BHP Billiton Iron Ore Pilbara Strategic Proposal

Flora and Vertebrate Fauna Screening Assessment

26 February 2016
### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
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</thead>
<tbody>
<tr>
<td>DEC</td>
<td>Department of Environment and Conservation (former name for DPaW)</td>
</tr>
<tr>
<td>DoE</td>
<td>Federal Department of the Environment</td>
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<tr>
<td>DPaW</td>
<td>Western Australian Department of Parks and Wildlife</td>
</tr>
<tr>
<td>DRF</td>
<td>Declared Rare Flora</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EP Act</td>
<td><em>Environmental Protection Act 1986</em> (State)</td>
</tr>
<tr>
<td>EPA</td>
<td>Western Australian Environmental Protection Authority</td>
</tr>
<tr>
<td>EPBC Act</td>
<td><em>Environment Protection and Biodiversity Conservation Act 1999</em> (Federal)</td>
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<tr>
<td>FDS</td>
<td>Full Development Scenario</td>
</tr>
<tr>
<td>IUCN</td>
<td>International Union for Conservation of Nature</td>
</tr>
<tr>
<td>MNES</td>
<td>Matters of National Environmental Significance</td>
</tr>
<tr>
<td>PDB</td>
<td>Project Definition Boundary</td>
</tr>
<tr>
<td>PERSP</td>
<td>Public Environmental Review – Strategic Proposal</td>
</tr>
<tr>
<td>SEA</td>
<td>Strategic Environmental Assessment</td>
</tr>
<tr>
<td>SP</td>
<td>Strategic Proposal</td>
</tr>
<tr>
<td>TEC</td>
<td>Threatened Ecological Community</td>
</tr>
<tr>
<td>WC Act</td>
<td><em>Wildlife Conservation Act 1950</em> (State)</td>
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</tbody>
</table>

### Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>30% Conceptual Development Scenario</td>
<td>This scenario represents the extent of cumulative direct disturbance within the Project Definition Boundary at a future point when 30% of BHP Billiton Iron Ore’s identified operations are operating concurrently (a reasonably foreseeable level of operation). In addition to BHP Billiton Iron Ore’s developments, the scenario includes reasonably foreseeable third-party iron ore mines. It also includes the Existing Development Scenario.</td>
</tr>
<tr>
<td>Conservation Significant Species</td>
<td>Species that are either:</td>
</tr>
<tr>
<td></td>
<td>- Listed under the EPBC Act as Critically Endangered, Endangered, Vulnerable or Migratory;</td>
</tr>
<tr>
<td></td>
<td>- Listed under the WC Act under Schedules 1-7; or</td>
</tr>
<tr>
<td></td>
<td>- Listed by DPaW as Priority Species.</td>
</tr>
<tr>
<td></td>
<td>- Listed by the IUCN as Critically Endangered, Endangered, Vulnerable, or Near Threatened.</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Full Conceptual Development Scenario</td>
<td>This scenario is based on the production rate associated with full development of BHP Billiton Iron Ore’s future identified projects being in concurrent operation. It builds on the 30% Conceptual Development Scenario, so it includes the Existing Development Scenario and reasonably foreseeable third-party iron ore mines; however, it does not include future long-term predictions about third-party iron ore mines or other land uses as this information is not publicly available.</td>
</tr>
<tr>
<td>Public Environmental Review</td>
<td>Strategic Proposal (PERSP)</td>
</tr>
<tr>
<td></td>
<td>The document that outlines the potential impacts of the Strategic Proposal on factors and management strategies to address potential impacts. The PERSP is assessed by the EPA in considering whether the Strategic Proposal is environmentally acceptable.</td>
</tr>
</tbody>
</table>
| Species\(^1\)                             | A group of biological organisms consisting of individuals who are either:  
|                                           | • Capable of interbreeding to produce fertile offspring; or  
|                                           | • Possess common characteristics derived from a common gene pool. |
| Strategic Proposal                         | The proposal for future developments (State level).                                                                                                                                                     |
| Strategic Environmental Assessment (SEA)   | The overall process for the State Strategic Proposal and Federal Strategic Assessment.                                                                                                                   |

\(^1\) We acknowledge the wide and varied scientific and philosophical discussion around the definition of species. The definition used here is based on the definition in the EPBC Act and centres on a ‘common gene pool’.
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1 Introduction

BHP Billiton Iron Ore Pty Ltd (BHP Billiton Iron Ore) currently operates five iron ore mines in the Pilbara region of Western Australia: Yandi, Mining Area C, Mount Whaleback, Eastern Ridge and Jimblebar. To meet future iron ore demand, BHP Billiton Iron Ore is proposing new developments to their operations, known as the Strategic Proposal. This expansion will include a number of new mines, rail lines and infrastructure facilities. To simplify future approvals, BHP Billiton Iron Ore has decided to undertake a Strategic Environmental Assessment (SEA).

This approach to approvals and environmental assessment is supported by both the State and Federal governments as well as the Western Australian Environmental Protection Authority (EPA). One component of the Strategic Proposal involves an impact assessment to assess the degree of impacts on conservation significant species. This report defines the process and methods by which BHP Billiton Iron Ore has identified the risk of potential impact to conservation significant fauna species at different levels (stages) of the future development of the Strategic Proposal. Those species that have been identified during this screening assessment to be at higher risk of impact from the implementation of the Strategic Proposal are discussed in the Public Environmental Review Strategic Proposal (PERSP) (BHP Billiton Iron Ore 2016).

1.1 Strategic Proposal

BHP Billiton is among the world’s largest producers of major commodities, including coal, copper, iron ore, nickel and uranium, and has substantial interests in oil and gas. BHP Billiton Iron Ore, one of BHP Billiton’s businesses, has been developing mines and infrastructure in the Pilbara region since the 1960s, and proposes to continue to do so over the long term. This long-term development plan, the Strategic Proposal, looks at the Life of Asset, for all of BHP Billiton’s current and future Pilbara tenements, and includes:

- New greenfield mining operations at Caramulla, Mudlark, Coondiner, Munjina / Upper Marillana, Gurinbiddy, Ophthalmia / Prairie Downs, Jinidi, Rocklea, Marillana, Roy Hill, Mindy, Ministers North and Tandanya (Figure 1);
- Future expansions to existing mining operations at Jimblebar, Newman, Mining Area C and Yandi;
- Associated infrastructure, including, but not limited to, power lines, pipelines, accommodation camps, access roads, conveyors and airports;
- Rail spurs (connecting the new mining operations to existing rail infrastructure);
- Rail loops (within each mining operation to enable ore loading); and
- Potential expanded rail capacity of the Newman to Port Hedland rail line.

It does not include existing BHP Billiton Iron Ore operations and infrastructure, future development of operations at Yarrie, Goldsworthy and South Flank, or current and future operations at Port Hedland.

The Environmental Protection Authority’s (EPA’s) Strategic and Derived Proposal mechanisms are considered by both the EPA and BHP Billiton to be appropriate methods for assessing the Strategic Proposal and for achieving acceptable environmental outcomes (EPA 2012a). In comparison to the traditional mine-by-mine approval approach used in Western Australia, the assessment of the Strategic Proposal allows for a more cumulative, integrated and regional consideration of environmental impacts.

For the purposes of the assessment, an estimated area of influence (referred to as the Project Definition Boundary) has been determined to be a 50 km buffer around existing BHP Billiton Iron Ore mining tenements covered by the
Strategic Proposal. The rail corridor to Port Hedland with a 10 km buffer is included. A precautionary approach has been applied in determining the Project Definition Boundary (Figure 2).

Figure 1: Current and future proposed iron ore mining operations in the Pilbara

Figure 2: Project Definition Boundary
2 Methods

The purpose of this assessment is to identify conservation significant species with the highest potential for impact from implementation of BHP Billiton Iron Ore’s Strategic Proposal and Third Party projects under 30% implementation and Full Development scenarios (discussed further in Section 2.1). This assessment is reliant on biodiversity data retained in BHP Billiton Iron Ore’s corporate database, and data available from state and national government and non-government databases (see Section 2.3.1). The assessment only considers direct impacts (i.e. clearing) to recorded locations for conservation significant species. It does not consider indirect impacts, such as the introduction or spread of weeds.

2.1 Impact footprint scenarios

The potential impacts to conservation significant species have been estimated by taking into account existing mining and non-mining impacts in the Pilbara bioregion of Western Australia as well as two potential future development scenarios:

1. The BHP Billiton Iron Ore 30% Conceptual Development Scenario; and
2. The BHP Billiton Iron Ore Full Conceptual Development Scenario.

The 30% Conceptual Development Scenario provides a snapshot of BHP Billiton Iron Ore’s potential Strategic Proposal based upon conceptual development of up to 30% of BHP Billiton’s current assets. The disturbance from reasonably foreseeable future third party mines has been included under this scenario, and was estimated from publicly available data for projects referred to the EPA prior to June 2012. This includes projects that are already approved but not yet implemented.

The Full Conceptual Development Scenario is based on the production rate associated with full development of BHP Billiton Iron Ore’s future identified projects being in concurrent operation. It builds on the 30% Conceptual Development Scenario, so it includes the Existing Development Scenario and reasonably foreseeable third-party iron ore mines; however, it does not include future long-term predictions about third-party iron ore mines or other land uses as this information is not publically available. Third party projects included in the 30% Conceptual Development Scenario are also included in the Full Conceptual Development Scenario. No additional third party disturbance areas (post June 2012) are included in the Full Conceptual Development Scenario as this level of information was not publicly available when development scenario footprints were developed.

Non-mining impacts (such as roads and human settlements) are less well defined and less predictable, but generally of less consequence at the scale of this assessment. The impacts to flora and vegetation and fauna at a regional scale, from these sparse developments in the Pilbara is not considered to be significant. Therefore, non-mining impacts have not been included in the existing, 30% Conceptual Development or Full Conceptual Development scenarios.

The direct disturbance footprint totals used as a baseline for the application of impacts are summarised in Table 1.

