Cape Flattery Silica

Initial Advice Statement

Report

Final

22 November 2023

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EXECUTIVE SUMMARY

This Initial Advice Statement (IAS) has been prepared in accordance with Part 4, Subdivision 2, section 27AB of the *State Development and Public Works Organisation Act 1971* (SDPWO Act) for the proposed Cape Flattery Silica Sand Project (the Project). The Project is a silica sand mining and processing operation located within Mining Lease Application (MLA) area MLA100284 and MLA100352 (transport lease). The proponent is Cape Flattery Silica Pty Ltd (CFS), wholly owned by Metallica Minerals Limited (Metallica).

The Project is located approximately 42 kilometres (km) northeast of Hope Vale and 200 km north of Cairns, North Queensland (**Figure 1** and **Figure 2**). MLA100284 area is approximately 616 hectares (ha) in size and is a greenfield site within the Cape Bedford/Cape Flattery dune field complex, characterised by large northwest trending transgressive elongated and parabolic sand dunes. ML100352 is approximately 0.781ha in size and covers a portion of land connecting the mine area with the proposed jetty. The Project's MLAs are located on Lot 35 SP232620 within the Hope Vale Aboriginal Shire Local Government Area (LGA) and are adjacent to the existing silica sand mining and shipping operation owned by Mitsubishi Corporation (Mitsubishi).

The Project is a resource activity and involves mining and processing up to 4 million tonnes per annum (Mtpa) of high purity silica sand on site over a 15-year life of mine (LOM), with 38-39 million tonnes (Mt) of saleable product to be shipped offsite over the life of the mine. Development of the active mine area would be staged with progressive rehabilitation and back-filling occurring behind the advancing mine face. The total Project disturbance footprint over the LOM is 315.509 ha (refer to **Figure 3** and **Figure 4**).

The Proponent considers that the Project meets the requirements for declaration as a Coordinated Project under section 27(2)(b) of the SDPWO Act as the project meets the following criteria:

- Complex approval requirements imposed by a local government, the State or the Commonwealth.
- Strategic significance to a locality, region or the State, including for the infrastructure, economic and social benefits, capital investment or employment opportunities it may provide.
- Significant environmental effects.
- Significant infrastructure requirements.

On 22 November 2022, the Proponent submitted a Referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (ref. no. EPBC 2022/09376) to the Department of Climate Change, Energy, the Environment and Water (DCCEEW). On 16 January 2023, the Referral Decision was made that the Project was a Controlled Action. On 17 February 2023, the Assessment Method was determined to be by an Environmental Impact Statement (EIS) under Chapter 4, Division 6 of the EPBC Act, which will encompass Matters of National Environmental Significance (MNES) within and outside the MLA boundary. CFS is requesting that an EIS under the SDPWO Act use bilateral provisions between the State and Commonwealth to also consider MNES.

Under the SDPWO Act process the following approvals will be facilitated:

- An Environmental Authority permit granted by the Department of Environment and Science (DES) to permit Environmentally Relevant Activities (ERA) associated with the extraction of mineral resources.
- Mining leases granted by Department of Resources (DoR) to permit extraction of mineral resources.
- A Development Approval (DA), Material Change of Use, for construction and operation of marine infrastructure with accompanying permits to be attached to the Development Approval.
- Development Approval for Operational Work: Tidal works, marine plant removal, destruction or damage and work for land within limits of a port.
- A Water Licence that permits the extraction of underground water.

Silica sand is a 'new economy' mineral and a 'critical' mineral in the Queensland New Economy Minerals Strategy (2020), the Critical Minerals Strategy (2022), the Queensland Resources Industry Development Plan (QRIDP) (2022), the Mineral Resources Regulation (2013) Schedule 4A, the Queensland Critical Minerals Strategy (2023), and the newly released Queensland New-Industry Development Strategy (2023). The Project will contribute to the achievement of the objectives identified in these strategies, as part of an energy transition away from carbon. CFS have based decisions for the Project area on environmental desktop and field investigations appending this report, to ensure significant impacts are defined, avoided, minimised, mitigated or offset. This is also reflected in the design outcomes from the Project's Pre-feasibility Study (PFS) and Definitive Feasibility Study (DFS).

Avoidance of impacts has been demonstrated through a number of Project design features, including:

- Supporting infrastructure being located in areas of low ecological significance.
- Vegetation clearing requirements limited to a well-defined silica resource, thereby avoiding unnecessary clearing.
- Access tracks and roads are aligned away from sensitive areas and ephemeral waterways.
- Buffer zones established for mapped wetland areas.

From the assessment of proposed residual impacts, it was determined that management strategies employed onsite would appropriately mitigate the residual Project impacts to an acceptable risk level. The Project will have short-term, relatively moderate impacts on the environment that are well-understood and are able to be managed through conditions of approvals.

The Project will seek to establish an operational local employment and economic opportunity strategy which will have a positive economic impact by providing preferential employment of residents in nearby regional centres therefore resulting in direct and indirect economic benefits to the communities of North Queensland. The Proponent continues to maintain a good relationship with local communities and Traditional Owners (TOs) who recognise the Cape Flattery area as a pre-existing

mining area, and are keen to ensure that the Project delivers jobs and other economic benefits. The Project will provide future employment opportunities for the local community and TOs.

1. INTRODUCTION

This Initial Advice Statement (IAS) has been prepared in accordance with Part 4, Subdivision 2, section 27AB of the *State Development and Public Works Organisation Act 1971* (SDPWO Act) for the proposed Cape Flattery Silica Sand Project (the Project), Cape Flattery Silica Pty Ltd (CFS, the Proponent), wholly owned by Metallica Minerals Limited (Metallica).

The Project is located approximately 42 kilometres (km) northeast of Hope Vale and 200 km north of Cairns, North Queensland (**Figure 1**). The Project's Mining Lease Application (MLA) areas 100284 and 100352 are within CFS' Exploration Permit Minerals (EPM 25734) and is approximately 617 hectares (ha) in size. The total Project disturbance footprint over the 15-year life of mine (LOM) is 315.509 ha. The Project's MLAs are located on Lot 35 SP232620 within the Hope Vale Aboriginal Shire Council (HVASC) Local Government Area (LGA) and is adjacent to the existing silica sand mining and shipping operation owned by Mitsubishi Corporation (Mitsubishi). The Project transhipping operation and loading of Ocean Going Vessels (OGV) will occur within the Port of Cape Flattery operating extent and is excised from the Great Barrier Reef Marine Park (GBRMP).

A number of State and Commonwealth approvals are required to support the Project. Given the complexity of approvals required for the Project, its value to the State and potential economic, social, and environmental impacts, the Proponent considers the Project meets the criteria for a Coordinated Project declaration, requiring an Environmental Impact Statement (EIS), under the SDPWO Act. The EIS would also address matters relevant under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.1. Background

The objective of the Project is to extract high purity silica sand, a critical mineral recognised by both State and Commonwealth Governments, to supply the fast-growing solar panel manufacturing industry and potentially within Queensland. Silica sand is a critical component of solar PV panels and therefore, is an important aspect of achieving the renewable energy targets for Queensland, the Nation and globally. The Project involves extracting and processing up to 4 million tonnes per annum (Mtpa) of high purity silica sand onsite over a 15-year LOM, 38-39 million tonnes (Mt) of saleable product to be shipped offsite over the life of the mine, where the silica is converted to pure silicon by heating it in a furnace. As the Commonwealth has recognised the importance of silicon by listing it in Australia's Critical Minerals Strategy 2019 (the Strategy), the Project is well positioned to contribute to the achievement of the objectives identified in this strategy, as part of an energy transition away from carbon.

The Project is adjacent an existing long term silica sand mine owned and operated by Mitsubishi. Ports North is the Port Authority for the Port of Cape Flattery. With no chemical processing and use of standard industry mining methods, the Project will extract silica-rich ores and ship directly to market through the Port of Cape Flattery.

The Proponent maintains a good relationship with local communities and Traditional Owners (TOs) who recognise Cape Flattery as a pre-existing mining area. The Project will provide future employment opportunities for the local community and TOs to pursue their own economic and social aspirations.

1.1.1. Reason for Seeking Coordinated Project Status

The Proponent understands that the Coordinated Project process, whilst statutory, has the ability to be flexible with the Office of the Coordinator-General's (OCG) discretion. The Project advanced significantly through its impact assessment studies which has reduced the Project's risk profile considerably (refer **Section 6.13**). The Project is now considered in the detailed design phase and is seeking this declaration to provide a coordinated and efficient approach to the approvals.

The Proponent considers that the Project meets the requirements for declaration as a Coordinated Project under the SDPWO Act as it:

- Requires Local, State, and Commonwealth approvals.
- Has significant infrastructure requirements associated with the mining, port, and transhipping operations.
- Has potential to be of strategic significance to the region, State and Commonwealth including but not limited to social and economic benefits, employment opportunities and capital investment under a range of existing strategies and policies associated with new economy and critical minerals, and growing renewable energy markets.

The Project has a number of complex elements that would benefit from assessment through the Coordinated Project process and facilitation including:

- Multiple underlying land tenure (e.g. tidal land, designated port limits, MLA).
- Interaction of approvals for off-lease and on-lease infrastructure requirements inclusive of:
    - Internal roads/site access.
    - Jetty.
    - Jetty Infrastructure Area (JIA).
    - Marine Offloading Facility (MOF).
    - Transhipping activities and facilitation of marine permitting.

A Coordinated Project declaration under bilateral provisions would provide the support needed to navigate Project approvals for silica sand mining thereby allowing the Project's benefits to be realised. As a critical minerals project, it aligns with the government's focus on decarbonisation further described in the Queensland New-Industry Development Strategy 2023.

On 22 November 2022, the Proponent submitted a Referral under the EPBC Act (ref. no. EPBC 2022/09376) to the Department of Climate Change, Energy, the Environment and Water (DCCEEW). On 16 January 2023, the Referral Decision was made that the Project was a Controlled Action. On 17 February 2023, the Assessment Method was determined to be by an EIS under Chapter 4, Division 6

of the EPBC Act, which will encompass Matters of National Environmental Significance (MNES) within and outside the MLA boundary.

An EIS assessment process is required, thereby requiring the Terms of Reference (ToR) to define the general and specific matters that must be addressed when preparing the EIS. The benefits of this process include:

- The opportunity for efficient assessment of EPBC Act matters in accordance with the Queensland and Commonwealth Government EPBC Act assessment bilateral.
- Allowing the public an opportunity to comment and provide input into the ToR.
    - Having an independent and transparent social, economic, and environmental assessment of the Project undertaken by the Queensland Coordinator-General.

The Proponent believes the EIS process under the SDPWO Act is most appropriate as it allows for a risk-based approach whilst facilitating whole of government comments on the Project. The discretion afforded to the Coordinator-General under the SDPWO Act allows for the preparation of a ToR that is fit for purpose based on Project scope and the technical investigations prepared to date.

1.1.2. Project History

Baseline environmental assessments and a pre-feasibility study for the Project commenced in 2021, with the engineering and infrastructure design studies and ongoing baseline data collection still underway. Preliminary studies have influenced the Project layout, avoiding significant impacts on environmental values, and minimising the remaining impact footprint (**Figure 2**). The Proponent is seeking to address the requirements of an EIS and has already completed preliminary technical studies to support this. The preliminary technical investigations for the IAS undertaken by CFS to date include:

- Air quality assessment (Trinity Consultants 2022a).
- Noise impact assessment (Trinity Consultants 2022b).
- Surface water impact assessment (WRM 2022).
- Groundwater assessment and conceptual modelling (Groundwater Assessment and Solutions 2022).
- Terrestrial ecology assessment (Epic Environmental 2022).
- Aquatic ecology technical report (Hydrobiology 2022a).
- Marine ecology technical report (Hydrobiology 2022b).
- Traffic impact assessment (PTT 2022).
- Cultural heritage due diligence assessment (Niche 2022).
- Progressive rehabilitation and closure plan (SGM Environmental, 2023).
- Metocean assessment of Cape Flattery (Royal Haskoning DHV 2022).
- Coastal processes technical report (JBPacific 2022).

- Great Barrier Reef World Heritage Area impact assessment (Epic Environmental 2022).

The Proponent has committed capital funding to the Project's development and has prepared a Definitive Feasibility Study (DFS) to firm up the various Project components.

The DFS that was released to the Australian Stock Exchange (ASX) in July 2023 is based on production of 1.8mtpa. CFS has used the independent capital and operating expenditure estimates from this DFS and prepared an updated feasibility analysis on the increased annual production of up to 4mtpa. Updates to the feasibility analysis included adding a second mining face in the Project's design which will feed a second processing plant. This resulted in increasing the output of the mine, resulting in the shortening of the LOM to 15 years as opposed to 25 years. During this development, CFS has also been made aware that performance from the plant and mining equipment may see increased productivity beyond initial figures reflected in the initial feasibility analysis. This extra productivity is captured in the 4mtpa ROM rate.

The EPBC Act provides the legal framework to protect and manage nationally and internationally important fauna, flora, ecological communities, and heritage places defined as MNES. CFS submitted a Referral under the EPBC Act (ref. no. EPBC 2022/09376) to the DCCEEW on 22 November 2022. On 16 January 2023, the Referral Decision was made that the Project was a Controlled Action. On 17 February 2023, the Assessment Method was determined to be by an EIS which will encompass MNES within and outside the MLA. As a result, CFS is requesting that an assessment under bilateral provisions occur, as this process would facilitate assessments under both the EPBC Act and SDPWO Act, avoiding duplication.

The controlling provisions of the Controlled Action decision are:

- World Heritage properties (sections 12 & 15A).
- National Heritage places (sections 15B & 15C).
- Great Barrier Reef Marine Park (sections 24B & 24C).
- Listed threatened species and communities (sections 18 & 18A).
- Listed migratory species (sections 20 & 20A).

1.2. Purpose and Scope of IAS

This IAS has been prepared in line with the Application Requirements for a 'Coordinated Project' Declaration and under Part 4, Subdivision 2, Section 27AB of the SDPWO Act to support an application to the OCG, with the intention of:

- Assisting the OCG in deciding whether the Project should be declared a Coordinated Project.
- Assisting the OCG in determining whether an EIS is appropriate.
- Informing and enabling stakeholders to determine the relevance, nature, scope and magnitude of the Project impacts.
- Assisting the OCG to prepare draft ToR for the EIS if this process is deemed appropriate for the Project.

This IAS provides an overview of the Project to the OCG, stakeholders and the public, and may also be used to inform the ToR. Importantly, the Proponent presents in this IAS the results from investigations already completed for the Project as well as baseline studies underway.

An EIS under section 26(a) of the SDPWO Act is considered the appropriate approach as the project is a large-scale project with multiple components and complex approval requirements including impacts to MNES under the EPBC Act.

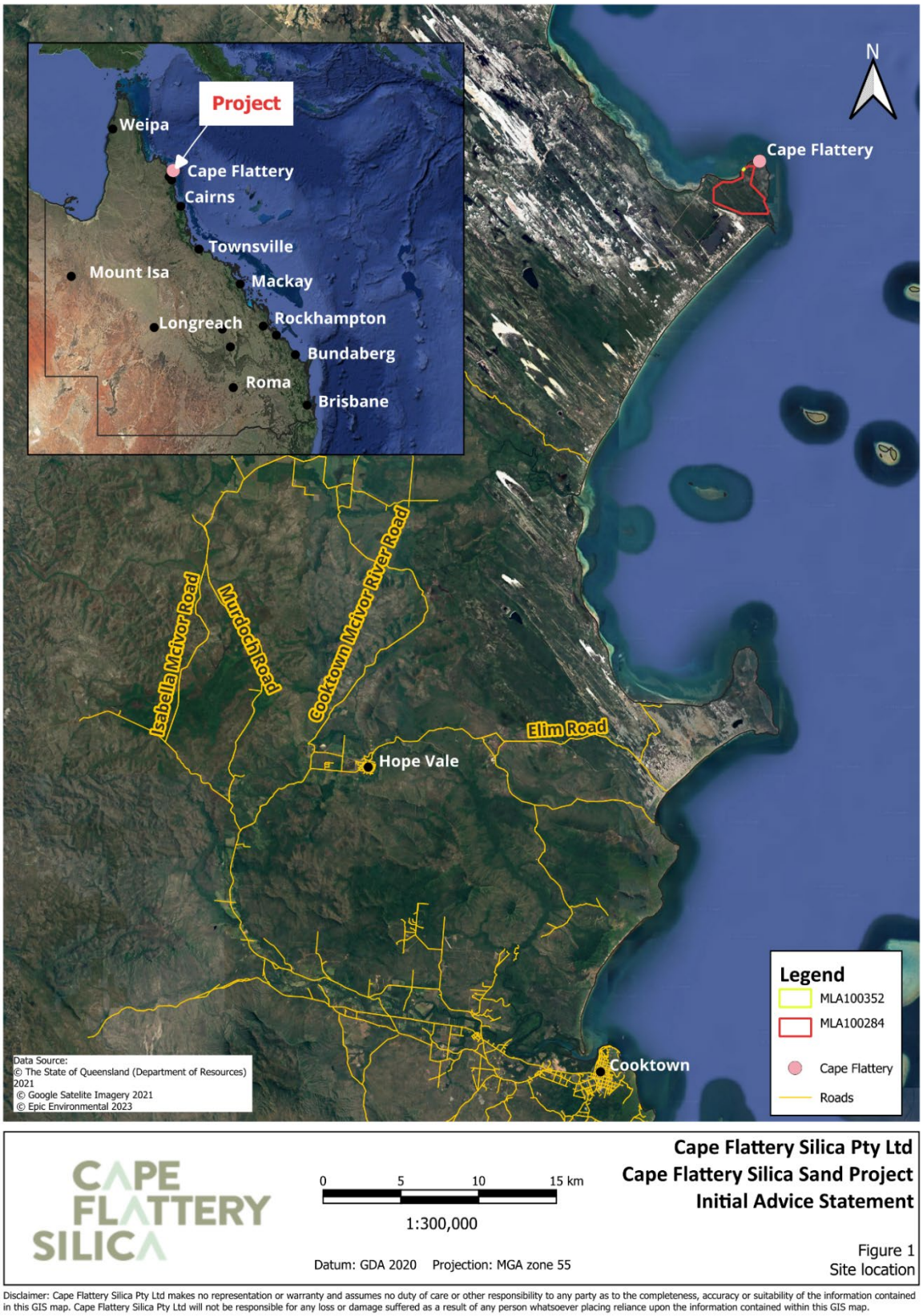

Figure 1 – Site location

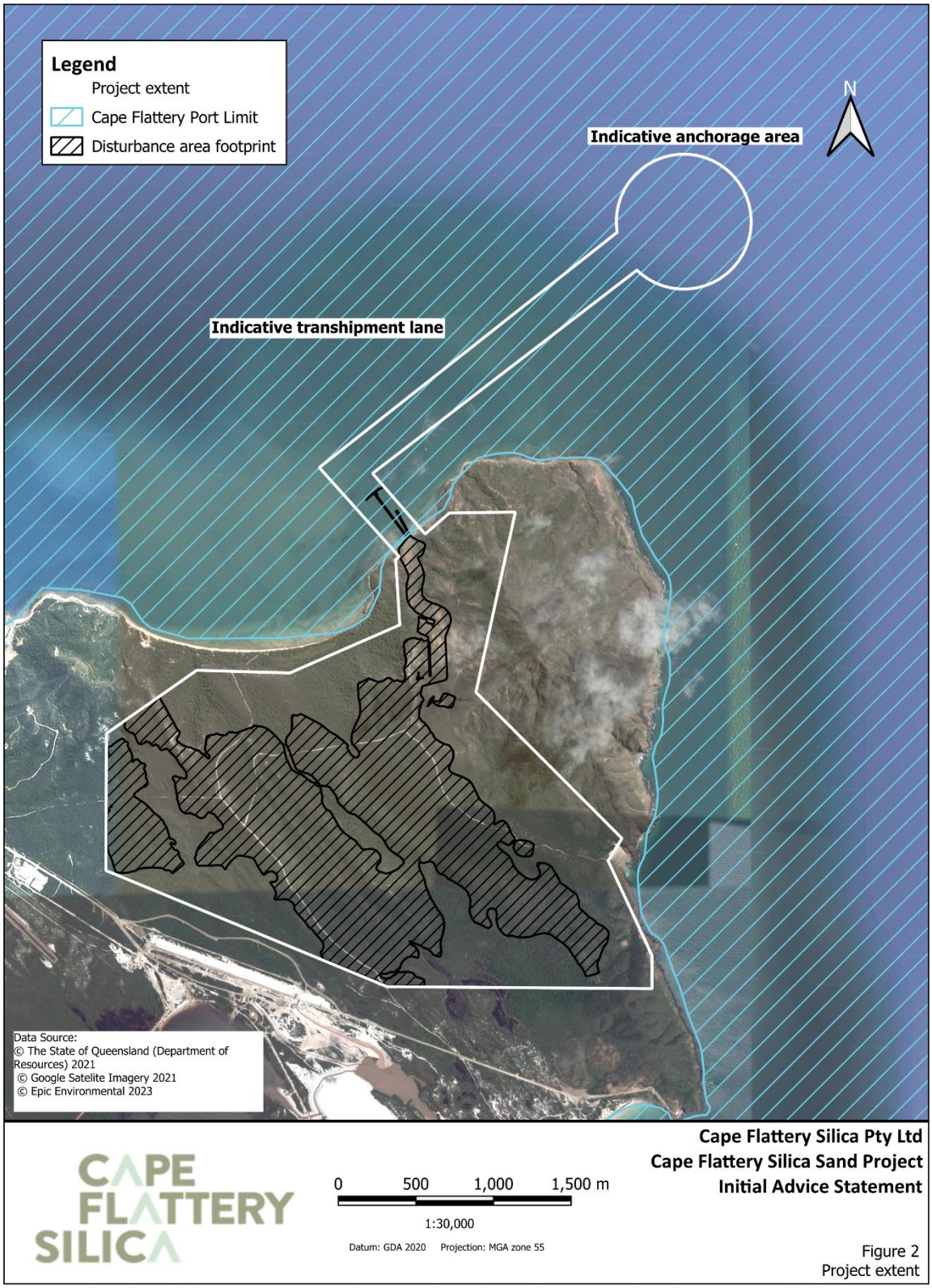

Figure 2 – Project extent

2. Proponent

CFS is a wholly owned subsidiary of ASX listed Metallica Minerals Limited (Metallica) (ASX:MLM) and is the Proponent for the Project. CFS and ASX:MLM are both registered suitable operators, reference numbers RSO003908 and 341825, respectively. An overview of the Proponent's details is provided in **Table 1**.

Table 1: Proponent Details

Details	Proponent
Entity	Cape Flattery Silica Pty Ltd
ABN	52 138 608 894
Contact	Theo Psaros, Executive Chairman
Address	Level 1, North Tower, 527 Gregory Terrace Fortitude Valley QLD 4006
Phone	+61 7 3249 3000
Website	www.metallicaminerals.com.au
Email	tpsaros@metallicaminerals.com.au/nvilla@metallicaminerals.com.au

2.1. Relevant Project Experience

CFS is an Australian development company focused on delivering high purity silica sand (HPSS) to a diversified global customer base. The Project will be CFS's first mining operation, although the Board of Directors, management team and shareholders have significant experience in the resources sector, including start-up projects in Far North Queensland. CFS intends to own and operate the Project.

The Executive Chairman involved in the project is Theo Psaros who has over 35 years of diverse global and local commercial experience in a number of business sectors and industries within multi-million dollar publicly listed company, private companies and government departments. Theo's resource industry experience included a number of years as Chief Financial Officer and Chief Operating Officer of MetroCoal Limited, Chairman of the Surat Basin Coal Alliance and a member of the industry group that assisted with the Queensland Government Department of Natural Resources & Mines to prepare the 30-year strategic plan for the resources industry in Queensland, ResourcesQ.

The General Manager for CFS is Nicholas Villa who possesses over 20 years' experience as a mining professional and is well practiced in the delivery of resource projects, taking them from early exploration phase through to full production.

MLM's two non-Executive Directors, Mark Bojanjac and Brad Sampson, bring significant global mining experience having developed mines in Australia and internationally. MLM's Chief Financial Officer, Scott Waddell, also brings bulk commodity mining experience to CFS having worked at Rio Tinto and Metro Mining projects in Cape York.

2.2. Principal Consultants

The Project's principal consultants are detailed in **Table 2**.

Table 2: Principal Consultants

Consultants	Technical Capability
EMM Consulting	Lead approvals consultant- EIS, Environmental Authority (EA), Development Application (DA).
Cowie Environmental Services (Cowie)	CFS internal environmental consultant- EIS, EA, DA, IAS, and Project of Regional Significance Application
Epic Environmental	Historical environmental consultant support - EA application, DA, EPBC referral, Draft IAS, and Initial Project of Regional Significance Application
Wave International	Pre-feasibility study, DFS
JukesTodd Turner Townsend	DFS, project development options
Ausrocks	DFS, Pre-feasibility study, mine planning and geology
Mineral Technologies	DFS, Process design and engineering development
SGM Environmental	Progressive rehabilitation and closure plan

2.3. Environmental Record of the Proponent

CFS, Metallica, and its Board of Directors have not been subject to any proceedings or offences under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources.

2.4. Capability to Complete EIS

The Proponent has the financial and technical capacity to complete an EIS and will recruit a highly experienced project team to deliver the required program of works. It is noted that financial and technical capability statements have been provided to the OCG separately as they contain commercially sensitive information.

3. NATURE OF PROPOSAL

3.1. Scope of Project

The Project is a silica sand mining and processing operation located within the MLAs (MLA100284 and MLA100352), covering an area of approximately 617 ha. Within the MLA areas, the total disturbance footprint over the LOM is 315.509 ha.

The Project is located on a greenfield site within the Cape Bedford/Cape Flattery dune field complex and is characterised by large northwest trending transgressive elongated and parabolic sand dunes. The Project is located on Lot 35 SP232620 within the HVASC LGA, adjacent the existing silica sand mining and shipping operation owned by Mitsubishi, approximately 42 km northeast of Hope Vale and 200 km north of Cairns, Queensland (**Figure 3**).

Outside of the MLA on the north-eastern side of the site (but still connected to the site), a jetty and MOF are proposed to be constructed on land within the HVASC LGA, and inside the tidal areas of Cook Shire Council and the Port of Cape Flattery and its Port Limits which is under the authority of Ports North (**Figure 3**). MLA100352 has been submitted to cover the JIA and beginning of the jetty and MOF. As the jetty and MOF cannot be fully covered by the MLA, being over water infrastructure, they are subject to the requirements of the *Planning Act 2016*.

The Project involves mining and processing up to 4 Mtpa of high purity silica sand on site over a 15-year LOM, which is expected to produce saleable tonnes of 38-39Mt after processing. Shipping frequency will be approximately one ship per week, accessing the Port via established shipping routes (specific route to be determined by the Harbour Master on the day of shipping) under Great Barrier Reef and Torres Strait Vessel Traffic Service (Reef VTS) pilotage and Australian Maritime Safety Authority (AMSA) regulations. The July 2021 update from the North East Shipping Management Plan noted an average of around 22 large commercial vessels per day (sample size from Inner route Cape York to Cairns). Shipping numbers associated with the Project would therefore be in the order of approximately 1.0% of existing shipping numbers, which is not considered a materially significant increase and is expected to be within the management allowance of existing shipping management practices. Estimated shipping size is Supramax (55,000 deadweight tonnage (DWT)) to Ultramax (65,000 DWT) with an average loading rate of 1,250 tonne per hour (tph) and the discharge rate at the OGV of approximately 1,500 tph. Therefore, loading time for a 55,000 DWT OGV is around five to six days. Larger vessels such as Panamax size vessels carrying 80,000 tonnes (t) of silica sand may be used depending on availability and freight rates (CFS 2022).

The total disturbance footprint is 315.509 ha. A breakdown of the disturbance footprint components includes:

- Active mining area - 274.742 ha.
- Disturbance area buffer - 28.865 ha.
- Infrastructure areas - 11.902 ha (119,020 metres squared (m^2)).

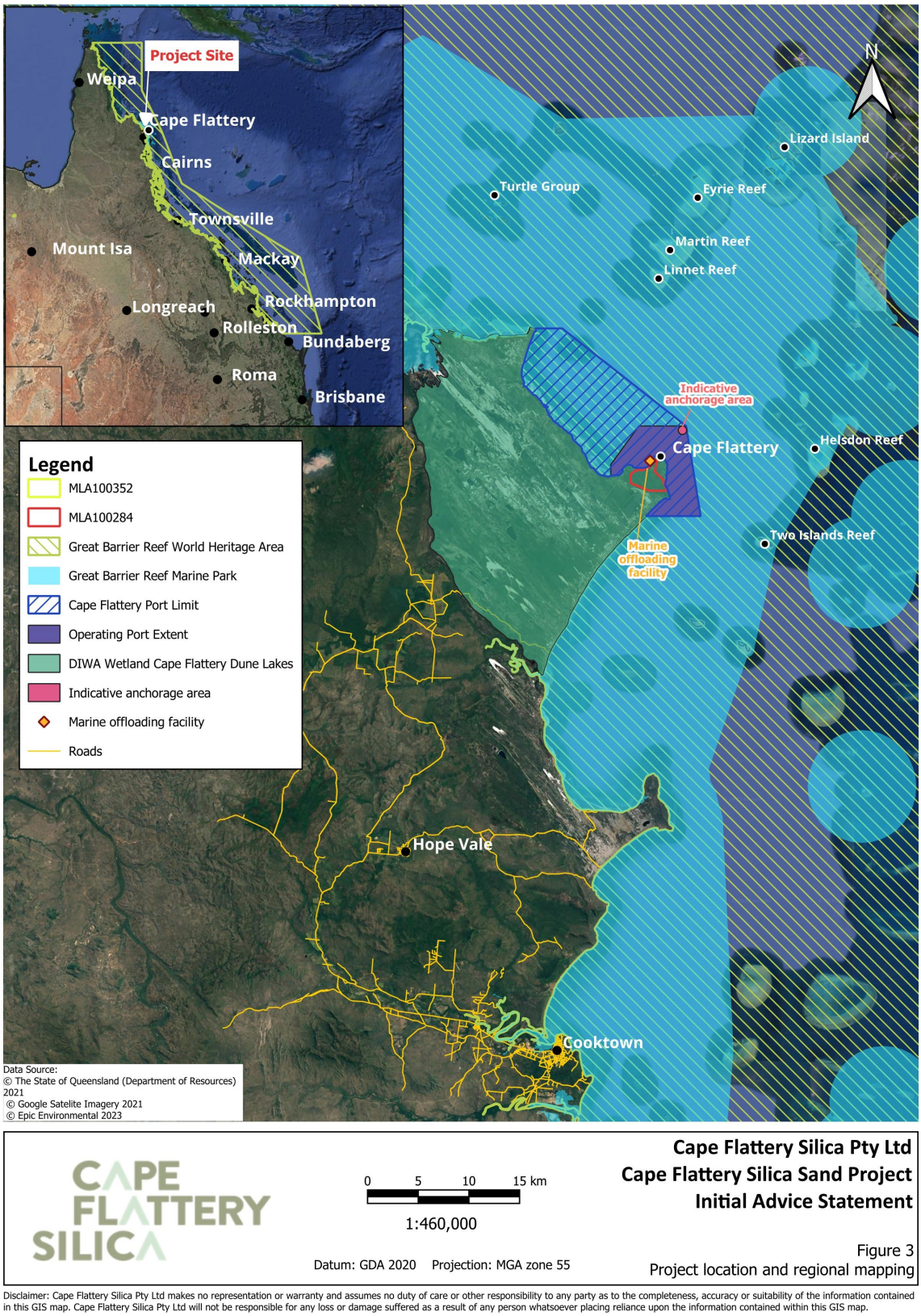

Figure 3 – Project location and regional mapping

3.1.1. Overview of Key Infrastructure

On-lease Project infrastructure will include a Mine Infrastructure Area (MIA) for general mine service facilities, mining panels, stockpile areas, laydown areas, processing plant, worker's accommodation for up to 52 persons, sediment basin, water storages, sewage treatment plant, conveyors, access tracks and a JIA to service the off-lease project infrastructure (Jetty and MOF) (refer to **Figure 4**).

Off-lease Project infrastructure includes an approximately 400 metre (m) long jetty, a 200 m long MOF and transhipment from the jetty to a swing basin with mooring / anchorage capability. The jetty will be supported by 36 single piles over the total length and three mooring dolphins (piles) for the transhipment vessels to moor against while being loaded. Additional piles will support the transhipment vessel loading and jetty hopper infrastructure which extends an additional 10 m from the end of the jetty (**Figure 5**).

The MOF is a purpose-built structure to facilitate the delivery of equipment and goods to the Project during both construction and operations. From the JIA, an access road will lead down to the shoreline and a prefabricated concrete jetty will be constructed and extended from the edge of the rocky shore area where it will meet a series of pile supported prefabricated concrete sections. Seafloor disturbance is therefore constrained to the immediate location at each support pile. The last concrete section will be at a sufficient depth to allow for loading and unloading of materials from appropriately sized landing craft vessels.

The key Project infrastructure is displayed in **Figure 4** and **Figure 5** and summarized in **Table 3**.

Table 3: Infrastructure Summary

Item / Infrastructure	Area within the MLA	Area outside the MLA	Comment/s
Process Plant	2,400 m^2	-	Prepared earthworks pad to accommodate silica processing plant – slurry lines/process water pipelines and diesel generators
Product Stockpile	16,200 m^2	-	Prepared earthworks pad to accommodate the dewatering plant, radial stacker and 100,000t product stockpile
Mine Infrastructure Area	24,000 m^2	-	Prepared earthworks pad to accommodate facilities, including: • Offices for administration and operations • Site facilities (e.g., parking, ablutions etc) • Equipment workshop and storage • Go-line, vehicle wash, fuel storage and filling pad, tyre bay and oily water separator • Diesel generators/solar panels/battery power

Item / Infrastructure	Area within the MLA	Area outside the MLA	Comment/s
			• Raw water tank storages
Accommodation Facility	8,600 m^2	-	52-bed camp comprising demountable ensuite rooms, as well as mess hall, bathroom facilities and workers recreational area.
Construction laydown	2,390 m^2	-	Designated area for general use. The area will be cleared and used as a hardstand area for plant and materials during construction and operational phases.
Potable water tank	600 m^2	-	Storage of potable water after treatment in the water treatment plant to provide seven days storage in the event of source failure.
Raw water tank	600 m^2	-	Storage of raw water, runoff, or other untreated water, excluding sewage.
Sewage treatment plant	600 m^2	-	Treatment of onsite sewage for rehabilitation use. Sewage is collected from ablution facilities at the JIF and mine facilities and transported to the treatment plant.
Water treatment plant	600 m^2	-	Treatment of raw water to ensure water quality is suitable for human consumption.
Overland Conveyor	1,930 m^2	-	1,000 to 1,500 tonnes per hour (tph) overland conveyor, full length 1.75 km located between the Product Stockpile and Jetty head.

Item / Infrastructure	Area within the MLA	Area outside the MLA	Comment/s
Boundary Access Road	37,330 m^2	-	Four Wheel Drive (4WD) access near Connies Beach, perimeter track around mine lease area with no impact on Connies Beach.
Site Access / Internal Roads	16,270 m^2	-	1.2 km unsealed road access road between JIF and the Product Stockpile. The roadway comprises 6 m unsealed pavement with widening for overtaking. The road formation has provision for the overland conveyor and pipelines along part of its length.
Sediment Basin	4,620 m^2	-	Captures surface water runoff from the product stockpile.
Communications	Within MIA or Accommodation Facility	-	Satellite based Starlink communications over internet with repeater stations and mine site digital radios with repeater stations.
Jetty Infrastructure Area	5,500m^2	-	Paved earthworks pad to accommodate jetty infrastructure, including: • Jetty pilings (land based) • Access road to MOF • Crib room • Ablutions block • Drainage sump • Clean and dirty water diversion drains • Diesel generators / fuel tank
Jetty	80 m^2	1,420 m^2	400 m long elevated jetty piled with berthing and three mooring dolphins. Infrastructure starts on MLA with conveyor Target depth at berth of around 4.5m Lowest Astronomical Tide (LAT).
Transhipment Vessel Loading (located at end of jetty)	-	Within Jetty footprint	Tele stacker (telescopic) fixed mount supported on jetty structure filling a circa 10,000 DWT transhipment vessel.

