West Pilbara Iron Ore Project
Terrestrial Fauna Desktop Study – Southern Access Corridor

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Prepared for
API Management Pty Ltd

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1 Introduction

1.1 Background

API Management Pty Ltd (API) is managing the Australian Premium Iron Joint Venture (API JV), on behalf of equal joint venture partners Aquila Resources Ltd (Aquila) and AMCI Holdings Australia Pty Ltd (AMCI). API holds a number of iron ore tenements in the western Pilbara area of Western Australia and proposes the development of the "West Pilbara Iron Ore Project Stage 1" (WPIOP). The WPIOP involves mining of iron ore from a number of resources on the western fringe of the Hamersley Ranges, between 35 and 85 km south of Pannawonica. A port is proposed for Anketell Point, near Dixon Island where iron ore would be transported to via a rail line.

The rail corridor located near deposits at Catho Well will be accessible via a proposed road, referred to as the Southern Access Corridor (the Study Area), extending north from the Nanutarra-Wittenoom Road.

1.2 Scope and Objectives

API has commissioned Astron Environmental Services to undertake a Desktop Study to identify the likelihood of conservation significant fauna and fauna habitat occurring within the Southern Access Corridor. The scope of the fauna Desktop Study is to:

- Undertake a review and analysis of the relevant fauna literature, studies, data or other information to identify fauna likely to be present in the Study Area, including conservation significant species and communities;
- Identify fauna habitat types likely to be present in the Study Area, including habitat known to be of special significance; and
- Identify potential impacts, risks and/or constraints in relation to fauna for the Study Area.

The Desktop Study constitutes the desktop portion of a Level 1 survey as defined by EPA Position Statement No. 3 and EPA Guidance Statement No. 56 (EPA, 2004). In order to complete the requirements of a Level 1 assessment, a reconnaissance field assessment would be required.

1.3 Project Location

The West Pilbara Iron Ore Project extends from the western fringe of the Hamersley Ranges, between 35 and 85 km south of Pannawonica, to the coast near Karratha. The proposed Southern Access Corridor is approximately 34 km in length (200m wide corridor) connecting the Nanutarra-Wittenoom Road with the southern-most resources areas located to the north (Figure 1 and Figure 2).

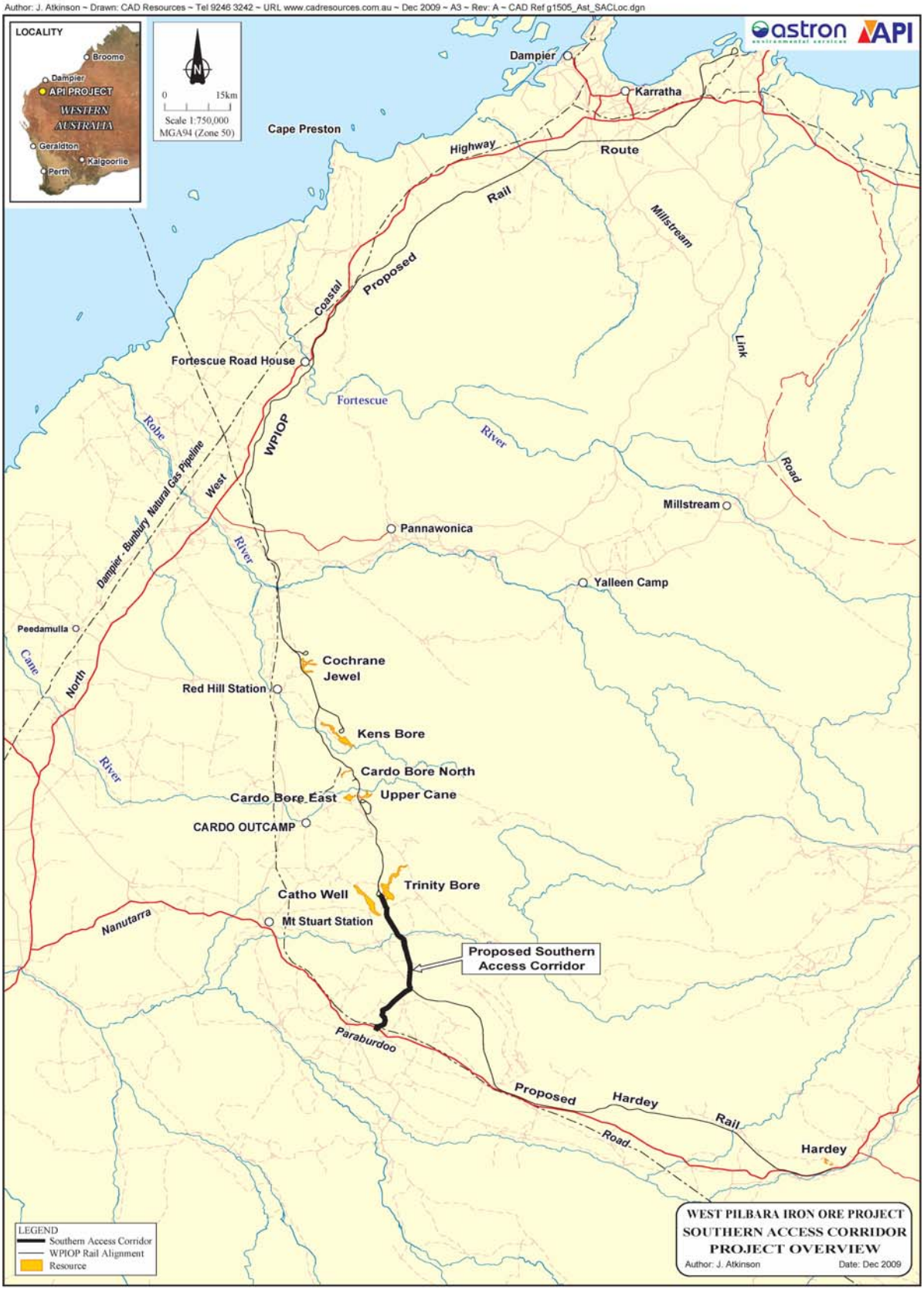

Figure 1: Regional location of the West Pilbara Iron Ore Project and Southern Access Corridor Study Area.

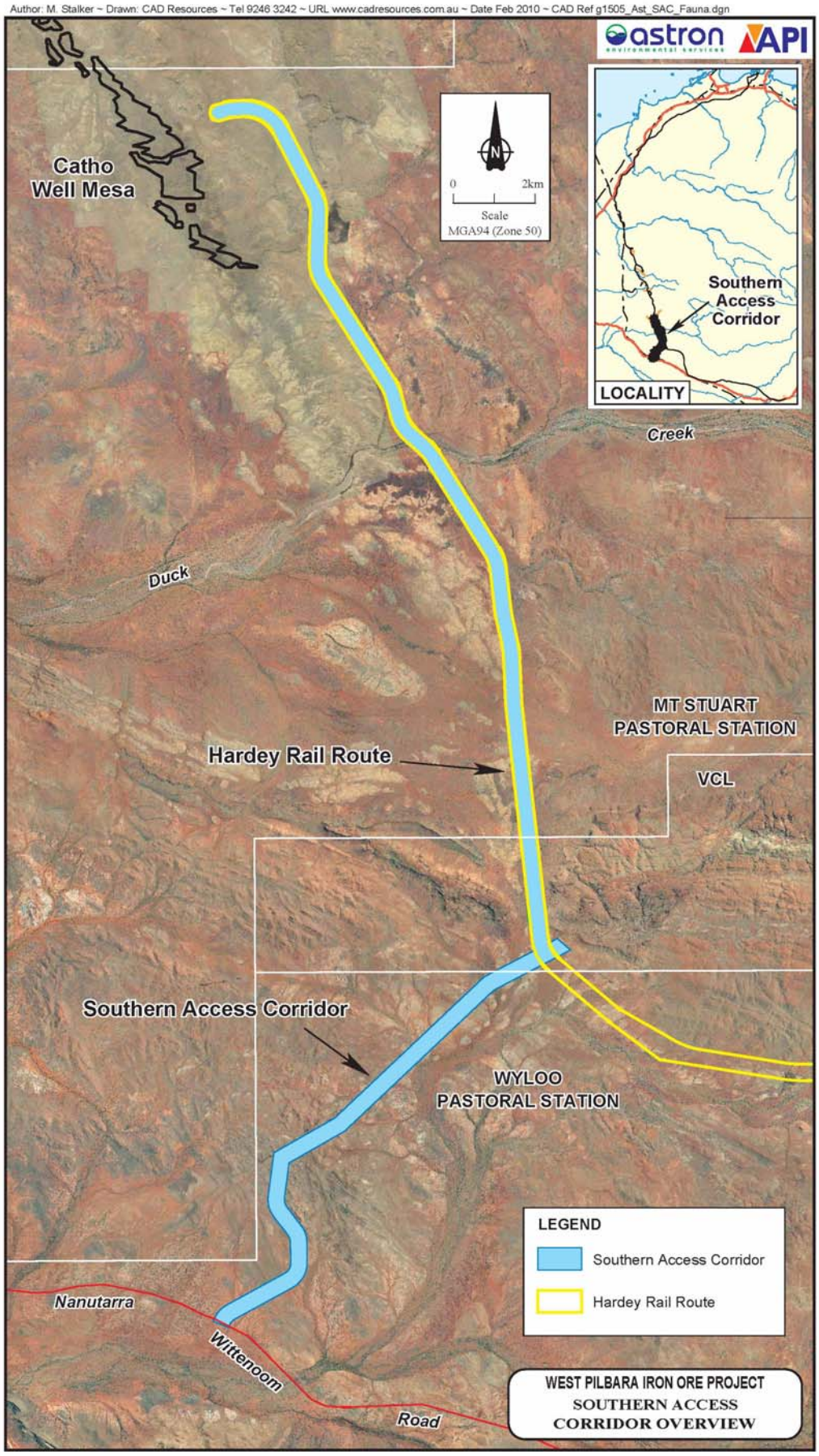

Figure 2: West Pilbara Iron Ore Project Southern Access Corridor Study Area.

