Rio Tinto Alcan

Appendix 9-A

Environmental Management Plan Outline - Non-Avian Migratory Species

Rio Tinto Alcan

ESTUARINE CROCODILE (*Crocodylus porosus*)
Environmental Management Plan Outline

Preferred Habitat	**Foraging** Tidal rivers, creeks, estuaries, coastal floodplains and channels, billabongs and swamps and freshwater areas. Seasonally available feeding resources that exploited in wet season freshwater habitats. **Nesting** The preferred nesting habitat for the Estuarine Crocodile includes elevated, isolated freshwater swamps that do not have the influence of tidal movements. Nests are often located on floating rafts of vegetation. **Migratory** Adults capable of extensive movements and known to move over several hundred kilometres, although large scale migratory movements are not thought to be a regular occurrence. Localised migration associated with dispersal of individuals from breeding areas and accessing nesting and feeding habitats is common. Regular wet season movement of sub-adult and adult individuals from estuary to freshwater stream reaches and wetlands occurs.
EPBC Status	Migratory
Known Threats	Note: known threats listed below are not all necessarily applicable to the SoE Project. Relevant SoE Project-related threats on Estuarine Crocodile and mitigation measures for relevant impacts are detailed separately in this table. Estuarine Crocodile eggs are subject to predation by goannas and feral pigs; however, egg predation is not a major source of egg mortality due to the presence of the guarding female. The main reasons for the failure of eggs to hatch include infertility, flooding, overheating, poor gas exchange, and desiccation. It is estimated that up to 75% of eggs laid in a season will not hatch. Young Estuarine Crocodiles may fall prey to monitor lizards, predatory fish, various aquatic birds and raptors, larger crocodiles and other predators, with few making it to adulthood. As adults the only sources of mortality for Estuarine Crocodiles are from larger crocodiles and humans. Many Estuarine Crocodiles are killed accidentally in fishing nets. It is estimated that less than 1% of eggs laid by Estuarine Crocodiles hatch and survive to adulthood. Other commonly identified threats to the species include habitat loss and degradation, and habitat degradation by feral animals.
Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	**Port Site** **Known to Occur**: Recorded in marine environments within the SoE Project area with individuals sighted along the beach between Pera Head and Boyd Bay. **New Spoil Ground** **Possible**: Recorded in marine environments within the SoE Project area, although not as far out to sea as the new spoil ground. However, this species is known to occasionally traverse some distance into the marine environment, so it is possible that this species may occur in this area on occasion. **Albatross Bay Spoil Ground** **Possible**: Recorded in marine environments within the SoE Project area, although not as far out to sea as the Albatross Bay spoil ground. However, this species is known to occasionally traverse some distance into the marine environment, so it is possible that this species may occur in this area on occasion. **Ferry/Barge Terminals – Hey and Embley River** **Known to Occur**: Recorded in estuarine environments within the SoE Project area with individuals observed in close proximity to the Hey Point and

Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	Hornibrook terminals. The ferry/barge terminal sites are situated within estuarine and mangrove environments that represent the main habitat for this species. The species is likely to use the habitat within the ferry/barge terminal areas for foraging and shelter. **Dam C - Norman Creek** **Known to Occur**: Foraging and nesting habitats for Estuarine Crocodiles have been recorded within the footprint of Dam C and upstream of Dam C. **Balance of SoE Project Area not disturbed** **Known to Occur**: Field surveys recorded 55 individual sightings numerous sightings of tracks and slides. **Shipping Route** **Possible**: Estuarine Crocodiles may swim considerable distances offshore and so may potentially transit areas along the shipping routes. The likelihood of presence decreases further south towards Gladstone as this species is less common in these areas.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	**Potential Negligible Impacts**
	Physical Disturbance of Benthic or Intertidal Habitats - Negligible impacts on Estuarine Crocodiles are anticipated as a result of physical disturbance of benthic or intertidal habitats associated with dredging activities.
	Dredge Entrainment - Dredging activities using TSHD may injure or kill individual Estuarine Crocodiles as a result of accidental intake and entrainment as the TSHD head moves along the seabed.
	Underwater Acoustic Impacts - Negligible impacts on Estuarine Crocodiles are anticipated as a result of underwater noise associated with pile activities.
	
	General Mitigation Measures
	Specific mitigation measures are not required for the negligible impacts, however, the following general mitigation measures will reduce any potential for impact on these species:
	▪ Accurate positioning systems shall be installed in dredges to ensure dredging and disposal occur in approved areas;
	▪ Dredging activities shall be restricted to locations shown on the dredging plan(s); and,
	▪ Dredging activities shall be conducted using equipment that is in survey and registered, and complies with the conditions of relevant approvals.
	
