

Appendix 8-A

Environmental Management Plan Outline - Avian Migratory Species





Environmental Management Plan Outline

Waterbirds and Woodland Birds Environmental Management Plan Outline

Species	Waterbirds	Clamorous Reed-warbler (<i>Acrocephalus stentoreus</i>), Great Egret, White Egret (<i>Ardea alba</i>), Eastern Reef Egret (<i>Egretta sacra</i>), Sarus Crane (<i>Grus antigone</i>), Glossy Ibis (<i>Plegadis falcinellus</i>).
	Woodland Birds	Oriental Cuckoo (<i>Cuculus saturates</i>), Rainbow Bee-eater (<i>Merops ornatus</i>), Satin Flycatcher (<i>Myiagra cyanoleuca</i>), Rufous Fantail (<i>Rhipidura rufifrons</i>), Black-faced Monarch (<i>Monarcha melanopsis</i>).
Preferred Habitat	Waterbirds	Preferred habitats for waterbird species include, but are not limited to, river shallows, estuaries, tidal mudflats, freshwater wetlands and large dams.
	<i>Rainbow Bee-eater / Oriental Cuckoo</i>	Both the Rainbow Bee-eater and Oriental Cuckoo are known to occur within a variety of timbered and more open habitats including woodlands and forest, riparian zones, parks and gardens, and the complex of open and timbered habitats in coastal areas, including beaches.
	<i>Satin Flycatcher / Rufous Fantail / Black-faced Monarch</i>	The Satin Flycatcher, Rufous Fantail and Black-faced Monarch are known to occupy forest and woodland habitats usually where there is deep shade and complex vegetation structure. Favoured habitats include rainforest riparian gallery forest, vine forest, <i>Melaleuca</i> forest and mangroves.
EPBC Status	Migratory	
Known Threats	Waterbirds	Threats to migratory waterbird species are associated with physical disturbance of preferred habitats, and effects on the ecological integrity of habitats that may result from development related factors such as changes to water quality, and altered groundwater and surface water regimes.
	Woodland Birds	Loss of preferred natural habitat represents the main threat to these species although the Rainbow Bee-eater may also be common in disturbed areas provided that insect prey is available.
Potential Habitat within the SoE Project Area	Waterbirds	Available habitat within the SoE Project area includes all natural and artificial wetlands, waterways and intertidal flats. Habitat for the Clamorous Reed-warbler includes those wetlands that support reed beds.
	<i>Rainbow Bee-eater / Oriental Cuckoo</i>	All habitats within the SoE Project area are considered potential habitat for both species.
	<i>Satin Flycatcher / Rufous Fantail / Black-faced Monarch</i>	Potential habitat for within the SoE Project area for these species includes the riparian and alluvial woodlands, vine forest and paperbark woodlands and wetland swamps. Additionally these species may utilise the coastal vine forest, mangrove and estuary communities found across the SoE Project area.
Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	Waterbirds	<p><u>Mining Area</u> Unlikely: mining areas do not overlap with the favoured wetland habitats of these species. <u>Infrastructure footprint</u> Possible: The riparian and colluvial habitat corridor within the Dam C footprint may be utilised by the Great Egret or Glossy Ibis during the wet season but these habitats do not represent key habitat for these species. <u>Balance of the SoE Project Area not disturbed</u> Known to Occur: Four species confirmed within the SoE Project area with an additional species likely to occur.</p>
	<i>Rainbow Bee-eater / Oriental Cuckoo</i>	<p><u>Mining Area</u> Known to Occur: Darwin Stringybark woodland habitat that occurs within the mining area is utilised by these species. <u>Infrastructure footprint</u> Known to Occur: the Rainbow Bee-eater is confirmed in these areas and the Oriental Cuckoo also likely to occur.</p>

Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	<i>Rainbow Bee-eater / Oriental Cuckoo</i>	<p><u>Balance of the SoE Project Area not disturbed</u></p> <p>Known to Occur: the Rainbow Bee-eater is common in a variety of habitats, but mainly in association with beach, estuary, vine forest and riparian habitats. The Oriental Cuckoo is likely to be present in small numbers in similar wide array of habitats.</p>
	<i>Satin Flycatcher / Rufous Fantail / Black-faced Monarch</i>	<p><u>Mining Area</u></p> <p>Unlikely: mining areas do not overlap with the favoured dense forest habitats of these species.</p> <p><u>Infrastructure footprint</u></p> <p>Likely: the Rufous Fantail and Satin Flycatcher are likely to utilise the dense riparian habitats within the Dam C area. The Black-faced Monarch possibly uses this area.</p> <p><u>Balance of the SoE Project Area not disturbed</u></p> <p>Known to Occur: the Rufous Fantail was found to be common in the SoE Project area in favoured dense habitats comprising mangroves, riparian gallery forest, vine forest and <i>Melaleuca</i> wetland. The Satin Flycatcher and Black-faced Monarch are likely to occupy similar habitats to the Rufous Fantail but especially riparian gallery forest and <i>Melaleuca</i> wetlands.</p>
SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	<p><u>Potential Impacts</u></p> <p>All potential impacts have been assessed as negligible.</p> <p><u>Clearing and Loss of Habitat</u></p> <ul style="list-style-type: none"> ▪ <i>Waterbirds</i> - These species prefer coastal, estuarine and riverine habitats that will be either undisturbed or protected from mining by the SoE environmental buffer system (refer to details below). This environmental buffer system shall exceed the requirement of the Queensland Coordinator General's approval conditions and comprise a methodology for determining set-back distances from sensitive vegetation, instead of from the banks of watercourses and wetlands. The sensitive vegetation to be buffered by Darwin Stringybark woodland will comprise the following vegetation types: riparian, wetland, estuarine, vine forest and coastal vegetation on sand. RTA would work with Traditional Owners and the relevant WCCC Sub-committee on establishment of environmental buffers as part of the CHEMP. The SoE environmental buffer system shall maintain a network of undisturbed habitats and shall be enhanced through the fire management program (refer details below) which shall conserve fire sensitive flora and promote overall vegetation diversity and the feral pig control program (refer details below) which will aim reduce pig damage to riparian and wetland areas. ▪ <i>Rainbow Bee-eater / Oriental Cuckoo</i> - The largest impacts will be on general habitat (Darwin Stringybark woodland). There will be some loss of general habitat used for foraging. However, the overall impact to these habitats will be negligible as these habitats are to be progressively rehabilitated and there is a significant amount of similar general habitat in the SoE Project area and Subregion which will not be impacted. The SoE environmental buffer system will also protect some areas of Darwin Stringybark woodland from mining. Given the habit of these species to utilise naturally open habitats and disturbed habitat such as parks and gardens, it is anticipated that the species will utilise both mature and developing rehabilitated areas. Fragmentation impacts are anticipated to be small given the highly mobile nature of these species. ▪ <i>Satin Flycatcher / Rufous Fantail / Black-faced Monarch</i> - Impacts on the Satin Flycatcher, Rufous Fantail and Black-faced Monarch will be minimal as these species prefer denser vegetation types including mangroves, riparian gallery forest, vine forest and <i>Melaleuca</i> wetland which would only be subject to limited disturbance. These areas will also be protected from mining by the SoE environmental buffer system. <p><i>Edge Effects</i> – Edge effects are anticipated to be negligible given the small amount of high suitability habitat displaced and the negligible noise, light and air quality impacts.</p> <p><i>Fragmentation of Habitat</i> – Fragmentation impacts are expected to be small given the highly mobile nature of these species.</p> <p><i>Effect on Movement/Breeding/Feeding Patterns</i> – The small amount of fragmentation of habitat caused by clearing for construction will not affect these highly mobile species.</p> <p><i>Altered Light Regime</i> – Lighting will only affect a very small proportion of overall habitat for migratory avian species.</p>	

