

Appendix 7-E

Environmental Management Plan Outline - Threatened Marine and Estuarine Species





MARINE TURTLES

Environmental Management Plan Outline



Species		
Green Turtle (<i>Chelonia mydas</i>), Hawksbill Turtle (<i>Eretmochelys imbricate</i>), Flatback Turtle (<i>Natator depressus</i>), Loggerhead Turtle (<i>Lepidochelys olivacea</i>), Leatherback Turtle (<i>Dermochelys coracea</i>)		
Habitat	Green Turtle	Foraging Shallow coastal seagrass and seaweed, driftlines and <i>Sargassum</i> rafts. Nesting/Breeding Nests on sandy beaches. Remains close to the nesting site between nesting intervals. Mates near-shore in vicinity of the nesting ground. Migratory Pelagic for first 5-10 years. Adults are found in tropical and subtropical shallow coastal waters.
	Hawksbill Turtle	Foraging Intertidal and subtidal rocky and coral reefs. Nesting/Breeding Nests on sandy beaches. Mates near-shore or offshore from the nesting beach. Migratory Pelagic for first 5-10 years. Adults are found in tropical, subtropical and temperate waters.
	Flatback Turtle	Foraging Soft-bottom, coastal waters and rocky reefs over a wide depth range. Nesting/Breeding Nests on sandy beaches in dunes or a steep seaward slope. Mates offshore from the nesting ground. Migratory Coastal waters and surface waters of the continental shelf.
	Loggerhead Turtle	Foraging Intertidal and subtidal coral and rocky reefs, seagrass, unvegetated sand or mud. Nesting/Breeding Nest on open, sandy beaches in southern Queensland and Western Australia. Migratory Pelagic, but migrates from rookeries in coastal waters suitable for foraging.

Habitat	Olive Ridley Turtle	<p>Foraging Benthic unvegetated coastal waters but also some pelagic foraging over a wide depth range.</p> <p>Nesting/Breeding Nest on sandy beaches. Remain inshore near nest beach during intern-nesting periods.</p> <p>Migratory Hatchlings pelagic then juveniles return to coastal waters. Adults utilise coastal water and out to the continental shelf.</p>
	Leatherback Turtle	<p>Foraging Pelagic feeder in tropical, subtropical and temperate waters.</p> <p>Nesting/Breeding Nest on sandy beaches although only a very small proportion of the global population nest in Australia. Mates offshore.</p> <p>Migratory Pelagic.</p>
EPBC Status	Green Turtle – Vulnerable/Migratory; Hawksbill Turtle – Vulnerable/Migratory; Flatback Turtle – Vulnerable/Migratory; Loggerhead Turtle – Endangered/Migratory; Olive Ridley Turtle – Endangered/Migratory; Leatherback Turtle – Endangered/Migratory	
Known Threats	<p>Note: known threats listed below are not all applicable to the SoE Project. Relevant SoE Project-related threats on marine turtles and mitigation measures for relevant impacts are detailed separately in this table.</p> <ul style="list-style-type: none"> ▪ Light disturbance; ▪ Habitat damage from coastal development (apart from the Leatherback Turtle); ▪ By-catch in fishing gear and shark control nets; ▪ Feral animal predation on nests (apart from the Leatherback Turtle); ▪ Vessel strike; ▪ Indigenous harvesting in some areas; ▪ Entanglement and ingestion of marine debris; and, ▪ Illegal trade of tortoiseshell (Hawksbill Turtle). <p>Currently, there are two major threats to marine turtles along Western Cape York – predation of nests by feral pigs (apart from the Leatherback Turtle) and entanglement in lost or discarded fishing nets (ghost nets).</p>	
Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	Green Turtle	<p><u>Port Site</u> Likely: This species is known to forage in shallow coastal areas, which would include the Port site footprint. Surveys have found no nests within the footprint of the Port site.</p> <p><u>New Spoil Ground</u> Possible: This species prefers to forage in shallow coastal areas or within seagrass beds. The new spoil ground would be too deep (-25m LAT) to provide preferred foraging habitat for this species and it contains no seagrass beds. While the new spoil ground does not represent preferred habitat, it is possible they are transient in the area.</p> <p><u>Albatross Bay Spoil Ground</u> Possible: For the same reasons as the new spoil ground, it is unlikely that this species would frequently occur at the Albatross Bay spoil ground; however, it is possible that they transit the area.</p> <p><u>Ferry/Barge Terminals – Hey and Embley Rivers</u> Likely: This species is known to forage within shallow coastal areas and seagrass beds. Foraging habitat for this species is present in the estuaries.</p> <p><u>Balance of Project Area not disturbed</u> Likely: The species is likely to forage in the Project area. Surveys have found no nests in the Project area. No large rookeries are present in the region.</p> <p><u>Shipping Routes</u> Likely: This species is common, both feeding and nesting throughout the GBR and in tropical Australian waters including Torres Strait and the Arafura Sea.</p>

Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	Hawksbill Turtle	<p><u>Port Site</u> Likely: Near shore fringing reef communities occur within the vicinity of the Port area at Boyd Point, Pera Head and between Pera Head and Thud Point. This species may therefore traverse across the Port site to access preferred feeding habitat. This species is also known to nest on the beaches in the vicinity of the Project area. Therefore it may be assumed that the footprint of the Port site may also contain suitable nesting habitat for this species.</p> <p><u>New Spoil Ground</u> Possible: No seagrass beds or seabed features e.g. patch reefs were identified within the footprint of the new spoil ground. Drop camera surveys indicate that this area is largely unvegetated; however, Hawksbill Turtles may feed on seas cucumbers or jellyfish in this area. As Nine Mile Reef, which includes suitable foraging habitat for this species, is located approximately 6km south-south-west of the new spoil ground, this species may traverse the new spoil ground to access Nine Mile Reef for foraging.</p> <p><u>Albatross Bay Spoil Ground</u> Possible: The Albatross Bay spoil ground does not contain or is not close to any reef communities. It is currently actively used for disposal of spoil dredged annually by North Queensland Bulk Ports. It is therefore unlikely this species would frequently occur in this area; however they may transit the site.</p> <p><u>Ferry/Barge Terminals – Hey and Embley Rivers</u> Possible: The Hey and Embley Rivers contain seagrass and mangrove habitats which may be utilised by this species.</p> <p><u>Balance of Project Area not disturbed</u> Known to Occur: Although difficulties in identifying nest activity of this species exist, low density nesting is recorded from a number of locations from False Pera Head to Boyd Bay. Reef habitat in the area is also likely to provide significant foraging habitat for the species and they are also likely to inhabit seagrass flats and mangrove habitats.</p> <p><u>Shipping Routes</u> Likely: This species is common, both feeding and nesting throughout the GBR and in tropical Australian waters including Torres Strait and the Arafura Sea.</p>
	Flatback Turtle	<p><u>Port Site</u> Known to Occur: Nesting has been regularly recorded within and surrounding the Port site footprint and is best described as low density nesting. The area is not a major location for breeding aggregations of the species. This species forages in shallow coastal habitats. The footprint of the Port would be considered foraging habitat for this species.</p> <p><u>New Spoil Ground</u> Possible: No seagrass beds or seabed features e.g. patch reefs were identified within the footprint of the new spoil ground. Drop camera surveys indicate that this area is largely unvegetated; however Flatback Turtles may feed on sea cucumbers or jellyfish in this area.</p> <p><u>Albatross Bay Spoil Ground</u> Possible: The Albatross Bay spoil ground does not contain or is not close to any reef communities. It is currently actively used for disposal of spoil dredged annually by North Queensland Bulk Ports. It is therefore unlikely this species would frequently occur in this area; however they may transit the site.</p> <p><u>Ferry/Barge Terminals – Hey and Embley Rivers</u> Likely: The footprints of the ferry/barge terminals are within an estuarine environment which may be considered foraging habitat for this species.</p> <p><u>Balance of Project Area not disturbed</u> Known to Occur: The Flatback Turtle is likely to forage in the Project area and nesting has been regularly recorded and is best described as low density nesting. The area is not a major location for breeding aggregations of the species.</p> <p><u>Shipping Routes</u> Likely: Nesting for this species is centred in the southern GBR and in western Torres Strait. The species is found foraging around Australia including through Torres Strait.</p>
	Loggerhead Turtle	<p><u>Port Site</u> Likely: The species is likely to be transient in the vicinity of the Port and use it for foraging or resting.</p> <p><u>New Spoil Ground</u> Likely: This species is likely to occur within the new spoil ground for the same reasons that it is likely to occur in the vicinity of the Port.</p>

Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	Loggerhead Turtle	<p><u>Albatross Bay Spoil Ground</u> Likely: This species is likely to occur within the Albatross Bay spoil ground for the same reasons that it is likely to occur in the vicinity of the Port.</p> <p><u>Ferry/Barge Terminals – Hey and Embley Rivers</u> Likely: This species is likely to occur in the vicinity of the ferry/barge terminals for the same reasons that it is likely to occur within the Port footprint.</p> <p><u>Balance of Project Area not disturbed</u> Likely: The species is likely to be transient in the Project area and use it for foraging or resting. No rookeries are present in the Project area.</p> <p><u>Shipping Routes</u> Likely: This species is commonly observed within the GBR and is known to migrate through the Gulf of Carpentaria, Torres Strait, Arnhem Land and Papua New Guinea. Nesting occurs in the southern GBR.</p>
	Olive Ridley Turtle	<p><u>Port Site</u> Known to Occur: Sporadic nesting has been recorded surrounding the Port site footprint. This species forages in shallow unvegetated coastal habitats. The footprint of the Port would therefore be considered foraging habitat for this species.</p> <p><u>New Spoil Ground</u> Possible: Unvegetated sediments may provide foraging habitat for Olive Ridley Turtles, as this species has been known to forage within these depths. This species may also transit the site.</p> <p><u>Albatross Bay Spoil Ground</u> Possible: Unvegetated sediments may provide foraging habitat for Olive Ridley Turtles, as this species has been known to forage within these depths. This species may also transit the site.</p> <p><u>Ferry/Barge Terminals – Hey and Embley Rivers</u> Likely: This species forages in shallow unvegetated coastal habitats. The parts of the footprints of the ferry/barge terminals that are not vegetated may therefore provide foraging habitat for this species.</p> <p><u>Balance of Project Area not disturbed</u> Known to Occur: Low density nesting has previously been recorded from a number of locations from False Pera Head to Boyd Bay, and nesting has also been recorded further north between Weipa and Bamaga.</p> <p><u>Shipping Routes</u> Likely: This species nests in the Northern Territory and the Gulf of Carpentaria. Although uncommon in the GBR, Olive Ridley Turtles are found around northern Australia.</p>
	Leatherback Turtle	<p><u>Port Site</u> Likely: The species is likely to occur sporadically in the vicinity of the Port site, using it for foraging.</p> <p><u>New Spoil Ground</u> Likely: The species is likely to occur sporadically in the vicinity of the new spoil ground, using it for foraging.</p> <p><u>Albatross Bay Spoil Ground</u> Likely: The species is likely to occur sporadically in the vicinity of the Albatross Bay spoil ground, using it for foraging.</p> <p><u>Ferry/Barge Terminals – Hey and Embley Rivers</u> Unlikely: This species prefers oceanic environments to estuarine environments, so it is unlikely to utilise the estuaries that contain the footprints of the ferry/barge terminals as habitat.</p> <p><u>Balance of SoE Project Area not disturbed</u> Likely: The species is likely to occur in the SoE Project area, using it for foraging. Leatherback Turtles are rarely found in Queensland; however they have been reported on the Western Cape York peninsula coast.</p> <p><u>Shipping Routes</u> Likely: Although seen only in low densities in Australia, the species is known to occur in the Great Barrier Reef and nests in the Northern Territory and to the north of Australia, including in Papua.</p>