Item / Infrastructure	Area within the MLA	Area outside the MLA	Comment/s
Marine Offloading Facility	-	3,460 m^2	200 m pile mounted concrete ramp design. Structure to allow loading and unloading of materials from a landing craft or dumb barge. There will be a loading depth of around 3.0 m LAT. The MOF will have a 70t deck load capacity.
Total	**121,720m^2**	**4,880 m^2**	

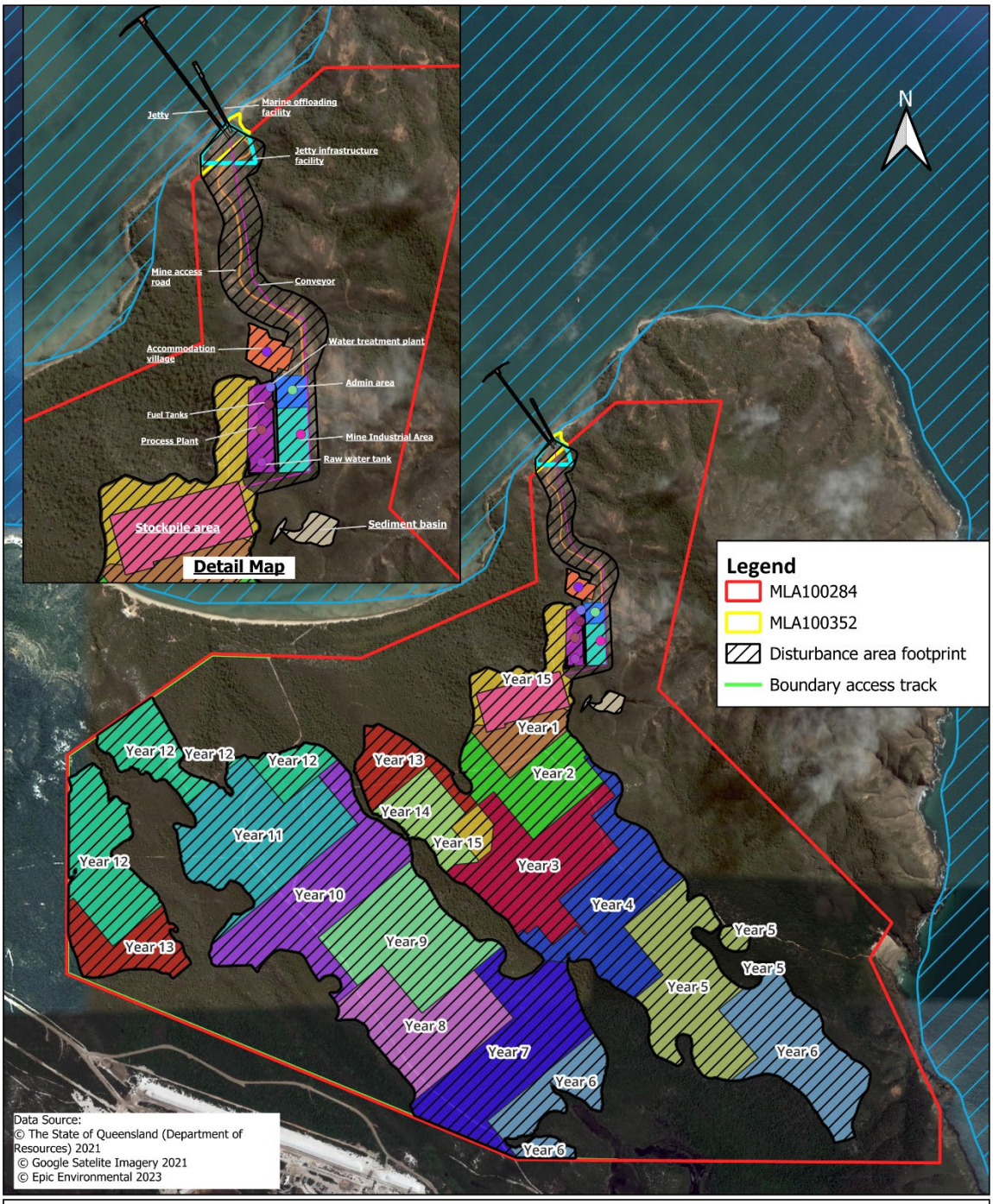

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Figure 4 – Mine layout

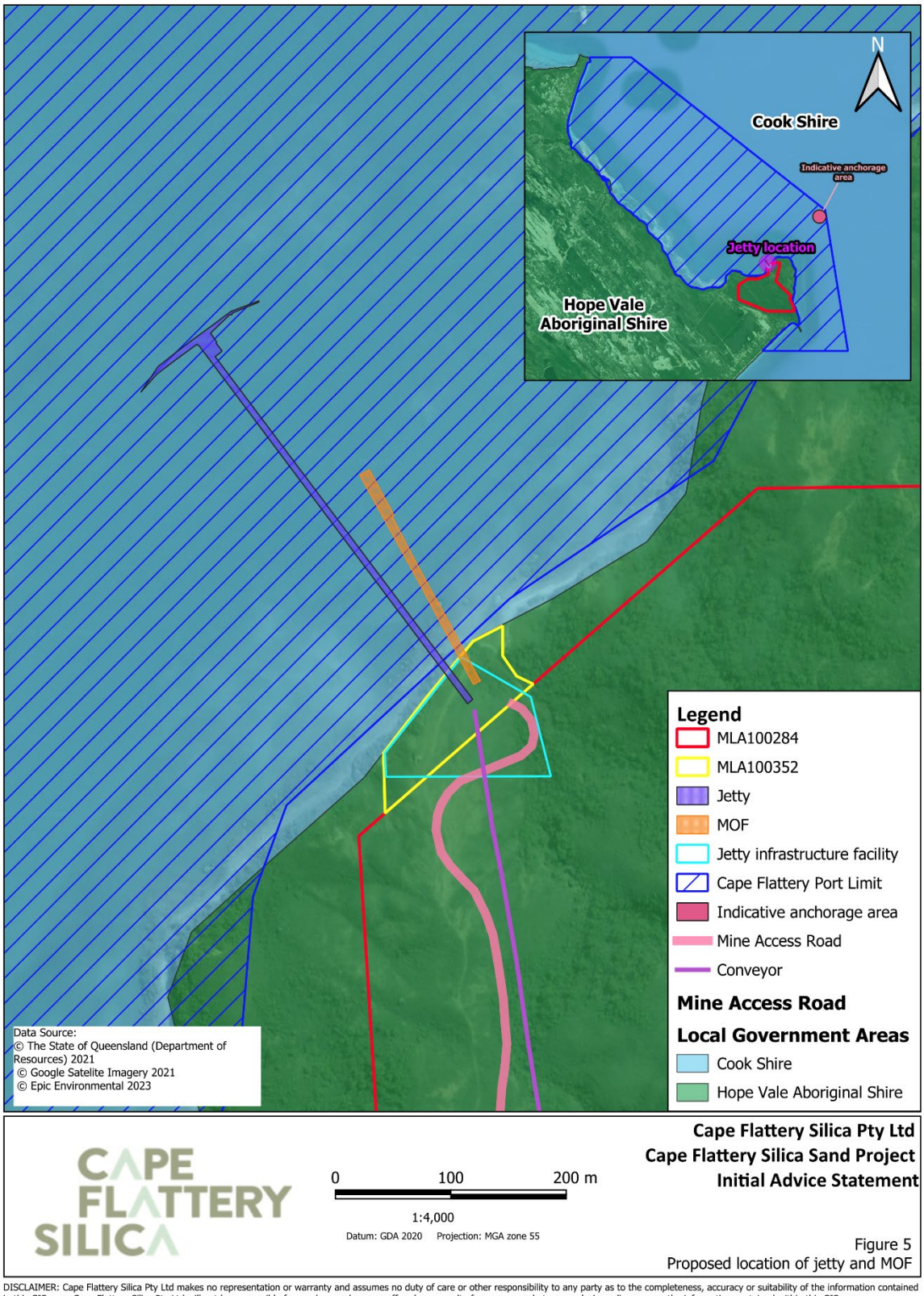

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Figure 5 – Proposed location of jetty and MOF

3.1.2. Overland conveyor

An overland conveyor from the product stockpile (located within MLA100284) to the JIA (located within MLA100352) is required for efficient transportation of product to the JIA for export. The overland conveyor will be a 1,000 to 1,500 tph conveyor from product stockpile to the end of the Jetty.

Loading of the overland conveyor will comprise a single stream, fed by front end loaders operating in the stockpile area. The front-end loaders will feed through a hopper/feeder arrangement to control the flow onto the product conveyor. The conveyor will commence at the product stockpile area heading north, aligned east of the MIA, and following the site access road. The conveyor will transfer material from the product stockpile to the jetty head via a series of overland conveyors and transfer points. These conveyors will take product from the stockpile and will continue to follow the site access road, maintaining a suitable grade and facilitating access for maintenance, before transferring onto the jetty conveyor via a transfer tower. All conveyors are fully enclosed to avoid any loss of material to the environment.

The materials handling system is initially designed to cater to 1.5 Mtpa of saleable product which will increase up to 4 Mtpa. The materials handling system will be a new ground-up build, designed to reach a barge loading rate of up to 1,500 tph. A second processing plant will be constructed to double the saleable product to circa 4 Mtpa once the mine is up and running. Once the initial plant is constructed and production commences, the construction team would continue on-site and transition into building the expansion capital, which would deliver a second processing plant capable of fulfilling the total capacity of just under 4 Mtpa Run of Mine (ROM) production. It is expected that this expansion capital will be completed in approximately 12-18 months and production at the higher capacity rate would commence sometime in about 3 years after first production.

3.1.3. Jetty Infrastructure Area (JIA)

A JIA, wholly located within MLA100352, is required to support both the logistics of mine construction and the operational logistics required during the operational phase of the mine. An unsealed gravel hardstand area will be provided at the JIA to accommodate maintenance and logistical activities in and around the Jetty and MOF. This hardstand area will be approximately 3,300 m^2. The hardstand area will be graded to fall to a drainage sump located at the rear of the hardstand area.

A diverter chute on the conveyor before the jetty, will discharge into a reinforced concrete bunker at the JIA. This bunker will provide emergency storage of silica sand if the jetty conveyor is shut down.

There will also be several amenities within the JIA area, namely:

- Jetty pilings (land based).
- Access track to MOF.
- Crib room – 6 x 3 m ATCO building.
- Draining sump.
- Clean and dirty water diversion drains.
- Diesel generators/fuel tank (self bunded).

- Male/Female ablutions (toilet) block – 4.25 m x 3 m ATCO style toilet block.

Wastewater at the ablutions on the JIA will be retained in a sullage tank for monthly collection by truck where it is transported directly to the main sewage treatment plant (STP).

3.1.4. Jetty

The navigable water depths within the Cape Flattery Port limits in areas are too shallow to allow direct access to the mine port facility by an ocean-going vessel. The proposed method of product export is to transfer the silica from the mine to ocean-going vessels using a transhipment barge.

The proposed jetty will be supported by 36 single piles over the total length and three dolphin piles installed at the end of the jetty for the barges to moor against while being loaded. Additional piles will support the barge loading and jetty hopper infrastructure, which will extend an additional 10 m from the end of the jetty. The jetty will be at least 400 m in length and approximately 3.4 m in width and constructed to support Conveyor 4. Conveyor 4 is fully enclosed to avoid any loss of material to the environment and is elevated to protect it from storm surges. As product is conveyed along the JIA pad on ground modules it will then transition to truss supports across the water before placement onto a barge via a hopper. The hopper will be on a telescoping stacker mounted on the jetty platform supported on piles. The marine infrastructure design has been through multiple revisions to reduce the impacts on mangroves, reef systems and seagrass beds including repositioning of the MOF ramp and pilings and jetty pilings.

Once loaded onto the barges, silica sand will be transported to the anchorage area. Product loading to the OGVs will then occur via crane bucket or conveyor onto the ships moored at the designated anchorage location within the Cape Flattery Port area (refer **Figure 4**).

Governance arrangements for the jetty are covered under a Port Authority under the *Transport Infrastructure Act 1994* being Far North Queensland Ports Corporation Limited, trading as Ports North. This includes all infrastructure located ocean side and placed on the seabed, with the proposed infrastructure (Jetty and MOF) to be owned by CFS, with operations being managed by Ports North. Under the *Land Act 1962* a lease (term or perpetual) or right to occupy will be required by CFS for use of the jetty. The future tenure arrangements for the land beside the jetty are covered under MLA100352.

3.1.5. Marine Offloading Facility

The MOF will be approximately 200 m long and is a purpose-built structure to facilitate the delivery of equipment and goods to the Project during both construction and operations (refer **Figure 4**). From the JIA, an access road will lead down to the shoreline and a concrete ramp will be constructed and extended from the edge of the rocky shore area where it will meet a series of prefabricated pile mounted concrete sections. As this facility is self-supporting on piles it allows tide and current to flow underneath. Seafloor disturbance is therefore constrained to the immediate location of each support pile. The end of the MOF will be at a sufficient depth to allow for loading and unloading of materials from appropriately sized barges and landing craft.

3.1.6. Process Plant

The proposed process plants for producing HPSS encompasses the relocatable Dry Mining Unit (DMU) that receives the ROM ore, and the Wet Concentrator Plant (WCP) that receives the sand slurry from the DMU, product dewatering and stacking, and reject handling. A total of two processing plants will be constructed to fulfill the 4 Mtpa capacity, with the second plant to be constructed after the completion of the first. A small portion of low-grade silica sand is expected during processing, this material will be used as backfill in the mined voids as part of the rehabilitation strategy.

The process facilities are designed around a 250t/h feed rate and 7,500 operating hour annual production scenario. Four process flow routes were developed to demonstrate the mass flows for alternate options within the WCP, including:

- Full Circuit – includes all process units.
- Excluding wet high intensity magnetic separators (WHIMS).
- Bypassing attritioning.
- The initial capital investment case – excluding WHIMS and includes an option to bypass attritioning.

The LOM relocatable and fixed plant design is required to withstand 250km/h cyclonic wind loads and allowance is included for the addition of field booster pumps to support the active mining face as it progresses away from the plant location during the mining life. The proposed location and layout for both plants are constrained by physical, permit and visual amenity considerations.

3.1.7. Swing Basin/Anchorage area

The proposed jetty location is within three nautical miles of suitable swing basins, affording efficient turnaround of barges and tugs in loading operations. Water depths within the identified anchorage area are approximately 20m, which is suitable for mooring of OGVs. An indicative anchorage area within the Cape Flattery Port limits (**Figure 5**) has been identified, with the headland waters of Cape Flattery being excised from the GBRMP as the operating port extent. This area is proposed within consideration to comply with AMSA and Reef VTS requirements for OGV movement through the GBRMP. Discussions have also been held with Ports North in relation to the suitability of this area for anchoring. To date Ports North do not have any objections to the current proposed location. Suitability of the proposed location will also be subject to review and determined in consultation with Maritime Safety Queensland (MSQ) and the Regional Harbour Master (RHM).

3.1.7.1. Barges/Transhipment

A transhipment vessel is proposed for operations given the short distance to the ship anchorage area. The jetty for transhipment will be constructed to bridge across fringing reef which has a minimum width of around 35 m in the proposed location (refer to **Figure 21**). The jetty will load the transhipment vessel at a rate of 1,000 - 1,500 tph, into a fixed point on the transhipment vessel. The jetty will be required to accommodate a self-propelled self-discharging transhipment vessel with capacity to support the 10,000 t per day OGV loading rate. The transhipment vessel has a length of up to 130 m, breadth of 24 – 30 m and has a capacity of up to 10,000 DWT. The transhipment vessel will moor at

the Jetty using mooring dolphins supported by access gangways. The Gross Registered Tonnage of the transhipment vessel is expected to exceed 500 t. The type of transhipment vessel, number of dolphins, and design specifications are dependent on vessel availability and contractor fleet which will further be explored during the EIS process.

The draught of the transhipment vessel will have a direct impact on the design of the MOF and the jetty length, given the shallow water depth. A water depth of 4.5 m at the LAT at the end of the jetty would be required to accommodate a suitable transhipment vessel. This allowance comprises a barge draught of between 4.0 m plus Under Keel Clearance (UKC) of ~10 percent (%). Water depths within the indicative anchorage area are approximately 20 m, allowing for mooring of OGVs. It is noted that further work is required to better understand seafloor characteristics and determine the best method for securing bulk carriers. This will also be investigated during the EIS process.

Two (2) separate unloading system options are being considered:

- Self-loading/self-propelled vessels are currently being considered. A number of self-unloading vessels are gravity fed, with a conveyor running along the bottom of the vessel onto which the material drops. This system requires specially constructed holds with the hold slope designed to suit the material to be discharged. Gravity fed systems minimise maintenance requirements as there is no heavy-duty reclaiming equipment required and can achieve very high discharge rates, up to 10,000 tph.
- A bucket lift self-unloader uses a loop of connected buckets to scoop the product out of the hold and deposit it into a deck mounted hopper to be discharged through a boom. A bucketwheel reclaimer utilises a bucketwheel on a travelling gantry to discharge the length of the hold onto a conveyor system. An advantage of a bucketwheel is that it discharges from a flat deck, therefore minimising cargo hold volumetric loss. Barge construction can be utilised as the freeboard deck is the cargo hold deck, so no watertight hatch covers are required. This arrangement can be configured to load from Handy size to Panamax size vessels that typically services operations exporting 1.5 Mtpa.

These options were selected via the PFS with final options determined through the DFS. The final designs will be completed and locked in via the EIS process.

3.1.7.2. Ocean Going Vessels (OGV)

Estimated shipping size is Supramax (55,000 DWT) to Ultramax (65,000 DWT) with a loading time per ship of around five to six days.

Loading of OGVs will be undertaken within Port limits in a designated swing basin area. During loading, OGVs will be secured either through anchoring (using the ships own anchor) or via a single point mooring.

A single point mooring is typically secured by multiple weights, e.g., three, one tonne concrete blocks, weighed down at the base and connected to a common chain on a float. The benefits of a single point mooring or anchor would mean that the OGV can turn into the predominant sea or wind conditions,

enables safe and easy access to both sides of the vessel for loading and reduces the overall installation onto the seabed, reducing the environmental impact of permanent mooring points.

OGV shipping movements (on average one per week) outside of the Port of Cape Flattery will be undertaken within existing shipping routes and as such, will be operated and controlled by others to comply with the AMSA and Reef VTS requirements for movement through the GBRMP. OGV shipping through existing shipping channels is not considered an impact to the GBRMP and was not part of the EPBC Act referral. The headland waters, operating port extent, of Cape Flattery including the proposed marine infrastructure associated with the project are excised from the GBRMP.

3.1.7.3. Communications

Marine 2-way radio communications equipment (VHF/UHF) will be used to provide communications between the mine, transhipment vessel and OGVs. This will also allow access to the Queensland Police Service network for emergency use. Vessel Tracking System (VTS) will be in operation as part of the port management requirements.

3.1.7.4. Marine Vessel Wastewater

Marine sewage generated from OGVs, tugs and barges will be managed in accordance with Great Barrier Reef Marine Park Authority (GBRMPA) and Queensland Transport/Maritime Safety Queensland requirements. Rules vary based on the level of treatment achieved by the vessel treatment system, but generally take the form of not discharging sewage within defined buffers of reefs, the mainland, or other marine park boundaries.

All ships engaged in international voyages (including cruise ships and trading ships) must comply with all relevant annexes of the International Convention for the Prevention of Pollution from Ships (MARPOL). Australia implements MARPOL through the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* and the *Navigation Act 2012*. *The Protection of the Sea (Prevention of Pollution from Ships) Act 1983* includes enforcement related provisions from the United Nations Convention on the Law of the Sea. All OGVs must comply with these legislative requirements.

3.2. Ancillary Aspects

The following sections describe ancillary aspects of the Project that will occur within the MLA boundaries.

The MIA will include site office, workshop, laboratory, crib room, amenities building, emergency accommodation buildings, potable water treatment plant, fuel storage facilities, diesel power supply, roads, water supply, settling pond and sewage treatment facilities. Installed equipment and buildings are modular and minimal maintenance is required during operations.

Site infrastructure is summarised in **Table 3**.

3.2.1. Water

Monitoring bores have been installed within the proposed MLA. Production bore locations have been identified through the DFS phase of the Project's development in conjunction with approvals processes. Water is planned to be sourced from a productive bore field located approximately 3.2 km

by track from the MIA. All water bores have and will be constructed and decommissioned in accordance with the "Minimum construction requirements for water bores in Australia".

Recycling of onsite stormwater and process water is being investigated for non-potable purposes. The Project will not be exercising underground water rights, there will be no interference of underground water (through dewatering or for hydraulic fracturing) as mining activities will occur above the groundwater table.

On 22 February 2022, the Project was recognised by the Department of Regional Development, Manufacturing and Water (DRDMW) as a Project of Regional Significance under the *Water Plan (Cape York) 2019* (Water Plan). This status means that the Project can apply for a water entitlement from the 25,000 ML of unallocated water held in the Strategic Reserve for the Water Plan. In accordance with the Water Plan, both Coordinated Projects and Projects of Regional Significance are eligible to request, but are not guaranteed, unallocated water held in the strategic reserve under the Water Plan. Project water demand is expected to be fully met within a 1,300 ML per annum water licence under the unallocated water release process with water taken through an approved and validated meter.

The *Water Act 2000* (Water Act) provides a structured system for the planning, protection, allocation and use of Queensland's surface waters and groundwater. Under the Water Act, a person must not take, supply, or interfere with water unless authorised for the taking of water from overland flow, groundwater, a watercourse, lake, or spring. Resource tenure holders can access underground water taken in the course of, or as a result of, exercising underground water rights. Thus, no authority is required for the use of water from mine dewatering undertaken to the extent necessary to achieve safe operating conditions.

Alternate water sources were considered during the PFS and DFS. CFS determined that there were minimal options to the project due to the remote nature of the site. With the project being declared as a Project of Regional Significance, the most logical option was to apply for a Water Licence to access the unallocated water held in the Strategic Reserve of the Water Plan. As described in section 6.5 below pump testing has confirmed the availabiity of water to support the project.

As part of the water licensing process, a groundwater drilling and monitoring program is being executed to collect data that will support further groundwater modelling including water levels, drawdowns, and cone of influence.

Seasonal water assignment

The proposed project area is located within the Jeannie Catchment of the Cape York Water Plan area. In this catchment area, an application to seasonally assign all or part of an existing underground water licence may be accepted. An application for a seasonal water assignment is subject to assessment under section 45 of the Cape York Water Management Protocol.

Water permit

A Water Permit application will be lodged under Chapter 2, Part 3, Division 3, Section 137 of the Water Act for the purpose of accessing water for the construction phase of the project.

The criteria for a Water Permit application are outlined in Section 138 of the Water Act and may be subject to notification under the *Native Title Act 1993*. Within 30 business days (b.d) of a decision to grant the permit, the Chief Executive is to give notice of the permit including details of the location, activity, period and any other imposed conditions. Options for a seasonal water assignment will be investigated during the EIS process prior to applying for a water permit.

Water Licence under an unallocated water release process

CFS will prepare and lodge a Water Licence Application under the unallocated water release process via submission to the DRDMW requesting the release of strategic reserve water under *The Water Plan (Cape York) 2019* to meet the operational supply demands of the project in Q3 2023. This will be undertaken through the Coordinated Project assessment process.

The DRDMW have confirmed with CFS the criteria to be addressed in the Water Licence application presented below in **Table 4**:

Table 4: Water Licence Key Assessment Criteria

Criteria	Evidence Required
(a) the availability of water in the plan area for the proposed purpose.	In addressing this criterium: Confirm project demand (minimum inclusions are specific annual volume, volume range, daily extraction volume, timing of take, and demand pattern). Discuss details of construction water requirements that are not sourced from the strategic reserve (annual volume, location and source/s of water, and duration of take as well as consideration of any licensing and permitting requirements). Discuss the annual volume of water required from the strategic reserve, including justification of this volume. Identify location of proposed bore field, including location of each proposed bore to be used to access water for the Project.
(b) the efficiency of existing and proposed water use practices.	In addressing this criterium: • Provide an assessment of the efficiency of water use practices to be implemented in all areas of the project such as during washing and processing, washdown facilities, losses at all water storages, sewage plant operation, dust suppression, potable water supply, and in any other activities. • Describe how these practices are consistent with best management practice. • Discuss options for how the take of water would be measured, considering the requirements under the Queensland interim water metre standard for non-urban metering.

Criteria	Evidence Required
(c) the impact the proposed taking of water may have on existing authorisations in the plan area.	In addressing this criterium: • Provide any groundwater modelling undertaken and identify any impacts on existing water users. • Discuss mitigation of impacts on existing water users where identified. If impacts cannot be avoided, provide information detailing how mitigation would be achieved. For example, by reducing the project annual volume of water taken, daily volume, flow threshold or by altering the timing of water extractions.
(d) the availability of an alternative water supply for the purpose for which the water is required.	In addressing this criterium: • Provide an assessment of alternate water supplies that may be used in place of, in conjunction with, or to augment water sought from the strategic reserve. The response should demonstrate how reliance on strategic reserve water is minimised. The assessment must detail how the following alternative water supplies were considered: • Associated (underground) water. • Overland flow (limited capacity) and underground water. • Alternative unallocated water reserves; and, water trading.
(e) the impact the proposed taking and use of water may have on natural ecosystems.	In addressing this criterium: • Provide any groundwater modelling undertaken and identify any impacts on groundwater flows in the project area. For example, this may include information about changes to groundwater levels, salinity, groundwater flow paths and groundwater pressures, groundwater dependent ecosystems and identify any adjacent or nearby springs which may be impacted as a result of groundwater extraction. • Where identified, discuss how adverse impacts will be mitigated.
(f) whether the land is suitable for the intended purpose, including measures to prevent, or if practical reverse the degradation of natural ecosystems.	In addressing this criterium: • Discuss the topography, drainage, soil attributes (such as erosivity, sodicity and salinity hazard), effect on natural ecosystems (including to downstream receiving waters of the Great Barrier Reef and Gulf of Carpentaria), and any control methods.
(g) other considerations?	The Department may identify additional matters which require resolution during their assessment of the submission.

The Water Licence Application will need to be made in accordance with the *Water Plan (Cape York) 2019*, specifically:

- Licence application requirements under s28 and s29.
- An application for water from the Strategic Reserve for State purpose, in this case a Project of Regional Significance.
- The Water Plan outcomes presented in Part 3 of the *Water Plan (Cape York) 2019*.

Key inputs from the EIS to the Water Licence application will include:

- Project Water Balance.
- Groundwater Modelling based on testing to be completed in Q4 2023.
- Groundwater Impact Report.
- Relevant assessment material from the EIS process.

Metering

In accordance with Schedule 11 of the *Water Regulation 2016*, the plan area under the Cape York Water Plan is a metered entitlement area. Should a water entitlement be granted from the strategic reserve, or water accessed via a seasonal water assignment, water must be taken through an approved and validated meter.

3.2.2. Wastewater

Treated wastewater will be pumped from the JIA to a STP/irrigation area within the MLA area. The STP is proposed to be a package plant. The process will involve advanced secondary treatment (i.e. the removal of solids, biological oxygen demand, nutrients, disinfection, and drip irrigation of treated effluent into the designated irrigation area). The operation of the irrigation area will be included in the site water balance model.

The Class A STP on site will support up to 50 Equivalent Persons (EP) and will include deposition into an irrigation field to support rehabilitation. Specific requirements around the outputs of wastewater for treatment will meet Class A standards and EA requirements.

Wastewater at the ablutions on the JIA will be retained in a sullage tank for monthly collection by truck where it is transported directly to the main STP.

3.2.3. Process Water Management

Management of the water supply will be automated from supply bores that feed directly into the raw water tanks near the plant. Raw water from these tanks is then drawn down and added to recycled process water as needed, making up for any losses from the circuit that occur.

3.2.4. Potable Water

Raw water will be extracted from the supply bores and pumped to the water treatment plant (WTP) located in the MIA. The proposed system includes a package WTP which will involve filtration and disinfection. Treated water will meet National Health and Medical Research Council and Australian Drinking Water guidelines and will supply up to 120 EP onsite. Treated water will be stored in a central tank located adjacent to the WTP and reticulated throughout the site. Potable water will be reticulated to the following:

- Administration, crib rooms, toilets.
- Accommodation.
- Tank feeding emergency shower, eye wash and crib at workshop/fuel bay.
- Tank feeding emergency shower, eye wash and crib at processing plant.

3.2.4.1. Water for Firefighting

As operations are within a mining lease and not within a relevant Queensland Fire Emergency Services district, the code requirements for firefighting and in particular the need to provide sufficient water reserves is not applicable. CFS proposes to apply risk mitigation to manage fire through provision of sufficient fire extinguishers and a resident water cart which can be used for firefighting purposes.

3.2.5. Stormwater

Engineering design has allowed for culvert and drainage structures to facilitate run off stormwater, minimising the need for site water management.

Stormwater management structures on site will be designed to deal with areas of sediment runoff, or at the process plant where sand fines will be captured. Stormwater from roof areas of ancillary structures will be collected and stored for re-use. Runoff from other impervious surfaces will be collected and transferred to the sediment basin and, after sediment is removed in accordance with routine stormwater management devices and approaches, the leftover water will be recycled into the water management system and used in the processing plant.

The sediment basin may be a regulated structure, this will be verified during the detailed design and EIS phase. An assessment of consequence categories and hydraulic performance will be undertaken if changes to the basin design are found to be required.

The JIA hardstand area will be graded to fall to a drainage sump located at the rear of the hardstand area.

3.2.6. Access Roads

Operational requirements for access roads are periodic maintenance and dust suppression. This will be delivered through mine operations personnel and leased fleet. All access tracks for the Project will be contained within the MLA boundaries and no additional road work will be required outside of the project area. There are no public roads within the proposed MLA or the surrounding area and currently, public access to Connies Beach is via an existing unsealed access track from the south and cuts directly through the proposed mining area. Therefore, access to Connies Beach will be facilitated by a new unsealed access track around the inner western perimeter of the MLA boundary (**Figure 4**).

Signage and fencing are proposed to manage use of the shared boundary access track, for Project personnel entering the Project's western entry point, and for directing TOs and people with permission travelling to Connies Beach, ensuring they are kept away from any active mining areas. CFS has consulted with the Traditional Landowner groups with regards to the existing and proposed access arrangements and have received approval for the relocated track, as it is some distance from camping and fishing areas.

An unsealed single-lane roadway will be constructed between the product stockpile to the JIA area. The overland conveyor will share the road formation along parts of the road alignment. Site personnel will be transported to site via sea, accessing the MIA via bus transport from the JIA. This site access road is the primary access route to the mine site (refer to **Figure 4**).

3.2.7. Power

There is no reticulated electricity in the vicinity of the Project, so the Project will need to be self-sufficient with regards to energy generation. The DFS has accounted for installation of diesel generation facilities. Investigations during the DFS phase has confirmed benefits of employing systems that will reduce energy consumption as well as carbon emissions. This includes photovoltaic (PV) Solar/Wind hybrid systems. Investigations with renewables providers have confirmed the Project location is suitable with regards to wind and solar resources and significant measurable benefit can be achieved. Deployment of renewable solutions will be carried out as soon as practicable for the project. Further investigation of renewable solutions will be undertaken during the EIS process and included in the coordinated project, with early-stage investigations favouring an onsite solar farm potentially located adjacent to the stockpile area.

Total fuel storage on site will be equivalent to approximately 1 month's usage (800,000 litres (L)). In operation, a fuel barge will moor at the jetty approximately once a week and discharge in the order of 270,000 litres of fuel per week via a pumped diesel transport system to the bulk storage at the MIA for the power generation and mobile equipment. The diesel system can also be used to refuel the Crew Transfer Vessel (CTV) and transhipment vessel from the bulk storage facility. Diesel gensets are augmented with 3.3Mw of solar capacity and battery storage after the first year of mining.

A low voltage (LV) diesel power generation and LV reticulation supplies the main power loads of the process plant and camp, these are augmented in Year 2 of operation by battery storage and solar power production. Satellite load centres are provided with standalone diesel gensets.

3.2.8. Craneage and Transport

The following transport and craneage equipment are currently proposed for construction:

- 70 to 100 t crane.
- Semi-trailer and rigid body trucks.
- Two dozers.

A detailed equipment list has been prepared as part of the EIS for the Project, including requirements for shipping (i.e. transhipment vessel, mooring and anchorage details, safety and emergency related marine infrastructure, etc.). Preferred contractors for transport and craneage will be identified during the tender submission process.

3.2.9. Procurement of Mine Equipment and Materials

It is a priority of the Project to ensure procurement of required mine equipment, materials and other mine inputs is maximised locally, regionally and within the State. Specific quantities and sources of this equipment and material have been defined during the DFS.

Construction equipment, materials and other mine inputs are expected to be transported to the site via barge from Cairns. These inputs would be transported to the port of embarkation by B-Double trucks. Barge deliveries and exports will continue during operations on a weekly basis.

3.2.10. Freight Delivery

Freight will be delivered to site by barge, departing from Cooktown, unloaded at the MOF, driven into Project area and entered in the inventory by a CFS employee.

3.2.11. Logistics Management

A CFS employee will manage logistics as above and the following will be incorporated into the onsite inventory management software:

- Purchase to pay.
- Inventory management.
- Freight tracking and customs clearance.

3.2.12. Solid Waste

As there is no municipal collection of solid waste in the vicinity of the Project, the Project will be self-sufficient in terms of collection and storage of all solid wastes. It is intended that contractor services will be engaged for the removal of waste from site and responsible disposal in the region, likely using the weekly barge after delivery of freight. A solid waste storage area will be determined during the EIS process and a suitable licensed landfill will be identified to receive the waste lawfully. Current indications are that the regional landfill in Mareeba is the most likely destination.

3.2.13. Communications

CFS will install 2-way radio communications equipment (UHF/VHF) to provide communications between the mine, transhipment vessel and OGVs. This will also allow access to the Queensland Police Service network for emergency use.

3.2.14. Fuel Storage

Diesel fuel will be stored on site for use in power generation and by mining and other plant. Volumes required are:

- Minimum 800,000 L (one month).
- Initial 7 million L growing to14 million L of fuel per annum.

This fuel will be stored in the MIA as shown on the layout plans (refer to **Figure 4**). There will be a two-way pipeline from/to the jetty to allow for supply of fuel farm and supply to transhipment vessel. The pipeline will be managed in accordance with the Operational Environmental Management Plan (OEMP).

3.3. Land Use

3.3.1. Existing Land Use

Cape Flattery and its surrounds are in mostly undeveloped landscapes zoned as rural under the Hope Vale Shire Council Planning Scheme 2014. The Project area is a greenfield site comprised of native ecosystem and wetland areas, with unsealed public access tracks traversing the site northwards to

Connies Beach. There is no grazing or any other agricultural activity currently undertaken on the Project area.

Currently the Port of Cape Flattery is used for the export of silica sand from the Mitsubishi Cape Flattery Silica Mines Pty Ltd (CFSM) Operation. The MLA is sided by CFSM's tenements to the south and west, and the coastline to the north and east. Connie's Beach to the immediate North of the project is used for cultural and recreational purposes by the TOs and no activities are proposed on or in proximity to this area. Similarly, supporting mine infrastructure has been located away from areas of cultural significance after consultation with TOs.

3.3.2. Intended Land Use (On-lease)

Intended land use within the Project tenure (e.g. on-lease) will be mining and processing, and will be comprised of mining activities and the infrastructure identified in **Table 3**, namely**:**

- MIA for general mine service facilities (includes communications).
- Mining panels.
- Stockpile areas.
- Construction laydown area.
- Processing plant.
- Product stockpile.
- Worker's accommodation facility for up to 52 persons.
- Sediment basin.
- Potable water tank and raw water tank.
- Sewage treatment plant.
- Water treatment plant.
- Overland conveyors.
- Boundary access road.
- Site access tracks/internal roads.
- JIA to service the marine project infrastructure.
- Internal roads/site access.
- JIA, including Transhipment Vessel Loading Infrastructure.

3.3.3. Intended Land Use (Off-lease)

The proposed Jetty and MOF will be located off-lease over the water, with piles located below mean high water (MHW).

3.4. Project Need, Justification and Alternatives Considered

The PFS identified that the silica sand resource at Cape Flattery is extensive. The Project area contains large quantities of HPSS and is geographically constrained by the eastern coastline and Mitsubishi's CSFM Operation is well-established in extracting and exporting high-purity silica sand from Cape Flattery on their adjacent lease. HPSS sands are becoming more sought after, with the global market growing at a compound annual growth rate of around six percent between 2010 and 2017. In 2017, a total of 188 million tonnes (Mt) of silica sand was produced globally (Wave International 2022).

This growth is being driven by silica sand's application across a broad range of industries, including glassmaking, foundry casting, water filtration, chemicals, and metals, along with hydraulic fracturing process requirements and the increasing manufacture of high-tech products such as solar panels. There is strong demand for processed HPSS (>99.9 percent silicon dioxide (SiO2)) with low iron (100 parts per million (ppm)) for high-tech products. The global silica sand market has been forecast to grow from US$7 billion to US$20 billion in 2024 (Wave International 2022).

The demand for HPSS (which is high-silica low iron silica sand) in Asia, particularly in China, has been growing rapidly over the last five years, with a Compound Annual Growth Rate (CAGR) of 8.4%. China's own demand for imported silica sand has grown even faster at 27.9% CAGR, resulting in a foreseeable supply deficit of 4 million tonnes or more by 2026. The main driving force behind this demand is the increasing need for PV glass in the solar industry, which relies heavily on supply of HPSS. The timing of the CFS project's completion is expected to be well timed to meet this growing demand from China and other Asia-Pacific countries (as evidenced by visits to the project by a number of Japanese, Korean and Malaysian companies). Australia has been the dominant supplier of HPSS to Asia-Pacific, with the country exporting 3.89 Mt of HPSS to China, Japan, Taiwan and South Korea in 2022 alone. HPSS demand is expected to continue its exponential growth, driven by the global shift and structural transition from fossil fuels to renewables, particularly solar energy. China remains the leading global producer of solar glass, with HPSS comprising approximately 72% of ever 100kg of PV glass. HPSS production at Cape Flattery is well positioned to meet this demand due to specification, logistic advantages, along with HPSS being a well-recognised product.

CFS are seeking to develop the Project as it is considered strategic and favourably positioned for extracting HPSS to access these growing markets. Preliminary metallurgy analysis results indicate the Project's silica sand attributes have the potential to produce saleable products that meet the specification requirements for global glassmaking and foundry industries. The Project is capable of producing the standard, widely traded form of silica, silicon dioxide, which is planned to be exported by ship from Cape Flattery to glass manufacturing and foundry companies, most likely in Asia.

Australia's Critical Minerals Strategy 2023 (the Strategy) aims to refine Australia's policy settings to enable the resources sector to supply the growing markets for raw and refined critical minerals. Australia has a moderate to high geological potential in 24 minerals that are deemed critical by many countries. The Commonwealth has recognised the importance of silica by listing it in the Strategy. CFS understand the importance of silica sand as a 'critical' mineral, as well as a 'new economy' mineral in the Queensland New Economy Minerals Strategy 2020, and the Queensland Resources Industry Development Plan 2022. CFS will contribute to and benefit from the Queensland Critical Minerals

Strategy (2023) and Queensland New Industry Development Strategy (2023). The Project will contribute to the achievement of the objectives identified in these strategies, as part of an energy transition away from carbon. Therefore, the Project is likely to benefit from both Federal and State support as well as inherent efficiencies from producing silica sand in Queensland. CFS is currently in discussion with the Queensland Government to investigate the potential for Cape Flattery to be designated a Critical Mineral Zone under the Queensland Critical Minerals Strategy (2023).

Silica sand is a critical component of solar PV panels and therefore, is an important aspect of achieving the renewable energy targets for Queensland, the Nation and globally. This Project has the potential to establish the region as a supplier of high purity silica sand. In this sense, the Project is in the public interest as it aligns with global efforts to move towards a more sustainable use of resources.

The Department of Resources (DoR) is progressing the MLA for the proposed silica sand development on Cape Flattery and is aware that it will bring benefits to the local communities and to the State of Queensland when in production. These benefits include direct employment opportunities to the TOs and the communities of Hope Vale and Cooktown, economic development in the region for a mineral that is important in renewable energy production and the provision of royalty benefits to the State.

It is noted that DoR issued a letter calling on CFS to collaborate with nearby projects to share infrastructure where possible. CFS reached out multiple times to the adjacent CFSM, however they were not receptive at the time and remain so after multiple attempts. Shared use with other proponents is not possible due to their unwillingness to allow CFS access and likely development timeline being well past the CFS Project or their preference for other options closer to their planned operations. Transhipping is currently the only feasible export route due to Project remoteness and the lack of adequate road infrastructure in the surrounding area.