<p>SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures</p>	<p><i>Water Quality</i> – There are no impacts on water quality anticipated that will indirectly impact migratory avian species through modification of habitat.</p> <p><i>Altered Hydrological Regime</i> – Substantial hydrological change in migratory avian habitats is not anticipated.</p> <p><i>Noise</i> – Anticipated increases in noise are relatively minor and localised compared to existing conditions.</p> <p><i>Air Quality</i> - Increases in air emissions are relatively minor and localised. The species are highly mobile and could move.</p> <p><i>Introduction of Weeds and Pests</i> – The SoE Project is unlikely to lead to the introduction of any invasive weeds or fauna that could affect migratory avian species.</p> <p><i>Altered Fire Regime</i> – Construction and operational activities are not anticipated to incur adverse changes to the current fire regime.</p> <p>Avoidance, Mitigation and Enhancement Measures</p> <p>Negligible impacts are anticipated and therefore no specific mitigation is warranted. However, these species would benefit from the following general avoidance, mitigation and enhancement measures.</p> <p><i>General Avoidance Measures</i></p> <p><u>SoE Environmental Buffer System</u></p> <ul style="list-style-type: none"> ▪ Sensitive vegetation shall be buffered from mining by Darwin Stringybark woodland including the following vegetation types: riparian, wetland, estuarine, vine forest and coastal vegetation on sand. ▪ Typically, a buffer distance up to 200m shall be adopted for vine forest, wetlands, estuaries, coastal vegetation on sand and riparian vegetation along watercourses of stream order three and above. ▪ Narrower buffer distances to a minimum of about 100m may be adopted for riparian vegetation along watercourses of stream order one and two, or where significant ecological attributes are absent and physical characteristics are such that a narrower buffer will still provide edge effect protection and filtering of surface runoff flows from disturbed areas. ▪ As a minimum, the SoE environmental buffer system will cover approximately 8,356ha more than the regulatory buffer requirements set out in the Queensland Coordinator General's conditions of approval. ▪ Carry out surveys to confirm the boundaries of mapped sensitive vegetation types in the field prior to any clearing activities associated with mining operations. Surveys shall also assess the stream order of any watercourses and the presence or absence of significant ecological features such as springs, aquatic refugia and threatened flora and fauna in and around the sensitive vegetation types. ▪ Buffer distances shall be set based on the findings of the surveys and, where relevant, stream order. ▪ Establishment of the buffer distance and authorisation for clearing non-buffered areas shall be managed through a ground disturbance approval. ▪ A buffer mapping system shall be maintained to identify all buffer areas and distances. <p><u>Siting Infrastructure in Areas with Less Sensitive Habitat</u></p> <ul style="list-style-type: none"> ▪ Project planning for infrastructure shall aim to minimise impact on avian migratory species by siting facilities in areas with less sensitive habitat. <p><i>General Mitigation and Enhancement Measures</i></p> <p><u>Fire Management Program</u></p> <p>The vegetation in the SoE environmental buffers will be enhanced by the implementation of a favourable fire regime under a fire management program.</p> <ul style="list-style-type: none"> ▪ Develop a program in cooperation with Traditional Owners and the relevant Western Cape Communities Coordinating Committee (WCCCC) sub-committee. ▪ The program shall aim to conserve fire-sensitive flora and vegetation communities and promote overall vegetation diversity by reducing fire intensity and
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<p>SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures</p>	<p>frequency and promoting a regime of early to mid-dry season lower intensity burns with a lower frequency.</p> <ul style="list-style-type: none"> Establish and maintain of a network of fire breaks to facilitate effective control burns and provide opportunities for combating inappropriate fires. Control public access to the SoE Project area. <p><u>Weed Management Program</u></p> <ul style="list-style-type: none"> Prior to the establishment of the mine access road, any vehicles travelling to the SoE Project area that are deemed to be at risk from weed contamination shall be washed down for weeds. Washdown facilities shall be provided at the Humbug barge terminal and all vehicles thoroughly washed before transfer to the Hey River barge/ferry terminal and mine access road. Runoff from wash-down facilities shall be treated before being released. Annual weed surveys shall be conducted post wet season, targeting: <ul style="list-style-type: none"> all operational areas (mining and infrastructure) and immediately adjacent ecosystems; and, site access roads. Periodic weed surveys shall be conducted at least every three years, targeting: <ul style="list-style-type: none"> habitats where key weed species are most likely to become established; and, areas within the mining lease where there is high recreational visitation (especially riparian and wetland areas). Detailed mapping of the above areas shall form the basis of the weed management program and guide annual weed surveys. Training courses shall be conducted regularly for relevant mine personnel, highlighting significant weed species and basic identification features for weeds likely to be encountered on the site, to ensure staffs have been provided with enough information to accurately identify weed species. Protocols shall be established for easy reporting of weed occurrence by any personnel working on site and be of a format that encourages reporting. Results of weed surveys and any weed reporting shall be uploaded to the site GIS in a timely manner so that