<p>SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures</p>	<p>Potential Impact: Creation of a Turbidity Plume Impacts from dredging and offshore spoil disposal will include turbidity plumes and the potential suspension of sediments that may reduce water quality. These impacts have the potential to impact the benthic foraging habitats and foraging behaviour of all marine turtle species.</p> <p><i>Mitigation Measures</i> <u>Dredging and Offshore Spoil Disposal Management</u> Mitigation measures and/ or monitoring shall be carried out in accordance with the approved Dredge Management Plans (DMPs). The Dredge Management Plan for the Port (initial capital dredging) and Dredge Management Plan for the river facilities (capital dredging) includes measures such as:</p> <ul style="list-style-type: none"> ▪ 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; ▪ Accurate positioning systems shall be used on dredges to ensure direct impacts are restricted to the approved dredging and disposal areas; ▪ 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 activities at the Port; ▪ Current and forecast 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: <ul style="list-style-type: none"> ▪ 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). <p>Subsequent capital and maintenance dredging for the Port will require separate approved dredge management plans.</p> <p>Potential Impact: Dredge Entrainment Dredging activities using TSHD may injure or kill individual marine turtles as a result of accidental intake and entrainment as the TSHD head moves along the seabed. This impact is relevant for all marine turtle species.</p> <p><i>Mitigation Measures</i> <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:</p> <ul style="list-style-type: none"> ▪ 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: <ul style="list-style-type: none"> ▪ 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 marine turtle sightings; ▪ Mobile dredging operations: <ul style="list-style-type: none"> ▪ shall not commence if marine turtles are observed within 300m of the dredge; and, ▪ where underway, shall alter course if marine turtles are likely to be struck or captured. ▪ Stationary dredging operations: <ul style="list-style-type: none"> ▪ shall not commence if marine turtles are observed within 300m of the dredge; and, ▪ shall cease if marine turtles are observed within 50m of the dredge head.
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<p>SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures</p>	<ul style="list-style-type: none"> ▪ Marine turtle monitoring would be carried out as follows: <ul style="list-style-type: none"> ▪ daily monitoring for impacted marine turtles shall be undertaken at the dredge and at the shoreline down-current from the dredging operation; and, ▪ if monitoring indicates that more than two marine turtles are killed within a 24 hour period as a result of dredging, the dredge shall be relocated from the area until an incident investigation has been carried out and relevant preventative actions implemented. ▪ Operating procedures that minimise the risk of marine turtle 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; ▪ The administering authority is to be immediately notified of any marine turtle captures by the dredge or injury to any marine species of conservation significance; and, ▪ An incident response strategy shall be implemented during dredging activities and offshore spoil disposal. Adaptive management responses that relate to marine turtle incidents (injury or mortality) associated with dredging and spoil disposal activities shall follow an incident investigation and action process aligned with a series of tiered response principles. <p>Subsequent capital and maintenance dredging for the Port will require separate approved dredge management plans.</p> <p>Potential Impact: Altered Light Regime</p> <p>It is possible that nesting activities and hatchlings of Flatback Turtles, Olive Ridley Turtles and Hawksbill Turtles may be impacted by shore-based lighting from construction (not including dredging) and operation of the Port and associated onshore facilities where light spill will affect marine turtle nesting beaches.</p> <p><i>Mitigation Measures</i></p> <p><u>Lighting Management</u></p> <ul style="list-style-type: none"> ▪ Lighting shall be shielded and recessed as far as possible to minimise light spill onto the water; ▪ Ensure lighting is minimised overall to that which is essential for safe and efficient operation of the facility; ▪ Timer switches or movement sensors shall be installed on the Port where applicable; ▪ Lights on the Port shall be shielded and/or recessed to minimise light spill; ▪ Long wavelength lights or other lighting demonstrated to have a low impact on nesting marine turtles shall be installed; ▪ Any other lighting options that further reduce impacts to marine turtles while allowing for the safe and efficient operation of the Port facility shall be installed; and, ▪ Monitoring of marine turtle hatchling success and behaviour, including aggregation around light sources, and implementation of adaptive management as required. <p><i>Enhancement Measures</i></p> <p><u>Feral Pig Control Program</u></p> <p>The feral pig control program to be implemented will address the existing threat to nests and hatchlings from feral pig predation as well as further reduce the impact on nesting marine turtles and their hatchlings from altered light regimes associated with construction and operation of the Port. The program which aims to reduce feral pig numbers along nesting beaches is expected to reduce the level of predation on marine turtle nests and hence increase hatchling survivorship in the Project area. The feral pig control program constitutes an offset under the <i>Queensland Biodiversity Offsets Policy</i>. The implementation of this offset is a condition of the Queensland Coordinator General's approval of the Project.</p> <p>The 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 wetland areas within the management zone and reduce nest predation by feral pigs. The feral pig control program in relation to marine turtle nesting shall include the following:</p> <ul style="list-style-type: none"> ▪ Shooting of feral pigs (helicopter or ground based methods) shall occur prior to peak nesting season. Specific details of control methods to be employed shall be subject to safety considerations and availability of equipment; ▪ Cover the coastal zone between Ina Creek and Winda Winda Creek and associated riparian hinterland areas; ▪ The feral pig control program shall commence after the year 1 baseline marine turtle monitoring program and continue to the extent necessary while RTA operates the Boyd Port; and, ▪ Marine turtle monitoring (refer Monitoring and Inspection).
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<p>SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures</p>	<p>Potential Negligible Impacts</p> <p><i>Altered Light Regimes</i> - Negligible impacts on nesting marine turtles and their hatchlings are anticipated as a result of altered light regimes associated with dredging activities, spoil disposal and Project-related shipping.</p> <p><i>Underwater Acoustic Impacts</i> - Underwater noise during construction of marine and river facilities will be principally generated by pile driving activities at the Port, river facilities and temporary seaborne access. It is possible that marine turtles foraging, nesting and migratory behaviours may be affected by underwater pile driving noise. Negligible impacts on marine turtles are also anticipated as a result of underwater noise associated with dredging activities, spoil disposal and Project-related shipping.</p> <p>Marine Oil Spill from 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 marine turtles in the vicinity of the spill.</p> <p><i>Physical Disturbance of Benthic or Intertidal Habitats</i> - Negligible impacts on marine turtles are anticipated as a result of physical disturbance to benthic or intertidal habitats associated with dredging activities. Negligible impacts on marine turtles are also anticipated as a result of the deposition of dredged sediments on benthic habitats.</p> <p><i>Changes in Coastal Processes</i> - Negligible impacts on nesting marine turtles are anticipated as a result of changes to coastal processes associated with dredging activities at the Port.</p> <p><i>Physical Disturbance of Beach Habitats</i> - Negligible impacts on nesting marine turtles are anticipated as a result of physical disturbance to beach habitats from piling or temporary beach access associated with the construction and operation of marine facilities.</p> <p><i>Recreational Use of Beach</i> - Negligible impacts on nesting marine turtles are anticipated as a result of changes in the recreational use of beaches.</p> <p><i>Vessel Discharges</i> - Negligible impacts on marine turtles are anticipated as a result of vessel discharges associated with Project-related shipping activities.</p> <p><i>Vessel Strike</i> - Negligible impacts on marine turtles are anticipated as a result of vessel strike associated with Project-related shipping activities.</p> <p>General Mitigation Measures</p> <p>Specific mitigation measures are not required for the negligible impacts, however, the following general mitigation measures will further reduce any potential for impact on the species.</p> <p><u>Lighting Management</u></p> <ul style="list-style-type: none"> ▪ Minimisation of light levels from the dredging works to those lights that are necessary for their safe operation; ▪ Lighting on board vessels at sea and in port would be minimised to that necessary to comply with navigational safety regulations and provide for safe working while personnel are on deck; and, ▪ Vessels waiting to berth at ports would only anchor in existing offshore anchorage areas as prescribed by the relevant Harbour Master. <p><u>Feral Pig Control Program (refer details above)</u></p> <p>The feral pig control program will further reduce the impact on nesting marine turtles and their hatchlings associated with altered light regimes associated with dredging activities and spoil disposal and Project-related shipping.</p> <p><u>Pile Driving Management</u></p> <ul style="list-style-type: none"> ▪ Soft start-up shall be used to disperse marine turtles prior to normal pile driving activities commencing; ▪ Continual marine fauna observations (including marine turtles) 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: <ul style="list-style-type: none"> ▪ drilling, 750mm piles and 355.6mm piles: 300m; ▪ 1050mm piles: 350m; ▪ 1200mm piles: 430m; ▪ 1500mm piles: 470m; and, ▪ 1 x 1500mm and 2 x 1050mm piles: 640m. (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
