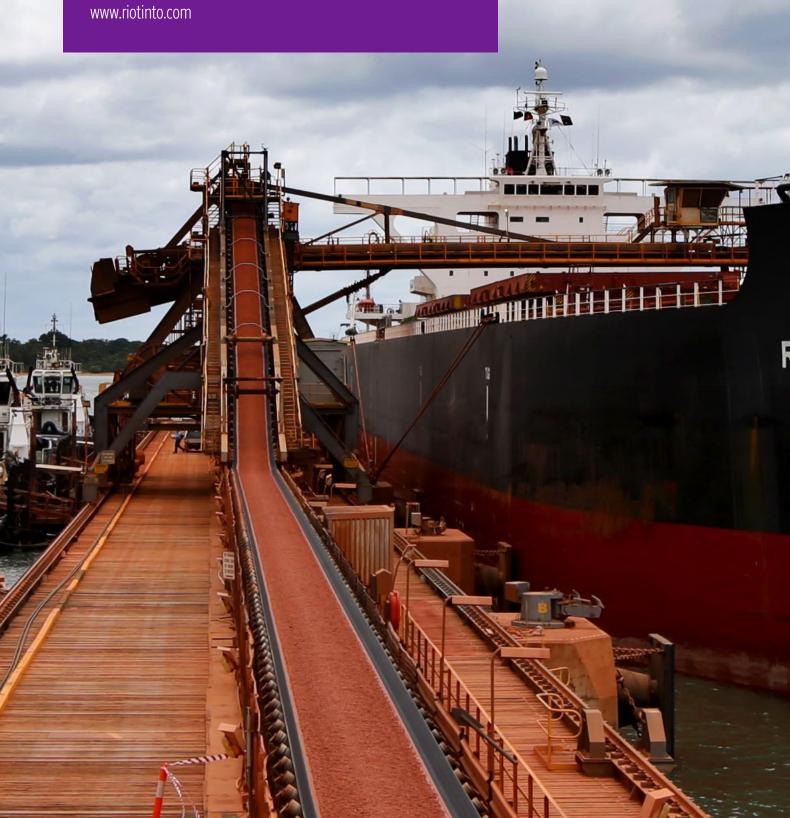


## Information package

Proposed maintenance dredging at the Chith Export Facility, Humbug and Thunggun Hey River Terminals

Servicing the Amrun mine in Weipa, Queensland





### Amrun operations up and running

In December 2018, Rio Tinto exported the first shipment of bauxite from its new Amrun mine, six weeks ahead of project schedule. The Amrun mine extends the life of our Weipa operations by decades, exporting to both Rio Tinto's Gladstone refineries and internationally to China.

Now at full production, Amrun produces 22.8 million tonnes of bauxite a year with the option to expand in future. Amrun significantly builds on our history of more than 55 years on the Western Cape, sustaining jobs and supporting business growth in the region.

As an operational mine, we have moved into a planned maintenance schedule for our supporting infrastructure.

Part of our regular maintenance schedule includes maintenance dredging and bed levelling at the Chith Export Facility and our two river terminals. This maintenance dredging is essential to maintain navigational depths and ensure ongoing operational efficiency of the port.

As with every aspect of our operations, we invest to deliver best practice processes and outcomes. Ahead of applying for the necessary permits to conduct regular maintenance dredging over the next ten years, we worked with local Weipa port representatives, North Queensland Bulk Ports, to conduct extensive research into the various options available.

The result of this research was a comprehensive approach to sustainably managing sediment from dredging, which we can now confidently recommend as the best option for this port area.

We have prepared this information package to succinctly summarise the results of our research. On the following pages you will find information about how and why maintenance dredging takes place, the proposed maintenance dredging volumes and processes, and key environmental investigations.

As always, we must finish by thanking all of our stakeholders, including our community and Traditional Owner partners, for their support and engagement throughout this process.

We could not continue to operate on the Western Cape, and continue to grow our portfolio, without this support, and we look forward to many more productive years ahead, playing our part to nurture a vibrant and resilient regional community.

Now at full production, Amrun produces 22.8 million tonnes of bauxite a year with the option to expand in future. Amrun significantly builds on our history of more than 55 years on the Western Cape, sustaining jobs and supporting business growth in the region.

### Executive summary

Rio Tinto is proposing to periodically remove built-up sediment from within the Chith Export Facility and our Humbug and Thunggun Hey River Terminals boundaries to maintain navigational depths and for operational efficiency of the port.

Natural sediment shifts at these facilities as a result of wind and wave energy resuspending marine sediments within the naturally turbid environment of Albatross Bay. This process results in sediments accumulating in some navigational areas and can affect the efficiency of the facility.

### Sustainable Sediment Management Assessment

A range of options were assessed to determine whether maintenance dredging could be avoided, reduced or whether the sediment removed during the maintenance dredging could be recycled. This work is brought together through the Sustainable Sediment Management Assessment for Navigational Maintenance.

(Readers may come across the term 'Amrun Port' in many of the supporting studies and reports that comprise our Sustainable Sediment Management Assessment for Navigational Maintenance. Please note that this term can be read interchangeably with 'Chith Export Facility' for the purposes of these documents.)