Table 1: Conceptual footprint areas for each development scenario

<table>
<thead>
<tr>
<th>LAND USER</th>
<th>EXISTING DEVELOPMENT SCENARIO</th>
<th>30% CONCEPTUAL DEVELOPMENT SCENARIO</th>
<th>FULL CONCEPTUAL DEVELOPMENT SCENARIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHP Billiton Iron Ore Mines</td>
<td>18,194</td>
<td>48,394</td>
<td>124,666</td>
</tr>
</tbody>
</table>
## 2.1.1 Disturbance Data for Existing BHP Billiton Iron Ore Operations

The disturbance data for existing BHP Billiton Iron Ore disturbance footprints was derived from analysis of aerial imagery by BHP Billiton Iron Ore and was current as of December 2013. The layer includes disturbance associated with the Area C, Jimblebar, Whaleback, Eastern Ridge and Yandi mining operations. Some non-process infrastructure was excluded, such as power lines and accommodation camps.

### Further information detailing how these numbers were derived is discussed in more detail in sections 2.1.1 to 2.1.5.

### 2.1.2 Disturbance Data for Existing Third Party Iron Ore Operations

The disturbance data for existing third party disturbance was derived by BHP Billiton Iron Ore from analysis of aerial imagery (as of September 2013) and includes disturbance associated with:

- Rio Tinto’s (including joint ventures with Hamersley Iron, Hamersley HMS and Robe River Mining Co.) Brockman Syncline 4, Hope Downs 1, Hope Downs 4, Koodaideri, Marandoo, West Angelas, Western Turner Syncline, Western Turner Syncline Stage 2, Yandicoogina (Junction SE, Junction SW and Oxbow, Pocket and Billiard South);
- Fortescue Metal Group’s Cloudbreak (expansion), Christmas Creek (expansion), Mindy Mindy and Nyidinghu;
- Atlas Iron’s Davidson’s Creek;
- Australian Premium Iron Management’s Hardey;
- Iron Ore Holdings’ Iron Valley;
- Brockman Resources’ Marillana; and
- Hancock Prospecting’s Roy Hill Stage 1 and Roy Hill Stage 2.

Note that FMG’s Solomon Iron Ore Mine expansions were not included as an input in the Cumulative 30% Development Case as the expansions are located more than 50 km away from BHP Billiton Iron Ore mining tenures and were not considered likely to contribute to potential cumulative impacts from BHP Billiton Iron Ore’s operations.

Third party operations considered for the existing disturbance footprint were those that occur within the Project Definition Boundary and had been approved and were underway as at September 2014. Haul roads, rail and accommodation camps were not included in the footprints.

### 2.1.3 Disturbance Data for the Strategic Proposal

Disturbance for the Strategic Proposal was categorised into pits, OSAs, infrastructure areas and rail corridors. The disturbance area for pits and OSAs was informed by available resource information and the predicted volume of mining at each time period. For infrastructure, a nominal 1,500 ha of disturbance was allocated for each Strategic Proposal operation. Haul roads and accommodation camps were excluded.
Detailed engineering design has not yet been undertaken for all elements of the Strategic Proposal, thus the location and timing of mining operations may change in the future in response to newly identified resources, as a result of technology advances or to avoid environmental impacts. This is not considered likely to significantly impact the outcomes of this screening assessment, which provides a regional-scale assessment of potential impacts in the long-term.

Strategic Proposal operations included in the 30% Conceptual Development Scenario are Mining Area C, Jimblebar, Jinidi (partial development), Marillana, Mudlark, Munjina / Upper Marillana, Eastern Ridge, South Flank and Yandi mining operations.

Strategic Proposal operations included in the Full Conceptual Development Scenario, in addition to those listed above for the 30% Conceptual Development Scenario, are Caramulla, Coordiner, Gurinbiddy, Jinidi (full development), Mindy, Ministers North, Ophthalmia / Prairie Downs, Rocklea, Roy Hill, and Tandanya mining operations.

### 2.1.4 Disturbance Data for Reasonably Foreseeable Future Third Party Iron Ore Operations

The disturbance data for reasonably foreseeable future third party iron ore mining operations was derived from publicly available data for projects already approved but not yet implemented, and projects referred to the EPA as of September 2014. These data do not take into account any further expansions that third party operators may propose to undertake in the future.

The disturbance data for reasonably foreseeable future third party iron ore mining operations include disturbance associated with:

- Rio Tinto’s (including joint ventures with Hamersley Iron, Hamersley HMS and Robe River Mining Co.) Brockman Syncline 4, Hope Downs 1, Hope Downs 4, Koodaideri, Marandoo, West Angelas, Western Turner Syncline, Western Turner Syncline Stage 2, Yandicoogina (Junction SE, Junction SW and Oxbow, Pocket and Billiard South);
- Fortescue Metal Group’s Cloudbreak (expansion), Christmas Creek (expansion), Mindy Mindy and Nyidinghu;
- Atlas Iron’s Davidson’s Creek;
- Australian Premium Iron Management’s Hardey;
- Iron Ore Holdings’ Iron Valley;
- Brockman Resources’ Marillana; and
- Hancock Prospecting’s Roy Hill Stage 1 and Roy Hill Stage 2.

Consideration of future third party projects was limited to those within 50 km of a Strategic Proposal mining operation. The exception was the Roy Hill Iron Ore Mine (Roy Hill Iron Ore Holdings Pty Ltd), which was included because of its close proximity to Fortescue Marsh.

Note that FMG’s Solomon Iron Ore Mine expansions were not included as an input in the Cumulative 30% Development Case as the expansions are located more than 50 km away from BHP Billiton Iron Ore mining tenures and were not considered likely to contribute to potential cumulative impacts from BHP Billiton Iron Ore’s operations.

### 2.2 Determining Conservation Significance

To identify conservation significant species that may be at risk of being impacted as a result of direct impacts as a result of the Strategic Proposal an examination of legislative frameworks and available data within the state and specifically the Pilbara region was undertaken.
2.2.1 Current Legislation and Frameworks

Conservation significance of species was determined by the species’ listing under the following national or state legislature, or government conservation lists:

- Species listed as Critically Endangered, Endangered, Vulnerable or Migratory under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Species listed under Schedules 1 to 7 of the *Wildlife Conservation Act 1950* (WC Act), as listed in the 2015 Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.
- Department of Parks and Wildlife Priority species lists.
- Species listed as Critically Endangered, Endangered, Vulnerable or Near Threatened under the International Union for Conservation of Nature (IUCN) Red List.

For the purposes of this document, these species collectively are referred to as ‘conservation significant.’

A description of the conservation rankings is provided in Appendix 1.

2.3 Data Analysis

2.3.1 Data Sources

A list of all conservation significant flora and vertebrate fauna species was developed using data from the following sources:

- BHP Billiton Iron Ore – BHP Billiton Iron Ore’s corporate geographical information system (GIS) database, which houses all the data obtained from biological surveys undertaken or commissioned by BHP Billiton Iron Ore. It contains more than 125,000 records for flora, and almost 28,000 records for vertebrate fauna. Data current as of December 2015 (flora) and January 2016 (fauna). This data is largely restricted to BHP Billiton Iron Ore’s Pilbara tenements.
- Department of Parks and Wildlife:
  - The WA Herbarium’s (WAHerb) specimens database for all of Western Australia and current as at 15 November 2015;
  - The Department of Parks and Wildlife’s Threatened and Priority Flora List database, which contains all rare and priority flora records, for the Pilbara bioregion and current as at 16 December 2015;
  - The Department of Parks and Wildlife’s Fauna Survey (threatened and priority fauna) database, which are records from the Department’s Threatened and Priority Fauna database and the Fauna Survey Returns System database), for the Pilbara bioregion and current as at 16 December 2015.
- Western Australian Museum – the Western Australian Museum’s collection database for mammals, birds, reptiles and amphibians, provided 8 January 2016.
- BirdLife Australia – an extract for all records of species that occur within the Pilbara was obtained from BirdLife Australia’s Atlas Database, provided 7 January 2016.

Additional data for selected vertebrate fauna species identified from the Pilbara were obtained from the following sources:
2.3.2 Analysis of Flora Data

A geodatabase of all conservation significant flora data was developed by merging the three datasets (BHPBIO corporate data, WAHerb’s specimen database and DPaW’s Threatened and Priority Flora List database) into one dataset. Species taxonomy was reviewed to ensure consistency of naming and that current taxonomy and conservation status was allocated. Duplicate records were identified (i.e. where the same species had been recorded in multiple datasets from the same location) and deleted. This included repeat sampling of a species from the same location (i.e. the same species recorded from the same location on multiple occasions, e.g. during monitoring).

This dataset was intersected with the Project Definition Boundary to determine the conservation significant species of interest (i.e. those species with records within the Project Definition Boundary). The remaining species were removed from the dataset. An impact analysis was then undertaken on the identified species of interest to determine the number of records for each species that occurred in the Pilbara area (defined by the 250k Geoscience Australia Mainland boundary and the bounding box of 115.08E 24.23S, 121.561E 19.787S (see Figure 3)) and within the footprints produced for each development scenario (described in Section 2.1).

The outputs were used to inform a qualitative assessment of the likely risk of cumulative impact from the Strategic Proposal, using specialist knowledge of each species’ ecology and distribution.

2.3.3 Analysis of Fauna Data

A geodatabase of all conservation significant vertebrate fauna data was developed by merging the four datasets (BHPBIO corporate data, DPaW’s Fauna Survey (threatened and priority fauna) database, the Western Australian Museum’s collection database for mammals, birds, reptiles and amphibians and Birdlife Australia’s Atlas database) into one dataset. Species taxonomy was reviewed to ensure consistency of naming and that current taxonomy (based on the WA Museum’s latest fauna checklist (Government of Western Australia, 2015)). Conservation status was allocated according to declared / gazetted species conservation status current as at February 2016 (see Section 2.2). Duplicate records were identified (i.e. where the same species had been recorded in multiple datasets from the same location) and deleted. This included repeat sampling of a species from the same location (i.e. the same species recorded from the same location on multiple occasions, e.g. during monitoring).

This dataset was intersected with the Project Definition Boundary to determine the conservation significant species of interest. The remaining species were removed from analysis. Additional records for these species of interest were obtained from the Atlas of Living Australia and DPaW and merged with the conservation significant fauna database.

An impact analysis was undertaken to determine the number of records for each species that occurred in the Pilbara area (defined by the 250k Geoscience Australia Mainland boundary and the bounding box of 115.08E 24.23S, 121.561E 19.787S (see Figure 3)) and within the footprints produced for each development scenario (described in Section 2.1).