weed mapping is maintained as a live database. Any weed infestation areas shall have controlled access until appropriate treatment and suppression is complete and there is no risk of propagules being translocated. <p><u>Feral Pig Control Program</u></p> <p>A feral pig control program shall be developed in consultation with EHP and shall be further refined and implemented in consultation with the Traditional Owners. The program, which shall focus on reducing feral pig numbers, will reduce feral pig damage to riparian and wetlands areas within the management zone. The feral pig control program shall include the following:</p> <ul style="list-style-type: none"> shooting of feral pigs (helicopter or ground based methods) shall occur in annually (typically in May). Specific details of control methods to be employed shall be subject to safety considerations and availability of equipment; and, cover the coastal zone between Ina Creek and Winda Winda Creek and associated riparian hinterland areas. <p><u>Progressive Rehabilitation</u></p> <p>Progressive rehabilitation will enable the establishment of habitat that can be utilised by some Waterbirds and Woodland Birds.</p> <ul style="list-style-type: none"> Develop and implement a rehabilitation strategy, including objectives and commitments described in the Western Cape Communities Coexistence Agreement (WCCCA) that will return the land to a post-mining land use that will be safe, stable, protects downstream water quality, and is self-sustaining. A Rehabilitation Management Plan for the SoE Project shall be prepared and submitted to EHP within three years of the commencement of bauxite mining. An interim rehabilitation management plan shall be prepared and submitted to EHP for approval before 30 August 2013 which shall be reviewed and updated annually until the final Rehabilitation Management Plan is approved by EHP. The Rehabilitation Management Plan shall include the following:
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SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	<ul style="list-style-type: none"> ▪ schematic representation of final land form inclusive of drainage features; ▪ slope and cover designs; ▪ drainage design; ▪ erosion controls proposed on reformed land; ▪ revegetation methods inclusive of plant species selection, re-profiling, soil handling (including stockpiling), soil ameliorants/amendments, surface preparation and method of propagation; ▪ materials balance including available topsoil and low permeability capping material; ▪ geotechnical, geochemical and hydrological studies; ▪ chemical, physical and biological properties of soil and water; ▪ agreed post mining land and/or infrastructure use with the landowner/holder and the administering authority; ▪ rehabilitation goal, rehabilitation objective, indicators and measurable completion criteria for each agreed post mining land use within each domain that enables determination of rehabilitation success; ▪ description of experimental design for monitoring of reference and rehabilitated areas inclusive of statistical design; ▪ a rehabilitation monitoring program based on a statistically sound, mutually agreed sampling design; ▪ research program and associated milestones; and, ▪ programs for maintenance of rehabilitation as required to achieve the nominated rehabilitation objective. <ul style="list-style-type: none"> ▪ Rehabilitation indicators shall be measured and monitored to track the performance of rehabilitation against rehabilitation objectives. A range of indicators shall be chosen for monitoring. These may be improved on in the future as site-specific research trials, the findings of on-going monitoring, and consultation outcomes become available. ▪ A rehabilitation monitoring program shall be developed to regularly assess the success of rehabilitation. The monitoring methodology would be likely to be similar to that currently used for operations north of the Embley River and include: <ul style="list-style-type: none"> ▪ monitoring in the first year after establishment at a scale of one 500m² transect plot per 10ha of rehabilitation; and, ▪ follow-up monitoring, for example 4, 8 and 12 years after establishment. ▪ Performance against rehabilitation indicators shall be used to inform an adaptive management approach. <p><u>Surface Water Management</u></p> <ul style="list-style-type: none"> ▪ Stormwater runoff shall be managed by constructing and maintaining appropriately sized stormwater management structures. ▪ An erosion and sediment management plan shall be developed prior to construction. ▪ Surface water monitoring shall be conducted in accordance with Coordinator General's approval conditions for the SoE Project: <ul style="list-style-type: none"> ▪ a network of at least 28 surface water monitoring locations shall be maintained. Locations shall be related to proximity to authorised surface water release points. The parameters to be monitored include pH, EC, turbidity, sulphate, suspended solids, aluminium, copper, lead, iron and zinc. Locations shall be monitored regularly to establish a statistical baseline (consistent with ANZECC requirements) and also when any releases to surface water occur. ▪ investigation trigger values for fresh and estuarine waters have been set based on ANZECC (2000) default values and site-specific contaminant limits for receiving waters are to be set based on the statistical baseline.
Rehabilitation	<ul style="list-style-type: none"> ▪ A Rehabilitation Management Plan shall be implemented enabling the establishment of habitat that can be utilised by migratory avian species.
Collection of Baseline Data	<ul style="list-style-type: none"> ▪ Baseline data on Waterbird and Woodland Bird species was collected during EIS surveys for the SoE Project (RTA 2013).
Monitoring and Inspection	<ul style="list-style-type: none"> ▪ Monitoring and inspection of the SoE environmental buffer system, fire and weed management programs and rehabilitation. ▪ Surface water monitoring