This study found catchment run-off has minimal influence on sediment movement at the port, but tropical cyclones, and the associated wind and large waves, can significantly change levels of accumulation.

A key finding of the assessment was maintenance dredging was considered to provide the most cost effective and lowest greenhouse gas (GHG) emissions solution to sediment build up, with low environmental and operational impacts and high effectiveness.

Based on the assessment, it was found that occasional bed levelling in key areas could reduce the frequency of the maintenance dredging required within the Inner Harbour, but would not eliminate this need. Bed levelling is a modern technique used in many ports and harbours. It involves towing equipment behind a vessel to level out high spots and ridges on the seabed.

The assessment also included an investigation of options to recycle or reuse the dredged material to avoid disposal. However, the assessment found that due to the silty nature

and small volumes of the material that would be removed by maintenance dredging, there would be limited beneficial reuse options.

Rio Tinto's structured decision-making approach included participation from a range of stakeholders who identified the key metrics used, including environment, cultural heritage, regional economics and operations, health and safety and social.

### Preferred sediment management option

Placement of material on land was found to be a less favourable option than placement at sea.

Regarding placement at sea, both the existing offshore Amrun Dredged Material Placement Area (DMPA) and a new inshore DMPA underwent detailed comparative analysis. While the inshore DMPA performed marginally better against a range of criteria, both options performed strongly. Both options would provide feasible short and long-term solutions.

For this reason, a decision was made to relocate dredged materials from the Chith Export Facility area to the existing offshore Amrun DMPA, as the impacts of using this area are well understood.

Dredged materials from the river facilities will be placed at the existing Albatross Bay DMPA, as this is closer to those terminals

### Environmental risk assessment and management plans

Underpinning the preferred sediment management option are an environmental risk assessment and best practice maintenance dredging management plans. Rio Tinto will also implement an industry-leading adaptive monitoring and management program.

### Study approach





**Amrun** Chith Export Facilty

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### About Amrun and the Chith Export Facility

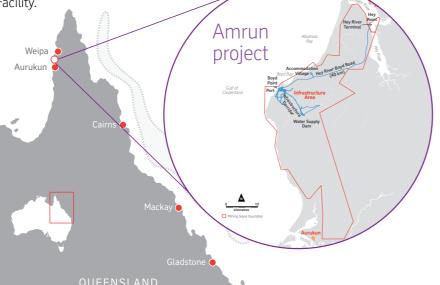
Rio Tinto is a global leader in aluminium, one of the world's most widely used metals.

In Australia, Rio Tinto fully owns and operates the bauxite operations in Weipa, including the East Weipa and Andoom mines (northern operations) and the newly constructed Amrun mine. Amrun extends the life of our Weipa operations by decades, significantly building on our strong history of more than 55 years in the region.

Because Amrun is located 40km south of Weipa, it has its own mine infrastructure area including a dam, tailings storage facility, two river terminals at Humbug and Hey River, a power station (20MW), processing facilities, including a six-module beneficiation plant, stockpile area, and the Chith Export Facility.

The navigational shipping areas within this infrastructure consist of:

- A main shipping channel for vessels to travel to and from the berth
- A single berth pocket (350m long, 75 110m wide)
- A wharf area, under the wharf and adjacent to the berth pocket
- Two river facilities to enable access between Weipa and Amrun ports:
  - Humbug roll-on roll-off (RORO)
  - Hey River RORO





Above Amrun location Below A

**Left** Amrun port area

and project area

### What is maintenance dredging?

When you look out at a port, you'll see the ships, ocean, the wharves and maybe some offloading machinery. What you won't see is the infrastructure beneath the surface. This includes a shipping channel and berthing pockets.

All of these are manmade depressions in the seabed that allow a ship to manoeuvre into port.

Over time, natural forces like tides, storms and cyclones cause some of the sediment that is constantly shifting through the ocean to settle into these channels and pockets.

This sediment starts to reduce the depth of these navigational areas, which have a design depth and a declared depth.

- Design depth is the original construction depth that port engineers consider ideal for operating safely and efficiently at both high tide and low tide.
- Declared depth is designated by the Harbor Master, acknowledging this sediment build-up and safe clearance.

If maintenance dredging does not take place, the channel and berth pockets get shallower, as illustrated below.

As the distance between ship and seabed (known as under keel clearance) reduces, the port's day-to-day activities become more difficult.

The depth necessary for safe loading, manoeuvring and transit of ships is impacted.

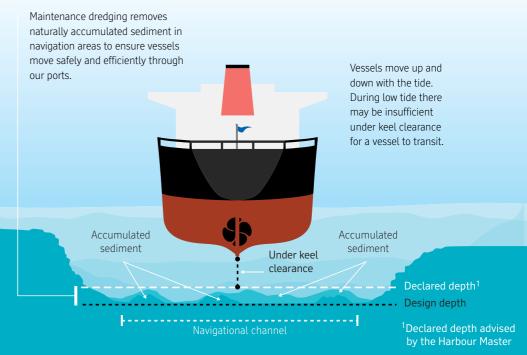
This can cause shipping delays that have significant flowon effects for businesses and the broader economy.