2 Methodology

2.1 Sources of Information

2.1.1 Database Searches

Information on terrestrial vertebrate fauna and habitats present was obtained from online database searches conducted on 22 January 2010 within a 40 km radius of the centre of the Study Area (coordinates: 22°34'15''S, 116°21'40''E). The following databases were searched for known records of all fauna species, including those of conservation significance:

- The Department of Environment and Conservation *NatureMap* (now including Western Australian Museum *FaunaBase* data) (DEC, 2010). This database provided information on the distribution of native fauna in the vicinity of the Study Area; and
- The Environmental Reporting tool of the Commonwealth *EPBC Act* on-line database (DEWHA, 2010). This database provided information on fauna protected by the EPBC Act that have the potential to occur within or near to the Study Area. Any protected reserves are also identified by this database.

2.1.2 Literature

Data from the database searches were supplemented with information from Tyler *et al.* (2000) for frogs, Storr *et al.* (1983; 1986; 1990 and 1999) for reptiles, Johnstone and Storr (1998; 2004) for birds, Van Dyck and Strahan (2008) for mammals and previous unpublished consultant reports. The following reports from surveys conducted in the region were also utilised:

- Biota (2009a) West Pilbara Iron Ore Project Mine Areas Seasonal Fauna Survey. Unpublished report prepared for API Management Pty Ltd. September 2009;
- Biota (2009b) West Pilbara Iron Ore Project Rail Corridor Fauna and Fauna Assemblages Survey. Unpublished report prepared for API Management Pty Ltd. November 2009; and
- Astron (2010, in prep) West Pilbara Iron Ore Project Southern Access Corridor Flora and Vegetation Survey. Unpublished reported in preparation for API Management Pty Ltd. September 2009.

2.2 Determination of Fauna Habitats

The sources of information were used to align fauna habitats described by Biota (2009a, 2009b) with vegetation associations recorded by Astron (2010, in prep); and then create lists of species expected to occur in the survey area. Expected species are defined as those that are likely to utilise the survey area based on their known occurrences and habitat preferences. It should be noted that these lists are based largely upon records from a wider range of habitats than the survey area. Therefore, some of the species listed may not be resident or make regular use of the survey area. In addition, some of the species listed are only seasonal or occasional visitors to the wider area.

The Biota (2009a) WPIOP Mine Areas survey area is located within the Hamersley subregion and aligns with the current Study Area; therefore is considered a good reference for species and habitats likely to occur in the Study Area. Portions of the Biota (2009b) WPIOP Rail Corridor survey traverses different bioregions, therefore caution has been applied when comparing habitats and determining the potential for the presence of fauna species.

Taxonomy and nomenclature for fauna species used in this report follow that provided in the *NatureMap* database (DEC, 2010c), which is based on the Western Australian Museum *FaunaBase* and *FaunaList* (2003).

2.3 Assessment of Conservation Significance

The conservation status of fauna species is assessed under Commonwealth and State legislation such as the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* and the Western Australian *Wildlife Conservation Act 1950*.

The Commonwealth *EPBC Act* uses conservation significance levels for fauna that are recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN) (IUCN 2009). For fauna these are: Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable and Conservation Dependent. In addition, bird species listed under the Japan and Australian Migratory Bird Agreement (JAMBA), the China and Australian Migratory Bird Agreement (CAMBA) and the Republic of Korea and Australia Migratory Bird Agreement (ROKAMBA) and listed as Migratory under the *EPBC Act*.

In Western Australia, all native fauna species are protected under the *Wildlife Conservation Act*. Fauna species that are considered rare, threatened with extinction or have a high conservation value are specially protected under the *Wildlife Conservation Act*. Classification of rare and endangered fauna under the Wildlife Conservation (Specially Protected Fauna) Notice 2010 recognises four schedules of taxa. These are;

- ***Schedule 1*** – fauna which are rare or likely to become extinct and are declared to be fauna in need of special protection.
- ***Schedule 2*** – fauna which are presumed to be extinct and are declared to be fauna in need of special protection.
- ***Schedule 3*** – birds which are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction which are declared to be fauna in need of special protection; and
- ***Schedule 4*** – fauna that are in need of special protection, otherwise than for the reasons mentioned in Schedule 1, 2 or 3.

In addition to the above classification, DEC also classifies fauna under five different Priority codes:

- ***Priority 1*** – *Taxa with few, poorly known populations on threatened lands*. Taxa which are known from few specimens or sight records from one of a few localities on lands not

managed for conservation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened species.

- ***Priority 2*** *– Taxa with few, poorly known populations on conservation lands, or taxa with several, poorly known populations not on conservation lands.* Taxa which are known from few specimens or sight records from one or a few localities on lands no under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- ***Priority 3*** *– Taxa with several, poorly known populations, some on conservation lands*. Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- ***Priority 4*** *– Taxa in need of monitoring.* Taxa which are considered to have been adequately/surveyed or for which sufficient knowledge is available and which are considered not currently threatened or in need of special protection, but could if present circumstances change. These taxa are usually represented on conservation lands. Taxa which are declining significantly but are not yet threatened.
- ***Priority 5*** *– Taxa in need of monitoring.* Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

2.4 Limitations

The EPA *Guidance for Assessment of Environmental Factors: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia, No. 56* (EPA, 2004) suggests that fauna surveys may be limited by many variables. Limitations associated with each of these variables are assessed in Table 1.

Table 1: Possible Limitations of the Fauna Desktop Study

Potential Limitation	Constraint (Yes/No) Significant, moderate or negligible	Statement/Comments
Competency/experience of the consultant carrying out the survey.	No	All members of the survey team have had appropriate training, experience and mentoring in undertaking fauna desktop studies.
Scope.	No	The Desktop Study undertaken was sufficient for the desktop portion of a Level 1 fauna survey.
Proportion of fauna collected and identified.	N/A	N/A
The proportion of the task achieved and further work which might be needed.	N/A	N/A
Timing/weather/season/cycle	N/A	N/A

Potential Limitation	Constraint (Yes/No) Significant, moderate or negligible	Statement/Comments
Disturbances (e.g. fire, flood, accidental human intervention, etc) which affected results of survey.	N/A	N/A
Intensity. In retrospect was the intensity considered to be adequate?	N/A	N/A
Completeness, e.g. was the relevant area fully surveyed?	N/A	N/A
Resources. Were the appropriate tools and materials available to complete the task effectively?	No	Adequate resources were available.
Remoteness and/or access problems. Were there any factors limiting access to the survey area?	N/A	N/A
Availability of contextual (e.g. biogeographic) information on the region. Is the region well documented?	No	WA Museum fauna database, DEC Threatened and Priority species lists, surveys in the region, consultants' personal experience all contributed to the Desktop Study.

3 Existing Environment

3.1 Interim Biogeographical Regionalisation of Australia (IBRA)

The Interim Biogeographic Regionalisation for Australia (IBRA version 6.1) divides the Australian continent into 85 bioregions and 403 sub-regions (Thackway and Cresswell, 1995). There are four subregions within the Pilbara Bioregion; the Study Area is located within the Hamersley subregion.

The Hamersley subregion (PIL3) is described as dissected bold plateaux and ranges of flat lying or moderately folded sandstone and quartzite. *Acacia aneura* (Mulga) low woodland over tussock grasses occurs on fine textured soils in valley floors, with *Eucalyptus leucophloia* (snappy gum) scattered over *Triodia brizoides* on the skeletal soils of the ranges (Kendrick, 2001).

The Biota (2009a) WPIOP Mine Areas survey area is located within the Hamersley subregion and aligns with the current Study Area. The Biota (2009b) WPIOP Rail Corridor survey traverses three subregions: Chichester (PIL1), Hamersley (PIL3) and Roebourne Plains (PIL4). Habitats and species recorded by Biota (2009b) in the Chichester and Roebourne Plains may therefore not align with habitats in the Study Area; this has been considered during the Desktop Study.

3.2 Land Systems

Surveys of land in the Pilbara Region (Van Vreeswyk *et al*., 2004) were undertaken on behalf of the Western Australian Department of Agriculture. Land was surveyed to provide a comprehensive description of the biophysical resources of the region along with an evaluation of the condition of the soils and vegetation. The surveys divided the region into a number of land systems including the following that occur within the Study Area:

- Boolgeeda land system;
- Capricorn land system;
- Newman land system;
- Paraburdoo land system;
- Rocklea land system.

A summary of these land systems in regard to geology, soils, topography and vegetation is presented in Table 2.

3.3 Geology and Landforms

The Study Area occurs in the transition between the sedimentary rocks of the Ashburton and the Hamersley Basins of the Pilbara Craton. The Ashburton Basin is comprised predominately of lithologies of the early Proterozoic Wyloo dome, consisting of shale, sandstone, dolomite, basalt and conglomerates. It includes the Mount McGrath Formation, Duck Creek Dolomite, June Hill Volcanics and Ashburton Formations (Thorne and Seymour, 1991).

The Hamersley Basin is characterised by sedimentary rocks, as well as basalt, shale, dolerite and banded iron formations (GeoView, 2009). It includes the Turee Creek group, Hamersley group and Fortescue group.

3.4 Conservation Reserves

There are no conservation reserves listed under the EPBC Act, or Environmentally Sensitive Areas, within a 40 km radius of the Study Area (DEWHA, 2010).

Table 2: Summary of Pilbara Region land systems (Van Vreeswyk *et al*. 2004) located within the Study Area.