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<p>SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures</p>	<p>appropriate observation zone may be determined in consultation with DSEWPaC).</p> <ul style="list-style-type: none"> ▪ Humbug terminal: <ul style="list-style-type: none"> ▪ all drilling and piling activities: 300m. ▪ Hornibrook terminal: <ul style="list-style-type: none"> ▪ drilling, 600mm piles and 750mm piles: 300m; ▪ 900mm piles: 310m; and, ▪ 1050mm piles: 340m. ▪ Hey River terminal: <ul style="list-style-type: none"> ▪ drilling and 600mm sheet piles: 300m; ▪ 600mm piles: 370m; ▪ 750mm piles: 400m; ▪ 900mm piles: 440m; and, ▪ 1050mm piles: 470m. ▪ Marine and river pile driving activities shall be stopped if marine turtles enter within an exclusion zone of 100m and remain within the zone for greater than five minutes; and, ▪ No piling activities shall commence if marine turtles are observed within the exclusion zone during visual observations prior to start-up. <p><u>Underwater Noise Management (Project-related Shipping)</u></p> <ul style="list-style-type: none"> ▪ All vessels shall operate in accordance with appropriate industry and equipment noise and vibration standards; ▪ SoE bauxite 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 vessels shall be conducted to the manufacturers' specifications; and, ▪ Where possible, avoid leaving engines, thrusters and auxilliary plants in stand-by or running mode unnecessarily. <p><u>Marine Oil Spill Management</u></p> <p>The risk of marine oil spills from Project-related shipping will be reduced by measures to reduce the risk of collisions or groundings. This includes the use of tugs in port areas, qualified bridge personnel, bridge management systems including fatigue management, pilotage and Vessel Tracking Systems. The following additional mitigation measures shall be implemented to reduce the potential unmitigated impacts on marine turtles from oil spills associated with Project-related shipping activities:</p> <ul style="list-style-type: none"> ▪ 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; ▪ 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. <p><u>Dredging and Offshore Spoil Disposal Management</u></p> <p>The Dredge Management Plan for the Port (initial capital dredging) and Dredge Management Plan for the river facilities (capital dredging) includes measures such as:</p> <ul style="list-style-type: none"> ▪ 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); ▪ Dredging activities shall be conducted using equipment that is in survey and registered, and complies with the conditions of relevant approvals;
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<p>SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures</p>	<ul style="list-style-type: none"> ▪ 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; and, ▪ Subsequent capital and maintenance dredging for the Port will require separate approved dredge management plans. <p><u>Management of Beach Profile and Cliffs</u></p> <p>The impact to the longshore beach profile and cliffs due to the increased depth of the berth and departure area of the Port shall be limited to a reasonably short distance both sides of the wharf trestle structure. Potential impacts shall be monitored and mitigation undertaken if cliff erosion is exacerbated.</p> <p><u>Beach Management for Marine Turtle Nesting for the Temporary Seaborne Access and Port Construction</u></p> <ul style="list-style-type: none"> ▪ Prior to commencement of construction of the Port or temporary seaborne access facilities, an inspection for the presence of marine turtle nests shall be conducted and, if there are nests that have not been predated by feral pigs, RTA shall consult with EHP to evaluate options for the relocation of nests to a distance outside the potential zone of impact; ▪ All temporary seaborne access infrastructure facilities shall be removed when no longer required and the plateau at the temporary barge landing area reinstated as close as possible to original contours; ▪ The concrete matting for the temporary barge landing access shall provide a 7.5m wide access for vehicles directly up the beach. This pathway will remove a very small proportion of the available 5.8km marine turtle nesting habitat available between Boyd Point and Pera Head. The provision of the concrete pathway will provide a defined pathway to prevent vehicles from disturbing marine turtle nests; and, ▪ Bunting and/or signage shall be used along pathways and landing area to minimise disturbance to adjacent potential marine turtle nesting areas. <p><u>Access Permit System</u></p> <ul style="list-style-type: none"> ▪ An access permit system shall be developed in consultation with the Traditional Owners with the objective of minimising impacts on nesting marine turtles, nests and hatchlings by the construction and operational workforce that includes the following. <ul style="list-style-type: none"> ▪ access to the marine turtle nesting beach will be forbidden without a permit; ▪ recreational access to the marine turtle nesting beach shall not be permitted at night; ▪ no access above high tide mark except in designated walk way areas to avoid nesting sites; ▪ inductions shall include appropriate behaviours for beach access to prevent impacts to nesting marine turtles or nests; and, ▪ awareness program will also include signage, posters in the camp, and consideration of educational tours and/or involvement in the proposed marine turtle nesting monitoring program. ▪ Enforcement of the access permit system shall be through enforcement of the following measures that shall be included in the code of conduct for the construction camp: <ul style="list-style-type: none"> ▪ implement workforce induction and awareness sessions to communicate requirements relating to safety, security, behaviour and land access both on and off the mining lease; ▪ implement a complaints system and incident management process whereby any reported incidents of unacceptable behaviour are investigated and incidents responded to; and, ▪ proactive discussion and engagement with community stakeholders to establish a system to monitor and respond to issues, including the implementation of additional management measures where necessary. ▪ RTA shall reinforce the required code of conduct for employees and contractors in the Project area and emphasise need for appropriate behaviour at all times. Monitoring of the access permit system shall be conducted through the Project health, safety and environment management system including corrective actions for any breaches of the access permit system implemented through the incident management system. <p><u>Vessel Discharge Management</u></p> <ul style="list-style-type: none"> ▪ All vessels shall operate in full compliance with international and Australian regulations with respect to the treatment and discharge of operational wastes, particularly plastics; ▪ No garbage or sewage shall be discharged in the Port area and on-board garbage management plans and systems shall reduce the risk of accidental loss of waste overboard;
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<p>SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures</p>	<ul style="list-style-type: none"> ▪ No operational discharges from vessels shall occur from Project-related shipping 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); ▪ Project vessels shall not discharge any garbage while at sea within the Port area, GBRMP or parts of the Torres Strait defined as “nearest land”; ▪ Project vessels shall have on-board garbage management plans and systems to minimise the risk of accidental loss overboard of garbage, particularly plastics; ▪ All Project vessels shall have an on-board sewage treatment plant that is IMO approved, holding tanks and discharge connections to allow discharge at shore facilities or holding until the vessel is outside Australian Waters; ▪ All sewage waste from bauxite ships working on the domestic route between Boyd Port and Gladstone shall be discharged to a shore-based facility in Gladstone; ▪ A sewage log book for bauxite vessels shall be maintained in accordance with the provisions of MARPOL Annex IV – Sewage, and the Transport Operations (Marine Pollution) Act; and, ▪ On-board sewage treatment systems shall be included in bauxite vessel's planned maintenance system, and compliance with sewage treatment and discharge regulations would be included in Port State Control inspections. <p><u>Vessel Strike Management</u></p> <ul style="list-style-type: none"> ▪ 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 and will reduce speed when approaching shallow water; ▪ Any injury or death of marine turtles shall be reported to EHP for inclusion in the Wildlife Stranding database and those that may be attributable to RTA operations shall 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 marine turtles, are more commonly found. <p><i>General Enhancement Measures</i></p> <p><u>Feral Pig Control Program</u></p> <p>The feral pig control program constitutes an offset under the <i>Queensland Biodiversity Offsets Policy</i>. The implementation of this offset is a condition of the Queensland Coordinator General's approval of the Project. The program has two components as follows.</p> <ol style="list-style-type: none"> 1. Marine Turtle Monitoring (refer to monitoring and inspection) 2. Feral Pig Control: <ul style="list-style-type: none"> Objectives: <ul style="list-style-type: none"> ▪ To reduce feral pig numbers along nesting beaches. ▪ To reduce the level of predation on marine turtle nests. Feral Pig Control Methods: <ul style="list-style-type: none"> ▪ An annual feral pig control program shall be implemented using shooting (helicopter or ground based methods) prior to the peak of marine turtle nesting season (timing to be confirmed subject to results of initial baseline survey). Specific details of control methods to be employed are subject to safety considerations and availability of equipment. ▪ The feral pig control program shall cover the coastal zone between Ina Creek and Winda Winda Creek and associated riparian hinterland areas. ▪ The feral pig control program shall commence after the year 1 baseline marine turtle monitoring program and continue to the extent necessary while RTA operates the Boyd Port. ▪ Annual monitoring shall be conducted of beaches for marine turtle nesting and nest predation rates.
<p>Collection of Baseline Data</p>	<ul style="list-style-type: none"> ▪ Baseline data on the presence and nesting locations of marine turtles was collected during EIS surveys for the SoE Project (RTA 2013); and, ▪ Annual nest surveys shall be collected as part of the feral pig control program (refer monitoring and inspection).

