



Bauxite Hills Mine Marine Debris Management Plan

4 September 2018

Revision Record

Issue	Date	Reason for Issue	Responsible	Accountable
1	4/9/2018	Draft to DoE for comment	C Fish	C Fish
2	8/11/2018	Submission to DOE for approval	C Fish	C Fish

Table of Contents

Declaration of Accuracy	iii
Glossary	iv
Executive Summary	v
1 Project Description	1-1
1.1 Project Description.....	1-1
1.2 Marine Footprint.....	1-1
2 Legislation and Guidelines	2-1
2.1 Commonwealth Conditions Reference Table	2-1
2.2 Plans, Conventions and Agreements	2-2
2.2.1 Sawfish and River Sharks Multispecies Recovery Plan	2-2
2.2.2 Threat Abatement Plan for the Impacts of Marine Debris on the vertebrate wildlife of Australia's coasts and oceans (TAP).....	2-2
2.2.3 Action Plan for Australian Cetaceans.....	2-4
2.2.4 Recovery Plan for Marine Turtles in Australia	2-4
2.2.5 Marine Bioregional Plan for the North Marine Region.....	2-4
2.3 Consultation with Key Organisations.....	2-4
3 Environmental Management Standards	3-1
3.1 Objectives	3-1
3.2 Responsibilities.....	3-1
3.3 Environmental Training, Awareness and Competence.....	3-3
3.4 Potential Impacts and Risk	3-4
3.5 Environmental Auditing.....	3-6
3.6 Management Plan Review	3-7
4 Environmental Management Measures	4-1
4.1 Environmental Management Plans	4-1
4.2 Environmental Controls.....	4-1
4.2.1 Stop Waste Getting to the Marine Environment.....	4-1
4.2.2 Reduce Waste in the Marine Environment	4-4
5 Reporting	5-6
6 References	6-1

List of Figures

Figure 1-1 Project location	1-2
Figure 1-2 Marine Footprint	1-3
Figure 3-1 A dead turtle entangled in fishing net (image by GhostNets Australia)	3-5
Figure 3-2 Ingestion of plastics by marine birds.....	3-5

List of Tables

Table 2-1 Cross-reference table.....	2-1
Table 3-1 Responsibilities of key personnel.....	3-2
Table 4-1 Measures to prevent waste entering the Skardon River and marine environment	4-2
Table 4-2 Measures to reduce marine waste in the Skardon River.....	4-4

Appendices

Appendix A – BHM Waste Management Plan

Appendix B – BTS – Ship Sourced Pollution Prevention Plan

Declaration of Accuracy

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this Marine Debris Management Plan is complete, current and correct.
2. I am duly authorised to sign this declaration on behalf of the approval holder.
3. I am aware that:
 - a. Section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.
 - b. Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) where the person knows the information or document is false or misleading.
 - c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signed



Full name (please print)

COLLEEN FISH.

Organisation (please print)

METRO MINING LTD.

Date

14/11/2018.

Glossary

Abbreviation	Explanation
BHM	Bauxite Hills Mine
BHM-BH	Bauxite Hills Mine – Bauxite Hills tenements
BHM-SR	Bauxite Hills Mine – Skardon River tenements
BLF	Barge Loading Facility
BTS SSPPMP	Bauxite Transshipping Services – Ship Sourced Pollution Prevention Management Plan
CYNRM	Cape York Natural Resource Management group
DES	Department of Environment and Science
DoEE	Department of the Environment and Energy
DSO	Direct Shipping Ore
EA	Environmental Authority
EMS	Environmental Management System
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPA	<i>Environmental Protection Act 1994</i>
IMMP	Integrated Marine Monitoring Program
IUCN	International Union for Conservation of Nature
km	kilometre
m	metres
Mapoon Rangers	Mapoon Land and Sea Rangers
MARPOL	The International Convention for the Prevention of Pollution from Ships
MDMP	Marine Debris Management Plan
MOF	Material Offloading Facility
MOU	Memorandum of Understanding
MSMP	Marine Species Management Plan
MTpa	Million tonnes per annum
NC Act	<i>Nature Conservation Act 1992</i>
OGV	Ocean Going Vessel
nm	Nautical miles
REMP	Receiving Environment Management Plan
TAP	Threat Abatement Plan
WMP	Waste Management Plan

Executive Summary

Metro Mining operates the Bauxite Hills Mine (BHM) that incorporates the Skardon River tenements (BHM-SR) and the Bauxite Hills tenements (BHM-BH) on a brownfield site on the western coastline of Cape York, Queensland, approximately 35 kilometres (km) northeast of Mapoon.

BHM-SR and BHM-BH were approved under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) through the granting of approval EPBC 2014/7305, 21 September 2016, and EPBC 2015/7538, 23 June 2017, respectively.

In conjunction with the Marine Species Management Plan (MSMP) that was approved by the Minister on 18th August 2017, condition 11 of BHM-BH approval requires the development of a Marine Debris Management Plan (MDMP) to manage and minimise marine debris in the Skardon River, including the mouth of the Skardon River, and condition 12 requires that the Marine Debris Management Plan be implemented for the life of the project.

'Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris' has been listed as a key threatening process under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The management and minimisation of marine debris at BHM is in relation to the relevant species identified in the approval documents, including Dugong (*Dugong dugon*), listed sawfish and river shark species, listed turtle species and listed dolphin species.

Listed dolphin species are:

- the migratory Indo-Pacific Humpback dolphin (*Sousa sahulensis*); and
- Australian Snubfin dolphin (*Orcaella heinsohni*)¹.

Listed sawfish and river shark species are:

- Dwarf Sawfish (*Pristis clavata*);
- Green Sawfish (*Pristis zijsron*);
- Large Sawfish (*Pristis pristis*); and
- Speartooth Shark (*Glyphis glyphis*).

Listed turtle species are:

- Flatback Turtle (*Natator depressus*);
- Olive Ridley Turtle (*Lepidochelys olivacea*); and
- the Hawksbill Turtle (*Eretmochelys imbricata*).

The objective of this MDMP is to establish management measures which will be implemented to minimise or mitigate marine debris in the Skardon River, including the mouth of the Skardon River.

¹ Note that it is now recognized that there are four species of Indo-Pacific humpback dolphin with the Australian Humpback being *S. sahulensis*. It lacks the hump present in other species of *Sousa*.

Management measures are focussed around stopping waste entering the marine environment, and reducing the amount of waste already present in the marine environment.

Metro Mining and our transshipping contractors have already implemented waste management plans - required under State, Commonwealth and International legislation - focussed on stopping waste entering the marine environment. Additional commitments have been made in the MDMP that relate to reducing the amount of waste that is already present in the marine environment, specifically the Skardon River.

Metro Mining also commits to developing a Memorandum of Understanding (MOU) with the Mapoon Land and Sea Rangers to support the existing marine debris management activities in conjunction with GhostNets and Cape York Natural Resource Management (CYNRM).

Monitoring and reporting of marine debris within the Skardon River and the effectiveness of mitigation measures are detailed in this MDMP. The relationship of the MDMP to other management plans that have been implemented at BHM is also discussed.

1 Project Description

1.1 Project Description

Metro Mining operates the Bauxite Hills Mine (BHM) comprising the tenements of the BHM-BH and BHM-SR, approved under EPBC 2015/7538 and EPBC 2014/7305, as shown in **Figure 1-1**. BHM is located on Cape York Peninsula, in the Parish of Skardon within the Cook Shire, approximately 85km North of Weipa and 35 km to the north of Mapoon.

The BHM includes open cut mining operations, haul roads, Barge Loading Facility (BLF), Materials Offloading Facility (MOF) and transshipping activities along a portion of the Skardon River. The BHM is projected to produce and transport up to 6 million tonnes per annum (Mtpa) of ore over approximately 17 years.

Bauxite will be transported by barge via the Skardon River to the transshipment site, approximately 6 nautical miles (nm) offshore, and loaded into ocean going vessels (OGV's) and shipped to customers.

The majority of transshipping operations occur in the Skardon River and within the Port of Skardon River, however OGV's of between 50,000 to 120,000 tonne each will be loaded at the transshipment anchorage site that is in commonwealth marine waters. All marine activities occur to the south of the Western Cape York Marine National Park.

Barges will be loaded and bauxite will be transported to OGV's 24 hours per day with barges having an initial capacity of approximately 3,000 t to meet early production volumes, increasing up to around 7,000 tonne as the project reaches a maximum production.

Bauxite mining and transshipping will not be undertaken during extreme wet weather conditions associated with the wet season.

This MDMP was developed in compliance with the Commonwealth Permit EPBC 2015/7538 for Metro Mining Limited, effective 23 June 2017.

1.2 Marine Footprint

Key elements of the BHM in regard to the marine environment include the:

- Operation of the BLF and MOF;
- Barge and tug movements within the Skardon River; and,
- Offshore transshipment area (OGV anchorage area where bauxite will be transferred from barges to OGVs - approximately 12 km from the mouth of the Skardon River).

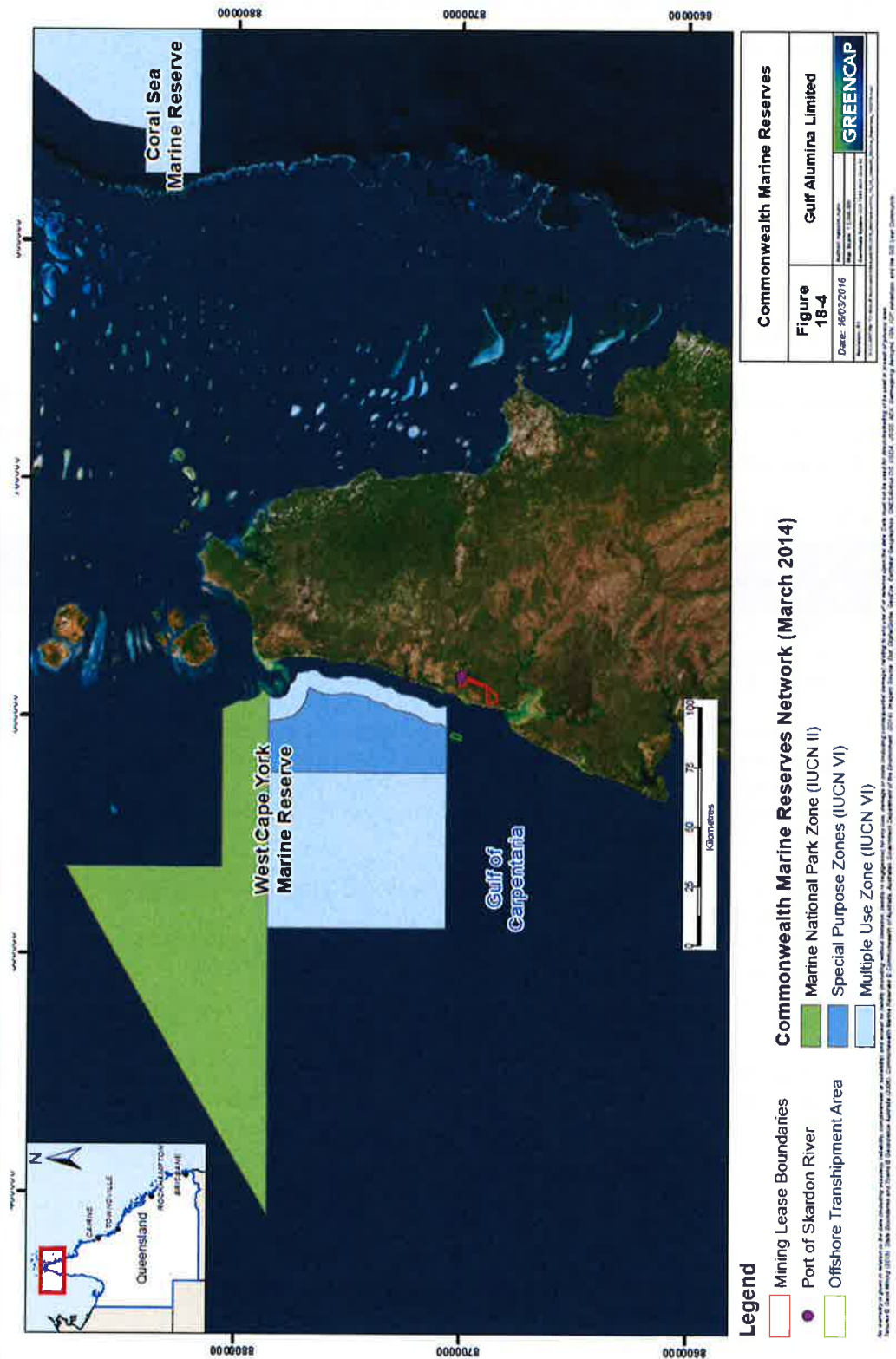
Figure 1-2 provides a footprint of the marine development footprint.