	<u>Dredge Entrainment Management</u>
	▪ All persons engaged in conducting dredging activities including but not limited to employees and contract staff shall be trained in procedures and practices necessary to:
	  ▪ comply with the conditions of the relevant regulatory approvals; and,
	  ▪ prevent environmental harm during normal operation and emergencies; or,
	  ▪ be under the close supervision of a trained person.
	▪ The TSHD shall have dredge heads with depth control, and where appropriate, fitted with marine wildlife protection or fauna exclusion devices (e.g. turtle deflector, deflector plates, tickler chains on dredge heads prior to and during operation); and,
	▪ During daylight hours, operators of specified vessels shall have a trained Marine Fauna Observer on watch during dredging operations.
	
	<u>Underwater Noise Management</u>
	▪ All equipment and machinery shall be maintained in accordance with manufacturer's recommendations and source of excessive underwater noise shall be investigated and remedied.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	***General Avoidance Measures*** The most suitable habitat for the species in the Project Area is found within the SoE environmental buffer system (refer details below) which will not be disturbed by mining activities. However Dam C will be constructed within suitable habitat. ▪ All other areas of moderate suitability habitat for the species within the Project area shall be protected from mining by the SoE environmental buffer system (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 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. ▪ Project planning for infrastructure shall minimise impacts on Estuarine Crocodiles by siting facilities in areas with less sensitive habitat. ▪ One water supply option considered for the Project involved constructing a second dam on the Ward River. This option involved a greater total area of disturbance of Estuarine Crocodile habitat and was not the preferred approach of Traditional Owners. By not adopting this approach, additional disturbance to Estuarine Crocodile habitat has been avoided. <u>SoE Environmental Buffer System</u> ▪ 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. ***General Enhancement Measures*** <u>Feral Pig Control Program</u> The feral pig control program is designed to enhance breeding success of marine turtles in the area will have consequential positive effects on Estuarine Crocodiles, as it reduces threats associated with nest predation and habitat destruction by feral pigs.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	The feral pig control program shall be developed in consultation with DEHP 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 and reduce nest predation by feral pigs. The feral pig control program in relation to Estuarine Crocodile habitat shall include the following: ▪ Shooting of feral pigs (helicopter or ground based methods) shall occur prior to peak marine turtle nesting season. Specific details of control methods to be employed shall be subject to safety considerations and availability of equipment; and, ▪ Shall cover the coastal zone between Ina Creek and Winda Winda Creek and associated riparian hinterland areas. <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 (including potential habitat of the Estuarine Crocodile) 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.
Collection of Baseline Data	▪ Baseline data on the presence and nesting locations of Estuarine Crocodile was collected during surveys for the SoE Project (RTA 2013).
Monitoring and Inspection	▪ Monitoring requirements during dredging operations in accordance with the DMPs. ▪ 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 conducted in accordance with this Management Plan and requirements of the DMPs; and, ▪ Zero incidents relating to Estuarine Crocodiles.
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

DUGONG (*Dugong dugon*)
Environmental Management Plan Outline

Preferred Habitats	**Foraging** Seagrass beds typically dominated by *Halophila* and *Halodule* species. Seagrass beds typically occur in shallow protected bays, shallow mangrove channels and the lee side of inshore islands. **Breeding** Shallow waters, such as on tidal sandbanks and estuaries. **Migratory** Generally do not appear to make systematic (seasonal) large scale migrations; but may move over large distances. Movement has been tracked up to approximately 600km and is thought to be associated with food availability.
EPBC Status	Migratory
Known Threats	Note: known threats listed below are not necessarily applicable to the SoE Project. Relevant SoE Project-related threats on Dugong and mitigation measures for relevant impacts are detailed separately in this table. Direct threats to Dugong include incidental mortality in fishing gear and shark nets, Indigenous harvesting and vessel strike. Indirect threats include habitat loss and degradation as a result of trawling, dredging, coastal clearing, land reclamation, marine pollution and boat propeller scarring that result in seagrass loss.
Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	**Port Site** **Known to Occur**: Traditional Owners report that the species migrates through Boyd Bay which also indicates migration past the Port site. **New Spoil Ground** **Possible**: May migrate through this area between foraging grounds, although this site does not contain suitable foraging habitat. **Albatross Bay Spoil Ground** **Possible:** May migrate through the area of the Albatross Bay spoil ground, although this site does not contain suitable foraging habitat. **Ferry/Barge Terminals – Hey and Embley Rivers** **Known to Occur**: Known to occur in the area, associated with seagrass beds. The seagrass beds in the Embley and Hey Rivers may potentially constitute foraging habitat for Dugong. **Balance of Project Area not disturbed** **Known to Occur**: Known to occur in the Project area. Traditional owners report that the species migrates through Boyd Bay. The species is highly mobile and would traverse coastal waters between seagrass beds. **Shipping Route** **Likely**: Dugong may swim considerable distances offshore and so may potentially transit areas along the shipping routes. The likelihood of presence along the shipping route is greatest in Gladstone Harbour, which contains suitable habitat, and in shallower areas of the shipping route in Torres Strait.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	**Potential Impact: Dredge Entrainment**
	Dredging activities using TSHD may injure or kill individual Dugongs as a result of accidental intake and entrainment as the TSHD head moves along the seabed.
	