Monitoring and Inspection	<p>Dredging and Offshore Spoil Disposal</p> <ul style="list-style-type: none"> Monitoring requirements during dredging operations in accordance with the DMPs. <p>Pile Driving Activities</p> <ul style="list-style-type: none"> Marine turtle observations during marine pile driving activities (refer management and mitigation measures). <p>Marine Turtle Monitoring</p> <p>Objectives:</p> <ul style="list-style-type: none"> Determine the abundance of nests on specific sections of beach over specified time intervals for Olive Ridley and Flatback Turtles (and other species if present). Identify the significance of sections of the beach to each species. Establish the level of predation on nests and determine the extent of predation by feral pigs. <p>Methodology</p> <ul style="list-style-type: none"> A baseline survey of two days each month (after spring high tides where high tides occur late in the evening (after 20:00 hours) designed to detect peak nesting patterns shall be conducted. In addition during the initial baseline year, two 14 day intensive surveys in July and October (during potentially the peak nesting periods) shall be conducted; From year two onwards, annual monitoring over two 14 day periods during peak of the nesting season (between July and October, to be confirmed from initial baseline year data) shall be conducted; The extent of beach that would be monitored shall include from Ina Creek in the south to the ML7024 boundary in the north; Monitoring teams shall include Traditional Owner representatives (if Traditional Owners are available) and would occur in daylight hours. Sections of beach where marine turtles could not physically nest can be excluded from the survey; The annual monitoring program shall be reviewed each year and may be amended based on earlier results; Monitoring shall include monitoring emerging hatchlings moving up the beach towards land, the re-emergence of hatchlings from the water and any aggregation of hatchlings around a light source; and, Monitoring details that shall be recorded include: <ul style="list-style-type: none"> Total number of nests; Location of nests (GPS); Species nested; Number of false crawls (mark all marine turtle tracks with GPS); Number and location of disturbed nests and potential cause of disturbance; and, Record all hatched nests.
Incident Management	<ul style="list-style-type: none"> Incidents to be reported and managed in accordance with the RTA's certified ISO14001 Environmental Management System and incident management system; and, Incidents of marine turtle injury or death related to dredging activities shall be in accordance with the requirements outlined in the DMPs.
Performance Reporting	<ul style="list-style-type: none"> Surveys and monitoring are conducted in accordance with this Management Plan and the requirements of the DMP's; and, Zero incidents relating to marine turtles.
Auditing	<ul style="list-style-type: none"> Auditing of this plan including the effectiveness of mitigation measures and monitoring shall be conducted in accordance with the RTA's certified ISO14001 Environmental Management System.