### Capital versus maintenance dredging

Maintenance dredging is the removal and placement of accumulated material from existing ship navigation areas to an approved placement area.

Capital dredging involves the removal of previously undisturbed areas of seabed to expand or create new shipping channels, berths or swing basins. Capital dredging was undertaken at Amrun in 2016 when the Chith Export Facility was established.

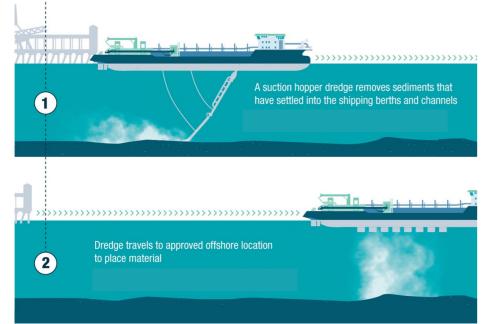
Below Accumulated sediment in navigation areas



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## How is maintenance dredging performed at the Chith Export Facility?

Maintenance dredging has been undertaken in 2018 and 2019 at the Chith Export Facility under a short-term permit, using what is called a Trailing Suction Hopper Dredger (TSHD). The TSHD is mainly used for dredging loose and soft material such as sand, gravel, silt or clay. The diagram below illustrates this more clearly.



In the first step, one or two suction tubes, equipped with a drag head, are lowered on the seabed and the drag head is trailed over the bottom. A pump system sucks up a mixture of sands, silts or clay and water, and discharges it in the 'hopper' or hold of the vessel.

Once fully loaded, the vessel sails to the designated placement site. The material is then deposited at the approved location through bottom doors or valves, as shown in the second step.

### International, national and state regulation

Activities to manage marine sediment in ports are highly regulated and, in particular, any dredging and dredged material placement is subject to detailed regulatory approval processes under international conventions, and under national and state legislation.

Australia is a signatory to the London Protocol, an international convention that aims to "protect and preserve the marine environment".

The placement of dredged material at sea must be in accordance with the London Protocol and the National Assessment Guidelines for Dredging (NAGD).

The NAGD set out the framework for the environmental impact assessment and permitting of the ocean disposal of dredged material. Prior to any decision to dredge and place material, a comprehensive assessment is required.

A strict NAGD criteria determines whether dredge material will be suitable for at-sea disposal or whether it must be placed onshore. Rio Tinto must have in place state and Commonwealth permits to conduct any maintenance dredging and at-sea disposal.

Rio Tinto currently has a three-year Sea Dumping Permit in place, as part of its Maintenance Dredge Management Plan. This short-term Sea Dumping Permit is due to expire in April 2021.

Rio Tinto is now applying for a 10-year Sea Dumping Permit to ensure ongoing operational efficiency and maintain navigational depths at its Chith Export Facility.

This information package outlines the process Rio Tinto is undertaking to seek a new permit under the Environment Protection (Sea Dumping) Act for placement of the dredged material at the existing offshore Amrun Dredged Material Placement Area.

# Why is maintenance dredging needed at the Chith Export Facility?

To maintain navigational depths and operational efficiency at the Chith Export Facility, Rio Tinto must undertake maintenance dredging to remove and relocate built-up sediment.

In addition to the area's regularly occurring sedimentation, extreme weather events, such as tropical cyclones, can result in significant increases in sedimentation. This can lead to increased maintenance dredging requirements following these events.

To reduce the risk of increased sedimentation from a tropical cyclone resulting in operational or safety issues at the port, annual maintenance dredging has typically been scheduled immediately after the wet season (when tropical cyclones occur).

Rio Tinto's studies have shown there is currently no feasible alternative to maintenance dredging.

### Economic and community impacts

If maintenance dredging did not occur at the Chith Export Facility, Rio Tinto's ability to continue to export from its Amrun mine at a current capacity of 22.8 million tonnes per annum would gradually be reduced.

Amrun is part of Rio Tinto's world-class Weipa operations and is the third continuous mining operation alongside East Weipa and Andoom. It builds on our 55-year history on the Western Cape, sustaining local jobs and supporting local business growth.

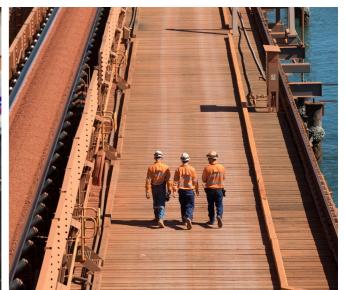
Importantly, we worked closely with our Traditional Owner partners in developing the Amrun project to ensure Indigenous employment is a key focus area for the business. We are committed to improving quality employment outcomes for local Aboriginal employees, and focusing on developing existing and potential local Aboriginal leaders across the site.

More than 350 local Aboriginal people have also participated in our Weipa traineeship programme since 2001.

We also have partnerships with local schools in the area, boosting employability for local students by implementing effective structured school-to-work pathways linking school-based programmes with core industry requirements.

In addition, we launched the Western Cape Community Development Fund in January 2019. The fund is a A\$750,000 commitment from 2019-2021 to build partnerships that address key social, environmental and economic challenges and opportunities and create long-term and sustainable benefits for the region.