	Mitigation Measures
	<u>Dredge Entrainment Management</u>
	The Dredge Management Plan for the Port (initial capital dredging) and Dredge Management Plan for the river facilities (capital dredging) includes measures such as:
	▪ All persons engaged in conducting dredging activities including but not limited to employees and contract staff shall be trained in procedures and practices necessary to:
	  ▪ comply with the conditions of the relevant regulatory approvals; and,
	  ▪ prevent environmental harm during normal operation and emergencies; or,
	  ▪ be under the close supervision of a trained person.
	▪ The TSHD shall have dredge heads with depth control, and where appropriate, fitted with marine wildlife protection or fauna exclusion devices (e.g. turtle deflector, deflector plates, tickler chains on dredge heads prior to and during operation);
	▪ During daylight hours, operators of specified vessels shall have a trained Marine Fauna Observer on watch during dredging operations;
	▪ A log shall be maintained on all dredge vessels detailing Dugong sightings;
	▪ Mobile dredging operations:
	  ▪ shall not commence if Dugongs are observed within 300m of the dredge; and,
	  ▪ where underway, shall alter course if Dugongs are likely to be struck or captured.
	▪ Stationary dredging operations:
	  ▪ shall not commence if Dugongs are observed within 300m of the dredge; and,
	  ▪ shall cease if Dugongs are observed within 50m of the dredge head.
	▪ Operating procedures that minimise the risk of Dugongs capture by the dredge head, and the risk from all activities of injury to marine species of conservation significance, shall be developed prior to the commencement of dredging activities; and,
	▪ The administering authority is to be immediately notified of any Dugong captures by the dredge or injury to any marine species of conservation significance.
	
	Subsequent capital and maintenance dredging for the Port will require separate approved dredge management plans.
	
	Potential Impact: Marine Oil Spill
	Impacts from a marine oil spill associated with Project related shipping activities - while the probability of a marine oil spill occurring is unlikely, such an incident may result in serious injury or mortality to Dugongs in the vicinity of the spill.
	
	Mitigation Measures
	<u>Marine Oil Spill Management</u>
	▪ The risk of marine oil spills from bauxite vessels shall be reduced by measures to reduce the risk of collisions or groundings. This includes the use of tugs in Port, qualified bridge personnel, bridge management systems including fatigue management, pilotage and Vessel Tracking Systems;
	▪ Bauxite vessels, including the hull and fuel tanks, shall be kept in a good state of repair and the fleet used shall consist of modern ships that are subject to an environmental and safety vetting system;

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	▪ All RTA owned vessels shall have spill kits on board, and spill kits shall be located at the Port, with vessel and shoreside oil spill contingency plans in place;
	▪ No bulk chemicals or hydrocarbons shall be stored at the Port;
	▪ No oil discharges from vessels while in Australian waters other than the discharge of treated oily water from machinery spaces (oil content not exceeding 15ppm in accordance with MARPOL Annex I); and,
	▪ All bauxite vessels shall have International Maritime Organization (IMO) approved oily water separators and high oil content alarm systems, the capacity to immediately shut down any non-compliant oily water discharge and to redirect oily water to holding tanks for discharge ashore.
	
	Potential Negligible Impacts
	Physical Disturbance of Benthic or Intertidal Habitats - Negligible impacts on Dugongs are anticipated as a result of physical disturbance of benthic or intertidal habitats associated with dredging activities. Negligible impacts on Dugongs are also anticipated as a result of the deposition of dredged sediments on benthic habitat associated with dredging and offshore spoil disposal activities.
	
