CHAPTER 11 – LAND USE AND LAND CONTAMINATION

GULF ALUMINA LTD – SKARDON RIVER BAUXITE PROJECT
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11. EXISTING LAND USE AND LAND CONTAMINATION

11.1 Introduction

This chapter describes the existing land uses and infrastructure potentially affected by the construction and operation of the Project. It also describes the potential, existing sources and locations of contaminated land within the Project area.

Overall site suitability and the location of Project activities on site are described in the context of land tenure, land use, land suitability, areas of regional interest and stock routes. Practical measures are identified to protect environmental values by achieving the identified environmental objectives and performance outcomes. A risk based assessment approach has been used to assess risks to land use and from existing contaminated land.

This potential for the Project to contaminate land, air or waters are assessed in other chapters of the EIS as identified in Table 11-1. This chapter describes the critical design requirements, site suitability and management measures for the following activities with the potential to contaminate land:

- transport and storage of dangerous goods and hazardous materials
- hydrocarbon and chemical storage and handling
- bio-remediation of contaminated soils.

Table 11-1  Chapters of the EIS describing the Project’s Potential to Contaminate Land

<table>
<thead>
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<th>Potential Contaminant Source</th>
<th>Chapter</th>
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<td>Hydrocarbons and chemicals – transport, handling and storage.</td>
<td>This chapter describes management of dangerous goods and hazardous materials (including hydrocarbons and chemicals) during transport, handling and storage.</td>
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<td>Transport and storage of dangerous goods and hazardous materials</td>
<td>Chapter 7 describes rehabilitation and decommissioning of potentially contaminated sites.</td>
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<tr>
<td>Infrastructure areas such as workshops.</td>
<td>Chapter 12, Chapter 22 and Chapter 23 describe potential impacts from unplanned release of hydrocarbons and chemicals and measures to mitigate impacts.</td>
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<tr>
<td>Ballast water and bilge water from barges and supply vessels,</td>
<td>Chapter 22 and Chapter 18 describe management of ballast water and bilge water.</td>
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<tr>
<td>and other ship sourced pollution.</td>
<td></td>
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<tr>
<td>Runoff from mining and infrastructure areas</td>
<td>Chapter 6 describes measures to minimise impacts from release of sediment affected from mining areas and the Port area.</td>
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11.2 Environmental Objectives and Performance Outcomes

The environmental objectives and performance outcomes below are based on Schedule 5, Table 2 of the 
Environmental Protection Regulations 2008 (EP Regulation). The mitigation and management measures 
presented in this chapter are designed to achieve these environmental objectives and performance 
outcomes. The environmental management plan (EM Plan) presented in Appendix 13 provides a 
consolidated description of these mitigation and management measures.

11.2.1 Environmental Objectives – Land Use

- The location for the activity on a site protects all environmental values relevant to adjacent sensitive 
  uses.
- Allow for ongoing land use following final rehabilitation and decommissioning.
- Minimise the extent and degree of disturbance on land as mining is occurring.

11.2.2 Performance Outcomes – Land Use

- The activity will be carried out on the site in a way that prevents or minimises adverse effects on the 
  use of surrounding land and allows for effective management of the environmental impacts of the 
  activity.
- Comply with rehabilitation and decommissioning performance criteria.

11.2.3 Environmental Objectives – Land Contamination

- The activity will be operated in a way that protects environmental values of land including soils, 
  subsoils, landforms and associated flora and fauna
- The activity will be operated in a way that protects environmental values of waters
- The activity will be operated in a way that protects environmental values of groundwater and any 
  associated surface ecological systems.
- The location for activities on the site, with the potential to cause contamination, protects 
  environmental values relevant to adjacent sensitive uses.
- The design of the facility (waste management facilities) permits the operation of the site at which the 
  activity is to be carried out, in accordance with best practice environmental management.
Any waste generated, transported, or received as part of carrying out the activity is managed in a way that protects all environmental values.

11.2.4 Performance Outcomes – Land Contamination

- The storage and handling of contaminants will include effective means of secondary containment to prevent or minimise releases to the environment from spillage or leaks.
- All storage provided for hazardous contaminants includes secondary containment to prevent or minimise releases to the environment from spillage or leaks.
- Contingency measures will prevent or minimise adverse effects on the environment due to unplanned releases or discharges of contaminants to water.
- The activity will be managed to prevent or minimise adverse effects on the environmental values of land due to unplanned releases or discharges, including spills and leaks of contaminants.
- The activity will be managed to prevent or minimise adverse effects on groundwater or any associated surface ecological systems.
- Waste generated, transported or received is managed in accordance with the waste and resource management hierarchy in the Waste Reduction and Recycling Act 2011.
- If waste is disposed of, it is disposed of in a way that prevents or minimises adverse effects on environmental values.
- The application of water or waste to the land is sustainable and is managed to prevent or minimise adverse effects on the composition or structure of soils and subsoils.
- The design of the facility prevents or minimises the production of hazardous contaminants and waste.
- If the production of hazardous contaminants and waste is not prevented or minimised, then the design of the facility contains and treats hazardous contaminants rather than releasing them.
- No contamination of land or waters from waste management beyond the footprint of waste management facilities.
- If land or groundwater contamination as a result of waste management activities has occurred, an investigation will be undertaken, with management or remediation as required. This may involve engaging a suitably qualified person approved by DEHP as a contaminated land specialist, where required, and will fully depend on the nature and extent of contamination.
- Waste monitoring data demonstrates reduction in waste produced (per tonne of production).
- Adherence to waste management plan indicating minimisation of waste generated, maximise reuse and recycling, and the safe treatment and disposal of all non-reusable and non-recyclable materials in compliance with legislation.

11.3 Legislative and Policy Context

11.3.1 Land Use

The approvals process and the legislative and policy context for the Project and its activities are identified in Chapter 2. Of most direct relevance to the objectives and outcomes identified in Section 11.2 which are addressed in this chapter, the following have been considered.
11.3.1.1 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) uses a number of mechanisms to achieve its objectives including:

- the EP Regulation which identifies environmentally relevant activities (ERAs) that require approval (refer *Chapter 2*)
- notifiable activities set out in Schedule 2 of the EP Act (refer *Chapter 2*)
- Environmental Protection Policies (EPPs) for water, noise and air
- Environmental Authorities (EAs) setting out the conditions for approval of the Project
- duties of care associated with environmental harm
- management of regulated and hazardous waste dams.

11.3.1.2 Land Act 1994

The *Land Act 1994* (Qld) (Land Act) provides a framework for the allocation of State land as leasehold, freehold or other tenure and its subsequent management.

The proponent may be required to apply for owners consent (for the occupation of unallocated State land (i.e. activities in Skardon River or Namaleta Creek) – entitling the holder to non-exclusive possession of the land).

11.3.1.3 Land Protection (Pest and Stock Route Management) Act 2002

The *Land Protection (Pests and Stock Route Management) Act 2002* (Qld) (LP Act) provides for the management of pests and the stock route network.

11.3.1.4 Regional Planning Interests Act 2014

The *Regional Planning Interests Act 2014* (RPI Act) requires resource activities authorised under resource acts and other regulated activities to align with the regional land use policies in the regional plans as well as other government policy.

The RPI Act introduces an assessment framework to manage the impact of resource activities on areas of the state identified in the Act as an “area of regional interest” — priority agricultural areas¹ (PAAs), priority living areas (PLAs), strategic environmental areas (SEAs) and strategic cropping areas (SCAs)².

Under the RPI Act, a resource activity, and other identified activities, cannot occur in these areas unless a regional interests development approval (RIDA) has been given for the activity.

Through the regional planning process (see Cape York Regional Plan in *Section 11.3.1.5* below), areas of regional interest in the Cape York region includes SEA, PAA and PLA areas.

Based on government maps, the Project MLs are not within SCA, SEA, PAA and PLA areas, and there are no priority agricultural land uses applicable to the Project area.

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¹ Note: Each PAA is a strategic area identified by the government as containing significant clusters of what are considered to be Priority Agricultural Land Uses (PALUs)—high value, intensive agricultural land uses.