### What maintenance dredging will take place?

#### Planned schedule

Future maintenance dredging requirements at the Chith Export Facility and the Humbug and Thunggun Hey River Terminals continue to be refined.

However, based on the current data, it is expected that an annual maintenance dredging program will likely be required at the Chith Export Facility. Sedimentation rates at the river facilities is minimal and maintenance dredging may be required less frequently at those terminals.

Exact dredging volumes per dredging program will vary depending on sediment accumulation and cyclonic activities, but an upper limit of 480,000 m<sup>3</sup> in total for 10 years is being requested in the permit application.

#### Anticipated volumes

Program type	Anticipated number of programs over 10-year permit	Volume per program	Volume over 10-year permit 320,000 m <sup>3</sup>	
Chith Export Facility Standard (typical year)	8	40,000 m <sup>3</sup>		
Chith Export Facility Large (cyclonic year)	2	60,000 m <sup>3</sup>	120,000 m <sup>3</sup>	
		Subtotal	440,000 m <sup>3</sup>	
Hey River Terminal	1	4,500 m <sup>3</sup> (1)	4,500 m <sup>3</sup>	
Humbug Terminal	1	32,100 m <sup>3</sup> <sup>(2)</sup>	32,100 m <sup>3</sup>	
		Subtotal	36,600 m <sup>3</sup>	

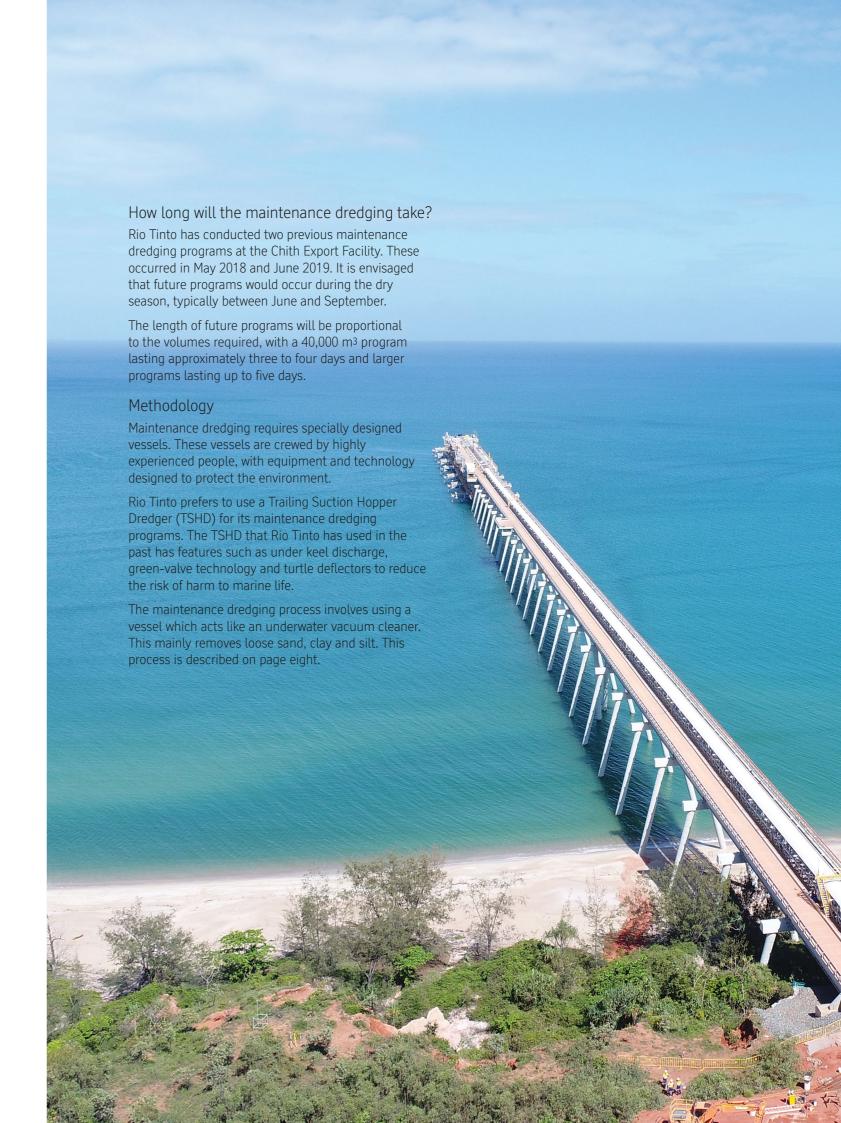
(1) Hey River Terminal – 10-year volume based on 5 standard years (300 m<sup>3</sup>) and 5 cyclonic years (600 m<sup>3</sup>) of sedimentation (2) Humbug Terminal – 10-year volume based on 5 standard years (2,140 m<sup>3</sup>) and 5 cyclonic years (4,280 m<sup>3</sup>) of sedimentation

#### Placement area

There is an existing offshore Amrun Dredge Material Placement Area (DMPA), which was used for capital dredging during port construction and all subsequent maintenance dredging (i.e. the 2018 and 2019 programs). It is recommended that this DMPA continue to be used for sediment relocation for all Chith Export Facility maintenance dredging programs.