The significance of the Project was recognised on 22 February 2022 by the DRDMW with the granting of 'Project of Regional Significance' status under the *Water Plan (Cape York) 2019*. The designation recognises the positive economic impacts the Project will have on the local Hope Vale Aboriginal Shire as well as its importance to the broader community and economy. The 'do nothing' option has been considered and dismissed on the basis that the social and economic benefits make the project highly desirable by TOs, local residents and local and state governments. The proposed mine will be staffed with predominantly local residents, with an anticipated 40% of those being local indigenous people. The Traditional Owners have expressed their support for the employment and economic benefits that the project is planned to deliver. Royalties to QLD Government are anticipated to be 32.5 million AUD over the life of the mine ($0.90 per tonne sold).

3.4.1. Alternatives and Future Expansion Considered

The Project is located in EPM 25734, within MLA100284 and MLA100352 with associated off-lease/marine infrastructure including a Jetty and MOF immediately adjacent to the MLA in the Cape Flattery Port limits, as shown in **Figure 5**, no other MLM owned sites or locations covered MLM EPM's are included in this application. MLM has taken comprehensive measures to ensure that current designs ensure infrastructure low impact as possible whilst still being fit for purpose. The MLA is spatially constrained by CFSM's tenements to the south and west, and the coastline to the north and east. Therefore, it is not possible for the Project to expand spatially beyond the extent of MLA100284

and MLA100352. It is not within the financial feasibility of the Project to look beyond to further expansions, so this IAS does not include any other tenements in any other locations outside of Cape Flattery.

CFS have had ongoing discussions with Mitsubishi for over 2 years regarding shared use of the existing jetty, located to the east of MLA100284 within the designated Ports North limits. CFS has determined that with minimal capital expenditure, the CFSM and Ports North jointly-owned jetty and shiploading infrastructure can be improved both operationally and tonnage wise to export 10-12 Mtpa. Mitsubishi have declined CFS offers to work with them to allow access to this facility via a commercial arrangement. At the date of submission, Mitsubishi is not open to shared access. Therefore, the proposed design seeks approval for construction of marine infrastructure (jetty and MOF) to allow for operational function of the mine. The EIS will further define the project, however this design is the most feasible economic, social, and environmental alternative to one that seeks to use the existing access roads and wharf infrastructure. The proposed design avoids wetlands of state significance and has a much smaller footprint than other options considered.

Discussions have also occurred between CFS and Mitsubishi regarding the potential for shared use of Mitsubishi's airstrip, and other infrastructure, however, CFS' operation will be separate from the neighbouring CFSM operation with no shared infrastructure. Mitsubishi has declined our interest in sharing infrastructure. CFSM have agreed that in the event of an emergency that CFS can utilise their airstrip, though CFS will not be able to use the airstrip for operational purposes.

The absence of substantial road infrastructure in the region means that access to the CFS site is totally dependent on effective access from the sea and the establishment, by the Project, of marine infrastructure. Metocean data has been collected over an extended period that has been used in the development of the marine designs. All marine structures and operations consider the need to protect the local fringing reef wherever possible and minimise environmental impacts. Sitting inside the limits of the Cape Flattery Port, the navigable water depths off the coast of Cape Flattery are too shallow to allow direct access to the mine port facility by an OGV without significant capital cost. The proposed method of product export is to transfer the sand from the product stockpile to OGV using a transhipment barge. The location of the Jetty and associated infrastructure has been chosen for its proximity to deep water, being that it is located adjacent a deep-water channel leading to an area of appropriate depth for the swing basin/anchorage area. Alternative locations for the Jetty are not feasible due to the distance from land to deep water that can accommodate the required transhipment barges and OGVs (**Figure 6**). Furthermore, the chosen location avoids impacts to the fringe and marine vegetation reef as much as possible.

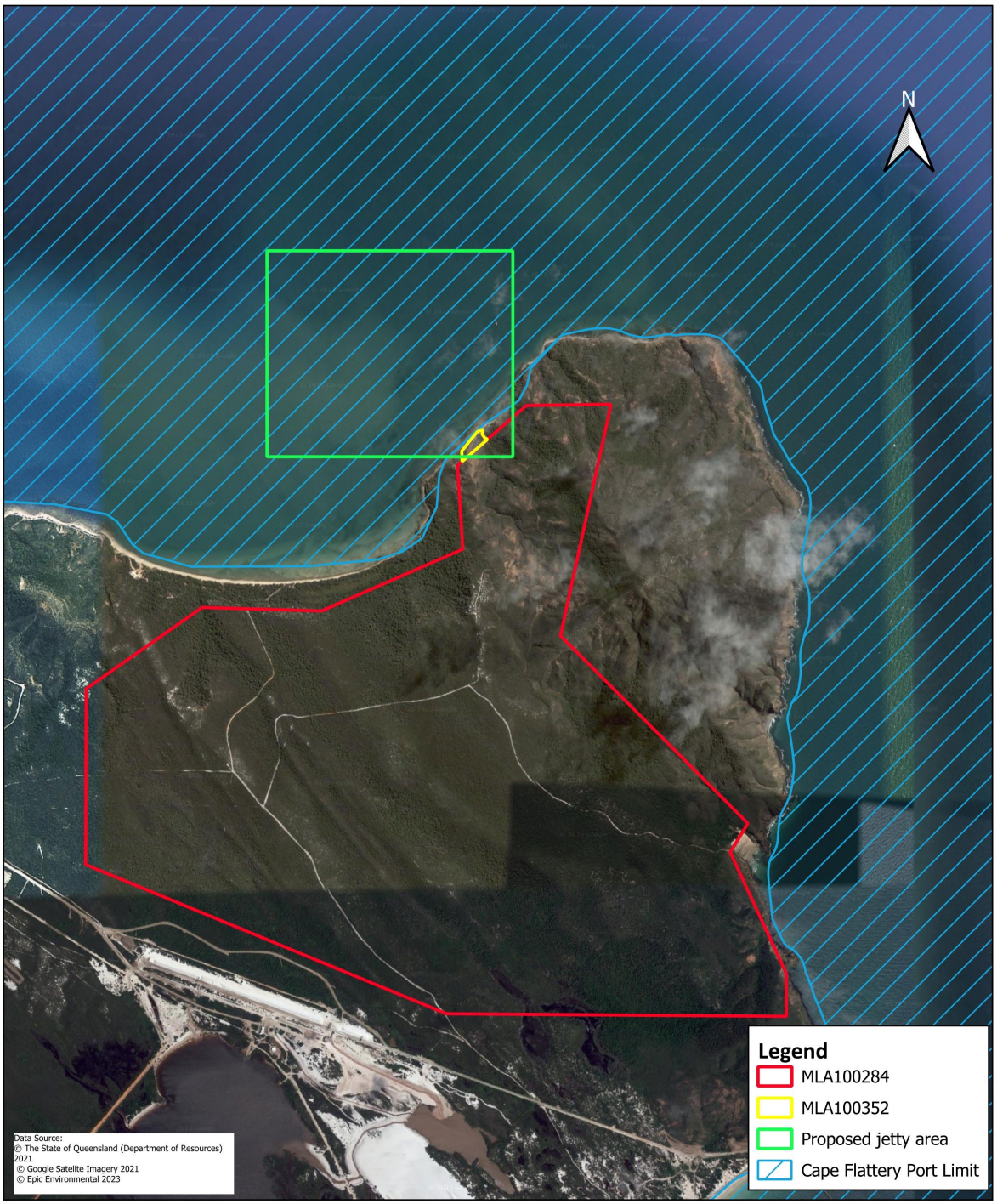

Figure 6 – Jetty location justification

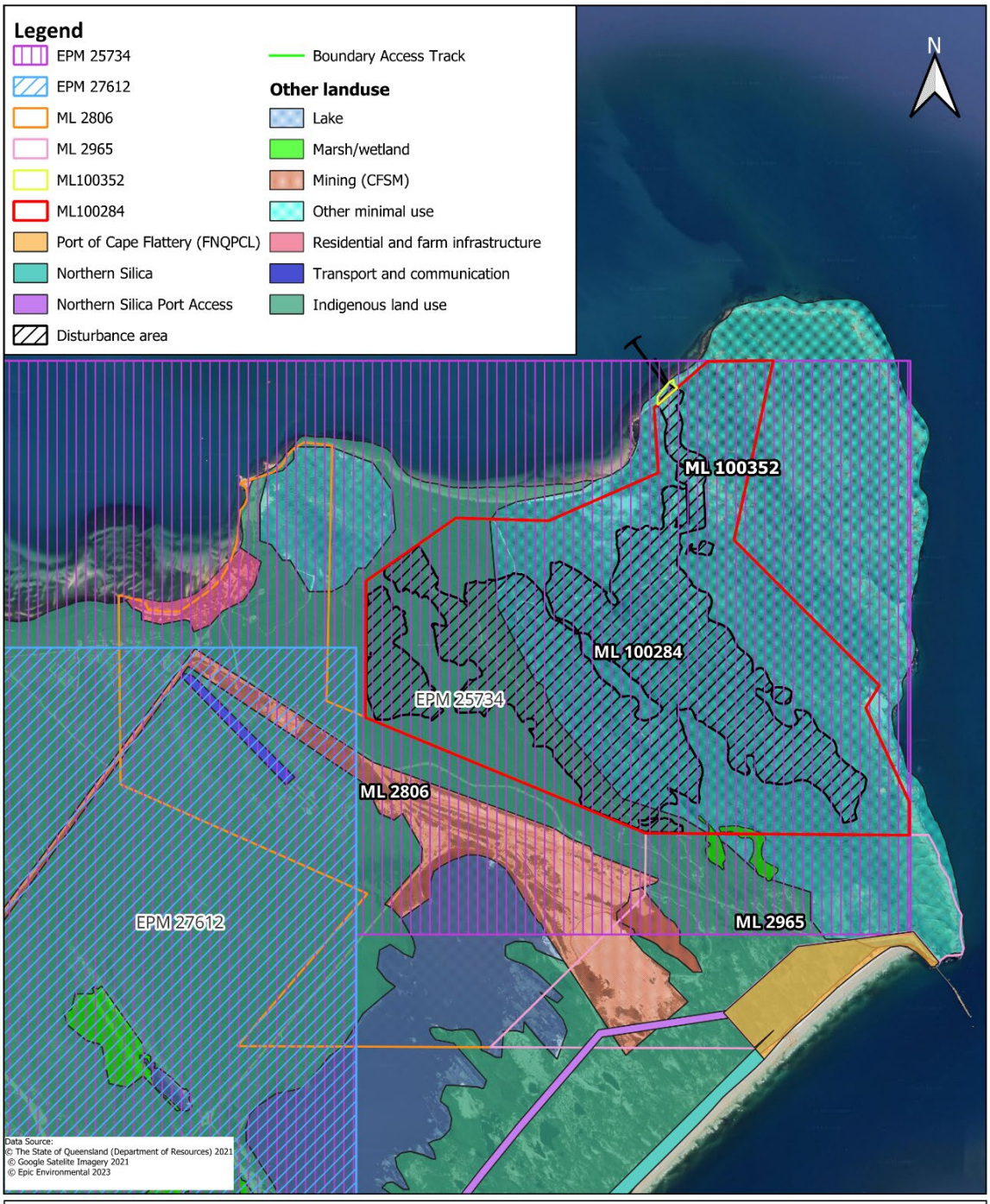

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Figure 7 – Existing land use and tenure

3.5. Components, Developments, Activities, and Infrastructure that Constitute the Project to be Declared Coordinated

Project components warranting a Coordinated Project declaration include the tenure and approvals associated with the progressive development and rehabilitation of the active mining area, associated mining and processing infrastructure and off-lease jetty/MOF infrastructure (refer **Figure 2**). Accordingly, a coordinated process for the statutory approvals pathway would provide continuity in terms of the assessment approach and ultimately, level of conditioning required in approving the Project.

Other key activities associated with development of the Project include:

- Construction and ongoing maintenance of the water and sewage treatment plants and water tanks.
- Onsite processing at the processing plants to produce up to 4 Mtpa.
- Construction and operation of the Accommodation village.
- Development of diesel generation facilities and potential solar/battery hybrid systems for power.
- Construction, operation, and maintenance infrastructure including:
    - MIA, including offices, communications.
    - Stockpile areas.
    - Construction laydown area.
    - Two processing plants.
    - Product stockpile.
    - Worker's accommodation facility for up to 52 persons.
    - Sediment basin.
    - Overland conveyors.
    - Boundary access road.
    - Site access tracks / internal roads.
    - Chemicals and fuel storage.
    - JIA to service the off-lease project infrastructure.
    - Internal roads/site access.

As identified in **Section 3.3.3**, there will be off-lease (Marine) infrastructure requirements required to support the Project. These include:

- Jetty.
- MOF.

- Transhipment activities to the anchorage area, within the designated Cape Flattery Port Limit under the authority of Ports North. (**Figure 2**)

Each of the above infrastructure has been examined in greater detail in **Section 3.1.1**, including water demand considerations.

3.6. External Infrastructure Requirements

Existing external infrastructure in Cooktown, Hope Vale and Cairns is required to support the Project, particularly for moving product, crew, waste and resources. Existing supply chains that service the surrounding projects will be capitalised on to support the project, therefore reducing potential impacts. The construction and operational workforces will be transported to the port of embarkation via plane from Cairns, or via bus from Cooktown and Hope Vale.

CTV and OGV shipping operation will rely on existing shipping lanes under Reef VTS pilotage and AMSA regulations. All ship movements that occur within the port limits of the Ports North are controlled by the Harbour Master for Cape Flattery. Once ships enter the GBRMP they are under the control of AMSA and MSQ along with GBRMPA use the following measures to avoid and mitigate risks:

- Designated shipping areas.
- Compulsory pilotage.
- Mandatory vessel monitoring and reporting.
- Navigation markers.
- Ship routing.
- Shore-based monitoring.
- Emergency response arrangements.
- The AMSA and MSQ have response plans in place to respond to shipping incidents.

At this stage, CFS no longer have influence over how ship movements occur.

In the event wherein these external infrastructures become unavailable, there will be a significant impact throughout the Project's construction and operation phases due to the heavy reliance on transportation routes and port facilities. Examples of potential factors may include climatic events and technical and/or congestion issues in port facilities, which can lead to substantial operational delays within required transport routes.

Waste from the Project is planned to be transported to a waste facility in Mareeba via Cairns utilising weekly barges, which are also dependent on existing off-lease marine infrastructure and shipping lanes.

3.7. Timeframes for the Project

The expected timeframes for the Project are displayed in **Table 5**, with construction proposed to commence in Q2 2025. Operational activities of the Project would be carried out over a 15-year mine life, with rehabilitation activities undertaken on a progressive basis, over the LOM.

Table 5: Proposed Project Timeframes

Item	Timeframe
Mining Lease Application Submitted	Q2 2021
Environmental Technical Studies and MNES Assessment completed	Q2 2022
EPBC referral submission	Q4 2022
Coordinated Project application	Q3 2023
Preparation of EIS according to final ToR, including any further technical studies	Q3 2023-Q3 2024
Assessment and approval of EIS	Q1 2025
DA and EA obtained	Q1 2025
Water permit granted	Q1 2024
Commencement of Construction	Q2 2025
Operations Commence	Q2 2027 - approximately 2041 (15-year mine life)

3.8. Construction and Operational Processes

Construction is expected to commence in Q2 2025 and will run for approximately 18 months. A peak construction workforce of around 80 persons onsite will be required and will work on a roster basis with transport to the Project from Cooktown by CTV. Travel time to site via CTV is approximately 1.5 hours.

Pre-construction activities will include the establishment of site safety and security measures, e.g., fencing and signage and the establishment of temporary amenities in accordance with relevant standards, waste receptacles, access roads and erosion/sediment controls. Subsequently, clearing and grubbing of vegetation/weeds and removal of topsoil and subsoil will take place. Earthworks and grading for site establishment will then commence.

Initial site works will be concentrated in areas where key infrastructure will be located and where access roads or laydown areas will be required. All site preparation works will be undertaken in accordance with the Project's Construction Environmental Management Plan (CEMP). Initial landing will occur in the proposed MOF and Jetty location to reduce impacts to the surrounding area, a barge

will land as briefly as possible on the sand to offload people and supplies before moving back out to deeper water to wait or returning to port. Construction of the MOF will pre-date the construction of the JIA such that landing on the sand will be avoided where possible to minimise impact on the shore. All machinery offloaded will only travel on designated access tracks and site laydown areas which will be located in areas planned for construction of infrastructure or proposed roads to reduce further impacts to the surrounding site. Site preparation works, including vegetation and topsoil removal and earthworks, will be staged to minimise the extent and duration of cleared areas at any one time. This staged approach will enable the Proponent to manage their environmental requirements, such as minimising dust and control of stormwater runoff.

Suitable soil and seed resources will be stripped, handled, and stored in a manner that aligns with industry best practice for use in later rehabilitation activities.

The MOF will be prioritised for early works construction to facilitate the delivery of building materials from Cairns that will be assembled on site. Vegetation clearing for access to the laydown area will be required to minimise the time the barge is waiting to offload supplies. Once the MOF has been built, the accommodation village will be delivered and constructed, followed by the Jetty and MIA construction simultaneously.

Construction will be undertaken in a manner that minimises environmental harm by ensuring all activities are kept within the designated cleared development footprint and adhering to requirements outlined in the management plans prepared for the site.

The Project will ensure local procurement of required mine related equipment, materials, and plant where possible. If local procurement is not possible, the Project will procure equipment regionally and then within the State. Specific quantities and sources of equipment/materials will be further defined during the detailed design stage.

Construction equipment, materials and plant will be transported to the Project site via a weekly barge from Cairns. These items would be transported to the port of embarkation by B-double trucks. The route used to transport construction equipment, materials and other mine inputs will be determined during the EIS process but will not impact agricultural freight. The transport and craneage equipment required for construction may include:

- 110 t crane.
- 60 t Franna.
- 30 t rough terrain crane.
- 30 t excavator.
- 10 t backhoe.
- Two (30 t and 50 t) dozers.
- 15-55 t wheel loaders.
- Compact track loader.

- Water trucks.

A detailed equipment list has been prepared as part of the DFS for the Project, including requirements for shipping (barge operations, mooring and anchorage details, safety, and emergency related marine infrastructure, etc.). Preferred contractors and craneage will be identified during the detailed design stage.

Operations are expected to commence in Q2 2027 (subject to timing of all approvals) with a 15 year LOM (refer **Section 3.7**). The mining method would involve sequential excavation using a front-end loader feeding a mobile tracked hopper-feeder which connects to the processing plant via a pipeline system. Water is added to the hopper-feeder to slurry the material and transport it from the mining face to the processing plant, via the pipeline. Development of the active mine area would be staged with progressive rehabilitation occurring behind the advancing mine face. Clearing and grubbing activities will occur during daylight hours. Sand extraction and processing will operate as a continuous process for 24 hours per day and 360 days per year.

Processing of silica sand will occur within the MIA which will consist of separation processes, and recovery/reuse of water used in the processing plant where possible. Non product materials generated through processing, would be directed to storage for use in rehabilitation activities. Where possible, it is anticipated that organic material will be reused on-site as part of the Project's environmental mitigation measures. This will be further defined during the EIS process.

Silica sand will be directly loaded from the product stockpile onto a covered conveyor and transported to the jetty where it is loaded onto transhipment vessels via a stacker. From there, silica sand will be transported offshore and transhipped onto bulk carrier ships within the Cape Flattery Port area and exported. Barge deliveries and exports from Cairns for equipment/consumables will continue during operation on a weekly basis.

3.8.1. Rehabilitation

The mine site itself (within the MLA areas) will be staged with progressive rehabilitation and back-filling occurring behind the advancing mine face. A Progressive Rehabilitation and Closure Plan (PRC Plan) has been developed for all areas within the MLA, during the EIS process this will be updated and finalised, decommissioning and rehabilitation of the Jetty and MOF will be included during this stage.. The entire Project area will be returned to a single Post Mine Land Use (PMLU) of native ecosystem to resemble the vegetation that currently occurs onsite prior to mining. There are no non-use management areas (NUMAs) nominated in the PRC Plan. A soil/land resource survey and assessment will be undertaken during rehabilitation to ensure the condition (both chemical and morphological properties) of the soil being returned (as backfill) to the disturbed areas matches as closely as possible to the pre-clearing, pre-mining soil condition. This is important to ensure the revegetated areas return to (as closely as possible) the natural ecosystem that existed pre-clearing.

LiDAR has been taken to 10cm resolution. Organic-rich soil will be used for rehabilitation after it has been excavated prior to mining and then returned back on top of the dune to aid in re-establishing vegetation. A detailed/intensive landform or topographic survey, 1m or better (undertaken using, for example, LiDAR), will be undertaken as required, to provide the necessary topographic information to

enable the rehabilitated post-mining landform to "mimic the pre-mining formation" and "blend in with the natural lower slopes to the south of the operation".

The quantity of backfill returned to the pit is approximately 25% of all material removed, and therefore the final landform will be lower than the pre-existing landscape. Due to the undulating nature of the resource base, the final landform will be reprofiled to mimic the pre-mining elongated dune formation and will blend in with the natural lower slopes to the south of the operation. Revegetation will occur naturally from the seed bank in the topsoil, additional seeding and planting of seedlings with preferred species. All of this will be undertaken to suit the final landform and ecosystem in terrestrial and marine areas. Seed mixes and seedling propagation will be developed through consultation with the Traditional Landowners and through site specific trials. Prior to vegetation clearing, appropriate native vegetation seed collection will be undertaken, with collected seeds to be used for seedling propagation and planting in the mine rehabilitation process.

The PRC Plan has been presented to the two TO clans and has been well received.

The Jetty, MOF and Workers' Camp will be decommissioned, dismantled and removed once operations have ceased. All building materials will be removed offsite via barge and appropriately disposed of or recycled at a licenced waste facility.

3.9. Workforce Requirements during Construction and Operation

The Project is forecast to require a construction workforce of 40 personnel per swing, and an operational workforce of approximately 80 personnel on a 40 person rotating roster, resulting in an increase in employment opportunities for a range of skilled and unskilled roles, and support the retention of employment and inward migration in Hope Vale, Cooktown and Cairns. CFS has a strong engagement with TOs and will provide opportunities to develop as employees and leaders.

As of 2021, less than half of the participating workforce in both Hope Vale (42.2%) and Cooktown (47%) are employed, with only 8.9% of Hope Vale workers being involved in the mineral mining industry (ABS 2022). CFS acknowledges the low level of experienced mineworkers in the region and will work towards skills development and training which is required to achieve high retention and a motivated workforce. From traineeships for employees at the start of their careers or Supervisor Development programs for those seeking advancement, CFS intends to maximise the opportunities for the local community.

CFS has set an objective of achieving 40% of the workforce coming from the Traditional Landowners and Indigenous Australian communities. CFS will maximise the education, training, and employment of Aboriginal People in connection with the Project, with the following order of preference:

- First preference to Dingaal people and Nguurruumungu people (equally).
- Second preference given to partners of Nguurruumungu people and Dingaal people.
- Third preference to Aboriginal people or Torres Strait Island people who hold native title over adjacent land or who live in Hope Vale/Cooktown.

Reaching the Indigenous workers will be undertaken through its Community Liaison Officers to ensure the various local groups can see that the company is actively recruiting in their community. CFS will

work closely with the Dingaal people, Nguurruumungu people and residents of Hope Vale to maximise employment & training opportunities. Throughout the construction and operation phases, the Project will have capacity to provide significant economic benefits to the region through ongoing indirect and direct outputs, household incomes, direct employment, and business turnover.

There are no existing roads to get on site, and existing tracks in the area are insufficiently established and are not considered reliable and safe for workers to travel to site. These existing routes are not dependable and present an unacceptable level of risk during the establishment of the project and during operations. As such, the construction and operational workforces will be transported to the Project from Cooktown by a weekly CTV on a Boat In Boat Out basis. The construction and operational workforces will largely be recruited from local areas including Hope Vale, Cooktown, and Cairns. The workforces will be on an 8/6 roster, with management and admin (approximately 7 persons) on a 5/2-4/3 roster.

There will be an associated number of personnel from the contractor for marine activities (including transhipping), however workforce numbers will be determined based on the transhipment solution once chosen. The marine crew will be sleeping and eating on the vessel. Marine personnel will be working on an as needs basis, adhering to maritime practices.

Operational requirements for the mine will comprise of movements of goods (fuel, food, operational consumables, periodic replacement parts/components) and personnel movements to and from the site. An accommodation facility (including messing and ancillary facilities) built for 52 people will be allocated for during the swing, and all food is provided whilst personnel are on site. The Procurement/Contracts Officer, Maintenance Superintendent, Logistics Coordinator, Camp Cooks and Store person will all be able to order equipment and supplies in the Pronto Procurement Module.

3.10. Economic Indicators

Indirect employment and economic contribution will be created through goods and services contracts with local and regional businesses, which will also provide direct and indirect social and economic benefits to the communities of North Queensland.

Metallica engaged Hong Kong-based marketing consultant, Prime Gain Limited (PGL), to study the current trends in demand and pricing for HPSS. The study identified a significant increase in demand for seaborn HPSS from Australia, particularly to China and other parts of Asia. Regional seaborne import demand is estimated to reach 14.4 M tonnes by the end of 2026, with China being the largest driver and accounting for 71% of that demand. Silica sand plays a key role in PV glass production, being a major long-term driver of the growth in demand for seaborne silica sand. PGL has advised that silica sand product pricing can reasonably achieve free on board (FOB) pricing of $75.00 to $90.28 per tonne, subject to various market conditions and variables. Based on the stated price, it is expected that the life of mine revenue from the project would be between $3.0 to $3.2 billion. Operating expenses for the life of mine would be between $1.0 to $1.1 billion based on an FOB Opex of $27-28/t.

Direct contributions to local, state, and national economies are expected to be approximately 60-80% of the total expenditure, subject to more detailed studies that will examine this in detail. Based on this, it could be expected that between $600m and $900m of expenditure over the life of mine would

contribute to local, state, and national economies. For example, it is expected that salaries and fixed contractors will constitute more than 10% of the expenditure over the life of mine, which would be predominately employed from local jurisdictions and include a good portion of Indigenous employment. In addition to the direct contributions, there are also indirect benefits to local and regional employment and businesses. There are various synergies with local and regional businesses and/or industries that will support the mine. These opportunities may include areas such as food for the camp, cleaning services, administration, waste removal, rehabilitation, and other mining services.

During commercial negotiations with the TOs, the TOs presented a plan that would require CFS and the TOs to investigate new business opportunities that they may plan to initiate when the project is in operation. The Company has a strong engagement with the TOs and are strongly invested in providing opportunities to develop opportunities for the TOs as employees and leaders. Whether through traineeships for employees at the start of their careers or Supervisor Development programs for those seeking advancement, the company intends to maximise the opportunities for the local people.

The Project can also provide a potential domestic supply of HPSS, should an Australian solar panel industry be developed. However, current overseas markets are still seen as the preferred option in terms of market demand.

3.10.1. Costs and Benefits Summary

The mine life is assumed to be over 15 years, mining a total reserve of 47 Mt, which is expected to produce saleable tonnes of 38-39 Mt after processing. There would be an appropriate ramp-up and ramp-down of production. Initial construction capital is expected to cost in the range of $180-190m (excluding working capital and bonds), wherein the first plant would deliver an initial capacity of just under 2 Mtpa ROM production once operational. Once the initial plant is constructed and production commences, the construction team would continue on-site and transition into building the expansion capital, which would deliver a second processing plant to be installed, capable of producing a total capacity of 4 Mpta ROM production for both plants. It is expected that this expansion capital will be completed in approximately 12-18 months and production at the higher capacity rate would commence sometime in about 3 years after first production. It is expected that the expansion capital to deliver 4 Mpta would cost an additional $40-50m and would involve a marginal increase in mining infrastructure and the stockpile area. CFS seeks to achieve 4mtpa as soon as practicable. Construction of the first and second processing plants will occur two years due to construction time. Opportunities to building the plants simultaneously will be explored, should they arise.

Forecasted operating costs are in the order of between $1.0 to $1.1 billion based on an FOB Opex of $27-28/t, making the Project a significant economic contributor to the local and regional economies of North Queensland.

A commercially responsible economic share of the Project income is also being negotiated with the TOs. This will deliver significant funds to the TOs.

The Project will provide hiring opportunities for Hope Vale and Cooktown residents in a range of skilled and unskilled roles. Indirect employment and economic contribution will be created through goods and services contracts with local and regional businesses.

The Project will seek to establish an operational local employment and economic opportunity strategy to provide direct and indirect economic benefits to the communities of North Queensland. An additional contingent of non-local personnel may also be required. If this was to occur, the influx of higher numbers of non-locals in the workforce may contribute to additional negative community impacts, particularly in relation to workforce integration and a loss of unique community identity and sense of place. However, an additional contingent of non-local personnel is not planned. Planning for the workforce, including training of indigenous residents of Hope Vale, are planned to begin within two years prior to first production.

This Project has the potential to support the local market for solar panel production and further establish the region as a supplier of high purity silica sand, recognised in Australian policy as a critical and new-economy mineral.

3.10.2. Local, State and National Economies

Local, State and National-level economic impacts from the Project including indicators such as gross regional product, gross state product, value added to the economy and employment indicators are being examined during the DFS. The LOM total of Queensland Government royalties is calculated to be $32.5M, with an average of $0.90/tonne throughout Project operation. Other fee expenditure worth $129.2M includes TO royalties, demurrage, marketing fees and water licence fees.

The Project would maintain and generate opportunities for long and short-term employment during construction, operation, decommissioning and rehabilitation phases. In turn, this could reasonably maintain or lead to long term economic benefits in local and regional contexts. The Project workforce would be sourced locally and regionally, dependent upon workforce availability and skills.

It must be noted that the above costs and assumptions are management's best estimate based on previous DFS work completed and amended by management for changes described above. The DFS was managed by Turner Townsend Jukes Todd and signed off by independent competent persons; however, estimates provided above have not yet been verified by an independent third party, but it is expected this will take place as the project continues through its development stages.

3.11. Financing requirements and implications

The Proponent has the financial capacity to fund the development of the Project. It is anticipated that the Project will be funded by the Proponent and/or associated entities.

4. Potential Approvals

This section identifies the key legislation applicable for the Project. Legislation has been presented with respect to Commonwealth, State and local jurisdictions. As this IAS is prepared under the SDPWO Act, it has not been specifically raised or summarised in **Table 6**. Each piece of legislation is briefly summarised, followed by its applicability to the Project, refer to **Table 6.**

Table 6: Approvals Summary

Legislation	Approval	Administering Authority	Within the Scope of EIS
Commonwealth			
Environment Protection and Biodiversity Conservation Act 1999	CFS submitted a referral (EPBC 2022/09376) to DCCEEW on 22 November 2022. On 16 January 2023, the Referral Decision was made that the Project was a Controlled Action. On 17 February 2023, the Assessment Method was determined to be by an EIS. Assessment of MNES may be carried out under the Assessment Bilateral Agreement between the State and Commonwealth under section 45 of the EPBC Act, provided that the Minister for the EPBC decides to make an appropriate assessment approach decision.	Department of Climate Change, Energy, Environment and Water	Yes
Commonwealth Native Title Act 1993	CFS maintain engagement with the Nguurruumungu and Dingaal Clans who share Native Title over the Project area. An Indigenous Land Use Agreement (ILUA) will be prepared for the project.	The Attorney-General's Department – Minister for Indigenous Affairs	No
EPBC Act Environmental Offsets Policy 2012	Environmental offsets may be required as a condition of approval for impacts to MNES.	Department of Climate Change, Energy, Environment and Water	Yes
State			
Environmental Protection Act 1994	A site-specific EA and Progressive Rehabilitation and Closure Plan is required as the key environmental approvals for the Project. Notifiable activities under schedule 2 – item 29(b)(iii) – petroleum product or oil storage-storing petroleum products or oil in above ground tanks for combustible liquids in class 1 (Diesel) in the Australian Standard AS1940, more than 25,000L.	Department of Environment and Science	Yes

Legislation	Approval	Administering Authority	Within the Scope of EIS
	Total fuel storage on site will be approximately 800,000 litres. As the project triggers notifiable activity 29, the site will be listed on the EMR. At the completion of the mine works, a site investigation report or validation report will be undertaken to determine if the site can be removed from the EMR or needs to be moved to the contaminated land register (CLR) as per Item 381 of the Environmental Protection Act 1994. Notifiable activities under schedule 3 – **Schedule 3 - ERA 9** - a mining activity involving drilling, costeaning, pitting, or carrying out geological surveys causing significant disturbance **schedule 3 - ERA 12** – Mining mineral sand. In accordance with Section 126C of the Environmental Protection Act 1994, a PRC Plan will describe and plan for how and where activities will be carried out on land in a way that maximises the progressive rehabilitation of the land to a safe, stable and non-polluting condition. The PRC Plan will include a proposed schedule outlining management milestones, criteria, and completion dates for rehabilitation to native ecosystem. The PRC Plan has been prepared alongside the EA application.		
Environmental Protection Regulation 2019	Resource and Prescribed Environmentally Relevant Activities (ERAs) for which an EA is likely required: **Schedule 3 - ERA 9** - a mining activity involving drilling, costeaning, pitting, or carrying out geological surveys causing significant disturbance **schedule 3 - ERA 12** – Mining mineral sand **Schedule 2 – ERA 64** – Water treatment for surface water runoff **Schedule 2 - ERA 31** – Mineral processing. The relevant activity will include mineral processing	Department of Environment and Science	Yes

Legislation	Approval	Administering Authority	Within the Scope of EIS
	in a year, > 100,000 tonnes per year (t/yr) of mineral products, other than coke (Schedule 2, Part 7, Item 31 (2(b)) **Schedule 2 - ERA 50** – The relevant activity includes loading or unloading 100t/day or stockpiling materials under an EA for a resource activity (Schedule 2, Part 11, Item 50 (1(a)) **Schedule 2 - ERA 63** – Sewage treatment for more than 100 but not more than 1,500EP with treated effluent discharges to an infiltration trench or irrigated (Schedule 2, Part 13, Item 63 (1(b)(i)) **Schedule 2 – ERA 8** – Chemical storage for more than 50t of chemicals of dangerous goods class 1 (Diesel) as the project will be storing approximately 510t at a time (Schedule 2, Part 2, item 8 (1(a)). Environmental objectives are also considered within Project design to minimise impact and performance outcomes adopted where required to manage and mitigate potential impacts. The wetland protection area (HES) on the mining lease, will be assessed as an MSES as part of the Environmental Authority. Mitigation measures are required under section 41AA to avoid the release of fine sediment or dissolved inorganic nitrogen to the GBR catchment waters. Releases from the proposed sediment basin and/or mining operations to the coastline are not anticipated and would have negligible impact on the Great Barrier Reef World Heritage Area given the distance and lack of nitrogen. Mitigation measures will be in place to reduce the risk of accidental releases and offsets will not be required.		
Queensland Heritage Act 1992	Works with potential to have more than a minor detrimental impact on heritage values under the QH Act require a development approval under the *Planning Act 2016.*	Department of Environment and Science	Yes

Legislation	Approval	Administering Authority	Within the Scope of EIS
	The Cape Bedford and Cape Flattery Dunes are listed under the non-statutory register of National Estate. The GBR is listed as a world heritage and national heritage site, and releases from the mine or sediment basin are not anticipated to impact the GBR and will be assessed further during the EIS process if required.	Queensland Heritage Committee	
Aboriginal Cultural Heritage Act 2003	CFS have undertaken a comprehensive process of engaging with relevant stakeholders. A Cultural Heritage Management Plan or Indigenous Land Use Agreement (ILUA) will be prepared in accordance with part 7 of the ACH Act.	Department of Senior, Disability Services and Aboriginal and Torres Strait Islander Partnerships (DSDSATSIP)	Yes
Mineral Resources Act 1989	ML for the mine are required for operation. ML have been obtained for all works above high water mark.	Department of Resources	Yes
Mining and Energy Resources (Financial Provisioning) Act 2018	EA holders for resource activities are required to use the approved methodology in the guideline 'Estimated rehabilitation cost under the *Environmental Protection Act 1994'* (ESR/2018/4425[1]) to calculate the amount the holder considers to be an estimate of the total rehabilitation cost. The administering authority will then assess the application and decide the estimated rehabilitation cost (the ERC decision). The ERC decision made by the administering authority will then be provided to the scheme manager, under the *Mineral and Energy Resources (Financial Provisioning) Act 2018*, who will determine the amount and form of scheme assurance the EA holder must pay.	Queensland Treasury	Yes

[1] This is the publication number. The publication number can be used as a search term to find the latest version of a publication at **www.qld.gov.au**.

