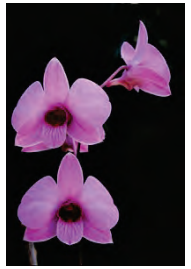
Rio Tinto Alcan

Appendix 5-A

Environmental Management Plan Outline - Threatened Flora Species



COOKTOWN ORCHID (*Dendrobium bigibbum*)

Environmental Management Plan Outline

Habitat	The Cooktown Orchid grows as an epiphyte on a variety of tree and rock hosts. It occurs on northern Cape York Peninsula south to about the Archer River. A closely related species, *Dendrobium phalaenopsis* (*Vappodes phaelenopsis*) also known as Cooktown Orchid, is listed as vulnerable and has a more restricted distribution centred on the Cooktown area. The Cooktown Orchid (*Dendrobium bigibbum*) inhabits denser vegetation types with moderate light intensity including coastal and inland vine forest, moist gullies in open forest and woodland with protection from fire, and riparian vegetation. There are records of the species from throughout its range in the northern Cape York Peninsula and it may be locally common in suitable habitat. The Cooktown Orchid has been recorded from several locations in the subregion, particularly in notophyll vine forest on coastal dunes and on lateritic red earths. The habitat preference of this species is well known and is restricted to closed forest, typically as an epiphyte in rainforest, vine thicket and mangrove habitats. The species is sensitive to fire and therefore is found only in situations where frequent fires do not occur. Vine forest patches on bauxite provide the required fire protection but with respect to riparian gallery forest the species is more commonly encountered inside broad occurrences of the vegetation, or where lateral seepage zones and mesic ground vegetation suppress fire frequency and scorch height.
EPBC Status	Vulnerable
Known Threats	▪ Pressure from localised settlement and visitors. ▪ Altered fire regimes. ▪ Illegal collection. ▪ It has also been suggested that the Cooktown Orchid may also be detrimentally affected by an increase in the incidence of severe cyclones.
Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	**Mining Area** **Unlikely:** No suitable habitat exists in Darwin Stringybark woodland. **Infrastructure footprint** **Known to Occur**: Identified in two locations in pockets of riparian rainforest within the footprint of Dam C, in the vicinity of the infrastructure corridor crossings on Norman Creek, and in the vicinity of road crossings of Norman Creek and Winda Winda Creek. **Balance of SoE Project Area not disturbed** **Known to Occur:** Located in coastal and non-coastal vine forest, and mangrove edges at several locations within the SoE Project area that would not be affected by mining or infrastructure.
SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	**Potential Impact - Clearing and Loss of Habitat** As a result of the construction of the Dam C and some linear infrastructure crossings. **Potential Impact - Fragmentation of Habitat in Construction Areas** Construction of infrastructure would produce small gaps in linear habitats occupied by the species.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	***Avoidance Measures*** The following avoidance measures will reduce Project related impacts on the Cooktown Orchid from clearing and loss of habitat and fragmentation of habitat: ▪ All remaining areas of known and potential habitat of the Cooktown Orchid within the Project area shall be protected from mining within the SoE environmental buffer system (see below for further details). 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, rather than 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 shall work with Traditional Owners and the relevant WCCCC Sub-committee on establishment of environmental buffers as part of the CHEMP. The SoE environmental 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. ▪ Mining shall not occur in areas that provide habitat for the Cooktown Orchid. ▪ Project planning for infrastructure shall minimise impact on vegetation that provides habitat for Cooktown Orchid. ▪ One original water supply option involved constructing a smaller single stage of Dam C and constructing a second dam on the Ward River. This option involved a greater total area of disturbance and the Ward River Dam will not be constructed. <u>SoE Environmental Buffer System</u> ▪ The SoE environmental buffer system shall maintain a network of undisturbed habitat. ▪ All of the potential habitat for the species within the Project area shall be protected from mining by the SoE environmental buffer system. ▪ 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. **Potential Impact - Air Quality** The vigour of a small number of individual plants could be adversely affected by dust settling on foliage in areas close to construction activities.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	***Mitigation Measures***
	<u>Dust Management</u>
	The following dust abatement measures shall be implemented to minimise airborne dust during construction and the potential effects of settled dust on individual plants.
	▪ Restricting the area to be cleared to the minimum practical.
	▪ Road watering during construction.
	