Land System	Landforms	Soils	Vegetation
Boolgeeda (stony lower slopes and plains below hills)	Low hills and rises	Stony soils, red shallow loams	Hummock grassland of *Triodia* spp. with very scattered *Acacia* shrubs.
	Stony slopes and upper plains	Stony soils, red shallow loams or red loamy earths	Hummock grassland of hard *Triodia* spp. or scattered shrubs of *A. aneura*, *A. ancistrocarpa* and other *Acacia* spp. with hard and soft *Triodia* ground layer.
	Stony lower plains	Red loamy earths	Hummock grassland of hard *Triodia* spp. Also scattered / moderately closed tall shrubland of *A. aneura* with hard and soft *Triodia* ground layer.
Boolgeeda (stony lower slopes and plains below hills)	Groves	Reed loamy earths	Moderately closed woodland or tall shrubland of *A. aneura* with sparse low shrubs and tussock grasses.
	Narrow drainage floors and channels	Red loamy earths and minor self-mulching cracking clays channels with river bed soils.	Scattered to closed tall shrublands / woodlands of *A. aneura*, *A. atkinsiana* and *Corymbia hamersleyana* with sparse low shrubs and hummock/tussock grassland.
Capricorn (Hills and ridges of sandstone and dolerite)	Ridges hills and upper slopes	Stony soils	Hummock grassland of hard and soft *Triodia* with scattered *A. inaequilatera* and other *Acacia* spp. and *Grevillea wickhamii*.
	Lower footslopes	Red shallow loams	As above
	Stony Plains	Red shallow loams and red shallow loams.	Hummock grassland of hard *Triodia* spp. with scattered *Acacia* spp. shrubs.
	Narrow drainage floors and channels	River bed soils.	Scattered tall shrubs / low woodland with *Acacia* spp. *C. hamersleyana* with numerous other shrubs and soft *Triodia*.
Newman land system (Rugged jaspilite plateau, ridges and mountains)	Plateaux ridges mountains and hills	Stony soils and red shallow loams with some red shallow sands.	Hummock grassland of mixed hard *Triodia* with very scattered / scattered shrubs and trees including *Acacia* and *Senna* spp., *G. wickhamii*, and mixed *Eucalyptus*. Occasionally soft hummock grassland.
	Lower slopes	Stony soils on upper margins with red loamy earths on lower margins.	Similar to above
	Stony plains	Stony soils with red shallow loams and some red loamy earths.	Hummock grassland of hard *Triodia* with isolated / very scattered shrubs of *Acacia* and *Senna* spp. and occasional *Eucalyptus* trees. Occasionally soft *Triodia* hummock grassland.
Newman land system (Rugged jaspilite plateau, ridges and mountains)	Narrow drainage floors with channels	Red shallow loams and red loamy earths. Channels with river soils.	Smaller floors support *Triodia* hummock grassland with very scattered shrubs. Larger floors and channels support tall *Acacia* spp. shrublands / woodlands and *E. victrix* with tussock or hummock grass understory.
Paraburdoo (Basalt derived stony gilgai plains)	Low basalt hills and ridges	Stony soils	Sparse Acacia spp. over low shrublands of *Corchorus walcottii*, *Ptilotus obovatus*, *Senna* spp., also *Triodia* hummock grassland with scattered *Acacia* shrubs.

Land System	Landforms	Soils	Vegetation
	Upper interfluves and slopes	Shallow red/brown non-cracking clays and red shallow loams.	Scattered tall shrubs of *A. aneura* or *A. xiphophylla* with low shrubs including *Senna* and *Maireana* spp.. Also *Triodia wiseana* with very scattered *Acacia* shrubs.
	Groves	Red deep loamy duplex soils and cracking clays	Moderately closed / closed tall shrubland / woodland of *A. aneura* with sparse under shrubs and tussock grasses.
	Gilgai plains	Shallow red/brown non-cracking clays and cracking clays.	Mixed tussock grassland with very scattered low shrubs, or scattered low tall shrublands of *A. xiphophylla* with tussock grass understory.
	Drainage zones	Deep red/brown non-cracking clays and red loamy earths.	Scattered tall shrubs of *A. aneura*, *A. xiphophylla* of *A. victoriae* with variable understory including *Senna* and *Maireana* spp.. Also *Triodia* hummock grassland with very scattered shrubs.
	Braided creek lines and channels	River bed soils	Closed tall shrubland or woodlands of *A. citrinoviridis* over *Acacia* spp., *E. camaldulensis with variable low shrubs and tussock grasses.*
	Calcrete platforms	Calcareous shallow loams	*Triodia* hummock grassland over scattered shrubs
Rocklea (Rugged basalt hills and dissected plateaus)	Hills, ridges, plateaus and upper slopes	Stony soils, red shallow loams and calcareous shallow loams	Hummock grassland of hard or soft *Triodia* spp. with isolated to very scattered shrubs such as *Acacia inaequilatera* and *Senna* spp.
	Lower slopes	Red shallow loams and red shallow sandy duplex soils	Hummock grassland of hard or soft *Triodia* spp. with isolated to very scattered shrubs such as *Acacia inaequilatera* and *Senna* spp.
	Stony plains and interfluves	Calcareous shallow loams, red sandy earths and shallow red/brown non-cracking clays	Hummock grasslands of hard or soft *Triodia* spp. with isolated to very scattered shrubs such as *A. inaequilatera*. Occasionally grassy shrublands such as *Acacia, Senna* and *Eremophila* spp.
	Gilgai Plains	Self-mulching cracking clays	Tussock grasslands with perennial grasses such as *Astrebla pectinata* and *Eragrostis xerophila*.
	Upper drainage lines	Red shallow sands and calcareous shallow loams. Channels with river bed soils	Hummock grasslands with hard or soft *Triodia* spp. with scattered *Acacia* spp. and *Corymbia hamersleyana*.
	Drainage floors and channels	Red loamy earths with red shallow sandy duplex soils and red/brown non-racking clays	Scattered to moderately close tall shrublands or woodlands or *Acacia* and *Eucalyptus* spp. with mixed understory shrubs and hummock grass or tussock grass understory.

4 Results

4.1 Habitats

Based on vegetation surveys undertaken by Astron (2010, in prep) and the delineation of habitats described in Biota (2009a, 2009b), the Study Area includes seven main fauna habitat units. These are distinguished on the basis of differences in vegetation, substrate and landforms derived from vegetation survey information. Twenty-six vegetation associations identified by Astron (2010 in prep.) within the Study Area support the nine fauna habitats delineated in Table 3. Biota (2009a, 2009b) descriptions are listed in the first column since this information provides the underlying template of fauna habitat and associated fauna species. In summary:

- Two vegetation associations described by Astron (2010, in prep) support the 'clay plains and the clay loam plain' fauna habitats;
- Seven vegetation associations described by Astron (2010, in prep) support the 'minor drainage with clay loam' fauna habitat;
- Six vegetation associations described by Astron (2010, in prep) support the 'stony loam plain' fauna habitat;
- Three vegetation associations described by Astron (2010, in prep) support the 'broad drainages with clay loam' and the 'major drainage stony alluvial bed' fauna habitats; and
- Eight vegetation associations described by Astron (2010, in prep) support the descriptions of the 'stony clay loam slope', 'rocky slope' and 'gravelly loam slope' fauna habitats.

Table 3: Vegetation Associations Delineated within the Study Area (Astron, 2010 *in prep*).

Vegetation Associations from Biota (2009a, 2009b)		**Vegetation Associations from Astron (2010, in prep)**	
Landform and Soils	**Vegetation**	**Landform and Soils**	**Description of Similar SAC Vegetation Associations**
Clay plain	*Acacia xiphophylla* shrubland over Triodia sp. Hummock grassland	Clayey Plains	*Acacia synchronicia, A. xiphophylla* tall shrubland over *Triodia epactia* open hummock grassland (Ca5)
Clay loam plain	Acacia *xiphophylla* tall shrubland over Triodia sp. Open hummock grassland		*Acacia xiphophylla* open scrub over *Sclerolaena* spp. herbland over *Sporobolus australasicus, Dactyloctenium radulans, *Cenchrus ciliaris* very open tussock grassland (Ca10).
	Acacia sp. Open shrubland over Triodia sp. Hummock grassland		
	Acacia xiphophylla open shrubland over Triodia sp. Very open hummock grassland		
	Eucalyptus sp. Scattered low trees over Acacia spp. Open shrubland		

Vegetation Associations from Biota (2009a, 2009b)		**Vegetation Associations from Astron (2010, in prep)**	
Landform and Soils	**Vegetation**	**Landform and Soils**	**Description of Similar SAC Vegetation Associations**
	over Triodia sp. Hummock grassland		
	Acacia *xiphophylla* tall shrubland		
	Acacia sp. Open shrubland over *Triodia sp.* Hummock grassland		
	Acacia xiphophylla open shrubland and Acacia sp. Open shrubland over Triodia sp. Open hummock grassland		
Minor drainage with clay loam	*Acacia tumida* shrubland over Triodia sp. Hummock grassland	Minor Creeklines	*Acacia pyrifolia* var. *pyrifolia* high shrubland over *Triodia epactia* hummock grassland **(Ia13)**
	Eucalyptus sp. Scattered trees over Acacia spp. Open shrubland over Triodia sp. Hummock grassland		*Eucalyptus victrix, Corymbia hamersleyana* scattered low trees over *Acacia pyrifolia* var. *pyrifolia, Gossypium robinsonii* high open shrubland over *Triodia epactia* open hummock grassland **(Ia21)**
			Acacia citrinoviridis high open shrubland over *A. bivenosa, Eremophila longifolia, Stylobasium spathulatum* open shrubland over *Triodia epactia open hummock grassland* **(Ia12)**
			Corymbia hamersleyana scattered to low open woodland over *Acacia ancistrocarpa, A. bivenosa* open shrubland to high shrubland over *Triodia epactia, T. wiseana* closed hummock grassland **(Ia26)**
			Acacia synchronicia, A. citrinoviridis, A. bivenosa high open shrubland to shrubland over **Cenchrus ciliaris* tussock grassland **(Ia33)**
			Acacia synchronicia high shrubland to open scrub over **Cewnchrus ciliaris* tussock grassland (with scattered *Triodia wiseana)* and open herbland of Chenopod spp **(Ia34)**
			Acacia synchronicia, A. kempeana, A. bivenosa high open shrubland to shrubland over **Cenchrus ciliaris* tussock grassland **(Ia35)**
Gilgai clay plain	Triodia sp. Closed hummock grassland	Habitat not represented in the Study Area	