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

SAWFISH and SPEARTOOTH SHARK Environmental Management Plan Outline



Species	Freshwater Sawfish (<i>Pristis microdon</i>), Green Sawfish (<i>Pristis zijsron</i>), Dwarf Sawfish (<i>Pristis clavata</i>), Speartooth Shark (<i>Glyphis glyphis</i> / <i>Glyphis Sp. A</i>)	
Habitats	Freshwater Sawfish	<p>Foraging Prefers soft bottomed habitats located in river embayments and estuaries more than 1m deep, however, the species will move into shallow waters when travelling upstream or while hunting prey. Adults may radiate out and follow the coastline within inshore marine waters.</p> <p>Breeding Pupping occurs in freshwater and in the wet season near river mouths. Freshwater environments are considered to be important nursery areas.</p>
	Dwarf Sawfish	<p>Foraging Prefers highly turbid environments and are only usually found in silt sections of an estuary, which are completely devoid of instream structure. The species is not found in freshwater. Adults were reported to migrate seasonally into inshore waters, although it remains unclear how far offshore the adults travel.</p> <p>Breeding Breeding in estuarine or low saline marine environments. Nursery areas in estuarine environments.</p>
	Green Sawfish	<p>Foraging Inhabits muddy soft bottom habitats close to shore in estuaries, river mouths, embankments and along sandy and muddy beaches throughout its range (<1 to 70m).</p> <p>Breeding Pups in estuarine waters. Nursery areas in estuarine and coastal waters.</p>
	Speartooth Shark	<p>Foraging Predominantly large tropical river systems, relatively shallow, turbid, upper freshwater, and brackish, reaches and associated floodplains. Distribution within rivers is limited by both upstream and downstream environments.</p> <p>Breeding Breeding habitat unknown. Nursery areas in freshwater.</p>
EPBC Status	Freshwater Sawfish – Vulnerable; Dwarf Sawfish – Vulnerable; Green Sawfish – Vulnerable; Speartooth Shark – Critically Endangered	

Known Threats	<p>Note: known threats listed below are not all applicable to the SoE Project. Relevant SoE Project-related threats on the elasmobranchs and mitigation measures for relevant impacts are detailed separately in this table. Impacts affecting these species in Australia include:</p> <ul style="list-style-type: none"> ▪ Commercial and recreational fishing and by-catch; ▪ Aquarium trade (Freshwater Sawfish, Dwarf Sawfish and Green Sawfish); ▪ Indigenous harvesting (Dwarf Sawfish, Green Sawfish); ▪ Collection of rostra for souvenirs (Dwarf Sawfish); ▪ Habitat degradation and disturbance (Freshwater Sawfish, Green Sawfish and Speartooth Shark); and, ▪ Shark finning (Freshwater Sawfish and Green Sawfish). 	
Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	Freshwater Sawfish	<p><u>Port Site</u> Possible: Subadults are commonly associated with estuarine waters and migrate to sea as they near maturity so may occur in the area. Not found during targeted surveys.</p> <p><u>New Spoil Ground</u> Possible: Subadults are commonly associated with estuarine waters and migrate to sea as they near maturity so may enter the area although are generally associated with inshore waters.</p> <p><u>Albatross Bay Spoil Ground</u> Possible: Subadults are commonly associated with estuarine waters and migrate to sea as they near maturity so may traverse the area although are generally associated with inshore waters.</p> <p><u>Dam C – Norman Creek</u> Unlikely: Not found during targeted surveys. Anecdotal records only of sawfish (unknown species) have been recorded in the lower estuarine reaches of Norman Creek, downstream of Dam C. The freshwater reaches of the Norman Creek tributary above and below Dam C location are generally narrow and depths rarely exceed 0.5 m during periods of reduced flow. No suitable habitat for <i>P. microdon</i> appears to exist and no suitable prey species were identified as occurring in freshwaters above or below Dam C, which suggests the tributary is unlikely to be extensively utilised by the species or represent significant habitat of the species. In addition, it is suggested that the extremely low conductivities of Norman Creek's freshwater tributaries would present an osmoregulation constraint on the Freshwater Sawfish as it possesses a more primitive osmoregulation capacity than modern ray finned fishes.</p> <p><u>Ferry/Barge Terminals – Hey and Embley Rivers</u> Possible: Although this species was not found during targeted August 2012 surveys and has not been recorded in either of these rivers since 1985 despite extensive surveys, the footprints of the ferry/barge terminals would be within the estuarine reaches of these rivers that this species may traverse. The extent of disturbance within these areas would be minimal in relation to the total estuarine environment available within these rivers. Disturbance would consist of the clearance of 400m² of mangroves (0.008% of the associated vegetation community within the SoE Project area) and 2.5ha of riverbed. The dredging in these areas would only be to a depth of -7.2m LAT.</p> <p><u>Balance of SoE Project Area not disturbed</u> Likely: This species may occur in estuarine and the lowermost freshwater reaches within the SoE Project area. Suitable habitat present in the brackish reaches of Norman Creek and the Ward River, though generally low abundance of all elasmobranch species have been observed in these systems. Anecdotal records of sawfish within lower Ward River estuary (which would not be disturbed by SoE Project related activities) and Norman Creek estuary (downstream of Dam C) reported by Traditional Owners may include this species.</p>

Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	Freshwater Sawfish	<p><u>Shipping Routes</u> Possible: Subadults are commonly associated with estuarine waters and migrate to sea as they near maturity so may enter the area although are generally associated with inshore waters.</p>
	Dwarf Sawfish	<p><u>Port Site</u> Likely: The species has been recorded from Albatross Bay and the Port footprint contains suitable habitat for the species. Not found during targeted surveys.</p> <p><u>New Spoil Ground</u> Unlikely: This species prefers shallower waters. The new spoil ground is in waters that are deeper than what this species would usually prefer.</p> <p><u>Albatross Bay Spoil Ground</u> Unlikely: For the same reasons as the new spoil ground, it is unlikely that this species would occur at the Albatross Bay spoil ground.</p> <p><u>Dam C – Norman Creek</u> Unlikely: Not found during surveys. This species is not found and does not enter freshwater environments. Dam C would be located in a freshwater reach of Norman Creek. Therefore this species is unlikely to occur within the footprint of Dam C or upstream of the dam.</p> <p><u>Ferry/Barge Terminals – Hey and Embley Rivers</u> Likely: Not found during targeted survey. Suitable habitat for this species is present in near coastal areas and the estuary of the Embley River. Disturbance in the Embley River associated with the SoE Project would be limited to a small amount of dredging activities related to the construction and maintenance of the Hornibrook terminal. This species may also utilise as a resting place either side of high tide, the 400m² of mangrove forest that would be cleared for the construction of the Hey River ferry/barge terminal. The area of mangroves that would be cleared only represents 0.008% of this mangrove community within the SoE Project area. Therefore there would be sufficient remaining mangrove habitat in the surrounding area which the species would be able to utilise for resting.</p> <p><u>Balance of SoE Project Area not disturbed</u> Likely: The species is likely to occur within Albatross Bay and the SoE Project area contains suitable habitat for the species.</p> <p><u>Shipping Routes</u> Unlikely: This species prefers shallower waters. The shipping route is in waters that are deeper than what this species would usually inhabit.</p>
	Green Sawfish	<p><u>Port Site</u> Likely: Not found during targeted surveys. The species has been recorded from Albatross Bay and the Port footprint contains suitable habitat for the species.</p> <p><u>New Spoil Ground</u> Possible: While smaller specimens are more common in coastal waters, estuaries and river mouths, larger animals have been found in deeper offshore waters.</p> <p><u>Albatross Bay Spoil Ground</u> Possible: While smaller specimens are more common in coastal waters, estuaries and river mouths, larger animals have been found in deeper offshore waters.</p> <p><u>Dam C – Norman Creek</u> Unlikely: Not found during surveys. This species is not found and does not enter freshwater environments. Dam C would be</p>

Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	Green Sawfish	<p>located in a freshwater reach of Norman Creek. Therefore this species is unlikely to occur within the proposed footprint of Dam C or upstream of the dam.</p> <p><u>Ferry/Barge Terminals – Hey and Embley Rivers</u></p> <p>Likely: Not found during targeted surveys. Records from Albatross Bay adjoining the mouth of the Embley River make occurrence of this species within the estuarine sections of the Hey and Embley Rivers likely. The extent of SoE Project related disturbance of these areas would be minimal in relation to the total estuarine environment available within these rivers. Disturbance would consist of the clearance of 400m² of mangroves (0.008% of the associated vegetation community within the SoE Project area) and 2.5ha of riverbed. The dredging in these areas would only be to a depth of -7.2m LAT.</p> <p><u>Balance of SoE Project Area not disturbed</u></p> <p>Likely: The species has been recorded from Albatross Bay and the SoE Project area contains suitable habitat for the species.</p> <p><u>Shipping Routes</u></p> <p>Possible: While smaller specimens are more common in coastal waters, estuaries and river mouths, larger animals have been found in deeper offshore waters.</p>
	Speartooth Shark	<p><u>Port Site</u></p> <p>Unlikely: Not found during targeted surveys. The species has only been captured in tidal rivers and estuaries. Although the species can tolerate higher salinities, it is considered that the Port site is too far away (~35km) from the river entrances that provide potential suitable habitat.</p> <p><u>New Spoil Ground</u></p> <p>Unlikely: This species prefers shallower waters and has only been captured in tidal rivers and estuaries. Although the species can tolerate higher salinities, the new spoil ground is remote from usual suitable habitat.</p> <p><u>Albatross Bay Spoil Ground</u></p> <p>Unlikely: This species prefers shallower waters and has only been captured in tidal rivers and estuaries. Although the species can tolerate higher salinities, the Albatross Bay spoil ground is remote from usual suitable habitat.</p> <p><u>Dam C – Norman Creek</u></p> <p>Unlikely: Not found during surveys. The potential area of occupancy of the Speartooth Shark in creek and river systems is restricted from the mouth of a river to the point where the river ceases to be perennial (Stevens et al. 2005). Regional records for the species come from large perennial river systems i.e. the Wenlock River. The species is not known to utilise small seasonal creek reaches. The Dam C would be on a highly seasonal freshwater tributary of Norman Creek which, although perennial, dries to small, shallow pools which are isolated except for connecting trickling flows in the dry season. Therefore, it is unlikely that the Speartooth Shark, if present in Norman Creek would require passage past the site of Dam C.</p> <p>In addition, it is suggested that the extremely low conductivities of Norman Creek's freshwater tributaries would present an osmoregulation constraint on the Speartooth Shark as it possesses a more primitive osmoregulation capacity than modern ray finned fishes. While the estuarine and possibly lower tidally influenced freshwater reaches of the Norman Creek system do provide potentially suitable habitat for this species, the seasonal freshwater tributaries of Norman Creek, including the middle tributary both upstream and downstream of Dam C do not.</p> <p><u>Ferry/Barge Terminals – Hey and Embley Rivers</u></p> <p>Possible: Not found during targeted August 2012 survey. This species was identified as occurring in the Embley and Hey Rivers during surveys conducted between 1978 and 1986 (Peverell <i>et al.</i> 2006, Last and Stevens 2009), however was not recorded in surveys by CSIRO conducted between 1986 and 2004, nor during the August 2012 targeted survey. While <i>G. glyphis</i> has not been confirmed as present in the Embley or Hey systems, it has been assumed the species may persist in those systems. If this species</p>