Commonwealth waters commence from the three nautical mile limit. The areas identified for transshipping and movement of bulk carriers servicing the Mine will be undertaken in Commonwealth marine waters. Mining and port activities occur approximately 10 km east of the mouth of Skardon River and 18 km to the south east of the West Cape York Commonwealth Marine Reserve.

Figure 1-1 Project location



Figure 1-2 Marine Footprint



2 Legislation and Guidelines

This MDMP has been prepared for Metro Mining to satisfy their responsibility under the following legislation and guidelines:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*
- *Environmental Protection Act 1994*;
- *Waste Reduction and Recycling Act 2011*;
- DOE Environmental Management Plan Guideline;
- Australian Maritime Safety Authority Reporting Guidelines; and,
- International Convention for the Prevention of Pollution from Ships – MARPOL 1996.

2.1 Commonwealth Conditions Reference Table

The Commonwealth Conditions (EPBC 2015/7538) requires a MDMP be prepared for the BHM. The conditions relating to the MDMP, and where they are addressed in this document, are outlined in **Table 2-1 Cross-reference table**.

Table 2-1 Cross-reference table

Condition No.	Condition	Section of MDMP
Marine Debris Related Conditions		
11	Within 12 months of the approval of the Marine Management Plan required under EPBC Act approval 2014/7305, the approval holder must submit a Marine Debris Management Plan for the written approval of the Minister.	All
	The Marine Debris Management Plan must be prepared in accordance with the Department's Environmental Management Plan Guidelines and in consultation with key organisations. The Marine Debris Management Plan must include:	Section 2.2.1
11a	a description of the measures that will be taken to reduce marine debris in the Skardon River and the Skardon River mouth;	Section 4.2
11b	details on the location and scope of the proposed measures;	Section 4.2
11c	details of how the proposed measures are consistent with Objective 6b in the Sawfish and River Sharks Multispecies Recovery Plan;	Section 2.2.1
11d	details of how the proposed measures are consistent with the objectives and actions contained in the Threat abatement plan for the impacts of marine debris on vertebrate marine life;	Section 2.2.2 and 3.1
11e	a timeline for implementation of the proposed measures;	Table 4-1 Table 4-2
11f	a program to report on the effectiveness of the proposed measures.	Section 5
12	The approved Marine Debris Management Plan must be implemented for the duration of this approval	Section 4.1

2.2 Plans, Conventions and Agreements

Metro Mining has considered the following plans, conventions and agreements during the development of this MDMP.

2.2.1 Sawfish and River Sharks Multispecies Recovery Plan

The Sawfish and River Sharks Multispecies Recovery Plan (CoA, 2015) considers the conservation requirements of these species across their range, and identifies the actions to be taken to ensure their long-term viability in nature.

BHM contributes positively to recovery through active education of staff and contractors of the conservation status and threats to Sawfish species and the Speartooth Shark. Bans on fishing within the Mining Lease area, and undertaking research in conjunction with CSIRO within the study area also contribute to the overall management objectives of the Recovery Plan.

Metro Mining will advise the Department of Environment and Science (DES) of any suspicious fishing and / or collecting activity in this remote and poorly policed area.

The proposed mitigation responses of avoidance and minimal disturbance, and definition of operational areas, vessel routes and speed limit zones remain consistent objectives of the Recovery Plan, as do the proposed no-fishing policy and educational and training processes to be provided to staff and contractors. The rehabilitation of freshwater / estuarine connectivity in drainages leading to Namaleta Creek will improve overall connectivity for such species if present.

Condition 11 (c) of the EPBC 2015/7538 states the MDMP must include, “*details of how the proposed measures are consistent with Objective 6b in the Sawfish and Riversharks Multispecies Recovery Plan*”.

Objective 6b of the Recovery Plan states:

Partner with marine debris organisations to support initiatives that reduce marine debris likely to impact on sawfish and river sharks.

To achieve this objective, Metro Mining commits to working with the Mapoon Land and Sea Rangers (Mapoon Rangers) to provide support for the existing marine debris programs, including the cleanup of beaches in the Mapoon Rangers district. A Memorandum of Understanding (MOU) for a range of management issues, including marine debris management, is being developed. Initial works have focused around feral animal controls, but will be expanded to include marine debris assistance and support of the annual ‘turtle camps’. While specific details may change in accordance with Mapoon Ranger activities, Metro commits to providing both in-kind and direct support in the form of assistance with personnel and equipment, and by contracting the Mapoon Rangers at standard contract rates to undertake activities with and on behalf of Metro Mining.

Through the Mapoon Rangers, Metro Mining is also involved in a larger collaboration with GhostNets, National Landcare Programme and Cape York Natural Resource Management.

2.2.2 Threat Abatement Plan for the Impacts of Marine Debris on the vertebrate wildlife of Australia’s coasts and oceans (TAP)

Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris was listed as a key threatening process under the EPBC Act in August 2003.

The TAP identifies harmful marine debris as including land-sourced garbage, fishing gear from recreational and commercial fishing abandoned or lost to the sea, and vessel-sourced, solid, non-biodegradable floating materials disposed of or lost at sea. Most of these items are made of synthetic plastics. Harmful marine debris is recognised as a ubiquitous, global problem.

The TAP identifies 5 major objectives to prevent and mitigate the impacts of harmful marine debris on vertebrate marine life. This MDMP meets these objectives as detailed below:

Objective 1 – Contribute to long-term prevention of the incidence of marine debris

The MDMP meets this objective through the controls that are in place in the *Waste Management Plan* and the *BTS-SMS-OHS-PLN06 - Ship Sourced Pollution Prevention Management Plan - Skardon River* to manage, minimise and mitigate waste produced on the site and ensure no marine debris is created.

Objective 2 – Understand the scale of impacts from marine plastic and microplastic on key species, ecological communities and locations.

The MDMP meets this objective through the commitment to collect and record type and volumes of marine debris, and also incorporates marine debris education as part of the site induction or through specific environmental training programs. Further, Metro Mining funds a Sawfish and River Shark research program that would identify any impact on sawfish and river sharks from marine debris.

Objective 3 – Remove existing marine debris

The MDMP meets this objective through commitments to undertake searches for marine debris and remove any debris that is found in the Skardon River, including the mouth of the Skardon River. In addition, there is a commitment to expand partnerships with Mapoon Land and Sea Rangers to provide support to their existing marine debris management activities.

Objective 4 - Monitor the quantities, origins, types and hazardous chemical contaminants of marine debris, and assess the effectiveness of management arrangements for reducing marine debris

The MDMP meets this objective through the commitment to report on types and volumes of marine debris that is found in the Skardon River or out to sea, including any large items of debris that are encountered. Recording of the location, type and volume of marine debris will be used to determine if the types and volumes of marine debris are increasing or decreasing over time – thereby drawing conclusions as to the effectiveness of management measures to reduce marine debris.

Objective 5 - Increase public understanding of the causes and impacts of harmful marine debris, including microplastic and hazardous chemical contaminants, to bring about behaviour change.

The MDMP meets this objective through the commitment to have marine debris issues and impacts included in environmental inductions or other environmental awareness training opportunities on site, and through partnerships with indigenous communities.

2.2.3 Action Plan for Australian Cetaceans

The action plan for Australian cetaceans (Bannister et al. 1996) was developed to provide a national overview of the conservation status of Australian cetaceans. It also provides the background and framework to facilitate the implementation of ongoing measures to ensure the protection and conservation of cetaceans from preventable anthropogenic pressures.

The action plan lists a number of threatening processes, the following are relevant for the MDMP:

- Entanglement in lines / plastic debris – waste management will avoid exposure of cetaceans to these threats;
- Pollutants – waste management strategy will avoid exposure of cetaceans to threatening concentrations of contaminants.

2.2.4 Recovery Plan for Marine Turtles in Australia

The Recovery Plan for Marine Turtles in Australia (EA, 2003) provides for research and management actions necessary to stop the decline and support the recovery of marine turtles so that their chances of long term survival in nature are maximised.

One of the threatening processes listed in the Recovery Plan is Marine Debris.

2.2.5 Marine Bioregional Plan for the North Marine Region

The plan presents a summary of the analysis of pressures affecting conservation values in the region, undertaken to inform the development of regional priorities. The marine bioregional plan identified 12 regional priorities comprising six conservation values and six conservation pressures.

One of the six priority conservation pressures identified in this Plan was Marine Debris (eg derelict fishing nets and discarded plastic).

The marine bioregional plan identifies that the pressures of potential concern on ecosystem functioning and integrity on the Gulf of Carpentaria basin are illegal, unreported and unregulated fishing, marine debris and climate change.

2.3 Consultation with Key Organisations

Metro Mining has undertaken consultation with the Key Organisations as follows:

- Commonwealth Department of the Environment and Energy (DOEE) - through the drafting and approval process for a number of environmental management plans, including this MDMP. DOEE have provided comments on the MDMP that have been incorporated into the final document.
- Qld Department of Environment and Science (DES) – through the drafting, submission and approval of a number of relevant environmental management plans, including the Waste Management Plan (see Appendix A), Land Use Management Plan and the Integrated Marine Monitoring Plan.

- Ports North – Ports North were consulted by Metro Mining’s transshipping contractors during the development of the Marine Operation management plans, including the BTS – Ship Sourced Pollution Prevention Management Plan (Appendix B).
- Mapoon Land and Sea Rangers (Mapoon Rangers) – Metro Mining consults with the Mapoon Rangers on a number of issues and the Rangers have been contracted to undertake site works including feral animal controls.

A Memorandum of Understanding is being developed to incorporate a cooperative approach to the following range of management issues associated with the Project Area:

- Marine Debris Management
- Turtle Camp assistance
- Fire Management
- Feral Animal and Weed Controls
- Sharing of monitoring data, particularly water quality

Metro Mining commits to developing an MOU with the Mapoon Rangers that includes specific cooperative actions and support of Ranger activities associated with Marine Debris management and cleanup of marine debris along the Skardon River and nearby coastline.

- Cape York NRM – Metro has held meetings with representatives of the CYNRM to discuss a range of land management issues, similar to discussions that have been held with the Mapoon Land and Sea Rangers. It is noted the Mapoon Rangers and CYNRM are already working cooperatively on a number of land management issues, and Metro Mining is committed to seeking partnership arrangements with both organisations.
- Land owners (OMAC) and Native Title Holders (Ankamuthi People) – Metro Mining has a Liaison Committee that meets at least three times a year with environmental management issues included as a standard agenda item.

3 Environmental Management Standards

The MDMP proposes management measures which will be implemented to minimise and mitigate marine debris related impacts to marine mammals and turtles occurring within the Skardon River, including the mouth of the Skardon River.

The MDMP is to be implemented in conjunction with the Marine Species Management Plan that was approved by the Commonwealth on 18th August 2017.

3.1 Objectives

The objectives of this MDMP are aligned with the objectives of the *Threat Abatement Plan for the impacts of marine debris on vertebrate wildlife of Australia's coasts and oceans, 2018* (TAP Marine Debris), however they have been modified for relevance to the focus area of the Skardon River, including the mouth of the Skardon River.

The marine debris management objectives for BHM are:

1. Contribute to long-term prevention of marine debris
2. Identify potential impacts from marine plastic and microplastic on identified species within the Skardon River
3. Remove marine debris from the Skardon River
4. Monitor the amount of marine debris in the Skardon River
5. Increase understanding for employees and contractors on the BHM of the causes and impacts of marine debris, including microplastic and hazardous chemical contaminants to bring about behavior change.

3.2 Responsibilities

In the State of Queensland, the *Environmental Protection Act 1994* (EPA) states that all personnel have a general environmental duty. This means that all personnel are responsible for the actions they take that affect the environment. In addition, Metro Mining assigns tasks and responsibilities to employees and contractors to comply with environmental legislation and standards that are relevant for the job position.

Personnel will be responsible for:

- Complying with their environmental duty of care under the EPA;
- Complying with the Environmental Authorities (EA's) for the applicable mining tenements;
- Carrying out environmental management activities as directed by the BHM Operations Manager;
- Observing and informing the BHM Operations Manager regarding general environmental performance of the Mine;
- Notifying the BHM Operations Manager of any non-conformances; and

- Participating in induction processes and tool box talks to ensure a suitable understanding of site environmental values and management processes.