	Creation of a Turbidity Plume - Negligible impacts on Dugongs are anticipated as a result of the creation of a turbidity plume associated with dredging and offshore spoil disposal activities.
	
	Underwater Acoustic Impacts - Negligible impacts on Dugongs are anticipated as a result of underwater noise associated with pile driving activities. Negligible impacts on Dugongs are also anticipated as a result of underwater noise impacts associated with Project related shipping activities.
	
	Vessel Strike - Negligible impacts on Dugongs are anticipated as a result of vessel strike associated with Project-related shipping activities.
	
	General Mitigation Measures
	Specific mitigation measures are not required for negligible impacts, however, the following general mitigation measures will further reduce any potential for impact on these species.
	
	<u>Dredging and Offshore Spoil Disposal Management</u>
	
	▪ The Dredge Management Plan for the Port (initial capital dredging) and Dredge Management Plan for the river facilities (capital dredging) includes measures such as:
	  ▪ accurate positioning systems shall be installed on dredges to ensure dredging and disposal occur in approved areas;
	  ▪ dredging activities shall be restricted to locations shown on the dredging plan(s); and,
	  ▪ dredging activities shall be conducted using equipment that is in survey and registered, and complies with the conditions of relevant approvals.
	▪ Mechanical devices, such as turbidity-reducing valves within overflow pipes on the TSHD shall be used;
	▪ Hopper doors shall be kept in good condition to minimise loss of sediment during transport;
	▪ The TSHD shall be equipped with below keel discharge of tail waters via an anti-turbidity control valve;
	▪ Direct sailing routes to and from the relevant spoil disposal ground shall be selected to minimise the impact of propeller wash;
	▪ Water quality monitoring and trigger levels, as well as coral health monitoring (if required) shall be implemented for dredging at the Port;
	▪ Current and forecasted meteorological and oceanographic information shall be considered in the daily work plan; and,
	▪ Adaptive management measures would be implemented as required depending on the level of impact and may include:
	  ▪ moving the dredge operations and vessels to other areas within the development footprint to reduce potential impacts on the affected corals;
	  ▪ reducing or ceasing overflow during periods when the dredge plume is considered likely to lead to further impacts; or

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	▪ reducing dredging activities from 24 hours a day to a period timed to reduce impacts (e.g. to 12 hours/day or night). ▪ Subsequent capital and maintenance dredging for the Port will require separate approved dredge management plans. <u>Pile Driving Management</u> ▪ Soft start-up shall be used to disperse Dugongs prior to normal pile driving activities commencing; ▪ Continual marine fauna observations (including Dugongs) shall be conducted for 30 minutes prior to and during marine and river pile driving activities. ▪ Observation zones shall be maintained as specified below with a minimum observation zone of 300m being maintained during all piling activities; ▪ Port: ▪ drilling, 355.6mm piles, 750mm piles and 1050mm piles: 300m; ▪ 1200mm piles: 360m; and, ▪ 1500mm piles: 400m. ▪ Humbug and Hornibrook terminals: ▪ all drilling and piling activities: 300m. ▪ Hey River terminal: ▪ drilling and 600mm piles: 300m; ▪ 750mm piles: 330m; ▪ 900mm piles: 360m; and, ▪ 1050mm piles: 380m. ▪ Marine and river pile driving activities shall be stopped if Dugongs enter within an exclusion zone of 100m and remain within the zone for greater than five minutes; and, ▪ Piling shall not commence if Dugongs are observed within the exclusion zone during visual observations prior to start-up. <u>Underwater Noise Management (Project-related Shipping)</u> ▪ All vessels shall operate in accordance with appropriate industry and equipment noise and vibration standards. ▪ RTA owned Project vessels, including on board machinery and equipment, shall be maintained to a high standard and any source of excessive underwater noise shall be investigated and remedied. ▪ Regular maintenance of RTA owned vessels shall be conducted to the manufacturers' specifications. Where possible, avoid leaving engines, thrusters and auxiliary plants in stand-by or running mode unnecessarily. <u>Vessel Strike Management</u> ▪ All SoE Project vessels shall strictly adhere to Port controls; ▪ The passenger vessel operating on the Hey and Embley Rivers shall use a transit lane which follows the greatest water depths to avoid significant seagrass meadows; ▪ Any injury or death of Dugongs shall be reported to EHP for inclusion in the Wildlife Stranding database and those that may be attributable to RTA operations would be investigated to determine appropriate mitigation measures; ▪ The passenger vessel shall be limited to a speed of 6 knots in water of less than 2.5m in depth when approaching berth; and, ▪ Large vessels shall travel more slowly and under pilotage in shallow or confined marine areas where susceptible marine fauna, including Dugongs, are more commonly found.