Incident Management	<ul style="list-style-type: none"> Incidents to be reported and managed in accordance with the RTA's certified ISO14001 Environmental Management System and incident management system.
Performance Reporting	<ul style="list-style-type: none"> Monitoring is conducted in accordance with this Management Plan. Zero incidents relating to Waterbirds or Woodland Birds.
Auditing	<ul style="list-style-type: none"> Auditing of this plan including the effectiveness of mitigation measures and monitoring shall be conducted in accordance with the RTA's certified ISO14001 Environmental Management System.

ANZECC/ARMCANZ (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. National Water Quality Strategy. Australian and New Zealand Environment Conservation Council and Agricultural Resource Management Council of Australia and New Zealand, Canberra.

RTA (2013). *Environmental Impact Statement*. Rio Tinto Alcan.

International Migratory Shorebirds, Aerial Species, Barn Swallow, Raptors and Seabirds Environmental Management Plan Outline

Species	International Migratory Shorebirds	Common Sandpiper (<i>Actitis hypoleucos</i>), Sharp-tailed Sandpiper (<i>Calidris acuminata</i>), Red Knot (<i>Calidris canutus</i>), Curlew Sandpiper (<i>Calidris ferruginea</i>), Red-necked Stint (<i>Calidris ruficollis</i>), Great Knot (<i>Calidris tenuirostris</i>), Greater Sand Plover (<i>Charadrius leschenaultia</i>), Lesser Sand Plover (<i>Charadrius mongolus</i>), Oriental Plover (<i>Charadrius veredus</i>), Latham's Snipe (<i>Capella hardwickii</i>), Japanese Snipe (<i>Gallinago hardwickii</i>), Grey-tailed Tattler (<i>Heteroscelus brevipes</i>), Asian Dowitcher (<i>Limnodromus semipalmatus</i>), Bar-tailed Godwit (<i>Limosa lapponica</i>), Black-tailed Godwit (<i>Limosa limosa</i>), Eastern Curlew (<i>Numenius madagascariensis</i>), Little Curlew, Little Whimbrel (<i>Numenius minutus</i>), Whimbrel (<i>Numenius phaeopus</i>), Pacific Golden Plover (<i>Pluvialis fulva</i>), Grey Plover (<i>Pluvialis squatarola</i>), Common Greenshank (<i>Tringa nebularia</i>), Marsh Sandpiper (<i>Tringa stagnatilis</i>), Terek Sandpiper (<i>Xenus cinereus</i>).
	Aerial Species	Fork-tailed Swift (<i>Apus pacificus</i>), White-throated Needletail (<i>Hirundapus caudacutus</i>).
	Barn Swallow	Barn Swallow (<i>Hirundorustica</i>).
	Raptors	White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>), Eastern Osprey (<i>Pandion cristatus</i>).
	Seabirds	Great Frigatebird (<i>Fregata minor</i>), Lesser Frigatebird (<i>Fregata ariel</i>), Little Tern (<i>Sterna albifrons</i>).
Preferred Habitat	International Migratory Shorebirds	Migratory shorebirds utilise a variety of habitat types including tidal mudflats and sandflats, inland lakes or waterways and estuaries. A number of internationally significant sites occur across Queensland. The nearest significant site is the south east Gulf of Carpentaria and is found approximately 500km south of the SoE Project area.
	Aerial Species	Aerial species spend day and night on the wing and occupy airspace above most habitat types.
	Barn Swallow	The Barn Swallow is often recorded in open country, near water, towns and cities. Habitats in which this species is known to occur include freshwater wetlands and paperbark woodland.
	Raptors	The Eastern Osprey and White-bellied Sea-Eagle are wide ranging bird species which occupy marine and terrestrial habitats. Preferred habitat for the Eastern Osprey includes coasts, estuaries, bays and inlets. The White-bellied Sea-Eagle utilises the same habitats as the Eastern Osprey as well as large rivers and inland lakes. Both bird species nest in tall trees within 1km of water.
	Seabirds	Seabirds utilise coastal waters and open ocean for feeding. Seabird species are known to breed in colonies on beaches and offshore islands.
EPBC Status	Migratory	
Known Threats	International Migratory Shorebirds	<p>Note: the known threats listed below are not all necessarily applicable to the SoE Project. Mitigation measures for relevant impacts on international migratory shorebirds associated with the SoE Project are detailed separately in this table.</p> <p>The following known threats to international migratory shorebird species have been identified:</p> <ul style="list-style-type: none"> Clearing, inundation, infilling or draining of habitat; Changes in hydrology, water quality or structural changes near roosting sites causing an indirect loss or degradation of

Known Threats	International Migratory Shorebirds	<p>habitat;</p> <ul style="list-style-type: none"> Habitat degradation due to loss of marine or estuarine vegetation, weed invasion of intertidal mudflats, water pollution and changes to the water regime, changes to hydrological regimes leading to the exposure of acid sulphate soils; Disturbance of during foraging as a result of residential and recreational activities; and, Direct mortality as a result of interferences in the flyways or degradation of important sites across flyways. These may include but are not limited to the development of wind farms in migration pathways, bird strike by aeroplanes and oil and chemical spills. <p>The above threats occur mainly as a result of population growth and economic development, especially in east and south-east Asia.</p>
	Aerial Species	Within Australia there are no recognised significant threats to these species.
	Barn Swallow	There are no specific threats to this species in Australia.
	Raptors	Nest disturbance and habitat loss are the primary threats to both raptor species within Queensland.
	Seabirds	<p>The primary threats to the Little Tern potentially occur at nesting sites along beaches where vehicle and human disturbance can directly destroy nests or adversely affect breeding activity, and feral animals can prey on eggs and young. The large numbers of feral pigs in the sub-region represent a significant predator threat to the species. Away from breeding areas, threats include:</p> <ul style="list-style-type: none"> Deterioration of water quality in estuaries; Pesticide residues in fish; and, Oil fouling of individuals and beach habitat. <p>Nesting Frigatebirds are subject to a number of threats. Threats to the mainland roosts include clearing of roost habitat, weed infestation that reduces long term recruitment of canopy trees, and frequent hot fires that may also affect recruitment of potential roost trees.</p> <p>Within foraging areas, threats to the species comprise any processes that lead to the deterioration of food items such as small fish and squid.</p>
Potential Habitat within the SoE Project Area	International Migratory Shorebirds	Shorebird habitat within the SoE Project area includes coastal intertidal zones and estuarine waterways found along the Gulf shoreline, the lower and upper estuary of Norman Creek, Hey Point estuary, and the coastal wetlands associated with Norman Creek and the Ward River.
	Aerial Species	It is considered that both aerial species would occupy airspace above the entire SoE Project area.
	Barn Swallow	Within the SoE Project area potential habitat for the Barn Swallow includes Darwin Stringybark forest, riparian gallery forest and alluvial woodland, paperbark woodland, foreshore, vine thicket, mangrove and estuarine communities.
	Raptors	Habitat for both raptor species within the SoE Project area includes tall trees lining the coastline and estuaries. Fringing riparian woodland would also provide nesting opportunities for the White-Bellied Sea Eagle. Habitat within the SoE Project area includes mangrove and estuarine communities, wetlands and riparian woodland, coastal foreshore, beach and tidal flats.