Legislation	Approval	Administering Authority	Within the Scope of EIS
	An ERC decision must be in effect and the scheme assurance must be paid to the scheme manager before any relevant activity under the EA can commence.		
Nature Conservation Act 1992 and Nature Conservation Regulation 2020	Seasonal terrestrial ecological surveys were conducted in February (wet season), as well as June and August (dry season) 2021. An aquatic ecological survey was also conducted in November 2021. The surveys did not identify any flora or fauna that required additional permits, with the exception of a protected plant pre-clearance survey for areas proposed to be cleared within a 'high risk area' (i.e. where protected plants have been recorded plus a 100 m buffer). Permits for the movement of protected animals, the clearing of protected plants and a Species Management Program may be required.	Department of Environment and Science – Queensland Parks and Wildlife Services	Yes
Environmental Offsets Act 2014	Offsets will be required for the Project and will be determined during the EIS process.	Department of Environment and Science	Yes
The Water Plan (Cape York) 2019	Water demand for the Project will be fully met within an approximate 1,300 ML per annum water licence from the strategic reserve under the *Water Plan (Cape York) 2019*, with recycling of onsite stormwater and process water being investigated for non-potable purposes.	Department of Regional Development, Manufacturing, and Water	No
The Water Act 2000	A sediment basin will be constructed to capture surface water runoff from the stockpile area. In accordance with section 97 of the Water Act, a person may take overland flow water that is not more than the volume necessary to satisfy the requirements of an environmental authority. However, section 97 will only apply if the take of overland flow	Department of Regional Development, Manufacturing, and Water	No

Legislation	Approval	Administering Authority	Within the Scope of EIS
	water is assessed and conditioned as part of the grant of an environmental authority.		
Mining and Quarrying Safety and Health Act 1999 (MQSH Act)	The MQSH Act applies to all mines, other than coal mines. It imposes safety and health obligations on persons who operate mines or who may affect the safety or health of others at mines. The Project will incorporate a hierarchy of controls from elimination, substitution, isolation, engineering, administration and personal protective equipment.	Department of Resources	Yes
Waste Reduction and Recycling Act 2011	CFS will investigate opportunities for reducing waste and recycling during the EIS phase, including investigating methods to avoid, reuse, recycle and safely dispose of any waste (including regulated waste) when required.	Department of Environment and Science	No
Regional Planning Interests Act 2014 (RPI Act)	The location of the Project is not subject to areas protected under the RPI Act.	State Development, Infrastructure, Local Government and Planning	No
Planning Act 2016 and *Regulation 2017*	Under the *Planning Act 2016*, a Development Approval application (DA) is required for assessment of the Project's off-lease infrastructure (Jetty and MOF, located below high-water mark) within the tidal areas of Cook Shire Council and within the extent of the Port of Cape Flattery area (administered by Ports North). The DA will provide the necessary supporting information to undertake a Material Change of Use (Impact Assessable) for Port Services and Operational Works (Prescribed Tidal Works, interference with or removal of marine plants, development within the limits of a port) in relation to the construction of the Project. The DA application will be lodged through the Coordinated Project process for assessment and public consultation with the decision-making to be undertaken by the Assessment Manager, the chief executive for the Planning Act.	Department of State Development, Infrastructure, Local Government and Planning	Yes

Legislation	Approval	Administering Authority	Within the Scope of EIS
	Operational works under the DA include: - Under schedule 10, part 17, division 1, item 28 (1)(a), operational work that is **tidal work**. - Under schedule 10, part 6, division 3, subdivision 1, item 11 operational works for **marine plant** removal, destruction or damage is assessable development. - Under schedule 10, part 13, division 3, operational work for land **within limits of a port**. - Under schedule 21, part 1, item 6 **vegetation clearing** for the project is considered exempt clearing works as the clearing is for a resource activity defined under section 107 (c) of the Environmental Protection Act 1994 (a mining activity).		
Vegetation Management Act 1999	The *Vegetation Management Act 1999* (VM Act) regulates the clearing of native vegetation. Assessment of clearing MSES/protected vegetation listed under the VM Act as part of a mining activity will be undertaken as part of the Environmental Authority Application and mining lease.	Department of Resources	Yes
Land Act 1994	The onshore Project area is located on the Hopevale DOGIT, which is Aboriginal Land Act freehold land, and also where exclusive native title has been determined to exist. The marine infrastructure component is located on Unallocated State Land being the Below HWM Area. The marine component of the Project will impact land administered under the Land Act 1994. An application for a term lease will be required to be lodged with DoR with the lessee being Ports North. Ports North will then grant a sub-lease to CFS for the construction and operation of the marine infrastructure. Native title will also be required to be addressed as part of this application under the Land Act 1994, although there is currently no native title	Department of Resources	Yes

Legislation	Approval	Administering Authority	Within the Scope of EIS
	determination or native title claimant application (registered or unregistered) in relation to the Below HWM Area.		
Biosecurity Act 2014	CFS will uphold the general biosecurity obligation to manage biosecurity risks and threats under their control.	Department of Agriculture and Fisheries	No
Transport Infrastructure Act 1994 (TI Act)	Approval under the TI Act will be arranged prior to any works on a State-controlled road. It is not anticipated that works will be required on any State-controlled roads.	Department of Transport and Main Roads	No
Maritime Safety Queensland Act 2002	Applicable for the marine components of the Project. Management plans will be developed for marine safety.	Department of Transport and Main Roads	Yes
Electricity Act 1994	Not applicable	NA	No
Strong and Sustainable Resource Communities Act 2017	Under section 9 a Social Impact Assessment must be prepared as part of the EIS process.	The Office of the Coordinator-General	Yes
Sustainable Ports Development Act 2015	The CFS Project is within the port limits of the Port of Cape Flattery and is therefore not subject to the *Sustainable Ports Development Act 2015*. This has been confirmed in writing by the QLD Department of Resource.	Department of Transport and Main Roads	No
Fisheries Act 1994	All mangrove and seagrass species identified within the Project area are listed as protected under the Fisheries Act 1994. Development Approval is required for assessable operational work for marine plant removal, destruction or damage. Assessment against State Code 8 – Coastal Development and Tidal Works and State Code 11 – Removal, Destruction or Damage of Marine Plants has been completed as part of the Development approval.	Department of Agriculture and Fisheries	Yes
Coastal Protection and Management Act 1995	In accordance with Schedule 10, Part 17, Division 3, Table 1, item 1 of the Planning Act, Development Approval is required for assessable operational work that meets the definition of tidal work as defined in the *Coastal Protection and Management Act 1995*. The jetty and MOF infrastructure components are	Department of Environment and Science	Yes

Legislation	Approval	Administering Authority	Within the Scope of EIS
	assessed against the current State Code 8 – Coastal Development and Tidal Works.		
Local			
Hope Vale Shire Council Planning Scheme 2014 (Planning Scheme)	The Project has considered and avoided, where possible, impacts to matters of local environmental significance, zoning, and cultural heritage described in the Planning Scheme.	Hopevale Shire Council	No

4.1. Owners consent

CFS is the holder of EPM 25734 but will require the grant of ML 100284 and other interests and approvals to develop and operate the Project, including building and operating the mine and connected infrastructure to produce and sell products.

CFS is currently negotiating agreements to secure the necessary landowner and native title consents and support for the Project, including agreements under the *Native Title Act 1993* with Hopevale Congress Aboriginal Corporation RNTBC in its capacities as trustee landowner of the Hopevale Deed of Grant in Trust (Lot 35 on SP232620; Hopevale DOGIT) and as agent registered native title body corporate (RNTBC) on behalf of the Nguurruumungu Clan and Walmbaar Aboriginal Corporation RNTBC in its capacity as agent RNTBC on behalf of the Dingaal Clan.

The area covered by CFS's application for ML100284 is within a shared area under the Hopevale Determination (1997) with native title held jointly by the Nguurruumungu Clan and the Dingaal Clan.

CFS is also currently developing cultural heritage management plans with Hopevale Congress Aboriginal Corporation RNTBC and Walmbaar Aboriginal Corporation RNTBC for the onshore Project area and the previous Registered Native Title Claimant to the former Dingaal Tribe native title claim for the offshore Project area, who are the relevant Aboriginal parties under the *Aboriginal Cultural Heritage Act 2003* for the Project area.

Following the grant of EPM 25734, CFS signed a Conduct and Compensation Agreement with the trustee landowner, Hopevale Congress Aboriginal Corporation RNTBC. CFS also negotiated and entered into separate Aboriginal Cultural Heritage Agreements with Hopevale Congress Aboriginal Corporation RNTBC and Walmbaar Aboriginal Corporation RNTBC to manage the conduct of exploration activities on the majority of the EPM 25734 area.

Hopevale Congress Aboriginal Corporation RNTBC is the registered owner of the Hopevale DOGIT part of which covers the onshore Project area. As noted above, CFS is negotiating an agreement with Hopevale Congress Aboriginal Corporation RNTBC to secure its consent as the trustee landowner for the grant of ML 100284.

Pursuant to Section 51(2) of the *Planning Act 2016*, owners' consent is required from Ports North and the DoR for construction of the Jetty and MOF. Consent from Ports North is also required in order for shipping operations to occur. Consultation between CFS and DoR in relation to these consents and tenure arrangements has also been ongoing.

An application for mining lease for infrastructure ML 100352 over a small part of the onshore Project area was lodged with DoR on 27 July 2023 to support the jetty loading facility. This mining lease application was notified in September 2023 under section 24MD(6B) of the *Native Title Act 1993* to both Hopevale Congress Aboriginal Corporation RNTBC and Walmbaar Aboriginal Corporation RNTBC.

This mining lease application removes the need for the grant of a trustee lease by Hopevale Congress Aboriginal Corporation RNTBC (as trustee landowner) to Ports North for the Above HWM Area (and the grant of a sub-lease by Ports North to CFS). It also removes the need for CFS to negotiate and obtain a registered ILUA with Hopevale Congress Aboriginal Corporation RNTBC and Walmbaar Aboriginal Corporation RNTBC to secure the necessary native title consents for the grant of the trustee lease.

The application for infrastructure mining lease ML100352 was notified under section 24MD(6B) of the Native Title Act 1993 (Cth) (NTA), giving the two registered native title bodies corporate the right to object to the grant of the mining lease. If no objections are lodged within the 2-month notification period or the grantee party and the objecting registered native title bodies corporate can reach agreement so that any objections can be withdrawn, the State can validly grant the mining lease.

Also, an ILUA was not required for the other mining lease application area. The application for mining lease ML100284 was notified under section 29 of the NTA and if the negotiation parties (ie the grantee party, native title parties and government party) sign a section 31 deed, the State can validly grant the mining lease.

The need for an ILUA only arose in relation to the original proposal from Ports North that, rather than pursuing the grant of an infrastructure mining lease, the landowner (ie Hopevale Congress Aboriginal Corporation RNTBC) would grant a trustee lease to Ports North for the Above HWM Area, which would require a registered ILUA between Cape Flattery Silica and the two registered native title bodies corporate to enable the trustee lease to be validly granted under the NTA.

A separate lease between Ports North and DoR will be applied for and granted for the Below HWM Area and subsequently, the grant of a sub-lease by Ports North to CFS.

5. Location of Key Project Elements

5.1. Location

5.1.1. Regional Context

The Project tenure is a greenfield site located in the Starke Coastal Lowlands subregion of Cape York Peninsula bioregion in Far North Queensland. It is located on the east coast of Cape York Peninsula in north Queensland, approximately 42 km north-east of Hope Vale and 56 km northeast of Cooktown. Approximately half of the bioregion is used for pastoral activities. Other tenures include Aboriginal

land and national parks. Other land uses include silica mining, wherein Cape Flattery Silica Mines operate under ML2806 and ML2965 located adjacent to the Project site (**Figure 7**). The Cape York Peninsula bioregion has hot and humid wet seasons with higher rainfall reliability than most rangeland bioregions.

5.1.2. Local Context

The Project tenure located approximately 42 km northeast of Hope Vale and 200 km north of Cairns, North Queensland (**Figure 1**). The MLA area is approximately 617 ha in size within the Cape Bedford/Cape Flattery dune field complex, characterised by large northwest trending transgressive elongated and parabolic siliceous sand dunes (refer to **Figure 8**). The dune development holds international significance, containing excellent gegenwalle (Counter-wall) dune formations, holding one of the most extensive development of large elongate parabolic dunes in the world (DCCEEW 2005).

The Project area comprises a large Quaternary Age silica sand mass with various episodes of dune formation in the Pleistocene (2.5 Million to 10,000 years ago) and Holocene (10,000 years ago to present).

Natural features and coastal landforms adjacent to and within the project area that are of particular interest and concern to the project include the wetlands to the south and mangroves, fringing reef and seagrass at the marine infrastructure area (**Figure 8**). The mine infrastructure has been designed to avoid these natural features as much as possible.

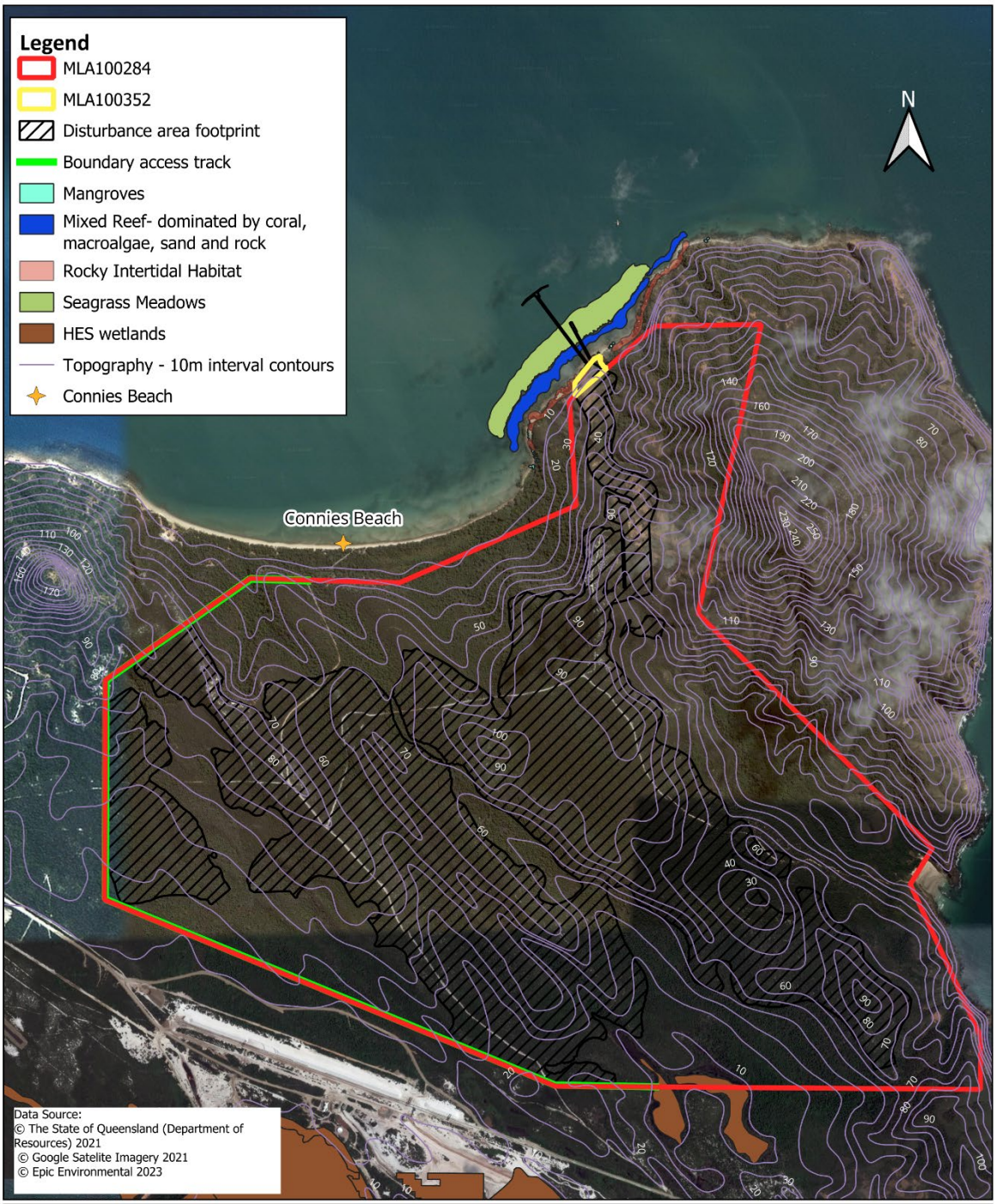

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Figure 8 – Topography and existing features

6. Environmental Considerations

6.1. Land Use and Built Environment

6.1.1. Existing Environment

Cape Flattery and its surrounds are in mostly undeveloped landscapes zoned as rural under the Hopevale Shire Council Planning Scheme 2014. The Project area is a greenfield site comprised of native ecosystem and wetland areas, with unsealed public access tracks traversing the site northwards to Connies Beach.

Topography across the Project area ranges from sea level in the east to approximately 100 m Australian Height Datum (AHD) in the north on a rocky hill (**Figure 8**). The Project area is bounded to the west, north-east and east by rocky hills. Otherwise, it is comprised of dune fields of varying height, rising to maximum height of 90 m AHD. The dune fields are mainly dominated by lacustrine littoral and palustrine wetlands. The larger Cape Flattery Dune Lakes within the dune field complex have limnetic elements hosting high invertebrate diversity and a number of endemic species (DCCEEW 2005). Very high conservation significance of the Cape Flattery Dune Lakes is due to the presence of distinct species assemblages and species with disjunct population. *Cherax cartalacoolah* (freshwater grayfish or yabby) is endemic to Cape Flattery region, found only in Dune Lakes and coastal creek habitats located south of the study area. (DRDMW 2023).

The Project does not overlap with any other mineral tenements, with the exception of the Proponent's EPM25734. The Project is adjacent a pre-existing silica sand mine owned and operated by CFSM. This mine has been operating at Cape Flattery for 56 years, owned by CFSM for over 45 years and the area is recognised by the local community and local government as a mining precinct. The local community supports the proposed Project and recognises it as an acceptable industry in the mining precinct. The Project will introduce a consistent use with the neighbouring area and will not be changing existing surrounding land uses.

Cape Flattery is bounded by the Pacific Ocean to the north and east. Land to the south and west comprises ML2965 and ML2806, both owned and operated by CFSM. CFSM operate a port with a single berth serviced by a travelling ship loader for the export of silica sand. This port was established solely for the export of silica sand by CFSM (**Figure 7**). The port is excised from the GBRMP with the jetty infrastructure jointly owned by CFSM and Ports North. CFSM own all above deck infrastructure including the conveyor and ship loader and Ports North own the below deck jetty infrastructure (noting these were funded and are maintained by CFSM).

The land-based Project infrastructure is within the HVASC LGA, and the marine- based infrastructure and activities fall within the tidal areas of Cook Shire Council and the Cape Flattery Port limits, shown in **Figure 4** and **Figure 5**. The Cape Flattery Port limits also encompass the port associated with the CFSM operation.

The land use within the Project area includes managed resource protection, other minimal use, and marsh/wetland (ALUMC 2016). Managed resource protection refers to land use designated for biodiversity, surface water supply, groundwater, landscape, and Traditional Indigenous uses (ALUMC

2016). Surrounding land uses within Lot 35 SP 232620 are largely cropping and grazing land (other minimal use), as well as:

- Managed resource protection.
- Mining.
- Marsh/wetland.
- Lake.
- River.
- Utilities.

There are no conservation reserves, stock routes, easements, or public road reserves within the Project area. No additional land tenures than those described above would be affected by the Project.

6.1.1.1. Shipping and Bathymetric Considerations

The proposed jetty is in a sheltered location, locally protected from prevailing wave conditions by a headland as well as from deep water conditions beyond the Great Barrier Reef. The elevation profile of the proposed jetty alignment, with formalised slope shoreline works, starts at an elevation of approximately 10 m AHD at the start of the jetty, drops steadily to 0 m AHD approximately 50 m from shore, and drops more gradually to approximately - 3 m AHD at 250 m from the coast. The jetty location has a relatively flat nearshore slope due to the site being primarily tide-dominated.

Due to this, the jetty for transhipment will be designed to be 400 m in length to reach deeper water, as the depth at berth will need to be between 3.75 and 4.5 m LAT. Under keel clearance is 10 % of draught, with proposed out loading rate of 1,000 to 1,500 tph.

The MOF will be comprised of pile supported prefabricated concrete sections joined together to achieve at least 200 m in length to achieve a depth at berth of approximately 3.0 m LAT. The maximum OGV size expected at the Cape Flattery Silica Project will be Panamax sized vessels, with the expected mainstay being Supramax or Ultramax vessels.

6.1.1.2. Geology

Reference to the Queensland Government's 'Detailed Survey Geology' layer presented on Queensland Globe indicates the Project area and surrounding areas are underlain by four dominant lithologies:

- The majority of the Project area is Pleistocene quartz sand forming high parabolic sand dunes.
- The eastern portion of the Project area includes Early Devonian to Late Devonian Hodgkinson formation, composed of mainly pale to dark or greenish grey, fine to medium-grained, medium to thick-bedded, quartz-intermediate greywacke, rhythmically interbedded with siltstone and mudstone; minor conglomerate, conglomeratic greywacke.
- The northern portion and a very small area in the south of the Project area include Middle Jurassic Dalrymple Sandstone, composed of cross-bedded quartz and sublabile sandstone locally labile, conglomerate, minor shale; rare skolithos beds.

The central and western portions of the Project area include Holocene Qhd-QLD, composed of quartzose and locally shelly sand; aeolian sand dunes (refer to **Figure 9**).

6.1.1.3. Soils

There are three soil units mapped within the Project area classified under the Soils of Cape York Peninsula (Biggs and Philip 1995), refer to **Table 7**. The Project area contains rudosol and tenosol soils, as shown in **Figure 9**. The soils across the Project area are described as poorly graded fine sands, poorly graded silt sands and silty sand. A review of the Australian Soil Resource Information System (ASRIS) register of acid sulphate soils of Australia indicates the Project area is located in an area of extremely low probability, very low confidence for presence of acid sulphate soils (ASRIS 2014).

Table 7: Soil Mapping Units

Code	Soil Name	Soil Type	General Description
Ss	Somerset	Orthic Tenosol	Deep sandy soils, very deep uniform coastal sands deposited on laterite and other surfaces
Hg	Hodge	Bleached-Leptic Tenosol/ Brown Kandosol	Shallow stony soils, very shallow to shallow bleached uniform or gradational brown soils formed on greywacke and slate
Dn	Daunt	Aeric Podosol	Shallow stony soils, giant uniform bleached sand over orstein pan, in coastal sand dunes

6.1.1.4. Acid Sulphate Soils

A review of the ASRIS register of acid sulphate soils of Australia indicates that the Project area is located in an area of extremely low probability, very low confidence for presence of acid sulphate soils (ASRIS 2014).

6.1.1.5. Contaminated Land and Environmental Management Registers

A search of the Department of Environment and Science (DES) Environmental Management Register (EMR) and Contaminated Land Register (CLR) (search criteria Lot 35 on SP232620) found the Project area is included on the EMR as has been subject to the following notifiable activity or hazardous contaminants:

- Landfill – disposing of waste (excluding inert construction and demolition waste).
- Petroleum product or oil storage – storing petroleum products or oil (in underground or above ground tanks).
- Abrasive blasting – carrying out abrasive blast cleaning (other than cleaning carried out in fully enclosed booths) or disposing of abrasive blasting material.

- Metal treatment or coating.

Lot 35 on SP232620 is a very large land parcel (109,845.44 ha in size) and the notifiable activities/hazardous contaminants are understood to be located outside of the Project area, associated with an adjacent activity (mining by Mitsubishi), confirmation of this and further information will be obtained during the EIS process. Section 125(1)(L)(iii) of the *Environmental Protection Act 1994* (EP Act) outlines the requirement for a Site Management Plan to be prepared as part of the PRC Plan to manage contamination of a site. As it is understood that the notifiable activities / hazardous contaminants under the EMR are located outside of the Project area, a Site Management Plan is likely not required.

Lot 35 on SP232620 is not listed on the CLR.

6.1.1.6. Agricultural Land Class

The agricultural land classes for the Project tenure have been provided in **Table 8** below.

Table 8: Queensland Agricultural Land Classes (the Project tenure)

EPM	Agricultural Land Class	Description	Area (ha)
25734	C	Land that is suitable only for improved or native pastures due to limitations that preclude continuous cultivation for crop production. Some areas may tolerate a short period of ground disturbance for pasture establishment	161.13
	D	Land is not suitable for agricultural use (including grazing); generally due to the presence of extreme limitations such as very steep slopes, rock outcrop, salinity, acidic drainage, or severe degradation.	452.53

Good Quality Agricultural Land (GQAL) is mapped by the State as Queensland Agricultural Land Classes (ALC) – A and B (State of Queensland 2015). Some ALC A&B land and Important Agricultural Areas (IAA) are located in the southern area of Lot 35 SP232620, however the total Project disturbance footprint (MLA) of the mine is just 315.509 ha and does not occur on ALC A&B land.

6.1.1.7. Visual Amenity

The visual assessment considers the potential visual impacts associated with the proposed mine infrastructure and marine infrastructure. A full and detailed visual amenity assessment will be undertaken during the EIS process. It is anticipated that the following infrastructure will be visible/partly visible from the water and will be designed and constructed in accordance with relevant visual amenity design requirements:

- MOF.
- Jetty.
- JIA.

- Accommodation village.

Natural screening using trees and vegetation will help reduce the visual impact of the on-land infrastructure. The marine infrastructure will be designed to reduce the visual impact as much as possible. The mine layout has been optimised to be hidden behind natural ridgelines as much as possible to reduce visual impacts from land and sea. Visual impacts from land are anticipated to be low due to the remote location and infrequent use of the site.

6.1.2. Potential Impacts to Existing Land Use and Built Environment

The jetty, MOF and indicative anchorage area are all located within the Cape Flattery Port Limit, which is outside the boundary of the GBRMP. During construction and operation, the Project has potential to impact on land resources and land use capacity in the area. This includes impacts such as changes to the existing landforms.

Existing land uses within the proposed mining footprint would be directly impacted. Once operational activities have ceased in parts of the indicative MLA area, land would be progressively rehabilitated and made stable, safe, and non-polluting in accordance with the PRC Plan. Project activities have potential to lead to degradation and erosion of soils, however, this has been considered in the PRC Plan. The total project disturbance footprint over the life of the mine is 315.509 ha, this land will all be progressively rehabilitated under the PRC Plan. The PRC Plan details the following rehabilitation milestones (RM) to ensure the most effective rehabilitation possible:

RM1- Infrastructure decommissioning and removal requirements

RM2 – Remediation of contaminated land

RM3 – Landform development and reshaping/reprofiling

RM4 – surface preparation

RM5 – revegetation (native ecosystem)

RM6 – achievement of surface requirements (native ecosystem) and

RM7 - achievement of PMLU to stable conditions (native ecosystem).

6.1.3. Management and Mitigation Measures

Preliminary mitigation measures in relation to land use and built environment include ongoing soil/geochemical surveying, visual amenity screening/fencing, rehabilitation landform modelling and ongoing consultation with landholders and the community in general to ensure open and transparent communication.

Specific to land management, an Erosion and Sediment Control Plan (ESCP) will be developed and implemented during construction and operation and will be based on the recommended design standards in the Best Practice Erosion and Sediment Control (BPESC) guideline (IECA 2008). Measures within the ESCP will be aimed at managing and avoiding land degradation issues. CFS commits to the development and implementation of relevant management plans to ensure environmental

compliance is met at the site. Further assessment at managing and avoiding land degradation issues will be investigated during the EIS process.

A CEMP, and an OEMP will be developed prior to construction and operational Project activities commencing. These plans will outline the environmental conditions at the site, potential impacts, management and daily running requirements. The CEMP and OEMP will outline relevant impacts, management and monitoring, and will incorporate procedures for emergency response, spills management and responding to complaints.

Additional management plans that will be developed for construction and operation (as sub-plans to the CEMP and OEMP, as required) include:

- Air Quality Management Plan.
- Nosie and Vibration Management Plan.
- Surface Water Management Plan.
- Groundwater Management Plan.
- Flora and Fauna Management Plan (FFMP).
- Weed and Pest Management Plan.
- Threatened Species Management Plans.
- Cultural Heritage Management Plan/ILUA.
- Traffic Management Plan.
- Waste and Contamination Management Plan.
- Fire Management Plan (FMP).

Management Plans associated with the marine operations and transhipment activities will also be prepared in accordance with State Code 7: Maritime Safety, including:

- Marine Execution Plan.
- Aids to Navigation Management Plan.
- Vessel Traffic Management Plan.
- Ship-sourced Pollution Prevention Management Plan.

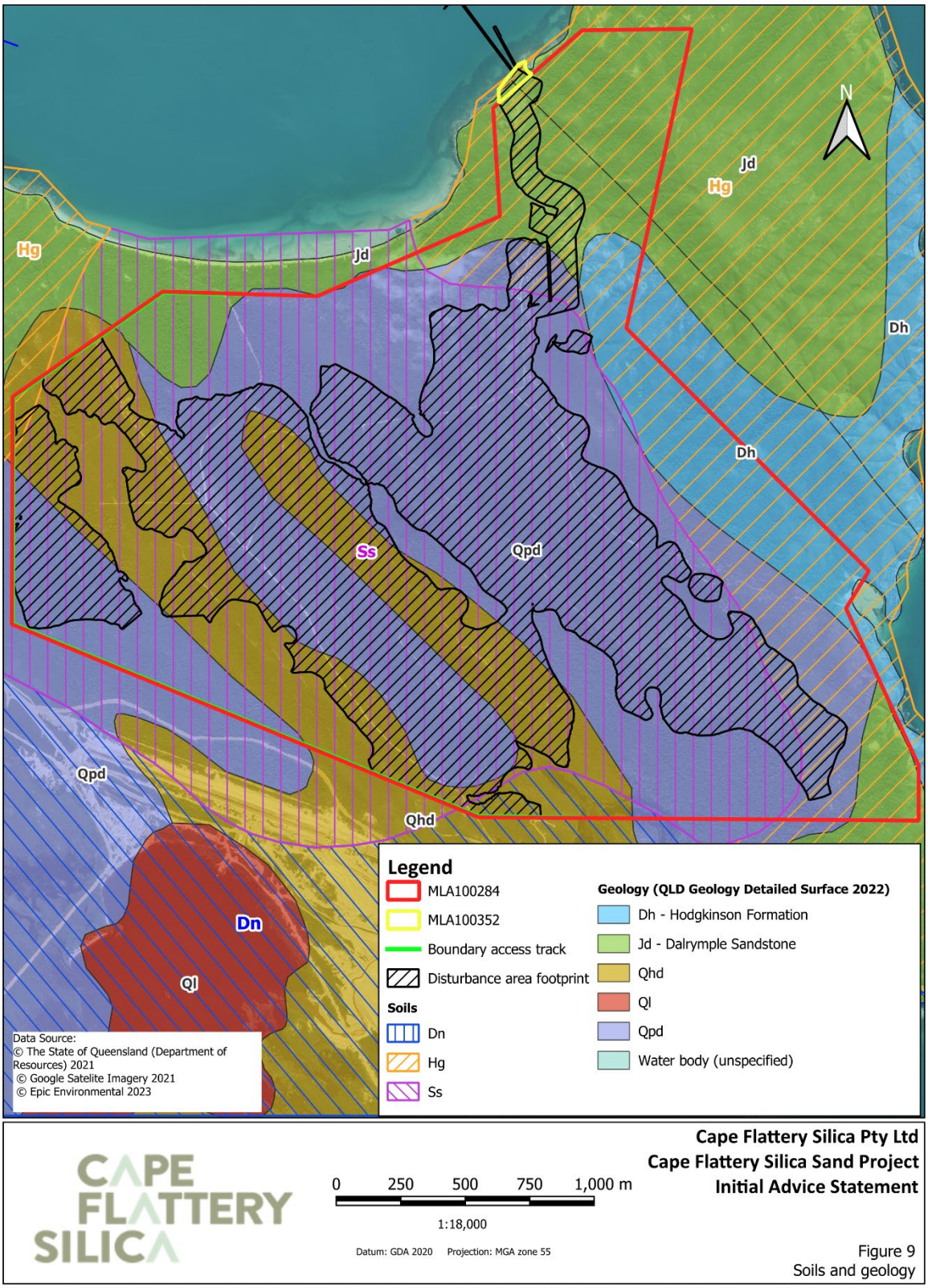

Figure 9 – Soils and geology

6.2. Air

6.2.1. Existing Environment

6.2.1.1. Climate

Average Conditions

The Project area experiences a tropical climate according to the Köppen-Geiger classification system (Australian Bureau of Meteorology (BoM) 2022). This includes two distinctive seasons: a hot humid summer (December to March) and a mild dry winter (April to November) season.

The closest long term synoptic weather station to the Project (operating 2003 to present) is located approximately 900 m southwest, at Cape Flattery Weather Station (Station 031213). Temperature and rainfall data have been obtained from the Cape Flattery Weather Station and wind speed has been obtained from Cooktown Airport (Station 031209) operating from 2000 to present and located approximately 55 km south of the Project. This data has been analysed to determine indicative temporal fluctuations in weather patterns, refer **Table 9.** The data indicates that:

- Mean annual rainfall is 1,477.3 millilitres (mm).
- January to April have the highest mean monthly rainfall. The highest mean monthly rainfall occurs in March with 753.6mm.
- Mean maximum temperatures range from 26.6 in June to 32.6 degrees Celsius (°C), in December.
- Mean minimum temperatures range from 21.3 in July and August to 25.0°C in December.
- Mean monthly wind speeds are greatest in the winter months.

Table 9: Long term climate data from Cape Flattery Weather Station

Month	Temperature (°C)1		Relative humidity (%)[2]		Wind speed (km/h)[2]		Rainfall (mm)[1]		
	Mean Max	Mean Min	9am	3pm	9am	3pm	Mean Monthly	Highest Daily	Highest Monthly
Jan	32.1	24.8	73.6	69.5	17.01	22.23	261.9	140.6	611.0
Feb	32.0	24.7	76.0	71.5	16.04	19.69	257.4	222.6	529.4
Mar	31.1	24.6	77.6	71.9	20.56	23.29	366.0	189.8	753.6
Apr	30.1	24.4	72.8	68.8	26.78	29.10	168.5	123.0	477.8
May	28.6	23.3	72.3	68.9	27.97	30.09	63.3	91.6	206.8
Jun	27.0	21.8	74.7	70.5	27.43	30.64	36.3	57.6	126.0

Jul	26.6	21.3	72.8	69.1	28.11	31.28	34.5	30.4	118.4
Aug	27.4	21.3	68.2	64.6	27.33	31.01	15.4	24.4	64.2
Sep	29.0	22.2	64.0	60.3	26.87	28.87	6.9	23.4	32.8
Oct	30.4	23.1	63.0	60.3	27.38	29.92	15.7	41.2	75.6
Nov	31.8	24.3	65.1	61.9	22.97	25.67	32.0	53.0	123.8
Dec	32.6	25.0	66.9	63.2	19.44	23.18	105.8	155.8	306.8
Mean	**29.9**	**23.4**	**70.58**	**66.71**	**23.99**	**27.08**	**113.64**	**96.12**	**285.52**

Source: BoM (2022)

[1]Temperature and rainfall data collected from 2003 to 2021

[2]Relative humidity and wind speed data are collected from 2007 to 2019

Rainfall

Climate data shows there is a distinct wet season, with the highest rainfall intensities occurring from December through to April, when monsoonal activity is prevalent.

Wind

A wind rose of measured wind data from 2015 to 2019 at Cape Flattery is presented in **Figure 10**. The graph indicates that the region is dominated by southeasterly winds.

Cyclones

Tropical cyclones are low pressure systems that form over warm tropical waters and have well defined wind circulations of at least gale force strength (sustained wind of 63 kilometres per hour (km/h) or greater with gusts in excess of 90 km/h) (BoM 2022). Cyclones pose a threat to communities and industry, via destructive winds, storm surge and through the impact of flooding, as the strongest and heaviest rains are associated with the passage of tropical cyclones.

Cyclones occur in tropical Queensland from November to April, and frequently in Cape York Peninsula. Recent cyclones passing near Cape Flattery include:

- Tropical cyclone Kimi (16 – 19 January 2021)
- Severe tropical cyclone Niran (27 February – 5 March 2021)

Cyclone frequency and intensity can vary markedly from year to year and over decades, influenced by several factors especially variations in the El Niño-Southern Oscillation (ENSO) cycle. Cyclone frequency during La Niña is twice that of El Niño. Long-range forecasts of the Southern Oscillation Index are not currently possible.

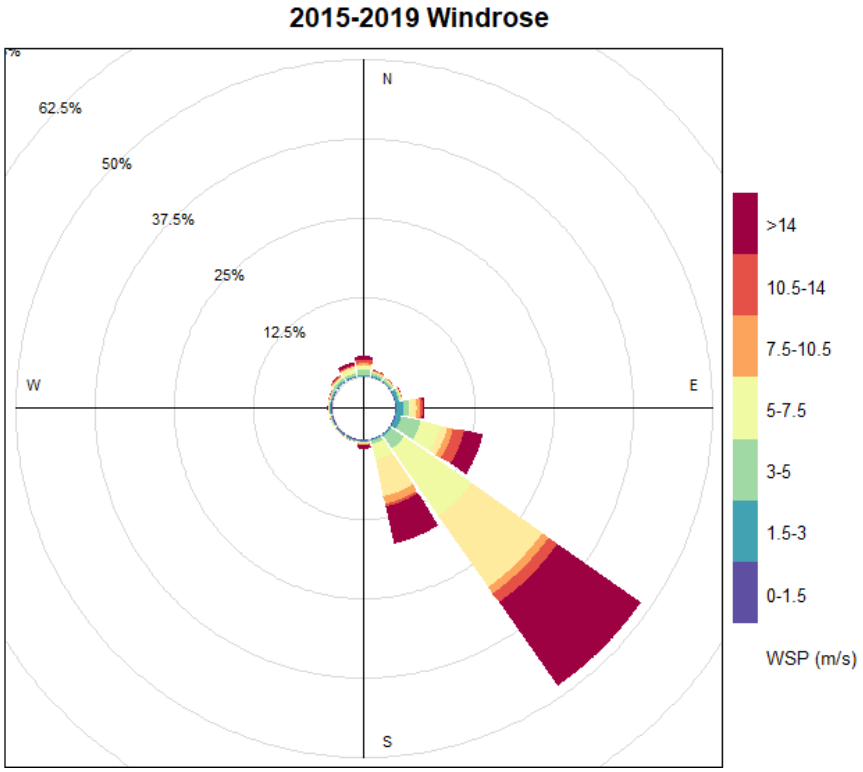

Figure 10 - Wind rose at Cape Flattery (2015 to 2019); Source: (Trinity 2022a)

6.2.1.2. Ambient Air Quality

The DES (2021) guideline suggests that a dust deposition limit of 120 milligrams per metre squared per day (mg/m^2/day) (3.6 g/m^2/month), averaged over one month, is often used in Queensland. For extractive industries such as mining, the insoluble component of the captured dust is analysed.

An air quality technical assessment was undertaken by Trinity Consultants (2022a) which established that, based on the rural nature of the Project location, ambient air quality would generally be an acceptable standard most of the time with possible exceptions including dust and particulates. Localised or short-term degradation of the air quality environment would most likely be due to smoke and dust from fires.

The nearest station monitoring particulate emissions located in an area that could be representative for the Project area is the DES Targinie monitoring station. Monitoring data from the Targinie station have been reviewed to estimate the background concentrations at the Project area. The Targinie station is classified as a background station and it is located away from urban and industrial emission sources. Its location is similar to that of the Project area and haul road, within mainly rural densely vegetated area. Hence, data from this station is likely representative of background concentrations for the Project area. Based on a typical ratio of particulate matter (10 micrometres or less in diameter) (PM10) to total suspended particles (TSP) of 0.39, the annual average TSP background has been estimated as 36 micrograms per metre cubed (µg/m^3).

No medium to high impact emissions sources were identified in the vicinity of the Project area, with the exception of the CFSM immediately to the south of the proposed site. There is no publicly available

data on dust impacts from the CFSM operations. Based on the air quality assessment, ambient air quality at the Project area is summarised with the estimated concentrations detailed in **Table 10**, noting these are well below the Environmental Protection (Air) Policy 2019 limits.

Table 10: Ambient air quality

Pollutant	Averaging Period	Concentration (µg/m3)
TSP	1 year	36
PM10	24 hours	15
	1 year	14
PM2.5	24 hours	6
	1 year	5.5
Dust deposition	30 days	40 mg/m^2/day

Source: Trinity (2022a)

The Project is a silica sand mining operation located in a remote area that is mostly undeveloped, and the following activities currently contribute to particulate emissions in the vicinity of the Project:

- Smoke from bushfires and controlled burns.
- Port of Cape Flattery (stockpiling and loading of CFSM product onto bulk vessels for export).
- Dust emissions from vehicles using unsealed roads.
- Upgrading, use, and maintenance of roads.