If material is dredged at the river terminals, it would be best practice for this material to be placed at the alternative Albatross Bay DMPA, which is nearer to these terminals. "

Maintenance dredging requires specially designed vessels. These vessels are crewed by highly experienced people, with equipment and technology designed to protect the environment.



### What are the environmental receptors and risks?

Based on more than two years of studies and peer-reviewed research, Rio Tinto studies by relevant experts have concluded the risk to environmental receptors from maintenance dredging at the Chith Export Facility and nearby river terminals will be low.

While our independent environmental risk assessment assigned a 'High' risk rating to the risk of introduced marine pests, this was accompanied by a likelihood level of 'Unlikely'. Any dredge vessel undertaking works at Amrun is required to comply with Australian Quarantine and Inspection Service and Bio-Security Queensland requirements in relation to ship ballast water and marine pest management. This includes the National System for the Prevention and Management of Marine Pest Incursions. The TSHD Brisbane operates only in Australian waters and predominantly at ports along the Queensland coastline.

### Environmental receptors

The environmental values at the Chith Export Facility and nearby river terminals are reflective of an inshore environment of the Cape York Peninsula. Water quality within the port is naturally turbid due to sediment resuspension driven by wave energy and rainfall.

Habitats in the area include patchy coral reefs, benthic infauna communities, intertidal ephemeral seagrass communities and coastal habitats including mangroves.

There are a number of protected fauna species that are known to occur at the port including marine turtles, sharks, in-shore dolphins, dugong and migratory shorebirds.

The port and surrounding areas also have values for commercial fisheries, tourism and recreation, and heritage. Of these, the commercial fishery operations that operate in the region are of most significance.

However, maintenance dredging at Amrun is a well-managed activity that is limited in scale and intensity and therefore impact to environmental values is unlikely. Changes to operations will be communicated and all boating laws and rules complied with.

#### Risk conclusions

All potential impacts were assessed against known environmental values and data to determine the risks posed by maintenance dredging at the Chith Export Facility and nearby river terminals. The key findings of this risk assessment are:

• The estimated volume of dredge material per program is small, which minimises the opportunity for environmental impacts.

- Resuspension of sediments from maintenance dredging is comparable to natural suspended sediment concentrations.
- Water quality monitoring results and numerical modelling of sediment transport demonstrates that natural suspended sediment levels are much higher than those generated by maintenance dredging.
- Risks to sensitive communities are likely to be low for coral and benthic communities. Hard coral cover has been shown to be unaffected by dredging activities and the species present are those which are more tolerant to turbidity. Benthic communities are sparse in the Amrun area. They could be temporarily impacted at the Dredge Material Placement Area due to smothering; however, studies have indicated the communities recover and restabilise.
- Other sensitive communities, such as seagrass and mangroves, lie outside of the area predicted to be impacted by turbidity and sedimentation and the risks from maintenance dredging are negligible.
- Notwithstanding, Chith Export Facility is located in an area known to support marine turtle nesting; however, potential dredging-related impacts are not of a sufficient scale or intensity to affect the wellbeing of marine turtle species. Indirect disturbances can be effectively managed via best practice dredging operations. The short timeframe (in most cases under five days) of each program will also reduce risks.
- Other mariners may experience short-term disruptions to their activities, but these disruptions will not be significant and will be communicated prior to the commencement of operations.

The TSHD will operate in accordance with the Maintenance Dredging Environmental Management Plan. This plan includes how unlikely incidents such as waste and oil spills will be managed as well as management of emissions, such as noise, light and air quality. In the unlikely event of a pollution incident, management will be in accordance with the TSHD on-board emergency procedures and the port's emergency response procedures.

### Environmental risk assessment summary table

Risk activity (cause)	Potential environmental receptors	Potential impact	Consequence	Likelihood	Risk rating
Smothering from dredge material placement	Benthic macroinvertebrate communities	Temporary disturbance of benthic habitat and associated communities	<b>Negligible</b> Minor, temporary, short-term negative impact	Likely	Low
Smothering from dredge material placement	Seagrass beds and seagrass habitat	Temporary loss of benthic habitat	Negligible Seagrass is not present at the placement site	Unlikely	Low
Dredging and placement generated sediment plume	Coral reef, seagrass and mangrove habitats	Changes to water quality leading to mortality or changes in the diversity or cover of coral, seagrass or mangroves	Negligible Impact is within the natural variation and tolerance of the system	Rare	Low
Dredging and placement generated sediment plume	Coral reef, seagrass and mangrove habitats	Sediment deposition resulting in the loss of coral, seagrass or mangroves	Negligible Impact is within the natural variation and tolerance of the system	Rare	Low
Movement of dredge vessel from the Port to the dredge material placement area	Transitory threatened and migratory marine animals	Potential for marine fauna vessel strike	<b>Negligible</b> No impact at the population or sub-population level	Unlikely	Low
Release of contaminants and nutrients	Marine biota	Potential for lethal and sub-lethal effects on biota	<b>Negligible</b> Material is suitable for disposal at sea	Rare	Low
Dredging suction	Foraging marine turtles	Potential for marine fauna to be caught	Negligible  No impact at the population or sub-population level	Unlikely	Low
Noise	Inshore dolphins, dugong and marine turtles	Potential for alienation of habitat	Negligible  No impact at the population or sub-population level	Rare	Low
Lighting	Foraging inshore dolphins, dugong and marine turtles	Alienation of habitat, animal mortality	Negligible  No impact at the population or sub-population level	Rare	Low
Introduction of marine pests	Marine biota	Potential competition with native species and changes to the ecosystem	High Significant impact on the environment in the Port and potentially in the greater region	Possible	High
Dredge program	Marine users	Disruption of activities	Negligible Impact is confined to a small area or interest group that is not vulnerable	Possible	Low