Vegetation Associations from Biota (2009a, 2009b)		**Vegetation Associations from Astron (2010, in prep)**	
Landform and Soils	**Vegetation**	**Landform and Soils**	**Description of Similar SAC Vegetation Associations**
Sandy loam plain	Acacia spp. Scattered low shrubs over Triodia sp. Hummock grassland	Habitat not represented in the Study Area	
Stony loam plain	*Acacia* sp. Open shrubland over *Triodia* sp. Hummock grassland	Stony Plains	*Acacia synchronicia, A. bivenosa (A. ancistrocarpa, A. inaequilatera)* open shrubland to shrubland over *Triodia wiseana* open hummock grassland **(Pa3)**
	Grevillea pyramidalis scattered shrubs over *Acacia spp*. Scattered shrubs over *Triodia sp*. Hummock grassland		*Acacia ancistrocarpa* open to closed scrub over *Senna artemisiodes* spp. *Oligophylla* x *helmsii* low open shrubland over *Triodia epactia* hummock grassland **(Pa8)**
	Acacia sp. Scattered shrubs over *Triodia* sp. Hummock grassland		*Acacia bivenosa, A. synchronicia, A. inaequilatera* shrubland over *Senna* spp. Scattered shrubs to low open shrubland over *Triodia epactia* hummock grassland **(Pa9)**
	Acacia spp. Open shrubland over *Triodia* sp. Hummock grassland		*Acacia kempeana (Acacia aneura)* high shrubland to open scrub over *Triodia epactia* and *Triodia wiseana* hummock grassland **(Pa16)**
	Acacia spp. Scattered shrubs over *Triodia* sp. Hummock grassland		*Acacia xiphophylla* low open woodland to high open shrubland over *Triodia wiseana (T. epactia)* very open hummock grassland **(Pa18)**
	Acacia spp. Scattered shrubs over *Triodia* sp. Hummock grassland		*Acacia xiphophylla* and *Acacia synchronicia* high shrubland to open scrub over **Cenchrus ciliaris* tussock grassland and *Triodia wiseana* very open hummock grassland **(Pa22)**
	Acacia sp. Scattered shrubs over *Triodia* sp. Hummock grassland		
Broad drainages with clay loam	Scattered *Corymbia hamersleyana* over open mixed *Acacia* shrubland over dense Buffel tussock grasses	Major Creeklines	*Eucalyptus victrix* open woodland over *Acacia pyrifolia* var. *pyrifolia* high open shrubland over *Triodia epactia* open hummock grassland **(Ae8)**
	Triodia sp. Hummock grassland with emergent *Acacia inaequilatera*		*Eucalyptus camaldulensis* var. *obutsa, E. victrix* woodland over *Triodia epactia* scattered hummocks over *Stemodia grossa* very open herbland **(Ae7)**
Major drainage stony alluvial bed	*Eucalyptus victix* and *E. camaldulensis* scattered trees over Acacia spp. Open shrubland over native tussock spp.		*Eucalyptus victirx* scattered low trees over *Acacia citrinoviridis* and *Acacia inaequilatera* open shrub over **Cenchrus ciliaris* tussock grassland **(Aa16)**

Vegetation Associations from Biota (2009a, 2009b)		**Vegetation Associations from Astron (2010, in prep)**	
Landform and Soils	**Vegetation**	**Landform and Soils**	**Description of Similar SAC Vegetation Associations**
Stony clay loam slope	*Acacia xiphophylla* open shrubland over *Triodia* sp. Open hummock grassland	Stony Hills and Breakaways	*Acacia arida, A. bivenosa* open heath over *Triodia wiseana* open hummock grassland to hummock grassland **(Sa4)**
Rocky Slope	Open *Triodia* hummock grassland		*Acacia inaequilatera* scattered tall shrubs to tall open shrubland over *A. bivenosa* open shrubland over *Triodia wiseana* hummock grassland **(Sa7)**
Gravely loam slope	*Triodia* sp. Hummock grassland		*Acacia synchronicia* (green and grey) scattered tall shrubs over *Senna artimisoides* ssp. *oligophylla* and *Senna glutinosa* ssp. *glutinosa* low open shrubland to low shrubland over hummock grassland of *Triodia wiseana* **(Sa14*)***
			Eucalyptus leucophloia ssp. *leucophloia* low open woodland over *Acacia bivenosa* scattered shrubs to shrubland over *Triodia wiseana* open hummock grassland to hummock grassland **(Sa23)**
			Corchorus laniflorus low shrubland over mixed species herbland *(Solanum* spp.*, Gomphrena* spp., *Tephrosia uniovultata)* over *Triodia wiseana* open hummock grassland **(Sa29)**
			Acacia arida (A. bivenosa, A. synchronicia) open shrubland over *Triodia wiseana* and *T. sp.* Robe River (M.E. Trudgen MET 12, 369) Hummock grassland **(Sa37)**
			Acacia citrinovirdis, A. inaequilatera, A. pruinocarpa tall open shrubland over *Triodia wiseana* (*T.* sp Robe River (M.E. Trudgen MET 12,369) hummock grassland **(Sa40)**
			Petalostylis labicheoides (Acacia bivenosa) open shrubland over *Triodia wiseana* (T. sp. Robe River (M.E. Trudgen MEZT 12, 369) open hummock grassland to hummock grassland **(Sa52)**
Mesa rocky breakaway	*Acacia* spp. Scattered shrubs over *Triodia* sp. Hummock grassland	Habitat not represented in the Study Area	
	Eucalyptus sp. Scattered low trees over *Acacia* spp. Open shrubland		

Vegetation Associations from Biota (2009a, 2009b)		**Vegetation Associations from Astron (2010, in prep)**	
Landform and Soils	**Vegetation**	**Landform and Soils**	**Description of Similar SAC Vegetation Associations**
	over *Triodia* sp open hummock grassland		
	Acacia spp. Open shrubland over *Triodia* sp. Hummock grassland		
	Eucalyptus leucophloia scattered trees over *Acacia* spp. Shrubland over *Triodia* sp. Hummock grassland		
	Acacia spp. Open shrubland over *Triodia* sp. Hummock grassland		
Mesa base	*Acacia* spp. Shrubland over *Triodia* sp. Hummock grassland	Habitat not represented in the Study Area	
Low calcrete hills with shallow loam	Open shrubland of *Acacia pyrifolia* and *Acacia ancistrocarpa* over *Triodia* hummock grasslands	Habitat not represented in the Study Area	
Mesa rocky breakaway/broad drainage	*Eucalyptus victix* and *E. camaldulensis* over *Acacia* spp. Open shrubland over *Triodia* sp. Hummock grassland	Habitat not represented in the Study Area	
Mesa top stony loam	*Acacia* spp. Scattered shrubs over *Triodia* sp. Hummock grassland	Habitat not represented in the Study Area	
	Acacia spp. Scattered shrubs over *Triodia* sp. Hummock grassland		
	Acacia spp. Open shrubland over *Triodia* sp hummock grassland		
	Acacia spp. Open shrubland over closed *Triodia* sp. Hummock grassland		
	Acacia spp. Open shrubland over *Triodia* sp. Hummock grassland		
	Grevillea wickhamii scattered shrubs over *Acacia* spp. Open shrubland over *Triodia* sp. Hummock grassland		
Mesa top laterite	*Acacia* spp. Scattered low shrubs over scattered *Triodia* sp. Hummock grassland	Habitat not represented in the Study Area	
	Acacia bivenosa shrubland over *Triodia* sp. Hummock grassland		
	Acacia spp. Open shrubland over *Triodia* sp. Hummock grassland		
	Eucalyptus leucophloia scattered trees over *Triodia* sp open hummock grassland		
	Acacia spp. Open shrubland over *Triodia* sp. Open hummock		

Vegetation Associations from Biota (2009a, 2009b)		**Vegetation Associations from Astron (2010, in prep)**	
Landform and Soils	**Vegetation**	**Landform and Soils**	**Description of Similar SAC Vegetation Associations**
	grassland		
	Acacia inaequilatera scattered shrubs over *Triodia sp*. Hummock grassland		
	Acacia spp. Open shrubland over *Triodia* sp. Open hummock grassland		
	Acacia spp. Shrubland over *Triodia* sp. Hummock grassland		

4.2 Vertebrate Fauna

The vertebrate fauna expected to occur within the Study Area is presented in Appendix A. These lists are based largely upon species recorded during the WPIOP Mine Area fauna survey (Biota, 2009a) and Rail Corridor fauna survey (Biota, 2009b), in addition to the known species distributions and available habitats. The results of the NatureMap (DEC, 2010) search are provided in Appendix B. Table 4 lists those species considered to be of conservation significance and details their respective conservation status. The Study Area is in excellent condition (Astron, 2010 in prep) and is expected to support an intact fauna assemblage typical of the Pilbara region.

These lists are based largely upon records from areas that have a wider range of habitats than the Study Area. Therefore, some of the species listed may not make regular use of the Study Area. In addition, some of the avifauna species listed are likely to be only seasonal or occasional visitors to the area.

Of the vertebrate fauna species recorded in the WPIOP Mine Areas (Biota, 2009a) and Rail Corridor (Biota, 2009b) it is likely that at least 206 species have the potential to also be found within the Study Area due to the presence of similar habitats to those in which the species were recorded by Biota (2009a, 2009b). This number includes 95 bird species, 27 mammal species, and 84 herpetofauna species (reptiles and amphibians).

4.2.1 Birds

Of the avifauna species recorded in the WPIOP Mine Area (Biota, 2009a) and Rail Corridor (Biota, 2009b), 94 species were found in similar habitats to those identified in the Study Area by Astron (2010 *in prep*). One additional species has been recorded within a 40 km radius of the Study Area (DEC, 2010). Therefore a total of 95 avifauna species have the potential to occur within the Study Area based known fauna distribution records and habitat preferences (Appendix A).