	Potential Impact - Introduction of Weeds
	Construction and operational activities could lead to the introduction and spread of fire promoting weeds and smothering weeds. If left to proliferate these weeds could affect potential habitat of the species.
	
	Mitigation Measures
	<u>Weed Management Program</u>
	▪ 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:
	  ▪ 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:
	  ▪ 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 staff 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.
	
	Potential Impact - Altered Fire Regime
	Construction and operational activities could have moderate impacts on the fire regime if fire promoting weeds are introduced.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	***Mitigation Measures***
	Weed Management Program (refer to detail above)
	
	Potential Negligible Impacts
	Edge Effects - Clearing may produce edge effects at the edge of riparian vegetation where infrastructure necessarily crosses drainage lines. However, the extent of the edge effect on the species would be negligible as individuals of the species are regularly observed at the natural edge of riparian and vine forest vegetation.
	Effects on Recruitment/Movement of Propagules - Construction of infrastructure will produce small gaps in linear habitats occupied by the species but not of a sufficient magnitude to affect local dispersal of propagules or genetic continuity.
	Altered Hydrological Regime - Substantial changes to riparian and non-riparian ecosystems due to potential changes to groundwater and surface water hydrology are not anticipated and any effects are unlikely to impact on epiphytic species.
	
	General Mitigation and Enhancement Measures
	Specific mitigation measures are not required for the negligible impacts, however, the following general mitigation and enhancement measures will further reduce any potential for impact on the species and shall enhance the existing environment.
	
	SoE Environmental Buffer System
	The SoE environmental buffer system (refer details above) shall further reduce any potential for impact from any alteration of the hydrological regime on areas that may provide habitat for the Cooktown Orchid.
	
	Surface Water Management
	▪ 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:
	  ▪ 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 would 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.
	
	Fire Management Program
	The vegetation in the SoE environmental buffers will be enhanced by the implementation of a favourable fire regime under a fire management program.
	▪ 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.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	▪ Establish and maintain of a network of fire breaks to facilitate effective control burns and provide opportunities for combating inappropriate fires. ▪ Restrict public access to the SoE Project area. <u>Feral Pig Control Program</u> 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 pig damage to riparian and wetlands areas within the management zone that support habitat for the Cooktown Orchid and shall enhance that habitat. The feral pig control program shall include the following: ▪ shooting of feral pigs (helicopter or ground based methods) shall occur 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. <u>Translocation Program</u> A condition of the Queensland Coordinator General's approval of the SoE Project is that for each plant that is found within disturbance areas, 3.5 orchid plants shall be translocated and/or propagated and established in areas of riparian habitat that are not to be disturbed.
Rehabilitation	▪ Only small areas of habitat for this species would need to be rehabilitated. ▪ RTA will develop and implement a rehabilitation strategy, including objectives and commitments described in the Western Cape Communities Coexistence Agreement (WCCCA) that would 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 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	▪ Baseline data on the Cooktown Orchid was collected during EIS surveys for the Project (RTA 2013).
Monitoring and Inspection	▪ Monitoring and inspection of vegetation buffer, fire and weed management programs, and rehabilitation. ▪ Vegetation surveys prior to clearing associated with mining. ▪ Annual and periodic weed surveys. ▪ Surface water monitoring.
Incident Management	▪ Incidents to be reported and managed in accordance with the RTA's certified ISO14001 Environmental Management System and incident management system.
Performance Reporting	▪ Monitoring is to be conducted in accordance with this Management Plan. ▪ Zero incidents relating to the Cooktown Orchid.
Auditing	▪ 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.

CHOCOLATE TEA TREE ORCHID (*Dendrobium johannis*)
Environmental Management Plan Outline