Potential Habitat within the SoE Project Area	Seabirds	Seabird habitat within the SoE Project area includes the coastal waters and estuary inlets to the west of the site. Scattered dunal areas found within the SoE Project area may accommodate breeding colonies for the Little Tern.
Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	International Migratory Shorebirds	<p><u>Mining Area</u> Unlikely: mining areas do not overlap with the favoured wetland habitats of these species. <u>Infrastructure footprint</u> Likely: isolated individuals may forage in the Port area. The wetland and riparian habitats in the Dam C area are unlikely to be utilised by the species. <u>Balance of the SoE Project Area not disturbed</u> Known to Occur: five species confirmed as present with a further three species likely and 14 species possible.</p>
	Aerial Species	<p><u>Mining Area</u> Likely: airspace above all habitats likely to be utilised. <u>Infrastructure footprint</u> Likely: airspace above all habitats likely to be utilised. <u>Balance of the SoE Project Area not disturbed</u> Known to Occur: both species confirmed within coastal and riparian habitats but likely to utilise airspace above all habitats.</p>
	Barn Swallow	<p><u>Mining Area</u> Possible: the species may forage above Darwin Stringybark woodland in proposed mining areas. <u>Infrastructure footprint</u> Likely: the species is likely to forage in the area within the infrastructure footprint. <u>Balance of the SoE Project Area not disturbed</u> Likely: habitats likely to be occupied by the species include naturally open areas such as beach, estuary and coastal swamps throughout the SoE Project area.</p>
	Raptors	<p><u>Mining Area</u> Unlikely: mining areas do not overlap with the favoured coastal habitats of these species. <u>Infrastructure footprint</u> Known to Occur: both species forage along the coastline where the port would be constructed. <u>Balance of the Project Area not disturbed</u> Known to Occur: both species confirmed in favoured habitat throughout the Project area.</p>
	Seabirds	<p><u>Mining Area</u> Unlikely: mining areas do not overlap with the favoured coastal habitats of these species. <u>Infrastructure footprint</u> Known to Occur: all three species forage along the coastline where the Port would be constructed. <u>Balance of the SoE Project Area not disturbed</u> Known to Occur: three species confirmed within the SoE Project area in coastal habitats. No Frigatebird roosts located or anticipated within the SoE Project area.</p>