The key roles that are core to the successful implementation of the MDMP are outlined in **Table 3-1**. Those roles responsible for each management measure is presented in the tables found in Section 4 of this MDMP.

Table 3-1 Responsibilities of key personnel

Role	Responsibilities
Metro Mining	
CEO	Approval Holder and Senior Executive. Holds overall accountability for compliance with legislation and mine approvals. Responsible to ensure senior corporate and BHM Operations Manager commit to environmental compliance and raising environmental standards.
BHM Operations Manager	Responsible for ensuring sufficient resources are provided to comply with legislation and mine approvals, including this MDMP. Final site accountability for compliance with environmental legislation and mine approvals.
Manager Environment and Communities (Mgr E&C)	Corporate oversight of environmental compliance across all sites and interface with the environmental regulator. Ensure budget and resource requirements are identified and provided to the General Manager to approve, to ensure environmental compliance.
BHM Environmental Superintendant	Site responsibility for implementing the EMPs to achieve compliance. Initial point of contact for regulators. Primary person responsible for implementation of the MDMP including: <ul style="list-style-type: none"> ▪ Implementation of environmental budget; ▪ Environmental awareness training and inductions; ▪ Respond to environmental incidents; ▪ Review Transshipping Contractor approvals and procedures to ensure all required controls are in place; ▪ Providing advice to the Transshipping Contractor as required; ▪ Review of environmental incidents, monitoring results and audit reports
Marine Construction Contractors	
Transshipping Contract Manager	Responsibility for all ensuring all approvals and procedures are in place to achieve compliance with relevant legislation and guidelines. Responsible for ensuring contractor compliance with the commitments made in all marine operational management plans, and with Metro's EMPs: <ul style="list-style-type: none"> ▪ Implementation of operational controls; ▪ Sustainable procurement; ▪ Day to day inspection of environmental controls; ▪ Response to environmental incident; ▪ Supervision of waste management; ▪ Emergency preparedness and response; and ▪ Corrective and preventative action.

Marine Vessel Operators	
Master of each Vessel	Responsible for ensuring compliance with the various marine operational and environmental management plans and procedures: <ul style="list-style-type: none"> ▪ Implementation of maritime operational controls; ▪ Response to environmental incident; ▪ Emergency preparedness and response; and ▪ Corrective and preventative action.
Crew of each Vessel	Responsible to assist in the day to day implementation of waste management
Waste Contractors	
Waste Contract Manager	Responsible for ensuring waste is managed in accordance with contract conditions and relevant legislation, incorporating waste storage, handling, transport and disposal.
All staff	
All site staff	All staff are required to: <ul style="list-style-type: none"> ▪ Undertake all activities in accordance with the agreed plans of management, procedures and work methods; ▪ Ensure that they are aware of the contact person regarding environmental matters; ▪ Reporting all environmental incidents, or activity that has the potential to result in an environmental incident; and ▪ Ensure they attend the environmental induction / training / toolbox provided.

3.3 Environmental Training, Awareness and Competence

All staff will receive appropriate training to ensure effective implementation of the BHM EMPs.

All personnel will undergo a site induction covering the key environmental issues and measures relating to working at BHM. The induction will include:

- Legislative requirements such as the general environmental duty and duty to notify under the *Environmental Protection Act 1994*;
- Reporting of potential and actual environmental incidents;
- Spill kit types and locations; and
- Contacts for environmental incidents and emergencies.

Marine debris awareness information will be provided through the induction process, or other site training processes eg toolbox talks. Personnel performing specified tasks under the MDMP shall be qualified based on appropriate education, training, skills and / or experience, as required.

3.4 Potential Impacts and Risk

The TAP has identified the following potential impacts to the marine species:

Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris was listed as a key threatening process under the EPBC Act in August 2003.

Harmful marine debris includes land-sourced garbage, fishing gear from recreational and commercial fishing abandoned or lost to the sea, and vessel-sourced, solid, non-biodegradable floating materials disposed of or lost at sea. Most of these items are made of synthetic plastics. Harmful marine debris is recognised as a ubiquitous, global problem.

As plastic debris accumulates in the environment, exposure to physical, chemical and biological processes results in its fragmentation into smaller pieces, and the potential for ingestion by animals increases (Browne et al., 2008). Potential routes for entry of microplastics (including beads and fibres) into the environment include fragmentation of larger items, introduction of small particles that are used as abrasives in cleaning products, and spills of plastic powders and pellets in sewage waste.

*Seabirds often eat floating plastic. Wilcox et al. (2015b) suggested that nearly all species of seabirds will eventually be found ingesting plastic, based on the discoveries reported so far. For example, 21 per cent of surveyed wedge-tailed shearwater (*Ardenna pacifica*) chicks on Heron Island in the southern Great Barrier Reef were fed plastic fragments by their parents, ingesting 3.2 fragments on average (Verlis et al., 2013). In addition, plastic-derived polybrominated diphenyl ethers (a very common class of flame retardants) are found in the abdominal fat tissues of short-tailed shearwaters (*Ardenna tenuirostris*) in the north Pacific Ocean, presumably transferred from ingested plastics (Tanaka et al., 2013).*

Studies published between 1985 and 2012 identified general plastic as the main debris ingested by marine turtles, followed by soft plastic, rope and styrofoam (Schuyler et al. 2014). Up to 52 per cent of sea turtles may have ingested debris (Schuyler et al. 2016). Other research suggests that turtle nesting activity (and therefore recruitment of new generations) may also be impacted by marine debris. Fujisaki and Lamont (2016), found a substantial increase in loggerhead turtle nesting activity after the removal of large debris from nest beaches in Florida, USA.

Ocean currents can be complex and are dictated by a range of factors such as seasonal (monsoon and trade) winds and tidal patterns. The prevailing currents and conditions of the Coral Sea, Torres Strait and Gulf of Carpentaria means Far North Queensland and the Cape York Peninsula is a recognised marine debris 'hot spot'. There are many areas within this region where large quantities of marine debris accumulate and are washed ashore.

Impacts occur from ingestion of toxic substances, and through marine fauna becoming entangled, or strangled, by marine debris they cannot remove. Images provided below show some of the horrific impacts.

Figure 3-1 A dead turtle entangled in fishing net (image by GhostNets Australia)



Figure 3-2 Ingestion of plastics by marine birds



The purpose of the MDMP is to manage the potential risks identified above on the MNES marine species that have been identified as relevant for the BHM. These species are:

Listed dolphin species are:

- the migratory Indo-Pacific Humpback dolphin (*Sousa sahulensis*); and
- Australian Snubfin dolphin (*Orcaella heinsohni*)².

Listed sawfish and river shark species are:

- Dwarf Sawfish (*Pristis clavata*);
- Green Sawfish (*Pristis zijsron*);
- Large Sawfish (*Pristis pristis*); and
- Speartooth Shark (*Glyphis glyphis*).

Listed turtle species are:

- Flatback Turtle (*Natator depressus*);
- Olive Ridley Turtle (*Lepidochelys olivacea*); and
- the Hawksbill Turtle (*Eretmochelys imbricata*).

3.5 Environmental Auditing

Metro Mining's environmental audit schedule includes environmental compliance audits against State and Commonwealth approvals, and reviews of EMP's and contractor management plans to assess effectiveness of controls and ensure a process of continual improvement.

Review of EMPs and other management plans will generally be undertaken during the wet season shut down period, when site mining activities cease.

To address Conditions 20 and 15 of the Commonwealth Conditions (EPBC 2014/7305 for the BHM-SR tenements and EPBC 2015/ 7538 for the BHM-BH tenements), Metro Mining will undertake an audit within three months of every 12 month anniversary of the commencement of activities. The audit will address compliance with each of the Commonwealth Conditions (EPBC 2014/7305 and EPBC 2015/7538) which includes this MDMP. Any non-compliances will be provided to the DotEE at the same time the report is published.

To address Conditions 21 and 19 of the Commonwealth Conditions (EPBC 2014/7305 and EPBC 2015/ 7538), if directed by the Minister, Metro Mining will ensure an independent audit of compliance with the conditions of approval is conducted and a report submitted to the minister. The audit criteria and independent auditor will be approved by the Minister before commencement.

The Manager Environment and Community will be responsible for coordinating Metro Mining internal audits, which may be undertaken by suitably experienced site personnel, or by specialized contractors.

² Note that it is now recognized that there are four species of Indo-Pacific humpback dolphin with the Australian Humpback being *S. sahulensis*. It lacks the hump present in other species of *Sousa*.

3.6 Management Plan Review

This MDMP will be reviewed on an annual basis. Reviews will address matters such as the overall design and effectiveness of this MDMP, progress in environmental performance, changes in environmental risks, review of changes in environmental performance measures and actions, changes in business conditions and any relevant emerging environmental issues.

4 Environmental Management Measures

4.1 Environmental Management Plans

Metro Mining has developed and implemented a number of Environmental Management Plans (EMPs) to address the identified environmental risks and potential impacts at the BHM. The EMP's that are relevant for this MDMP are:

- Waste Management Plan (WMP) – waste management and minimisation procedures for land-based activities
- Marine Species Management Plan (MSMP) – management of potential impacts to marine MNES species relevant for the BHM
- Integrated Marine Monitoring Plan (IMMP) – detailed monitoring plan to identify any potential environmental impacts from marine activities

The MDMP should be assessed in conjunction with these plans, or ideally, Metro would propose to integrate the MSMP, IMMP and MDMP into a single Marine Management Plan, noting this approach does not currently comply with the approval conditions and therefore has not been undertaken.

In addition to the above EMPs, Metro Mining contracts the transshipping operations to a third party, who are responsible for developing their own operational management plans specific to their marine activities. These plans include:

- BTS-SMS-OHS-PLN01 - Marine Operations Management Plan - Skardon River
- BTS-SMS-OHS-PLN06 - Ship Sourced Pollution Prevention Management Plan - Skardon River
- BTS-SMS-OHS-PLN07 - Spillage - Pollution Response Management Plan - Skardon River

These plans, when implemented in conjunction with the MDMP, provide the controls to manage marine debris issues in the Skardon River.

The MDMP is to be implemented for the duration of the EPBC Act approvals for EPBC 2014/7305 and EPBC 2015/ 7538.

4.2 Environmental Controls

Environmental controls to manage marine debris are generally focused on two areas:

1. Stop waste getting to the marine environment
2. Reduce the waste already in the marine environment

4.2.1 Stop Waste Getting to the Marine Environment

For BHM, stopping waste getting into the environment is already managed under two management plans that are required under separate legislation, namely the BHM *Waste Management Plan* (Appendix A) focused on waste management on the land, and the BTS Ship Sourced Pollution Prevention Management Plan (Appendix B), for waste management on the water.

The *BHM Waste Management Plan* is a condition under the State Department of Environment and Science (DES) Environmental Authorities (EA) for both BHM-SR and BHM-BH. Commitments made in the BHM Waste Management Plan are included in Table 4-1 below.

The *BTS Ship Sourced Pollution Prevention Management Plan for Skardon River* is a requirement under the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (the Act), that implements the MARPOL and includes a number of enforcement related provisions derived from the United Nations Convention on the Law of the Sea.

Under this Act there are also a number of Marine Orders given enforcement which relate to Marine Pollution Prevention, including:

- Marine Order 91 (Marine Pollution Prevention – Oil);
- Marine Order 95 (Marine Pollution Prevention – Garbage); and
- Marine Order 96 (Marine Pollution Prevention – Sewage).

This Act applies both within and outside Australia and extends to every external Territory and to the exclusive economic zone (EEZ) which 200 nautical miles (nm) from Australian coastline.

This Act prohibits the discharge of oil or oily mixtures and garbage by all ships and vessels in Australian waters and EEZ or by an Australia ship beyond Australian EEZ, except in prescribed

Commitments made in the *BTS Ship Sourced Pollution Prevention Management Plan for Skardon River* are included in Table 4-1 below.