There were a number of obviously erroneous records in the government supplied databases that were removed from the analysis as follows:

- Records for the southern giant petrel (*Macronectes giganteus*) in the vicinity of Weeli Wolli Creek are in fact records for the ghost bat (*Macroderma gigas*) recorded on behalf of BHP Billiton Iron Ore and appear to be a transcription error when loading data into the fauna returns database.
- Records for the crest-tailed mulgara (*Dasycercus cristicauda*) in the Pilbara are considered to belong to the brush-tailed mulgara (*D. blythi*) following a recent review by Woolley et al. (2013). Records of *D. cristicauda* within the Pilbara area, Strategic Assessment Boundary and development scenarios were merged with the *D. blythi* dataset.

- Records for the black-flanked rock-wallaby (*Petrogale lateralis lateralis*) approximately 10 km north of BHP Billiton Iron Ore’s tenure in the East Ophthalmia Range are from 1975. There are no records from the Ophthalmia Range despite more than 40 vertebrate fauna surveys having been undertaken in this area. These records are considered to either belong to the Rothschild’s rock wallaby (*Petrogale rothschildi*) which is commonly recorded in the region, or the black-flanked rock-wallabies located in this area are now locally extinct. No records for this species were identified in any of the development scenarios.

- There are two records for princess parrot (*Polytelis alexandrae*) within the southern boundary of the Fortescue Marsh. The source of these records is Birdlife Australia. There are no other records for princess parrot in the Pilbara with the nearest records being approximately 250 km to the south and 270 km to the east, which are aligned with this species documented distribution. This records were considered to be a mis-identification and were removed from the dataset.

- Records of the Lake Disappointment gecko (*Diplodactylus fulleri*) north-west of the Fortescue Marsh within the Fortescue River valley are considered to be incorrect, as this species is considered to be endemic to the Lake Disappointment area. These records are from the Fauna Licence Returns Database. There are no records for this species from the Fortescue Marsh area within the WA Museum database.

- Records of the unpatterned robust slider (*Lerista macropisthopus remota*) in the vicinity of BHP Billiton Iron Ore’s Mt Whaleback operations. These records were mis-identified by the Australian Museum and were later confirmed to be *Lerista neander* by Brad Maryan of the WA Museum. Feedback regarding these records has been provided to the DPaW.

The outputs were used to inform a qualitative assessment of the likely risk of cumulative impact from the Strategic Proposal, using specialist knowledge of each species’ ecology and distribution.

### 2.3.4 Selection of Species for Further Assessment

A nominal threshold has been used to screen those species with the highest risk of potential for impact from the proposed implementation of the Strategic Proposal. Whilst a number of national and state references denote 30% and 10% of original extent of vegetation as threshold threat levels (The National Objectives and Targets for Biodiversity conservation 2001-2005 report (Department of Environment and Heritage [DEH] 2001), EPA Position Statement No. 2 (EPA 2000), EPA Guidance Statement No. 10 (EPA 2006), Guide to the assessment of applications to clear native vegetation by the Department of Environment Regulation (DER 2014)), there is no similar consistent threshold applied at a species level.

For this assessment, flora ‘Species of Interest’ (i.e. those with the highest risk of potential impact (without mitigation) were considered to be those species where more than 10% of known West Australian records occur within the development scenario footprints. A more conservative level was set for fauna (than for flora) as many of these species are highly mobile or transient, so there is a higher potential for species that may occur in an area to not be recorded during field surveys. Fauna ‘Species of Interest’ were identified as those species where more than 5% of known West Australian records occur within the Project Definition Boundary.
Figure 3: Location of ‘Pilbara Area’ in relation to the Project Definition Boundary
3 Results and Discussion

3.1 Flora Impact Assessment

A total of 128 conservation significant flora species were identified within the Project Definition Boundary. These species, along with details of the total number of records within the combined databases, the total number of records with the ‘Pilbara Area’ (Figure 3) and the total number of records within the Project Definition Boundary are shown in Table 1. The risk of potential impacts to each species is determined by the number of West Australian records that fall within footprints under the 30% and Full Conceptual Development Scenarios (explained in Section 2.1). The number of records that fall within currently approved disturbance footprints are also shown (Existing Impact for BHP Billiton Iron Ore and Third Party columns in Table 1).

To determine flora species that have a higher potential to be impacted by the Strategic Proposal, the following criteria were applied to the 128 conservation-significant flora species occurring within the Project Definition Boundary.

- Known flora records potentially impacted by more than 10% from the development scenarios; or
- Known flora records that only occur within the Project Definition Boundary.

Note that due to the spatial extent of some of the data utilised for this project and a sampling bias from data collected by BHP Billiton Iron Ore, the proportion of records within development footprints is likely to be overestimated.

A total of 51 conservation significant flora species were considered to be species of interest for more detailed assessment in the PERSP (identified as a Species of Interest in Table 1). Of these, two were determined to have a higher risk of potential to be impacted by the Strategic Proposal. The potential impacts to these species and the likely significance of impacts are described in Table 1.

One species listed under the EPBC Act was identified by the analysis, *Lepidium catapycnon*, which has recently been delisted from the WC Act, and at a state level is considered a Priority 4 species. For the purposes of this document, *L. catapycnon* is considered a Priority 4 species. The species’ conservation significance at a national level is concurrently being assessed under the EPBC Act.
### Table 2: Species description and distribution for conservation-significant flora species within the Project Definition Boundary

<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td><strong>TIER 1 – Threatened Species</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Aluta quadrata</em></td>
<td>21</td>
<td>21</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td><em>Thryptomene wittweri</em></td>
<td>10</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

**General Note:**
- Records are sourced from Rio Tinto commissioned surveys, government databases, and on-ground surveys.
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios[^1]</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?[^2]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
</tr>
<tr>
<td><strong>TIER 2 – Priority Species</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Abutilon</em> sp. Pritzelianum (S. van Leeuwen 5095) DPaW Priority 1</td>
<td>55</td>
<td>48</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td><em>Acacia</em> sp. East Fortescue (J. Bull &amp; D. Roberts ONS A 27.01) DPaW Priority 1</td>
<td>97</td>
<td>97</td>
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<td><em>Barbula ehrenbergii</em> DPaW Priority 1</td>
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<td><em>Bothriochloa decipiens</em> var. <em>cloncurrensis</em> DPaW Priority 1</td>
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<td>Species (sorted as per highest conservation ranking)</td>
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<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?²</td>
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<td><strong>Pilbara Area</strong></td>
<td><strong>Project Definition Boundary</strong></td>
<td><strong>Existing</strong></td>
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<td><strong>Calotis squamigera</strong></td>
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<td><strong>Dicrastylis mitchellii</strong></td>
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<td><strong>Dipteracanthus chichesterensis</strong></td>
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¹ Number of records within conceptual development scenarios includes records from Existing, Reasonably foreseeable third party, 30% Conceptual and Full Conceptual development areas.

² Species of interest? refers to whether all WA records from within PDB and 25% of known WA records within 30% and FDS are of interest.
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?&lt;sup&gt;2&lt;/sup&gt;</th>
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<td><em>Eremophila appressa</em> DPaW Priority 1</td>
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<tr>
<td>Known from two locations in the Gascoyne (Augustus subregion) and Pilbara (Hamersley subregion) where it occurs on ridge slopes. Risk considered low.</td>
<td>No</td>
<td></td>
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<td></td>
<td>9</td>
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<td><em>Eremophila pilosa</em> DPaW Priority 1</td>
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<tr>
<td>Restricted to a small area in the Fortescue subregion of the Pilbara where it has been recorded growing on red-brown clays of sandy plains. Risk considered low.</td>
<td>Yes. All WA records from within PDB.</td>
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<td><em>Eremophila sp.</em> Hamersley Range (K. Walker KW 136) DPaW Priority 1</td>
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<tr>
<td>Restricted to the south-east Pilbara and extending into the northern fringe of the Gascoyne bioregion where it grows on open rocky slopes, gullies and rock faces associated with large hills and cliffs. Six records from the Pilbara with two occurring within the 30% Development Scenario and Full Conceptual Development Scenario. Risk considered moderate.</td>
<td>Yes. All WA records from within PDB and 33% of known WA records within 30% and FDS.</td>
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<td><em>Eremophila sp.</em> Jigalong (B. Buirchell BB 204) DPaW Priority 1</td>
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<tr>
<td>Restricted to the North-East Gascoyne (just outside boundary of the South-East Pilbara). Not within the Full Conceptual Development Scenario. Risk determined to be low.</td>
<td>Yes. All WA records from within PDB.</td>
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<td>1</td>
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<tr>
<td><em>Eremophila sp.</em> Snowy Mountain (S. van Leeuwen 3737) DPaW Priority 1</td>
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<tr>
<td>Restricted to one location on the southern fringe of the Pilbara bioregion where it was observed growing at the summit of a hill in skeletal soil. Not within the Full Conceptual Development Scenario. Risk determined to be low.</td>
<td>Yes. All WA records from within PDB.</td>
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<tr>
<td>Species (sorted as per highest conservation ranking)</td>
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<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?</td>
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<td><strong>Existing</strong></td>
<td><strong>Reasonably foreseeable third party</strong></td>
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<td><em>Eremophila sp. West Angelas (S. van Leeuwen 4068)</em> DPaW Priority 1</td>
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<td><em>Eremophila spongiocarpa</em> DPaW Priority 1</td>
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<td><em>Euphorbia inappendiculata var. queenslandica</em> DPaW Priority 1</td>
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<td><strong>Project Definition Boundary</strong></td>
<td><strong>Existing</strong></td>
<td><strong>Reasonably foreseeable third party</strong></td>
</tr>
</tbody>
</table>
| Goedenia pedicellata  
DPaW Priority 1                                                                                           | 4       | 4                                                        | 2            | 0                                      | 0                   | 0                   | Restricted to the Pilbara region, but known from two widely distributed populations. Habitat described as rocky slopes and crests of small hills. Risk considered low due to distance between populations and likely number of additional populations within this range. No records occur within the Full Conceptual Development Scenario footprints. | No |
| Helichrysum oligochaetum  
DPaW Priority 1                                                                                           | 11      | 11                                                      | 7            | 0                                      | 0                   | 0                   | Known from a number of populations within the Pilbara (Fortescue, Hamersley, Roebourne subregions) and Gascoyne (Ashburton subregion) bioregions. Occurs on depressions and floodplains in clay soils. Risk considered low. | No |
| Heliotropium muticum  
DPaW Priority 1                                                                                           | 272     | 272                                                     | 234          | 0                                      | 0                   | 0                   | Distributed from Port Hedland south into the central Pilbara. Previously recorded from a number of locations in the vicinity of BHP Billiton Iron Ore’s Mainline Rail. Risk considered low. | No |
| Hibiscus sp. Canga  
P.J.H. Hurter & J. Naaykens 11013  
DPaW Priority 1                                                                                           | 4       | 4                                                        | 4            | 0                                      | 0                   | 0                   | Restricted to the southern fringe of the Pilbara bioregion in the vicinity of Paraburdo, where it often grows in association with the Canga detrital formations. Not records within the Full Conceptual Development Scenario footprints. Risk determined to currently be low. It is noted that a large number of WA Hibiscus specimens are still over east and until they are returned the taxonomy of Hibiscus is problematic. | Yes. All WA records from within PDB. |
| Hibiscus sp. Mt Brockman (E. Thoma ET 1354)  
DPaW Priority 1                                                                                           | 5       | 5                                                        | 5            | 0                                      | 0                   | 0                   | Restricted to the central southern sector of the Pilbara bioregion in the vicinity of West Turner syncline where it occurs in sheltered or rocky drainage lines below cliff lines or rocky ridges. No records within the Full Conceptual Development Scenario footprints. Risk considered low. | Yes. All WA records from within PDB. |
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
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<th>Species of interest?</th>
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<td><strong>Josephinia sp. Marandoo (M.E. Trudgen 1554)</strong></td>
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<td><strong>Myriocephalus scalpellus</strong></td>
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<td><strong>Rhodanthe ascendens</strong></td>
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<td><strong>Rothia indica subsp. australis</strong></td>
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<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?²</td>
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<tr>
<td>Senna sp. Millstream (E. Leyland s.n. 30/8/1990)</td>
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<td>Stemodia sp. Battle Hill (A.L. Payne 1006)</td>
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<tr>
<td>Tecticornia globulifera</td>
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<td>Records</td>
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<td>Species of interest?²</td>
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<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
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<tr>
<td>Tecticornia sp. Christmas Creek (K.A. Shepherd &amp; T. Colmer et al. KS 1063) DPaW Priority 1</td>
<td>28</td>
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<td>Tephrosia rosea var. Port Hedland (A.S. George 1114) DPaW Priority 1</td>
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<td>984</td>
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### Flora and Vertebrate Fauna Screening Assessment