6.2.1.3. Sensitive Receptors

Sensitive receptors are defined under the *Planning Regulation 2017* as *"caretakers' accommodation, child care centre, community care centre, community residence, detention facility, dual occupancy, dwelling house, dwelling unit, educational establishment, health care services, hospital, hotel, multiple dwelling, non-resident workforce accommodation, relocatable home park, residential care facility, resort complex, retirement facility, rooming accommodation, rural workers accommodation, short-term accommodation or tourist park."*

The definition of a sensitive place is provided in the *Guideline: Application requirements for activities with impacts to air* (DES 2021) and is required to be considered by operators of ERAs. A sensitive place could include but is not limited to (DES 2021):

- Dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises.
- Motel, hotel or hostel.
- Kindergarten, school, university or other educational institution.

- Medical centre or hospital.
- Protected area under the Nature Conservation Act 1992 (NC Act).
- World Heritage Area.
- Public park or garden.
- Place used as a workplace including an office for business or commercial purposes.
- Nearby sensitive receptors identified for the project are shown in **Table 11** and **Figure 11**, and are summarised as follows:
    - Receptors 1 to 18 represent the existing Mitsubishi Mine Camp to the west of the Project.
    - Receptors 21 and 22 are identified as two abandoned houses and therefore these two receptors are not considered to be sensitive and have not been considered in this assessment.
    - The beach area to the north is used for camping where receptors 27, 28 and 29 are located to represent this area, however, the area is not a formal camping area therefore these sites do not constitute formal sensitive receptors and have not been considered in this assessment.
    - A number of the receptors (19, 20, and 23 to 26) are commercial in use, and therefore are still considered in the assessment but are less sensitive to air quality impacts than the residential receptors.
    - Receptor 30 is the onsite Project accommodation village which will be designed to accommodate air quality levels.

The green shaded rows in **Table 11** indicate receptors that are not considered sensitive, based on reviews undertaken in the air quality impact assessment.

Table 11: Nearby sensitive receptors

Receptor ID	Description	Direction and distance from closest mining panel
1	Mitsubishi Mine Camp	850 m west
2	Mitsubishi Mine Camp	950 m west
3	Mitsubishi Mine Camp	980 m west
4	Mitsubishi Mine Camp	990 m west
5	Mitsubishi Mine Camp	1.01 km west
6	Mitsubishi Mine Camp	970 m west
7	Mitsubishi Mine Camp	940 m west

8	Mitsubishi Mine Camp	915 m west
9	Mitsubishi Mine Camp	950 m west
10	Mitsubishi Mine Camp	880 m west
11	Mitsubishi Mine Camp	1.02 km west
12	Mitsubishi Mine Camp	1.11 km west
13	Mitsubishi Mine Camp	1.16 km west
14	Mitsubishi Mine Camp	1.14 km west
15	Mitsubishi Mine Camp	1.09 km west
16	Mitsubishi Mine Camp	1.20 km west
17	Mitsubishi Mine Camp	1.23 km west
18	Mitsubishi Mine Camp	1.18 km west
19	Commercial (Airport)	1.28 km west
20	Commercial (Industry)	1.05 km west
21	Residential (Abandoned)	350 m north
22	Residential (Abandoned)	260 m north
23	Commercial (Industry)	1.22 km west
24	Commercial (Mitsubishi)	530 m southwest
25	Commercial (Jetty)	1.00 km southeast
26	Commercial (Industry)	1.04 km northwest
27	Camping (Informal)	320 m north
28	Camping (Informal)	410 m north
29	Camping (Informal)	510 m north
30	Accommodation Village	Within MLA

Source: Trinity (2022a & 2022b)

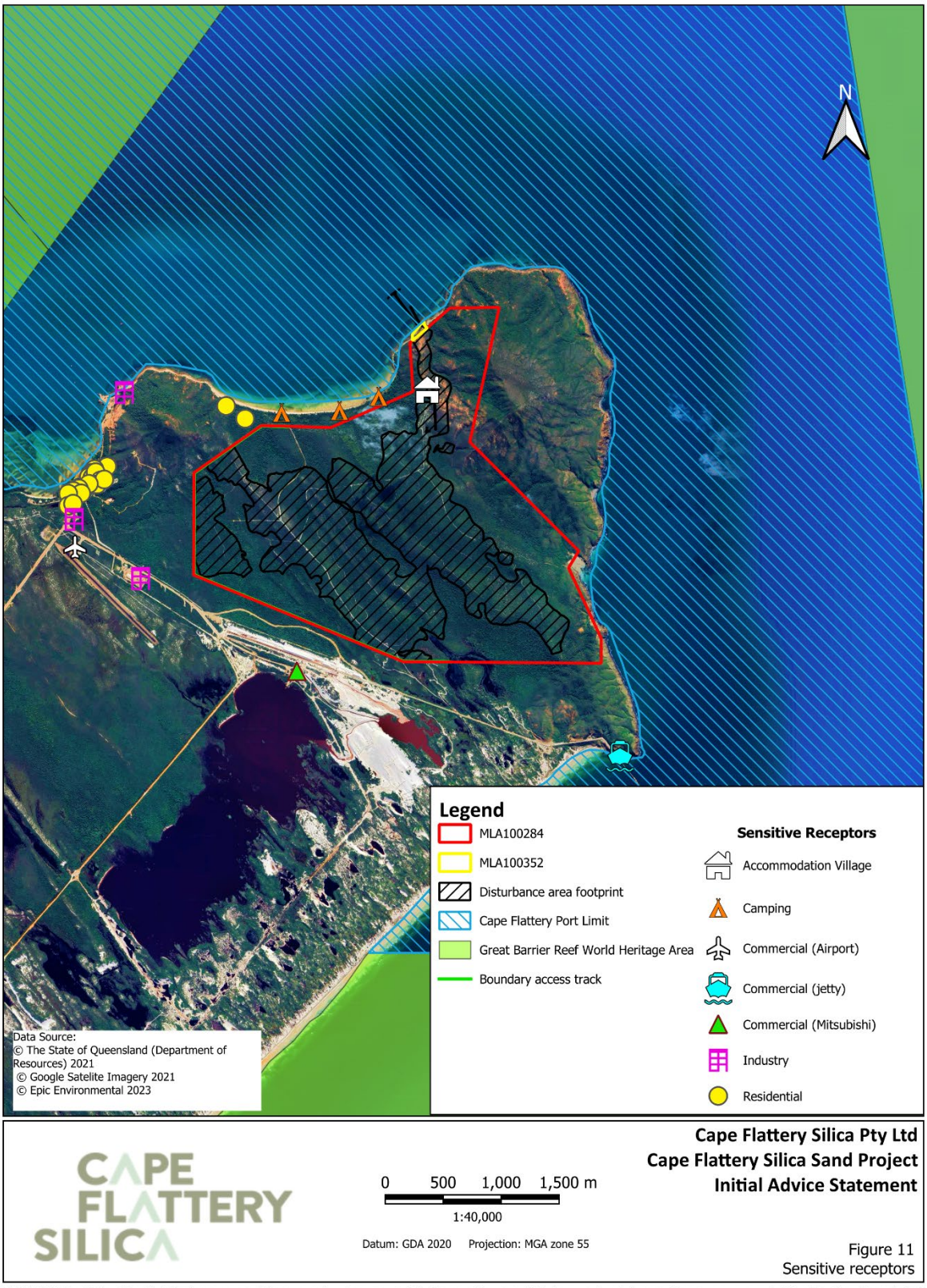

Figure 11 – Sensitive receptors

6.2.2. Potential Impacts to Air

Mitsubishi-owned CFSM is the focus of mineral processing and shipping activities, therefore can be considered as both an existing source of emissions and a potential receptor. Air quality may be impacted on a local scale by the Project, primarily through the generation of dust associated with earthworks and vehicle movements. Potential for health impacts was addressed using criteria for TSP, PM10 and PM2.5. Potential for amenity impacts was addressed using the dust deposition criterion (Trinity 2022a). The primary risk of impacts to air quality relates to particulate emissions from plant and vehicle operations on open surfaces, and from movement of topsoil and the mined product as follows:

- Clearing activities.
- Topsoil / subsoil stripping.
- Movement of topsoil and subsoil.
- Other earthworks.
- Stockpiling.
- Extraction and movement of resources.
- Traffic on unsealed roads.
- Grading of access roads.
- Movement of light vehicles, haul trucks and other machinery.
- Mobile screening of material.
- Wind erosion.

Greenhouse gases will be generated by activities at the Project including:

- Combustion of fuel in heavy and light vehicles.
- Combustion of fuel for electricity production via portable generators.
- Vegetation clearing.

Whilst gaseous emissions will be associated with fuel combustion, given the significant separation distance to the nearest receptors (> 5 km) and the scale of the operation, the impacts of gaseous emissions will be negligible.

Mining and processing will operate as a continuous process for 24 hours per day, 360 days per year. Based on the currently available mining plans, there is potential for particulate emissions to arise as a result of the following direct mining impacts:

- Sequential dry mining of mine panels over 26 years.
- Vehicle related traversing emissions (minimal as haul vehicles are not being used).
- Product extraction, stockpiling, removal and transport.

- Overburden / topsoil removal and stockpiling.
- Onsite processing of extracted material.

The air quality assessment undertaken by Trinity Consultants (2022a) found that there was a low to negligible chance of dust or diesel emissions causing exceedances of air quality criteria at sensitive receptors. Predicted impacts at the on-site accommodation camp are also well within occupational exposure standards. Potential for environmental nuisance, even from low levels of potential odorous emissions (mainly fuel from machinery) including controls to avoid, minimise, mitigate and manage impacts will be further assessed during the EIS process where required.

Impacts on the endangered ecosystems during construction and operation are considered to be consistent with existing impacts of wind-blown sand dust. Importantly, dust deposition levels only exceed nuisance criterion within the mining pit itself, and do not impact on the sensitive receptors or the critically endangered Regional Ecosystem (RE) 3.2.12a.

6.2.3. Management and Mitigation Measures

The impact assessment found there was low to negligible chance of exceedances (dust deposition, annual average TSP, 24-hour average PM_{10}, annual average PM_{10}, 24-hour average $PM_{2.5}$ and annual average $PM_{2.5}$) at sensitive receptors.

Areas of vegetation maintained around the Project area will provide benefits in terms of dust management and will act as a windbreak and may provide a small reduction in dust concentrations by impinging dust particles from a dust laden air stream.

A decarbonisation plan, in line with the draft Industry Decarbonisation Plan Policy, will be required for the project, this will be prepared during the EIS process.

Given the separation distance of the nearest sensitive receptors, scale of operations, estimated emissions, prevailing wind direction and the potential benefit of vegetated buffers, it is considered unlikely that air quality impacts in excess of nominated air quality criteria will arise as a result of the Project.

Regardless, an Air Quality Management Plan (AQMP) will be developed and implemented throughout construction and operations to monitor and manage potential air quality impacts associated with the Project. The AQMP will identify Project activities with potential to have air quality impacts and the controls required to avoid, minimise, and mitigate these impacts.

The following mitigation measures will be implemented to manage dust and diesel emissions at the Project area:

- Water trucks will be used in the extraction area to minimise dust from plant.
- All conveyors will be covered.
- Visual assessment of stockpiles will be undertaken by site staff to monitor wind-blown dust.
- Re-handling of soil to be avoided by direct placing onto rehabilitation areas.
- Where light traffic traverses access roads, watering will occur to minimise dust.

- Any dust complaints will be recorded and investigated promptly and appropriate actions to reduce noise nuisance will be taken.
- Rehabilitation and decommissioning will occur in accordance with the PRC Plan to reduce erosion and dust.
- Mining disturbance will be restricted to what is necessary for current operations at the time.
- Construction plant and equipment will be properly maintained to allow for optimal fuel efficiency and to minimise gaseous and particulate exhaust emissions.
- Equipment, vehicles and plant will be shut down when not required (to avoid emissions during idling).
- Light vehicles will be limited to a 20 km/h speed limit on unsealed roads.
- Locally produced goods and services will be procured where feasible and cost effective to reduce transport fuel emissions.
- Opportunities to use low emission construction materials, such as recycled aggregates and cement replacement materials will be investigated and incorporated where feasible and cost-effective.
- Burning of cleared vegetation will be limited onsite.
- Equipment will be properly maintained to minimise gaseous and particulate exhaust emissions.
- Disturbance will be limited to the active mining area and infrastructure disturbance footprints required for construction and operation.
- Construction site layouts have been designed to reduce travel distances and double handling of materials to reduce fuel usage and emission generation.

6.3. Noise

A noise impact assessment was undertaken by Trinity Consultants (2022b) which included the analysis of noise logger data collected in the Project area next to an abandoned building (-14.95722197, 145.32251207.)

6.3.1. Existing Environment

The Project is on a greenfield site within the Cape Bedford/Cape Flattery Dune field complex, characterised by large northwest trending transgressive elongated and parabolic sand dunes. The Project is not in close proximity to any towns, with Hopevale located approximately 42 km southwest and Cairns approximately 200 km south. The closest active operation to the Project is the CFSM operation, which is adjacent to the Project.

Table 12: Background noise levels

Period	Measured Rating Background Noise Level (RBL) L_{90} dBA	Filtered RBL L_{90} dBA
Day (7am to 6pm)	40	39
Evening (6pm to 10pm)	39	38
Night (10pm to 7am)	41	40

Source: Trinity (2022b)

6.3.2. Potential Impacts to Noise

The majority of noise emissions at the Project will arise from:

- Screening/trommels.
- Conveyors.
- Pumps/compressors/generators.
- Loaders/dozers.
- Cyclones.
- Accommodation village.

Construction activities will have similar or lesser emissions than operations and will occur for only a short period of time. Construction activities will have less impact than operational activities and therefore only operational Project activities were modelled in the acoustic assessment.

Decommissioning and closure of the Project will have lesser emissions, and similar emissions at worst, than construction and operations. Impacts from these activities will be minimal at sensitive receptors. Therefore, no detailed noise assessment of decommissioning activities has been undertaken.

There are no significant vibration sources associated with the Project. Production blasting will not be necessary and therefore vibration issues are not addressed further, and no airblast noise and vibration limits have been proposed.

Overall, noise from construction and operation (and decommissioning) causing environmental nuisance (impact to the amenity) to the local community was assessed to have a low inherent risk (Trinity 2022b).

6.3.2.1. Residential Receptors

Highest predicted noise levels at residential receptors are 37 A-weighted decibels (dBA) L_{eq} during day and 33 dBA L_{eq} during night (excluding the Receptor 21 and 22). These levels are compliant with the proposed noise criteria of 45 dBA $L_{Aeq,adj,1hr}$ for day, 42 dBA $L_{Aeq,adj,1hr}$ for evening and 37 dBA $L_{Aeq,adj,1hr}$ for night.

6.3.2.2. Abandoned Residential Receptors

Predicted noise levels at the receptors 21 and 22 vary from 25 to 47 dBA L_{eq} during day and 31 to 45 dBA L_{eq} during night. The noise levels exceed the noise criteria for occupied residential receptors for some scenarios. However, the receptors 21 and 22 are both abandoned and not in habitable condition. Therefore, no noise mitigation requirements are proposed for achieving noise criteria at receptors 21 and 22.

6.3.2.3. Commercial Receptors

Predicted noise levels at commercial receptors are 34 to 53 dBA L_{eq} during daytime and 35 to 48 dBA L_{eq} during night, as would be expected in reasonably close proximity to mine operations.

Noise levels inside the commercial premises would be 15 to 30 dBA lower than the predicted levels, which would be within standard design noise levels from AS NZS 2107: 2016 40 to 45 dBA for office areas and generally <60 dBA for industrial buildings.

6.3.2.4. Informal Camping Area

Predicted noise levels at the camping site area is 33 to 54 dBA during daytime and 37 to 47 dBA during night. Given the proximity the mining noise will occasionally be clearly audible, though this is wind dependent. The subject area is not a formal camping area and therefore compliance against noise criteria is not required.

6.3.2.5. Onsite Accommodation

Compliance with noise limits is not required for the onsite accommodation as it is owned by mine itself. However, it is proposed to review the predicted noise levels.

Predicted noise level at the midpoint of proposed accommodation village is 60 to 73 dBA L_{eq}. Noise levels inside the accommodation rooms may be approximately 20 dBA lower (i.e. 40 to 53 dBA L_{eq}) could be similar to that experienced at a quieter location with a loud room air-conditioner. The noise levels are well below the workplace 85 dBA $LA_{eq,8h}$ noise limit defined by the Queensland Work Health and Safety Regulation 2011 and associated Code of Practice.

6.3.2.6. Predicted Low Frequency Noise Emission Levels

An assessment of low frequency noise emissions at residential receptors was undertaken included in accordance with the guideline Assessment of Low Frequency Noise criteria. Predicted low frequency noise levels were found to be acceptable, and low frequency noise emissions were not assessed at the commercial receptors and camping areas.

6.3.2.7. Pumpstation Assessment – Mine to Stockpile

Mining will be sequential excavation using a front-end loader feeding a mobile tracked hopper-feeder which connects to the processing plant via a pipeline with primary and booster pumps. Water is added to the hopper-feeder to slurry the material from the pit to the plant, and it is likely the system will consist of number of booster pumpstations.

6.3.3. Management and Mitigation Measures

Noise and vibration complaints are not expected as a result of the project. In the unforeseen event of a nonvexatious noise or vibration complaint, monitoring will be undertaken.

If monitoring indicates an exceedance of EA limits, then noise and/or vibration management measures will be implemented in conjunction with long-term monitoring until such time as complaints and/or exceedances have been resolved.

The following management measures will be implemented to manage noise emissions:

- A Noise and Vibration Management Plan (NVMP) will be prepared and included in the CEMP and OEMP for implementation. The NVMP will include processes and responsibilities to assess, monitor, minimise and mitigate noise and vibration impacts during construction and operation.
- Vehicle movements (on and off site) will be managed to avoid or minimise noise impacts. Mitigation measures for vehicle movements outside of standard construction hours are to be included in the NVMP.
- Clearing and grubbing activities will occur during day shift hours.
- The equipment selection and maintenance process will include:
    - Use of broadband reversing alarm system
    - Consideration of noise abatement fittings on plant if noise complaints arise repetitively and other mitigation measures are unsuccessful in a reduction to EA mandated levels
    - Proper maintenance of all noise generating equipment, machinery and exhaust systems operated onsite.
- Construction equipment will be sited with consideration of existing noise barriers and shut down when not in use.
- Any continuous stationary machinery such as generators will be located the furthest from sensitive receptors where practicable.
- Equipment which are not required to be operated will be shut down (instead of unnecessary idling for extended periods).
- Where complaints are received, these will be documented in a complaints register. Measures for reducing noise levels will be identified and actioned as part of the complaint response process.
- Double-handling of soil will be avoided where practicable by directly placing stripped soil onto undisturbed areas or rehabilitation sites.
- The mine layout has been optimised to be hidden behind natural ridgelines as much as possible to shield noise generation.
- Plant and infrastructure layout will be optimised during the detailed design phase to shield noise generation.

- Use of covered conveyor systems will limit vehicle movement required onsite.

An environmental risk assessment was completed for all identified noise impacts and the residual risk after implementing the management measures was low to negligible.

6.4. Surface Water

6.4.1. Existing Environment

The Project is located in the Cape Flattery Port limits area within the Jeannie basin, which extends along the Cape York Peninsula coast. There are no major waterways in the vicinity of the Project, but there are a number of small wetlands in the Cape Flattery area, as shown in **Figure 12** and **Figure 13**. The conditions of waterways located in the vicinity of the Project are classified as slightly to moderately disturbed ecosystems under the Queensland Water Quality Guidelines (Department of Environment and Heritage Protection (DEHP) 2013). The marine water immediately adjacent to the Project does not fall within marine park zoning areas (refer **Figure 14**).

Beyond the Cape Flattery Port Limit, the surrounding environmental significant areas include a habitat protection zone within 1.5 km of the JIA. This zoning requires a 500 m buffer, which the Project is not located within.

The Study area is located adjacent to but outside the GBRMP, with the boundary being approximately 3.5–4.0 km in either direction. This boundary surrounds the JIA, swing basin and proposed anchorage area and is excluded from the GBRMP. The area outside of this boundary is defined as the Great Barrier Reef Marine Park, Cairns/Cooktown Management Area.

Based on data obtained from DES, there are palustrine wetlands located within the MLA area, covering an area of approximately 1.3 ha. Further, there are a number of palustrine and lacustrine wetland areas within 500 m of the MLA area that are also listed as a Matter of State Environmental Significance (MSES) high ecological significance (HES) wetlands. As per the SDAP State Code 9: Great Barrier Reef wetland protection areas guideline MSES HES wetlands require a 200 m buffer from any proposed development outside a prescribed urban area, whilst this code is not applicable for the project, it has been used as a guide for best practice with the 200m buffer implemented around the wetland. An MSES assessment will be undertaken during the EIS, as well as any significant residual impacts potentially conditioned in a subsequent EA approval. As per **Figure 12**, the MIA is located over 100 m from the palustrine wetlands located to the south of the MLA but within the 200 m buffer. The conceptual understanding of the wetlands associated with the site is that they are perched waterbodies with an impermeable base and are disconnected from the water table, this will be clarified during further investigations undertaken as part of the EIS process.

The neighbouring silica mine owned by CFSM currently holds an active water licence (180150) that authorises CFSM to take a maximum volume of 12,000 ML/year from groundwater and surface water. No key river or tributary systems flow within the Project area, instead a series of small, unnamed, nonperennial first order tributary inputs discharge into the adjacent marine area. The Cape Flattery region also supports several HES palustrine wetlands and a series of MSES high value ecosystem (HEV) lakes known as “Cape Flattery Dune Lakes” (Hydrobiology, 2022a), refer to **Figure 12**. The freshwaters within the Project area itself are not HEV apart from Dune Lakes, the remaining areas are moderately

disturbed (Hydrobiology, 2022a). There is a small area of natural wetlands that are HES on the Map of Queensland Wetland Environmental Values present on the southern boundary of the Project area.

Figure 13 shows the surface (receiving) water quality monitoring locations. The water quality data does not show any elevated metal concentrations in the natural surface waters. High electrical conductivity (EC) was observed at surface water monitoring location 8 (SW8), which is potentially representative of runoff from the adjacent and existing mining area (WRM 2022).

6.4.2. Potential Impacts to Water

A surface water impact assessment undertaken by WRM 2022 found that potential impacts of the Project on surface water resources include:

- MIA disturbance areas reducing surface water catchment resulting in reduced surface water flows causing impacts to the downstream surface water dependant ecosystems.
- Active mine area reduces surface water catchment resulting in reduced surface water flows causing impacts to the downstream palustrine wetlands.
- Changes to stream flows due to reduction in catchment area draining to local drainage paths due to capture of runoff within onsite storages.
- Land disturbance during construction activities causing sedimentation resulting in poor water quality impacting downstream surface water dependant ecosystems and the Coral Sea.
- Storage of chemicals and fuel results in accidental spills contaminating surface water impacting surface water dependent ecosystems.

Overall, potential impacts to surface water quality and change in stream flows (due to reduced catchment area) was assessed to have a moderate inherent risk rating.

The Project will reduce the catchment area draining to receiving watercourses due to capture of runoff from disturbed catchment areas within the water management system. The maximum mine affected catchment areas represent up to 8% of the local watercourse catchments in the vicinity of the Project.

While there is some reduction in the natural watercourse catchments associated with the active mining area, it is unlikely that there will be a detectable impact on flows. In addition, the catchment excision is only temporary, and the catchment will be reinstated as part of the final landform. The quantity of backfill returned to the pit is approximately 25% of all material removed, and therefore the final landform will be lower than the pre-existing landscape. Due to the undulating nature of the resource base, the final landform will be reprofiled to mimic the pre-mining elongated dune formation and will blend in with the natural lower slopes to the south of the operation allowing for the reinstatement of the catchment processes. The impact of the proposed mine on changes to the landform hydrogeomorphology (including impacts to HES wetlands) will be further assessed during the EIS process as required.

Further assessment will be undertaken on a finer scale to better understand any potential impacts to the HES wetlands due to the following:

- Changed recharge/flow processes.

- Changed site water balance.
- Potential for piercing of/interaction with the base extent of any perched layers.

Assessments will also work to detail the extent of any indurated/cemented/sealing basement layer and ascertain if the wetlands/swaps contain GDE and how the current mine plan encroachment on the buffer areas potentially affect any indurated layer of a perched wetland/swamp area.

6.4.3. Management and Mitigation Measures

The following mitigation measures will be implemented to manage potential construction and operational impacts to surface water quality and change in stream flows (due to reduced catchment area) at the Project:

- Actively manage the water levels in the sediment basin for use in processing.
- Divert 'clean' water runoff from undisturbed areas away from disturbed areas.
- Divert 'mine affected' area runoff to mining area and/or sediment basin for storage.
- Diversion drains will be monitored regularly to ensure they are operating as designed and do not allow mixing of clean and dirty water.
- Carry out ripping, mulching and vegetation placement immediately after topsoil placement to control erosion wherever possible.
- Regular monitoring of water quality and storage volumes in the water storages will be undertaken to support management actions to prevent uncontrolled releases.
- The pumps will be inspected and operated regularly to ensure they will operate when required.
- Contaminated water sumps and interceptors are to be inspected and cleaned out regularly.
- All vehicles, plant and equipment will be confined to maintained tracks to minimise dust, will be required on-site will be in good condition, and will be regularly maintained and inspected for leakages, in order to minimise the risk of contaminant spill.
- Bulk chemicals and fuels will be stored within the Project area at locations away from surface water bodies and will be managed in accordance with:
    - *Mining & Quarrying Safety and Health Act 1999 and Regulations 2017*
    - *AS 1940:2017 Storage and Flammable or Combustible Substances*
    - *AS 3780:2008 The storage and Handling of Corrosive Substances*
- In the event of an accidental spill or release of contaminants, corrective and preventative actions implemented as per the spill emergency response plan within the CEMP and OEMP.

An environmental risk assessment was completed for all identified surface water impacts and the residual risk after implementing the management measures was low to negligible. Further surface water hydrology and quality assessments will be carried out as part of the EIS process. Potential impacts on other water users and the Great Barrier Reef Catchment Area will also be assessed under

the EIS process, however releases from the mining activity or sediment basin are not anticipated and will therefore not impact the catchment waterways or adjacent GBR.

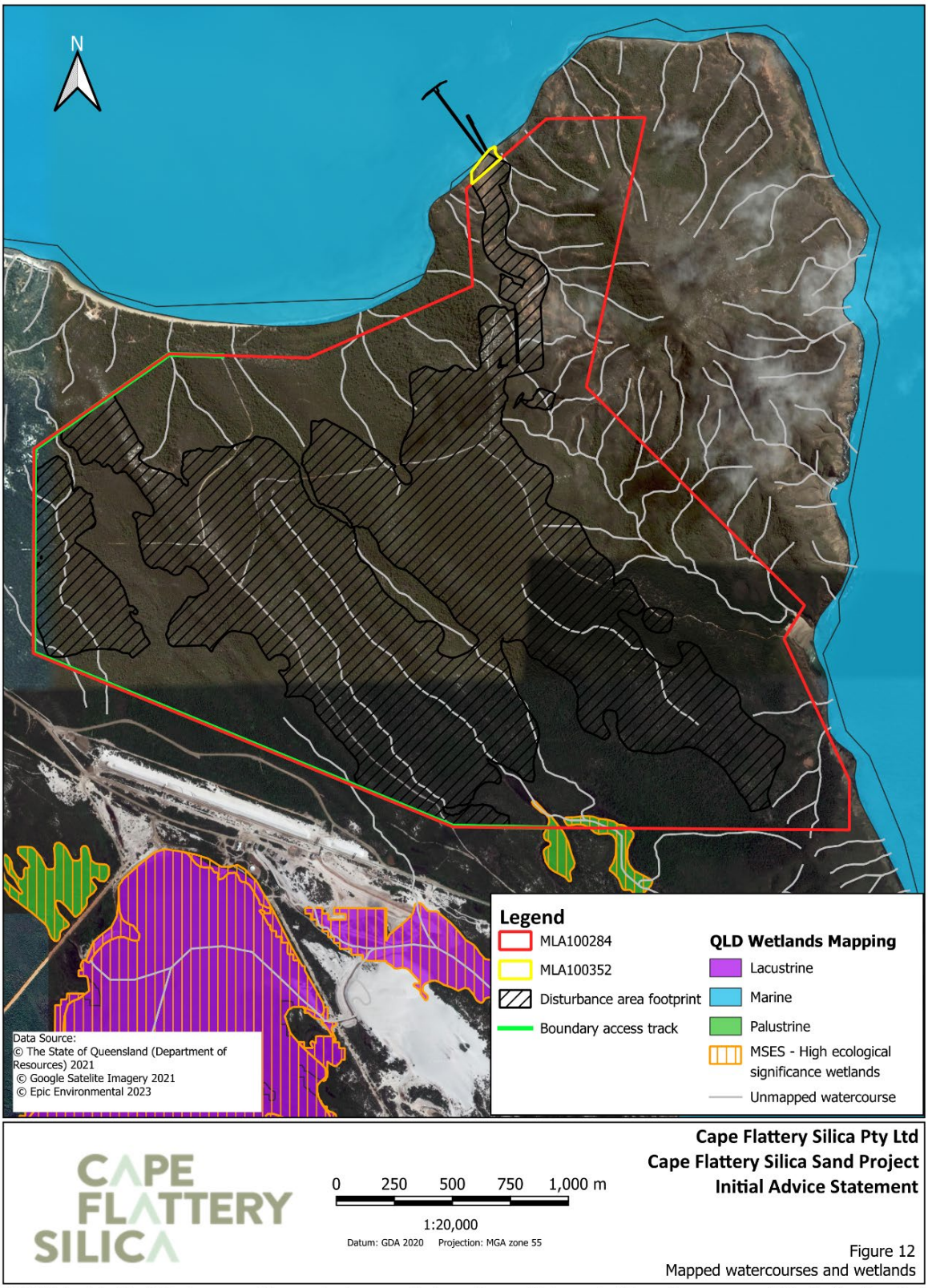

Figure 12 – Waterways and wetlands

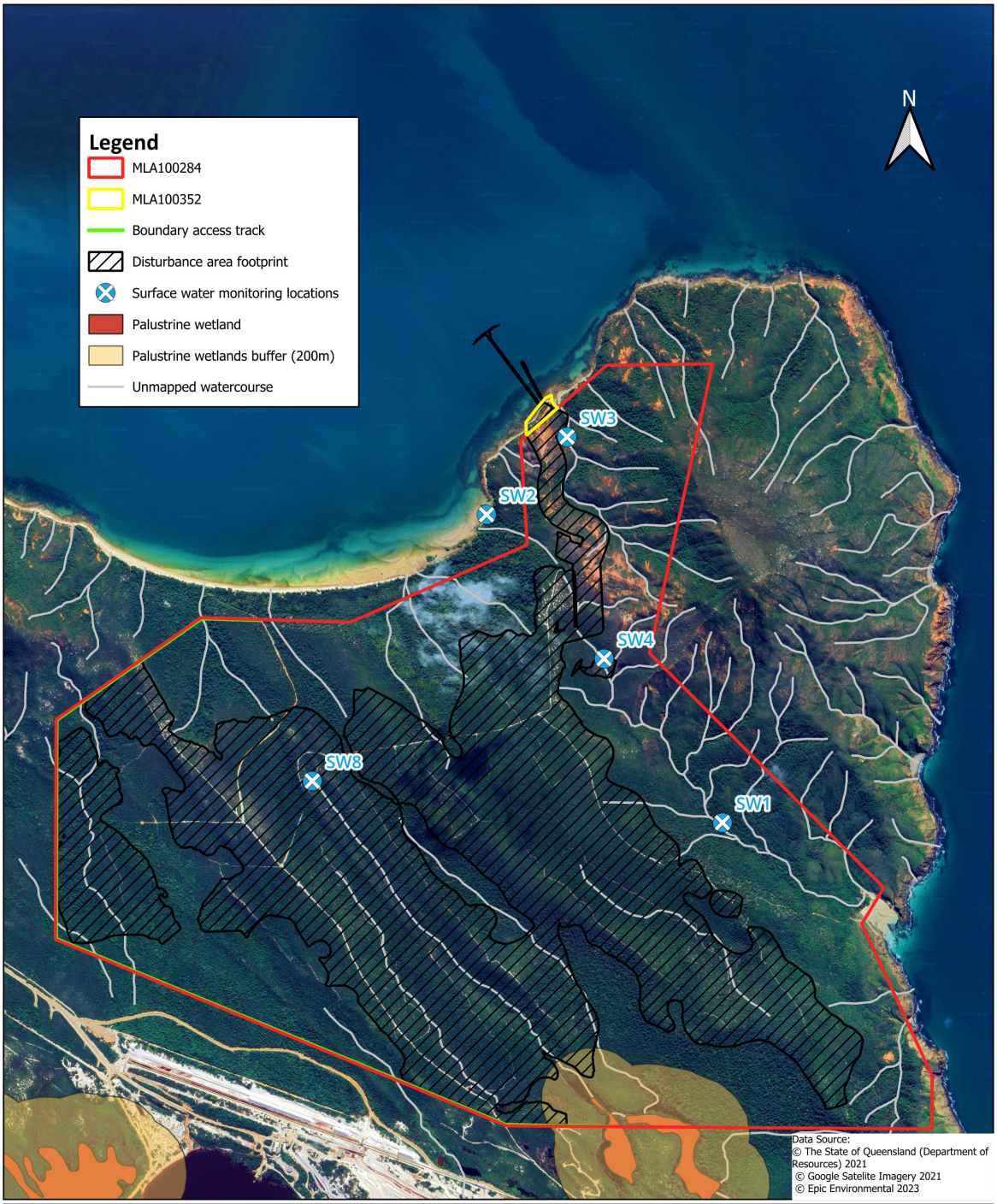

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Figure 13 – Surface water monitoring locations

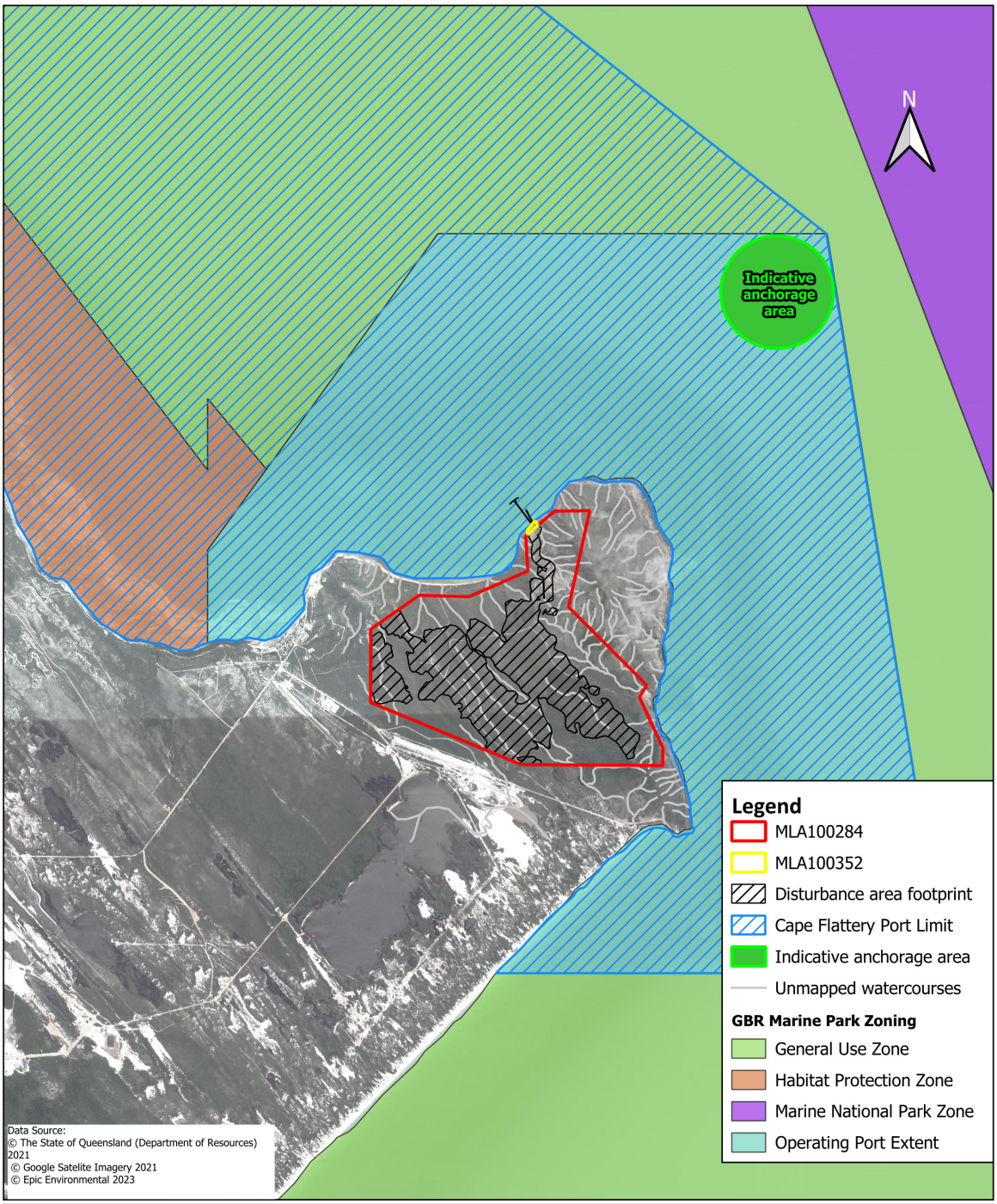

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Figure 14 – Marine zoning

6.5. Groundwater

6.5.1. Existing Environment

The Project is located within the Devonian Palmer-Barron Sub province of the Hodgkinson Province of the Silurian – Devonian Mossman Orogen. The major aquifer is within the Pleistocene to Holocene coastal deposits which extend up to 12 km inland in the Cape Flattery area. These deposits are on average between 25–30 m in thickness. The Quaternary dune field occupies a low coastal plain overlying sandstones of the Late Jurassic to Early Cretaceous Dalrymple Sandstone of the Laura Basin and the Silurian to Carboniferous Hodgkinson Formation.

Groundwater Assessments and Solutions (June 2022) installed 9 groundwater monitoring bores (MB) (MB01, MB02, MB03, MB04, MB05, MB06, MB07, MB08, PB01) within the Project area and a sand spear by a licensed water bore driller in March 2021. MB locations are displayed in **Figure 15**. A baseline groundwater monitoring program for the Project has commenced with eight MBs located within the northern coastal dunes.