<p>SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures</p>	<p><u>Potential Impacts</u></p> <p>All potential impacts as follows have been assessed as negligible.</p> <p><u>Clearing and Loss of Habitat</u></p> <ul style="list-style-type: none"> ▪ <i>International Migratory Shorebirds</i> - Negligible impacts are anticipated. International migratory shorebirds are restricted to coastal and wetland habitats that would not be affected by mining disturbance and would be subject to limited construction and operational disturbance. These habitats shall be protected from mining <u>by the SoE environmental buffer system</u> (refer to details below). The SoE environmental buffer system shall exceed the requirement of the Coordinator General's approval conditions and comprise a methodology for determining set-back distances from sensitive vegetation, instead of from the banks of watercourses and wetlands. The sensitive vegetation to be buffered by Darwin Stringybark woodland shall comprise the following vegetation types: riparian, wetland, estuarine, vine forest and coastal vegetation on sand. RTA would work with Traditional Owners and the relevant WCCCC Sub-committee on establishment of environmental buffers as part of the Communities Heritage and Environmental Management Plan. The SoE buffer system will maintain a network of undisturbed habitats and will be enhanced through the fire management program (refer details below) which aims to conserve fire sensitive flora and promote overall vegetation diversity and the feral pig control program (refer details below) which will reduce pig damage to riparian and wetland areas. ▪ <i>Aerial Species</i> - Negligible impacts are anticipated. There will be some loss of general habitat used for foraging. However, the overall impact to these habitats will be negligible as it would be progressively rehabilitated and there is a significant amount of similar general habitat in the SoE Project area and Subregion which would not be impacted. The SoE environmental buffer system will also protect some areas of Darwin Stringybark woodland from mining. For the aerial species group, foraging habitat comprises the airspace above terrestrial habitats and the availability of prey within this zone is not necessarily related to the terrestrial habitat located directly below it, as evidenced by this species foraging equally over natural and disturbed habitat types. ▪ <i>Barn Swallow</i> - Negligible impacts are anticipated. There will be some loss of general habitat used for foraging. However, the overall impact to these habitats will be negligible as it would be progressively rehabilitated and there is a significant amount of similar general habitat in the SoE Project area and subregion which would not be impacted. The SoE environmental buffer system will also protect some areas of Darwin Stringybark woodland from mining. Fragmentation impacts are anticipated to be small given the highly mobile nature of these species. ▪ <i>Raptors</i> - Negligible impacts are anticipated. These species prefer coastal, estuarine and riverine habitats that will be either undisturbed or protected from mining by the SoE environmental buffer system. ▪ <i>Seabirds</i> - No roosts of the Lesser or Great Frigatebird occur within areas that would be disturbed by the SoE Project and disturbance to these species habitats is restricted to a very small extent of disturbance to foraging habitat in coastal areas. These habitats will be protected from mining by the SoE environmental buffer system. The nearest roost trees of the Lesser or Great Frigatebird near Weipa are several hundred metres from the proposed Humbug barge <i>terminal</i> and adjacent to an existing industrial area and wharf. This Frigatebird roosting area has co-existed with the Lorim Point industrial area for over 40 years and long experience indicates that the birds are largely unaffected by the substantial industrial activity in the area. There is no suitable nesting habitat for the Little Tern at the proposed Port site or at the site of the temporary seaborne access infrastructure near Pera Head and this area was not observed to be used for roosting by the species. <p><i>Edge Effects</i> – Edge effects are anticipated to be negligible given the small amount of high suitability habitat displaced and the negligible noise, light and air quality impacts.</p> <p><i>Fragmentation of Habitat</i> – Fragmentation impacts are expected to be small given the highly mobile nature of these species</p> <p>Effect on Movement/Breeding/Feeding patterns – The small amount of fragmentation of habitat caused by clearing for construction will not affect these highly mobile species.</p>
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<p>SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures</p>	<p><i>Altered Light Regime</i> – Lighting will only affect a very small proportion of overall habitat for migratory avian species. Impacts on seabirds associated with light from the Humber barge terminal would occur within a background of substantial existing light emissions and have a negligible impact on the roost area.</p> <p><i>Water Quality</i> – There are no impacts to water quality anticipated that will indirectly impact migratory avian species through modification of habitat.</p> <p><i>Altered Hydrological Regime</i> – Substantial hydrological change in migratory avian habitats is not anticipated during construction or operations.</p> <p><i>Noise</i> – Anticipated increases in noise are relatively minor and localised compared to existing conditions.</p> <p><i>Air Quality</i> – Increases in air emissions are relatively minor and localised. The species are highly mobile and could move.</p> <p><i>Introduction of Weeds and Pests</i> – the SoE Project is unlikely to lead to the introduction of any invasive weeds or fauna that could affect migratory avian species.</p> <p><i>Altered Fire Regime</i> – Construction and operational activities are not anticipated to incur adverse changes to the current fire regime.</p> <p>Avoidance, Mitigation and Enhancement Measures</p> <p>Negligible impacts are anticipated and therefore no specific mitigation is warranted. However, these species would benefit from the following general avoidance, mitigation and enhancement measures:</p> <p><i>General Avoidance Measures</i></p> <p><u>SoE Environmental Buffer System</u></p> <ul style="list-style-type: none"> ▪ Sensitive vegetation shall be buffered from mining by Darwin Stringybark woodland including the following vegetation types: riparian, wetland, estuarine, vine forest and coastal vegetation on sand. ▪ Typically, a buffer distance up to 200m shall be adopted for vine forest, wetlands, estuaries, coastal vegetation on sand and riparian vegetation along watercourses of stream order three and above. ▪ Narrower buffer distances to a minimum of about 100m may be adopted for riparian vegetation along watercourses of stream order one and two, or where significant ecological attributes are absent and physical characteristics are such that a narrower buffer will still provide edge effect protection and filtering of surface runoff flows from disturbed areas. ▪ As a minimum, the SoE environmental buffer system will cover approximately 8,356ha more than the regulatory buffer requirements set out in the Queensland Coordinator General's conditions of approval. ▪ Carry out surveys to confirm the boundaries of mapped sensitive vegetation types in the field prior to any clearing activities associated with mining operations. Surveys shall also assess the stream order of any watercourses and the presence or absence of significant ecological features such as springs, aquatic refugia and threatened flora and fauna in and around the sensitive vegetation types. ▪ Buffer distances shall be set based on the findings of the surveys and, where relevant, stream order. ▪ Establishment of the buffer distance and authorisation for clearing non-buffered areas shall be managed through a ground disturbance approval. ▪ A buffer mapping system shall be maintained to identify all buffer areas and distances. <p><u>Siting infrastructure in areas with less sensitive habitat.</u></p> <ul style="list-style-type: none"> ▪ Project planning for infrastructure shall aim to minimise impact on avian migratory species by siting facilities in areas with less sensitive habitat.