#### Records Table

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<tr>
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<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
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<tbody>
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<td>Pilbara Area</td>
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<td><strong>Triodia sp. Karijini</strong> (S. van Leeuwen 4111)</td>
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<td><strong>Vittadinia sp. Coondewanna Flats</strong> (S. van Leeuwen 4684)</td>
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<tr>
<td>DPaW Priority 1</td>
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<td><strong>Adiantum capillus-veneris</strong></td>
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## Flora and Vertebrate Fauna Screening Assessment

### Table of Species (sorted as per highest conservation ranking)

<table>
<thead>
<tr>
<th>Species</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?</th>
</tr>
</thead>
</table>
| **Aristida lazaridis**  
DPaW Priority 2 | 203  | 203  | 1  | 0  | 68  | 83  | Occurs in the Pilbara and Kimberly regions of Western Australia and in the Northern Territory and Queensland. Recorded from a number of locations within BHP Billiton Iron Ore’s Area C, Tandanya and Mudlark tenements in the Central Pilbara and 5 km north of Newman. This species is also known to occur in Karijini National Park. In one of these locations it was the dominant ground cover. Apparently confined to sandy or loamy soils. A number of records occur within the 30% and Full Conceptual Development Scenario footprints (all restricted to BHP Billiton Iron Ore tenure), but this is likely an artefact of sampling. Risk considered low due to extent of distribution and presence within Karijini National Park. | Yes. All WA records from within PDB, 33% of known WA records within 30%, and 41% of known WA records within FDS. |
| **Cladium procerum**  
DPaW Priority 2 | 12  | 11  | 7  | 0  | 0  | 0  | Commonly recorded along the coastline of the NT, Queensland, NSW, Victoria and South Australia. Within WA it is restricted to the Pilbara region. No records within the Full Conceptual Development Scenario footprints. Risk considered low. | No |
| **Dicladanthera glabra**  
DPaW Priority 2 | 11  | 11  | 11 | 0  | 0  | 0  | Recorded from only a small area in the Hamersley and Fortescue subregions of the Pilbara. Occurs in alluvium soils along watercourses and near rock pools. No records from the Full Conceptual Development Scenario footprints; however all currently known records are restricted to the Project Definition Boundary. Risk considered low. | Yes. All WA records from within PDB. |
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios¹</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
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<td><strong>Eremophila forrestii</strong> subsp. Pingandy (M.E. Trudgen 2662) DPaW Priority 2</td>
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<td>Pilbara Area</td>
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Occurs commonly across the NT, Queensland and north-eastern South Australia. Recorded from four locations in WA; at BHP Billiton Iron Ore’s Dynasty and Yandi tenements, along a rail line near Karratha, and in the far northeast near Wyndham. Usually recorded on raised banks within major drainage channels of streams or rivers. A single record from within the Full Conceptual Development Scenario footprints. Risk considered low.

Yes. 44% of known WA records within 30% and 50% of known WA records within FDS.

Previously recorded from around BHP Billiton Iron Ore’s Yandi, Marillana and Jinidi tenements and extending east to Newman where it is common in the Ophthalmia Range. It is also known from the Tanami Desert. It’s a short-lived colonising species that is rapidly outcompeted. Large proportion of records within the Full Conceptual Development Scenario footprints, which likely reflects sampling bias given distribution of records. Risk considered moderate.

Yes. 13% of known WA records within 30% and 53% of known WA records within FDS.
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?</th>
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<tbody>
<tr>
<td><strong>Total WA, Pilbara Area, Project Definition Boundary</strong></td>
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<tr>
<td><strong>Existing</strong></td>
<td><strong>Reasonably foreseeable third party</strong></td>
<td><strong>30% Conceptual</strong></td>
<td><strong>Full Conceptual</strong></td>
<td></td>
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</tbody>
</table>
| **Paspalidium retiglume**  
DPaW Priority 2 | 10 | 9 | 2 | 0 | 0 | 0 | 0 | Distributed across northern Australia in WA, the NT and QLD. Several records in WA, mainly from the Chichester subregion of the Pilbara, but also recorded near Halls Creek in the Central Kimberley. No records from BHP Billiton Iron Ore tenure, and no impact in the Full Conceptual Development Scenario. Risk considered low. | No |
| **Pentalepis trichodesmoides subsp. hispida**  
DPaW Priority 2 | 7 | 7 | 3 | 0 | 0 | 0 | 0 | Restricted to the Chichester, Hamersley and Roeborune subregions of the Pilbara where it has been recorded from six localities. No records in the Full Conceptual Development Scenario. Risk considered low. | No |
| **Scaevola sp.**  
Hamersley Range basalts (S. van Leeuwen 3675)  
DPaW Priority 2 | 23 | 23 | 23 | 0 | 0 | 0 | 4 | Restricted to the Central Pilbara. Not previously recorded from BHP Billiton Iron Ore tenure during baseline surveys, but four records within third party tenure occur within the Full Conceptual Development Scenario. Risk considered low. | Yes. All WA records from within PDB and 17% of known WA records within FDS. |
| **Stylidium weeliwolli**  
DPaW Priority 2 | 307 | 299 | 292 | 0 | 2 | 3 | 3 | Occurs widely across the Pilbara and Gascoyne regions of WA. Prefers gritty sand soil and sandy clay on the edges of watercourses. Two records in the Full Conceptual Development Scenario, however given the high number of records in the Pilbara and Gascoyne, the risk is considered low. | No |
<table>
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<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios¹</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?²</th>
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<tr>
<td><strong>Acacia daweana</strong> DPaW Priority 3</td>
<td>18</td>
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<td><strong>Acacia glaucocaesia</strong> DPaW Priority 3</td>
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<td><strong>Acacia levata</strong> DPaW Priority 3</td>
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<td>Records</td>
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<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?²</td>
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<tr>
<td><strong>Acacia subtiliformis</strong> DPaW Priority 3</td>
<td>645</td>
<td>645</td>
<td>Recorded extensively between Newman and Karijini National Park, a range of approximately 120 km east-west and 90 km north-south. Habitat specific occurring on rocky calcite low hills and plains. Known from BHP Billiton Iron Ore’s Yandi and Jinidi tenements, and occurring extensively on calcite plains bordering Weeli Wolli Creek. A number of records occur within the 30% and Full Conceptual Development Scenario footprints. Impact considered low.</td>
<td>Yes. All WA records from within PDB and 14% of known WA records within FDS.</td>
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<tr>
<td><strong>Amaranthus centralis</strong> DPaW Priority 3</td>
<td>6</td>
<td>4</td>
<td>Commonly occurs in southern Northern Territory, and from the Everard Ranges near Lake Eyre south to the Flinders Ranges in northern South Australia. There are two collections from western Queensland, and two records from the Pilbara region of Western Australia. In WA, it occurs along Marillana Creek adjacent to BHP Billiton Iron Ore’s Yandi Mine. No records within the Full Conceptual Development Scenario footprints. Risk considered low.</td>
<td>No</td>
</tr>
<tr>
<td><strong>Ampelopteris prolifera</strong> DPaW Priority 3</td>
<td>5</td>
<td>3</td>
<td>Occurs in northern WA in the Gascoyne, Northern Kimberley and Pilbara regions. Prefers to grow near water or in wet ground. No records in the Full Conceptual Development Scenario. Risk considered low.</td>
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<td>Species (sorted as per highest conservation ranking)</td>
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<td>Aristida jerichoensis var. subspinulifera DPaW Priority 3</td>
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<td>Astrebla lappacea DPaW Priority 3</td>
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<td>Species of interest?</td>
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<td>Crotalaria smithiana DPaW Priority 3</td>
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<td>Dampiera metallorum DPaW Priority 3</td>
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<td>Eleocharis papillosa DPaW Priority 3</td>
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<td><strong>Fimbristylis sieberiana</strong> DPaW Priority 3</td>
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<td><strong>Geijera salicifolia</strong> DPaW Priority 3</td>
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## Flora and Vertebrate Fauna Screening Assessment