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#### Environmental receptors and risks, modelling

The bathymetric modelling undertaken shows ongoing maintenance dredging and placement volumes at the Chith Export Facility and nearby river terminals are dependent on the wave energy associated with the number of tropical cyclones or tropical lows that occur each wet season.

Numerical modelling of dredging and placement was undertaken on the following three sedimentation year types:

- Typical year (11,000 m³) with average wave conditions and no tropical cyclones
- Cyclonic year (19,000 m³) with above average wave conditions associated with a single tropical cyclone that directly impacts the Weipa region
- Worst-case year (59,000 m³) with worst-case wave conditions due to the occurrence of multiple tropical cyclones and tropical lows, which directly impact the Weipa region.

It demonstrated that the increase in suspended sediments associated with maintenance dredging and placement of up to 59,000 m<sup>3</sup> of sediment during a worst-case dredge program still remained below the natural suspended sediment range with no waves at the sensitive environmental receptors.

The natural suspended sediment concentration is generally much higher than that resulting from maintenance dredging and was predicted to remain within natural conditions for the sensitive receptors for all dredge scenarios considered.

Note there are limitations in the bathymetric model due to the short period of data collection (fewer than three years) and the absence of erosion data. To account for the model limitations, confidence errors have been used when calculating predicted sedimentation volumes. Adjustments to the model will also be made once further bathymetric data is collected.

### How will environmental risks be managed?

### Maintenance dredging monitoring program

The environmental maintenance dredging monitoring plan aims to:

- Detect any impacts from maintenance dredging
- Respond to environmental conditions during maintenance dredging to manage unpredicted changes to water quality.

These aims will be met through the implementation of a three-tiered approach, as detailed in the Amrun Port Maintenance Dredging Marine Environmental Monitoring Plan. Results from each tier of the monitoring program will be used to inform how Rio Tinto manages maintenance dredging.

#### Adaptive management measures

Adaptive management provides for continuous monitoring, evaluation and adjustment of management response measures, based on monitoring and environmental conditions.

Based on an understanding of natural environmental conditions and thresholds for impact, a series of response levels (triggers) can be established and then monitored to ensure conditions outside of natural ranges are avoided or stopped before they occur.

### Monitoring review and updates

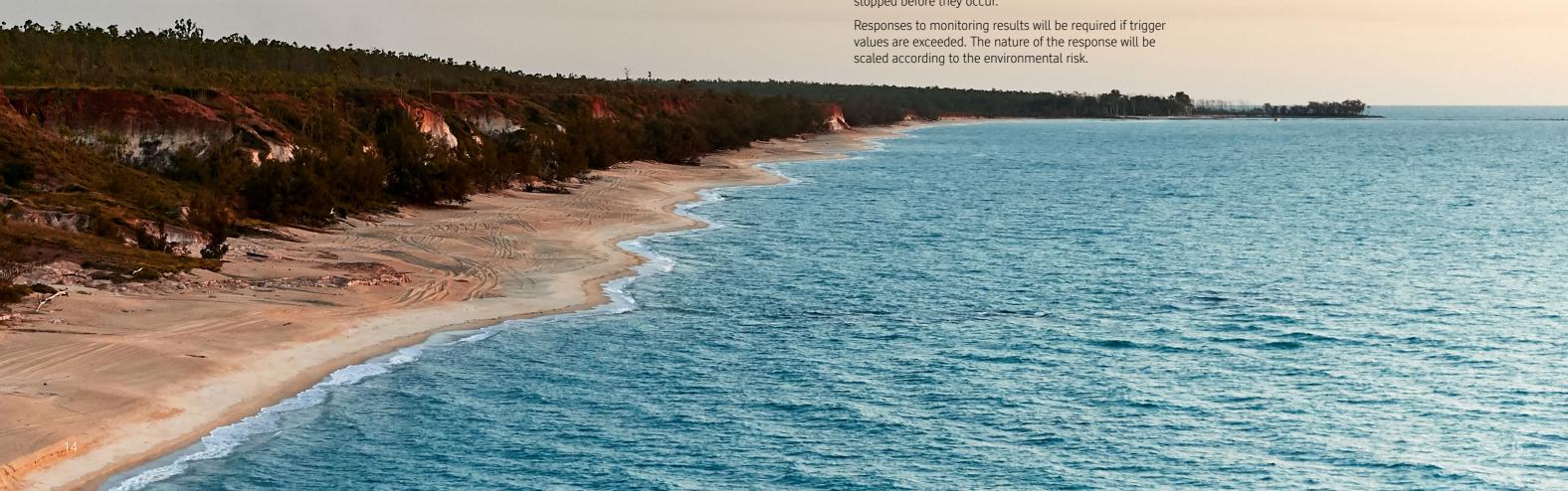
The Amrun Port Marine Environmental Monitoring Plan will be reviewed after each dredging program and the plan updated (if required) prior to any future dredging.