² Land mapped as SCL anywhere in Queensland when the SCL Act was repealed became an ‘area of regional interest’. This applied regardless of whether a regional plan exists for the area. A RIDA is required to operate in areas of regional interest, including strategic cropping areas (SCAs).
11.3.1.5 Cape York Regional Plan

The Cape York Regional Plan (CYRP) is designed to create strategic, long-term land use certainty, particularly in relation to areas that are appropriate for economic development opportunities and those that are set aside for environmental protection.

The region has outstanding natural areas of high conservation value, a diverse and rich Indigenous heritage together with a wealth of natural assets, particularly mineral resources. Enabling sustainable economic development opportunities in the region balanced with the protection of the Cape’s natural areas is a key priority of the Queensland Government.

The CYRP was made on 8 August 2014 and publically notified on 15 August 2014 and has been prepared to facilitate appropriate economic development in the region and identifies strategic land-use classifications to manage competing economic and environmental state interests in the region. These classifications include SEAs, National Parks, PAAs and PLAs.

11.3.1.6 Cook Shire Planning Scheme

The Project area is identified\(^3\) in the Cook Shire Planning Scheme as situated in a ‘Rural Locality’.

11.3.2 Land Contamination

Contaminated land is managed in Queensland under a range of legislation and policy including the following:

- *Environmental Protection Act 1994* (EP Act)
- *Environmental Protection Regulation 2008* (Qld) (EP Regulation)
- *Waste Reduction and Recycling Act 2011* (WRR Act)

11.3.2.1 Environmental Protection Act 1994

Chapter 7, Part 8 of the EP Act contains the contaminated land provisions. These provisions adopt the concept of risk management through the development of two registers for the recording of land. Sites are recorded on the Environmental Management Register (EMR) or Contaminated Land Register (CLR) on the basis of risk assessment that shows a notifiable activity has been or is being conducted on the site (EMR) or the land has been contaminated by a hazardous contaminant (CLR).

Many activities may result in environmental harm being caused. Chapter 7, Part 1 of the EP Act addresses this potential by imposing two main duties: the general environmental duty (GED) and the duty to notify. These duties are relevant to all persons undertaking notifiable activities or managing sites on the EMR or CLR.

Land contamination may result in serious or material environmental harm. Chapter 7, Part 1, Division 2 of the EP Act establishes a duty to notify of such harm.

11.3.2.2 Site Management Plans (SMPs)

Division 5 of the contaminated land provisions of the EP Act enable the preparation of SMPs for land on the EMR. In some cases it is not necessary or practical to remove all the contamination from a site in order to prevent environmental harm and/or public health risks. In such circumstances, the administering authority can approve SMPs for land, which state how a site will be managed in order to prevent environmental harm or public health risks. Once approved, SMPs are recorded on the EMR and are provided with any related search of the register.

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\(^3\) Identified on Map 10 (Plan 1 of 5) of the scheme.
11.3.2.3 Guideline for Contaminated Land Professionals

To assist suitably qualified professionals (SQPs) in their assessment of site for contamination, the ‘Guidelines for Contaminated Land Professionals’ (EHP, 2014)\(^4\) was developed to establish best practice for managing land contamination through the planning and development control process.

11.3.2.4 Waste Reduction and Recycling Act 2011

The aim of the Waste Reduction and Recycling Act 2011 is to encourage the proper use of resources by improving ways of reducing and dealing with waste.

Under section 156 of the Act, the chief executive may approve a resource if the chief executive considers the resource has a beneficial use other than disposal. Under section 157 a person may apply to the chief executive for a specific approval of a resource if the person possesses the resource when the application is made.

11.3.2.5 Environmentally Relevant Activities

Potential environmentally relevant activities (ERAs) for the Project, to which a section of schedule 2 of the EP Act 1994 applies, and for which there is an aggregate environmental score, are described in Chapter 2.

11.3.2.6 Notifiable Activities

Notifiable activities, under Schedule 3 of the EP Act 1994, which potentially apply to the Project are described in Chapter 2.

Throughout the life of a mining project, the EA holder is required to notify the administering authority if a notifiable activity (listed in Schedule 3 of the EP Act) is being carried out on land within the mining tenement. The land is subsequently recorded on the EMR. Prior to approving the application for surrender of the EA, or certifying progressive rehabilitation, the administering authority must be satisfied that any land within the area subject to the Progressive Rehabilitation Report (PRR) or Final Rehabilitation Report (FRR), that is listed on the EMR because of the mining activity, has been satisfactorily rehabilitated and does not pose an unacceptable risk to human health or the environment.

11.3.2.7 Environmental Protection Regulation 2008

Schedule 9 of the Environmental Protection Regulation 2008 (EP Regulation) provides the specific properties that qualify each contaminant as a contaminant to water. It does not detail the properties and characteristics of contaminants for environmental values other than water.

Section 47 also defines the specific characteristics of a contaminant which are required to be monitored to determine the impact of an activity on the receiving environment. These characteristics are:

- the physical and chemical properties and reactivity of the contaminant, material or waste;
- the biological, carcinogenic, mutagenic or toxic properties of the contaminant, material or waste;
- the variation of the concentration, emission rate or flux over time, of the contaminant, material or waste.

11.3.2.8 Standards and Regulations for the Transport, Storage and Handling of Dangerous Goods

A number of requirements need to be met in order to transport, store and handle dangerous substances such as fuel, oil and other chemicals. The following is a list of the relevant Australian Standards, legislation

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and policy documents and Regulations that apply for the dangerous goods which will be present on the Project site.

- ADG 7.3 Australian Dangerous Goods Code (National Transport Commission, 2014) - provides technical requirements for the land transport of dangerous goods across Australia.
- Transport Operations (Road Use Management – Dangerous Goods) Regulation 2008
- AS 1940:2004. The Storage and Handling of Flammable and Combustible Liquids. This specifies the requirements and recommendations for the safe storage and handling of flammable liquids and dangerous goods Class 3 (Flammable liquids) (as classified in the United Nations (UN) recommendations for the Transport of Dangerous Goods).

The Australian Maritime Safety Authority (AMSA) regulates the sea transport of dangerous goods.


Maritime Safety Queensland and the Department of Transport and Main Roads jointly administer the following maritime legislation in Queensland, as well as other legislative marine safety standards:

- Maritime Safety Queensland Act 2002
- Maritime Safety Queensland Regulation 2002
- Transport Operations (Marine Safety) Act 1994
- Transport Operations (Marine Safety) Regulation 2004
- Transport Operations (Marine Pollution) Regulation 2008
- Transport Infrastructure (Waterways Management) Regulation 2012.

Far North Queensland Ports Corporation Limited, trading as Ports North, is a company Queensland Government Owned Corporation responsible for the development and management of the declared Port of Skardon River, as well as other ports in north Queensland.

Ports North has responsibilities conferred on it by State legislation (Transport Infrastructure Act 1994 and Transport Operations (Marine Pollution) Act 1995) for the safe and efficient management of the port and its infrastructure, and for managing pollution from shipping activities. The jurisdiction of Ports North at the Port of Skardon River includes all land under the Port North’s control and all waters within designated port limits, as defined under the Transport Infrastructure Act. Under the Transport Infrastructure (Ports) Regulation 1994, Ports North may control activities in the port by port notice such as the movement and mooring of ships, or the loading or unloading of goods from ships using its facilities. Port activities carried out by either port users or Ports North must comply with all relevant government legislation.

The AMSA is responsible for implementing the International Maritime Organization (IMO) regulations for all safety related aspects for marine carriage of all types including bulk liquid and solid cargoes, dangerous goods, general cargoes, containers, as well as standards and operations concerning cargo lifting gear.

The following IMO publications are of relevance to the Project in the context of shipping of materials to and from the site as well as port management:


11.4 Environmental Values – Land Use

11.4.1 Location

The Project is located entirely within the Cook Shire Local Government Area (LGA), on the western side of Queensland’s Cape York Peninsula, about 90 km north of Weipa. The CYRP covers an area of approximately 128,880 km², with an estimated (at 30 June 2011) residential population of around 17,000.