<table>
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<th>Species (sorted as per highest conservation ranking)</th>
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<th>Number of records within conceptual development scenarios</th>
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<th>Species of interest?[^2]</th>
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<td>Glycine falcate DPaW Priority 3</td>
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<tr>
<td>Goodenia lyrata DPaW Priority 3</td>
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<td>26</td>
<td>26</td>
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<tr>
<td>Goodenia purpurascens DPaW Priority 3</td>
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[^2]: Yes = Species of interest
<table>
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<td>Total WA</td>
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<td>Goodenia sp. East Pilbara (A.A. Mitchell PRP 727) DPaW Priority 3</td>
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<td>Grevillea saxicola DPaW Priority 3</td>
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<td>Gymnanthera cunninghamii DPaW Priority 3</td>
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<td>74</td>
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<td>Heliotropium murinum DPaW Priority 3</td>
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### Flora and Vertebrate Fauna Screening Assessment

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<td><em>Indigofera gilesii</em> DPaW Priority 3</td>
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<td>152</td>
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<td><em>Indigofera sp.</em> Bungaroo Creek (S. van Leeuwen 4301) DPaW Priority 3</td>
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<td>44</td>
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<td><em>Iotasperma sessilifolium</em> DPaW Priority 3</td>
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<td><em>Maireana prosthecocochaeta</em> DPaW Priority 3</td>
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<td>Nicotiana umbratica</td>
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<td>Oldenlandia sp.</td>
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<td>Hamersley Station (A.A. Mitchell PRP 1479)</td>
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<td>Olearia mucronata</td>
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<td>Pilbara trudgenii</td>
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<td><strong>Existing</strong></td>
<td><strong>Reasonably foreseeable third party</strong></td>
</tr>
</tbody>
</table>
| *Polymeria distigma*  
DPaW Priority 3 | 18 | 4 | 3 | 0 | 0 | 0 | 0 | Mostly distributed in WA with a few records from the NT and NSW. In WA, occurs across the north in the Pilbara, Dampierland, Great Sandy Desert and the Ord Victoria Plain regions. Prefers sandy soils. No records within the Full Conceptual Development Scenario footprints. Risk considered low. | No |
| *Pterocaunon xenicum*  
DPaW Priority 3 | 7 | 3 | 1 | 0 | 0 | 0 | 0 | Restricted to WA, occurring mostly in the Great Sandy Desert and the Ord Victoria Plain, with a few records from the very north-eastern fringes of the Pilbara region. No records within the Full Conceptual Development Scenario footprints. Risk considered low. | No |
| *Ptilotus subspinescens*  
DPaW Priority 3 | 47 | 47 | 42 | 0 | 0 | 0 | 0 | Restricted to the eastern edge of the Hamersley region of the Pilbara, near BHP Billiton Iron Ore’s Rocklea tenement. Prefers gentle rocky slopes, scree and the bases of scree. No records within the Full Conceptual Development Scenario footprints. Risk considered low. | No |
| *Rhagodia sp.*  
*Hamersley (M. Trudgen 17794)*  
DPaW Priority 3 | 1309 | 1309 | 1309 | 7 | 9 | 209 | 405 | Recorded extensively over floodplains in western parts of Mining Area C, extending to Tandaya, Mudlark, South Flank and Jinidi tenements, all held by BHP Billiton Iron Ore. Also recorded around Newman and extending east to Jimblebar. Widely distributed taxon associated with mulga on floodplains. Few records occur within Karijini National Park, but additional records likely with additional survey work. Risk considered low to moderate. | Yes. All WA records from within PDB, 16% of known WA records within 30% and 31% of known WA records within FDS. |
<table>
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<tr>
<th>Species (sorted as per highest conservation ranking)</th>
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<td><strong>Rostellularia adscendens var. latifolia</strong> DPaW Priority 3</td>
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<td><strong>Sida sp. Barlee Range (S. van Leeuwen 1642)</strong> DPaW Priority 3</td>
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<td><strong>Whiteochloa capillipes</strong> DPaW Priority 3</td>
<td>6</td>
<td>3</td>
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</tr>
<tr>
<td></td>
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</tr>
<tr>
<td><strong>Xanthoparmelia nashi</strong> DPaW Priority 3</td>
<td>12</td>
<td>2</td>
<td>2</td>
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</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acacia bromilowiana</strong> DPaW Priority 4</td>
<td>63</td>
<td>63</td>
<td>57</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

¹ Number of records within conceptual development scenarios includes existing records, reasonably foreseeable third party records, 30% Conceptual Scenario records, and Full Conceptual Scenario records.

² Presence or absence of the species as of the latest data available.
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td>Bulbostylis burdigeae</td>
<td>113</td>
<td>113</td>
<td>94</td>
<td>5</td>
</tr>
<tr>
<td>DPaW Priority 4</td>
<td>548</td>
<td>548</td>
<td>547</td>
<td>26</td>
</tr>
<tr>
<td>Eremophila youngii subspp. lepidota</td>
<td>467</td>
<td>461</td>
<td>460</td>
<td>0</td>
</tr>
<tr>
<td>Species (sorted as per highest conservation ranking)</td>
<td>Records</td>
<td>Number of records within conceptual development scenarios</td>
<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?</td>
</tr>
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</tr>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td>Goodenia berringbinensis</td>
<td>26</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>DPaW Priority 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goodenia nuda</td>
<td>555</td>
<td>553</td>
<td>443</td>
<td>25</td>
</tr>
<tr>
<td>Species (sorted as per highest conservation ranking)</td>
<td>Records</td>
<td>Number of records within conceptual development scenarios</td>
<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?</td>
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<td>---------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Existent</td>
<td>Reasonably foreseeable third party</td>
<td>30% Conceptual</td>
</tr>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td></td>
</tr>
</tbody>
</table>
| Lepidium catapycnon  
DPaW Priority 4 | 1108 | 1108 | 1102 | 25 | 5 | 29 | 170 | Broadly distributed between the Pilbara towns of Newman, Nullagine and Wittenoom. The total area of extent approximates 21,736 km² with eight known populations occurring within Karijini National Park. Increasing numbers of populations of *Lepidium catapycnon* have been recorded on BHP Billiton Iron Ore tenure, including Newman, Mining Area C, South Flank, Jinidi, Yandi, Marillana, and Mindy. At a state level, the conservation ranking for *Lepidium catapycnon* has recently been downgraded from Threatened (under the WC Act) to Priority 4 in response to the increasing frequency at which this taxon is being found. It is regarded as being relatively common across the southeast Pilbara region and well represented within Karijini National Park. Risk considered low. | Yes. 15% of known WA records within FDS. |
| Ptilotus mollis  
DPaW Priority 4 | 63 | 62 | 29 | 0 | 0 | 0 | 5 | Extensive distribution throughout the Pilbara bioregion, and also recorded from Rudall River National Park. A small population of 59 plants has been recorded from three points on the north-east slopes of Mt Robinson within BHP Billiton Iron Ore’s South Flank tenement. Risk considered low. | No |
| Ptilotus trichocephalus  
DPaW Priority 4 | 21 | 18 | 13 | 0 | 0 | 0 | 0 | Restricted to the northern Gascoyne and southern Pilbara regions of WA. Prefers sandy soils in colluvial plains. Not recorded on BHPBHIO tenements, and no records in the Full Conceptual Development Scenario. Risk considered low. | No |
| Rhynchosia bungarensis  
DPaW Priority 4 | 116 | 113 | 42 | 0 | 2 | 2 | 2 | Occurs in northwest WA in the Carnarvon, Gascoyne and Pilbara regions. Prefers pebbly, shingly coarse sand amongst boulders on banks of flow lines in the mouths of gullies. A small number of records within the Full Conceptual Development Scenario footprints (3rd party): Risk considered low. | No |
1. Development Scenarios:
   - Existing Development Scenario includes existing BHP Billiton Iron Ore and third party developments.
   - Reasonably foreseeable third party includes future approved or proposed third party developments and does not include existing developments.
   - 30% Conceptual Development Scenario includes existing development, reasonably foreseeable third party developments and BHP Billiton Iron Ore’s 30% Conceptual Development Scenario.
   - Full Conceptual Development Scenario includes existing development, reasonably foreseeable third party developments and BHP Billiton Iron Ore’s Full conceptual Development Scenario.

2. Species of interest are those species that are either:
   - All known Western Australia records are from within the Project Definition Boundary; or
   - More than 10% of known records occur within the 30% or Full Conceptual Development Scenario footprints.
3.2 Fauna Impact Assessment

A total of 50 conservation significant vertebrate fauna species were identified within the Project Definition Boundary. These species, along with details of the total number of records in West Australia within the combined databases, the total number of records within the Pilbara Area and the total number of records within the Project Definition Boundary are shown in Table 2. The risk of potential impact to each species was determined by the number of West Australian records that fall within footprints under the 30% and Full Conceptual Development Scenarios (explained in Section 2.1). The number of records that fall within currently approved disturbance footprints are also shown (Existing Impact for BHP Billiton Iron Ore and Third Party columns in Table 1). Based on these known occurrences, a qualitative assessment was utilised to determine the potential level of risk of impact as low, moderate or high.