Three bird species of conservation significance were recorded by Biota (2009a, 2009b):

- Grey Falcon, *Falco hypoleucos* (Priority 4);
- Peregrine Falcon, *Falco peregrinus* (Schedule 4); and
- Australian Bustard, *Ardeotis australis (*Priority 4).

In addition, Biota (2009a, 2009b) recorded the presence of the Rainbow Bee-eater *Merops ornatus* and the Fork-tailed Swift*, Apus pacificus* which are listed as Migratory under the *EPBC Act (1999)*. All five of these species have the potential to occur in the Study Area based on habitat preferences and are described in Section 4.2.5.

4.2.2 Herpetofauna (Reptiles and Amphibians)

A total of 84 herpetofauna species (reptiles and amphibians) have the potential to occur in the Study Area based on habitat preferences, including 53 species recorded in WPIOP Mine Areas (Biota, 2009a) and Rail Corridor (Biota, 2009b). This includes the following three conservation significant herpetofauna species: Pilbara Olive Python, *Morelia olivacea barroni* (Schedule 1 and Vulnerable EPBC Act), and a Skink species, *Notoscincus butleri* (Priority 4) which were recorded by Biota (2009a, 2009b); and an Unnamed Blind Snake, *Ramphotyphlops ganei* (Priority 1) recorded within 40 km of the Study Area (DEC, 2010). These species are described in Section 4.2.5.

4.2.3 Mammals

A total of 27 native mammal species have the potential to occur within the Study Area based known fauna distribution records and habitat preferences (Appendix A). Sixteen native non-volant (ground-dwelling) mammal species recorded by Biota (2009a, 2009b) were found in similar habitats to those identified in the Study Area (Astron, 2010 *in prep*). One additional species has been recorded within a 40 km radius of the Study Area (DEC, 2010). Biota (2009a, 2009b) also recorded ten species of volant species (bats) within the WPIOP Mine Areas and Rail Corridor.

Five mammal species (volant and non-volant) of conservation significance were recorded by Biota (2009a, 2009b) or have been recorded within 40 km of the Study Area (DEC, 2010):

- Northern Quoll, *Dasyurus hallucatus* (Schedule 1 and Vulnerable EPBC Act);
- Long-tailed Dunnart, *Sminthopsis longicaudata* (Priority 4);
- Western Pebble-mound Mouse, *Pseudomys chapmani* (Priority 4);
- Ghost Bat, *Macroderma gigas* (Priority 4); and
- Pilbara Orange Leaf-nosed Bat, *Rhinonicteris aurantius* (Schedule 1 and Vulnerable).

These species of conservation significance are described in detail in Section 4.2.5.

4.2.4 Short Range Endemics

Potential Short Range Endemics (SRE) from three major groups (Pulmonata (terrestrial snails), Diplopoda (millipedes) and Mygalomorphae (trapdoor spiders)) were recorded by Biota (2009a)

within the WPIOP Mine Areas and have the potential to also occur in the Study Area. Collections of potential SRE fauna require morphological and, possibly molecular genetic studies to confirm the degree of endemism of identified populations. Short Range Endemic fauna fall outside of the scope of this Desktop Study, but are noted here to allow an assessment of future studies that may be required in the Study Area.

4.2.5 Conservation Significant Fauna

The fauna species listed in Table 4, which have a conservation status under State and/or Commonwealth government legislation, have either been recorded by Biota (2009a) in the WPIOP Mine Areas, by Biota (2009b) in the WPIOP Rail Corridor, or have been recorded within 40 km of the Study Area (DEC, 2010).

Table 4: Conservation Significant Vertebrate Fauna Species Listed as Potentially Occurring in the Study Area.

Species Name	Common Name	Status	Comment
Birds			
Falco hypoleucos	Grey Falcon	Priority 4	Likely to occur in the Study Area
Falco peregrinus	Peregrine Falcon	Schedule 4	Possibly occurs in the Study Area
Ardeotis australis	Australian Bustard	Priority 4	Likely to occur in the Study Area
Merops ornatus	Rainbow Bee-eater	Migratory	Possibly occurs within the Study Area
Apus pacificus	Fork-tailed Swift	Migratory	Likely to occur in the Study Area
Mammals			
Dasyurus hallucatus	Northern Quoll	Schedule 1 and Vulnerable	Possibly occurs within the Study Area
Sminthopsis longicaudata	Long-tailed Dunnart	Priority 4	Likely to occur within the Study Area
Pseudomys chapmani	Western Pebble-mound Mouse	Priority 4	Likely to occur within the Study Area
Macroderma gigas	Ghost Bat	Priority 4	Possibly occurs within the Study Area
Rhinonicteris australis	Pilbara Orange Leaf-nosed Bat	Schedule 1 and Vulnerable	Possibly occurs within the Study Area
Reptiles			
Morelia olivacea barroni	Pilbara Olive Python	Schedule 1 and Vulnerable *EPBC Act*	Likely to occur within or nearby the Study Area
Ramphotyphlops ganei	Unnamed Blind Snake	Priority 1	Possibly occurs in the Study Area
Notoscincus butleri	Skink	Priority 4	Possibly occurs in the Study Area

4.2.5.1 Grey Falcon, Falco hypoleucos *(Priority 4)*

The Grey Falcon is widespread but rare throughout the arid zone, occurring in the northern half of Western Australia (Johnstone and Storr, 1998). This species is a resident or nomadic visitor to its habitat, which is generally lightly wooded coastal and riverine plains, or near wetlands. The Grey Falcon uses old nests of other birds, usually near a watercourse, and lays eggs between late winter and early spring.

The Grey Falcon was recorded opportunistically by Biota (2009a) in the WPIOP Mine Areas and is likely to utilise habitat adjacent to creeklines in the current Study Area.

4.2.5.2 Peregrine Falcon, Falco peregrinus *(Schedule 4)*

The Peregrine Falcon is uncommon, although widespread throughout much of Australia excluding the extremely dry areas and has a wide and patchy distribution. It shows habitat preference for areas near cliffs along coastlines, rivers and ranges and within woodlands along watercourses and around lakes.

The Peregrine Falcon was recorded by Biota (2009b) in the northern section of the WPIOP Rail Corridor. It favours hilly or mountainous country and open woodlands and may be an occasional visitor to the Study Area given its widespread nature.

4.2.5.3 Australian Bustard, Ardeotis australis *(Priority 4)*

Australian Bustards are found in tussock grassland, *Triodia* hummock grassland, grassy woodland, low shrublands and structurally similar artificial habitats. They feed on insects, small vertebrates, seeds and fruit, apparently moving in response to local variations in food supply. They are often found near water, both natural and artificial.

This species was recorded by Biota (2009a) within the WPIOP Mine Areas and in the central portion of the Rail Corridor (Biota, 2009b). The Australian Bustard may occur within the Study Area as suitable habitat of *Triodia* hummock grassland is present (Astron, 2010 *in prep*). It is a mobile species and a broad extent of suitable habitat occurs in the area.

4.2.5.4 Northern Quoll, Dasyurus hallucatus *(Schedule 1 and Vulnerable EPBC Act)*

The Northern Quoll once occurred across northern Australia from the Pilbara region of Western Australia to south-eastern Queensland. Its range has become fragmented, largely over the last few decades, and it is now found in six main locations. It is most common in rocky, sparsely vegetated areas and open woodlands, sometimes near human habitation, within 50 km of the coast. Reasons for the species' recent decline are not understood, but cane toads, changing grazing and fire regimes and other impacts that degrade the habitat are the most likely causes. Northern Quolls, generally solitary and nocturnal, make their dens in rock crevices, tree holes or, occasionally, termite mounds.

This species was recorded once by Biota (2009a) in the WPIOP Mine Areas in rocky, breakaway habitat, and opportunistically in the Rail Corridor survey (Biota, 2009b). The current Study Area may provide suitable habitat for this species in the breakaways that were recorded in the flora survey (Astron, 2010 in prep) however no caves were observed (J.Atkinson, 2010 pers. comm.).

4.2.5.5 Long-tailed Dunnart, Sminthopsis longicaudata *(Priority 4)*

The Long-tailed Dunnart is found in a variety of habitats including plateaus, breakaways and crests of ranges with low open vegetation usually comprising Mulga over sparse *Triodia*. The species feeds on arthropods, mainly beetles and ants, and breeding occurs from August to December. There are few records of the Long-tailed Dunnart, mostly from widely scattered localities in the arid zone (Strahan, 1995).

This species was recorded on a *Triodia* hillslope habitat in the nearby WPIOP Mine Areas (Biota, 2009a). The Study Area contains rocky hillslopes and breakaways, and contains Mulga habitat that seems to be most favoured by the Long-tailed Dunnart.

4.2.5.6 Western Pebble-mound Mouse, Pseudomys chapmani *(Priority 4)*

Although suitable habitat is patchy, extant populations are widespread in the extensive ranges of the central and southern Pilbara, extending into smaller ranges of the Little Sandy Desert. The Western Pebble-mound Mouse is well known for the characteristic pebble mounds which it constructs and these mounds are most common on spurs and lower slopes of rocky hills. The persistence of abandoned mounds in the adjacent Gascoyne and Murchison regions and small, isolated coastal ranges in the Pilbara indicates considerable decline, which occurred in the 1970s and was attributed to foxes and introduced herbivores (Van Dyke and Strahan 2008). This species was previously listed as a Schedule 1 species but has been downgraded to a Priority 4 species.

This species was recorded through the observation of active pebble mounds in the WPIOP Mine Areas (Biota, 2009a) and Rail Corridor (Biota, 2009b). The Study Area contains stony plains and slopes that would provide the preferred habitat of the Pebble-mound Mouse, and this species is therefore likely to be present.