Chapter 4 describes, and presents figures of, the location of the Project in a regional and local context.

Chapter 25 describes the various LGAs likely to be affected by the Project and details population size, projected population growth statistics and prevailing economic conditions of the LGAs including types of industry most prevalent in those LGAs.

Road access to the Project MLs is seasonally weather dependent and is only possible in the dry months of the year for high clearance four wheel drive vehicles and is therefore not a practical means of regularly access to the Project area. Air and sea transport will be used.

The nearest state controlled road is the (90D) Peninsula Development Road (Coen – Weipa), located approximately 80 km to the south of the Project area.

A number of existing and proposed mines exist in the region including:

- Rio Tinto Alcan’s existing Weipa bauxite mine operations.
- Rio Tinto Alcan’s proposed South of Embley project.
- Metro Mining’s (formerly Cape Alumina’s) Bauxite Hills Project.

The closest of these is the (proposed) Bauxite Hills Project which would be located adjacent to the west and east of the Project and which would run (partly) concurrently with the Project.

Existing kaolin mine infrastructure and transport infrastructure within the Project MLs will be used and upgraded to form part of the Project which includes the following:

- Port of Skardon River and Skardon River landing
- dry plant area at the Port of Skardon River, including dry plant infrastructure, fuel storage, pond, waste storage and landfill
- wet plant area, including mine pits which currently function as water storage and management pits
- airstrip
- accommodation camp (including sewage treatment)
haul road connecting the former wet plant and dry plant areas, via the camp and airstrip.

11.4.1.1 Project Mining Tenure

The relevant mining tenures are granted mining leases (MLs) 6025 (1,922ha), 40069 (260 ha) and 40082 (1,743 ha), the combined extent of which comprise the Project area for land use and contaminated land assessment (reference Chapter 4).

11.4.2 Regional Plan Values and RPI Act Areas of Regional Interest

The purpose of the CYRP is to enhance the quality of life throughout the region by facilitating opportunities for appropriate economic development while recognising the need to protect Cape York’s regionally important environmental areas.

The plan identifies and interprets the state’s interest in land use planning and development, as described in the State Planning Policy (SPP), for the Cape York region.

The plan specifically provides direction to address competing state interests relating to:

- economic development, including agriculture and the resources sectors
- protection of significant environmental areas, and
- the growth potential of the region’s towns.

To do this the CYRP establishes regional land use categories that are used to signal the appropriateness of areas in the region for development opportunities. The categories are as follows:

- **Strategic Environmental Areas** – SEAs are areas that contain regionally significant values for biodiversity, cultural values, water catchments and/or ecological function. Development in SEAs will be supported only where it can be demonstrated that the development outcome does not present risk of irreversible or widespread impacts to the environmental attributes of the SEA. SEAs are areas of regional interest under the RPI Act. Resource activities and regulated activities proposed in these areas are subject to meeting the relevant assessment criteria.
  - **Designated Precincts** identified in SEAs are those areas where significant biodiversity values or areas of high cultural heritage significance have been recognised for specific protection. Mining resource activities, broadacre cropping and water storage (dams) are unacceptable uses in a designated precinct, giving the highest level of protection to the precinct’s natural and cultural features.

The closest SEA and Designated Precinct to the Project is the Cape York SEA, which is located 20 km to the southwest of the Project, within a separate catchment to those potentially impacted by the Project, at the convergence of the Wenlock and Ducie Rivers south east of Mapoon.

- **National Parks** - The CYRP allows for the allocation of national parks and regional parks under the provisions of the *Nature Conservation Act 1992* (NC Act). These areas are recognised for their protection of the region’s natural and cultural resources. However, these areas are also recognised as not being ‘closed’ to appropriate economic opportunities. Development and activities in national parks may be facilitated where they are ecologically sustainable activities that protect an area’s natural condition and values.

The closest national (and regional) park is the Jardine River National Park around 60 km north east of the Project, within a separate catchment to those potentially impacted by the Project. The Heathlands
Regional Park is situated around 40 km north east of the Project and is outside the Skardon River catchment.

- **Priority Agricultural Areas** - PAAs are identified in the plan to recognise and protect the region’s existing strategic intensive agricultural area containing highly productive agricultural land uses.
  - In a PAA, **Priority Agricultural Land Uses** are recognised as the primary land use and must be given priority over any other proposed land use. PAAs are areas of regional interest under the RPI Act. Assessment and decision criteria have been developed to facilitate the co-existence of compatible resource activities with high value agricultural land uses in the PAA. These criteria will enable opportunities for economic diversity to ensure that Cape York develops as a resilient and prosperous region. These criteria are implemented through the RPI Act and the *Regional Planning Interests Regulation 2014* (RPI Regulation).

- **PALUs** are land uses included in the following classes of the Australian Land Use and Management Classification:
  - 3.3—Cropping
  - 3.4—Perennial horticulture
  - 3.5—Seasonal horticulture
  - 4—Production from irrigated agriculture and plantations, or
  - 5.1—Intensive horticulture.

The closest PAA to the Project is the Lakeland Downs PAA located approximately 500 km south east of the Project MLs.

- **Priority Living Areas** - PLAs provide certainty for towns in the region to grow. The PLAs are designed to safeguard areas required for growth by providing opportunities for the identified towns to expand, as detailed in a local government planning instrument. PLAs ensure that these towns will not become encumbered by resources activities through the establishment of a buffer around the town growth areas. PLAs are an area of regional interest under the RPI Act. The Act gives local governments the formal ability to provide advice to the Chief Executive about the appropriateness of a resource activity in a PLA.

Mapoon (Aboriginal Shire) located greater than 10 km to the south-west of the Project’s southern mining lease boundary, is a Priority Living Area (PLA).

- **Strategic Cropping Areas** - Though not identified in the CYRP, SCAs in the Cape York Region are designated under the RPI Act. The closest area of SCA (described in Section 11.3.1.4) is located 620 km to the south east near Port Douglas.

Areas of regional interest (under the RPI Act) and CYRP interest are shown in Figure 11-1.
Figure 11-1

Gulf Alumina Limited

Legend
- Mining Lease Boundaries
- Priority Living Areas
- Strategic Environmental Areas
- Designated Precinct

Protected Areas
- National Parks
- National Parks (Cape York Peninsula Aboriginal Land)
- Regional Parks

SEAs, PAAs, SCAs, PLAs, and National Parks

Date: 14/03/2016

Gulf of Carpentaria

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Legend
- Mining Lease Boundaries
- Priority Living Areas
- Strategic Environmental Areas
- Designated Precinct

Protected Areas
- National Parks
- National Parks (Cape York Peninsula Aboriginal Land)
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SEAs, PAAs, SCAs, PLAs, and National Parks

Date: 14/03/2016

Gulf Alumina Limited

Legend
- Mining Lease Boundaries
- Priority Living Areas
- Strategic Environmental Areas
- Designated Precinct

Protected Areas
- National Parks
- National Parks (Cape York Peninsula Aboriginal Land)
- Regional Parks

SEAs, PAAs, SCAs, PLAs, and National Parks

Date: 14/03/2016

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11.4.3 Overlapping Tenure

Tenures, other than tenures held by Gulf, which are overlapping, adjacent or within 2 km of the Project mining leases are detailed in Chapter 4.

11.4.4 Third Party Infrastructure

No third party infrastructure (other than the Port of Skardon River) will be affected by the Project.

11.4.5 Landholders and Properties

Properties which intersect or are adjacent to the Project MLs are shown in Figure 11-2 and included in Table 11-2, which provides a description, and the predominant land use, of each property.

The Project MLs lie within Deed of Grant (formerly in Deed of Grant in Trust (DOGIT)) land. Responsibility for the DOGIT areas beyond the Mapoon community township rests with Old Mapoon Aboriginal Corporation (OMAC).