A total of 16 conservation significant vertebrate fauna species were considered to be Species of Interest. Note that due to the spatial extent of some of the data utilised for this project and a sampling bias from data collected by BHP Billiton Iron Ore, the proportion of records within development footprints is likely to be overestimated.
### Table 2: Species description and distribution for conservation-significant fauna species within the Project Definition Boundary

<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td><strong>TIER 1</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Curlew sandpiper <em>Calidris ferruginea</em></td>
<td>53,088</td>
<td>104</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Northern quoll <em>Dasyurus hallucatus</em></td>
<td>3,638</td>
<td>1,605</td>
<td>403</td>
<td>13</td>
</tr>
</tbody>
</table>

**Notes:**
- Consistent with the convention of EPBC Act and WC Act, the species are ranked in order of conservation significance.
- The species are listed within the table sorted as per their highest conservation ranking.
- The number of records within conceptual development scenarios includes records from existing and reasonably foreseeable third party areas.
- The risk of significance of impact from the 30% and/or full conceptual development scenarios is assessed based on the EPBC Act and WC Act criteria.
- Species are assessed as being of interest if they meet the criteria outlined in the EPBC Act and WC Act, or if there is significant decline in their populations within the Pilbara region.
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios¹</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td>Night parrot Pezoporus occidentalis</td>
<td>59</td>
<td>9</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Australian painted snipe Rostratula benghalensis australis</td>
<td>1,847</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Pilbara olive python Liasis olivaceus barroni</td>
<td>187</td>
<td>185</td>
<td>117</td>
<td>4</td>
</tr>
<tr>
<td>Species (sorted as per highest conservation ranking)</td>
<td>Records</td>
<td>Number of records within conceptual development scenarios</td>
<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?[^2]</td>
</tr>
<tr>
<td>---</td>
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</tr>
</tbody>
</table>
| **Greater bilby** *Macrotis lagotis***
EPBC Act: Vulnerable
WC Act: Schedule 3 Vulnerable
IUCN Vulnerable | 2,522 251 131 3 0 3 3 | | Once widespread across semi-arid Australia but now reduced to scattered populations. Still has a relatively widespread distribution, with the majority or records located in the NT. In WA, populations occur across the state but are concentrated in the southwest. Inhabit areas of high rainfall and high temperatures with suitable burrowing habitat such as dunes. As the majority of records occur outside the Pilbara and only two occur in the Full Conceptual Development Scenario, the cumulative risk to this species is considered to be low. | Yes. 5% of known WA records within PDS. |
| **Black-flanked rock-wallaby** *Petrogale lateralis lateralis***
EPBC Act Vulnerable
WC Act: Schedule 2 Endangered
IUCN Near Threatened | 153 13 3 0 0 0 0 | | Recorded from scattered records across central Australia, mostly from southern NT and northern SA. In WA, records span across the state. Can use a variety of habitats but prefers feeding on grass in close proximity to cliffs or rock piles. Given the limited numbers in the Pilbara and zero records in the Full Conceptual Development Scenario, the risk is considered to be very low. | No |
| **Princess parrot** *Polytelis alexandrae***
EPBC Act Vulnerable
DPaW Priority 4
IUCN Near Threatened | 147 2 2 0 0 0 0 | | Widely distributed across central Australia in western NT, western SA and most of inland and eastern WA. Inhabits sand dunes and sand flats in open savanna woodlands and shrub-lands. As the majority of records are outside the Pilbara and there are no records in the Full Conceptual Development Scenario, the risk to this species is considered very low. | No |
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td>Pilbara leaf-nosed bat</td>
<td>389</td>
<td>347</td>
<td>117</td>
<td>0</td>
</tr>
<tr>
<td>Rhinonicteris aurantia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPBC Act: Vulnerable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WC Act: Schedule 3 Vulnerable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grey falcon</td>
<td>1,981</td>
<td>94</td>
<td>58</td>
<td>0</td>
</tr>
<tr>
<td>Falco hypoleucos</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WC Act: Schedule 3 Vulnerable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ghost bat</td>
<td>1,821</td>
<td>997</td>
<td>507</td>
<td>35</td>
</tr>
<tr>
<td>Macroderma gigas</td>
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<tr>
<td>WC Act: Schedule 3 Vulnerable</td>
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</tr>
<tr>
<td>Species (sorted as per highest conservation ranking)</td>
<td>Records</td>
<td>Number of records within conceptual development scenarios¹</td>
<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?²</td>
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</tr>
<tr>
<td></td>
<td>Total</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td>Northern brushtail possum</td>
<td>2,197</td>
<td>214</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td><em>Trichosurus vulpecula arnhemensis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WC Act: Schedule 3 Vulnerable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peregrine falcon <em>Falco peregrinus</em></td>
<td>31,292</td>
<td>207</td>
<td>124</td>
<td>0</td>
</tr>
<tr>
<td>WC Act: Schedule 7 Other Specially Protected</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Pilbara flat-headed blind-snake <em>Anilios ganei</em></td>
<td>85</td>
<td>84</td>
<td>68</td>
<td>4</td>
</tr>
<tr>
<td>DPaW Priority 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black-lined ctenotus <em>Ctenotus nigrilineatus</em></td>
<td>62</td>
<td>57</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>DPaW Priority 1</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

¹: Number of records within conceptual development scenarios:
- **Total** - Total number of records in all scenarios.
- **Pilbara Area** - Number of records within the Pilbara area.
- **Project Definition Boundary** - Number of records within the project definition boundary.
- **Existing** - Number of records existing.
- **Reasonably Foreseeable Third Party** - Number of records reasonably foreseeable by third parties.
- **30% Conceptual** - Number of records in the 30% conceptual development scenario.
- **Full Conceptual** - Number of records in the full conceptual development scenario.

²: Species of interest: Yes or No.
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Northern coastal free-tailed bat</strong></td>
<td>95</td>
<td>41 1 0 0 0 0 0</td>
<td>Occurs only along the coastline of northern Western Australia and the Northern Territory in mangroves and rainforest. As this species does not occur inland, risks from cumulative impacts of mining are considered to be very low.</td>
<td>No</td>
</tr>
<tr>
<td><em>Ozimops cobourganus</em></td>
<td></td>
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<tr>
<td>DPaw Priority 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spotted ctenotus</strong></td>
<td>45</td>
<td>22 17 0 0 0 0 0</td>
<td>Distributed across the northwest of WA. Specimens occurring in the Pilbara may be grouped with <em>Ctenotus uber johnstonei</em>, or they may belong to a currently undescribed taxon, in which case they would have no official conservation status. As a precautionary approach, the Pilbara taxon is treated as the Priority 2 subspecies. Habitat is mapped as stony plain and mulga. No records in the Full Conceptual Development Scenario. Risk considered low.</td>
<td>Yes. 37% of known WA records within PDS.</td>
</tr>
<tr>
<td><em>Ctenotus uber johnstonei</em></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>DPaw Priority 2</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Pilbara barking gecko</strong></td>
<td>30</td>
<td>27 26 0 0 1 5</td>
<td>A relatively newly described (2011) restricted-range species occurring at mid-elevations in the Hamersley Ranges. Known from two separate areas approximately 175 km apart (Biologic 2014). It is unknown whether its distribution is continuous between these areas, or if it occurs as a series of isolated populations. There will be an impact under the 30 percent Development and Full Conceptual Development Scenarios.</td>
<td>Yes. 86% of known WA records within PDS.</td>
</tr>
<tr>
<td><em>Underwoodisaurus seorsus</em></td>
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<tr>
<td>DPaw Priority 2</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Spectacled hare-wallaby</strong></td>
<td>92</td>
<td>48 10 0 0 0 0</td>
<td>Historically occupied nearly all of the northern half of Australia, but now occurs only patchily from the Pilbara in WA across the Northern Territory and into Queensland. Inhabits tropical grasslands and seeks shelter in spinifex hummock during the day. Occurs over a wide (if scattered) area with no records in the Full Conceptual Development Scenario, so determined to be at low risk.</td>
<td>Yes. 11% of known WA records within PDS.</td>
</tr>
<tr>
<td><em>Lagorchestes conspicillatus leichhardtii</em></td>
<td></td>
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</tr>
<tr>
<td>Species (sorted as per highest conservation ranking)</td>
<td>Records</td>
<td>Number of records within conceptual development scenarios¹</td>
<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?²</td>
</tr>
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<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td>Brush-tailed Mulgara <em>Dasycercus blythi</em> DPaW Priority 4</td>
<td>2,534</td>
<td>686</td>
<td>362</td>
<td>1</td>
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<tr>
<td>Letter-winged kite <em>Elanus scriptus</em> DPaW Priority 4 IUCN Near Threatened</td>
<td>1,422</td>
<td>9</td>
<td>2</td>
<td>0</td>
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</tr>
<tr>
<td>Short-tailed mouse <em>Leggadina lakedownensis</em> DPaW Priority 4</td>
<td>659</td>
<td>158</td>
<td>51</td>
<td>2</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Fortescue grunter <em>Leiopotherapon aheneus</em> DPaW Priority 4 IUCN Near Threatened</td>
<td>45</td>
<td>35</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

1. Number of records within conceptual development scenarios:
   - Total WA
   - Pilbara Area
   - Project Definition Boundary
   - Existing
   - Reasonably Foreseeable Third Party
   - 30% Conceptual
   - Full Conceptual

2. Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios:
   - Yes
   - No

Notes:
- Distributed widely across central and inland Australia including WA, the NT and SA. Exact ranges are difficult to determine due to past nomenclature confusion with *D. cristicauda* and *D. hillieri*, which were synonymised and then subsequently split (Woinarski 2014). Inhabits spinifex grasslands. Occurs over a wide area with relatively few records in the Full Conceptual Development Scenario, so risk therefore determined to be low.

- Occurs in inland arid regions of Australia. Prefers open country and grassland. As the majority of records are outside the Pilbara and there are no records in the Full Conceptual Development Scenario, the risk to this species is considered low.

- Has a restricted distribution within the Pilbara and is only known from the Fortescue, Robe and Ashburton river systems. Considered reasonably common within this range, inhabiting clear freshwater streams and pools over sandy and rocky bottoms. Due to the high likelihood of additional records of this species occurring within its range and no records in the Full Conceptual Development Scenario, the risk is
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios¹</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td>Lined soil-crevice skink <em>Notoscincus butleri</em> DPaW Priority 4</td>
<td>144</td>
<td>124</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Western pebble-mound mouse <em>Pseudomys chapmani</em> DPaW Priority 4</td>
<td>3,523</td>
<td>3,396</td>
<td>2,967</td>
<td>194</td>
</tr>
<tr>
<td>Long-tailed dunnart <em>Sminthopsis longicaudata</em> DPaW Priority 4</td>
<td>160</td>
<td>36</td>
<td>14</td>
<td>2</td>
</tr>
</tbody>
</table>