Objectives of groundwater monitoring bore installation were to:

- Test the preliminary conceptual hydrogeological model, particularly to provide understanding of:
    - Groundwater flow directions, both on a local scale and a sub-regional scale.
    - Seasonal changes in water levels.
    - The shape of the aquifer.
- Provide a means of collecting baseline water quality information.
- Provide a means of obtaining hydraulic data.

Groundwater levels within the dunal sands have been determined to be between 15 to 45 m below ground level (bgl). No MBs extend to the weathered/fractured basement.

Following the completion of the drilling program, bores were registered with DoR (RN193347 – RN193352). Soil samples were also collected from drill cuttings at 3 m intervals using a sieve and were stored in plastic zip lock bags and stored in an esky.

The conceptual understanding of the wetlands associated with the site is that they are perched waterbodies with an impermeable base and are disconnected from the water table.

Hydraulic parameters of aquifer soils were derived by the interpretation of soils sample particle analysis and the comparative analysis of results within literature for other Queensland Sand Mass studies. It is assumed that the Hydraulic Conductivities of the A Horizon Soils is within the range of 55 metres per day (m/day) and 75 m/day as observed by John Wilson and Partners (1979) on Bribie Island and Murphy (2009) on North Stradbroke Island.

Type B Horizon soils were found to have a range of Hydraulic Conductivities of between 1.33 m/day and 2.80 m/day, which is significantly lower than expected from literature values. A2 Horizon soils

group (MB01 and MB06) are more aligned to Hydraulic Conductivity values expected from literature with a range of 7.78 m/day and 9.99 m/day.

The Dalrymple Sandstone and Hodgkinson Formation were considered to represent hydrogeological basement for the purpose of the assessment. With the outcrop of the basement to the north and east, dune deposits are likely to thin as they onlap to the basement, however in the area to the south of the Project area they are over 110 m thick. Dune deposits are variably comprised of clean quarzitic sand, and interbedded sand (variously coloured) and clay (GW&S 2022). Additional reference bores that are suitably sited and will remain for the LOM will be installed and monitored for the purpose of developing further understanding of the groundwater system and risk to environmental values during the EIS process.

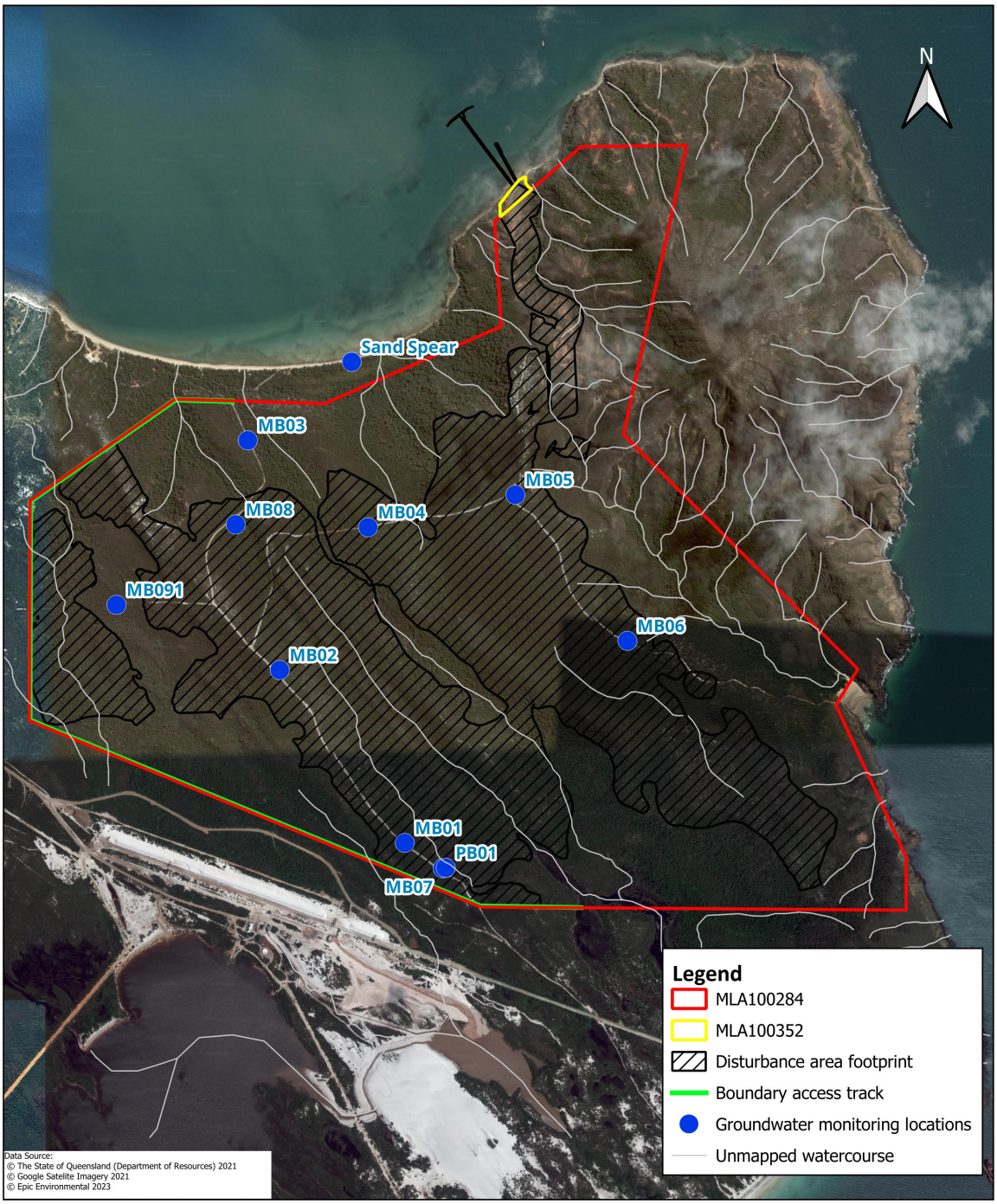

Figure 15 – Groundwater monitoring locations

6.5.1.1. Groundwater Levels

Groundwater levels were recorded for all MBs, displayed in **Table 13**. Groundwater levels were initially taken at completion of bore installation in March 2021, with additional manual measurements taken in June, August, September, and November 2021 using an electronic dip measure. Groundwater levels on the site are between 15 and 45 metres below ground level (mbgl), and groundwater elevations are between approximately 6 m AHD and 10 m AHD.

Five rounds of groundwater sampling were undertaken in March, June, August, September, and November 2021, with a further six rounds of groundwater sampling undertaken in May, August, September, October, November, and December 2022 (refer **Table 13**). Groundwater samples from MB01, MB03, MB06, MB07, MB08, MB091 and PB01 and a Sand Spear located adjacent to Connies Beach were sampled and analysed. All groundwater samples were considered fresh with EC between 64 micro siemens per centimetre (µS/cm) and 414 µS/cm and Total Dissolved Solids (TDS) between 41 micrograms per litre (mg/L) and 747 mg/L. Values for pH tended to be acidic, with some variations, in the range of between 3.36 and 9.27. The values for pH in all three bores (MB01, MB03 and MB06) showed significant variation over time.

Groundwater levels at MB01 in the southwest of the MLA area were closest to the ground surface at around 15 mbgl. The deepest water level measured was at MB06 at approximately 45 mbgl. Variation in depth of groundwater appeared to be highly dependent on the ground elevation at each location. When viewed on a satellite image MB01 appears to be located in the interdunal hollow as opposed to MB06 which appears to be higher up on the dune profile.

Table 13: Groundwater Levels (Manual below ground level)

Field Data (SWL)	Metres Below Top of Casing (mBTOC)										
	2021					2022					
	March	June	August	September	November	May	August	September	October	November	December
MB01	14.93	14.57	14.79	14.92	15.155	-	14.3	14.3	-	14.6	14.7
MB02	DRY	DRY	42.91	41.89	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MB03	30.7	30.68	31.65	30.63	30.695	-	30.8	30.8	-	31.1	30.1
MB04	DRY	42.21	43.21	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MB05	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MB06	45.62	45.65	46.61	45.575	45.6	-	44.9	44.9	-	44.9	44.7

6.5.1.2. Site Groundwater Balance

A preliminary site groundwater balance was developed for the Project area which accounts for gains and losses to the groundwater regime across the Project area and forms a critical part of the groundwater allocation application process. A groundwater balance for an aquifer is prepared by the estimation of the magnitudes of inflows and outflows and changes in storage as follows:

Inflow – Outflow = Change in Storage

The figure for diffuse recharge (12,325 ML/year) based on the mean annual rainfall figure accounts for the current understanding of site annual inflow. Site discharges are limited to the flow boundary discharge calculation based on the assumption that only the southern boundary discharges from the site, no extraction occurs on site, lakes and swamps are assumed, at this time, to not be in direct connection to groundwater and therefore evaporation and evapotranspiration do not affect the groundwater balance. A groundwater discharge figure of 12,427 ML/year accounts for annual outflows.

A groundwater deficit of 102 ML/year was calculated as the change in storage for an average annual water budget of the undeveloped site. As groundwater discharge exceeds recharge this could be described as an aquifer which is in excess of full capacity under current circumstances, noting that this figure of 102 ML/year amounts to amounts to less than 1% of the annual recharge figure and is likely well within the bounds of error of the current study. It is also to be expected that a groundwater balance for an undeveloped site with little or no external influences is likely to have equivalent values of inflow and outflow and as such is effectively a balanced system. Variations within such a system are likely due to climate variations over time.

The extraction of 1300 ML/year of proposed groundwater, equates to 2.25% of the total aquifer volume at a very conservative average depth of 50 m and a Specific Storage (Ss) of 1 x 10-4 or 0.65% of the total aquifer volume with an assumed aquifer depth of 100 metres and a Specific Storage (Ss) of 1 x 10-4. Further the extraction of the proposed 1300 ML/year also represents approximately 10.5% of the again conservative estimate of 12,325 ML/year of Mean Annual Recharge. The mean annual recharge figure does not account for discharges to streams, water bodies or any discharges other than the southern and western flow boundary. Further the period of reporting (March to November 2021) is preceded by five years of below average rainfall (between 45% and 57%). This appears to indicate that the aquifer remains at (or above) capacity even during dry periods time. Underground water availability will be further assessed during the EIS process as required.

6.5.1.3. Groundwater Regime and Aquifer

The groundwater regime on the MLA is predominately a sand mass aquifer which is located on an easterly projection of the greater Cape Flattery / Cape Bedford Sand Mass. The MLA area forms a minor part of the overall aquifer system.

The Cape Flattery dune field is extensive, covering an area over 100 km^2. The large sand mass has formed high transgressive or parabolic dunes from beach ridge barriers or tidal delta sands (Oresome Australia 2020). The local aquifer system is formed of soils defined as poorly graded fine sands or poorly graded silty sands (refer **Section 6.1.1.3**).

The quality of the groundwater in the Project area is characterised as acidic, fresh with occurrences of Cobalt, Copper, Nickel, Lead and Zinc at levels above guideline values. Further testing was performed as part of the groundwater monitoring and drilling program executed in October 2022. CFS conducted pump testing in May 2023 to determine the availability of a reliable water source for the Project. Testing was completed from a production bore (RN 193773) at the Cape Flattery site with an electric submersible pump with the suction placed at 47m depth.

In view of the high calculated transmissivity of the aquifer, and the evidence of a high reported yield from the same unconsolidated sand aquifer system in the vicinity, Rob Lait and Associates is of the opinion that individual bores with larger diameter casing and well screens (say 200mm) should be able to sustain supplies of 20L/s. Given the areal extent and saturated thickness of the sand aquifer at Cape Flattery, there should be adequate volume in storage to permit sustainable development of the groundwater resource (Rob Lait and Associates Pty Ltd, June 2023). During the EIS process, additional data from additional pump tests and bores drilled through the full aquifer thickness or to appropriate depths will be undertaken to assess the ability of the aquifer to permit sustainable groundwater use. Cumulative impacts of pumping bores associated with this project, and potential interactions with other existing and potential water users, will also be considered when estimating safe long-term extraction rates.

6.5.1.4. Groundwater Recharge and Flow

Groundwater recharge at the Project area is largely through diffuse recharge to all sand mass areas. Recharge occurs through direct infiltration to the sand mass across the site; however, some currently undefined recharge may occur from rainfall runoff from the hard rock areas to the sand mass. The presence of alluvial gullies and swamps indicate that some rainfall runoff does occur which suggests that at times rainfall rate and duration exceeds vertical infiltration time.

While it has not yet been confirmed as to the mechanism of swamp formation, the swamps themselves may indicate the presence of a perching layer or that they represent groundwater levels in that vicinity. Dependent of that determination, the swamps may act as a recharge source or as a discharge location through evaporation.

Primary discharge for the Project is to the west, with groundwater flow moving toward the CFSM operations boundary and potentially flowing to the beaches in the north and south. The primary discharge boundary is likely a Flux Boundary which is dependent on regional groundwater heads. Calculated ranges of rainfall recharge volumes for the Project area (assuming 513 ha) are as follows:

- Minimum annual recharge: 7,703 ML/year.
- Mean annual recharge: 12,325 ML/year.
- Maximum annual recharge: 30,298 ML/year.

The volume groundwater available from a 2 m reduction of head within the sand mass of the MLA area is conservatively calculated to be 2,311 ML. If the aquifer is assumed to have an average depth of 100 m the total volume of groundwater can conservatively be assumed to be approximately 115,500 ML. This will be further assessed and quantified during the EIS process.

Site discharges are limited to the flow boundary discharge calculation based on the assumption that only the southern boundary discharges from the site, no extraction occurs on site, lakes and swamps are assumed, at this time, to not be in direct connection to groundwater and therefore evaporation and evapotranspiration do not affect the groundwater balance (GW&S 2022).

A groundwater discharge figure of 12,427 ML/year accounts for site annual outflows. Therefore, a groundwater deficit of 102 ML/year is calculated as the change in storage for an average annual water budget of the undeveloped site. As groundwater discharge exceeds recharge this could be described as an aquifer which is in excess of full capacity under current circumstances time.

The calculated deficit of 102 ML/year amounts to amounts to less than 1% of the annual recharge figure and is well within the bounds of error of the current study. As is to be expected for an undeveloped site with little or no external influences the water balance represents an essentially balanced system.

The extraction of 1300 ML/year of proposed groundwater use equates to a 2.25% of the total aquifer volume at a very conservative average depth of 50 metres and a Specific Storage (Ss) is 1 x 10-4 or 0.65% of the total aquifer volume with an assumed aquifer depth of 100 metres and a Specific Storage (Ss) is 1 x 10-4. Further the extraction of the proposed 1300 ML/year also represents approximately 10.3% of the again conservative estimate of 12,325 ML/year of Mean Annual Recharge.

It was found that the extraction of 1300 ML/year will likely have short term localised effects adjacent to the extraction location (Cone of depression) which would not likely cause any significant effects on the wider aquifer or to aquifer discharge. Any drawdowns would likely be accounted for within current rainfall regimes and during periods of higher rainfall. Further assessment and modelling will be undertaken during the EIS process to determine the local and regional impacts and environmental value of supply.

6.5.1.5. Groundwater Dependent Ecosystems

Groundwater dependent ecosystems (GDEs) are ecosystems that are dependent on groundwater systems for their continued existence. Desktop review of the Queensland Government Spatial Database and the DES Wetlands Info Website (State of Queensland (Qld) 2017 – 2021) indicates that there is no existing GDE mapping within or adjacent to the MLA. The Groundwater Dependent Ecosystems Atlas (GDE Atlas) identified the following potential GDEs in the vicinity of the Project:

- Aquatic GDEs associated with the Wetland / Swamps located in the southwest quadrant of the MLA area are mapped as having high potential for the presence of Aquatic Ecosystem dependent GDEs.
- Terrestrial ecosystems: the entire MLA area is mapped as having high potential for the presence of Terrestrial Ecosystem dependent GDEs.

Both GDE groups identified cover extensive areas of the Jeannie Catchment. The aquatic GDE determination includes all significant wetlands within the Jeannie Catchment and the terrestrial GDE group is mapped as an entire undefined vegetation group within the catchment. However, the current mine plan does not directly encroach on the wetlands associated with the high potential aquatic GDE.

As groundwater levels have only been established at three sites (MB01, MB03 and MB06) and the significant undulation of the sand dunes, it is not possible to determine if the other REs located on dunal sands are completely or intermittently dependent on groundwater. The latter is considered more likely, if at all (GA&S 2022).

The current projected interaction with the aquifer is limited to the extraction of 1300 ML/year for operations. The groundwater conceptual models indicate that the wetland is disconnected from groundwater. Further assessment of GDE including assessment of subterranean fauna, groundwater connectivity, monitoring bore location and saltwater intrusion will be undertaken during the EIS process if required.

6.5.2. Potential Impacts to Groundwater

A groundwater impact assessment and conceptual model was prepared by Groundwater Assessment and Solutions (2022). The Conceptual Model fulfils the purpose of providing an understanding of the physical characteristics of the groundwater catchment, flow, and quality characteristics of the groundwater source. It also provides a documented understanding of the groundwater regime based on the currently available data.

The model is highly dependent on the availability and the extent of relevant data sets and will document such things as:

- Top and base of each stratigraphic horizon within the groundwater catchment defined from drilling intercepts, outcrop mapping, interpretation of downhole geophysics, seismic interpretations where available.
- Structural features identified from seismic interpretation and drilling investigations.
- Formation properties derived from drill stem tests, pumping tests, injection tests, core analyses, downhole geophysics, records of flow rates from wells or from literature.

During development of the Conceptual Model several data sets were identified as limited or absent. All data gaps identified will be prioritised and the implications of those data gaps to the Conceptual Model will be outlined and reported. Subject to the level of data available from the database, the resulting uncertainties in the hydrogeological model, and the relative importance of the formation in terms of impacts, it may be necessary to collect additional data to support the ongoing activities.

Water for use in operations will be extracted via the identified bores, with potential impacts limited to these locations. The Project will not exercise underground water rights and will only extract water under the Water Licence. The potential impacts of the Project on groundwater resources and the corresponding inherent risk ratings were:

- Storage of chemicals and fuel results in accidental spills contaminating groundwater impacting GDEs – Low.
- Mine infrastructure and active mine area disturbance areas causing infiltration of mine affected water resulting in contamination of groundwater basin and GDEs – Moderate.

- Groundwater extraction during operations results in groundwater drawdown impacting third party used – Moderate.

The EIS will include hydrological modelling of impacts on other existing and potential water users, including cumulative impacts from nearby mining operations. Modelling will also address aquifer responses to recharge/return water resulting from sand washing etc at sites remote from the original point of take as per the Independent Expert Scientific Committee (IESC) guidelines for groundwater assessment and modelling requirements.

6.5.3. Management and Mitigation Measures

The following mitigation measures will be implemented to manage groundwater in relation to the release of contaminants via infiltration of mine affected water from the MIA or active mine area and drawdown impacting third party users:

- Groundwater Management Plan (GWMP) will be prepared for construction and operations of the Project. The GWMP will detail the process and measures to manage and ground water impacts associated with the construction and operation works. The GWMP will:
    - Describe measures to minimise and /or manage sediment and mine water processing within the Project area, including use and containment of flocculants.
    - Describe spill management procedures including requirements for locating and maintaining spill response materials such as spill kits.
    - Detail groundwater monitoring requirements, including discharge criteria.
- Runoff into active mining area will be stored and utilised for dust suppression.
- Clean water runoff will be diverted from undisturbed areas away from disturbed areas.
- Mine affected area runoff will be diverted to the active mining area and/or sediment basins for storage.
- Diversion drains will be monitored regularly to ensure they are operating as designed and do not allow mixing of clean and dirty water or infiltration into groundwater basins or GDEs.
- No acid mine drainage will occur.
- Tailings have been confirmed as geochemically inert.
- Chemical processing will be limited to use of flocculants and restricted to the processing plant and bunded active mining area.
- Groundwater extraction will not exceed the 1,300 ML per annum water licence from the strategic reserve (noting no underground water rights will be exercised).
- Monitoring of groundwater levels from established MBs to ensure drawdown does not exceed trigger levels identified in the Conceptual Groundwater Model.
- The maximum mining depth will not intersect deeper groundwater aquifers. The local aquifer system is formed of soils defined as poorly graded fine sands or poorly graded silty sands.

An environmental risk assessment was completed for all identified groundwater impacts and the residual risk after implementing the management measures was low to moderate. Additional groundwater hydrology, quality and sediment basin design and mining depth assessments will be undertaken as part of the EIS process as required.

6.6. Terrestrial Ecology

6.6.1. Existing Environment

The Project area lies in the Starke Coastal Lowlands subregion of Cape York Peninsula bioregion. Approximately half of the bioregion is used for pastoral activities. The Cape York Peninsula bioregion has hot and humid wet seasons with higher rainfall reliability than most rangeland bioregions.

A desktop assessment of the Project area identified a number of matters of state environmental significance (**Figure 16**) and matters of national environmental significance (**Figure 17**) associated with terrestrial ecological values as occurring or possibly occurring in or near the Project area, including:

- The Littoral Rainforest and Coastal Vine Thickets of Eastern Australia Threatened Ecological Community (TEC) (**Figure 17**)
- HES wetlands to the south (**Figure 16**)
- Areas of essential habitat for wildlife (VM Act) (**Figure 18**)
- Vegetation identified under the VM act as Category B – remnant vegetation, predominantly 'least concern' with 2 sections of 'of concern' and essential habitat (**Figure 18**)
- Vegetation identified under the Biodiversity Status Mapping under the EP Act as Dominant and sub-dominant (**Figure 19**)
- Threatened fauna species under the EPBC Act (**Figure 17**)
- Threatened or near threatened flora species (**Figure 17**)
- Fauna species listed as 'Migratory' under the EPBC Act.

All regulated vegetation under the VM Act and EP Act, as well as areas of overlap between MNES and MSES, that will be impacted by clearing for the Project will be further assessed and listed during the EIS process. Where required, impacts to ecological processes affecting species comprising VM Act matters will also be assessed during the EIS process.

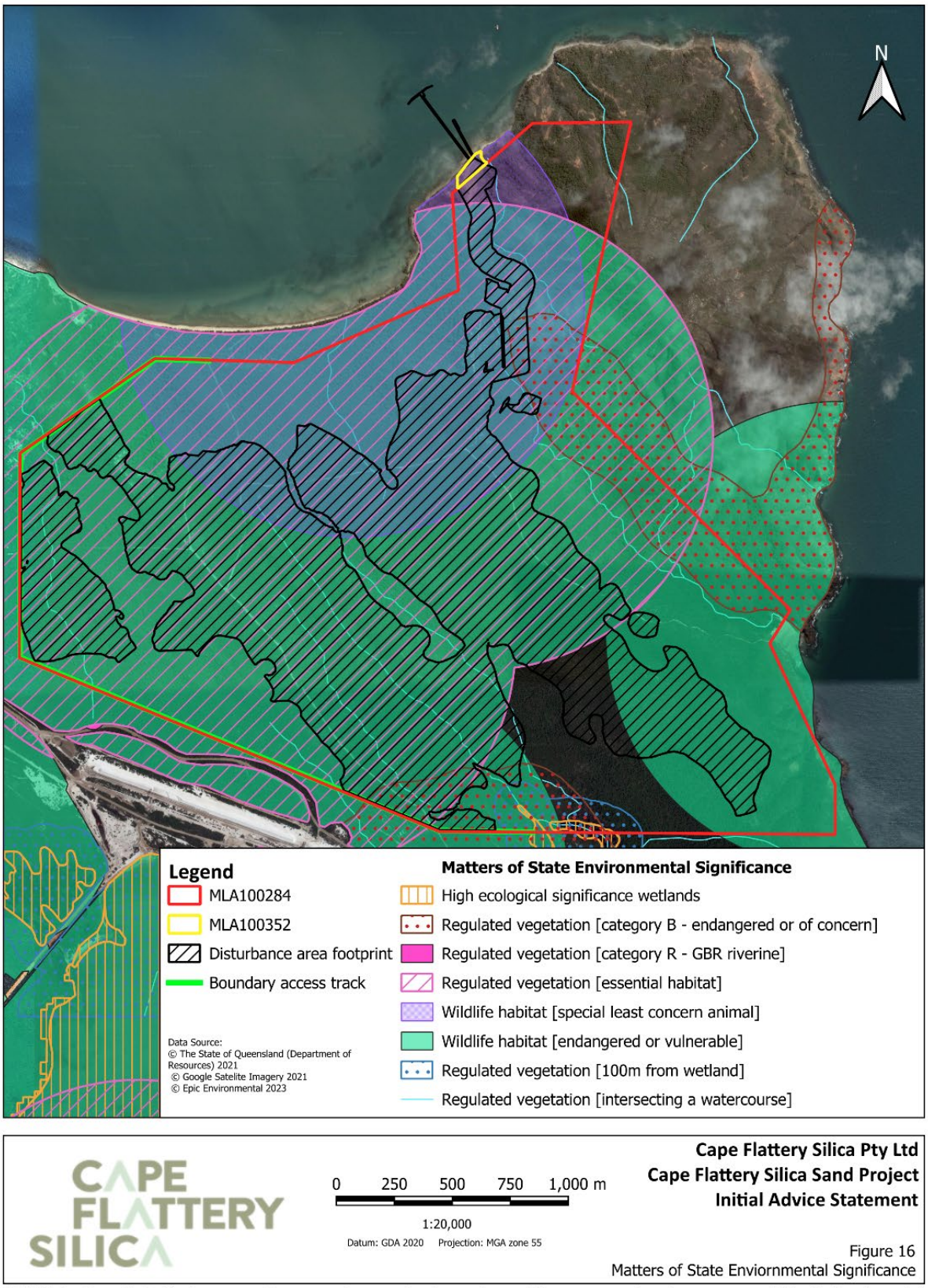

Figure 16 – Matters of state environmental significance

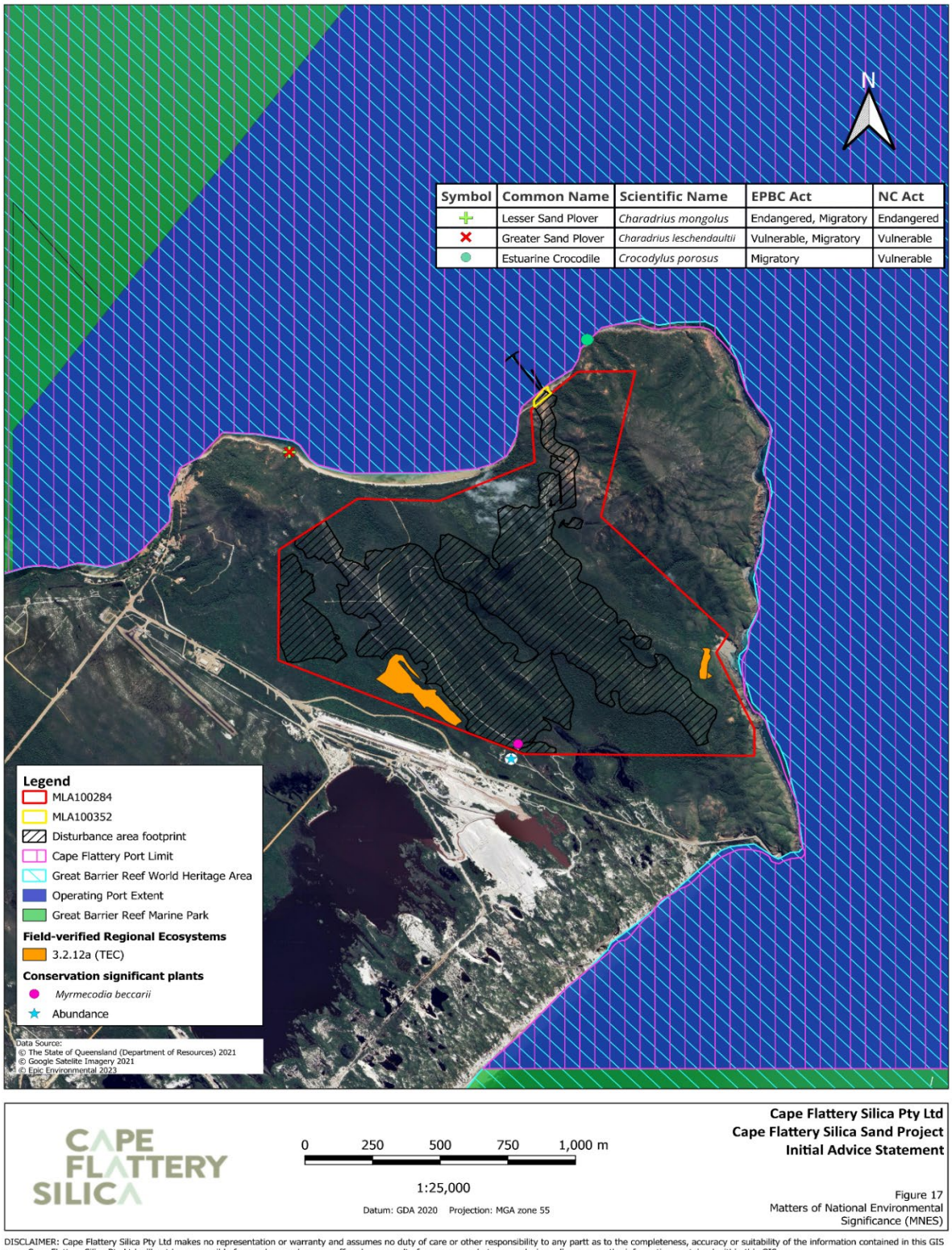

Figure 17 – Matters of National Environmental Significance (MNES)

6.6.1.1. Regional Ecosystem Description Database (REDD)

The Regional Ecosystem Description Database (REDD) lists the biodiversity status (BD Status) and the vegetation management class (VM class) of each regional ecosystem. The biodiversity status is based on an assessment of the condition of remnant vegetation by the DES in addition to the criteria used to determine the class under the VM Act. The VM class is listed in the Vegetation Management Regulation under the Act. There can be distinct differences between regulated vegetation mapping under the VMA and the regional ecosystem mapping (biodiversity status mapping) as presented by the DES both in terms of area covered and status, particularly if a property map of assessable vegetation (PMAV) has been certified over the land.

Vegetation Management Act

An online assessment was undertaken of the VM Act mapping. The mapping indicated that the majority of vegetation clearing will be undertaken in areas classed as category B, remnant vegetation of 'least concern', there are two section that are classed as category B, remnant 'of concern' vegetation. The area is also predominantly classed as essential habitat under the VM Act (**Figure 18).**

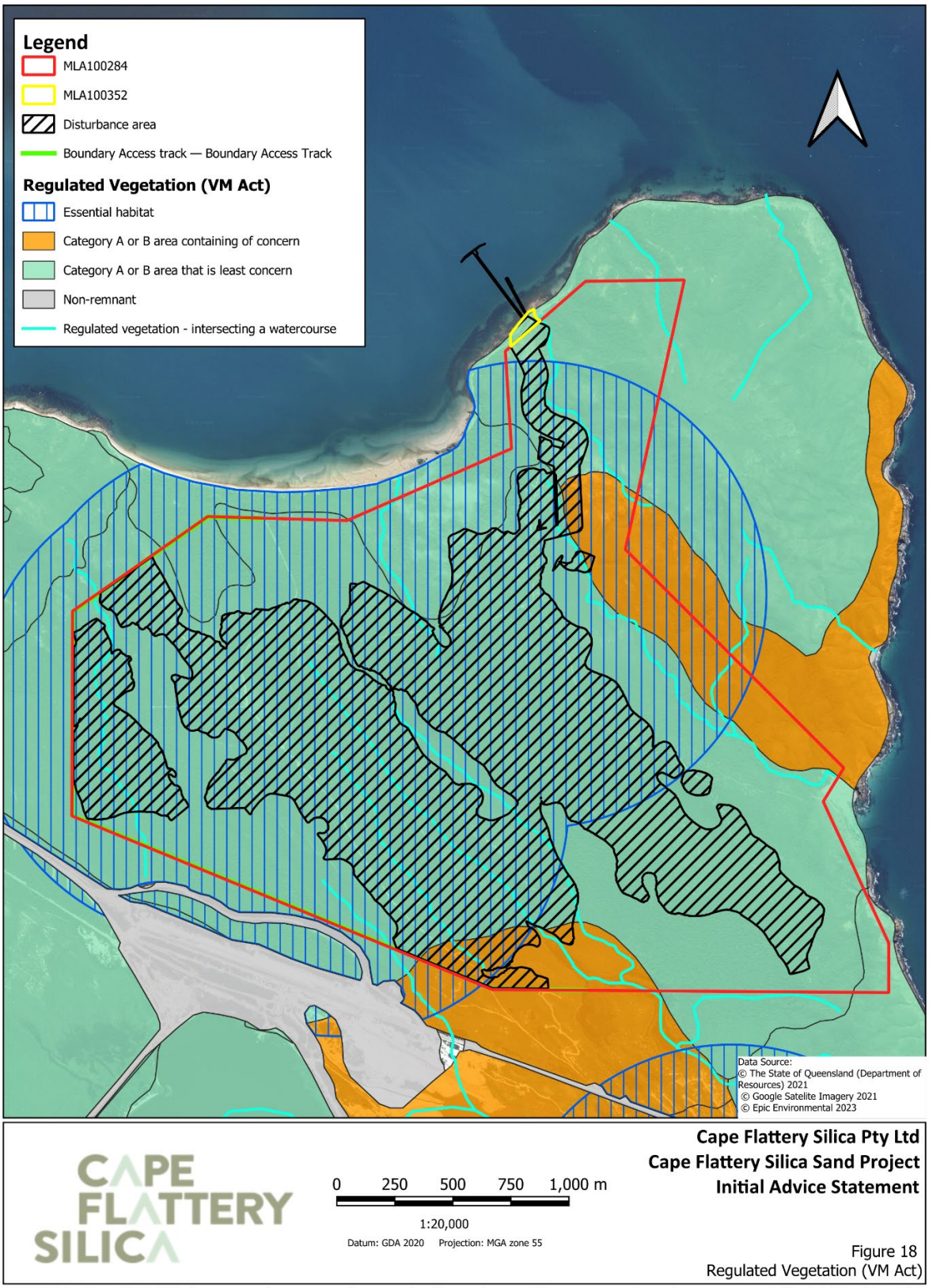

Figure 18 – Regulated vegetation (VM Act)

Biodiversity Status mapping

An online assessment was undertaken of the EP Act biodiversity status mapping. The mapping indicated that the majority of vegetation clearing will be undertaken in areas classed as 'no concern at present' with one section to the south classed as 'of concern sub-dominant', and one to the north as 'of concern dominant' (**Figure 19**).

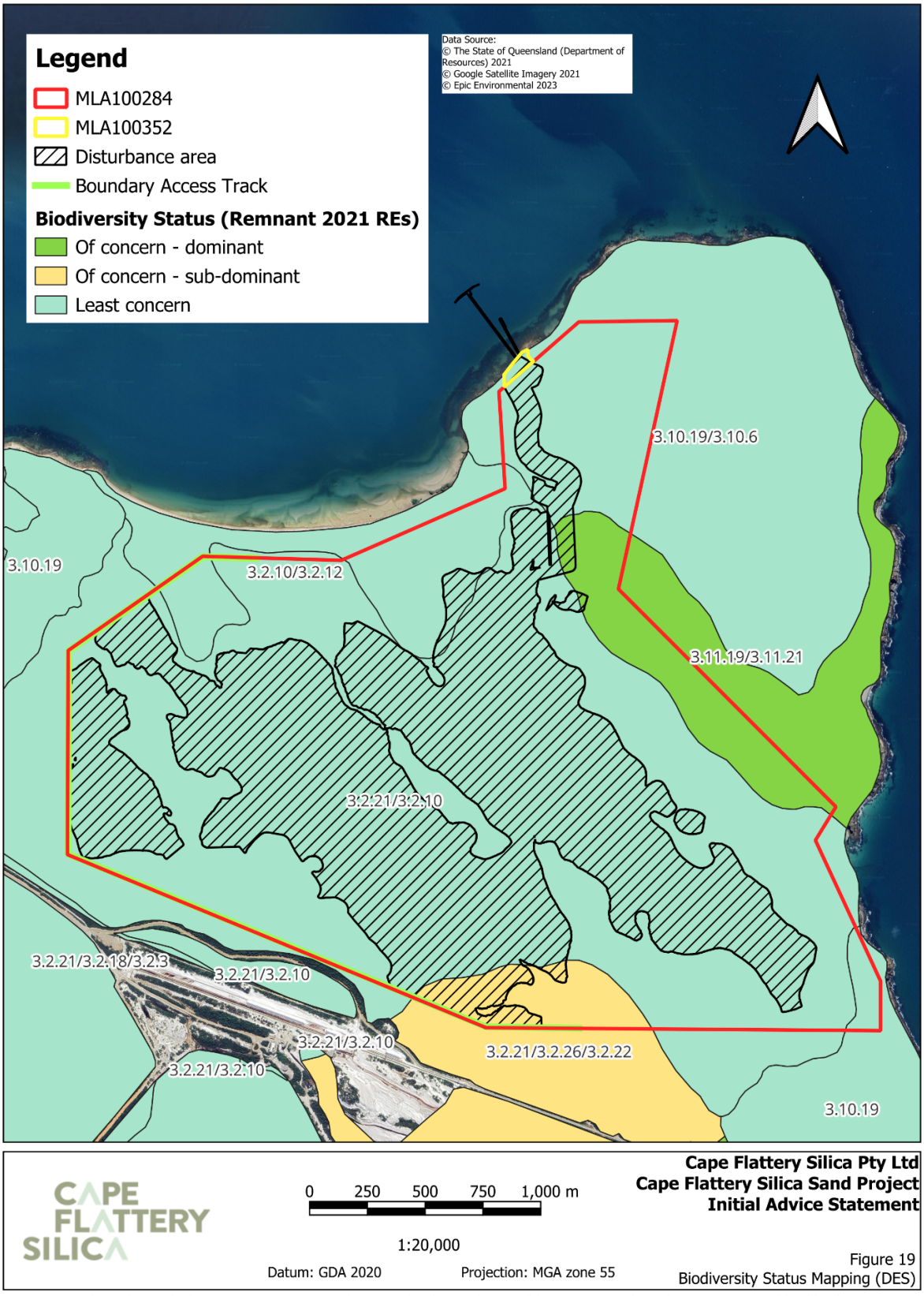

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Figure 19 – Biodiversity status mapping (DES)

6.6.1.2. Field verified REs

A wet season flora and fauna survey was conducted over a three-night period from 26 to 28 February 2021 by Epic Environmental. The dry season fauna survey was conducted from 23 to 29 June 2021 and the dry season flora survey was carried out from 15 to 19 August 2021.