Table 11-2  Real Property – Land Parcels Transecting or Adjacent to the Project MLs

<table>
<thead>
<tr>
<th>Lot/Plan</th>
<th>Landholder/Lessee</th>
<th>Description</th>
<th>Primary Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot MP41159 (Adjacent)</td>
<td>Rio Tinto Alcan</td>
<td>Lot 7024 on MP41159 is State mapped as Mines Tenure (MT) land type - being land leased as ‘Mining Homestead Tenement Leases’ by the State of Queensland to RTA Weipa Pty. Ltd., and administered by the DNRM(^6)</td>
<td>Cultural, (possibly recreation and hunting) Bauxite exploration</td>
</tr>
<tr>
<td>Lot 1 SP120090 (Adjacent/Nearby)</td>
<td>Apudthama Land Trust</td>
<td>Occasional use for hunting of feral cattle and pigs by local indigenous parties. Not used for agriculture or grazing. The Lot is included as ‘adjacent’ as it forms the northern bank to the Skardon River and Project area is intersected by the river.</td>
<td>Cultural, recreation, hunting Bauxite exploration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lot/Plan</th>
<th>Landholder/Lessee</th>
<th>Description</th>
<th>Primary Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot 11 SP204113 (Intersects Project ML)</td>
<td>Old Mapoon Aboriginal Corporation Trustee for the benefit of Aboriginal people particularly concerned with the land and their ancestors and descendants, and under <em>The Aboriginal Land Act 1991</em>.</td>
<td>Port of Skardon River is located within the Lot. Existing (non-operational) Kaolin mine infrastructure located within the Lot. Occasional use for hunting of feral cattle and pigs by local indigenous parties. Not used for agriculture or grazing.</td>
<td>Port of Skardon River Cultural, recreation, hunting Bauxite exploration</td>
</tr>
<tr>
<td>Lot 13 SP204113 (Intersects Project ML)</td>
<td>Old Mapoon Aboriginal Corporation (OMAC) Trustee for the benefit of Aboriginal people particularly concerned with the land and their ancestors and descendants, and under <em>The Aboriginal Land Act 1991</em>.</td>
<td>Occasional use for hunting of feral cattle and pigs by local indigenous parties. Not used for agriculture or grazing.</td>
<td>Cultural, recreation, hunting Bauxite exploration</td>
</tr>
<tr>
<td>Namaleta Creek (Intersects Project ML)</td>
<td>State Of Qld Unallocated Creek</td>
<td>Limited recreational fishing, boating</td>
<td></td>
</tr>
<tr>
<td>Skardon River (Intersects Project ML)</td>
<td>State Of Qld Unallocated River</td>
<td>Boating (generally recreational or as a transit route/access by boat) and fishing.</td>
<td></td>
</tr>
</tbody>
</table>

### 11.4.6 Dwellings and Receptors

Existing dwellings (shown in Figure 11-3) in and around the Project area, were identified using satellite imagery and the proponent’s existing knowledge of the area. Figure 11-3 shows the dwellings on the properties identified within a 10 km and 20 km buffer of the study area.

The only existing dwellings identified within 20 km of the Project ML boundaries were outside the 10 km buffer and were all located within and near Mapoon, to the south of the Port of Musgrave.

The Metro Mining Bauxite Hills Project accommodation camp\(^7\) is expected to be located within the 5 km buffer of the Project ML boundaries.

---

\(^7\) Note: The position of the Metro Mining Bauxite Hills Project accommodation camp is indicatively located in the southern portion of the project’s mining leases, near Gulf’s existing camp.
Land Ownership - Properties Intersected by and Adjacent to the Project Study Area

Legend
- Port of Skardon River
- Gulf Alumina Mining Leases (MLs)
- Lots
- Old Mapoon Aboriginal Corporation (OMAC)

Figure 11-2

Gulf Alumina Limited

Date: 14/03/2016

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Legend

- **Mining Lease Boundaries**
- **Potential Sensitive Receptors**
- **Port of Skardon River**
- **Lots**
- **10km Buffer of Mining Lease Boundaries**
- **20km Buffer of Mining Lease Boundaries**

**Properties and Dwelling**

Figure 11-3

Gulf Alumina Limited

Date: 14/03/2016

11.4.7 Existing Land Uses

Within the Project MLs the existing kaolin mine is a predominant feature. The kaolin mine is currently non-productive and is under care and maintenance. Apart from the kaolin mining and Port infrastructure, there has been very little direct disturbance to the terrestrial environment.

The vegetation in the area to be mined for bauxite is almost entirely *Eucalyptus tetradonta* (Darwin stringybark) - *Corymbia nesophila* (Melville Island bloodwood) woodland. While this vegetation type is fire tolerant/dependant, there are patches impacted by non-storm season fire lighting. There is some dry season disturbance by feral pigs, notably in Namaleta Creek, though recovery occurs during the same year.

Other land uses within the Project MLs include feral cattle hunting by the Traditional Owners (for meat supply).

Land within the MLs is not used for agriculture or logging and there are no pastoral properties within or close to the Project area.

Tourists generally camp on the beach near the mouth of Skardon River, approximately 4 km west of the Project area. Mapoon Land and Sea Management works closely with OMAC. Land and Sea Rangers manage feral animals and the beach area, including removal of ghost nets and other beach debris and protection of turtle breeding grounds, mainly from feral pigs.

11.4.7.1 Stock Routes

No stock routes are identified within the Project MLs. No stock routes are expected to be affected by the Project’s construction or operational activities.

11.4.7.2 Roads

Access to the Project MLs is possible via the Telegraph Road (a local road) followed by around 90 km of bush track (situated to the south and east of the Project MLs). Local road and bush track access is seasonally dependent and is only possible in a four wheel drive in the dry months of the year. Roads within and adjacent to the Project Area are shown in Figure 11-4.

The proponent will maintain the current track access to the beach (to the south of the Skardon River mouth) across the Project ML in consultation with the Traditional Owners for tourist vehicles (not mine vehicles or mine workers). This will require a protected haul-road crossing when bauxite mining commences. Tourists will also be able to use this access, provided they have permits from Traditional Owners and comply with traffic procedures at the crossing.

11.4.7.3 Key Resource Areas

There are no state-declared Key Resource Areas (KRAs) within the Project MLs, nor is the Project area intersected by a KRA Separation Area.
Legend
- Mining Lease Boundaries
- Local Road
- Port of Skardon River
- Tracks
- Routes to Site

Roads Within and Adjacent to the Project Area

Figure 11-4
Gulf Alumina Limited

Date: 14/03/2016
Author: malcolm.nunn
Map Scale: 1:300,000
Coordinate System: GDA 1994 MGA Zone 54
Revision: R1

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Gulf of Carpentaria

Queensland

CAIRNS
TOWNSVILLE
BRISBANE
ROCKHAMPTON
TOWNSVILLE

±
11.4.8 Site Suitability

11.4.8.1 Cropping and Horticulture

The Cape York Peninsula Land Use Strategy (CYPLUS)\(^8\) Project identified land suitable for cropping and horticulture as shown in Figure 11-5. Potential exists for peanuts, sorghum and maize to be grown on Project area. However, due to the low mineral content in the main Red Earth soil group, it is unlikely that any crops could be grown without the expense of high levels of fertiliser application. Providing irrigation from the dry season limited water supply would significantly add to input costs. Finally, with distance from markets, other than Weipa, it is unlikely that any cropping or horticulture venture would not be viable on this soil type.

Alluvial soils within or adjacent to the Mp, Mn and Sd soil groups\(^9\) may be suitable for horticulture production for local consumption and marketing, due to there likely being a higher mineral content resulting from sea breeze or occasional sea water inundation (see Figure 11-6).

In the Western Cape Region, only narrow coastal and alluvial soils have a limited potential for horticulture and cropping – none of these areas will be disturbed by the bauxite mining proposal. *Eucalyptus Tetradonta* woodland (where mining will occur) has a very low pasture value as has been found in Weipa and indicated by low macropod numbers. Unpublished pasture trials in Weipa indicated that cattle could be fattened on Leucaena and improved grass pasture. However, Leucaena is generally not accepted from an environmental perspective, being an exotic shrub capable of becoming a woody weed, if not managed by grazing and slashing. While Leucaena is present in Weipa and could be utilised for beef production, it is not present in Skardon River and not recommended to be planted.