**EPBC Act Migratory**

<p>| Garganey <em>Anas querquedula</em> EPBC Act Migratory WC Act: Schedule 5 Migratory | 147 | 1 | 1 | 0 | 0 | 0 | 0 | Occurs sparsely across most of Australia (excluding SA) with the majority of records occurring in inland waterways of Victoria. Breeds in Western Eurasia then winters in Australia from October to February. Prefers large freshwater or brackish lakes. As the vast majority of records occur outside the Pilbara and there are no records in the Full Conceptual Development Scenario, the risk is considered to be low. | No |</p>
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios¹</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total WA</strong></td>
<td><strong>Pilbara Area</strong></td>
<td><strong>Project Definition Boundary</strong></td>
<td><strong>Existing</strong></td>
<td><strong>Reasonably Foreseeable Third Party</strong></td>
</tr>
<tr>
<td>Fork-tailed Swift</td>
<td>Apus pacificus</td>
<td><strong>EPBC Act Migratory</strong></td>
<td><strong>WC Act: Schedule 5 Migratory</strong></td>
<td>6,469</td>
</tr>
<tr>
<td>Cattle Egret</td>
<td>Ardea ibis</td>
<td><strong>EPBC Act Migratory</strong></td>
<td><strong>WC Act: Schedule 5 Migratory</strong></td>
<td>98,552</td>
</tr>
<tr>
<td>Eastern Great Egret</td>
<td>Ardea modesta</td>
<td><strong>EPBC Act Migratory</strong></td>
<td><strong>WC Act: Schedule 5 Migratory</strong></td>
<td>139,992</td>
</tr>
<tr>
<td>Species (sorted as per highest conservation ranking)</td>
<td>Records</td>
<td>Number of records within conceptual development scenarios</td>
<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td>Sharp-tailed Sandpiper <strong>Calidris acuminate</strong> EPBC Act Migratory WC Act: Schedule 5 Migratory</td>
<td>56,811</td>
<td>140</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Pectoral Sandpiper <strong>Calidris melanotos</strong> EPBC Act Migratory WC Act: Schedule 5 Migratory</td>
<td>3,619</td>
<td>13</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Red-necked Stint <strong>Calidris ruficollis</strong> EPBC Act Migratory WC Act: Schedule 5 Migratory</td>
<td>154,107</td>
<td>284</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Long-toed Stint <strong>Calidris subminuta</strong> EPBC Act Migratory WC Act: Schedule 5 Migratory</td>
<td>1,638</td>
<td>26</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Species (sorted as per highest conservation ranking)</td>
<td>Records</td>
<td>Number of records within conceptual development scenarios¹</td>
<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?²</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>---------</td>
<td>-------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td>5 Migratory</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little Ringed Plover <em>Charadrius dubius</em>  EPBC Act Migratory WC Act: Schedule 5 Migratory</td>
<td>382</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Oriental Plover <em>Charadrius veredus</em>  EPBC Act Migratory WC Act: Schedule 5 Migratory</td>
<td>1,614</td>
<td>30</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Gull-billed Tern <em>Gelochelidon nilotica</em> EPBC Act Migratory WC Act: Schedule 5 Migratory</td>
<td>15,038</td>
<td>175</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Species (sorted as per highest conservation ranking)</td>
<td>Records</td>
<td>Number of records within conceptual development scenarios</td>
<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td><strong>Oriental Pratincole</strong>&lt;br&gt; <em>Glareola maldivarum</em>&lt;br&gt; EPBC Act Migratory&lt;br&gt; WC Act: Schedule 5 Migratory</td>
<td>1,070</td>
<td>76 4 2 0 2 2</td>
<td>With a total population estimated at 2.88 million, this species is widespread in northern Australia, especially along the coast of the Pilbara, the Kimberley and the Top End. Breeds in south-east Asia and winters in Australia. No internationally important sites occur in the Pilbara, however two occur nearby in Dampierland, namely 80 Mile Beach and Roebuck Bay. As the vast majority of the population occurs outside the Pilbara the risk to this species is considered low.</td>
<td>No</td>
</tr>
<tr>
<td><strong>Barn Swallow</strong>&lt;br&gt; <em>Hirundo rustica</em>&lt;br&gt; EPBC Act Migratory&lt;br&gt; WC Act: Schedule 5 Migratory</td>
<td>689</td>
<td>45 1 0 0 0 0</td>
<td>Total population estimated at 190 million. Breeds in North America, Europe, northern Africa and Asia and migrates to northern Australia to winter. Recorded in Australia along the northern third of the continent including inland around freshwater wetlands. Highly adaptable to differing habitats, preferring a good supply of artificial structures for nesting and perching. The risk to this species is considered negligible.</td>
<td>No</td>
</tr>
<tr>
<td><strong>Black-tailed Godwit</strong>&lt;br&gt; <em>Limosa limosa</em>&lt;br&gt; EPBC Act Migratory&lt;br&gt; WC Act: Schedule 5 Migratory&lt;br&gt; IUCN Near Threatened</td>
<td>9,428</td>
<td>50 4 0 0 0 0</td>
<td>Recorded in all states and territories of Australia, however prefers coastal regions. The largest populations in Australia occur in the Top End of the NT. Breeds in the far north areas of the world such as Iceland, northern Scandanavia, and Siberia, and then winters in Asia and Australia. Total population estimated at 1.3 million, with 160,000 occurring in Australia. No internationally important sites occur in the Pilbara. This species is considered at very low risk.</td>
<td>No</td>
</tr>
<tr>
<td>Species (sorted as per highest conservation ranking)</td>
<td>Records</td>
<td>Number of records within conceptual development scenarios(^1)</td>
<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?(^2)</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>---------</td>
<td>-------------------------------------------------</td>
<td>------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Rainbow Bee-eater <em>Merops ornatus</em> EPBC Act Migratory WC Act: Schedule 5 Migratory</td>
<td>150,915</td>
<td>2,624</td>
<td>1,027</td>
<td>18</td>
</tr>
<tr>
<td>Eastern Osprey or Osprey <em>Pandion haliaetus</em> EPBC Act Migratory WC Act: Schedule 5 Migratory</td>
<td>14,542</td>
<td>380</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Ruff <em>Philomachus pugnax</em> EPBC Act Migratory WC Act: Schedule 5 Migratory</td>
<td>588</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Species (sorted as per highest conservation ranking)</td>
<td>Records</td>
<td>Number of records within conceptual development scenarios</td>
<td>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</td>
<td>Species of interest?</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>WA</strong></td>
<td><strong>Pilbara Area</strong></td>
<td><strong>Project Definition Boundary</strong></td>
<td><strong>Existing</strong></td>
</tr>
<tr>
<td><strong>Glossy Ibis</strong> <em>Plegadis falcinellus</em></td>
<td>23,493</td>
<td>58</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td><strong>Little Tern</strong> <em>Sternula albifrons</em></td>
<td>20,667</td>
<td>101</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td><strong>Wood Sandpiper</strong> <em>Tringa glareola</em></td>
<td>8,160</td>
<td>137</td>
<td>31</td>
<td>1</td>
</tr>
</tbody>
</table>

1. Existing records include records from existing (existing) and reasonably foreseeable third party (existing).

2. Risk of significance of impact from the 30% and/or Full Conceptual Development Scenarios.
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
</tr>
<tr>
<td>Common Sandpiper <em>Tringa hypoleucos</em></td>
<td>9,303</td>
<td>167</td>
<td>15</td>
</tr>
<tr>
<td>EPBC Act Migratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WC Act: Schedule 5 Migratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>42,394</td>
<td>314</td>
<td>21</td>
</tr>
<tr>
<td>Common Greenshank <em>Tringa nebularia</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPBC Act Migratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WC Act: Schedule 5 Migratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marsh Sandpiper <em>Tringa stagnatilis</em></td>
<td>16,355</td>
<td>94</td>
<td>3</td>
</tr>
<tr>
<td>EPBC Act Migratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WC Act: Schedule 5 Migratory</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Common Sandpiper

*Tringa hypoleucos*

EPBC Act Migratory

WC Act: Schedule 5 Migratory

9,303 167 15 2 0 2 5 Occurs worldwide, breeding in northern Europe and Asia and then migrating to Africa, southern Asia and Australia. Recorded along all coastlines of Australia and in many inland areas as well, but concentrated in the north-west where it is widespread in small numbers. Total world population of 2.5 to 4 million individuals, with approximately 3,000 occurring in Australia. No internationally important sites in WA. As a common and highly mobile species, the risk from mining is considered low.

Common Greenshank

*Tringa nebularia*

EPBC Act Migratory

WC Act: Schedule 5 Migratory

42,394 314 21 3 0 3 4 Broad worldwide distribution, breeding from western Europe to eastern Russia, and migrating to Africa, Asia and Australasia. Occurs at low densities along mudflats and inland wetlands. There are no internationally important sites in the Pilbara, however nearby Roebuck Bay and 80 Mile Beach in the Kimberley region of WA are considered important. Population estimate anticipated to increase after more comprehensive survey data becomes available. Risk to species from cumulative mining impacts considered low.

Marsh Sandpiper

*Tringa stagnatilis*

EPBC Act Migratory

WC Act: Schedule 5 Migratory

16,355 94 3 1 0 1 1 Breeds from eastern Europe to eastern Siberia, and then migrates to Africa, Asia and Australia. Found on coastal and inland wetlands throughout Australia, but concentrated in the south-east around Victoria and NSW. Global population estimated between 190,000 and 1.2 million. With the majority of the population occurring outside the Pilbara, the risk to this species is considered low.

Species of interest?

No
<table>
<thead>
<tr>
<th>Species (sorted as per highest conservation ranking)</th>
<th>Records</th>
<th>Number of records within conceptual development scenarios</th>
<th>Risk of Significance of Impact from the 30% and/or Full Conceptual Development Scenarios</th>
<th>Species of interest?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total WA</td>
<td>Pilbara Area</td>
<td>Project Definition Boundary</td>
<td>Existing</td>
</tr>
<tr>
<td>Common Redshank <em>Tringa tetanus</em> EPBC Act Migratory WC Act: Schedule 5 Migratory</td>
<td>164</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

1. Development Scenarios:
   - Existing Development Scenario includes existing BHP Billiton Iron Ore and third party developments.
   - Reasonably foreseeable third party includes future approved or proposed third party developments and does not include existing developments.
   - 30% Conceptual Development Scenario includes existing development, reasonably foreseeable third party developments and BHP Billiton Iron Ore’s 30% Conceptual Development Scenario.
   - Full Conceptual Development Scenario includes existing development, reasonably foreseeable third party developments and BHP Billiton Iron Ore’s Full conceptual Development Scenario.

2. Species of interest are those for which more than 5% of known Pilbara records occur within the Project Definition Boundary.
3.3 Limitations

This assessment has relied on data from a number of sources, and the accuracy of the data not collected on behalf of BHP Billiton Iron Ore has not been verified and unless there is evidence to the contrary it has been assumed that it is accurate and collected in accordance to standard industry guidelines.