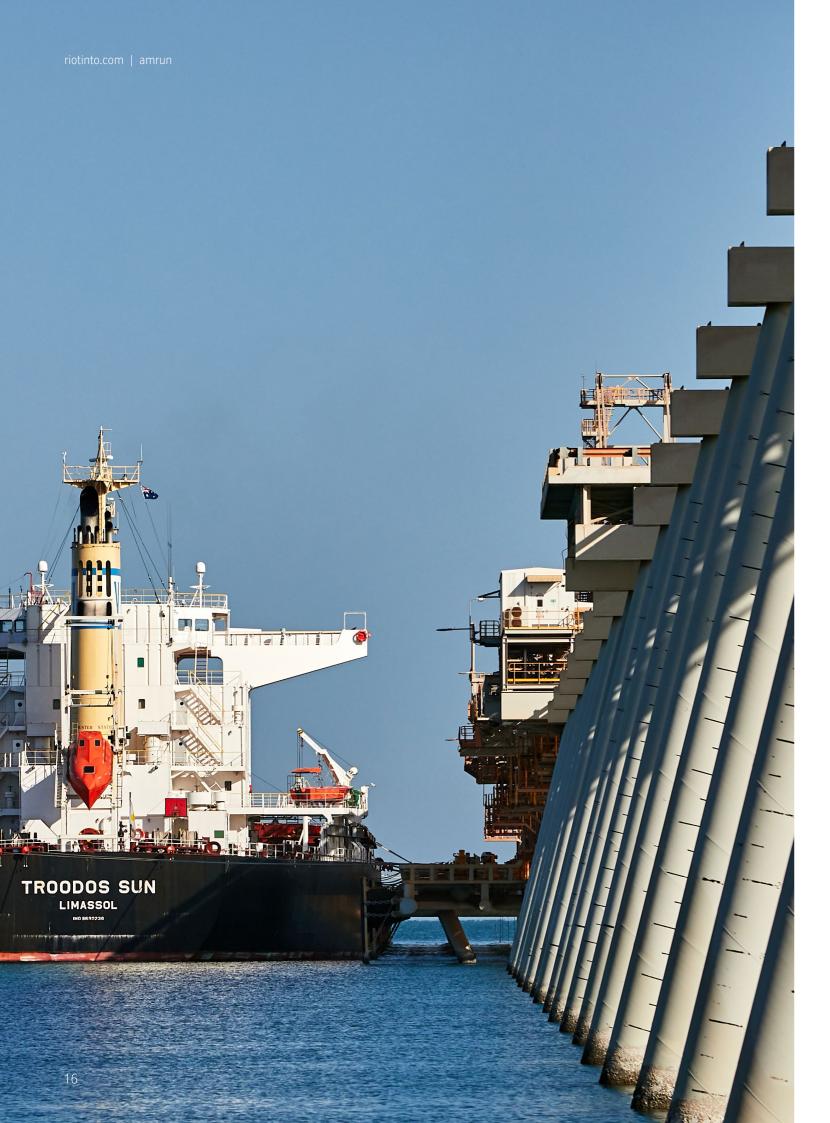
The review will examine the:

- Effectiveness of monitoring methods
- Response times and outcomes of adaptive monitoring actions
- Monitoring results and data
- Environmental changes and any incidents.
- Audit outcomes

The review will be undertaken in consultation with the Boyd Port (Amrun) Dredging Technical Advisory Group (BPDTAG), consisting of representatives from the Commonwealth, state and local government, port users, environmental, Traditional Owner and community interest groups.

The BPDTAG's feedback will be considered as part of future plan revisions.





### Frequently asked questions

#### What are the timeframes?

Rio Tinto proposes to lodge a permit application for placement of dredged material at sea under the Environment Protection (Sea Dumping) Act with the Commonwealth Department of Agriculture, Water and the Environment (DAWE) in 2020.

The statutory timeframe for a decision to grant, or refuse to grant, a permit is 90 calendar days from the date of application.

Subject to a successful outcome of Rio Tinto's permit applications, Rio Tinto would be in a position to start maintenance dredging under this new permit in mid-2021. This would depend on the availability of the dredging vessel

A dredging vessel is typically required in Amrun each year between May and September.

Routine maintenance dredging at the Chith Export Facility under the existing short-term permit is currently scheduled to take place in May 2020.

### Will the works impact nearby mariners?

Direct physical impact with mariners from collision with the maintenance dredge is unlikely as the vessel will be moving at a slow pace.

During maintenance dredging operations, the dredge will be displaying the lights and day shapes as required by orders and regulations for preventing collisions at sea.

There will be restricted safety zones around the maintenance dredge equipment. However, this will be minimal and will be designed to ensure the safety of the boating and fishing public.

Mariners will be provided with notifications and information regarding maintenance dredging operations.

### Who has been engaged and consulted?

Rio Tinto is engaging with stakeholders throughout the application process and the Commonwealth Department of Agriculture, Water and the Environment's assessment period.