Bauxite is a product of high leaching of soils. The 1800 mm annual rainfall in the Western Cape region is concentrated within a 3-month wet season. The topsoil is less than 200 mm thick and subsoil around 400 mm. Below this is bauxite containing aluminium silica and some iron, while all other minerals have been leached out. The main reason the topsoil contains some additional minerals is due to its carbon content. Coastal soils can get some mineral input from sea breezes. The long dry season means pasture dries off and any cropping venture would require irrigation. Wet season grass can be described as ‘green desert’ as it contains very low mineral content – cattle have to be feed supplements. Leucaena helps by providing nitrogen, being a legume, and minerals obtained from deep roots. It also improves the soil.

Various tree crops were tried in Weipa without success, notably cashew nuts and Mahogany trees. Mahogany trees have been successfully grown in Weipa, but with patchy success, probably due to varying groundwater levels and poor soil quality. It is not considered to be economically viable on a large scale.

11.4.8.2 Pastoral

The CYPLUS Project indicated that all soil types would be suitable for low intensity grazing of native pastures. The alluvial soils (mentioned above) may provide cattle with pasture containing higher mineral levels, otherwise forage quality would generally be poor.

The condition of feral cattle in the area is poor, with seasonal improvement. Any pasture venture would require provision of high levels of mineral supplements. Without an introduced legume and mineral


- Mp = Mapoon - Deep Duplex or Gradational soils with a dark loamy surface over a mottled grey clay, formed in swamp.
- Mn = Marina - Very deep Uniform frequently cracking saline grey clays formed on marine plain.
- Sd = Skardon - Recent estuarine deposits under mangrove.
supplements, it is unlikely that a cattle venture would be feasible. Given the distance from markets, beef production may only be viable in supplying communities in the Western Cape Region.

People living in the Mapoon value the feral cattle, which they occasionally hunt, thereby managing stock levels. The proponent does not intend establishing a post mining pastoral land use and would only consider such, if requested by Traditional Owners.

The Queensland Government’s Agricultural Land Audit identifies land important to current and future production and constraints to development. Levels of current pasture production within and adjacent to the Project area is shown in Figure 11-7. Pasture productivity levels within the Project area of disturbance are generally low.
Figure 11-5
Potential Annual Horticulture within and adjacent to the Project Area

Legend
- Mining Lease Boundaries
- Port of Skardon River
- Agricultural Land Audit - Potential Annual Horticulture
- Agricultural Land Class

Potential Annual Horticulture within and adjacent to the Project Area

Gulf Alumina Limited
Date: 14/03/2016

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Figure 11-6

Legend

Legend

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining Lease Boundaries</td>
<td>-</td>
<td>Mining Lease Boundary</td>
</tr>
<tr>
<td>Port of Skardon River</td>
<td>-</td>
<td>Port of Skardon River</td>
</tr>
<tr>
<td>Watercourses</td>
<td>-</td>
<td>Watercourse</td>
</tr>
<tr>
<td>10m Elevation Contours</td>
<td>-</td>
<td>10m Elevation Contour</td>
</tr>
</tbody>
</table>

Soils of the Cape York Peninsula

- Mapoon
- Battavia
- Skardon
- Caravan
- Somerset
- Grevil

Cape York Peninsula Soils

Date: 14/03/2016

Elevation 10m contours © State of Queensland - Department of Natural Resources and Mines (2015).
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11.5 Potentially Existing Land Contamination

The environmental values to be protected or enhanced are the life, health and well-being of people and the diversity of ecological processes and associated ecosystems surrounding the Project. Inappropriate management of any existing contaminated land within the Project area that may be impacted by the Project may lead to release of contaminants to land or water.

11.5.1 Contaminated Land Register and Environmental Management Register

The Contaminated Land Register (CLR) is a register of 'risk' sites - proven contaminated land which is causing or may cause serious environmental harm. Land is recorded on the CLR when scientific investigation shows it is contaminated and action needs to be taken to remediate or manage the land.

The Environmental Management Register (EMR) is a land-use planning and management register. Land that has been or is being used for a notifiable activity, and about which the department is notified, is recorded on the EMR. The EMR provides information on historic and current land use—including whether the land has been or is currently used for a notifiable activity, or has been contaminated by a hazardous contaminant.

A review of the EMR and CLR was completed to identify any existing known or potential contamination sources.

Web based searches of EHP’s CLR and EMR revealed that both Lots found within the Project MLs (i.e. Lot 11 SP204113 and Lot 13 SP204113) are listed on the EMR (EMR Site I.D.: 118455 and 118457 respectively).

The identified Lots were both historically subdivided from Lot 5 on WP53 which was included on the EMR (subdivided new parcels remain on the EMR unless it can be shown that they are not located near the contaminating activity).

Both Lots have been subject to the following notifiable activities pursuant to section 374 of the EP Act 1994.

- **Chemical Storage** – (other than petroleum products or oil under item 29) – storing more than 10 t of chemicals (other than compressed or liquefied gases) that are dangerous goods under the dangerous goods code.
- **Landfill** – disposing of waste (excluding inert construction and demolition waste).
- **Petroleum Product or Oil Storage** – storing petroleum products or oil –
  a) In underground tanks with more than 200L capacity; or
  b) In above tanks with –
    i. For petroleum products or oil in class 3 in packing groups 1 or 2 of the dangerous goods code – more than 2, 500L capacity; or
    ii. For petroleum products or oil in class 3 in packing groups 3 of the dangerous goods code – more than 5,000L capacity; or
    iii. For petroleum products that are combustible liquids in C1 or C2 in Australian Standard AS1940, The storage and handling of flammable and combustible liquids published by Standards Australia – more than 25, 000L capacity.

Neither Lot (i.e. Lot 11 SP204113 and Lot 13 SP204113) is located on the CLR.

These notifiable activities are almost certainly related to the former kaolin mine activities undertaken on Lot 11 SP204113.
11.5.2 Locations of Potentially Contaminated Areas

The locations of former kaolin wet and dry plant, existing stockpiles, dams, historical chemical storage area(s), landfill(s), petroleum product or oil storage area(s), and sewage treatment plant (accommodation camp) are shown in Figure 11-8.

The locations of known or likely contaminated areas within the Project MLs are identified below.

11.5.2.1 Wet Plant Areas, Existing Stockpiles and Dams

The decommissioned wet plant area, (including kaolin stockpiles processing area, bioremediation pad and settlement dams) are located in ML6025 in the southern extent of the Project area. The Water Pit and Claystone Pit within the wet plant area will be retained for the life of the Project.

Contaminated soil (e.g. resulting from oil spills onto exposed soil) from kaolin mine operations was, , removed and transported to the existing bioremediation pad (in the former wet plant area) where it was treated to break down the hydrocarbons. Composting material was added including kitchen food waste, deep-fry oil and cardboard. Soil substrate will be added and the composting process encouraged with irrigating with water and turning over the soil mix.

The bio-remediation pad is located in an area proposed for bauxite mining and will be subject to a contaminated land assessment prior to any mining and relocation (likely to the landfill area at the Port infrastructure area).

11.5.2.2 Dry Plant Areas

The dry plant area is located in the Port infrastructure area. The proponent may keep elements of the infrastructure associated with the existing kaolin dry plant area for use in the Project’s operations – as indicated below:

- dry plant shed
- two water tanks
- a 2.2-megalitre bulk diesel storage tank, bunded by compacted earth and clay lining (the tank is currently kept empty, but would be used for the Project subject to refurbishment and improved bunding)
- small diesel transfer tanks exist at the Skardon River landing shed and workshop
- offices, crib room and toilets
- a concrete and besser brick bunded lay down yard for storage of waste oils prior to shipping off site
- a laydown yard for scrap material
- sediment settlement pond and drainage bunds.

Hydrocarbon management is currently conducted by an existing contractor on site - while the kaolin mine is under care and maintenance.