The Project area has historically experienced minimal disturbance, and vegetation clearing appears to be limited to the vehicle tracks, and small-scale tree removal around campsites along the Connies Beach foreshore (which lies outside the ML). Within or adjacent to the Project area, field assessment identified the following ecological values associated with terrestrial habitats:

- Nine field verified REs including one vegetation community (RE 3.2.12a) considered analogous to the *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia* TEC (Critically Endangered under the EPBC Act) (refer **Figure 20**)
- 55.36 ha of vegetation listed as Category B of concern vegetation under the VM Act 1999.
- Occurrence of two threatened plant species - *Acacia solenota* (Vulnerable under the NC Act) (very common) and *Myrmecodia beccarii* (Vulnerable under the NC Act and EPBC Act) - and habitat that may possibly support a further three threatened plant species.
- Occurrence of the following threatened fauna species:
    - Greater Sand Plover and Lesser Sand Plover (listed as Vulnerable or Endangered under the EPBC Act and/or NC Act respectively) were recorded outside but adjacent to the Study area.
    - Beach Stone Curlew and Estuarine Crocodile (both Vulnerable under the NC Act) also recorded outside but adjacent to the Study area.
    - Cape Heath Ctenotus (Vulnerable under the NC Act) was commonly recorded within the Study area.
- A further three threatened species have potential to occur within the Study area.
- Occurrence of seven bird species listed as Migratory under the EPBC Act recorded outside but near the Project area and habitat that may support six bird species listed as Migratory under the EPBC Act.
- In addition, the southern boundary of the Project intersects two wetlands considered as of HES, although these were not able to be accessed during the site surveys (Epic Environmental 2022)

All other REs verified present within the MLA are listed as Least Concern under the VM Act and No Concern under the EP Act.

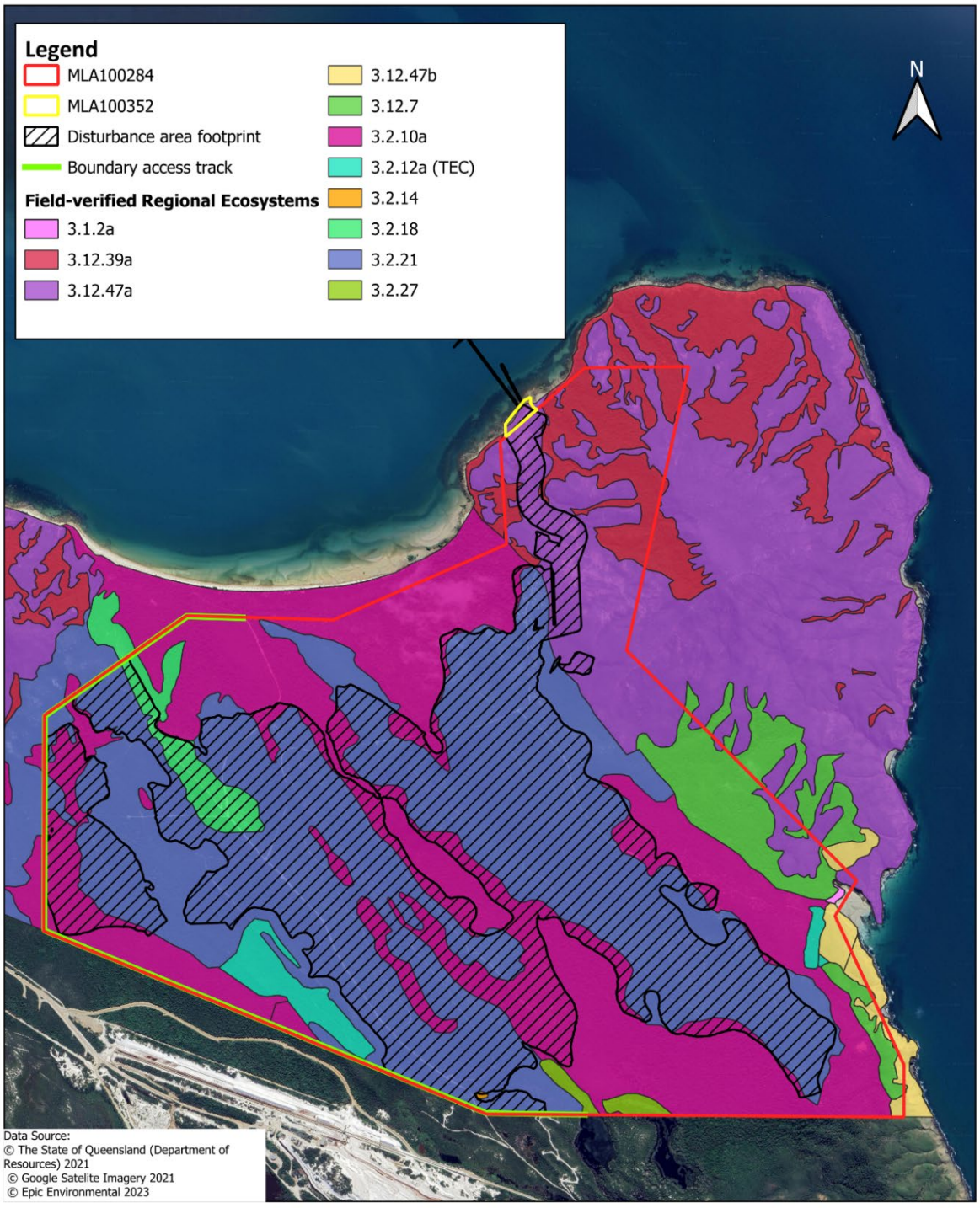

Figure 20 – Field verified regional ecosystems

6.6.2. Potential Impacts to Ecology

The overall Disturbance area for the Project (i.e. the area to be mined and areas to be modified for infrastructure) encompasses 315.509 ha. The main impact from the Project is expected to be from vegetation clearing. Rehabilitation of mined areas will occur in accordance with the PRC Plan as mining progresses over the life of the Project. As such, the extent of habitat loss at any one time will be much less than the overall Disturbance area and no loss of connectivity at the local or landscape scale is anticipated. Most other potential impacts of the Project are considered manageable with the application of project-specific mitigation measures. Other likely impacts to terrestrial ecological values from the Project may include fauna mortality, impacts to local surface water flows and groundwater values.

The TEC is located outside the Disturbance area and no impacts are anticipated. Based on Commonwealth impact guideline criteria no significant impact is anticipated for any observed or predicted threatened or migratory species listed as a MNES.

The Project will impact potentially suitable habitat for Cape Heath Ctenotus (a skink). The potential for Cape Heath Ctenotus to use rehabilitated areas is uncertain but its life history is promising in that regard. Nevertheless, an assessment under the State impact guidelines indicates there is potential for the Project to have a significant residual impact on this species. *Acacia solenota* is considered to have a high likelihood of successful rehabilitation based upon its life history. As such, given the progressive nature of the Project mining, significant residual impacts have been assessed as unlikely to occur on the species. No significant residual impacts are predicted to occur on any other fauna or flora species listed as a MSES.

The Project may require offsets as per the Queensland Environmental Offsets Policy for the following terrestrial MSES (overlapped areas will need to be investigated during the EIS process where required):

- 0.34 ha of vegetation listed as Of Concern under the EP Act.
- 8.68 ha of Category B (remnant) vegetation located within 10 m of a mapped watercourse (stream order 1 and 2) on the VM Act mapping layer.
- 230.04 ha of field verified potentially suitable habitat for Cape Heath Ctenotus (listed as Vulnerable under the NC Act).
- 4.29 km of regulated vegetation (Category B – remnant vegetation) intersecting watercourses.

Wherein adverse impacts cannot be avoided or mitigated, significant residual impacts (SRI) on the listed MSES for regulated vegetation will require offsets in accordance with the *Environmental Offsets Act 2014*. An SRI assessment will be undertaken during the EIS process if required.

6.6.3. Management and Mitigation Measures

CFS commits to a range of measures to minimise impacts to MNES, MSES and ecological values associated with the Project area. In the first instance, the final design process for the Project will reduce the area of impact to areas representing habitat for threatened species as much as is feasible for the construction of infrastructure. Through implementation of the mitigation hierarchy, Project

design measures have included the following elements reducing impacts to ecological values associated with the Project:

- Avoidance of the TEC identified as occurring within the Project area including placing a 50 m non-disturbance buffer around each occurrence.
- Placing a 200 m non-disturbance buffer around the wetlands on the southern boundary of the Project area.
- Avoidance of impacts to Connies Beach which provides intermittent habitat for several wader/shorebird species listed under State and Commonwealth legislation.
- Mining will avoid intersecting the shallow groundwater aquifer avoiding any follow-on impacts to potential GDEs should any occur in the area.

Where avoidance is not possible, a range of mitigation strategies will be implemented under an overarching Project CEMP and OEMP. The CEMP and OEMP will comprise a number of sub-plans relevant to ecological impacts including (but not limited to):

- Threatened Species Management Plan.
- Weed and Pest Management Plan.
- Air Quality Management Plan.
- Noise and Vibration Management Plan.
- Erosion and Sediment Control Management Plan.
- Surface Water and Groundwater Management Plans.
- Waste and Contamination Management Plan.

Residual risk ratings after implementing the management measures were determined to be low to moderate. As part of the EIS process an assessment will be undertaken to determine the level of residual impact and potential impacts from a reduction of groundwater levels on the TEC and surrounding ecosystems. The EIS will also demonstrate that the clearing of vegetation and the adverse impacts of the clearing have been reasonably avoided or minimised, where required.

Where required, an in-depth flora and fauna assessment will be undertaken during the EIS process and will consider regulated vegetation, wetlands, regional ecosystems, essential habitat, ecological processes, and watercourses. This is to assess impacts of clearing on the composition, function, and structure of these values, identifying whether the clearing will cause a significant residual impact and require an offset.

6.7. Aquatic Ecology

6.7.1. Existing Environment

6.7.1.1. Controlled Action and Assessment Level Decisions

The freshwater systems of the MLA area are located within the Jeannie Basin, specifically within the management area of the landside of Port of Cape Flattery. The Jeannie Basin comprises an area of 3,638 km^2 being composed of the Jeannie, Howick, and Starke rivers with an area of 175 km^2 being estuarine wetlands. The main river input of the area is the Jeannie River, with its headwaters rising in the northern region of the Cape York Peninsula of the Great Dividing Range. The river flows in a north easterly direction and discharges into the coral sea over 50 km north-west of the MLA. No key river or tributary systems flow within the MLA area, instead a series of small, unnamed, non-perennial first or second order tributary discharge into the adjacent marine area.

The Cape Flattery region also supports several HES palustrine wetlands and a series of HEV lakes known as the "Cape Flattery Dune Lakes". The very high conservation significance of the Cape Flattery Dune Lakes is due to the presence of distinct species assemblages and species with disjunct population. With, *Cherax cartalacoolah* (freshwater grayfish or yabby) being endemic to the Cape Flattery region and found only in Dune Lakes and coastal creek habitats located south of the study area. (DRDMW 2023). Two palustrine wetlands intersected by the southern boundary of the MLA are mapped as of HES and will not receive planned run off from the Project area during high rainfall events due to the installation of a sedimentary basin with level controls in place. Two dune Lakes located south of the MLA are mapped as HEV. To avoid runoff into the lakes, clean water will be diverted around the project where needed, with mine water runoff to be captured and then diverted towards the sediment basin. All remaining areas within the MLA are all described as slightly disturbed.

There are no State operated gauging stations within the MLA area or within the entire Jeannie River catchment.

6.7.1.2. Aquatic Habitat – Observed Values

During terrestrial ecology surveys carried out in 2021, the habitat was observed across three waterways draining northwest, and southeast within the Project area, all found to be containing little water. A preliminary targeted aquatic ecology survey was carried out for the Project in November 2021.

Creek line habitats

Ten assessment sites were located on unmapped waterways associated with the Project area. Water was present at only three of these sites which included one site with evident estuarine influence. Structural elements representing a waterway (i.e., defined banks, a riparian zone and instream flow paths) were not evident at several of the sites. The absence of such features occurs consistently along the natural drainage line as identified by current available aerial imagery. It is expected that water inputs (rainfall) are immediately drained by the sand substrates and flow through the vadose zone (i.e., sub-surface flows) following elevation contours. These would express at lower bed elevations through the drainage lines and at the mapped palustrine wetlands and further downstream dune

lakes. Further analysis and assessment on waterway features including determination of tidal/fresh waterways will be conducted during the EIS. If required, the lakes and adjoining features will be surveyed during the EIS process for the presence of fish and whether the adjoining features meet the waterway definition as per the *Fisheries Act 1994*.

Low macrohabitat diversity was observed across the wetland and creek systems associated with the Project area. Limited presence of large substrate such as cobbles and boulders suggest that when flowing riffle habitat is unlikely to occur in the creeks. The majority of sites assessed were found to be predominantly dry presenting limited to no aquatic habitat, whilst the remaining sites were pools consisting of rocky or sandy/silt substrate. Microhabitat was variable, with wetlands dominated by small woody debris followed by detritus and creek sites dominated by detritus and large woody debris. There is limited diversity across the Project area with no presence of blanketing silt and minor occurrences of undercut banks and periphyton observed at only two sites. Riparian plant species present ranged in structure from trees greater than 10 m in height (canopy) to grasses creating a diverse riparian zone at most locations.

Given the lack of water present aquatic flora diversity at the creek sites was low including three species associated with freshwater habitats and four estuarine species. Seventeen native fish species were recorded from creek sites. Ten of these were recorded from one site receiving estuarine input reflected in the presence of species associated with such habitat. No turtles were recorded. Evidence of the presence of Estuarine Crocodile (*Crocodylus porosus*) was observed at, or downstream of two sites. This species is listed as Vulnerable under the Queensland NC Act (Hydrobiology 2022a). If required, the EIS process will involve an assessment of impacts on the composition, function, structure of regional ecosystems within the defined distance of a watercourse will be conducted to determine potential significant residual and requirements of an offset.

Wetlands

The two mapped palustrine wetlands intersected by the southern boundary of the Project area are considered to be irregularly shaped wetlands and swamps consistent with those described in Pye (1982). They occupy the lower depressions between major dunes. These lakes have a wet season depth of more than 2 m, but 1-1.5 m is more common (Pye 1982). The west wetland contained a high cover of macrophytes, dominated by *Lepironia articulata*, and *Leptocarpus spp.*, while the east wetland had only fringing macrophyte areas. The lack of nutrients in such wetlands systems would limit diversity. There is evident connectivity between the two wetlands, though flows are only likely to occur during wet seasonal conditions. The baseline groundwater conceptualisation carried out for the Project considers the wetlands are disconnected from the water table and therefore are perched water bodies with an impermeable base which are not groundwater dependent. The groundwater assessment also concluded that further investigations are required (GA&S 2022). Wetlands under the VM Act will be distinguished from the Directory of Important Wetlands in Australia and where needed during the EIS process an assessment to identify significant residual impact will be completed which will determine if offsets are required.

Four aquatic flora species and four native fish species were identified at the wetland sites. No turtles were recorded. Evidence of the presence of Estuarine Crocodile was observed at the wetlands during the aquatic ecology survey.

6.7.2. Potential Impacts on Environmental Values

An aquatic ecology impact assessment undertaken by Hydrobiology (2022a) found that construction and operation phase impacts on aquatic ecological values of the Project relate mainly to aquatic habitat, biota, flow (habitat connectivity), water quality and the spread and introduction of exotic species. It should be noted construction impacts are associated with the installation of the MIA and other Project infrastructure. Operational impacts include the mining phase which will have a larger extent of influence. The potential impacts of the Project on aquatic ecology environmental values and the corresponding inherent risk ratings were:

- Mine infrastructure and active mine area disturbance areas reducing surface water catchment causing reduced surface water flows resulting in loss of macrohabitat – Moderate.
- Mine infrastructure and active mine area disturbance areas reducing surface water catchment causing reduced surface water flows resulting in loss of microhabitat diversity – Moderate.
- Mine infrastructure and active mine area disturbance areas reducing surface water catchment causing reduced access to feeding, nesting, and spawning resources, resulting in degradation of the health of aquatic ecology – Moderate.
- Mine infrastructure and active mine area disturbance areas causing changes to hydrology and hydraulics resulting in an impact to the health of aquatic ecology – Moderate.
- Mine infrastructure and active mine area disturbance areas causing changes to the water quality of local waterways resulting in degradation of the health of aquatic ecology – Moderate.
- Land disturbance from construction activities resulting in introduction and spread of aquatic weeds causing degradation of aquatic habitat in waterways – Moderate.
- Storage of chemicals and fuel results in accidental spills contaminating surface water resulting in habitat of local waterways – Moderate.

6.7.3. Management and Mitigation Measures

The Aquatic Ecology Assessment identified all the mitigation measures that are recommended for the Construction and Operation phases of the Project, which includes, but is not limited to the following:

- Clearing footprint will clearly be delineated and minimised as far as practicable.
- Land disturbance will be limited to the active mine area and disturbance footprint necessary for operation.
- Use of excavators or other suitable machinery will be no greater than the capacity required for the purpose.
- Vegetative material will be stockpiled away from watercourses.

- Upslope drainage will be constructed to divert clean catchment away from the active mining areas, with mine water runoff captured and then diverted towards the sediment basin.
- During extreme weather events any water in the mining area will be dewatered to the sediment basin (if the storage capacity is below the minimum operating volume) and/or allowed to pond to infiltrate into the soil over a longer period. The downstream edge of the mining area would be bunded, to prevent ponded water spilling into the receiving environment.
- Operational water supply will minimise as far as practicable the dewatering of groundwater or extraction of local watercourses.
- The active mine area will be staged with progressive rehabilitation occurring behind the advancing mine face, in accordance with the PRC Plan.
- Runoff, erosion, and sediment control measures will be installed and maintained, as per the requirements outlined in the Project ESCP and SWMP.
- No watercourse crossings are proposed. All vehicles will be confined to maintained tracks and roads to minimise dust.
- Regular monitoring of water quality and storage volumes in the water storages will be undertaken to support management actions and to prevent uncontrolled releases.
- Personnel will undertake site inductions including education and awareness training of impacts of aquatic weeds to aquatic ecosystem values.
- Access tracks around the perimeters all disturbed areas will add an additional buffer that will limit weed dispersal distances.
- Areas subject to progressive rehabilitation will be regularly inspected for weed presence. Management controls will be developed and implemented where necessary.
- A Weed and Pest Management Plan (WPMP) will be required and will include, but not be limited to:
    - Monitoring and control frequencies (treatment methods and number of treatments required).
    - Appropriate decontamination procedures for vehicles, machinery, and other construction equipment internal to and those vehicles and equipment leaving the site.
- All vehicles, plant and equipment required on-site will be in good condition, and will be regularly maintained and inspected for leakages, in order to minimise the risk of contaminant spill.
- Bulk chemicals and fuels will be stored and managed in accordance with the Spills Management Procedure (SMP) within the CEMP and OEMP.

- Refuelling of mobile plant and vehicles will occur at designated areas within the Project. These areas will be suitably distanced from surface water bodies and drainage lines.
- Spill kits for chemical and hydrocarbon spills will be available at refuelling points with personnel trained in their use.
- The spills emergency response plan within the CEMP and OEMP will be followed in the event of an accidental spill or release.
- There will unlikely be any releases from the proposed sediment basin (WRM 2022). Should the storage capacity (minimum operating volume) be exceeded then releases are to be managed in a way which will not increase peak discharge rates to local waterways.

A marine plant rehabilitation plan will be provided for both the temporary works area after construction and the permanent works area after the life of the mine. An environmental risk assessment was completed for all identified aquatic ecology impacts to receiving environments and the residual risk after implementing the management measures was low to moderate. Where required, an in-depth flora and fauna assessment will be undertaken during the EIS process and will consider regulated vegetation, wetlands, regional ecosystems, essential habitat, ecological processes, and watercourses. This is to assess impacts of clearing on the composition, function, and structure of these values, identifying whether the clearing will cause a significant residual impact and require an offset.

6.8. Marine Environment

6.8.1. Existing Environment

6.8.1.1. Coastal Processes

The coastline of Far North Queensland experiences a range of hydrodynamic, wave and extreme weather-related processes that are linked through dependent and independent variables, including astronomical tide, local storms and cyclones, interaction of storm surges along the open coastline and the Torres Strait and local wave climate, including any sheltering provided by headlands and nearshore islands.

Astronomical tide is the regular periodic variation in water levels due to gravitational effects of the moon and sun. Storm surge is the combined result of the severe atmospheric pressure gradients and wind shear stress of the storm acting on the underlying ocean. Longshore sediment transport is when waves arrive at oblique angles to the coast, they cause sediment suspended in the water column to flow parallel to the coastline orientation. Generally, Far North Queensland and the east coast of Australia, the transport direction is toward the north due to prevailing south to south-easterly waves (JBPacific 2022).

6.8.1.2. Bathymetric Considerations

Cape Flattery is in a sheltered location, locally protected from prevailing wave conditions by a headland as well as from deep water conditions beyond the GBR. The elevation profile of the proposed jetty alignment, with formalised slope shoreline works, starts at an elevation of approximately 10 m AHD at the start of the jetty, maintaining a height above water level factoring in potential storm surge.

The Cape Flattery location has a relatively flat nearshore slope due to the site being primarily tide-dominated.

Due to this, the jetty for transhipment will be designed to be 400 m in length to reach deeper water, as the depth at berth will need to be approximately 4.5 m LAT. Under keel clearance is ~10% of draught, with proposed out loading rate of 1,000 to 1,500 tph. The MOF will be comprised of pile mounted prefabricated concrete sections totalling at least 200 m in length to achieve a depth at berth of approximately 3.0 m LAT.

6.8.1.3. Marine Habitat

The marine habitat values associated with the Project area were surveyed in November 2021. The waters immediately offshore from the JIA comprise:

- An intertidal rocky shoreline with scattered mangroves present along the upper edge.
- A fringing reef community dominated by macroalgae with some corals.
- Patchy seagrass meadows.
- Bare sandy benthic substrate offshore from the seagrass meadows.

The rocky shore habitat extends continuously except for some sand coverage at the mouth of an unnamed creek to the immediate north-east of the JIA. The fauna of this habitat was generally restricted to molluscs that can tolerate high energy wave action such as chitons, limpets, and some snails, in addition to encrusting fauna such as barnacles and oysters. Within the interstices between rocks there was an abundant and diverse micro and macroinvertebrate fauna.

The fringing reef community runs adjacent and parallel to the rocky shoreline. This is a rocky reef dominated by microalgal mats and algal forests characterised by Sargassum species (estimated 64.2 percent coverage). Hard corals and soft corals maintained an estimated coverage of 12.9 percent and 3 percent respectively in this community. Hard corals were dominated by Acroporid and Corymbose coral taxa. Bare sea floor comprised 16.5 percent coverage. The jetty has been designed to avoid direct impact (i.e. piling) to this community.

Seagrass meadows occur in the lower intertidal to subtidal zones with the largest meadows (with respect to area coverage) being observed approximately 3–10 m offshore of the fringing reef (being separated by bare sandy substrate). Three seagrass species were observed: *Halodule uninervis* (dominant), *Halophila spinulosa* and *Halophila ovalis*. Seagrass cover fluctuates in the mapped area with several sparse to thick seagrass areas. Seagrass cover generally ranged between approximately 10-30 percent coverage.

6.8.2. Potential Impacts to Marine Environment

6.8.2.1. General nearshore wave conditions assessment

Modelling of general nearshore wave conditions at Cape Flattery, undertaken by JBPacific (2022), has demonstrated that the site is subject to mild wave conditions due to the headland protection from larger south-easterly conditions with the average wave height at the jetty and MOF site being 0.2 m, with the maximum height being up to 1.2 m.

The Project works that extend into the coastal zone include the piled jetty and MOF. Given the structures are piled, the expected impacts are considered low to local waves and are not expected to affect nearshore wave conditions.

Wave modelling and analysis was also undertaken by Royal HaskoningDHV (2022) to derive Metocean conditions at four offshore transhipment sites and one site close to the future jetty site at Cape Flattery in association with the Project.

6.8.2.2. Non-cyclonic tide conditions assessment

As assessment of non-cyclonic tide conditions was undertaken using the DELFT3D-FLOW model which estimated the tidal currents and velocities at the project site. The model also used input tidal conditions from the TXPO global tidal model and was calibrated against the recorded data from the storm tide gauge at Cooktown, approximately 76 km south of the Project site.

Peak tide velocity varies along the length of the jetty and MOF jack-up barge zone, with peak conditions at the most seaward point of the jetty around 0.26 m/s. Minor impacts to tidal flows are predicted due to the formalisation of the shoreline directly in front of the JIA platform which may reduce flow velocities by 0.2 to 0.01 m/s. This impact is considered low, with highly localised effects.

A desktop analysis of the local scour effects was undertaken to estimate scour at the base of the structure piles, which was initiated by hydrodynamic forces interacting with an obstruction. Coastal structure, including piers create obstructions to flow which can increase local scouring effects through processes such as altered local flow patterns, increase wave reflection, altered soil pressure and liquefaction.

The assessment concluded that as the piles will mainly be constructed across a rocky outcrop, they would not be susceptible to scour, however the property of the seabed stratum beyond the fringing rock layer is unknown. To protect the piles against scour, rocks may be used to secure the material at the base of the pile.

6.8.2.3. Cyclonic tide and wave conditions assessment

An assessment of cyclonic tide conditions was undertaken using the DELFT3D-FLOW model which estimated the cyclonic conditions at the site. This model also used input tidal conditions from TXPO global tidal model and cyclone data from IBTrACS South Pacific dataset and was calibrated against the recorded data from the storm tide gauge at Cooktown during historic cyclone events.

The calibrated cyclone model was used to estimate storm surge and wave conditions at Cape Flattery during Tropical Cyclone (TC) Ita which occurred in 2014. The model showed a residual surge at the Project site, with a maximum surge of 0.83 m and during the TC, a peak wave height of 2.3 m.

6.8.2.4. Sediment transport and shoreline assessment

A comparison of the Project to the potential Longshore Sediment Transport (LST) rate was undertaken to determine any impacts to sediment transport and shoreline alignment. The potential LST was estimated using the JBP Beach Evolution Model (JBEM) using simulated nearshore wave conditions. The LST rate at the Project site was found to be minor (~11,000 m3/year) with actual rates assumed to be smaller (potentially half this rate).

Beach shape is driven by LST, with any structures extending through the active coastal zone able to influence beach shape and cause erosion. The jetty and MOF both extend into the coastal zone, and the impacts to alongshore sediment transport are considered low and are not expected to have a significant effect on transport in the immediate area or significantly reduce down-drift of sediment to adjacent beaches.

In summary, the coastal processes assessment undertaken by JBPacific (2022) found that coastal works part of the Project (construction of the jetty, MOF, and piling) is not expected to have a significant impact on local natural coastal processes, with the exception of:

- Potential localised scour around jetty piles of <0.7 m at the most seaward location.
- Pressure impact at the seafloor below piles of jack-up barges.
- Potential for minor reduction of tidal velocity due to formalisation of the MOF shoreline slope.

6.8.2.5. Marine Traffic/Shipping

As investigated in the marine shipping assessment undertaken by Thompson Clarke Shipping (2022), the inshore marine area associated with the proposed port infrastructure is currently subject to little disturbance apart from activities associated with recreational camping on the nearby Connies Beach shoreline. The offshore waters are located within the Cape Flattery Port limits and are subject to existing shipping movements. These are largely associated with CFSM project activity including ship loading at the CFSM jetty to the south of the proposed action and smaller vessel movements carrying equipment/personnel to a barge landing near the accommodation area to the west of the Proposed Action.

The extent and design of port infrastructure has been minimised in extent as much as is feasible. Transhipment activity between the JIA and OGVs will occur within the Cape Flattery Port Limits which are within the Great Barrier Reef World Heritage Area (GBRWHA) but not the GBRMP. OGV shipping movements will occur on average once every week, and when outside of the Port of Cape Flattery limits, will be undertaken within existing shipping routes. As such, OGVs will be operated and controlled by others to comply with AMSA and Reef VTS requirements for movement through the GBRMP. The Project's releases from the proposed sediment basin and/or mining operations to the coastline are not anticipated and would have negligible impact on the GBRWHA given the distance. Furthermore, OGV shipping through existing shipping channels is not considered to have an impact to the GBRWHA.

Transhipment barge movements are not expected to directly impact, or cause additional impact, to large marine fauna through collision (due to low vessel speeds) or impact habitat suitable for foraging. Potential for boat strike will be minimised using methods in a Vessel Traffic Management Plan, and the National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (DEE 2017).

Shipping activity within the Port of Cape Flattery area will be required to operate under the existing Ports North management of the area including the Port of Cape Flattery Port Rules (Ports North 2022), Port Procedures and Information for Shipping – Cape Flattery, Cooktown, and Port Douglas (DTMR

2021), and management measures described in the Port of Cape Flattery – Environmental Management Plan (Ports North 2014).

The introduction of exotic marine pest species will be managed under a Project specific Ship-sourced Pollution Prevention Management Plan which includes management of ballast water.

6.8.2.6. Underwater Noise

Construction noise generated from pile driving required for the jetty can potentially disturb marine animals, particularly marine mammals (whales and dolphins) and turtles (DPTI 2012). Underwater noise can result in behavioural impacts such as changes in breathing patterns, changes in vocalisation and avoidance, and physiological impacts such as temporary or permanent hearing loss.

During operation, sudden loud, impulsive or impact noises may startle fauna, which can affect feeding and breeding behaviour in some species if occurring over the longer term. These impacts are expected to occur to fauna using the habitats within and immediately adjacent to the Project infrastructure. Whilst operations at the marine infrastructure is expected to increase background noise above and below water, this would be less than what is experienced during construction. Noise generation during operation will be associated with increased vehicle movements, boat activity and human activity.

The inherent impacts from underwater noise are considered moderate and low for construction and operation, respectively. Given the distance between the Project and sensitive areas of the Marine Park, noise impacts into the Marine Park are considered minimal and an underwater noise impact assessment will be conducted and assessed against the relevant controlling provisions significant impact criteria during the EIS process where required.

6.8.2.7. Fauna

A marine ecology impact assessment was undertaken by Hydrobiology (2022b) which found that the following impacts on marine fauna are expected to have the potential to occur during the construction and operation of the Project:

- Indirect water quality impacts.
- Noise impacts generated from piling activities.
- Light pollution from construction lighting.
- Increased risk of vessel strikes.
- Potential introduction of non-native and invasive marine species.
- Water quality impacts from spills, leaks, introduction of litter and sewage.

Pile driving activities have the potential to impact on water quality from the generation of minor localised turbidity due to sediment disturbance and land runoff. The expected suspended sediment concentrations will generally be below what is associated with dredging and any land run off will largely be mitigated via appropriate erosion sediment control measures which will be defined in a Stormwater Management Plan.

Light pollution generated from construction activities is expected to occur which can affect the behaviour of some wildlife and may disturb the activities of those active during the night. The National Light Pollution Guidelines for Wildlife (Commonwealth of Australia, 2020) dictates that light pollution impacts should be considered where there is important habitat for a listed species known to be affected by artificial light within 20 km of a project. No turtle nesting sites were observed within the immediate Project area, however a nesting record exists from 1996 of the conservation significant Leatherback turtle (Dermochelys coriacea), within 4 km of the Project area on the opposite side of the headland past the Port of Flattery. As the 20 km threshold provides a nominal distance at which artificial light impacts should be considered, not necessarily the distance at which mitigation will be required, it is likely that the mountain between the Project and the known turtle nesting area block light impacts.

There are commercial trawlers that currently take respite in the bay from windy conditions as needed and represent a frequent presence of commercial vessels in the area and a higher baseline for activity. The Project will contribute to an increase in boat traffic in the area during construction and operation, which will result in an increased risk of underwater noise. Without management, this increased boat traffic may result in boat strikes to marine animals. Proven mitigation measures will be implemented to reduce this potential impact through known management planning processes.

There is also the potential for the increase in vessel movements during construction and operation to introduce non-native and potentially invasive marine species. These can be carried in the ballast water of vessels or in fouling communities residing on vessel hulls. Management plans will be developed in line with relevant legislation which will outline mitigation measures to reduce impacts from ballast water, including and appropriate retention and discharge requirements of ballast waters. Processes to establish the mine and associated infrastructure in this location, will ensure that appropriate steps are taken to prevent the introduction of invasive plants and animals into this area during the construction of the mine and throughout its operational life.

6.8.2.8. Flora

Construction impacts on marine flora are expected to be mainly on the physical disturbance to the benthic habitat, particularly the removal and modification of marine habitat and operational impacts, mainly through the shading from the jetty and MOF. **Figure 21** and **Figure 22** show the proposed areas of impact for each habitat (mangrove, reef, rocky intertidal and seagrass). It is estimated that based off the wider infrastructure footprint required for construction, a maximum removal of approximately 497 m^2 of the rocky intertidal zone. The directly impacted area represents approximately 0.6 percent of the study area and 0.3 percent of the rocky intertidal habitat of the wider region. Currently, there is no existing highest astronomical tide information (HAT) mapping for Cape Flattery found within the Queensland Government Spatial Database, with Cooktown being the closest area to the Project site with HAT information. HAT surveys have not been conducted during this stage, however this will be investigated further during the EIS process where required.

The design of the jetty will ensure a minimum span of around 35 m over reef habitat to avoid direct impacts from clearing. An estimated area of 516 m^2 of reef habitat may be impacted by the MOF and jetty due to localised shading effects. The marine ecological values are displayed in **Figure 21**. It is

noted that within the fringing rocky reefs, microalgal mats and algal forests have been identified. Marine algae is a marine plant, and impacts to these marine plants will be avoided where possible. Any unavoidable impacts to marine algae will be calculated into the impact area footprint and minimised and mitigated to the greatest extent possible.

The results of the seagrass survey showed that seagrass was generally restricted to the lower intertidal to subtidal zones of the area with the largest meadows being observed approximately 3 to 10 m behind the fringing reef. The seagrass community was largely dominated by *Halodule uninervis*, interspersed with *Halophila spinulosa*, and *Halophila ovalis*.

Direct impacts to seagrass through construction include the removal of seagrass for the pilings, comprising an area of 400 m^2. This represents 0.5% of the total known seagrass meadows within the study area. The jetty and MOF will also result in indirect impacts from shading, albeit localised, affecting an area of seagrass of approximately 1,059 m^2. Light is an essential element to support seagrass growth and resilience and with a decrease in sunlight, seagrass can become vulnerable to the effects of turbidity, therefore the ongoing direct impacts will be considered equivalent to a permanent impact within the subsequent EIS.

The unmitigated impact from loss of seagrass, intertidal and reef habitats is characterised as moderate because of the intact nature of the habitat, noting that in regional context, this area is very small. During the EIS process a suitably qualified person and/or entity will identify all potential impacts to marine plants and inherent marine plants from all aspects of the proposed works. This includes all marine infrastructure (jetty, marine offloading facility, piles, barge loading, jetty hopper, swing basin with mooring, anchorage area, vessels, access track, ancillary aspects, etc.) and terrestrial infrastructure.

Permanent impacts will include the permanent structures and ongoing indirect impacts associated with the ongoing mine operation, such as shading to seagrass meadows (from fixed and non-fixed infrastructure), boat wash disturbance, trimming of mangroves to keep infrastructure clear etc.

There are likely temporary impacts to marine plants for the construction of the mine infrastructure. Temporary impacts are those that, once completed, will allow marine plants to recolonise or grow back to pre-disturbance condition in a timely manner and in a situation where they will not be impacted again. The subsequent EIS will demonstrate rehabilitation of temporary impacted areas and where avoidance of marine plant impacts cannot be achieved, the EIS will outline how impacts will be minimised and mitigated to the greatest extent possible.

6.8.2.9. Great Barrier Reef

The project and entirety of the Cape Flattery Port Limits is located within the limits of the GBRWHA, National Heritage Area and GBR catchment area. The headland waters of Cape Flattery, known as the operating port extent, within which the project lies, is excised from the GBRMP (**Figure 17**). The GBR was declared a World Heritage Area (WHA) in 1981 based on its 'outstanding universal values' (OUVs). Epic Environmental undertook a GBRWHA impact assessment in 2022 for the project. The project is located 2.3 km from the boundary of the GBRMP at its nearest point. The GBRWHA is listed as a MNES under the EPBC Act, the majority of the Project lies on terrestrial land adjacent to the GBRWHA,

however the marine infrastructure (Jetty and MOF) is located in waters of the GBRWHA. Transhipment activity associated with the Project will also occur in the waters of the GBRWHA, as such the Project has the potential to impact the OUVs that contribute to the GBRWHA.

Ports North manages activities in the marine environment within the Cape Flattery Port limits through the Port of Cape Flattery Environmental Management Plan 2014. Ports North seeks to 'manage our ports in a pro-active manner to minimise any impacts from port operations or new developments' through a structured environmental program that involves environmental assessment, monitoring, protection and rehabilitation'. The project will operate within the existing and future management framework implemented for the Port of Cape Flattery area.

The potential impacts of the Project to the GBRWHA are both direct and indirect, although the impacts associated with sand mining are considered relatively benign. Direct impacts are largely associated with the construction of the jetty, MOF and vessel movements. Indirect impacts may include dust, noise and light pollution.

The design, location and construction of the jetty and MOF have been revised over several iterations in order to reduce impacts to sensitive marine habitats in the local area (**Figure 22**). As such, there will be no direct loss of any of the scattered low-growing mangroves or the fringing reef and minimal localised impacts to seagrass restricted to the piling area for each support pillar.

The accidental release of pollutants from Project activities has the potential to impact the surrounding environment and downstream freshwater and marine environments. The greatest risk may arise from the accidental discharge of diesel and other fuels to the environment during transfer of fuel to onshore storage tanks, or via the pump-out of sewerage systems from barges, tugs and service vessels. Spills and accidents resulting in the release of chemicals or fuels to the marine environment are not considered a substantial risk from the project. The application of standard operating controls are considered to substantially limit the likelihood of such impacts.

OGV shipping through existing shipping channels is not considered to have an impact to the GBRWHA. The project is predicted to have a minor but very localised impact to some of the OUVs and no impact on large marine fauna or seabirds/shorebirds is predicted as a result of the activities. An initial assessment of the impacts, mitigation measures and assessment against the EPBC Act referral guideline OUVs for the project was undertaken by Epic Environmental with significant impact on the OUVs of the GBRWHA found to be unlikely.

6.8.3. Management and Mitigation Measures

With planned rehabilitation to be undertaken consistent with the PRC Plan for the Project and reduction of the disturbance footprint as much as possible, the residual impact to the marine environment is minor. Ongoing coastal process monitoring will be undertaken through the life of the Project to continually assess the potential for impacts on the coastal environment. Potential impacts of mining operations and transport routes on the environmental values of the GBR will be assessed during the EIS process.