Table 4-1 Measures to prevent waste entering the Skardon River and marine environment

Environment Measure	Document	Standards	Survey / monitoring guidelines	Where	When	Responsibility of:
Storage and Management of Wastes as per Australian Standards	Waste Management Plan	In accordance with relevant Australian Standards	Waste tracking records and site audits for bins and waste management infrastructure	Within all BHM tenements, along Skardon River, including the mouth of Skardon River	Continual	All employees and contractors Audit by Environmental Superintendent
Storage and Management of Wastes as per the Waste Hierarchy	Waste Management Plan	Waste Hierarchy	Waste tracking records and site audits for bins and waste management infrastructure	Within all BHM tenements, along Skardon River, including the mouth of Skardon River	Continual	All employees and contractors Audit by Environmental Superintendent
Storage and Management of Regulated Wastes as per Australian Standards	Waste Management Plan	In accordance with relevant Australian Standards	Waste bunding, tracking records and site audits for bins and waste management infrastructure	Within all BHM tenements, along Skardon River, including the mouth of Skardon River	Continual	All employees and contractors Audit by Environmental Superintendent

Waste Disposal	Waste Management Plan	Disposed of all waste in lawful manner at licenced offsite facility	Waste tracking records and site audits	Within all BHM tenements, along Skardon River, including the mouth of Skardon River	Continual	All employees and contractors Audit by Environmental Superintendent
Waste Reporting	Waste Management Plan	Waste Contractor to supply disposal volumes of relevant materials	Copies of reports to be maintained	Within all BHM tenements, along Skardon River, including the mouth of Skardon River	Minimum of annually	Waste Contractor
Waste Transport	Waste Management Plan	Licensed Waste Transport and Waste tracking	Waste transport licences and waste tracking documentation to be audited	Within all BHM tenements, along Skardon River, including the mouth of Skardon River	For each transfer of waste materials offsite	Waste Contractor and/or Waste Transporter
Waste Audits	Waste Management Plan	In accordance with Table 8-1 Waste Management Plan	Waste audits to be undertaken and records maintained on site	Within all BHM tenements, along Skardon River, including the mouth of Skardon River	As per Waste Management Plan	Environmental Superintendent
Marine Induction	BTS SSPPMP	New crew to have SSPPMP included in induction and at Toolbox meetings	Records of inductions and information included	For all marine based employees and contractors	As per SSPPMP	Transshipping Contractor Manager
Oily water discharge	BTS SSPPMP	Oil discharge monitoring and control system for discharge from bilge tanks	Oily Water Separator fitted to ensure compliance with MARPOL 15ppm	For all marine and river vessels	As per SSPPMP	Transshipping Contractor Manager
Garbage storage management and disposal	BTS SSPPMP	Each vessel to have bins for recycling and general waste and all waste is to be disposed of to shore based facilities. No garbage to sea.	Inductions and records of inductions	For all marine based employees and contractors	As per SSPPMP	Transshipping Contractor Manager Audits by Environmental Superintendent

Reporting	BTS SSPPMP	All ship sourced waste to be logged and records kept in each respective ships 'Oil, Garbage and Sewage' record book	Inductions and records of inductions Record books to be available for inspection at all times	For all marine based employees and contractors	As per SSPPMP	Transshipping Contractor Manager Audits by Environmental Superintendent
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4.2.2 Reduce Waste in the Marine Environment

Existing EMP's on site focus on managing and minimising our own waste, and do not address the issue of external marine debris that may get deposited into the Skardon River, or raising awareness as to what impacts this may have on the MNES listed species in the area.

To address this, the following actions are proposed to reduce marine debris in the Skardon River.

Table 4-2 Measures to reduce marine waste in the Skardon River

Environment Measure	Management needs / questions addressed	Parameters measured	Survey / monitoring guidelines	Where	When	Responsibility of:
Shoreline searches	Location of marine debris	Location	GPS coordinates and photographs	Along Skardon River, including the mouth of Skardon River	Quarterly at low tides, and ad hoc	Environmental Superintendent, Boat Masters
Record of types / volume of marine debris	Volume and type of marine debris	Type and volumes	Number, size, weight, type of waste	Along Skardon River, including the mouth of Skardon River	Quarterly at low tides, and ad hoc	Environmental Superintendent, Boat Masters
Removal of marine debris	Type of collection method required and waste disposal required (eg general waste, regulated waste)	Type and volume of marine debris disposal	Number, size, weight, type of waste	Along Skardon River, including the mouth of Skardon River	When shoreline searches identify marine debris	Environmental Superintendent
Incident report for any marine species directly impacted by marine debris	Direct Impacts from marine debris on marine fauna	Impact of marine debris on marine fauna	Type of marine fauna and type of impact from marine debris	Along Skardon River, including the mouth of Skardon River	At all times	All personnel

Marine debris awareness to be included in induction or other site communications	Raise awareness and understanding of marine debris and impacts to MNES listed species	% of site personnel who undergo marine debris awareness training	% of site personnel who undergo marine debris awareness training	At BHM	As required	Environmental Superintendent
Memorandum of Understanding	Develop partnership agreement with Mapoon Rangers to assist with Land Management and Marine Debris Management Initiatives	To be determined in the MOU	To be determined in the MOU	Applicable for BHM Project Area and surrounding marine shorelines, as agreed	June 2019	Mgr E&C in conjunction with Head Mapoon Ranger

5 Reporting

Records will be maintained of all marine debris that is identified, collected and disposed of from along the Skardon River, including the mouth of the Skardon River. This will provide information over time to determine if marine debris is increasing or decreasing in the area.

In addition, an incident report will be completed on site for any marine mammals that are seen with potential marine debris related injuries, or found washed up on shore due to potential marine debris related issues.

Metro Mining will also support the Mapoon Land and Sea Rangers in relation to marine debris related activities, including any formal reporting requirements. Metro's support will include both in-kind and direct monetary support, including the utilisation of the Mapoon Rangers as a commercial entity to provide land management and marine debris management services.

As per the Commonwealth Conditions a report will be prepared within three months of every 12-month anniversary of the commencement of the BHM. This report will be available on Metro Mining's website and will address compliance with the Commonwealth Conditions, including the implementation of this MDMP. For the purpose of reporting on implementation of this MDMP, the report will include:

- The location, nature and potential impacts of marine waste removed and its disposal methods;
- Partnership arrangements for the purpose of monitoring and removing marine waste;
- The number, species and treatment method for animals impacted by marine debris; and,
- Implementation and effectiveness of measures to prevent the discharge/loss of waste to the marine environment from BHM operations.

Any non-compliance with the Commonwealth Conditions will be provided to DoEE at the same time as the compliance report is published on the Metro Mining website. These reports will remain on the website for the life of the Mine.

6 References

Department of the Environment and Energy (DoEE) (2018). *Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans*. Canberra: DoEE. Available from: <http://www.environment.gov.au/system/files/resources/e3318495-2389-4ffc-b734-164cdd67fe19/files/tap-marine-debris-2018.pdf>

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Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). *The North Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the North Marine Region*. Canberra: DEWHA. Available from: <http://www.environment.gov.au/resource/north-marine-bioregional-plan-bioregional-profile-description-ecosystems-conservation>.

Commonwealth of Australia (2014) *Environmental Management Plan Guidelines*.

Appendix A – BHM Waste Management Plan

**Skardon River Project
Waste Management Plan**

**CDM
Smith**

Skardon River Project Waste Management Plan

7 February 2017

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Table of Contents

1	Introduction	1-1
1.1	Purpose	1-1
1.2	Objectives	1-1
1.3	Relevance to the Environmental Authority	1-1
1.4	Legislation and Guidelines.....	1-3
2	Waste Management Hierarchy	2-1
2.1	Waste Avoidance.....	2-1
2.2	Waste Re-use	2-2
2.3	Waste Recycling	2-2
2.4	Recover Energy.....	2-2
2.5	Treat Waste	2-3
2.6	Waste Disposal.....	2-3
2.7	Cleaner Production	2-3
3	Waste Streams	3-1
3.1	Re-usable Wastes.....	3-1
3.1.1	Vegetation.....	3-1
3.1.2	Conveyor Belting / Tyres.....	3-2
3.2	Recyclable Wastes	3-2
3.2.1	Cardboard	3-2
3.2.2	Aluminium Cans	3-2
3.2.3	Tyres	3-2
3.2.4	Concrete.....	3-2
3.2.5	Timber	3-3
3.2.6	Steel / Metal.....	3-3
3.2.7	Fridges / Air Conditioners.....	3-3
3.2.8	Gas Cylinders	3-3
3.2.9	Batteries	3-3
3.2.10	Diesel / Waste Oil / Cooking Oil	3-4
3.3	Regulated Wastes	3-4
3.3.1	Fuel and Oil Filters.....	3-4
3.3.2	Oily Rags.....	3-4
3.3.3	Hydraulic Hoses	3-4
3.3.4	Used Absorbents.....	3-4
3.3.5	Assorted Chemicals	3-5
3.4	Compostable Wastes	3-5
3.4.1	Putrescible Wastes	3-5
3.4.2	Sewage Effluent.....	3-6
3.4.3	Sewage Sludge	3-6
3.4.4	Grease Traps.....	3-6
3.4.5	Hydrocarbon-stained Soil.....	3-6
3.5	General Waste	3-6
3.5.1	Paper / Plastic / Glass	3-6
3.5.2	Conveyor Belt / Rollers / Large Operational Wastes.....	3-6
3.5.3	Mixed Wastes	3-7
3.6	Medical / Sanitary Waste	3-7
3.6.1	Medical Wastes.....	3-7
3.6.2	Sanitary Wastes.....	3-7
3.7	Kaolin Mine Decommissioning	3-7
3.8	Other Wastes	3-7

3.8.1	Vehicle Washdown	3-7
3.8.2	Oily Water	3-8
3.8.3	Sediment Dams and Sediment Controls	3-8
3.8.4	Radioactive Materials	3-8
3.8.5	Air Emissions	3-8
4	Waste Management Summary	4-1
5	Waste Management Facilities	5-1
5.1	Waste Recovery and Transfer Station	5-1
5.2	Sewage Treatment Plant	5-2
5.3	Effluent Irrigation Area	5-3
5.4	Composting Area	5-3
5.5	Bioremediation Pads	5-4
5.6	Kaolin Mine Landfill	5-5
6	Waste Tracking	6-1
7	Waste Reporting	7-1
7.1	Waste Contractor Reporting	7-1
7.2	National Environmental Protection Measure (NEPM) Reporting	7-1
8	Waste Auditing	8-1

List of Figures

Figure 2-1 Waste management hierarchy	2-1
---	-----

List of Tables

Table 5-1 Contaminant release limits to land	5-3
Table 8-1 Waste auditing	8-1

1 Introduction

1.1 Purpose

This Waste Management Plan (Waste MP) will address the waste management requirements of the Bauxite Hills Mine (Mine), including the Skardon River Project's Environmental Authority (EA) issued by the Department of Environment and Heritage (EHP), the Federal Department of the Environment and Energy (DotEE) Project conditions, and all applicable legislation and guidelines.

The purpose of this Waste MP is to provide a guidance document for employees, contractors and visitors for the transport, handling, storage, management and disposal of waste products produced at the Bauxite Hills Mine.

The Waste MP is intended to be a working document to be used in day-to-day operations by Metro Mining staff and its contractors associated with the construction and operation of the Bauxite Hills Mine.

1.2 Objectives

The Waste MP will seek to achieve the following objectives:

- To specifically address condition C3 of the EA permit: EPML00967013;
- To provide a framework that demonstrates Metro Mining's commitment to conduct all construction activities in a manner that complies with approval conditions and minimises impacts to the environment;
- To provide management strategies, including procedural standards, that minimise adverse environmental impacts associated with waste management;
- To ensure that all employees and contractors are aware of their environmental responsibilities and are proactive in their approach to waste management; and
- To comply with relevant legislation and guideline requirements relevant to waste management.

1.3 Relevance to the Environmental Authority

The Gulf Alumina EA has a number of conditions relating to waste management, as below:

A10 - *Spillage of all chemicals, waste oils and flammable and combustible liquids must be contained within an on-site containment system and controlled in a manner that prevents environmental harm.*

A12 - *All waste materials, explosives, hazardous chemicals, corrosive substances, toxic substances, gases and dangerous goods must be stored and handled in accordance with the current Australian standard. Where no relevant Australian Standard exists, all materials must be stored within an effective on-site containment system that prevents contamination of land or waters.*

Schedule C – Waste

C1 - All waste generated as part of the mining activities must be disposed of in a lawful manner at an off-site facility, with the exception of:

- a) Treated sewage effluent, which must be released in accordance with all conditions of this environmental authority; and
- b) General waste, which can be disposed of in the landfill facilities identified in Table C1 – Location of approved landfills.

C2 - Leachate or stormwater runoff that has been in contact with waste materials in the landfill, bioremediation pad or waste storage areas must not be used for the purposes of irrigation, dust suppression or release to the receiving environment.

C3 - By 1 April 2017, the environmental authority holder must develop and implement a Waste Management Plan (WMP).

C4 - Regulated waste, including tyres, awaiting removal may be temporarily stored on site awaiting removal provided it is stored to ensure there is minimal risk of causing fire or contamination to land or waters.

C5 - All reasonable and practicable fire prevention measures must be implemented, including removal of grass and other materials within a 10m radius of a tyre storage area.