Oil contaminated refuse including oily rags, used oil/fuel filters, grease cartridges are stored in a bunded area (at the Skardon River landing area) and barged off site to a licensed disposal agent. Up to 1,000 L of waste oil is stored in 200 L drums at the lubrication storage yard west of the former dry plant shed. These drums are stored within a concrete and besser brick bund. The bund has the capacity of approximately 20,000 L (10 m x10 m x 0.2 m). An earthen bund within this area is used for empty containers awaiting shipment off site or treatment and disposal. Empty 200 L oil drums are currently stored in this facility.

The waste lay down yard/waste oil storage may either continue to be used for a similar purpose during the Project or may be replaced with other Port activities such as the bauxite stockpile. In either case, the
area will be subject to a contaminated land assessment that will inform appropriate management measures.

### 11.5.2.3 Existing Landfill (Landfill 1)

The landfill is situated in a previous borrow pit to the west of the former kaolin dry plant. A narrow slot 1.5 m wide and 20 m long is currently used for putrescibles waste from the accommodation camp (limited waste generated as the camp is not permanently occupied).

A large slot 3 m deep and 7 m wide has been used for scrap metal disposal and was used for metal (mainly engines) from the burning of illegal fishing boats under a Commonwealth Government programme undertaken by a third party contractor on-site. This programme has ceased and no boats have been disposed of in the last 3 years.

The existing landfill would be for disposal of metal, plastic or wood scrap from kaolin mine demolition work.

Scrap material is expected to be generated from the demolition of the kaolin wet plant and dry plant. This demolition material would be placed in lay-down yards of the former wet and dry plants for assessment sorting and export by scrap dealers. Non recycled material would go to Landfill 1.

Material from kaolin mine demolition is expected to be non-putrescible and inert, and the existing landfill provides available capacity for this waste. Groundwater bores will be established upgradient and downgradient of the existing landfill to monitor potential contamination sources.

Bunds will be maintained / upgraded around the perimeter of the landfill will divert surface flows away from the landfill. When the landfill cell has attained maximum storage capacity or is no longer proposed for use, it will be capped with kaolin clay overburden material and compacted to effectively limit infiltration of stormwater. A cover of bauxite waste material, subsoil and topsoil will then be placed for revegetation. Revegetation by native grasses, shrubs and trees will be conducted by sowing seed, as described in Chapter 7.

### 11.5.2.4 Landfill 2

A landfill scheduled to be located in the borrow pit situated 1.6 km south of the current landfill at E: 615514, N: 8697062 was previously proposed as part of the existing EA amendment. This landfill is not currently active, and is situated in an area scheduled for mining. Therefore this location is not now expected to be used as a landfill location.

### 11.5.2.5 Historical Landfill

The original landfill used by Australian Kaolin (AKL) during kaolin mining was abandoned in the 1990s after two years due to wet season flooding. This landfill was located approximately 1.2 km north-north-east of the accommodation camp site. The site has been rehabilitated and has stabilised. This site is located in an area proposed for bauxite mining, however it is not expected that this site will be a source of contamination.

### 11.5.2.6 Sewage Treatment Plant

The existing sewage treatment plant consists of a proprietary package plant (Biocycle) operating on an extended aeration process. Sewage is broken down by bacterial activity with a slow accumulation of sludge remaining to be disposed. The plant treats wastewater to a tertiary level producing a clear water effluent. The plant, consisting of 3 units, each with a capacity to handle sewage generated by 20 people (total 60). The whole system can operate to maximise bio-efficiency and dispersal of effluent through 3 irrigation lines. A low number of people, still maintains bacterial activity. A clearly signed grassed area (3 ha), north of the camp, can be irrigated through poly pipes with effluent waters. This area was used for
treated effluent irrigation throughout the kaolin mine operations and will continue to be used for the Project.

A wet weather storage pond (20 m x 20 m by 2 m depth) provides a back-up effluent storage, should it be required during the wet season. This pond has the capacity to take effluent discharge for up to 24 days, including allowance for storm surge.

During the (current) care and maintenance mode, the camp is accommodates 2-4 people on a regular basis, with up to 10 on occasions. The irrigation system has been shut down, with all effluent flowing to the storage pond.

11.5.2.7 Grease Trap

A grease trap is situated on the southern side of the mine camp for collection of kitchen waste water. The grease trap functions as a septic tank, decomposing grease and other organic components, with water flowing on into a soak pit.

A back-up process is in place for pumping excess water from the soak pit and irrigating the bio-remediation pad. If required, bulking material (subsoil) can be added to the grease trap, and the resulting substrate removed to the bio-remediation pad.

This area will be incorporated into the Project’s ongoing kitchen waste water and grease trap waste management.
Figure 11-8
Legend
- Mining Lease Boundaries
- Existing Disturbance Footprint
- Port of Skardon River

Potentially Contaminated Sites

Gulf Alumina Limited

Date: 16/03/2016

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Scale 1:100,000

Coordinate System: GDA 1994 MGA Zone 54

Revision: R1

Date: 16/03/2016

Author: Malcolm Nunn

Scale 1:20,000

Scale 1:40,000

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11.6 Land Use Impacts

This section describes the Project’s potential impacts and measures to mitigate impacts on the various land tenures and uses described in Section 11.4.

In assessing any of the Project’s impacts to land use, the Project’s operational activities are considered the main source of potential impact to land tenures and uses. Construction and decommissioning activities will occur within the Project’s operational areas and hence any impacts associated with construction and decommissioning are implicitly considered when considering impacts from operations. Project construction and operation is described in Chapter 5, and rehabilitation and decommissioning is described in Chapter 7.

11.6.1 Timber Use

The vegetation to be cleared for bauxite mining is predominantly *E. tetrodonta* woodland. *E. tetrodonta* predominates, comprising about 70% of the upper canopy trees and averages 22-32m in height. *C. nesophila* is present as a subdominant canopy species as well as large *Erythrophleum chlorostachys* (Cooktown ironwood) trees (refer Chapter 15). Both of the subdominants are of high timber value, particularly due to termite resistance. Most mature *E. tetrodonta* trees are piped with termite damage and filled with earth mound material, limiting their use to narrow planks, such as floor boards.

Harvesting of timber prior to bauxite mining has been tried in Weipa. While logistics of harvesting within a mining operation were found to be difficult, piped timber and distance from market has been a major factor limiting viability. Post mining planting of exotic forestry plantations has also been tried in Weipa without success. If requested, Gulf Alumina would consider forestry options in Skardon River that might benefit Traditional Owners.

11.6.2 Landholders and Properties

The Project MLs sit entirely within (freehold) Lots 11 SP204113 (16,200 ha), and 13 SP204113 (3,000 ha).

Lot 13 SP204113 is located on the opposite bank of the Skardon River estuary to proposed Project activities and hence will not be directly impacted by the Project.

The proposed additional new disturbance as a result of bauxite mining is limited to Lot 11 SP204113 which has an existing disturbance area (from the existing kaolin mine) of approximately 153 ha.

The proposed bauxite mine will create an additional 1,315 ha of new disturbance. Therefore, the new disturbance area comprises 8.1% of the total area of Lot 11 SP204113, which is considered to be a minor portion of the total property area.

For public and workplace health and safety reasons, access to mining areas during operations will be restricted. This may have a limited effect on hunting opportunities or other cultural or recreational activities on the land. However, given the area of land within Lot 11 SP204113 that will not be affected by mining, this impact is likely to be minimal. In addition, access to the west of the mining leases along the existing four wheel drive track will be retained through a dedicated and controlled haul road crossing.

11.6.3 Adjacent Areas

Current adjacent land uses are associated with recreational hunting and fishing, as well as mining (exploration).

Potential impacts of the Project on adjacent land use may result from the following:

- Mining activities may result in noise, vibration or dust impacts (see Chapter 19 and Chapter 20).
- Surface soils (see Chapter 10), surface water and groundwater (see Chapter 12) may be contaminated from unplanned and uncontrolled releases of sediment affected water (see Chapter 6), or other contaminants such as hydrocarbons (management measures are proposed to manage and control sediment and potential contaminants).
- Lot 7024 MP41159 (situated adjacent to the east of the Project MLs) is held by Rio Tinto Alcan and is situated upstream of the Project. Therefore potential impacts to this Lot are limited.
- Lot 1 SP120090, held by the Apudthama Land Trust is situated north of the Skardon River. Fishing activities on the Skardon River may be affected to a minor degree as a result of increased Port activity, but there are not expected to be any impacts to the land within this Lot.