4.2.5.7 Pilbara Orange Leaf-nosed Bat, Rhinonicteris aurantius *(Schedule 1 and Vulnerable)*

The Pilbara Leaf-nosed Bat is known only from the Pilbara and Gascoyne regions of Western Australia. The Pilbara Leaf-nosed Bat roosts in caves and abandoned, deep and partially flooded mines that trap pockets of warm, humid air; it may also occupy smaller, less complex mines for part of the year (Van Dyck and Strahan, 2008). The Pilbara Leaf-nosed Bat is known from roost sites in mines in the east Pilbara, mines in the Marble Bar area, and from natural roost sites and mines in the Gascoyne. Foraging habitat for this species is diverse and includes *Triodia* hummock grasslands covering low rolling hills and shallow gullies, with scattered *Eucalyptus camaldulensis* along the creeks. The foraging habitat occupied by the Pilbara Leaf-nosed Bat is constrained by suitable roost sites; however, there is little to no information in the literature on how far from their roost sites they forage.

This species was recorded via direct capture and echolocation call in the WPIOP Mine Areas in cave habitats and adjacent to water (Biota, 2009a). Biota (2009a) considered that the bats recorded did not form part of a large roosting colony or maternity roost, however suggested that such colonies could occur in the Mine Areas if deep caves were present. No caves were observed in the Study Area during the Southern Access Corridor flora survey; however it is likely that caves are present in

adjacent rocky areas (J. Atkinson, 2010 pers. comm.). The Study Area could however provide suitable foraging habitat for the Orange Leaf-nosed Bat in its *Triodia* hummock grasslands and creeks.

4.2.5.8 Ghost Bat, Macroderma gigas *(Priority 4)*

The Ghost Bat is Australia's only carnivorous bat, preying on large insects, frogs, lizards, birds, small mammals and other bats. Prey is taken to a feeding site, which is usually a rock over-hang or small cave. During the day the Ghost Bat roosts in large caves, mines or deep rock fissures. The distribution of the Ghost Bat is patchy and widespread throughout northern Australia including the arid Pilbara region and lush north Queensland rainforests. The reasons for its decreased range in recent years are uncertain; however the Ghost Bat is sensitive to disturbance and the few remaining large colonies are at risk (Strahan, 1995).

Evidence of the Ghost Bat was recorded in the WPIOP Mine Areas (Biota, 2009a). With similar habitat requirements as the Orange Leaf-nosed Bat, it is possible that this species could be recorded as an occasional visitor to the Study Area.

4.2.5.9 Pilbara Olive Python, Morelia olivacea barroni *(Schedule 1 and Vulnerable EPBC Act)*

The Pilbara Olive Python generally occurs around watercourses in the Pilbara and is associated with permanent pools in rocky areas. This species has been the subject of behavioural and ecological studies on the Burrup Peninsula by DEC scientists and a local volunteer group, the Nickol Bay Naturalists Club (Pearson, 2003). Generally, it is a nocturnal ambush predator, often waiting at rock pools for prey. In the Pilbara, breeding occurs in the cooler months of June to August, when males will search up to 3 km for females. Eggs hatch in January and the small pythons disperse in search of food immediately after hatching (Pearson, 2003).

This species was recorded by Biota (2009a) during their survey of the WPIOP Mine Areas. Rockpiles, particularly those associated with permanent water are preferred habitat of the Pilbara Olive Python. The Study Area contains two creeks in excellent condition with intact fringing vegetation: Duck Creek is an ephemeral watercourse and pools water for many months following good seasonal rain; and another creek, believed to be a tributary of Mettawandy Creek located approximately 200 m from the centre line of the Study Area (Astron, 2010 *in prep*). These creeks would provide suitable habitat for the Olive Python.

4.2.5.10 Ramphotyphlops ganei *(Unnamed Blind Snake) (Priority 1)*

This species is endemic to the Pilbara Region (DEWHA, 2009), and which has been recorded within 40 km of the Study Area (DEC, 2010). *Ramphotyphlops* (blind snakes) are fossorial, insectivorous snakes that feed on termites and the pupae, larvae and eggs of ants (Wilson and Swan, 2004). *R. ganei* is generally associated with moist areas, such as gullies, gorges and floodplains. This species may be found in the Study Area.

4.2.5.11 Lined Soil-crevice Skink, Notoscincus butleri *(Priority 4)*

Notoscincus is a genus of skinks. The species *N. butleri* (Lined Soil-crevice Skinks) is located only in arid northwest of Western Australia (Wilson and Swan, 2004). This species may be found in the Study Area, however little is known about its habitat and range.

4.2.6 Migratory Species

4.2.6.1 Rainbow Bee-eater, Merops ornatus *(Migratory)*

The Rainbow Bee-eater is found across the better-watered parts of Western Australia including islands. It prefers lightly wooded, preferably sandy, country near water. It is a resident, breeding visitor, passage migrant and winter visitor, wintering from the Gascoyne north to Indonesia. It moves south mainly in late September and early October and north from February to April. It is scarce to very common across its range (Johnstone and Storr, 2004).

This species was recorded numerous times in the WPIOP Mine Areas (Biota, 2009a) and Rail Corridor (Biota, 2009b), and may occur within the Study Area along the minor creeklines.

4.2.6.2 Fork-tailed Swift, Apus pacificus *(Migratory)*

The Fork-tailed Swift is found in most parts of Western Australia in most open habitats, however their distribution is temporally and spatially patchy (Johnstone and Storr, 1998). This species is present in Western Australian from September to May, and often occurs prior to or after cyclone activity (Johnstone and Storr, 1998).

The Fork-tailed Swift was recorded in the central portion of the WPIOP Rail Corridor (Biota, 2009b). It is likely to occur within the Study Area given its widespread occurrence across a range of habitats.

4.2.7 Introduced Species

Biota (2009a) recorded three introduced species during their survey of the WPIOP Mine Areas: the Feral Cat, House Mouse and European Cattle. Other introduced species that are known to occur in within the wider area include the Feral Fox, Dog and European Rabbit.

5 Discussion

Studies by Biota (2009a and 2009b) indicate that the habitats of greatest significance in the WPIOP mine and rail corridor area occur where major riverine drainages adjoin rocky landforms, particularly those associated with the Robe Pisolite mine deposits. This mosaic of habitat is unlikely to be directly impacted by the construction of the Southern Access Corridor (SAC), however 'major creekline' habitat and 'stony breakaways and hills' habitat do occur within the Study Area. Therefore, potential impacts to the habitats could occur.

The potential impacts to terrestrial fauna arising from the construction of Southern Access Corridor infrastructure, particularly impacts on the creeklines and stony hill habitats include:

- Direct fauna habitat disturbance will occur as a result of clearing of fauna habitat required to construct roads and drainage.
- Indirect fauna habitat modification as a result of changes to surface hydrology, particularly sheet flow, affecting vegetation. This leads to a risk of fauna habitat degradation through indirect effects.
- Direct loss of individual fauna as a result of clearing of habitat during infrastructure construction, which is likely to lead to the direct mortality of fauna. In addition, traffic movement along the SAC during mine operation is likely to lead to ongoing direct loss of fauna.

6 Conclusion

This Desktop Study identified 206 vertebrate fauna species that may possibly occur within the Study Area encompassing the Southern Access Corridor. Of these, 13 are of conservation significance. The presence of significant fauna species or significant fauna habitat can only be determined by conducting a field fauna survey. However, due to the wide regional occurrence of habitat types found in the Study Area, and the mosaic in which they occur, it is unlikely that the construction of the Southern Access Corridor infrastructure will have significant impacts on the fauna or fauna habitat present.

7 References

Aplin, K.P. and Smith, L.A., (2001) Checklist of the Frogs and Reptiles of Western Australia. *Records of the Western Australian Museum, Supplement No. 63*, 51-74.

Aplin, T.E.H. 1979. The flora. In: *Environment and Science*. Ed: B.J. O'Brien. University of WA Press, Perth.

Astron (2010, in prep) West Pilbara Iron Ore Project Southern Access Corridor Flora and Vegetation Survey. Unpublished reported in preparation for API Management Pty Ltd. September 2009.

Biota Environmental Services (2009a) West Pilbara Iron Ore Project Mine Areas Seasonal Fauna Survey. Unpublished report prepared for API Management Pty Ltd. September 2009.

Biota Environmental Services (2009b) West Pilbara Iron Ore Project Rail Corridor Fauna and Fauna Assemblages Survey. Unpublished report prepared for API Management Pty Ltd. November 2009.

DEC (2010) NatureMap. http://naturemap.dec.wa.gov.au./default.aspx. Accessed 22 January 2010.

DEWHA (2009) Biodiversity Assessment – Pilbara. Australian Natural Resource Atlas. http://www.anra.gov.au/topics/vegetation/assessment/wa/ibra-pilbara.html. Accessed January 2010.

DEWHA (2010) Protected Matters Search Tool. http://www.environment.gov.au/erin/ert/epbc/index.html. Accessed January 2010.

EPA (2004) Guidance for the Assessment of Environmental Factors – Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. Environmental Protection Authority, Western Australia.

GeoView (2009)

http://mapserver.doir.wa.gov.au/arcims/GeoVIEW2/viewer.htm?Title=GeoVIEW.WA. Accessed January 2009. Department of Mines and Petroleum, Perth.

How, R.A, Cooper, N.K. and Bannister, J.K. (2001) Checklist of the Mammals of Western Australia. *Records of the Western Australian Museum, Supplement No. 63*, 91-98.

International Union for Conservation of Nature (IUCN) (2009) IUCN Red List: Categories and their Application.
http://www.iucn.org/about/work/programmes/species/red_list/about_the_red_list/
Accessed 16 April 2010.

Johnstone, R.E. and Storr, G.M. (1998) *Western Australian Birds: Volume I – Non- Passerines (Emu to Dollarbird).* W.A. Museum, Perth.

Johnstone, R.E. and Storr, G.M. (2004) *Western Australian Birds: Volume II –Passerines (Blue-winged Pitta to Goldfinch).* W.A. Museum, Perth.

Johnstone, R. (2001) Checklist of the birds of Western Australia. *Records of the Western Australian Museum, Supplement No. 63*, 75-90.

Kendrick, P. (2001) Pilbara 3 (PIL3 – Hamersley subregion). *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002*. Department of Conservation and Land Management.

Pearson, D. (2003) Olive Pythons in the Pilbara. *Landscope 19*, 32-39.