C6 - As of 21 December 2016, only construction and demolition waste from the demolition of the kaolin mine can be disposed of in Landfill 1 (the original landfill).

C7 - The proposed landfill and landfill expansion area must be designed and constructed by an appropriately qualified person.

C8 - The proposed landfill and landfill expansion area must be constructed in accordance with the design required by condition C7.

C9 - A landfill leachate collection system must be designed by an appropriately qualified person and installed and maintained by the environmental authority holder to:

1. collect leachate generated in the proposed landfill, landfill expansion areas and bioremediation pads;
2. direct the collected leachate out of the proposed landfill, landfill expansion area and bio-remediation pads into an appropriate leachate storage facility; and
3. prevent the release of leachate to the receiving environment.

C10 - A landfill liner system must be installed and maintained to:

1. prevent release of contaminants, including leachate, to land and waters;
2. prevent the percolation of groundwater into the landfill; and
3. prevent subsurface migration of landfill gas from the landfill unit.

C11 - The only wastes permitted to be processed by bioremediation are grease trap waste, biosolids, hydrocarbon contaminated soil and cardboard waste.

C12 - All bioremediation must take place on the bioremediation pads identified in Table C2 - Location of bioremediation pads.

C13 - Soil conditioning activities must be conducted in accordance with the current Australian Standard and must not exceed 200 tonnes or more of compost or soil conditioners in a year.

C14 - The locations where bioremediated materials are placed must be recorded.

C15 - When the deposition of waste to the landfill unit ceases, a final capping system for the landfill unit must be designed by an appropriately qualified person and installed by the environmental authority holder to minimise:

1. infiltration of water into the landfill unit;
2. water ponding on the surface;
3. percolation of groundwater into the landfill and
4. erosion of the final capping system.

C16 - A landfill post-closure management plan must be designed and implemented by the environmental authority holder for a period of 10 years or until the administering authority determines that the landfill units are stable and that no release of waste materials, leachate, landfill gas or other contaminants that may cause environmental harm is likely. The landfill post-closure management plan must include measures to:

1. maintain the structural integrity and effectiveness of the final capping system;
2. maintain and operate the leachate collection system;
3. maintain the groundwater monitoring system and monitor quality of groundwater in accordance with the conditions of this environmental authority;
4. maintain and operate the landfill gas monitoring system; and
5. maintain and operate the landfill gas collection system.

This Waste MP has been developed to address the above listed EA requirements.

1.4 Legislation and Guidelines

Requirements relating to waste management in Queensland and Australia are governed by several legislative instruments, policies and guidelines. Those relevant to waste management on the Bauxite Hills Mine include:

- Environmental Protection Act 1994;
- Environmental Protection Regulation 2008;
- Waste Reduction and Recycling Act 2011;
- Protection of the Sea (Prevention of Pollution from Ships Act 1983) (Cth);
- Transport Operations (Marine Pollution) Act 1995;

- *Transport Operations (Marine Pollution) Regulation 2008;*
- EHP Application requirements for activities with waste impacts (EM964);
- National Waste Policy 2009–2050 (Cth);
- Queensland Waste Avoidance and Resource Productivity Strategy 2014-2024;
- National Environment Protection (Used Packaging Materials) Measure 2011 (Cth); and
- Guidelines for Sewerage Systems Residuals Management (NRMMC, 2004).

2 Waste Management Hierarchy

The Waste Management Hierarchy and Cleaner Production concepts will be the primary strategies employed for the Mine for sustainable waste management.

The Waste Management Hierarchy highlights the need to move practices away from landfill disposal and to promote prevention, preparing for reuse, recycling, other recovery and disposal, as illustrated in Figure 2-1 below.

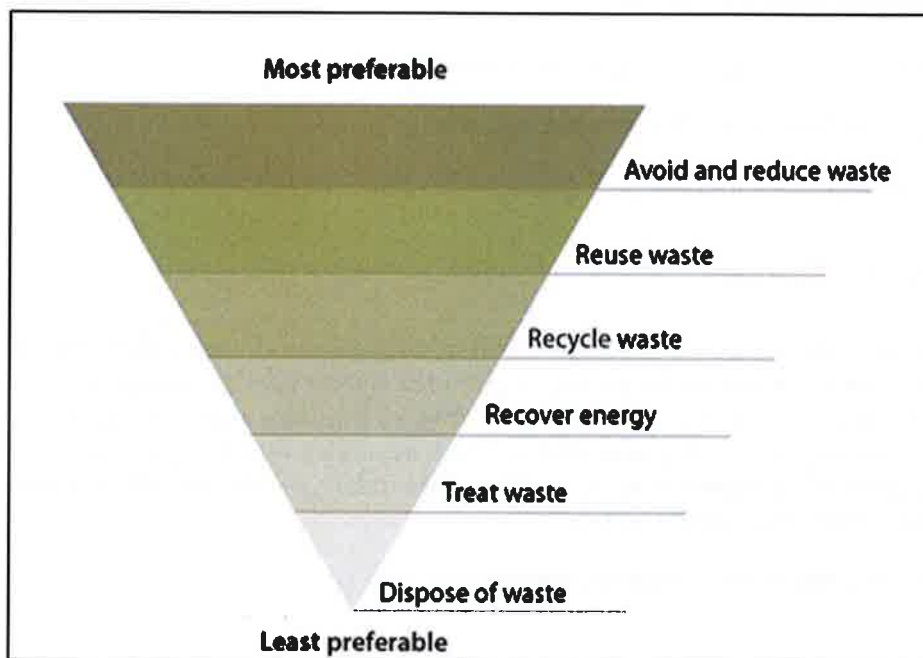


Figure 2-1 Waste management hierarchy

2.1 Waste Avoidance

Waste avoidance is most often achieved in the planning stages of a project whereby opportunities to prevent waste streams coming onto site, and completely avoiding the need to manage the waste, are identified and implemented.

This can be achieved by choosing low waste options for consumable products, such as the use of bulk supply containers that can be re-used indefinitely, rather than single use containers that will get thrown away after each use, or items that have reduced packaging. Options such as solar energy for electrical supply, field lights and water pumps reduces the use of diesel generators on site, thereby reducing waste oil and fuel filters. Sourcing supply contractors who implement their own sustainable waste management practices can also prevent wastes being brought to site.

The use of pre-fabricated materials will play an important part in waste avoidance for the Mine. Given the remote location and limited access to the site, a number of pre-fabricated/modular components will be sourced and brought onto site for the BLF, conveyors and stacker/reclaimer

infrastructure. This will substantially reduce the quantities of some waste streams associated with the construction phase of the Mine, including scrap steel and surplus concrete.

2.2 Waste Re-use

Re-use refers to waste that is re-used without substantially changing its form. A number of waste streams generated at the mine will be re-used on site. These include:

- Cleared vegetation that will be placed directly onto rehabilitation areas to provide immediate habitat and erosion control advantages;
- Conveyor belting / tyres (tug and barge berthing protection);
- Putrescible wastes from the kitchen (composting); and
- Waste water effluents (site irrigation).

2.3 Waste Recycling

Recycling represents an important component of the waste management strategy used on-site. It involves the treatment of a waste that is no longer usable in its current form and using it to create new products. Due to the remote nature of the site, the range of recyclable materials may be reduced due to availability of recycling companies and costs associated with transport and treatment. Segregation will generally occur at the point of generation, and storage will be located at the centralised waste storage facility on-site.

Wastes that have been identified for recycling include:

- Scrap metals;
- Recyclables (aluminium tins and cardboard only);
- Waste oil, cooking oil and diesel can be blended together and recycled;
- Tyres;
- Lead-acid batteries;
- Surplus concrete (crushed and used as roadbase or hardstand); and
- Bulk materials generated from decommissioning.

Opportunities to increase recyclable waste streams will be regularly reviewed to ensure emerging opportunities for waste recycling are maximised.

2.4 Recover Energy

This step on the hierarchy encourages the recovery of embodied energy from waste products, that may produce some negative environmental impacts, but that produce a net benefit by offsetting the use of non-renewable energy sources and avoiding methane emissions from landfill.

One opportunity for the mine may be energy recovery from tyres – after they are de-beaded and shredded – through use as a furnace fuel. Additional opportunities to recover energy from waste products will be reviewed if they become available.

2.5 Treat Waste

The waste hierarchy realises that not all waste products can be reused or recycled, and some will require treatment, to reduce potential impacts on the environment, followed by disposal. Metro Mining has not currently identified any wastes in this category.

2.6 Waste Disposal

This will only be considered where there is no other option available to minimise, reuse, recycle, recover or treat waste. Non-recyclable waste will be transported to a landfill, in the Weipa or Cairns region, for disposal in accordance with regulatory requirements.

It is anticipated that the only waste streams to be directed to landfill from the Mine will include non-recyclable general waste, and some regulated wastes such as oily rags, waste oils, chemicals and solvents, and sludges. Regulated waste will be transported off-site by a licensed contractor to an appropriate regulated waste disposal facility.

2.7 Cleaner Production

Cleaner production is not part of the Waste Hierarchy itself, but is an overlying strategy that is complementary with the proposed implementation of an Environmental Management System in accordance with ISO 14001 standards.

Cleaner production is a continual improvement process designed to maximise resource usage and operational efficiency in order to minimise waste disposal.

Cleaner production techniques practised by the mine will include:

- Improved operation and maintenance practices to reduce the quantity of resources used and to minimise the amount of waste generated. This is achieved through the selection of efficient motors to drive conveyors, and by ensuring that all machinery is well-maintained and is operating at peak efficiency.
- Selection and use of the most appropriate technology to reduce the quantity of resources used and to minimise the amount of waste generated. The DSO mining process utilised at Bauxite Hills ensures that minimal process water is required and there are no washed fines to be disposed of.

Segregation of wastes at the point of generation means that wastes can be more readily reused and recycled both on-site and off-site.

3 Waste Streams

Waste streams at the Mine have been identified and separated into the following categories:

1. Re-usable
2. Recyclable
3. Regulated¹
4. Compostable
5. Medical / Sanitary
6. Kaolin Mine Decommissioning
7. Other

If a waste material fits into more than one category e.g. waste oil is a regulated waste that is also recyclable, this will be identified in the discussion.

3.1 Re-usable Wastes

3.1.1 Vegetation

Vegetation that is cleared ahead of mining operations or for construction purposes will initially be placed into windrows. Mine planning, in consultation with the Site Environment Officer, will determine what different areas of cleared vegetation will be used for, and this will be communicated to the clearing team. Depending on the identified purpose, vegetation windrows will either be:

- Pushed back over mined areas once mining is complete and the area has been returned to final grade and had topsoil replaced;
- Put through a portable woodchip machine and then transported to the composting site, location requiring woodchip or stored in skips for transport offsite; and
- If not suitable or practicable for the first two management options, windrowed vegetation will be burnt, with the final organic rich ash material to be incorporated into nearby topsoil stockpiles or placed directly onto rehabilitation areas.

¹ Regulated wastes are classified under the *Environmental Protection Regulation 2008* (EP Reg). A full list of regulated wastes can be found in Schedule 2E of the EP Reg. All regulated wastes have legislated transport, storage, management and disposal requirements, in addition to the Mine standards and procedures.

3.1.2 Conveyor Belting / Tyres

Old or damaged conveyor belting that is removed from the BLF will be cut into usable lengths and stored in a specific skip at the Waste Recovery and Transfer Station. Lengths of conveyor will be reused as required for protection for the jetty and berthing dolphins. If the amount of waste conveyor is greater than can be reused on site, excess conveyor belting will be placed in the general waste skip. Waste tyres will also be assessed for suitability as berthing protection, and may be used for this purpose provided suitable attachment to the berth is able to be achieved.

3.2 Recyclable Wastes

3.2.1 Cardboard

Cardboard that is not contaminated with any other materials (ie plastic wrapping) will be collected at the Store building and placed into the compactor when a suitable load is available. Compacted cardboard will be stored on pallets in the Waste Recovery and Transfer Station, and covered with a tarpaulin to keep out rain. Pallets of compacted cardboard will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the pallets and transfer the compacted cardboard to their recycling facility. Volumes of compacted cardboard will be reported to MMI by the Waste Contractor.

3.2.2 Aluminium Cans

Aluminium cans will be crushed by the individual prior to placing them into a designated wheelie bin. A can crusher and wheelie bin will be placed at the camp, the wet mess and at the Mine Office. The wheelie bins will be emptied into a designated skip at the Waste Recovery and Transfer Station, and when full, will be loaded onto the next available back-loaded supply barge to Weipa/Cairns, where the Waste Contractor will collect the skip. The Waste Contractor will take the full skip to their recycling facility, and leave an empty skip to be taken back to site. Volume of recycled aluminium cans will be reported to MMI by the Waste Contractor.