11.6.4 Sensitive Receptors (Dwellings)

There are no dwellings within the Project MLs. Dwellings surrounding the Project MLs are shown in Figure 11-3. Due to the separation distances between Project activities and surrounding dwellings (at Mapoon), there is not expected to be any impact on the use of these dwellings.

11.6.5 CYRP

There are no SEAs, Designated Precincts, National Parks, SCAs, PAAs, PALUs, or PLAs within the Project MLs or likely to be affected by the Project.

11.6.6 Land Suitability and Agricultural Land

The land within the Project MLs has potential for agricultural use – however it is currently not used for agriculture and use of the land for horticulture or pasture is unlikely to be feasible, therefore impacts on land suitability are expected to be minor.

11.6.7 Key Resource Areas

There are no state-declared KRAs in the study area nor is the study area intersected by a KRA Separation Area. Therefore the Project is not expected to have any impact on KRAs.

11.6.8 Overlapping Tenures

Overlapping tenure parties are identified in Section 11.4.3.

The proponent will consult with the owner/operators of overlapping tenements, where there is potential for interaction between project activities. The objectives will be to minimize hazards and risks to people, property and the environment from potential interactions.

The proponent will comply with all requirements of the Mineral Resources Act 1989, including notification and or consultation with overlapping exploration (EPMs) tenure holders.

11.6.9 Third Party Infrastructure

No third party infrastructure is expected to be impacted by the Project. The Port will be operated by Ports North, however all infrastructure will be constructed by the proponent for the purpose of shipping the Project’s bauxite.
11.7 Management Measures and Plans – Land Use

In meeting the objectives and performance outcomes referred to in Section 11.2, management measures and plans are presented in this section for:

- performance outcomes relevant to this chapter, as described in Section 11.2
- values described in Section 11.4 and Section 11.5 (i.e. values addressed in this chapter and not in other chapters)
- impacts to values described in Section 11.6, and
- impacts which do not have a low risk as identified in Section 11.10.

Management measures and plans for impacts to values identified in other chapters are presented in those chapters, including the critical design requirements for the Project.

11.7.1 Landholders and Properties

Project design, including water management, waste management, and spills and emissions management will prevent emissions having and irreversible or widespread impact on adjacent areas.

OMAC, as owners of the land under the Aboriginal Land Act 1991 directly impacted by the Project, will receive a share of the royalty payments paid to the State government.

Chapter 3 includes details of (ongoing) consultations between the proponent and affected parties and other interested parties. These discussions have included the following potential land use mitigation measures:

- Allow continued use of leasehold in areas not impacted by mining, where this can be done safely.
- Ensuring access across the mine leases (including access to the beach at the mouth of Namaleta Creek to the Skardon River mouth) are maintained.
- Logistical support and funding for management of the beach to allow the removal of ghost nets from beach areas.
- Limiting disturbance of sensitive areas by locating only those activities where alternative locations are not feasible.
- Reviewing options for reducing duplication of infrastructure at Skardon River, due to the proponent and Metro Mining proposing separate mining operations and ship loading facilities in close proximity to one another.
- Design, construct and operate product haul road to minimise sedimentation and erosion, minimise impacts on drainage crossings, control dust emissions and allow crossing point between bisected sections of property.
- Reviewing opportunities to create an all-weather road from Skardon River landing to a landing on Namaleta Creek by utilising the proposed haul road and Namaleta crossing.
- Retention of the airstrip and other infrastructure as a legacy for Traditional Owners.
- Design and construct sediment dams in accordance with relevant guidelines.
- Implementation of a Mine Closure Plan.
- Rehabilitation and decommissioning for all activities to return land to proposed post mine land use.
- Surface water monitoring and control of activities to minimise impacts to surface water (refer Chapter 12).
- Monitor groundwater bores and control of activities to minimise impacts to groundwater (refer Chapter 12 and Chapter 13).
- Controls to minimise dust, noise and vibration (refer Chapter 19 and Chapter 20).

As the haul road will intersect the existing four wheel drive track allowing access to the west of the mining leases, a dedicated and controlled haul road crossing will be retained to allow ongoing use of the track (not for mine workers or mine vehicles). Other potential crossing points of Project linear infrastructure (e.g. the haul road) will be discussed with the landowner, as required.

During operations, areas proposed for mining will be demarcated to prevent unnecessary disturbance of adjacent land.

Progressive rehabilitation of mined areas will be implemented with the intention of achieving of similar post mine land use to that which existed before mining. Rehabilitation and decommissioning, including the process for determining and implementing the preferred post mine land use, is described in Chapter 7.

The post bauxite mining land use will be regeneration of native vegetation. Flora and fauna pest management will be undertaken as part of an ongoing Weed and Pest Management Plan (refer to Chapter 15).

Cattle grazing and forestry will only be considered for the final land use within the Project MLs where specifically requested by, and in agreement with, the landowners.

Retention of mine infrastructure (e.g. the accommodation camp, water management dams, airstrip and roads) will be considered for the final land use within the Project MLs where specifically requested by, and in agreement with, the landowners.

11.7.2 Dwellings and Receptors

Due to the separation distance to dwellings and receptors (refer Section 11.6.4), there will be no direct impacts on dwellings and receptors. Impacts from dust, noise and vibration, and measures to mitigate impacts, are described in Chapter 19 and Chapter 20 respectively.

11.7.3 Land Suitability

Chapter 7 describes rehabilitation and decommissioning of Project activities, including potential post mine land uses. The post bauxite mining land use will be regeneration of native vegetation and to return the site to a stable self-sustaining landform requiring no ongoing management or monitoring, in line with a defined final land use. With the implementation of the proposed rehabilitation measures, consequences on land suitability, and existing land use are expected to be minor.

11.8 Contaminated Land Impacts

Impacts associated with the Project’s potential to impact land and waters from release of contaminants are described in other chapters of the EIS, as described in Table 11-1.

Potential contamination impacts exist through the following Project operational activities:

- transportation of dangerous goods and hazardous materials
- storage, handling and disposal of hydrocarbons dangerous goods and hazardous materials
- bio-remediation of contaminated soils.
For decommissioned kaolin mine areas (some of which may have existing contamination within them, although this is not expected), the potential exists for contaminants present to become mobilised during construction and operational activities.

11.9  Management Measures - Land Contamination

This section describes the existing and proposed critical design requirements, site suitability and management measures for the following activities with the potential to contaminate land:

- transportation of dangerous goods and hazardous materials
- storage, handling and disposal of hydrocarbons dangerous goods and hazardous materials
- bio-remediation of contaminated soils.

Table 11-1 describes other potential sources of contamination from the Project and the chapter in which they are addressed.

This section also describes management measures for existing sources of site contamination.

11.9.1 Existing Mitigation and Management Measures

The following ongoing environmental management procedures are currently being undertaken in cooperation with on-site care and maintenance contractors and will be adapted and updated to incorporate bauxite mining activities in order to manage existing contaminated land for the Project during construction and operations:

5. Chemical Storage and Handling.
8. Sewage Management.

11.9.2 Transportation of Dangerous Goods and Hazardous Materials

Potential dangerous goods and hazardous materials required for the Project include (but are not limited to):

- **Hydrocarbons**, (e.g. diesel, petrol, oils and lubricants).
- **Chemicals**, (e.g. sewage treatment process chemicals, potable water treatment chemicals, cleaning chemicals, paints and resins, pesticides/herbicides, coolants, solvents/thinners, batteries, heavy metals).
- **Other waste** (e.g. sewage effluent and sludge).

Road access to the project area is not feasible for the transport of dangerous goods and hazardous materials. The transport of dangerous goods and hazardous materials through shipping will be undertaken in accordance with the regulatory requirements detailed in Section 11.3.2, including the requirements of the Maritime Safety Queensland and the Department of Transport and Main Roads.
The proponent will implement international Maritime Organisation regulations for safety related aspects for marine carriage of bulk liquid and solid cargoes, dangerous goods, general cargoes, containers, and comply with standards and operations concerning cargo lifting gear.