Storr, G.M. (1984) Birds of the Pilbara Region, Western Australia. *Records of the Western Australian Museum* Supplement No. 16**.**

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1983) *Lizards of Western Australia II. Dragons and Monitors*. W.A. Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1990) *Lizards of Western Australia. III. Geckoes and Pygopodids.* W.A. Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1999) *Lizards of Western Australia. I. Skinks.* 2nd edition, W.A. Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (2002) *Snakes of Western Australia.* 2nd edition, W.A. Museum, Perth.

Thackway, R. and Cresswell, I.D. 1995*. An Interim Biogeographic Regionalisation for Australia*: a framework for establishing the national system of reserves. Version 4.0 Canberra: Australian Nature Conservation Agency.

Thorne, A.M. and Seymour, D.B. 1991. Geology of the Ashburton Basin, Western Australia. Bulletin 139. Geological Survey of Western Australia.

Trudgen, M.E., (1988) A Report on the Flora and Vegetation of the Port Kennedy Area. Unpublished report prepared for Bowman Bishaw and Associates, West Perth.

Tyler, M.J., Smith, L.A. and Johnstone, R.E., (2000) *Frogs of Western Australia,* 2nd edition. W.A. Museum, Perth.

Van Dyck, S. and Strahan, R. (2008) *The Australian Museum Complete Book of Australian Mammals.* 3rd edition, Angus and Robertson, Sydney.

Wilson, S. and Swan, G. (2002) *A Complete Guide to Reptiles of Australia*. Reed New Holland, Sydney.

Appendix A:
List of Fauna Potentially Occurring in the Study Area

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Avifauna Species Recorded by Biota (2009a, 2009b) or recorded by DEC (2010)

FAMILY Species Name	Common Name	Conservation Status
CASURIIDAE		
Dromaius novaehollindiae	Emu	
PHASIANIDAE		
Coturnix pysilophora	Brown Quail	
Coturnix pectoralis	Stubble Quail	
ANATIDAE		
Anas superciliosa	Pacific Black Duck	
PODICIPEDIDAE		
Tachybaptus novaehollandiae	Australasian Glebe	
ARDEIDAE		
Ardea pacifica	White-necked Heron	
Ardea novaehollandia	White-faced Heron	
THRESKIORNITHIDAE		
Threskiornis spinicollis	Straw-necked Ibis	
ACCIPITRIDAE		
Hamirostra melanosternon	Black-breasted Buzzard	
Haliastuf sphenurus	Whistling Kite	
Accipiter faciatus	Brown Goshawk	
Accipiter cirrocephalus	Coloured Sparrowhawk	
Aquila morphnoides	Little Eagle	
Aquila audax	Wedge-tailed Eagle	
Circus assimilis	Spotted Harrier	
FALCONIDAE		
Falco berigora	Brown Falcon	
Falco cenchroides	Australian Kestrel	
Falco hypoleucos	Grey Falcon	Priority 4
Falco peregrinus	Peregrine Falcon	Priority 4
OTIDAE		
Ardeotis australis	Australian Bustard	Priority 4
TURNICIDAE		
Turnix velox	Little Button-quail	
COLUMBIDAE		
Phaps chalcoptera	Common Bronzewing	
Ocyphaps lophotes	Crested Pigeon	
Geophaps plumifera	Spinifex Pigeon	
Geopelia cuneata	Diamond Dove	
Geopelia striata	Peaceful Dove	
PSITTACIDAE		
Cacatua roseicapilla	Galah	
Cacatua roseicapilla subsp. *assimils*		
Cacatua sanguinea	Little Corella	
Nymphicus hollandicus	Cockateil	
Apromictus erythropterus	Red-winged Parrot	
Platycercus zonarius	Australian Ringneck	
Melopsittacus undulatus	Budgerigar	
CUCULIDAE		
Cuculus pallidus	Pallid Cuckoo	
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	
CENTROPODIDAE		

Avifauna Species Recorded by Biota (2009a, 2009b) or recorded by DEC (2010)

FAMILY Species Name	Common Name	Conservation Status
Centropus phasianinus	Pheasant Coucal	
APODIDAE		
Apus pacificus	Fork-tailed Swift	Migratory
CAPRIMULGIDAE		
Eurostopodus argus	Spotted Nightjar	
HALCYONIDAE		
Dacelo leachii	Blue-winged Kookaburra	
Todiramphus pyrrhopygia	Red-backed Kingfisher	
Todiramphus sanctus	Sacred Kingfisher	
MEROPIDAE		
Merops ornatus	Rainbow Bee-eater	Migratory
MALURIDAE		
Malurus lamberti	Variegated Fairy-wren	
Malurus leucopterus	White-winged Fairy-wren	
Stipiturus ruficeps	Rufous-crowned Emu-wren	
Amytornis striatus	Striated Grasswren	
Amytornis striatus subsp. *whitei*		
PARDALOTIDAE		
Pardalotus rubricatus	Red-browed Pardalote	
Pardalotus striatus	Striated Pardalote	
ACANTHIZIDAE		
Smicrornis breviorstris	Weebill	
Gerygone fuscsa	Western Gerygone	
MELIPHAGIDAE		
Lichmera indistincta	Brown Honeyeater	
Certhionyx niger	Black Honeyeater	
Lichenostomus virescens	Singing Honeyeater	
Lichenostomus keartlandi	Grey-headed Honeyeater	
Lichenostomus pernicillatus	White-plumed Honeyeater	
Melithreptus gularis	Black-chinned Honeyeater	
Phylidonyris albifrons	White-fronted Honeyeater	
Lacustroica whitei	Grey Honeyeater	
Manorina flavigula	Yellow-throated Miner	
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	
Epthianura tricolor	Crimson Chat	
PETROCIDAE		
Petroica goodenovii	Red-capped Robin	
Petroica cucullata	Hooded Robin	
POMATOSTOMIDAE		
Pomatostomus temporalis	Grey-crowned Babbler	
CINCLOSOMATIDAE		
Cinclosoma castaneothorax	Chestnut-breasted Quail-thrush	
PACHYCEPHALIDAE		
Oreoica gutturalis	Crested Bellbird	
Pachychephala rufiventris	Rufous Whistler	
Colluricincia harmonica	Grey Strike-thrush	
DICRURIDAE		
Rhipidura leucophrys	Willie Wagtail	
Grallina cyanoleuca	Magpie-lark	

Avifauna Species Recorded by Biota (2009a, 2009b) or recorded by DEC (2010)

FAMILY **Species Name**	**Common Name**	**Conservation Status**
CAMPEPHAGIDAE		
Coracina novaehollandiae	Black-faced Cuckoo-strike	
Corancina novaehollandiae subsp. *subpallida*		
Lalage tricolor	White-winged Triller	
ARTAMIDAE		
Artamus personatus	Masked Woodswallow	
Artamus cinereus	Black-faced Woodswallow	
Artamus minor	Little Woodswallow	
CRACTICIDAE		
Cracticus torquatus	Grey Butcherbird	
Cracticus nigrogularis	Pied Butcherbird	
Cracticus tibicen	Australian Magpie	
CORVIDAE		
Corvus orru	Torresian Crow	
Corvus bennettii	Little Crow	
HIRUNDINIDAE		
Hirundo neoxena	Welcome Swallow	
Hirundo nigricans	Tree Martin	
Hirundo ariel	Fairy Martin	
PTILONORHYNCHIDAE		
Ptilonorhynchus maculatus subsp. *quttatus*	Western Bowerbird	
Ptilonorhynchus maculatus	Spotted Bowerbird	
SYLVIIDAE		
Eremiornis carteri	Spinifex Bird	
Cincloramphus mathewsi	Rufous Songlark	
Cincloramphus cruralis	Brown Songlark	
ALAUDIDAE		
Mirafra javanica horsfieldii	Singing Bushlark	
DICAEIDAE		
Dicaeum hirundinaceum	Mistletoebird	
PASSERIDAE		
Taeniopygia guttata	Zebra Finch	
Emblema pictum	Painted Finch	
MOTACILLIDAE		
Anthus australis	Australian Pipit	

Non-volant Mammals Recorded by Biota (2009a, 2009b) or DEC (2010)

FAMILY Species	Common Name	Conservation Status
DASYURIDAE		
Dasykaluta rosamondae	Little Red Kaluta	
Dasyurus hallucatus	Northern Quoll	Schedule 1 and Vulnerable *EPBC Act*
Ningaui timealeyi	Pilbara Ningaui	
Planigale ingrami	Long-tailed Planigale	
Planigale sp. 't'	Planigale sp. 't'	
Sminthopsis longicaudata	Long-tailed Dunnart	Priority 4
Sminthopsis macroura	Stripe-faced Dunnart	
MACROPODIDAE		
Macropus robustus	Euro	
Macropus rufus	Red Kangaroo	
MURIDAE		
**Mus musculus*	House Mouse	
Pseudomys chapmani	Western Pebble-mound Mouse	Priority 4
Pseudomys delicatulus	Delicate Mouse	
Pseudomys desertor	Desert Mouse	
Pseudomys hermannsburgensis	Sandy Inland Mouse	
Zyzomys argurus	Common Rock-rat	
PHALANGERIDAE		
Trichosurus vulpecula subsp. arnhemensis	Northern Brushtail Possum	
CANIDAE		
Canis lupus dingo	Dingo	
FELIDAE		
**Felis catus*	Cat	
BOVIDAE		
**Bos taurus*	European Cattle	
Volant Mammals Recorded by Biota (2009a, 2009b) or by DEC (2010)		
EMBALLONURIDAE		
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	
Taphozous georgianus	Common Sheathtail Bat	
MEGADERMATIDAE		
Macroderma gigas	Ghost Bat	Priority 4
HIPPOSIDERIDAE		
Rhinonicteris aurantius	Pilbara Orange Leaf-nosed Bat	Schedule 1 and Vulnerable *EPBC Act*
VESPERTILIONIDAE		
Chalinolobus gouldii	Gould's Wattled Bat	
Scotorepens balstoni	Inland Broad-nosed Bat	
Scotorepens greyii	Little Broad-nosed Bat	
Vespadelus finlaysoni	Finlayson's Cave Bat	
MOLOSSIDAE		
Tadarida australis	White-striped Freetail-bat	
Chaerephon jobensis	Northern Freetail-bat	