Habitat	The Chocolate Tea Tree Orchid is an epiphytic orchid on tree hosts. The Chocolate Tea Tree Orchid occurs on Northern Cape York Peninsula from the tip south to Coen and Kowanyama. It also occurs on Torres Strait and Great Barrier Reef islands and may also occur in Papua New Guinea. The Chocolate Tea Tree Orchid grows in open humid habitats such as close to swamps and in closed forest, and has been recorded from *Melaleuca* woodland and coastal semi-evergreen vine thicket. It inhabits areas that are subject to periodic fire and appears less fire sensitive than the Cooktown Orchid. It has been recorded throughout its range on the northern Cape York Peninsula with most records from the eastern side. The species has been recorded from several locations in the Weipa region, including the Andoom, Weipa and the Ely mining lease areas. The habitat preferences of this species in the Weipa region are well known with the Chocolate Tea Tree Orchid being restricted to mesic habitats, typically as an epiphyte on mature *Syzygium* spp. and *Melaleuca* spp. trees in riparian gallery forest and on the margins of swamp habitats and their associated ecotones.
EPBC Status	Vulnerable
Known Threats	▪ Habitat degradation from localised settlement and visitors. ▪ Over collection by orchid enthusiasts.
Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	**Mining Area** **Unlikely**: No suitable habitat exists in Darwin Stringybark woodland. **Infrastructure footprint** **Known to Occur**: Occurs within the infrastructure corridor where it crosses Norman Creek. Not found within the footprint of Dam C. **Balance of SoE Project Area not disturbed** **Known to Occur**: Located in riparian gallery forest and *Melaleuca* dominated swamps particularly along major drainage lines and associated tributaries throughout the SoE Project area, in areas not to be disturbed.
SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	**Potential Impact - Clearing and Loss of Habitat** Small areas of known habitat occur within the footprint of infrastructure corridor crossings of some drainage lines. ***Avoidance Measures*** The following avoidance measures will reduce Project related impacts on the Chocolate Tea Tree Orchid: ▪ All remaining areas of known and potential habitat of the Chocolate Tea Tree Orchid within the Project area shall be protected from mining within the SoE environmental buffer system (see below for further details). 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, rather than 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 will work with Traditional Owners and the relevant WCCCC Sub-committee on establishment of environmental buffers as part of the CHEMP. The SoE environmental 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 which would reduce pig damage to riparian and wetland areas.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	▪ Project planning for infrastructure shall minimise impact on vegetation that provides habitat for Chocolate Tea Tree Orchid. ▪ One original water supply option involved constructing a smaller single stage of Dam C and constructing a second dam on the Ward River. This option involved a greater total area of disturbance and the Ward River Dam will not be constructed. <u>SoE Environmental Buffer System</u> Known and potential habitat areas of the Chocolate Tea Tree Orchid within the Project area will be protected from mining within the SoE environmental buffer system, which incorporates the following: ▪ The SoE environmental buffer system comprises a methodology for determining set-back distances from sensitive vegetation, rather than banks of watercourses and wetlands. ▪ The SoE environmental buffer system shall maintain a network of undisturbed habitat from mining areas. ▪ All of the potential habitat for the species within the Project area shall be protected from mining by the environmental buffer system. ▪ 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. **Potential Impact - Air Quality** The vigour of a small number of individual plants could be adversely affected by dust settling on foliage during the construction phase of the SoE Project. ***Mitigation Measures*** <u>Dust Management</u> The following dust abatement measures shall be implemented to minimise airborne dust during construction and the potential effects of settled dust on individual plants. ▪ Restricting the area to be cleared to the minimum practical. ▪ Road watering during construction.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	**Potential Impact - Introduction of Weeds**
	Construction and operational activities could lead to the introduction and spread of fire promoting weeds and smothering weeds. If left to proliferate these weeds could affect potential habitat of the species.
	
	Mitigation Measures
	<u>Weed Management Program</u>
	▪ 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:
	  ▪ 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:
	  ▪ 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 staff 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.
	
	Potential Impact - Altered Fire Regime
	Construction and operational activities could impact on the fire regime if fire promoting weeds are introduced.
	
	Mitigation Measures
	<u>Weed Management Program (refer to detail above)</u>
	
	Potential Negligible Impacts
	Edge Effects - Clearing may produce edge effects at the boundary of adjoining uncleared wetland habitat. However, the extent of the edge effect on the species would be negligible as individuals of the species are regularly observed at the natural edge of *Melaleuca* dominated wetland vegetation or in isolated trees in wetland areas.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	*Fragmentation of Habitat* - Construction of infrastructure corridors will produce small gaps in habitats occupied by the species. However, potential impacts will be negligible because the Chocolate Tea Tree Orchid naturally occurs in both dense and open wetland habitats where gaps are common.
	
	Effects on Recruitment/Movement of Propagules - Construction of infrastructure will produce small gaps in linear habitats occupied by the species but not of a sufficient magnitude to affect local dispersal of propagules or genetic continuity. The network of undisturbed habitats that will remain and be unaffected by direct disturbance from the operational phase of the Project will maintain current dispersal mechanisms and levels of genetic continuity. Potential impacts on recruitment/movement of propagules during construction and operation will be negligible.
	