Rio Tinto's long-term maintenance dredging management plan is being developed in consultation with a Boyd Point (Amrun) Dredging Technical Advisory Group (BPDTAG).

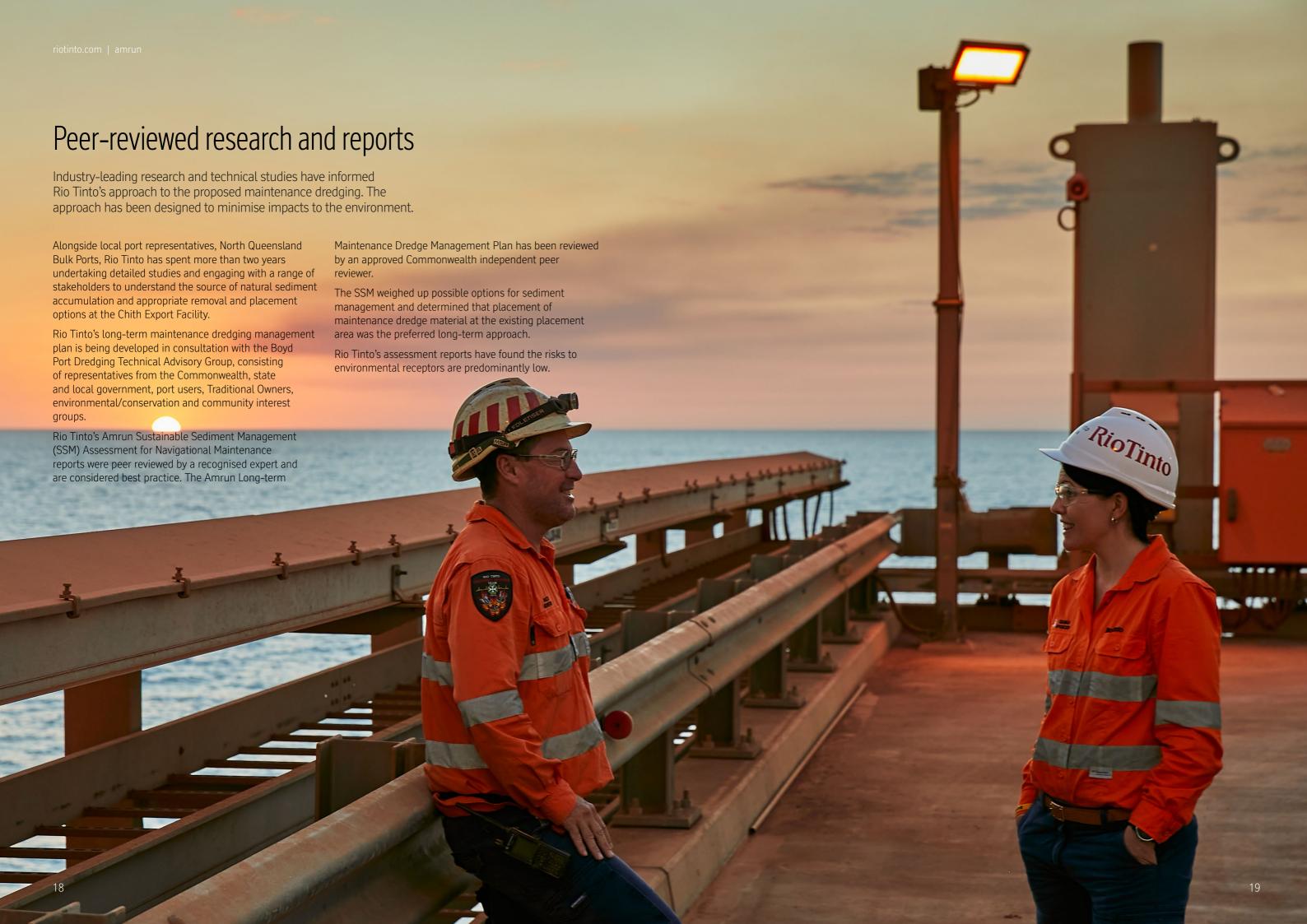
The BPDTAG consists of representatives from:

- Rio Tinto
- Biosecurity, Department of Agriculture and Fisheries (Queensland Government)
- Fisheries, Department of Agriculture and Fisheries (Queensland Government)
- Department of Environment and Science (Queensland Government)
- Department of Agriculture, Water and the Environment (Commonwealth Government)
- Maritime Safety Queensland (Queensland Government)
- North Queensland Bulk Ports (Port of Weipa port authority)
- Western Cape Communities Co-existence Agreement (Traditional Owners)

### Where do I go for more information?

Detailed information on any aspect of this assessment is available via the reports referenced in the executive summary section of this document. To access any of these reports or to discuss any details of the Amrun dredging permit application, please contact:

Email: RTAWeipafeedback@riotinto.com Call our freecall feedback hotline 1800 707 633



### **Rio Tinto**

Weipa, Queensland 4874 Australia

### Contact us

Email: RTAWeipafeedback@riotinto.com
Call our freecall feedback hotline 1800 707 633

Find out more at riotinto.com/amrun or riotinto.com/weipa