Herpetofauna Recorded by Biota (2009a, 2009b) or by DEC (2010)

FAMILY Species	Common Name	Conservation Status
HYLIDAE		
Cyclorana maini	Sheep Frog	
Litoria rubella	Naked Tree Frog	
MYOBATRACHIDAE		
Pseudophryne douglasi	Gorge Toadlet	
GEKKONIDAE		
Gehyra punctata	Spotted Dtella	
Gehyra purpurascens	Purple Arid Dtella	
Gehyra variegata	Tree Dtella	
Heteronotia binoei	Bynoe's Gecko	
Oedura marmorata	Marbled Velvet Gecko	
Rhynchoedura ornata	Beaked Gecko	
PYGOPODIDAE		
Delma elegans	Pilbara Delma	
Delma nasuta		
Delma pax		
Delma tincta		
Lialis burtonis		
Pygopus nigriceps		
DIPLODACTYLIDAE		
Diplodactylus conspicillatus	Fat-tailed Gecko	
Diplodactylus mitchelli		
Diplodactylus savagei		
Lucasium stenodactylum		
Lucasium wombeyi		
Strophurus elderi		
SCINCIDAE		
Carlia munda	Rainbow Skink	
Ctenotus aff. helenae		
Ctenotus duricola		
Ctenotus grandis		
Ctenotus hanloni		
Ctenotus helenae	Clay-soil Ctenotus	
Ctenotus mimetes	Checker-sided Ctenotus	
Ctenotus pantherinus	Leopard Ctenotus	
Ctenotus pantherinus subsp. *ocellifer*		
Ctenotus robustus		
Ctenotus rubicundus		
Ctenotus rutilans		
Ctenotus saxatilis		
Ctenotus schomburgkii		
Ctenotus serventyi		
Ctenotus severus		
Ctenotus uber uber		
Cyclodomorphus melanops		
Cyclodomorphus melanops subsp. *melanops*		
Egernia depressa	Pygmy Spiny-tailed Skink	
Egernia formosa		

Herpetofauna Recorded by Biota (2009a, 2009b) or by DEC (2010)

FAMILY Species	Common Name	Conservation Status
Eremisacincsus sp. nov.		
Glaphyromorphus isolepis		
Lerista bipes		
Lerista clara		
Lerista flammicauda		
Lerista jacksoni		
Lerista muelleri	Mueller's Lerista	
Lerista rolfei		
Lerista verhmens		
Lerista zietzi		
Menetia greyii	Common Dwarf Skink	
Menetia surda		
Menetia surda subsp. *surda*		
Morethia ruficauda subsp. *exquisita*		
Notoscincus butleri		Priority 4
Notoscincus ornatus		
Notoscincus ornatus subsp. *ornatus*		
Tiliqua multifasciata	Cenralian Blue-tongued Lizard	
AGAMIDAE		
Ctenophorus caudicinctus	Ring-tailed Rock Dragon	
Ctenophorus caudicinctus subsp. *caudicinctus*		
Ctenophorus isolepis	Military Dragon	
Ctenophorus isolepis subsp. *isolepis*		
Ctenophorus nuchalis	Central Netted Dragon	
Ctenophorus reticulatus	Western Netted Dragon	
Ctenophorus scutulatus	Lozenge-marked Dragon	
Amphibolurus longirostris	Long-nosed Dragon	
Pogona minor	Dwarf Beared Dragon	
Tympanocryptis cephala	Pebble Dragon	
BOIDAE		
Antaresia perthensis	Pygmy Python	
Antaresia stimsoni subsp. *stimsoni*	Stimson's Python	
CARPHODACTYLIDAE		
Nephrurus wheeleri		
Nephrurus wheeleri subsp. *cinctus*		
VARANIDAE		
Varanus acanthurus	Spiny-tailed Monitor	
Varanus brevicauda	Short-tailed Pygmy Monitor	
Varanus bushi		
Varanus eremius		
Varanus giganteus	Perentie	
Varanus gilleni	Pygmy Mulga Monitor	
Varanus panoptes		
Varanus pilbarensis		
Varanus tristis		
TYPHLOPIDAE		
Ramphotyphlops ammodytes	Blind Snake	
Ramphotyphlops ganei		Priority 1

Herpetofauna Recorded by Biota (2009a, 2009b) or by DEC (2010)

FAMILY **Species**	**Common Name**	**Conservation Status**
Ramphotyphlops grypus		
Ramphotyphlops hamatus		
Ramphotyphlops pilbarensis		
PYTHONIDAE		
Liasis olivaceus barroni	Olive Python	Schedule 1 and Vulnerable *EPBC Act*
ELAPIDAE		
Acanthophis wellsi		
Brachyurophis approximans	North-wesetern Shovel-nosed Snake	
Demansia psammophis	Yellow-faced Whipsnake	
Demansia rufescens	Rufous Whipsnake	
Furina ornata	Orange-naped Snake	
Parasuta monachus	Monk Snake	
Pseudonaja modesta	Ringed Brown Snake	
Suta punctata		

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Appendix B:

Nature Map Report

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NatureMap Species Report - API Southern Access Corridor

Created By Megan Stalker on 22/01/2010

Kingdom Animalia
Species Group All Animals
Method 'By Circle'
Centre 116°21' 40" E,22°34' 15" S
Buffer 40km

	Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
1.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
2.	24540	*Amytornis striatus subsp. whitei*			
3.		*Anaphaeis java subsp. teutonia*			
4.	25318	*Antaresia perthensis (Pygmy Python)*			
5.	25241	*Antaresia stimsoni subsp. stimsoni*			
6.	24356	*Artamus personatus (Masked Woodswallow)*			
7.	25331	*Brachyurophis approximans*			
8.	25715	*Cacatua roseicapilla (Galah)*			
9.	24725	*Cacatua roseicapilla subsp. assimilis*			
10.	25015	*Carlia munda*			
11.	24834	*Cincloramphus mathewsi (Rufous Songlark)*			
12.	24363	*Coracina novaehollandiae subsp. subpallida*			
13.	24865	*Ctenophorus caudicinctus subsp. caudicinctus*			
14.	24876	*Ctenophorus isolepis subsp. isolepis*			
15.	24886	*Ctenophorus reticulatus (Western Netted Dragon)*			
16.	24889	*Ctenophorus scutulatus*			
17.	25036	*Ctenotus duricola*			
18.	25045	*Ctenotus helenae*			
19.	25054	*Ctenotus mimetes*			
20.	25064	*Ctenotus pantherinus subsp. ocellifer*			
21.	25072	*Ctenotus rubicundus*			
22.	25071	*Ctenotus rutilans*			
23.	25073	*Ctenotus saxatilis (Rock Ctenotus)*			
24.	25075	*Ctenotus severus*			
25.	25090	*Cyclodomorphus melanops subsp. melanops*			
26.	25375	*Cyclorana maini (Sheep Frog)*			
27.	24091	*Dasykaluta rosamondae (Little Red Kaluta)*			
28.	24093	*Dasyurus hallucatus (Northern Quoll)*		T	
29.	24998	*Delma elegans*			
30.	25001	*Delma nasuta*			
31.	25297	*Demansia rufescens (Rufous Whipsnake)*			
32.	24926	*Diplodactylus conspicillatus (Fat-tailed Gecko)*			
33.	24944	*Diplodactylus savagei*			
34.	25092	*Egernia depressa (Pygmy Spiny-tailed Skink)*			
35.	25094	*Egernia formosa*			
36.	24837	*Eremiornis carteri (Spinifex-bird)*			
37.	24958	*Gehyra punctata*			
38.	24957	*Gehyra purpurascens*			
39.	24959	*Gehyra variegata*			
40.	24404	*Geophaps plumifera (Spinifex Pigeon)*			
41.	25113	*Glaphyromorphus isolepis*			
42.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
43.	30928	*Lerista clara*			
44.	25135	*Lerista flammicauda*			
45.	30929	*Lerista jacksoni*			
46.	25155	*Lerista muelleri*			
47.	30924	*Lerista rolfei*			
48.	30925	*Lerista verhmens*			
49.	25005	*Lialis burtonis*			
50.	30933	*Lucasium stenodactylum*			
51.	30934	*Lucasium wombeyi*			
52.	24135	*Macropus robustus subsp. erubescens (Euro, Biggada)*			

	Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
53.	24583	*Manorina flavigula (Yellow-throated Miner)*			
54.	25184	*Menetia greyii*			
55.	25187	*Menetia surda subsp. surda*			
56.	25193	*Morethia ruficauda subsp. exquisita*			
57.	24223	*Mus musculus (House Mouse)*	Y		
58.	24972	*Nephrurus wheeleri subsp. cinctus*			
59.	25197	*Notoscincus ornatus subsp. ornatus*			
60.	24742	*Nymphicus hollandicus (Cockatiel)*			
61.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
62.	25254	*Parasuta monachus*			
63.	25721	*Platycercus zonarius (Australian Ringneck (Ring-necked Parrot))*			
64.	25263	*Pseudonaja modesta (Ringed Brown Snake)*			
65.	25432	*Pseudophryne douglasi (Gorge Toadlet)*			
66.	25724	*Ptilonorhynchus maculatus (Spotted Bowerbird)*			Y
67.	24757	*Ptilonorhynchus maculatus subsp. guttatus (Western Bowerbird)*			
68.	25270	*Ramphotyphlops ammodytes*			
69.	25276	*Ramphotyphlops ganei*		P1	
70.	25277	*Ramphotyphlops grypus*			
71.	24927	*Strophurus elderi*			
72.	24157	*Trichosurus vulpecula subsp. arnhemensis (Northern Brushtail Possum)*			
73.	30814	*Tympanocryptis cephalus (Pebble Dragon)*			
74.	25209	*Varanus acanthurus (Spiny-tailed Monitor)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5