Collection of Baseline Data	▪ A comprehensive desk-top assessment of Dugongs in the SoE Project area was undertaken and incidental observations for Dugongs were made during the various field investigations for the SoE Project (RTA 2013).
Monitoring and Inspection	▪ Monitoring requirements during dredging operations in accordance with the DMPs; and, ▪ Dugong observations during marine pile driving activities (refer management and mitigation measures)
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 conducted in accordance with this Management Plan and the requirements of the DMPs; and, ▪ Zero incidents relating to Dugong.
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.

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

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CETACEANS

Environmental Management Plan Outline


Bryde's Whale


Indo-Pacific Humpback Dolphin


Australian Snubfin Dolphin

Species	Australian Snubfin Dolphin (*Orcaella heinsohni*), Indo-Pacific Humpback Dolphin (*Sousa chinensis*), Bryde's Whale (*Balaenoptera edeni*)	
Habitat	Australian Snubfin Dolphin	**Foraging** Shallow coastal waters less than 20m deep, often associated with tidal riverine and estuarine systems, enclosed bays and coastal lagoons. **Breeding** Unknown. No calving areas are known in Australian waters, but a near-term foetus and a neonate are recorded from Townsville. **Migratory** Unknown. Potentially have a large home range from which they follow a model of emigration and immigration for particular habitat areas.
	Indo-Pacific Humpback Dolphin	**Foraging** Mangroves to sandy bottom estuaries and embankments to rock and/or coral reefs (<100m deep). **Breeding** Unknown. No calving areas are known in Australian waters. **Migratory** Unknown. There is some evidence of longshore movements of animals in Australian populations.
	Bryde's Whale	**Foraging** Inshore form moves along the coast inside the 200m contour in response to prey availability. Offshore form is found in waters 500-1,000m deep. **Breeding** Limited data suggest breeding and calving in lower latitudes. **Migratory** No evidence of large-scale movements of inshore form. Offshore form may migrate to warmer tropical waters during winter.
EPBC Status	Migratory	
Known Threats	Note: known threats listed below are not necessarily applicable to the SoE Project. Relevant SoE Project-related threats on the Australian Snubfin Dolphin, the Indo-Pacific Humpback Dolphin and Bryde's Whale, and mitigation measures for relevant impacts are detailed separately in this table. Impacts affecting these species in Australia include: ▪ Habitat destruction and degradation (dolphin species); ▪ Incidental capture or entanglement in fishing gear and shark nets;	

Known Threats	▪ Illegal killing and live capture (Indo-Pacific Humpback Dolphin); ▪ Competition with fisheries (Indo-Pacific Humpback Dolphin and Bryde's Whale); ▪ Pollution of habitat; ▪ Interaction with vessels and vessel strike; ▪ Pathogens (Australian Snubfin Dolphin); ▪ Slow reproductive rate(Indo-Pacific Humpback Dolphin); ▪ Wildlife tourism (Indo-Pacific Humpback Dolphin); and, ▪ Bryde's Whale is also identified as being at risk from acoustic disturbance (e.g. seismic surveys).	
Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	Australian Snubfin Dolphin	**<u>Port Site</u>** **Known to Occur**: Incidental sightings of this species were recorded in the vicinity of the Port footprint during 2007-2010 field studies. Not found during targeted August 2012 survey. **<u>New Spoil Ground</u>** **Possible**: No incidental sightings were recorded. This species usually inhabits shallow coastal waters less than 20m deep and are often associated with coastal and estuarine waters, enclosed bays and coastal lagoons. The new spoil ground is in deeper water than this and therefore it is unlikely to represent preferred habitat for this species. However, it is possible they may migrate through the area. **<u>Albatross Bay Spoil Ground</u>** **Possible**: No incidental sightings were recorded. The Albatross Bay spoil ground is primarily characterised as flat, unvegetated soft sediments habitat, and are therefore unlikely to support sufficient densities of prey species to be considered preferred habitat for this species. However, it is possible that this species may migrate through or opportunistically feed in the area. **<u>Ferry/Barge Terminals – Hey and Embley Rivers</u>** **Likely**: No incidental sightings were recorded during 2007-2010 in the Hey and Embley Rivers or during targeted August 2012 survey. However, this species are known to occur in estuarine and costal habitats. As such, it is likely that this species may occur in the ferry/barge terminals. **<u>Balance of SoE Project Area not disturbed</u>** **Known to Occur:** Incidental sightings of this species were recorded in coastal waters during field studies. **<u>Shipping Routes</u>** **Known to Occur**: Although the Australian Snubfin Dolphin has been recorded from the Gladstone area and throughout coastal waters along the north Queensland coast, the species would generally occur inshore and in shallower waters rather than the majority of the shipping route.
	Indo-Pacific Humpback Dolphin	**<u>Port Site</u>** **Known to Occur**: Incidental sightings of this species were recorded in the vicinity of the Port footprint during 2007-2010 field studies. Targeted cetacean surveys in 2012 confirmed the presence of Indo-Pacific Humpback Dolphins at Boyd Point. **<u>New Spoil Ground</u>** **Possible**: No incidental sightings were recorded. The new spoil ground is primarily characterised as flat, unvegetated soft sediments habitat, and are therefore unlikely to support sufficient densities of prey species to be considered preferred habitat for this species. However, it is possible that this species may migrate through or opportunistically feed in the area. **<u>Albatross Bay Spoil Ground</u>** **Possible**: No incidental sightings were recorded. The Albatross Bay spoil ground is primarily characterised as flat, unvegetated soft

Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	Indo-Pacific Humpback Dolphin	sediments habitat, and are therefore unlikely to support sufficient densities of prey species to be considered preferred habitat for this species. However, it is possible that this species may migrate through or opportunistically feed in the area. **Ferry/Barge Terminals – Hey and Embley Rivers** **Known to Occur**: Targeted cetacean surveys in 2012 confirmed the presence of Indo-Pacific Humpback Dolphins within the Hey and Embley River estuaries. **Balance of SoE Project Area not disturbed** **Known to Occur**: Incidental sightings of this species were recorded in coastal waters during field studies. **Shipping Routes** **Known to Occur**: Although the species has been recorded from the Gladstone area and throughout coastal waters along the north Queensland coast, the Indo-Pacific Dolphin would generally occur inshore and in shallower waters rather than the majority of the shipping route.
	Bryde's Whale	**Port Site** **Possible**: While the Port site does not contain preferred habitat, the recording of the species from tropical inshore waters suggests it is possible that the species may occur sporadically in the vicinity of the Port footprint. **New Spoil Ground** **Possible**: This species may possibly occur within the new spoil ground footprint for the same reasons that it possibly occurs in the vicinity of the Port site. **Albatross Bay Spoil Ground** **Possible**: This species may occur within the Albatross Bay spoil ground footprint for the same reasons that it possibly occurs in the vicinity of the Port site. **Ferry/Barge Terminals – Hey and Embley Rivers** **Unlikely**: Although this species occurs in shallow water, it generally is found in coastal areas rather than estuaries. It is therefore unlikely to occur within the barge/ferry terminal footprints of the Embley and Hey River Rivers. **Balance of SoE Project Area not disturbed** **Possible**: While the SoE Project area does not contain preferred habitat, it is possible that the species may occur sporadically in the SoE Project area. **Shipping Routes** **Possible**: Although there have been very limited confirmed sightings of the Bryde's Whale in Australia, the majority of the shipping route is within suitable pelagic habitat and the known geographic range for this species.
SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	**Potential Impact: Underwater Acoustic Impacts** Underwater noise during construction of marine and river facilities will be principally generated by pile driving activities at both the marine and river facilities. It is possible that pile driving activities may temporarily displace the Bryde's Whale, Australian Snubfin Dolphin and Indo-Pacific Humpback Dolphin, however, the proportion of potential habitat that will be impacted is negligible and pile driving activities will be of short-term duration. ***Mitigation Measures*** Pile Driving Management ▪ Soft start-up shall be used to disperse cetaceans prior to normal pile driving activities commencing;	