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<p>SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures</p>	<p><i>General Mitigation and Enhancement Measures</i></p> <p>The following mitigation/enhancement measures shall be implemented to further reduce overall impact on these species.</p> <p><u>Fire Management Program</u></p> <p>The vegetation in the SoE environmental buffers will be enhanced by the implementation of a favourable fire regime under a fire management program</p> <ul style="list-style-type: none"> ▪ Develop a program in cooperation with Traditional Owners and the relevant Western Cape Communities Coordinating Committee (WCCCC) sub-committee. ▪ The program shall aim to conserve fire-sensitive flora and vegetation communities and promote overall vegetation diversity by reducing fire intensity and frequency and promoting a regime of early to mid-dry season lower intensity burns with a lower frequency. ▪ Establish and maintain of a network of fire breaks to facilitate effective control burns and provide opportunities for combating inappropriate fires. ▪ Control public access to the SoE Project area. <p><u>Weed Management Program</u></p> <ul style="list-style-type: none"> ▪ Prior to the establishment of the mine access road, any vehicles travelling to the SoE Project area that are deemed to be at risk from weed contamination shall be washed down for weeds. ▪ Washdown facilities shall be provided at the Humbug barge terminal and all vehicles thoroughly washed before transfer to the Hey River barge/ferry terminal and mine access road. ▪ Runoff from wash-down facilities shall be treated before being released. ▪ Annual weed surveys shall be conducted post wet season, targeting: <ul style="list-style-type: none"> ▪ All operational areas (mining and infrastructure) and immediately adjacent ecosystems; and, ▪ Site access roads. ▪ Periodic weed surveys shall be conducted at least every three years, targeting: <ul style="list-style-type: none"> ▪ habitats where key weed species are most likely to become established; and, ▪ areas within the mining lease where there is high recreational visitation (especially riparian and wetland areas). ▪ Detailed mapping of the above areas shall form the basis of the weed management program and guide annual weed surveys. ▪ Training courses shall be conducted regularly for relevant mine personnel, highlighting significant weed species and basic identification features for weeds likely to be encountered on the site, to ensure staffs have been provided with enough information to accurately identify weed species. ▪ Protocols shall be established for easy reporting of weed occurrence by any personnel working on site and be of a format that encourages reporting. ▪ Results of weed surveys and any weed reporting shall be uploaded to the site GIS in a timely manner so that weed mapping is maintained as a live database. ▪ Any weed infestation areas shall have controlled access until appropriate treatment and suppression is complete and there is no risk of propagules being translocated. <p><u>Feral Pig Control Program</u></p> <p>A feral pig control program shall be developed in consultation with EHP and shall be further refined and implemented in consultation with the Traditional Owners. The program, which will focus on reducing feral pig numbers, will reduce feral pig damage to riparian and wetlands areas within the management zone. The feral pig control program would include the following:</p> <ul style="list-style-type: none"> ▪ Shooting of feral pigs (helicopter or ground based methods) shall occur annually (typically in May). Specific details of control methods to be employed
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SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	<p>shall be subject to safety considerations and availability of equipment; and,</p> <ul style="list-style-type: none"> ▪ Cover the coastal zone between Ina Creek and Winda Winda Creek and associated riparian hinterland areas. <p><u>Surface Water Management</u></p> <ul style="list-style-type: none"> ▪ Stormwater runoff shall be managed by constructing and maintaining appropriately sized stormwater management structures. ▪ An erosion and sediment management plan shall be developed prior to construction. ▪ Surface water monitoring would be conducted in accordance with Coordinator General's approval conditions for the SoE Project: <ul style="list-style-type: none"> ▪ a network of at least 28 surface water monitoring locations shall be maintained. Locations shall be related to proximity to authorised surface water release points. The parameters to be monitored include pH, EC, turbidity, sulphate, suspended solids, aluminium, copper, lead, iron and zinc. Locations shall be monitored regularly to establish a statistical baseline (consistent with ANZECC requirements) and also when any releases to surface water occur. ▪ investigation trigger values for fresh and estuarine waters have been set based on ANZECC (2000) default values and site-specific contaminant limits for receiving waters are to be set based on the statistical baseline.
Rehabilitation	<ul style="list-style-type: none"> ▪ Given the minimal habitat disturbed for most of these species, rehabilitated mining areas are unlikely to be utilised by most species ▪ The Barn Swallow would potentially use rehabilitated areas and the aerial species (Fork-tailed Swift, White-throated Needletail) would forage over rehabilitated areas. ▪ A Rehabilitation Management Plan for the SoE Project shall be prepared and submitted to EHP within three years of the commencement of bauxite mining. An interim rehabilitation management plan shall be prepared and submitted to EHP for approval before 30 August 2013 which shall be reviewed and updated annually until the final Rehabilitation Management Plan is approved by EHP.
Collection of Baseline Data	<ul style="list-style-type: none"> ▪ Baseline data on for these species was collected during EIS surveys for the SoE Project (RTA 2013).
Monitoring and Inspection	<ul style="list-style-type: none"> ▪ Monitoring and inspection of the SoE environmental buffer system, fire and weed management programs and rehabilitation. ▪ Surface water monitoring.
Incident Management	<ul style="list-style-type: none"> • Incidents to be reported and managed in accordance with the RTA's certified ISO14001 Environmental Management System and incident management system.
Performance Reporting	<ul style="list-style-type: none"> ▪ Monitoring is conducted in accordance with this Management Plan. ▪ Zero incidents relating to international migratory shorebirds, aerial species, the Barn Swallow, raptors or seabirds.
Auditing	<ul style="list-style-type: none"> ▪ Auditing of this plan including the effectiveness of mitigation measures and monitoring shall be conducted in accordance with the RTA's certified ISO14001 Environmental Management System.

ANZECC/ARMCANZ (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. National Water Quality Strategy. Australian and New Zealand Environment Conservation Council and Agricultural Resource Management Council of Australia and New Zealand, Canberra.

RTA (2013). *Environmental Impact Statement*. Rio Tinto Alcan.