	Altered Hydrological Regime - Substantial changes to riparian and non-riparian ecosystems due to changes to groundwater and surface hydrology due to construction or mining are not anticipated and any effects are unlikely to impact on the epiphytic species. Potential impacts from altered hydrological regime will be negligible.
	
	General Mitigation and Enhancement Measures
	Specific mitigation measures are not required for the negligible impacts, however, the following general mitigation and enhancement measures will further reduce any potential for impact on the species and shall enhance the existing environment.
	
	<u>SoE Environmental Buffer System (refer to detail above)</u>
	The SoE environmental buffer system shall further reduce any potential for impact from any alteration of the hydrological regime on areas that may provide habitat for the Chocolate Tea Tree Orchid.
	
	<u>Surface Water Management</u>
	▪ 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 conditions for the SoE Project:
	  ▪ 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.
	
	<u>Fire Management Program</u>
	The vegetation in the SoE environmental buffers will be enhanced by the implementation of a favourable fire regime under a fire management program.
	▪ 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.
	▪ Restrict public access to the SoE Project area.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	Feral Pig Control Program 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 pig damage to riparian and wetlands areas within the management zone that supports habitat for the Chocolate Tea Tree Orchid and shall enhance that habitat. The feral pig control program shall include the following: ▪ shooting of feral pigs (helicopter or ground based methods) shall occur 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. Translocation Program A condition of the Queensland Coordinator General's approval of the SoE Project is that for each plant that is found within disturbance areas, 3.5 orchid plants shall be translocated and/or propagated and established in areas of riparian habitat that are not to be disturbed.
Rehabilitation	▪ Only small areas of habitat for this species would need to be rehabilitated. ▪ RTA will develop and implement a rehabilitation strategy, including objectives and commitments described in the Western Cape Communities Coexistence Agreement (WCCCA) that would 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 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	▪ Baseline data on the Chocolate Tea Tree Orchid was collected during EIS surveys for the Project (RTA 2013).
Monitoring and Inspection	▪ Monitoring and inspection of vegetation buffer, fire and weed management programs and rehabilitation. ▪ Vegetation surveys prior to clearing associated with mining. ▪ Annual and periodic weed surveys. ▪ Surface water monitoring.
Incident Management	▪ Incidents to be reported and managed in accordance with the RTA's certified ISO14001 Environmental Management System and incident management system.
Performance Reporting	▪ Monitoring is to be conducted in accordance with this Management Plan. ▪ Zero incidents relating to the Chocolate Tea Tree Orchid.
Auditing	▪ 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.