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	▪ Continual marine fauna observations (including cetaceans) shall be conducted for 30 minutes prior to and during marine and river pile driving activities.
	  ▪ Observation zones shall be maintained as specified below with a minimum observation zone of 300m being maintained during all piling activities;
	  ▪ Port (whales):
	  ▪ drilling: 300m;
	  ▪ 355.6mm piles: 570m;
	  ▪ 750mm piles: 790m away from shore and the entire Port footprint between the furthest piling activities and the shore;
	  ▪ 1050mm piles: 930m away from shore and the entire Port footprint between the furthest piling activities and the shore;
	  ▪ 1200mm piles: 12010m away from shore and the entire Port footprint between the furthest piling activities and the shore;
	  ▪ 1500mm piles: 1330m away from shore and the entire Port footprint between the furthest piling activities and the shore; and,
	  ▪ 1 x 1500mm and 2 x 1050mm piles: 1580m away from shore and the entire Port footprint between the furthest piling activities and the shore. (Note: If a different combination from the 1 x 1500mm and 2 x 1050mm piles is used which may result in a lower impact, an appropriate observation zone may be determined in consultation with DSEWPaC).
	  ▪ Port (dolphins):
	  ▪ drilling, 355.6mm piles, 750mm piles and 1050mm piles: 300m;
	  ▪ 1200mm piles: 360m; and,
	  ▪ 1500mm piles: 400m.
	  ▪ Humbug and Hornibrook terminals (dolphins only):
	  ▪ All drilling and piling activities: 300m.
	  ▪ Hey River terminal (dolphins only):
	  ▪ drilling and 600mm piles: 300m;
	  ▪ 750mm piles: 330m;
	  ▪ 900mm piles: 360m; and,
	  ▪ 1050mm piles: 380m.
	▪ Marine and river pile driving activities shall be stopped if cetaceans enter within an exclusion zone of 100m and remain within the zone for greater than five minutes; and,
	▪ No piling activities shall commence if cetaceans are observed within the exclusion zone during visual observations prior to start-up.
	
	Potential Impact: Marine Oil Spill
	While the probability of a marine oil spill occurring from Project-related shipping is unlikely, such an incident may result in serious injury or mortality to cetacean species in the vicinity of the spill.
	
	Mitigation Measures
	<u>Marine Oil Spill Management</u>
	▪ The risk of marine oil spills from bauxite vessels shall be reduced by measures to reduce the risk of collisions or groundings. This includes the use of tugs in Port, qualified bridge personnel, bridge management systems including fatigue management, pilotage and Vessel Tracking Systems;
	▪ Bauxite vessels, including the hull and fuel tanks, shall be kept in a good state of repair and the fleet used would consist of modern ships that are subject to an environmental and safety vetting system;

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	▪ All RTA owned vessels shall have spill kits on board, and spill kits shall be located at the Port, with vessel and shoreside oil spill contingency plans in place; ▪ No bulk chemicals or hydrocarbons shall be stored at the Port; ▪ No oil discharges from vessels while in Australian waters other than the discharge of treated oily water from machinery spaces (oil content not exceeding 15ppm in accordance with MARPOL Annex I); and, ▪ All bauxite vessels shall have International Maritime Organization (IMO) approved oily water separators and high oil content alarm systems, the capacity to immediately shut down any non-compliant oily water discharge and to redirect oily water to holding tanks for discharge ashore. **Potential Negligible Impacts** *Physical Disturbance of Benthic or Intertidal Habitats* - Negligible impacts on cetacean species are anticipated as a result of physical disturbance of benthic or intertidal habitats associated with dredging activities. Negligible impacts on cetacean species are also anticipated as a result of the deposition of dredged sediments on benthic habitat associated with dredging and offshore spoil disposal activities. *Creation of a Turbidity Plume* - Negligible impacts on cetacean species are anticipated as a result of the creation of a turbidity plume associated with dredging and offshore spoil disposal activities. *Dredge Entrainment* - Negligible impacts on cetacean species are anticipated as a result of entrainment in dredge equipment. *Underwater Acoustic Impacts* - Negligible impacts on cetacean species are anticipated as a result of underwater noise impacts associated with Project related shipping activities. *Vessel Strike* - Negligible impacts on cetacean species are anticipated as a result of vessel strike associated with Project-related shipping activities. ***General Mitigation Measures*** Specific mitigation measures are not required for negligible impacts, however, the following general mitigation measures will reduce any potential for impact on these species. <u>Dredging and Offshore Spoil Disposal Management</u> The Dredge Management Plan for the Port (initial capital dredging) and Dredge Management Plan for the river facilities (capital dredging) includes measures such as: ▪ Accurate positioning systems shall be installed on dredges to ensure dredging and disposal occur in approved areas; ▪ Dredging activities shall be restricted to locations shown on the dredging plan(s); and, Dredging activities shall be conducted using equipment that is in survey and registered, and complies with the conditions of relevant approvals. ▪ Mechanical devices, such as turbidity-reducing valves within overflow pipes on the TSHD shall be used; ▪ Hopper doors shall be kept in good condition to minimise loss of sediment during transport; ▪ The TSHD shall be equipped with below keel discharge of tail waters via an anti-turbidity control valve; ▪ Direct sailing routes to and from the relevant spoil disposal ground shall be selected to minimise the impact of propeller wash; ▪ Water quality monitoring and trigger levels, as well as coral health monitoring (if required) shall be implemented for dredging at the Port; ▪ Current and forecasted meteorological and oceanographic information shall be considered in the daily work plan; and, ▪ Adaptive management measures shall be implemented as required depending on the level of impact and may include: ▪ moving the dredge operations and vessels to other areas within the development footprint to reduce potential impacts on the affected corals; ▪ reducing or ceasing overflow during periods when the dredge plume is considered likely to lead to further impacts; or, ▪ reducing dredging activities from 24 hours a day to a period timed to reduce impacts (e.g. to 12 hours/day or night). ▪ Subsequent capital and maintenance dredging for the Port will require separate approved dredge management plans.