Shipping frequency is yet to be finalised; however, a vessel traffic management plan is being prepared which will include mitigation measures, such as reduced speeds, and modification of vessel routes to

avoid areas of known density such as humpback migration paths. There has been no previous reporting of vessel strike in the area, likely due the under-representation in studies and the lack of reporting in the area.

A Ship-sourced Pollution Prevention Management Plan, Marine Execution Plan, and Aids to Navigation Management Plan, will also be prepared to outline the impacts and associated management measures for all relevant environmental matters. Mitigation and management measures on potential GBRMP impacts will be further assessed during the EIS process.

Through implementation of mitigation measures, residual impacts from underwater noise could be reduced to low. Mitigation measures that will be implemented include:

- If required avoiding undertaking piling activities during times when marine mammals are present.
- Ensuring all team members involved in pile driving are briefed on marine mammal identification.
- Continual visual monitoring for marine mammals during piling activities.
- Implementation of procedures for pre-start, soft start, shut-down, and normal operation scenarios.
- Periodic monitoring of operational noise levels and comparison to standard guidelines.

The marine infrastructure design has been through multiple revisions to reduce the impacts on mangroves, reef systems and seagrass beds including repositioning of the MOF ramp and pilings and jetty pilings (**Figure 21** and **Figure 22**). Impact and offsets for removal of marine plants will be determined and finalised during the EIS process.

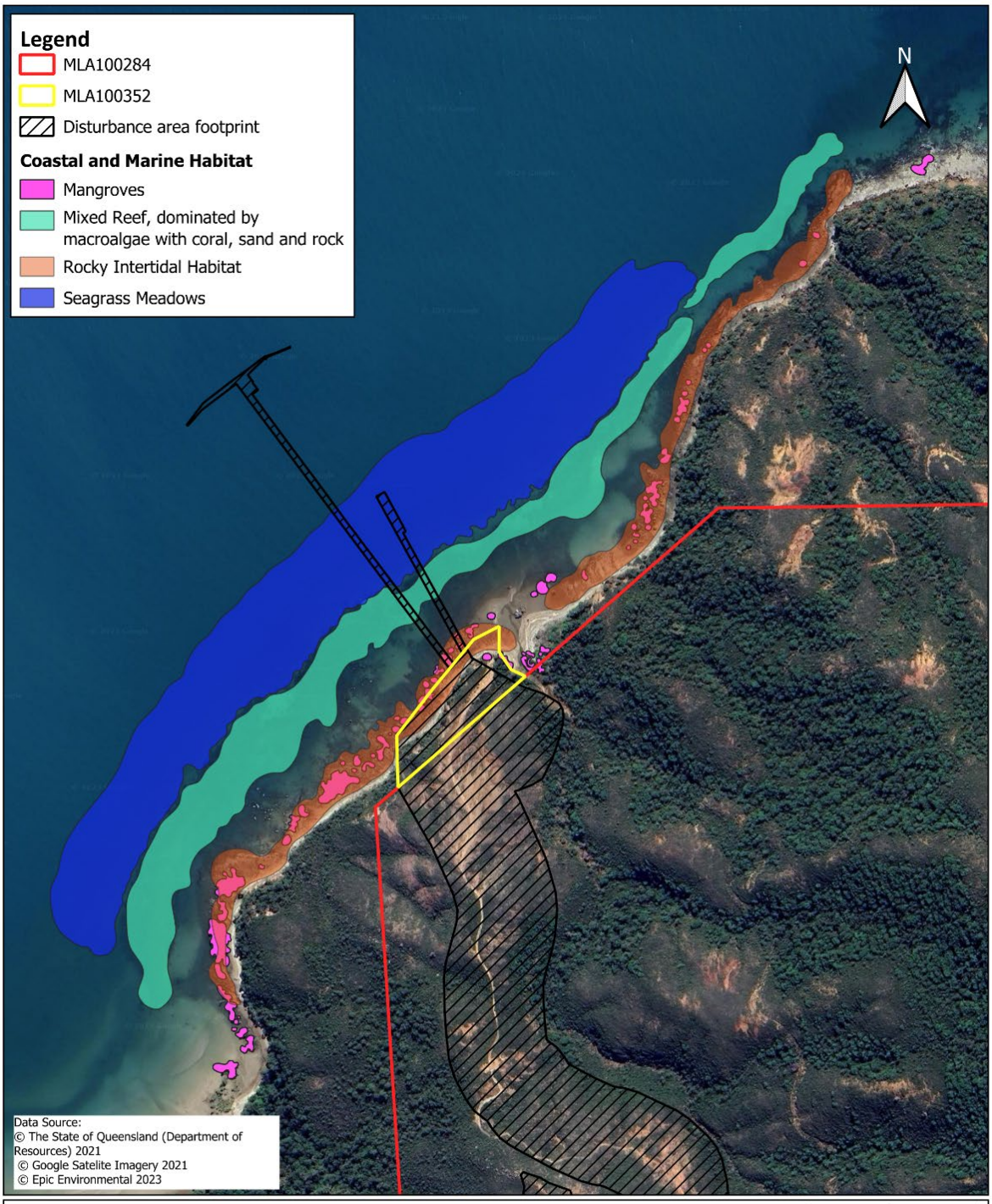

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Figure 21 – Marine ecological values

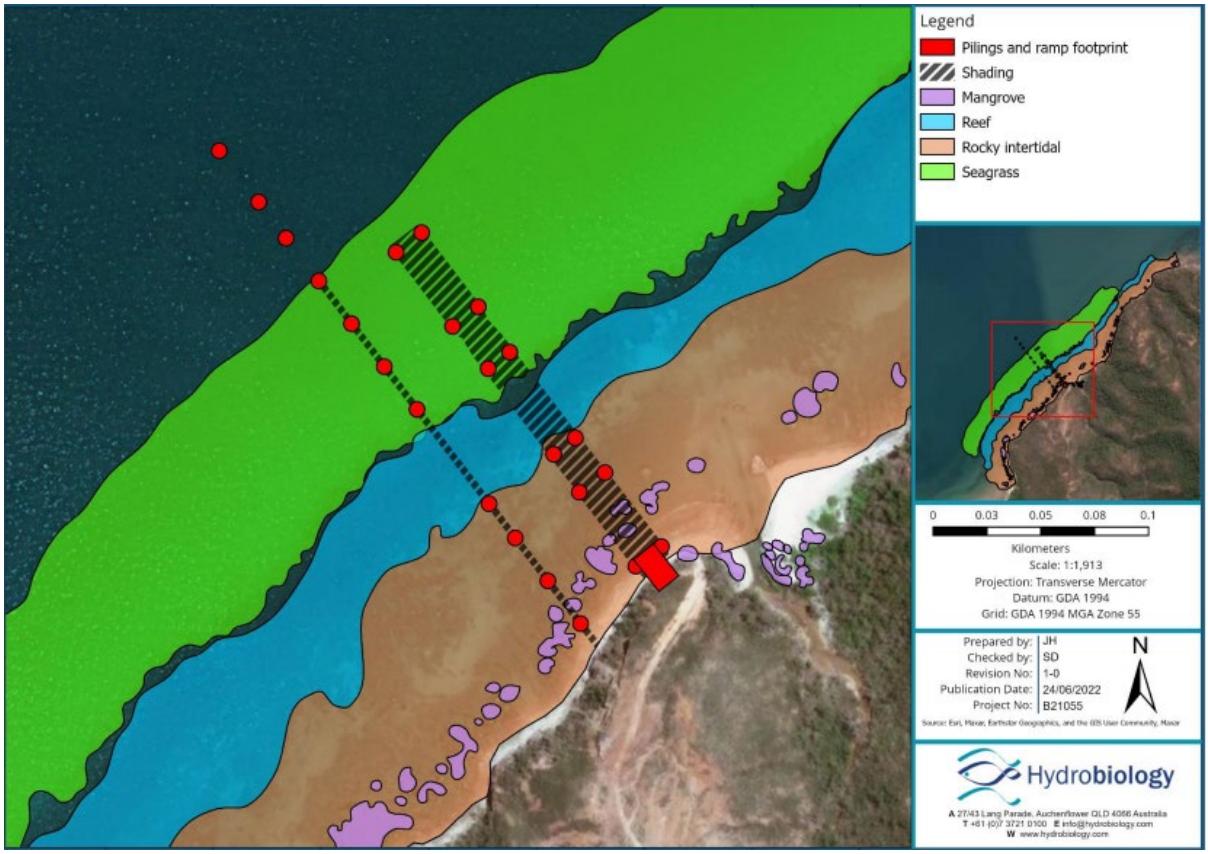

Figure 22 - Marine infrastructure and associated impacts to marine values

6.9. Traffic and Transport

6.9.1. Existing Environment

The Project area is currently only accessible via a combination of gazetted roads and non-gazetted tracks, including an access track limited to TOs and those with consent to enter the Connies Beach area, and along the eastern coastline. However, this route will not be utilised by the Project for the transport of goods and/or people.

It is proposed that all personnel during construction and operation will travel via boat from Cooktown to the Project area. Local personnel will be transported via shuttle bus to the Cooktown Marina or Cook's Landing, and personnel in Cairns will be transported via plane on a weekly basis to the Cooktown Marina or Cook's Landing for embarkation.

Annual Average Daily Traffic (AADT) volumes were determined for the traffic impact assessment (PTT 2022) for the Captain Cook Highway, Comport Street and Endeavour Valley Road in the vicinity of the Tingira Street Wharf in Cairns and Cooktown Marina in Cooktown.

All extracted material will be transported from the Project area via ship to overseas destinations, and all other mine inputs and outputs will also be transferred to and from the Project area to Cairns via barge.

6.9.2. Potential impacts to Traffic and Transport

6.9.2.1. Construction

A traffic and transport impact assessment undertaken by PTT (2022) determined that during construction, an additional 40 personnel car trips per day (on shift changeover days) is expected on the Captain Cook Highway in the vicinity of Cairns Airport, which equates to 0.10% of the existing AADT. This is an extremely small increase to the network. Similarly, the addition of up to two trucks per day to and from Tingira Street Wharf equates to 0.01% of the existing AADT. Therefore, additional personnel related trips and truck movement to and from Cairns Airport generated by the construction phase is not expected to adversely impact traffic operations or safety in Cairns.

Construction traffic movements at the Cooktown Marina would be highest on shift changeover days and zero on the other six days of the week. This will include two bus movements and up to 20 car trips per day, which will cause a marginal increase to traffic generation at Cooktown Marina. Thus, the proposed development is not expected adversely affect traffic operations or safety in Cooktown. The corresponding inherent risk due to potential impacts to traffic in the construction phase is low to negligible.

6.9.2.2. Operation

During operation, an additional 40 personnel car trips to Cairns Airport on shift changeover days equates to a 0.10% increase of the existing AADT. At the Cairns wharf area, there is expected to be an addition of one truck trip per day to and from the wharf.

Operational traffic movements at the Cooktown Marina would to be similar to those during the construction phase with no more than 12 to 22 vehicles per day on shift changeover days. The local road network has ample spare capacity to accommodate this marginal increase in traffic.

Therefore, the proposed Project is not expected to adversely affect traffic operations or safety in Cooktown in Cairns during the operational phase. The corresponding inherent risk due to potential impacts to traffic in the operation phase is low to negligible (PTT 2022).

6.9.3. Emergency Access

Emergency access will occur via helicopter and marine vessels. Site evacuation will occur via crew transfer vessels or passenger planes through the use of CFSM airstrip. CFSM have provided CFS with permission to use their airstrip for emergency access only, not operational use.

6.9.4. Management and Mitigation Measures

To minimise impacts on the surrounding road networks, it is proposed that a bus will be provided to transport local personnel from Cooktown and Hopevale to and from the Cooktown Marina, and Cairns personnel to and from Cooktown Airport to Cooktown Marina. This will minimise increases to traffic generation and safety risk from Project-related personnel travel.

All personnel, once onsite, will largely move between areas by foot, and any required operational vehicles will be confined to maintained tracks and roads, to limit impacts to environmental values onsite.

Additional justification and mitigation measures that will be implemented includes:

- Changes in traffic conditions on roads or paths will be comprehensively communicated to emergency services, public transport operators, other road user groups and other affected stakeholders.
- There will be adequate room for trucks, buses, and other Project vehicles to queue off the public road at the Marina without causing disruptions to the road network.
- All extracted material will be transported from the site by sea to overseas destinations.
- Offsite vehicles required for the Project will be minimal and will be garaged in Cairns and Cooktown as required.
- Access to the site is completely separate to the road network, with personnel and mine inputs and outputs accessing the Project jetty via sea transport.
- All Project vehicles will either unload supplies onto the barge and drive away from the Port, or be directly loaded onto the barge, to be transported to the Project. No parking is proposed for deliveries.
- Vehicles required onsite during construction and operation will remain on site.
- A complaints register will be maintained and actioned appropriately.
- Any community enquiries will be responded to appropriately.
- Use of vehicles within the MLA during construction and operation will be in accordance with the Traffic Management Plan included in the CEMP and OEMP.
- Any required operational vehicles will be confined to maintained tracks and gazetted roads.

Adequate signage will be installed and speed limits will be maintained to reduce the risk of a traffic accident. An environmental risk assessment was completed for all identified traffic impacts and the residual risk after implementing the management measures was low as reasonably achievable.

6.10. Social and Economic

6.10.1. Existing Environment

The term “stakeholder” includes any individual group or organisation interested in, affected by, or has the capacity to impact on the Project and could include direct landholders, adjoining landholders, Federal, State and Local government agencies, Indigenous groups, government service representatives, local community, surrounding region, elected representatives, business and commercial leaders / representatives and special interest groups. Further details on operational workforce requirements, likely sources of labour, and accommodation facilities are described in **Section 3.9**.

Key stakeholders who would potentially be directly or indirectly affected by the Project were identified. This list will be reviewed and expanded throughout the ongoing consultation and

engagement process. Various individuals and groups will have differing degrees of interest and influence over the Project, and at different stages of the Project.

The Project has identified the following stakeholder groups:

- TOs.
- Private landholders.
- Federal, State and Local Government including representatives and agencies.
- Business operators and representatives.
- Special interest groups.
- Local community

Table 14: Stakeholder Summary

Group	Stakeholders
Traditional owners	Dingaal and Nguurruumungu people
Landholders	Hope Vale Congress are registered as the owner of Lot 35 SP232620. Due to the large extent of the Lot, which the Project is part of, there are various landholders identified who have households in the same Lot. The landholders will be identified within the DFS phase and will be engaged in consultation about the Project.
Commonwealth, State, and Local Government including representatives and agencies	DCCEEW Leichhardt Federal Division DES Department of Resources DRDMW Department of Agriculture and Fisheries (DAF) Department of State Development, Infrastructure, Local Government and Planning Department of Transport and Main Roads MSQ Cook State Electorate HVASC Cairns Regional Council Cook Shire Council

Group	Stakeholders
	Queensland Police Queensland Ambulance Service Queensland Fire and Emergency Services Queensland Health Cooktown Airport Ports North
Business operators and representatives	Hope Vale and other surrounding regional businesses, including CFSM, accommodation providers, retail outlets, contractors, trades and services
Special interest groups	Community associations Educational providers Sporting and social groups Employment services Major event organisers
Community	Interested members of the Hope Vale Aboriginal and Cook Shires and North-West broader region

6.10.2. Community and Stakeholder Consultation

- A pre-lodgement meeting with the State Assessment and Referral Agency (SARA) in November 2021, including representatives from MLM, Epic Environmental, SARA, Cook Shire Council, MSQ, DAF, DES, DoR, RPS Group and Ports North.
- Ongoing meetings and correspondence with the DRDMW regarding the water licencing approval pathway.
- Ongoing Project update meetings and discussions with the DES regarding an EA application and the accompanying PRC Plan.
- Correspondence and meetings with DCCEEW regarding MNES associated with the Project and the EPBC Act referral and assessment process.
- Discussions with Ports North for the Development Application and Owner's Consent.
- Ongoing consultation and Project updates with the Department of Resources, Hopevale Congress, Ports North and MSQ Landowner's Consent and lessee requirements associated with marine infrastructure.
- Regular correspondence with TO's, direct and adjacent landholders to provide Project updates.

- Consultation with Cairns Regional Council and Cook Shire Council in regards to use of infrastructure such as airports, waste services and marine facilities.

6.10.3. Other Permits and Approvals

Potential Project impacts and benefits include:

- Regular correspondence with TO's, direct and adjacent landholders to provide Project updates.
- To plan the required workforce for the Project, as soon as agreements are executed with the Traditional Landowners, a skills audit will be completed. A key outcome of the skills audit will be the identification of training programs that will need to be implemented in the two years leading to first production. The Project intends to invest in training programs for the local community to set up pathways for the required future employment opportunities.
- Direct benefits through workforce employment. The Indigenous employment target for the Project is 40%. This target will require approximately 35 full time employees to be Indigenous appointments. These jobs will deliver positive impacts to the residents of Hope Vale and Cooktown in addition to qualified personnel who may choose to return to these towns.
- Indirect benefits for businesses in Hope Vale and Cooktown through the purchase of goods and services.
- Contributing to manufacturing across traditional and emerging industries. The Project could be a contributor to the Queensland Government's New Industry Development Strategy, potentially delivering solar panel manufacturing in far North Queensland.
- Creating infrastructure that supports the resilience and prosperity of the region.
- Contributing to the growth of the region through attracting people and investment, and driving sustainable economic prosperity.
- CFS has also identified other community programs to invest and co-invest such as forming an alliance with the Former Origin Greats (FOGS) organisation for the employment of sport liaison officer/s to organise sporting activities for the youth of Hope Vale (most likely rugby league, a code that many women in Hope Vale wish to participate in).

A Social and Economic Impact Assessment will be undertaken to identify social and economic impacts and any residual risk after implementing the management measures.

The Project will seek to establish an operational local employment and economic opportunity strategy which will have a positive economic impact by providing direct and indirect economic benefits to the communities of North Queensland.

6.10.4. Management and Mitigation Measures

Economic and social impacts from the Project and mitigation measures are being investigated further in the EIS process. CFS have and will continue to work with TOs through comprehensive stakeholder engagement and will seek employees from within the local Indigenous population where suitable candidates are available. CFS has been proactive in developing connections with local community

members and in particular, Hope Vale Congress Aboriginal Corporation RNTBC Trustee – on behalf of the Nguurruumungu Clan, and Walmbaar Aboriginal Corporation – on behalf of the Dingaal Clan. CFS continue to conduct monthly consultation with the groups in development of an ACHA and to provide updates on the Project.

Further information can be found in the DFS for the project.

6.11. Cultural Heritage

6.11.1. Existing Environment

6.11.1.1. Indigenous Cultural Heritage

The Project area is located within the native title determination of Hope Vale (Tribunal no. QCD1997/001) which is shared by Hope Vale Congress Aboriginal Corporation RNTBC, on behalf of the Nguurruumungu People, and Walmbaar Aboriginal Corporation, on behalf of the Dingaal People. Previous research from nearby sites and within the broader region also indicates that Indigenous communities used the area in the past. Rowland and Connolly (2002) created a distribution of archaeological sites according to bioregions based on the record of registered sites in Queensland. Their research indicates that artefact scatters (stone artefacts) are expected to be encountered within the Project area.

On 31 March 2021, Metallica signed Aboriginal Cultural Heritage Agreements with Hope Vale Congress Aboriginal Corporation and Walmbaar Aboriginal Corporation. The ACHAs provide Metallica with a process that allowed drilling to occur off the existing tracks within EPM 25734 in July/August 2021 (Metallica 2022).

In Queensland, Aboriginal cultural heritage values are protected under the Queensland *Aboriginal Cultural Heritage Act 2003* (ACH Act) or the *Torres Strait Island Cultural Heritage Act 2003*. A search of the Department of Senior, Disability Services and Aboriginal and Torres Strait Islander Partnerships (DSDSATSIP) database identified the following records within the Project and its surrounds:

- Cultural site (ER:61) within the Project area
- Landscape feature (ER:654) within 200 m buffer of the Project area.

6.11.1.2.Native Title

The Project is located wholly within the native title determination of QUD174/1997 Hope Vale (QCD1997/001). The Project's EPM 25734 is located on native title freehold land (Lot 35, SP 232620), which is held by Hope Vale Congress Aboriginal Corporation. Native title is shared between Hope Vale Congress Aboriginal Corporation RNTBC Trustee (Nguurruumungu Clan), and Walmbaar Aboriginal Corporation (Dingaal Clan). An ILUA will be entered into with CFS and the TO's for mining activities.

6.11.1.3. Non-Indigenous Cultural Heritage

Non-Aboriginal cultural heritage values are protected under the *Queensland Heritage Act 1992* in Queensland and are generally associated with human activities since the beginning of non-Aboriginal settlement of an area, as well as natural places which have meaning for people of the current day.

Search results of non-Aboriginal cultural heritage values undertaken on the National, State, and local heritage registers identified the following features:

- Cape Bedford / Cape Flattery Dunes, Cooktown McIvor Rd, Hope Vale (Place ID: 15071) (register of the National Estate within the Project area, considered non-statutory).
- Great Barrier Reef (Place ID: 105060) (world heritage and national heritage area within 200 m of the Project area).

During the EIS phase the level of impact on these features will be assessed and determined with mitigation and management measures detailed to reduce impacts.

The Hope Vale Aboriginal Shire Council Planning Scheme 2014 overlay map OM-002 identified a cultural site located within the Project area. The site is the same site identified on the DSDSATSIP search described in **Section 6.11.1.1**.

6.11.2. Potential Impacts to Cultural Heritage

The potential impacts to cultural heritage and the corresponding inherent risk identifies through the cultural heritage due diligence assessment were:

- Mining activities causing disturbance to land within the MLA boundary resulting in disturbance and/or damage to Aboriginal cultural heritage sites or artefacts – High.
- Mining activities causing disturbance to land within the MLA boundary resulting in disturbance and/or damage to non-Aboriginal cultural heritage sites or artefacts – Low.

Proposed activities of the Project were assessed under the ACH Act Duty of Care Guidelines, with results determining that the Project activities fall under Duty of Care Category 5: activities causing additional surface disturbance.

Through ongoing consultations with TOs, Connies Beach is determined as a place of Aboriginal cultural heritage significance. The location of the JIF and associated infrastructure was proposed by the TOs as a suitable location that was in proximity to the mining area and coastline but did not disturb Connies Beach. To preserve significance of the area, the Project design ensured that Connies Beach was completely avoided. When it was identified that the existing access track would fall within the active mining area, consultations with TOs were undertaken and a perimeter access track was included in design adjacent to the tenement boundary to facilitate safe access around the mining activities to Connies Beach. Section 6.2 and 6.3 above detail the air and noise assessments and impacts for the project, further detail will be assessed during the EIS including potential impacts to TO use of Connies Beach.

6.11.3. Management and Mitigation Measures

A due diligence assessment (DDA) was undertaken by Niche Environment and Heritage (2022) which concluded that a cultural heritage assessment should be undertaken for the Project as per the Duty of Care Guidelines. The assessment recommended the implementation of the following management measures for the Project:

- A Cultural Heritage Management Plan (CHMP) or ILUA will be prepared for the Project. The plan will detail measures to minimise impacts to identified heritage features within the Project area and will also detail procedures to manage unexpected heritage finds.
- Implement the Aboriginal Cultural Heritage Agreements and carry out proposed works in accordance with the agreements.
- Ongoing consultations with Aboriginal parties involved with the Project will be maintained to identify cultural heritage obligations and all aforementioned procedures, which are to be abided by throughout the life of the Project.
- A complaints register will be maintained and actioned.
- Personnel at the Project will undergo an induction informing them of their responsibilities in relation to potential Indigenous cultural heritage finds.
- An Unexpected Heritage Finds and Human Remains Procedure will be prepared and implemented to manage unexpected heritage finds in accordance with relevant guidelines and standards.
- Personnel will adhere to the procedure outlined in the DDA if any unexpected Aboriginal cultural heritage is found or is required to be handled during Project activities.
- Personnel will adhere to procedure outlined in the DDA when suspected human remains are encountered during Project activities.
- All Project activities related to mining and processing will remain within the ML boundary, so as not to impact on the GBRWHA.
- An Unexpected Heritage Finds and Human Remains Procedure will be prepared and implemented to manage unexpected heritage finds in accordance with relevant guidelines and standards.
- Prior to commencement of Project works, cultural heritage inductions will be conducted for all workers and staff which includes all aforementioned procedures, which are to be abided by throughout the life of the Project.

An environmental risk assessment was completed for all identified cultural heritage impacts and the residual risk after implementing the management measures was low to negligible. Further investigation of impacts on cultural heritage will be undertaken during the EIS process.

6.12. Hazard and Risk and Health and Safety

6.12.1. Existing Environment

Existing risks and hazards to the Project include cyclones, bushfires and climate change.

6.12.2. Potential Project Impacts

The MLAs of the Project are located outside of coastal hazard areas and not in a flood plain, so risks of flooding are low. The marine infrastructures (Jetty and MOF) however are located within the coastal

hazard zone. The Project area falls within two bushfire hazard areas, namely 'Very High Potential Bushfire Intensity' and 'High Potential Bushfire Intensity' in the *Hope Vale Shire Council Planning Scheme 2014* Bushfire Overlay Mapping (OM-001). However, there is no essential or community infrastructure proposed as part of the Project, so safety risks will be manageable. There is an existing risk of tropical cyclones at Cape Flattery, with two cyclones passing near the area in 2021 (tropical cyclone Kimi 16- 19 January and severe tropical cyclone Niran 27 February – 5 March) (BoM 2022).

Potential impacts of climate change, including but not limited to, the frequency and intensity of climatic events changing patterns of temperature, rainfall, hydrology (e.g., water balance, conceptual and hydrological model), extreme weather events, and any other identified climate hazards and risks, will be assessed during the EIS process. Management and mitigation measures will be implemented to reduce the impacts of climate change on the project's vulnerabilities.

6.12.3. Management and Mitigation Measures

The Project has been designed to withstand natural hazards in the area. In the event of a cyclone, critical staff will remain on site and shelter in a cyclone proof structure constructed at the mine camp. The jetty and MOF will be comprised pile supported platforms and include three cyclone mooring dolphins to be resistant to cyclones. The Communications will be maintained with local representatives for the Queensland Fire and Emergency Services (QFES) regarding Project activities and bushfire hazard conditions during construction and operation.

To mitigate the risk of bushfire, a 5m buffer area between development and vegetation is included in design, beyond the access track, with most of the proposed site located on an existing cleared rocky outcrop. A CEMP, OEMP and associated sub-plans will be developed prior to construction and will outline the environmental conditions at the site, potential impacts and hazards, management, and daily running requirements. These sub-plans will include a Stormwater Management Plan and Bushfire Emergency Response Plan. The management plans will outline the impacts and associated management measures for all relevant environmental matters.

Management Plans associated with the marine operations and transhipment activities within the DA assessment area will also be prepared in accordance with State Code 7: Maritime Safety, including:

- Marine Execution Plan.
- Aids to Navigation Management Plan.
- Vessel Traffic Management Plan.
- Ship-sourced Pollution Prevention Management Plan.
- A risk assessment determined that the Project would have a low risk on health and safety and is appropriately designed to mitigate the risk of cyclones or bushfires.

A risk assessment determined that the Project would have a low risk on health and safety and is appropriately designed to mitigate the risk of cyclones or bushfires.

6.12.3.1. Waste Management

As there is no municipal collection of solid waste in the vicinity of the Project, the Project will be self-sufficient in terms of collection and storage of all solid wastes. It is intended that contractor services will be engaged for the removal of waste from site and responsible disposal in the region, likely using the weekly barge after delivery of freight. A Waste and Contamination Management Plan will be developed to outline management measures for construction and operations. CFS will investigate opportunities for reducing waste and recycling during the detailed design and EIS phase.

Wastewater will be collected from the facilities within the MLA and pumped to the STP. This is proposed to be a package plant. The process will involve advanced secondary treatment (i.e. the removal of solids, biological oxygen demand, nutrients, disinfection, and drip irrigation of treated effluent in the designated irrigation area for rehabilitation). The operation of the irrigation area will be included in the site water balance model.

The STP onsite will support up to 50 EP and will include deposition into an irrigation field within the mined panels to support rehabilitation.

Wastewater at the ablutions on the JIA will be retained in a sullage tank for monthly collection by truck where it is transported directly to the main STP.

A small portion of low-grade silica sand (waste product) is expected during processing, this material will be used as backfill in the mined voids as part of the rehabilitation strategy.

6.12.3.2.Environmental Management

CFS has established a corporate governance framework that includes risk protocols to ensure there is effective oversight, management and control across material risks including environmental and approvals. CFS has established an Environmental Policy as part of its Environmental, Social, and Corporate Governance (ESG) responsibilities, has assigned appropriate resources and is committed to the establishment and implementation of management systems and plans for the construction and operation of the CFS Project.

6.13. Application of Mitigation Hierarchy

Technical studies undertaken for this Project largely informed the Project's mine design through application of the mitigation hierarchy to ensure impacts to environmental values were avoided, reduced/minimised and mitigated as much as possible.

6.13.1. Avoidance of Impacts

Through ongoing consultations with TOs, it was communicated that Connies Beach is as a place of Aboriginal Cultural heritage significance. Furthermore, ecological surveys undertaken in 2021 found Connies Beach to be ecologically significant as it provides intermittent habitat for several wader/shorebird species listed under State and Commonwealth legislation. Project design ensured that Connies Beach was completely avoided to preserve the significance of the area. When it was identified that the existing access track would fall within the active mining area, consultations with

TOs were undertaken and a perimeter access track was included in design adjacent to the tenement boundary to facilitate safe access around the mining activities to Connies Beach.

During preliminary terrestrial ecology surveys undertaken in the Project area in 2021, further described in **Section 6.6.1**, two TECs were identified within the ML boundary towards the southern and western boundaries (refer **Figure 17**). To preserve these TECs and avoid direct impacts, a 50 m non-disturbance buffer around each TEC was incorporated into mine design that the disturbance footprint does not encroach. Similarly, it was identified in consultations with TOs and technical studies that the two palustrine wetlands located towards the southeastern boundary of the ML hold cultural and ecological significance in the area. Therefore, the disturbance footprint was designed to avoid direct impacts to these wetlands and incorporated a 200 metre non-disturbance buffer around the area. As per the SDAP State Code 9: Great Barrier Reef wetland protection areas guideline MSES HES wetlands require a 200 m buffer from any proposed development outside a prescribed urban area, whilst this code is not applicable for the project, it has been used as a guide for best practice with the 200m buffer implemented around the wetland.

The proposed mining method for the Project involves sequential excavation of the sand dunes within the active mine area using a front-end loader. Groundwater assessments undertaken in 2021 confirmed the maximum mining depth is well above the groundwater table (refer **Section 6.5.2**). Therefore, mining will avoid intersecting the shallow groundwater aquifer and avoid any follow-on impacts to potential GDEs. Further assessment of GDE will be undertaken during the EIS process to ensure avoidance of impacts, where practical.

From coastal processes and marine ecology technical studies undertaken for the marine infrastructure, the jetty and MOF design has been amended to reduce direct impacts to fringing reef where possible. Employment of pilings rather than earthen groyne have been designed to minimise impacts as much as possible.

6.13.2. Minimising, Mitigating, and Offsetting Impacts

The MLA area is approximately 617 ha in size and is a greenfield site within the Cape Bedford/Cape Flattery dune field complex, characterised by large northwest trending transgressive elongated and parabolic sand dunes. Through the Project's design, existing access tracks were retained where possible, and cleared areas were used for the MIA and jetty infrastructure area to minimise additional clearing. The Project disturbance footprint over the life of the mine was minimised to approximately half of the total mining tenement area, covering 315.509 ha, with the remaining 306.97 ha to be undisturbed. The active mining area comprises 274.742 ha of the disturbance footprint. Whilst vegetation clearing is staged and has been minimised to that area necessary for construction and operation, offsets will apply for vegetation clearing. Any land used for environmental offsets will avoid, minimise, or mitigate any impacts to agricultural land of state or regional significance, to ensure there is no net loss in agricultural values.

The mine layout has maximised the area's natural topography to shield the Project from view from Connies Beach. The sequential panel mining has been staged in a way that minimises air and noise impacts to surrounding areas, minimises the extent of vegetation clearing and disturbance at one point in time in the mine life, and minimises the extent of the greater surface water catchment altered

by mining activities at one time. Sequential rehabilitation of the mine site to native ecosystem will occur progressively behind the advancing mine face throughout the mine life, the extent of habitat loss at any one time will be much less than the overall disturbance area and no loss of connectivity at the local or landscape scale is anticipated.

Potential impacts will be managed through the implementation of construction and operational environmental mitigation and management measures.

7. Acknowledgements

CFS would like to thank TOs from the Hope Vale Congress Aboriginal Corporation – on behalf of the Nguurruumungu Clan, and Walmbaar Aboriginal Corporation – on behalf of the Dingaal Clan for passing on their knowledge of the land as part of ongoing communications.

8. References

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9. Acronyms

Acronym/Abbreviation	Definition
AADT	Annual Average Daily Traffic
ACHA	Aboriginal Cultural Heritage Agreement
ACH Act	Queensland Aboriginal Cultural Heritage Act 2003
AHD	Australian Height Datum
ALUMC	Australian Land Use and Management Classification
AMSA	Australian Maritime Safety Authority
AQMP	Air Quality Management Plan
ASRIS	Australian Soil Resource Information System
ASX	Australian Stock Exchange
bgl	below ground level
Biosecurity Act	Queensland Biosecurity Act 2014
Managed resource BOM	Australian Bureau of Meteorology
BPESC	Best Practice Erosion and Sediment Control
CG	Coordinator-General
°C	Degrees Celsius
CEMP	Construction Environmental Management Plan
CFS	Cape Flattery Silica Pty Ltd
CFSM	Cape Flattery Silica Mines Pty Ltd
CHMP	Cultural Heritage Management Plan
CLR	Contaminated Land Register
CTV	Crew transfer vessel
DA	Development Application
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DDA	Due Diligence Assessment
DES	Department of Environment and Science

Acronym/Abbreviation	Definition
DFS	Definitive Feasibility Study
DoR	Department of Resources
DMU	Dry Mining Unit
DRDMW	Department of Regional Development, Manufacturing and Water
DWT	deadweight tonnage
EA	Environmental Authority
EIS	Environmental Impact Statement
EC	Electrical conductivity
EMP	Environmental Management Plan
EMR	Environmental Management Register
ENSO	El Niño-Southern Oscillation
EP	equivalent persons
EP Act	Queensland Environmental Protection Act 1994
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EPM	Exploration Permit Minerals
EPP (Air)	Queensland Environmental Protection (Air) Policy 2019
EPP (Noise)	Queensland Environmental Protection (Noise) Policy 2019
EPP (Water)	Queensland Environmental Protection (Water and Wetland Biodiversity) Policy 2019
EP Regulation	Queensland Environmental Protection Regulation 2019
ERA	Environmentally Relevant Activity
ESA	Environmentally Sensitive Area
ESCP	Erosion and Sediment Control Plan
FMP	Fire Management Plan
FFMP	Flora and Fauna Management Plan
GBRMP	Great Barrier Reef Marine Park

Acronym/Abbreviation	Definition
GBRMPA	Great Barrier Reef Marine Park Authority
GDE	Groundwater Dependent Ecosystem
GWMP	Groundwater Management Plan
ha	hectares
HES	high ecological significance
HEV	high value ecosystem
HMC	heavy mineral concentrate
HPSS	High purity silica sand
HVASC	Hope Vale Aboriginal Shire Council
JIA	Jetty Infrastructure Area
IAS	Initial Advice Statement
km	kilometres
km/h	kilometres per hour
LAT	Lowest Astronomical Tide
LC	Least concern
LGA	local government area
LOM	life of mine
LUP	Land Use Plan
LV	Low Voltage
m	metres
m/s	metres per second
M	Migratory
MARPOL	International Convention for the Prevention of Pollution from Ships
MB	Monitoring bore
mbgl	Metres below ground level
mBTOC	Metres Below Top of Casing
MERFP Act	Queensland Mining and Energy Resources (Financial Provisioning) Act 2018
MIA	Mine Infrastructure Area

Acronym/Abbreviation	Definition
ML	Megalitre
MLA	Mining Lease Application
MLES	Matter of Local Environmental Significance
MML	Metallica Minerals Limited
MNES	Matter of National Environmental Significance
MOF	Marine Offloading Facility
MQSH Act	Queensland Mining and Quarrying Safety and Health Act 1999
MR Act	Queensland Mineral Resources Act 1989
MSES	Matter of State Environmental Significance
MSQ	Maritime Safety Queensland
Mtpa	Million tonnes per annum
NC Act	Queensland Nature Conservation Act 1992
NT Act	Commonwealth Native Title Act 1993
NT	Near threatened
NVMP	Noise and Vibration Management Plan
NUMA	Non-use management areas
OC	Of concern
OEMP	Operational Environmental Management Plan
Offsets Regulation	Queensland Environmental Offsets Regulation 2014
OGV	Ocean Going Vessel
PFS	Project Feasibility Study
PMR	Protected Matters Report
PMLU	Post Mine Land Use
PRC Plan	Progressive Rehabilitation and Closure Plan
PV	Photovoltaic
QEOP Guideline	Queensland Environmental Offsets Policy: Significant Residual Impact Guideline
QFES	Queensland Fire and Emergency Services

Acronym/Abbreviation	Definition
QG	Queensland Government
QLD	Queensland
RBL	Rating background noise level
RE	Regional ecosystem
Reef VTS	Great Barrier Reef and Torres Strait Vessel Traffic Service
RNTBC	Registered Native Title Body Corporate
ROM	Run of Mine
RPI Act	Queensland Regional Planning Interests Act 2014
SCEP	Stakeholder and Community Engagement Plan
SDPWO Act	State Development and Public Works Organisation Act 1971
SIA	Social Impact Assessment
SPP	State Planning Policy 2017
SSEA	Site Specific Environmental Authority
SSRC Act	Strong and Sustainable Resource Communities Act 2017
STP	sewage treatment plant
SWMP	Surface Water Management Plan
t	tonnes
TEC	Threatened ecological community
TI Act	Queensland Transport Infrastructure Act 1994
TIA	Transport Impact Assessment
TOs	Traditional Owners
ToR	Terms of reference
tph	tonnes per hour
TSP	Total suspended particles
t/yr	tonnes per year
UHF	2-way radio communications equipment

Acronym/Abbreviation	Definition
UKC	Under Keel Clearance
V	vulnerable
VTS	Vessel Tracking System
VM Act	Queensland Vegetation Management Act 1999
Water Act	Queensland Water Act 2000
WCP	Wet Concentrator Plant
WHS Act	Queensland Work Health and Safety Act 2011
WPMP	Weed and Pest Management Plan
WTP	Water Treatment Plant
4G	Fourth-generation wireless
4WD	Four-wheel drive