Rio Tinto Alcan

Spathoglottis plicata
Environmental Management Plan Outline

Habitat	*Spathoglottis plicata* is known to occur from Cape York between Cooktown and the Jardine River and has been recorded from the Weipa area. It typically occurs in or close to swamps; in seasonally inundated areas; in moist, grassy patches close to streams; and, in *Melaleuca* swamp forest and riparian gallery rainforest.
EPBC Status	Vulnerable
Known Threats	▪ Over-collection and illegal collection by orchid enthusiasts. ▪ Disturbance and foraging by feral pigs. ▪ Altered hydrology. Additional potential threats are associated with inappropriate fire regimes (frequent late season fires), and changes to groundwater characteristics that reduce flow volumes and/or periodicity at permanent springs occupied by the species.
Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	**Mining Area** **Unlikely:** No suitable habitat exists in Darwin Stringybark woodland. **Infrastructure footprint** **Possible:** Potential habitat for the species occurs within the proposed footprint of Dam C and the infrastructure corridor crossing of Norman Creek, although targeted surveys did not locate the species within these areas. **Balance of SoE Project area not disturbed** **Possible**: Not detected during field surveys anywhere within the SoE Project area but suitable stream, wetland and seepage habitat occurs extensively in the SoE Project area in areas that would not be directly disturbed by the SoE Project.
SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	**Potential Impact: Disturbance of Habitat** ***Avoidance Measures*** The following avoidance measures will reduce Project related impacts on the *Spathoglottis plicata*: ▪ All potential habitat of the *Spathoglottis plicata* within the Project area shall be protected from mining within the SoE environmental buffer system (see below for further details). 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, rather than 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 will work with Traditional Owners and the relevant WCCCC Sub-committee on establishment of environmental buffers as part of the CHEMP. The SoE environmental 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. ▪ Project planning for infrastructure shall minimise impact on vegetation that provides habitat for *Spathoglottis plicata*. ▪ One original water supply option involved constructing a smaller single stage of Dam C and constructing a second dam on the Ward River. This option involved a greater total area of disturbance and the Ward River Dam will not be constructed.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	<u>SoE Environmental Buffer System</u> The SoE environmental buffer system incorporates the following: ▪ The SoE environmental buffer system comprises a methodology for determining set-back distances from sensitive vegetation, rather than banks of watercourses and wetlands. ▪ The SoE environmental buffer system shall maintain a network of undisturbed habitat from mining areas. ▪ All of the potential habitat for the species within the Project area shall be protected from mining by the environmental buffer system. ▪ 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 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. **Potential Impact: Introduction of Weeds** Construction and operational activities could lead to the introduction and spread of fire promoting weeds and smothering weeds. If left to proliferate in the vicinity of groundwater seepage zones fire promoting weeds could lead to an increase in fire intensity which could affect groundwater seepage areas. **Potential Impact: Altered Fire Regime** Construction and operational activities could have moderate impacts on the fire regime if fire promoting weeds are introduced. ***Mitigation and Enhancement Measures*** Construction and operational activities could have moderate impacts on the fire regime if fire promoting weeds are introduced. <u>Weed Management Program</u> The potential impacts of introduction and spread of weeds and altered fire regime if fire promoting weeds are introduced, during construction and operation, shall be mitigated by the development and implementation of a weed management program prior to commencement of construction: ▪ 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.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	▪ 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:
	  ▪ 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:
	  ▪ 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 staff 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.
	
	<u>SoE Environmental Buffer System</u>
	Potential impacts on the vegetation edge of spring areas from fire promoting weeds shall also be mitigated by implementation of the SoE environmental buffer system (refer details above) to ensure that possible groundwater seepage habitats are well removed from the proposed mining area.
	
	Potential Negligible Impacts
	No negligible impacts on this species have been identified.
	
	General Avoidance, Mitigation and Enhancement Measures
	Specific mitigation measures are not required for impacts that are negligible or less, however, the following general avoidance, mitigation and enhancement measures will further reduce any potential for impact on the species.
	▪ Mining shall not occur in areas that provide habitat for *Spathoglottis plicata*.
	▪ No plants are located in areas where infrastructure has been planned.
	▪ One water supply option involved constructing a smaller single stage of Dam C and constructing a second dam on the Ward River. This option involved a greater total area of disturbance will not be constructed.
	
	<u>Environmental Buffer System (refer to details above)</u>
	The environmental buffer system shall be implemented to reduce impact from any alteration of the hydrological regime on areas that may provide habitat *Spathoglottis plicata*.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	<u>Surface Water Management</u>
	▪ 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:
	  ▪ 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 would 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.
	
	<u>Fire Management Program</u>
	The vegetation in the SoE environmental buffers will be enhanced by the implementation of a favourable fire regime under a fire management program
	▪ 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 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.
	
	<u>Feral Pig Control Program</u>
	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 pig damage to riparian and wetlands areas within the management zone that support habitat for *Spathoglottis plicata* and shall enhance that habitat The feral pig control program would include the following:
	▪ shooting of feral pigs (helicopter or ground based methods) shall occur 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.

Rehabilitation	▪ Only small areas of habitat for this species would need to be rehabilitated. ▪ RTA will develop and implement a rehabilitation strategy, including objectives and commitments described in the Western Cape Communities Coexistence Agreement (WCCCA) that would 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 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	▪ Baseline data on the *Spathoglottis plicata* was collected during EIS surveys for the Project (RTA 2013).

Monitoring and Inspection	▪ Monitoring and inspection of vegetation buffer, fire and weed management programs and rehabilitation. ▪ Vegetation surveys prior to clearing associated with mining. ▪ Annual and periodic weed surveys. ▪ Surface water monitoring.
Incident Management	▪ Incidents to be reported and managed in accordance with the RTA's certified ISO14001 Environmental Management System and incident management system.
Performance Reporting	▪ Monitoring is to be conducted in accordance with this Management Plan. ▪ Zero incidents relating to the *Spathoglottis plicata*.
Auditing	▪ 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.