Likelihood of Occurrence in the SoE Project Area/ Disturbance Areas	Speartooth Shark	<p>was to occur within these rivers, the extent of disturbance associated with the ferry/barge terminals would be minimal in relation to the total environment available within these rivers.</p> <p><u>Balance of SoE Project Area not disturbed</u></p> <p>Possible: This species may occur in estuarine and the lowermost freshwater reaches within the SoE Project area below the perennial extent of the creeks and rivers. Records exist for the Wenlock River and similar habitat is present within the SoE Project area, though generally low abundances of all elasmobranchs species have been observed (Peverell <i>et al.</i> 2006).</p> <p><u>Shipping Routes</u></p> <p>Unlikely: This species prefers shallower waters and has only been captured in tidal rivers and estuaries. Although the species can tolerate higher salinities, the majority of the shipping route is remote from usual suitable habitat.</p>
Relevant SoE Project Related Impacts	The construction and operation of the SoE Project is predicted to have negligible unmitigated impacts on sawfish and the Speartooth Shark for all activities.	
SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	<p>Potential Negligible Impacts</p> <p><i>Physical Disturbance of Benthic or Intertidal Habitats</i> – Potential negligible impacts on these species associated with capital and maintenance dredging and offshore spoil disposal, and construction and operation of the marine and river facilities.</p> <p><i>Creation of a Turbidity Plume</i> - Potential negligible impacts on these species associated with capital and maintenance dredging and offshore spoil disposal.</p> <p><i>Deposition of Dredged Sediments on Benthic Habitat</i> - Potential negligible impacts on these species associated with capital and maintenance dredging and offshore spoil disposal.</p> <p><i>Restricted Movement in Riverine Habitat</i> - Potential negligible impacts on some of these species associated with the construction and operation of Dam C.</p> <p><i>General Avoidance, Mitigation and Enhancement Measures</i></p> <p>Although it has been determined that all SoE Project-related impacts will be negligible and therefore no mitigation measures are required, the following avoidance, mitigation or enhancement measures that shall be implemented to protect marine and estuarine fauna and habitats will further reduce the potential SoE Project-related impacts on sawfish and the Speartooth Shark.</p> <p><u>Dredging and Offshore Spoil Disposal Management</u></p> <p>Mitigation measures and/or monitoring shall be carried out in accordance with the approved Dredge Management Plans (DMPs). The Dredge Management Plan for the Port (initial capital dredging) and Dredge Management Plan for the river facilities (capital dredging) includes measures such as:</p> <ul style="list-style-type: none"> ▪ Dredges shall have accurate positioning systems 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 the 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; ▪ Accurate positioning systems shall be used on dredges to ensure direct impacts are restricted to the approved dredging and disposal areas; ▪ 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: 	

SoE Project Potential Impacts and associated Avoidance, Mitigation or Enhancement Measures	<ul style="list-style-type: none"> ▪ 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. <p><u>Marine and River Facilities Construction and Operations</u></p> <ul style="list-style-type: none"> ▪ All temporary seaborne access infrastructure facilities shall be removed when no longer required. <p><u>Surface Water Management</u></p> <ul style="list-style-type: none"> ▪ Stormwater runoff shall be managed by constructing and maintaining appropriately sized stormwater management structures. ▪ An erosion and sediment management plan shall be developed prior to construction. ▪ Surface water monitoring shall be conducted in accordance with Coordinator General's approval conditions for the SoE Project: <ul style="list-style-type: none"> ▪ a network of at least 28 surface water monitoring locations shall be maintained. Locations shall be related to proximity to authorised surface water release points. The parameters to be monitored include pH, EC, turbidity, sulphate, suspended solids, aluminium, copper, lead, iron and zinc. Locations shall be monitored regularly to establish a statistical baseline (consistent with ANZECC requirements) and also when any releases to surface water occur. ▪ investigation trigger values for fresh and estuarine waters have been set based on ANZECC (2000) default values and site-specific contaminant limits for receiving waters are to be set based on the statistical baseline.
Collection of Baseline Data	<ul style="list-style-type: none"> ▪ Baseline data on the presence of sawfishes and the Speartooth Shark was collected during surveys for the SoE Project (RTA 2013).
Monitoring and Inspection	<ul style="list-style-type: none"> ▪ Surface water monitoring.
Incident Management	<ul style="list-style-type: none"> ▪ Incidents to be reported and managed in accordance with the RTA's certified ISO14001 Environmental Management System and incident management system.
Performance Reporting	<ul style="list-style-type: none"> ▪ Zero incidents relating to sawfishes and the Speartooth Shark.
Auditing	<ul style="list-style-type: none"> ▪ Auditing of this plan including the effectiveness of mitigation measures and monitoring shall be conducted in accordance with the RTA's certified ISO14001 Environmental Management System.

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

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