There were a number of obviously erroneous records that were removed from the analysis. These species are detailed in Section 2.3.3. It is likely that there are other erroneous records in the dataset that weren’t identified during the data review process. Additional errors in species records from the data accessed during the assessment are likely to comprise a small proportion of the dataset and therefore not expected to significantly change the outcome of this assessment.

Delays in the loading of some data into government databases have resulted in inaccuracies in data considered in this assessment. For example, publicly available documents indicate that Rio Tinto Iron Ore has mapped locations for 4,341 individual Synostemon hamersleyensis plants (Eco Logical 2014), yet the data available for this species were restricted to locations that have been mapped by consultants for BHP Billiton Iron Ore.

The majority of species data obtained from the Pilbara have been sourced from biological surveys undertaken for impact assessments. In particular, the vast majority of species records from within the Project Definition Boundary and development scenario footprints have been generated from surveys commissioned for BHP Billiton Iron Ore. Therefore there will be a bias in the occurrence of species on mining and exploration tenements. Further, as biological surveys only provide a snapshot of the biological communities present at the time of survey, the absence of a record may not necessarily indicate that a species does not or will not occur there.

A large proportion of fauna species considered in this assessment are highly mobile, and therefore records may not be reflective of a species preferred habitat or continual presence in an area. Further, as some records date back to more than 50 years ago, these may not reflect species current distribution in the Pilbara.

Records are based on locations, not number of individuals or repeat records over time. One location may support a large or small population of a species, or a transient individual. Impacts to specific species will be further quantified at the Derived Proposal stage using detailed information obtained on behalf of BHP Billiton Iron Ore.

Indirect impacts were not considered in this screening assessment, as the influence of these impacts vary according to species, e.g. some species may be more impacted by feral predators than others, and therefore it was not possible to quantify these across a large range of species. The PERSP will consider indirect impacts to Factors as a whole.

The 30% Conceptual Development Scenario and the Full Conceptual Development Scenario footprints were informed by recommended pit designs, or, where recommended pit designs had not yet been developed, a mid-case of resource range analysis. Footprints for overburden storage areas (OSAs) and assumptions for infilling were inferred by BHP Billiton Iron Ore for each proposed operation on a case by case basis using the company’s knowledge of existing mining operation.

Disturbance polygons and associated infrastructure are indicative and represent an engineering assessment of current information. This level of certainty is fit-for-purpose for this level of analysis. There is a high probability that disturbance polygons will change as resource information improves, environmental values are avoided and market conditions change.

Impacts from third parties were determined using projects referred to the OEPA prior to June 2012 (the time of referral of the Strategic Proposal). This includes projects that are already approved but not yet implemented. These data do not take into account any further expansions that third party operators may propose to undertake in the future, as this information was not publicly available when the third party footprints developed.
4 References


Department of Parks and Wildlife (DPaW) 2013a, Priority Ecological Communities For Western Australia Version 19, Species & Communities Branch, Government of Western Australia.

Department of Parks and Wildlife (DPaW) 2013b, List of Threatened Ecological Communities Species & Communities Branch, Government of Western Australia.


EPA 2000. Position Statement No. 2: Environmental Protection of Native Vegetation in Western Australia: Clearing of Native Vegetation with Particular Reference to Agricultural Areas. Western Australian Environmental Protection Authority (EPA), Perth, Western Australia.

Environmental Protection Authority (EPA) 2006, Position Statement No. 9 Environmental Offsets, Government of Western Australia.

Environmental Protection Authority (EPA) 2006, Guidance Statement No. 10 Level of Assessment for proposals affecting natural areas within the System 6 region and Swan Coastal Plain portion of the System 1 Region, Government of Western Australia.


Environmental Protection Authority (EPA) 2009, Environmental Protection Bulletin No. 9 – Risk Based Approach to EIA, Government of Western Australia.


Appendix 1. Description of conservation rankings

Environment Protection and Biodiversity Conservation Act 1999

As described in Appendix A, the EPBC Act is the Australian Government’s central piece of environmental legislation, providing a legal framework by which to protect and manage nationally important flora and fauna as MNES. EPBC Act Categorisations are set out in Table D1.

Table D1: Categories of Threatened Flora and Fauna Species under the EPBC Act

<table>
<thead>
<tr>
<th>Conservation Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ex</strong></td>
<td><strong>Extinct</strong></td>
</tr>
<tr>
<td></td>
<td>Taxa which at a particular time if, at the time, there is no reasonable doubt that the last member of the species has died.</td>
</tr>
<tr>
<td><strong>ExW</strong></td>
<td><strong>Extinct in the Wild</strong></td>
</tr>
<tr>
<td></td>
<td>Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.</td>
</tr>
<tr>
<td><strong>CE</strong></td>
<td><strong>Critically Endangered</strong></td>
</tr>
<tr>
<td></td>
<td>Taxa which at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td><strong>Endangered</strong></td>
</tr>
<tr>
<td></td>
<td>Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.</td>
</tr>
<tr>
<td><strong>V</strong></td>
<td><strong>Vulnerable</strong></td>
</tr>
<tr>
<td></td>
<td>Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.</td>
</tr>
<tr>
<td><strong>CD</strong></td>
<td><strong>Conservation Dependent</strong></td>
</tr>
<tr>
<td></td>
<td>Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.</td>
</tr>
</tbody>
</table>

Wildlife Conservation Act 1950

The WC Act provides for the conservation and protection of wildlife. It is administered by DPaW and facilitates the listing of threatened native plants and threatened native animals that need to be specially protected because they are under identifiable threat of extinction, are rare, or otherwise in need of special protection. The Minister for Environment may list an ecological community as being threatened if it is presumed to be, or is at risk of becoming, totally destroyed. DPaW uses IUCN criteria for assigning species and communities to threat categories. It uses different codes for flora and fauna set out in Table D2.

Table D2: Conservation Codes for Western Australian Flora and Fauna

<table>
<thead>
<tr>
<th>Code</th>
<th>Schedule under the WC Act</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T</strong></td>
<td>Schedules 1-4</td>
<td><strong>Threatened species</strong> -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Published as Specially Protected under the <em>Wildlife Conservation Act 1950</em>, and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).</td>
</tr>
</tbody>
</table>
### Description

**Threatened fauna** is that subset of ‘Specially Protected Fauna’ declared to be ‘likely to become extinct’ pursuant to section 14(4) of the Wildlife Conservation Act.

**Threatened flora** is flora that has been declared to be ‘likely to become extinct or is rare, or otherwise in need of special protection’, pursuant to section 23F(2) of the Wildlife Conservation Act.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

<table>
<thead>
<tr>
<th>Code</th>
<th>Schedule under the WC Act</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>Schedule 1</td>
<td><strong>Critically endangered species</strong>&lt;br&gt;Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the <em>Wildlife Conservation Act 1950</em>, in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.</td>
</tr>
<tr>
<td>EN</td>
<td>Schedule 2</td>
<td><strong>Endangered species</strong>&lt;br&gt;Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the <em>Wildlife Conservation Act 1950</em>, in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.</td>
</tr>
<tr>
<td>VU</td>
<td>Schedule 3</td>
<td><strong>Vulnerable species</strong>&lt;br&gt;Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the <em>Wildlife Conservation Act 1950</em>, in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.</td>
</tr>
<tr>
<td>EX</td>
<td>Schedule 4</td>
<td><strong>Presumed extinct species</strong>&lt;br&gt;Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the <em>Wildlife Conservation Act 1950</em>, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.</td>
</tr>
<tr>
<td>IA</td>
<td>Schedule 5</td>
<td><strong>Migratory birds protected under an international agreement</strong>&lt;br&gt;Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds. Published as Specially Protected under the <em>Wildlife Conservation Act 1950</em>, in Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice.</td>
</tr>
<tr>
<td>CD</td>
<td>Schedule 6</td>
<td><strong>Conservation dependent fauna</strong>&lt;br&gt;Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the <em>Wildlife Conservation Act 1950</em>, in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice.</td>
</tr>
<tr>
<td>S</td>
<td>Schedule 7</td>
<td><strong>Other specially protected fauna</strong>&lt;br&gt;Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the <em>Wildlife Conservation Act 1950</em>, in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.</td>
</tr>
</tbody>
</table>

### Department of Parks and Wildlife Priority Species List

Species that have not yet been adequately surveyed to be listed under the *Wildlife Conservation Act 1950* are added to the Priority Flora and Fauna Lists under Priority 1, 2, 3 or 3. These three categories are ranked in order of priority for survey or evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna. Species that are adequately known, are rare but not threatened, or meet the criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons are
placed in Priority 4. Conservation Dependent species are placed in Priority 5. These Priority listings are set out in Table D3.

Table D3: Priority Listings for Flora and Fauna

<table>
<thead>
<tr>
<th>Priority</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, rail reserves and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.</td>
</tr>
<tr>
<td>P2</td>
<td>Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.</td>
</tr>
<tr>
<td>P3</td>
<td>Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.</td>
</tr>
</tbody>
</table>
| P4       | (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.  
(b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.  
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy. |
| P5       | Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years. |

IUCN Red List of Threatened Species

The IUCN Red List of Threatened Species provides taxonomic, conservation status and distribution information on plants, fungi and animals that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable). The IUCN Red List also includes information on plants, fungi and animals that are categorized as Extinct or Extinct in the Wild; on taxa that cannot be evaluated because of insufficient information (i.e. Data Deficient); and on plants, fungi and animals that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation program (i.e. Near Threatened). These categorisations are set out in Table D4.

Table D4: IUCN Conservation Status Categories for Flora and Fauna

<table>
<thead>
<tr>
<th>Priority</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extinct</td>
<td>A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon’s life cycles and life form.</td>
</tr>
</tbody>
</table>
| Extinct in the Wild | A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal,
seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

<table>
<thead>
<tr>
<th>Critically Endangered</th>
<th>A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endangered</td>
<td>A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.</td>
</tr>
<tr>
<td>Vulnerable</td>
<td>A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.</td>
</tr>
<tr>
<td>Near Threatened</td>
<td>A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.</td>
</tr>
<tr>
<td>Least Concern</td>
<td>A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.</td>
</tr>
<tr>
<td>Data Deficient</td>
<td>A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.</td>
</tr>
<tr>
<td>Not Evaluated</td>
<td>A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.</td>
</tr>
</tbody>
</table>