3.2.3 Tyres

The largest tyres that will be used on site are 2.06m in diameter. So long as no tyres exceed this diameter, all waste tyres – from light vehicles and from mining equipment – may be placed in the designated skip in the Waste Recovery and Transfer Station. When full, the skip will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the skip and transfer the tyres to their recycling facility. Volumes of waste tyres that have been recycled will be reported to MMI by the Waste Contractor.

3.2.4 Concrete

Waste concrete will be an intermittent waste stream. Decommissioning of the kaolin mining wet plant and dry plant areas will produce a significant amount of waste concrete, which will be placed into the onsite landfill as a bulky but inert waste material. Concrete wastes that are produced as part of the Bauxite Hills mining operations will be broken up and placed into waste skips, and stored at the Waste Recovery and Transfer Station. When full, the skip will be loaded onto the next available

back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the skip and transfer the concrete to their recycling facility. Volumes of concrete that have been recycled will be reported to MMI by the Waste Contractor.

3.2.5 Timber

Waste timber that cannot be reused on site will be collected in a separate skip. When full, the skip will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the skip and transfer the timber to their wood-chipping facility. Volumes of timber that have been recycled will be reported to MMI by the Waste Contractor.

3.2.6 Steel / Metal

Steel recycling is well established as it has a recognised economic value. All uncontaminated steel / metal materials will be placed in a designated skip at the Waste Recovery and Transfer Station. When full, the skip will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the skip and transfer the steel to their recycling facility. Volumes of waste steel that have been recycled will be reported to MMI by the Waste Contractor.

3.2.7 Fridges / Air Conditioners

Fridges and air-conditioners are both recyclable. Any fridge or air-conditioning unit that becomes inoperable will be placed onto a pallet in the Waste Recovery and Transfer Station, and secured in a safe manner. The pallet will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the skip and transfer the fridge/air-conditioner to their recycling facility. Volumes of fridges / air-conditioners that have been recycled will be reported to MMI by the Waste Contractor.

3.2.8 Gas Cylinders

Empty gas cylinders are to be placed into a caged pallet and secured appropriately to prevent them falling over. Steel chains are usually used. When full, the pallet will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the skip and transfer the cylinders to their recycling facility. Number of gas cylinders that have been recycled will be reported to MMI by the Waste Contractor.

3.2.9 Batteries

Used lead acid batteries (ULABs) are 100% recyclable, however they are also classified as a regulated waste, which means that waste tracking procedures will be required. Batteries may also give off harmful fumes, and for this reason have to be stored in a well-ventilated area while also being protected from the elements. Waste batteries will be segregated from other wastes and will be stored on a self-bunded pallet in a covered collection bund. The pallet will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the skip and transfer the batteries to their recycling facility. Volumes of batteries that have been recycled will be reported to MMI by the Waste Contractor.

3.2.10 Diesel / Waste Oil / Cooking Oil

Waste oil (including cooking oil) and any waste diesel material can be stored together. Combining the oils/diesel does not increase the hazard category of the materials and reduces the number of specific waste collection and transport containers that are required for waste management. The combined materials are to be collected in the appropriately labelled, self-bunded waste oil pods, that will be located at the Camp Kitchen, at the Maintenance Shed and at the MOF (for transfer of waste oil materials from the tugs / barges). When full, the self-bunded pods will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the skip and transfer the oil to their recycling facility. Volume of oil that has been recycled will be reported to MMI by the Waste Contractor.

3.3 Regulated Wastes

3.3.1 Fuel and Oil Filters

Fuel and oil filters will be collected at the Maintenance Shed and deposited into modified ICB's. The modified ICB's are self-bunded and covered. When full, the ICB will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the ICB and transfer the contents to their regulated waste treatment facility. Volumes of fuel and oil filters that have been disposed of will be reported to MMI by the Waste Contractor. Waste tracking documentation will be provided.

3.3.2 Oily Rags

Oily rags will be collected at the Maintenance Shed and deposited into modified ICB's. The modified ICB's are self-bunded and covered. When full, the ICB will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the ICB and transfer the contents to their regulated waste treatment facility. Volumes of oily rags that have been disposed of will be reported to MMI by the Waste Contractor. Waste tracking documentation will be provided.

3.3.3 Hydraulic Hoses

Hydraulic hoses will be collected at the Maintenance Shed and deposited into modified ICB's. The modified ICB's are self-bunded and covered. When full, the ICB will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the ICB and transfer the contents to their regulated waste treatment facility. Volumes of hydraulic hoses that have been disposed of will be reported to MMI by the Waste Contractor. Waste tracking documentation will be provided.

3.3.4 Used Absorbents

Used absorbents will be collected at the Maintenance Shed and deposited into modified ICB's. The modified ICB's are self-bunded and covered. When full, the ICB will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the ICB and transfer the contents to their regulated waste treatment facility. Volumes of used

absorbents that have been disposed of will be reported to MMI by the Waste Contractor. Waste tracking documentation will be provided.

3.3.5 Assorted Chemicals

Waste chemicals will be collected at the Maintenance Shed and deposited into modified ICB's or segregated onto self-bunded pallets. When full, the ICB or self-bunded pallet will be loaded onto the next available back-loaded supply barge for transport to Weipa/Cairns, where the Waste Contractor will collect the ICB / pallet and transfer the contents to their regulated waste treatment facility. Volumes of assorted waste chemicals that have been disposed of will be reported to MMI by the Waste Contractor. Waste tracking documentation will be provided.

3.4 Compostable Wastes

The Mine is trialling a composting system on site. This presents an opportunity for recycling of a number of organic waste streams, including food wastes, and creating a beneficial end-use product.

Several design options are available for the composting system, but as the compost is proposed to be used as soil conditioner and enhancer for on-site uses including in the camp and for rehabilitation purposes, a simple windrowing method is the preferred option.

Given the extreme weather that is characteristic of the wet season, it will be necessary to locate the process under a roof and in a bunded area with a sump and pumping system to ensure that runoff and leachate is captured during periods of high precipitation. Any runoff collected may either be reintroduced to the compost piles to maintain appropriate moisture levels, or directed to the waste water treatment plant. In addition, this area will have to be fenced off to keep out feral animals such as pigs and vermin.

The ultimate quantity of compost production is currently unconfirmed. However, should 200 tonnes or more of the resultant compost product be generated in a year, the composting process will constitute an ERA (ERA 53 – Composting and soil conditioner manufacturing) under the EP Regulation. to utilise a number of waste streams and transform them into a beneficial product that can be used for rehabilitation purposes around the mine. The composting site is located behind the accommodation camp. Figure to be inserted once final design details are complete.

NB – The composting trial proposes to use STP treated effluent products, putrescible wastes and grease trap waste, all of which have health and safety implications. A specific risk assessment will be undertaken prior to the commencement of the composting trial to ensure the highest standards of health and safety management are also incorporated into the program.

3.4.1 Putrescible Wastes

Putrescible wastes are solid wastes that have a high organic content and are capable of being broken down by microorganisms. The majority of these wastes on site will be produced at the Camp Kitchen as food scraps. These wastes may produce odours and also attract birds and animals as a food source, so they need to be managed carefully. A separate enclosed composting facility is being assessed for these wastes, to remove odours and prevent the attraction of native and/or feral animals to the composting trial area. The camp kitchen will be provided with separate putrescible

waste bins that will then either be emptied into the enclosed composting bin, or will be taken to the trial composting area and mixed with the other composting material as soon as possible.

3.4.2 Sewage Effluent

The site EA has a number of specific conditions regarding sewage treatment and the management of sewage effluent, as included in Appendix XX. Sewage effluent from the STP will be preferentially used in the composting trial, with any excess effluent irrigated in the identified effluent irrigation area.

3.4.3 Sewage Sludge

Sewage sludge will be cleared from the STP at the required interval and spread out at the bioremediation pads to dry. The dried sludge material will then be added to the compost trial.

3.4.4 Grease Traps

Grease traps located at the camp kitchen, accommodation facilities and the Mine Office will be emptied via a sucker truck as required, with the material added to the composting trial material.

3.4.5 Hydrocarbon-stained Soil

Hydrocarbon spills onto land will be contained and any stained soil/sub soil material will be removed and taken to the composting trial.

3.5 General Waste

3.5.1 Paper / Plastic / Glass

There are currently no recycling options available for these waste streams from the identified Waste Contractor. Any future opportunities to recycle these materials will be investigated, and if practicable, will be implemented. Until this occurs, these waste materials are to be deposited in General Waste Bins that will be provided at all relevant locations around the site, including in camp accommodation. General Waste Bins will be provided in a range of sizes, including Wheelie Bins and Skips.

3.5.2 Conveyor Belt / Rollers / Large Operational Wastes

Any large items or material that cannot be reused on site, and that does not fit into any other category is to be disposed to the General Waste skip. General Waste Skips will be limited in number to encourage the correct assessment and disposal of waste streams into the other available collection types.

3.5.3 Mixed Wastes

Mixed wastes include any of the other waste streams that have been cross contaminated such that they are no longer able to be disposed of in their specific category eg cardboard that has a plastic protective coating cannot be recycled but will have to go to general waste. Mixed waste may include food tins and packaging, building materials such insulation, fittings, flooring, fixtures, office materials such as pens, PPE that has been broken or is out of date.

NB – If any material has been contaminated with regulated waste, the entire volume becomes classed as regulated waste and must not be disposed of to general waste.

3.6 Medical / Sanitary Waste

3.6.1 Medical Wastes

Medical wastes include any materials that may have been contaminated with bodily fluids through the course of treating a sick or injured patient, including any sharps (needles) that have been used. A biohazard / sharps container, and a spare, will be provided in the first aid room and will be sent off site for appropriate processing as required. When one container is being taken away, the spare will be utilised, and a new container will be provided by the Waste Contractor.

3.6.2 Sanitary Wastes

Sanitary waste bins will be provided in all communal female toilets and at appropriate locations once final female employment numbers have been determined. Bins will be collected and new bins replaced, in accordance with the Waste Contractor procedures.

3.7 Kaolin Mine Decommissioning

Infrastructure and general waste from the historic kaolin mining operation has been left on site since it went into liquidation in 2008, with significant volumes of waste at both the Wet Plant and Dry Plant locations. Waste from the kaolin mine will be managed the same as all other wastes on site, with the exception of general wastes. Condition C6 of the EA states that from December 2016, only wastes associated with decommissioning of the kaolin mine may be deposited at the onsite landfill. Further details on the kaolin mine decommissioning can be found in the Plan of Operations. Metro Mining will systematically clear all waste materials associated with the kaolin mine decommissioning from the Bauxite Hills mining leases.

3.8 Other Wastes

3.8.1 Vehicle Washdown

The vehicle washdown on site will be equipped with sediment collection and an oil/water separator. The collected sediment and waste product from the oil/water separator is to be directed to the site Composting Facility for bioremediation.



3.8.2 Oily Water

Bunded areas will generally be covered to avoid significant accumulation of water that then becomes a management issue. Small amounts of water within a bund will be allowed to evaporate. Any significant volume of water within a bund area will require pumping and transport to the composting facility. If there is significant contamination clearly visible on the water surface, appropriate absorbents are to be used to collect as much hydrocarbon material as possible, before the remainder of the water is transported to the composting facility.

NB – Bund release points will be locked, with keys held by the Site Environmental Officer and the General Manager.

3.8.3 Sediment Dams and Sediment Controls

Sediment dams and various sediment controls are to be cleaned out as required for optimal performance, but as a minimum, prior to the wet season Mine closure. This material is either to be taken to the Composting Facility, or, if there is no visible sheen or hydrocarbon odour to the material, can be place back into mining pits as part of the rehabilitation program.

3.8.4 Radioactive Materials

Radioactive materials are used in the conveyor weight sensors and potentially in the on-belt quality control system. No radioactive materials will require disposal or management under this system. Any issue with the radioactive components are to be identified to the Radioactive Officer and managed under the Health and Safety Management System.

3.8.5 Air Emissions

No air emissions are proposed to be captured for specific waste management. Air quality (e.g. dust), greenhouse gases and associated monitoring and management are incorporated into the Environmental Authority under Air Quality, and are not identified as a waste product for the purposes of this Management Plan.

