shall implement the Final Closure and Decommissioning Plan required by conditions 13-1 and 13-2 from the commencement of decommissioning until the CEO of the Office of the Environmental Protection Authority on advice from the Department of Environment and Conservation and the Department of Mines and Petroleum determines implementation of the Final Closure and Decommissioning Plan may cease.
Decommissioning is defined as the process that begins near, or at, the cessation of mineral production and ends with removal of all unwanted infrastructure and services (ANZMEC/MCA 2000 Strategic Framework for Mine Closure Planning).

13-9 The proponent shall make the Final Closure and Decommissioning Plan required by conditions 13-1 and 13-2 publicly available in a manner acceptable to the CEO of the Office of the Environmental Protection Authority.

Notes

1. The Office of the Environmental Protection Authority may seek advice from other agencies or organisations, as required.

2. 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.

3. 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.
The Proposal (Assessment No. 1738)

The proposal is to develop and operate four open pit iron ore mining zones and associated infrastructure at the Hope Downs 4 Iron Ore Project (HD4) located approximately 30 km north west of Newman within the Shire of East Pilbara.

The location of the various project components is shown in Figures 2 and 3.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Sections 2, 7 and 8 of the project referral document, Hope Downs 4 Iron Ore Project: Public Environmental Review, prepared by Strategen, Leederville, Western Australia (January 2010).

Table 1: Summary of Key Proposal Characteristics

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>General</strong></td>
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<tr>
<td>Project life</td>
<td>25-30 years (approximately)</td>
</tr>
<tr>
<td>Location</td>
<td>See Figure 2</td>
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<tr>
<td><strong>Project Area</strong></td>
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<tr>
<td>Project Area</td>
<td>20,135 ha comprising:</td>
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<td></td>
<td>o mining area – 5805 ha</td>
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<tr>
<td></td>
<td>o infrastructure corridor – 9960 ha</td>
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<td></td>
<td>o excess water discharge infrastructure – 2520 ha</td>
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<tr>
<td></td>
<td>o accommodation area – 1850 ha</td>
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<tr>
<td><strong>Disturbance Area</strong></td>
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<tr>
<td>Vegetation Clearing</td>
<td>Clearing up to 5470 ha comprising:</td>
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<td></td>
<td>o mining area – 4000 ha</td>
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<td></td>
<td>o infrastructure corridor – 1100 ha</td>
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<td></td>
<td>o excess water discharge infrastructure – 180 ha</td>
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<td></td>
<td>o accommodation area – 190 ha</td>
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<td><strong>Mining Operation</strong></td>
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<td>Mining method</td>
<td>Open cut</td>
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<tr>
<td>Dewatering rate</td>
<td>Up to 20 GL/a</td>
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<td>Up to 140 m of drawdown to approximately 500m relative to sea level (RSL)</td>
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<tr>
<td>Discharge of excess water to Kalgan Creek</td>
<td>Discharge location:</td>
</tr>
<tr>
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<td>Approximately 16 km east of the mining area, downstream of Kalgan Pool</td>
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<td>The maximum footprint of creekbed saturation shall not:</td>
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<td>o exceed 29 km from point of discharge; and</td>
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<td>o extend closer than 30 km from the Fortescue Marsh boundary.</td>
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<td></td>
<td>Length of water pipeline:</td>
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<td>o approximately 16 km</td>
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<tr>
<td>Discharge of excess water to Hope Downs 1</td>
<td>Length of water pipeline:</td>
</tr>
<tr>
<td></td>
<td>o up to 52 km for option 1 or 65 km for option 6</td>
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<tr>
<td><strong>Infrastructure Corridor</strong></td>
<td>Length:</td>
</tr>
<tr>
<td></td>
<td>o up to 52 km for option 1 or up to 65 km for option 6</td>
</tr>
</tbody>
</table>

**Abbreviations**

ha hectares
GL/a Gigalitres per annum
m metres
km kilometres
Figures

Figure 1  Regional Location of Hope Downs 4 Iron Ore Mine. (See figure 1 above)
Figure 2  Hope Downs 4 Project Area. (See figure 2 above).
Figure 3  Conceptual Mine layout and Associated Infrastructure. (See figure 3 above)
Figure 4  Vegetation Mapping along Kalgan Creek
Figure 5  Vegetation Mapping in the Mining Area
Figure 6  Vegetation Mapping in the Western Portion of the Infrastructure Corridor.
Figure 7  Vegetation Mapping in the Eastern Portion of the Infrastructure Corridor.
Figure 4: Vegetation Mapping along Kalgan Creek
Figure 5: Vegetation Mapping in the Mining Area
Figure 6: Vegetation Mapping in the Western Portion of the Infrastructure Corridor.
Figure 7: Vegetation Mapping in the Eastern Portion of the Infrastructure Corridor.
Appendix 5

Summary of Submissions and Proponent's Response to Submissions