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	<u>Dredge Entrainment Management</u>
	The Dredge Management Plan for the Port (initial capital dredging) and Dredge Management Plan for the river facilities (capital dredging) includes measures such as:
	▪ All persons engaged in conducting dredging activities including but not limited to employees and contract staff shall be trained in procedures and practices necessary to:
	  ▪ comply with the conditions of the relevant regulatory approvals; and,
	  ▪ prevent environmental harm during normal operation and emergencies; or
	  ▪ be under the close supervision of a trained person.
	▪ The TSHD shall have dredge heads with depth control, and where appropriate, fitted with marine wildlife protection or fauna exclusion devices (e.g. turtle deflector, deflector plates, tickler chains on dredge heads prior to and during operation); and
	▪ During daylight hours, operators of specified vessels shall have a trained Marine Fauna Observer on watch during dredging operations:
	  ▪ mobile dredging operations:
	  ▪ shall not commence if cetacean species are observed within 300m of the dredge; and,
	  ▪ where underway, shall alter course if a cetacean species is likely to be struck or captured.
	  ▪ stationary dredging operations:
	  ▪ shall not commence if cetacean species are observed within 300m of the dredge; and,
	  ▪ shall cease if cetacean species are observed within 50m of the dredge head.
	▪ Operating procedures that minimise the risk from all activities of injury to marine species of conservation significance, shall be developed prior to the commencement of dredging activities; and,
	▪ The administering authority is to be immediately notified of any injury to any marine species of conservation significance.
	Subsequent capital and maintenance dredging for the Port will require separate approved dredge management plans.
	
	<u>Underwater Noise Management (Project-related Shipping)</u>
	▪ All vessels shall operate in accordance with appropriate industry and equipment noise and vibration standards.
	▪ RTA owned Project vessels, including on board machinery and equipment, shall be maintained to a high standard and any source of excessive underwater noise shall be investigated and remedied.
	▪ Regular maintenance of RTA owned vessels shall be conducted to the manufacturers' specifications.
	▪ Where possible, avoid leaving engines, thrusters and auxiliary plants in stand-by or running mode unnecessarily.
	
	<u>Vessel Strike Management</u>
	▪ All SoE Project vessels shall strictly adhere to Port controls;
	▪ The passenger vessel operating on the Hey and Embley Rivers shall use a transit lane which follows the greatest water depths to avoid significant seagrass meadows;
	▪ Any injury or death of cetaceans shall be reported to EHP for inclusion in the Wildlife Stranding database and those that may be attributable to RTA operations would be investigated to determine appropriate mitigation measures;
	▪ The passenger vessel shall be limited to a speed of 6 knots in water of less than 2.5m in depth when approaching berth; and,
	▪ Large vessels shall travel more slowly and under pilotage in shallow or confined marine areas where susceptible marine fauna are more commonly found.

Collection of Baseline Data	▪ Baseline data on the presence of cetaceans was collected during surveys for the SoE Project (RTA 2013).
Monitoring and Inspection	▪ Monitoring requirements during dredging operations in accordance with the DMPs. ▪ Cetacean observations during marine pile driving activities (refer management and mitigation measures).
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 conducted in accordance with this Management Plan and the requirements of the DMPs; and, ▪ Zero incidents relating to Australian Snubfin Dolphin, Indo-Pacific Humpback Dolphin and Bryde's Whale.
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.

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