4 Waste Management Summary

Type of Waste	Sources on Site	Site Disposal Option	Responsibility	Final Disposal Location	Additional Actions
Re-usable Waste					
Vegetation	Clearing	Dozer push onto rehabilitation area	Senior Environmental Officer (SEO)	Mine Rehabilitation	
		Woodchip into Skip	Clearing Contractor	Waste Contractor Recycling Facility	Barge to Waste Contractor
		Woodchip in haul truck	Clearing Contractor	Composting Facility	Truck to Composting Facility
		Burn	SEO	Mine Rehabilitation	Burning permit required
Conveyor belting	BLF	Protection for ship berths	Maintenance Mgr	Wharf / Jetty / MOF	
Recyclable Waste					
Cardboard	Stores	Compact and Palletise	Stores	Waste Contractor Recycling Facility	Barge to Waste Contractor
	Camp	Recycling Bin	Camp Operator	Stores	Stores to combine and compact cardboard
Aluminium cans	Site Office	Recycling Bin	SEO	Waste Contractor Recycling Facility	Barge to Waste Contractor
	Camp	Recycling Bin	Camp Operator	Waste Contractor Recycling Facility	Barge to Waste Contractor
Tyres	Maintenance shed	Tyre Skip	Maintenance Mgr	Waste Contractor Recycling Facility	Barge to Waste Contractor Waste Tracking
Concrete	Site plant and infrastructure	Concrete Skip	Contract Mgr	Waste Contractor Recycling Facility	Barge to Waste Contractor
Steel	Site plant and infrastructure	Waste Steel Skip	Contract Mgr	Waste Contractor Recycling Facility	Barge to Waste Contractor
Batteries	Mine machinery inc. light vehicles and tugs	Self-banded Battery Pallet	Store Mgr	Waste Contractor Recycling Facility	Barge to Waste Contractor Waste Tracking
Fridges / air conditioners	Camp	Recycling Skip	Camp Operator	Waste Contractor Recycling Facility	Barge to Waste Contractor
	Site Office	Recycling Skip	Maintenance Mgr	Waste Contractor Recycling Facility	Barge to Waste Contractor
Gas cylinders	Maintenance shed	Secure on gas cylinder pallet	Maintenance Mgr	Waste Contractor Recycling Facility	Barge to Waste Contractor

Diesel / waste oil / cooking oil	Camp	Self-bunded bin	Camp Operator	Waste Contractor Recycling Facility	Barge to Waste Contractor Waste Tracking
	Maintenance shed	Self-bunded bin	Maintenance Mgr	Waste Contractor Recycling Facility	Barge to Waste Contractor Waste Tracking
Timber	Clearing	Woodchip into Skip	Clearing Contractor	Waste Contractor Recycling Facility	Barge to Waste Contractor
Regulated Wastes					
Fuel / oil filters	Maintenance shed	Modified IBC	Maintenance Mgr	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
Oily rags	Maintenance shed	Modified IBC	Maintenance Mgr	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
Hydraulic hoses	Maintenance shed	Modified IBC	Maintenance Mgr	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
Used absorbents	Maintenance shed	Modified IBC	Maintenance Mgr	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
	Camp	Modified IBC	Camp Operator	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
	Transshipping	Regulated Waste Bin	Transshipping Contractor	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
	Spill locations	Modified IBC	SEO	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
Various chemicals – paint, cleaners, degreasers,	Laboratory	Self-bunded pallets – segregated depending on waste type	Laboratory Mgr	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
	Maintenance shed	Self-bunded pallets – segregated depending on waste type	Maintenance Mgr	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
	Port Area	Self-bunded pallets – segregated depending on waste type	Production Mgr	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
	Transshipping	Self-bunded pallets – segregated depending on waste type	Transshipping Contractor	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
	Camp	Self-bunded pallets – segregated depending on waste type	Camp Operator	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
	STP	Self-bunded pallets – segregated depending on waste type	STP Operator	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
Compostable Wastes					

Putrescible wastes	Camp kitchen	Collect in marked bin	Camp Operator	Site Composting Facility	
Sewage effluent	Camp STP	Irrigation system or compost area	STP Operator	Site Composting Facility	Irrigation to compost area
Sewage sludge	Camp STP	Transport to bioremediation pads	STP Operator	Site Composting Facility	Transport from Bioremediation Pad to Compost Facility
Grease traps	Camp	Transport to compost area	Camp Operator	Site Composting Facility	Sucker Truck required
	Site Office	Transport to compost area	Maintenance Mgr	Site Composting Facility	Sucker Truck required
Hydrocarbon stained soil	Spill Location	Transport to compost area	St:O	Site Composting Facility	
Vegetation	Mowing / gardening	Transport to compost area	Camp Operator	Site Composting Facility	
	Clearing	Transport to compost area	Clearing Contractor	Site Composting Facility	
General Wastes					
Paper Plastics Glass	Site office	General Waste Bin	Maintenance Mgr	Waste Contractor Landfill	Barge to Waste Contractor
	Maintenance shed	General Waste Bin	Maintenance Mgr	Waste Contractor Landfill	Barge to Waste Contractor
	Camp	General Waste Bin	Camp Operator	Waste Contractor Landfill	Barge to Waste Contractor
	Transshipping	General Waste Bin	Transshipping Contractor	Waste Contractor Landfill	Barge to Waste Contractor
Mixed waste eg steel cans, smaller building materials	Camp	General waste skip	Camp Operator	Waste Contractor Landfill	Barge to Waste Contractor
	Port Area	General Waste Skip	Maintenance Mgr	Waste Contractor Landfill	Barge to Waste Contractor
	Transshipping	General Waste Bin	Transshipping Contractor	Waste Contractor Landfill	Barge to Waste Contractor
Conveyor belt / rollers / cables / piping/ larger items	Port Area	General Waste Skip	Maintenance Mgr	Waste Contractor Landfill	Barge to Waste Contractor
	Maintenance shed	General Waste Skip	Maintenance Mgr	Waste Contractor Landfill	Barge to Waste Contractor
Biohazard / Sharps					
Sharps / Biohazard	First Aid	Sharps/ Biohazard container	First Aid Officer	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
Sanitary wastes	Camp	Sanitary waste bins	Camp Operator	Waste Contractor Regulated Waste Facility	Barge to Waste Contractor Waste Tracking
Kaolin Mine General Waste					
General waste	Wet plant Dry plant	Skip or Haul Truck	Decommissioning Contractor	Site Landfill	

5 Waste Management Facilities

The waste management facilities for the Mine are described below. Figure to be inserted once final design is completed.

5.1 Waste Recovery and Transfer Station

The Waste Recovery and Transfer Station will be located at the Port Infrastructure Area. It will have appropriate area for the range of waste management activities that have been described in this WM Plan, including being fully bunded and having appropriate internal bunding, covered areas and segregation areas as required for the range of waste streams. A final design will be provided for the Waste Recovery and Transfer Station as part of the final mine planning process.

A number of different bin types will be utilised around the mine site, that will be colour coded according to the waste stream they can accept. Once the final Waste Contractor has been awarded, the actual details of the colour coding and bin placement will be provided. Some of the bin types are shown in the plates below.



Plate 5-1: Colour-coded wheelie bin



Plate 5-2: Front-lift bins



Plate 5-3: Skip bins



Plate 5-4: Modified ICBs

5.2 Sewage Treatment Plant

Sewage treatment will occur at a central intermittent aeration type package treatment plant located at the accommodation camp. Toilet facilities at the PIA will be pumped out at an appropriate schedule and trucked back to the STP.

This system works on the combined principles of primary settling plus aerobic and secondary treatment. Wastewater to be treated flows first into the septic zone where solids are settled out and the anaerobic microorganisms perform the initial part of the purification process. Once organic impurities have been absorbed within the aerobic culture of microorganisms, the water passes to the secondary sedimentation zones. Clear water flows over into the clarification zone and the occasional film of microorganisms are automatically transferred back to the primary zone to improve its performance. In the disinfection zone, mild controlled chlorinating is applied to complete the treatment process.

It is anticipated that during operation of the Mine, effluent disposal will be at an average rate of 75,000 litres or 75 cubic metres per day (m^3/d) over the eight month operational period. Treated sewage effluent will be stored in a tank for dechlorination purposes prior to being used for irrigation.

5.3 Effluent Irrigation Area

Treated effluent water not reused on site will be irrigated to the 1 ha irrigation area, calculated as being suitable for this purpose. To maximise evapotranspiration and nutrient uptake, and minimise the deep percolation of nutrients through the soil profile, the irrigation area would be made up of a series of alternately operated lateral surface lines with forest wobbler sprinklers used to minimise the potential for irrigation water aerosol drift. Regular maintenance and removal of understory fire fuel load will be undertaken to minimise the risk of fire damage within the irrigation area. The requirements of the Queensland Water Recycling Guidelines and AS/NZS 1547:2000 will be implemented in the operation of the STP and associated treated effluent water irrigation system. AS/NZS 1547:2000 is the principal standard for onsite effluent treatment and irrigation regardless of the design size.

All sewage effluent released to land must be monitored at the frequency and for the parameters and meet the release limits specified in the EA for the Mine. Typical release limits (as shown in Queensland Water Recycling Guidelines December 2005) are Table 5-1.

Table 5-1 Contaminant release limits to land

Contaminant	Unit	Release Limit	Frequency
5 day Biochemical Oxygen Demand (BOD5)	mg/L	20	Monthly
Total Suspended Solids	mg/L	30	
Total Nitrogen	mg/L as Nitrogen	30	
Total Phosphorus	mg/L as Phosphorus	15	
E-coli	Organisms/100 mL	1,000	
pH	pH units	6.0 to 9.0	

The construction and ongoing management of the STP and associated effluent irrigation will be undertaken to meet all conditions of the EA, specifically conditions G18 – G26 that relate directly to sewage treatment and effluent irrigation.

5.4 Composting Area

A composting system is planned to be incorporated onsite, and utilised during the operational phase of the Mine. This presents an opportunity for a number of organic waste streams, including food wastes to be recycled.

Given that compost will be used as soil conditioner for the mine complex and possibly the mine rehabilitation process, a simple windrowing method is most likely. The composting facility will be bunded to prevent runoff of leachate material, and be fenced to keep out feral animals such as pigs.

The ultimate quantity of compost production will be confirmed during the early years of operation; however, the estimation of biosolids, putrescible wastes and other compostable wastes is around a 3 to 4 t/yr and as such will be under the 20 t/yr trigger limited for ERA 53 – Composting and soil conditioner manufacturing under the EP Regulation would not apply. In addition, the material will be used onsite and not sold as a commercial product.

5.5 Bioremediation Pads

Bio-solids (activated sludge) will be periodically pumped out of the solids digester tanks and the sludge spread on the bioremediation pad.

As part of the waste management strategy it is proposed that bio-solids (activated sludge) from the STP will be stabilised and treated (composted), along with other organic wastes, for use as a soil conditioner as part of the rehabilitation strategy. Bio-solids will be removed from the STP and taken to a purpose-built bioremediation pad. The bio-solids will be laid on covered pads to dewater. Once dewatered the bio-solids will be relocated to the Composting Facility and incorporated with other waste streams suitable for composting, and eventually used on site as compost. Water from the bio-solids treat area will be captured and returned to the STP for reuse.

Assuming the worst case scenario (during dry season operations) of 100 EP producing 250 L of effluent per day, the total daily sludge volume is 1,250 litres. This equates to 10 kg of dry solids equivalent produced per day. To accommodate this volume of dry solids equivalent a 6.25 m² (i.e. 2.5 x 2.5) drying bed is needed to provide the required surface area. During the wet season this volume is anticipated to reduce to approximately 50% of peak volume taking into account the system will require feeding during periods of low usage.

To ensure appropriate capacity Metro Mining has set aside a 0.1 ha area adjacent to the STP to accommodate seven days drying capacity during the dry season, appropriate buffers and further drying capacity if required. To ensure optimal operability during the wet season the drying pads will be covered by a permanent cyclone rated shelter. The bioremediation pad will have an impermeable base layer to prevent leaching and be bunded to contain runoff and prevent ingress of clean water. Typical examples of drying pads are shown in the plates below.



Plate 5-5: Example of drying pad



Plate 5-6: Example of covered drying pad

5.6 Kaolin Mine Landfill

The northern end of the landfill has historically been used for solid wastes from the kaolin operations, with the central area of the landfill utilised for putrescible wastes (**Plates 5-7 and 5-8** respectively). All previously used areas have been covered and compacted. These areas are not available for further use.



Plate 5-7: Northern end of landfill (photo January 2017)



Plate 5-8: Central area of landfill (photo January 2017)

The southern end of this landfill (**Plate 5-9**) has remaining capacity and the EA states may be used for bulk disposal of metal, plastic or wood scrap from demolition work associated with the kaolin mine decommissioning.



Plate 5-9: Southern end of landfill or kaolin decommissioning wastes (photo January 2017)

6 Waste Tracking

Under Queensland's environmental protection legislation waste handlers are required to submit waste tracking information to EHP as part of the system for tracking waste types as listed in Schedule 2E of the *Environmental Protection Regulation 2008*.

As the Waste Generator, Metro Mining must provide the following:

- Record the prescribed information about the waste;
- Give the prescribed information to the waste transporter;
- For online single waste tracking certificates, Connect (EHP's online system) will store the prescribed information for the waste tracking movement which will be accessible any time under the Metro Mining customer account; and
- Notify EHP of any discrepancies associated with the transaction.

Note: A generator must give trackable waste only to authorised waste transporters.

7 Waste Reporting

7.1 Waste Contractor Reporting

The Waste Contractor will provide reporting on volumes of all relevant materials that have been collected and transport from the Mine on a monthly basis, and will segregate these reports to allow monitoring of progress against waste reduction targets.

Copies of all waste tracking documentation will also be provided.

7.2 National Environmental Protection Measure (NEPM) Reporting

The National Environmental Protection Council (NEPC) has endorsed a National Environment Protection Measure (NEPM) in the form of the National Pollutant Inventory (NPI). It is a database designed to provide stakeholders and government agencies with information on the type and quantity of substances emitted to land, water and air. The objectives of the NPI are to:

- Provide information to industry and government to assist with environmental planning and management;
- Provide the community up to date information about substance emissions and transfers from industrial facilities; and
- Promote waste minimisation, cleaner production, and energy and resource efficiency.

Reporting on emissions in compliance with NPI requirements will be an annual requirement for the Mine.

8 Waste Auditing

Waste auditing is proposed to be undertaken as described in Table 8-1.

Table 8-1 Waste auditing

Audit	Frequency	Responsibility	Reporting
Waste Streams Produced on Site	Annually	SEO	Site
Audit Mining Contractor / Transshipping Contractor	Annually for first year – then year about with the two major contractors	SEO	Site
Audit Waste Contractor – desktop	Annually	SEO	Corporate
Audit Waste Contractor – Main Facility and Secondary Facilities	First year, then every second year, alternating with Secondary Facilities	Metro Mining Manager Env & Community	Corporate

Appendix B – BTS – Ship Sourced Pollution Prevention Plan



METRO MINING

BAUXITE HILLS PROJECT

SHIP SOURCED POLLUTION

PREVENTION MANAGEMENT PLAN

SKARDON RIVER

QUEENSLAND

BTS-SMS-OHS-PLN06

Restrictions on Use

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Rev	Description	Author	Reviewed	Approved	Date
1	Prepared for review	GS	IJ	IJ	25/08/16

Ship Sourced Pollution Prevention Management Plan

Table of Contents

1.	INTRODUCTION.....	3
1.1.	Purpose.....	3
1.2.	Rules.....	3
1.3.	Responsibilities.....	4
1.4.	References.....	4
2.	LOCATION.....	4
2.1.	Port of Skardon River.....	4
3.	PROCEDURES.....	5
3.1.	Oil.....	5
3.2.	Garbage.....	6
3.3.	Sewage.....	7
4.	REPORTING.....	8
4.1.	Record Keeping.....	8
5.	ATTACHMENT.....	9
5.1.	Untreated Sewage Discharge Map.....	9
5.2.	Ship Sourced Pollution Prevention - Flow Chart.....	10

Ship Sourced Pollution Prevention Management Plan

1. INTRODUCTION

Metro Mining Ltd (Metro) has entered into an agreement with Bauxite Transshipment Services Pty Ltd (BTS) a partnership between Transshipment Services Australia Pty Ltd and Dadaru SR for the provision of transshipment services relating to the Bauxite Hills Project.

The Project will include an open cut mining operation, haul roads, Barge Loading Facility (BLF), tug and barge operation, ship loading transshipment and will produce up to 5 million tonnes per annum (Mtpa) of ore over approximately 12 years. The mine will not be operational during the wet season.

Bauxite from the project is suitable as a direct shipping ore product. Bauxite will be transported by barge via the Skardon River to the transshipment site, approximately 6 nautical miles (nm) offshore, and loaded into ocean going vessels (OGV's) and shipped to customers.

OGV's of between 50,000 to 120,000 tonne each will be loaded at the transshipment anchorage site. Barges will be loaded and bauxite will be transported to OGV's 24 hours per day with barges having an initial capacity of approximately 3,000 t to meet early production volumes, increasing up to around 7,000 t as the Project reaches a maximum production of 5 Mtpa.

1.1. Purpose

The purpose of this document is to provide a thorough overview of BTS's Ship Sourced Pollution Prevention Management Plan and ensure regulatory compliance of the Bauxite Hills Project based out of the Port of Skardon River.

BTS on behalf of Metro have prepared for review by Ports North the design and implementation of a Ship Sourced Pollution Prevention Management Plan for use during the development and operational stages of the project.

1.2. Rules

This management plan was developed to ensure operational compliance with the legislation Protection of the Sea (Prevention of Pollution from Ships) Act 1983.

This Act implements the MARPOL and includes a number of enforcement related provisions derived from the United Nations Convention on the Law of the Sea. Under this Act there are also a number of Marine Orders given enforcement which relate to Marine Pollution Prevention, including:

- Marine Order 91 (Marine Pollution Prevention – Oil);
- Marine Order 95 (Marine Pollution Prevention – Garbage); and
- Marine Order 96 (Marine Pollution Prevention – Sewage).

This Act applies both within and outside Australia and extends to every external Territory and to the exclusive economic zone (EEZ) which 200 nautical miles (nm) from Australian coastline.

This Act prohibits the discharge of oil or oily mixtures and garbage by all ships and vessels in Australian waters and EEZ or by an Australia ship beyond Australian EEZ, except in prescribed

Ship Sourced Pollution Prevention Management Plan

circumstances or emergency situations as outlined in the Act. This Act also contains duties to report incidents of marine pollution.

1.3. Responsibilities

It is the responsibility of the BTS to ensure that this plan is implemented and the responsibility of the Master of each vessel to carry out the following procedures.

It is the Master's responsibility to co-ordinate the collection, separation and processing of all waste. It is the responsibility of all crew members to assist in the day to day implementation of the Waste Management.

1.4. References

Reference throughout this plan will be made to:

- Metro Mining Skardon River Environmental Impact Study;
- BTS Safety Management System (SMS);
- BTS Skardon River, Marine Operations Management Plan;

2. LOCATION

2.1. Port of Skardon River

The Bauxite Hills Project is located on Cape York Peninsula, approximately 90 km north of Weipa, in the Parish of Skardon within the Cook Shire. The Port of Skardon River is within the Project's mining leases.

Far North Queensland Ports Corporation Limited, trading as Ports North is responsible for the development and management of the declared Ports, including the Port of Skardon River. Skardon River was declared a Port in February 2002, and the Port limits cover an area of 2,489 ha. As the port manager, Ports North's role is to maintain the port to facilitate trade.

The Bauxite Hills Project area (Project mining leases), Skardon River and offshore activity areas, and underlying and adjacent cadastral boundaries are shown in Figure 1.

Ship Sourced Pollution Prevention Management Plan



Figure 1. Location Map

3. PROCEDURES

New crew joining the vessel will have the ship sourced pollution prevention plan explained during induction. At regular intervals the management plan will also be reviewed at Tool Box meetings.

3.1. Oil

Collection of Oily Water

Regulations contain limits on the amount of oil which vessels can legitimately discharge into the sea. Where discharge from bilge tanks is permitted it is a requirement that an oil discharge monitoring and control system together with oil filtering equipment (Oily Water Separator) be fitted so as to ensure that the oil content of any discharge does not exceed the maximum permitted under MARPOL (15ppm).

Processing Oily Water

Vessels Machinery spaces are fitted with a design approved oily water separator. Bilge water with oil content less than 15 ppm whilst underway may be discharged. 15 ppm discharges can be anywhere at sea (not within port limits) including the Great Barrier Reef Marine Park and Marine Protected Areas.

Storing Oily Water

A dedicated oil sludge tank is fitted to all vessels for the collection and storing of all oily water.

Ship Sourced Pollution Prevention Management Plan

This tank and all its inspection hatches, vents, outlets and piping arrangements are labelled and colour coded for clear identification.

Disposing of Oily Water

All oily water will be disposed of using an approved port or truck oil waste reception facility. Either by the means of suction from the sludge tank directly to the facility of transfer using approved oil containers to the bunded area for disposal.

All crew members are familiar with the oily water management procedures and any procedure will be included in induction for new crew members.

3.2. Garbage

Collection of Garbage

Bins will be placed on vessels for recyclable items and for general waste.

Each bin will be clearly labelled and will be lined with bin liners for ease of disposal and to ensure that liquids are contained. Bins will also be securely fastened to ensure that they do not move or open and release while at sea.

Food waste that is likely to decompose (such as meat, prawn tails etc.) will be double bagged and frozen ready to be disposed of at shore garbage facilities.

Bins will be on wheels so that garbage can be wheeled off vessels at port. In instances where only small amounts of garbage are collected, bags will be tied up and carried off vessel.

No garbage will be disposed of at sea.

Processing Garbage

No garbage processing equipment is carried on vessel.

All garbage will be disposed of using shore based facilities.

Storing Garbage

Bins will be placed at each end of vessel when transporting passengers.

Bins will also be securely fastened to ensure that they do not move or open and release while at sea.

Depending on size and weight of the garbage, bins will either be wheeled or carried off the vessel ensuring bin liner is replaced as soon as empty bin is returned to the vessel. Food waste will be disposed of where possible on a daily basis.

All crew members are familiar with garbage management procedures and any procedures will be included in induction for new crew members.

Disposing of Garbage

All garbage will be disposed of using shore based facilities.

Ship Sourced Pollution Prevention Management Plan

In situations where shore based facilities are not available, adequate on board storage space will be allocated to ensure that garbage may be appropriately managed until suitable shore based facilities are available.

3.3. Sewage

Processing of Sewage

BTS owner or operated vessels will not be fitted with a sewerage treatment plants (STP). Therefore we have not provided the requirement's for such a scenario. Comminution and disinfecting of sewage using an approved system in accordance with regulation 9.1.2 of MARPOL Annex IV is to be carried out if vessel is fitted with a STP. Additionally all vessels should ensure that the STP if fitted is operating at optimum performance when in Australian waters. STP is to be certified by administration to meet the operational requirements referred to in the regulations.

Storing Sewerage

A dedicated sullage tank is fitted to all vessels for the storage of all Black and Grey water. This tank and all its inspection hatches, vents, outlets and piping arrangements are clearly labelled and colour coded for clear identification.

All crew members are familiar with the sewerage management procedures and any procedure will be included in induction of new crew members.

Disposing of Sewerage

All vessels owned or operated by BTS operating out of the Port of Skardon River, will follow the untreated sewage discharge requirements under the Transport Operations (Marine Pollution) Act 1995 and Regulation 2008.

Untreated sewage discharge requirements are displayed in Figure 1.

Untreated sewage discharge requirements	Prohibited Discharge Waters
	* Nil Discharge in waters that are:
	– a boat harbour
	– a canal
	Smooth Waters (includes rivers, creeks, streams, lakes and designated smooth waters)
	– Nil Discharge
	Open Waters
	* For ships with 1–6 persons on board
	– Nil Discharge within ½ nautical mile (926 metres) of a wharf or jetty (other than a jetty that is a marina)
	– Nil Discharge within 1 nautical mile (1,852 metres) of aquaculture fisheries resources (such as oyster leases or a fish farms, for example)
	* For ships with 7–16 persons on board, as above plus
	– Nil Discharge within 1 nautical mile (1,852 metres) of a reef or the mean low water mark of an island or the mainland
	* For ships with 16 or more persons on board
	– Nil Discharge

Figure 1. Untreated Sewage discharge requirement's for ships other than declared ships

Ship Sourced Pollution Prevention Management Plan

4. REPORTING

4.1. Record Keeping

All ship sourced waste will be logged and records kept in each respective ships Oil, Garbage and Sewage record book.

These record books will be available for inspection by AMSA, BTS or Metro at all times.

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Safety Management System

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Ship Sourced Pollution Prevention Management Plan

5. ATTACHMENT

5.1. Untreated Sewage Discharge Map



Ship Sourced Pollution Prevention Management Plan

5.2. Ship Sourced Pollution Prevention - Flow Chart



Ship Sourced Pollution Prevention Plan