The proponent will comply with requirements of MSQ and Ports North for the safe and efficient management of the Port and its infrastructure and pollution management from shipping activities.

Potential impacts will be mitigated through the implementation of a management system which addresses the transfer of fuels and chemicals so that they are contained, controlled and managed to prevent spills outside of bunded areas and which requires that any significant spillage or leakage is immediately reported and an appropriate emergency clean-up operation implemented to prevent possible mobilisation of contaminants.

Where required, transport of dangerous goods and hazardous materials will be contracted out to operators with the appropriate licences, transportation vehicles and methods of transport. Off-site road transport of waste streams is not practical due to the condition of roads and tracks that connect to the Project area. Therefore the majority of waste removed from the site will be by boat. This is likely to be the same boat that provides regular supplies to the Project. The proponent will audit the licences of the relevant vessel operators to ensure that they are licensed to carry the types and volumes of waste generated.

11.9.3 Ship-sourced Pollution Prevention Management Plan

A Ship-sourced Pollution Prevention Management Plan (see Chapter 22) will be implemented which will consider:

- release of ballast water – controls to manage, record and monitor the release of ballast water potentially with contaminants or exotic organisms
- introduction of exotic marine organisms - manage the potential for exotic organisms to be released into the local marine environment from shipping through ballast release or biofouling
- release of shipping waste - manage the movement of waste from ship to shore and prevent illegal dumping and accidental release
- spills - implement measures to prevent spills, and actions to be undertaken in the event of spills
- other ship-sourced pollution - preventing the release of any substances from shipping.

11.9.4 Storage, Handling and Disposal of Hydrocarbons Dangerous Goods and Hazardous Materials

Notwithstanding the requirements of any applicable legislation, regulation or Australian Standard, any materials stored on the Project site that have the potential to cause environmental harm will be stored and serviced by an effective containment system that is impervious to the materials stored and managed to prevent the release of contaminants to waters or land.

Installation, maintenance and operation of all plant and equipment will be in a proper manner and condition and will be undertaken to avoid spills (see Chapter 5).

11.9.5 Spills, Leaks and Release of Contaminants

A mine vehicle wash will be located to the west of the new workshop. This will be a fully bunded / internally drained wash bay, with wash waters recycled internally via a silt trap and a triple interceptor to remove oily water and sediments prior to reuse. The system will include a wash diversion system, whereby drainage water is diverted through the treatment / recycling system when the wash hoses are in operation, including cleanup of the area after a wash. A further first flush allowance will be directed to
the diversion system, with subsequent rainfall draining via the normal stormwater system. Oily water will be stored within a dedicated and bunded tank located south of the proposed truck wash.

The refuelling point will comprise of an impermeable base and bund, with a ramp over the bund for access. Refuelling will be undertaken with various controls to minimise leaks and spills, such as:

- trigger delivery nozzles with an automatic cut-off
- fail-safe emergency switch to cut off fuel flow
- operating rules and procedures in clear view
- maintained and well stocked spill kit
- first flush diversion system, to be open during refuelling.

The workshop will include a degreasing station and triple interceptor to capture any spillages and remove oily materials from any wash waters. This material will be directed to the truck wash oily water storage tank as required. Waste oil will be removed to the waste oil receptacle, stored within the hazardous waste facility.

Impermeable base and bunding material will be sourced from local clay (e.g. existing kaolin overburden stockpiles) and spread, shaped and compacted to achieve a permeability of $1 \times 10^{-9}$ m/s or less. Use of geomembrane liners or similar may be used to augment this material, and concrete may be used for smaller bunded areas. Drum bunds and spill pallets or similar will be utilised within the hazardous waste facility, workshop and any other areas of minor storage, including for chemical storage.

Waters potentially affected by oily discharges, truck wash waters, etc. will pass through triple interceptors and silt traps to remove sediments, oil and grease, and other contaminants, which will be removed to the hazardous waste facility for removal off-site. Remaining waters will be fully reused on-site (recycled within the truck wash, dust suppression on-site, landfill area, etc). All of these areas will contain dedicated spill kits for rapid spill response. Each kit will be maintained fully stocked, with spare supplies maintained on-site. A regular inspection program will ensure they remain stocked, with spills recorded in the on-site incident register, and restocked after each incident.

To reduce the potential for spills that can have significant environmental impacts the following standards will be established in regards to spill containment:

- Bunding containment is installed and maintained on outdoor storage tanks and areas.
- Bunding containment is installed on all designated internal liquid storage areas.
- Inspections of containment areas are regularly completed and records kept.
- Integrity inspections of tanks and field constructed sumps are completed regularly.

All major storage vessels will be constructed to comply with the following requirements:

- all storage tanks will be constructed in compliance with AS 1940 – *The storage and handling of flammable and combustible liquids*
- adequate secondary containment equalling at a minimum 110% of the volume of the largest tank in the containment area
- reliable means of level detection
- must be constructed using material compatible with and impermeable to the fluid stored
- pipelines containing or transporting hazardous materials must be above ground.
- tanks and transfer areas should not be located in an area where worst case spills can cause release to sewer, body of water or soil.
A detailed plan for transfer of fuel from supply vessels to storage tanks and from storage tanks to barges will be undertaken. Fuel pipelines will be designed to minimise the risk of accidental release of fuel through safety features such as shut down mechanisms in the event of an emergency. Fuel unloading will be continually monitored during operations. The fuel delivery supply pipelines will be made from welded steel pipes with isolating valves that can be turned off in case of emergency. The coupling system from the steel pipeline to the barges refuelling pipeline will be located above a catch tray (for minor leakages) and in a fully bunded area on the wharf head - to capture any accidental release prior to closing valves in the event of an emergency. All pipelines will comply with Australian Standards.

The existing Port of Skardon River Oil Spill Contingency Plan will be reviewed and updated as required. A detailed spills response procedure will be developed to address the following principles of spills management:

- Communicate that the spill has occurred to the relevant supervisor.
- Consider the risk to personal health and the environment. If possible secure the area, identify the substance and level of response required.
- Cease the flow from the source.
- Contain the spill to minimise contamination (e.g. temporary bund, cover drains).
- Clean up the spill and correctly dispose of the material.
- Investigate and reporting how the spill could have been prevented.

Pending upon the volume of spills immediate reporting may also be required to Ports North, Maritime Safety Queensland and AMSA in accordance with the spill response plan.

A detailed site plan will be available detailing drains, sumps and the location of equipment. The following equipment will be available on site to assist with liquid spill management:

- spill response kits - placed around the site
- spill response equipment - emergency response trailer controlled by emergency management team
- oil absorbents
- sand bags
- earth moving equipment can be used to make temporary bunds for containment, if required.

11.9.6 Bulk Fuel Storage and Refuelling

A 2.2-megalitre bulk diesel storage tank (currently bunded by compacted earth), is located at the Skardon River landing. The bund capacity is approximately 2.4 ML, (thereby exceeding the tank volume of 2.2 ML and conforming to AS 1940). All sections of the bund were lined with clay.

The existing storage tank will be refurbished and subjected to integrity testing to ensure the system has no leaks or faults, and the existing bunded area upgraded so that the base and bund walls are impermeable.

The design, storage and handling of fuel of the site will be undertaken in accordance with relevant standards, including AS1940 - The storage and handling of flammable and combustible liquids.

Storage tanks will be bunded such that the capacity and construction of the bund is sufficient to contain at least 110% of a single storage tank or 100% of the largest storage tank plus 10% of the second largest storage tank in multiple storage areas.

All plant and machinery (particularly hydraulic hoses, fuel lines, etc) will be inspected regularly and repaired as required.
A new fuel pipeline will be constructed to transfer fuel from supply vessels to the storage tank(s) and from the tanks to refuel barges. The fuel pipelines will be designed to minimise the risk of accidental release of fuel through safety features such as shut down mechanisms in the event of an emergency. Fuel unloading will be continually monitored during operations. The fuel delivery supply pipelines will be made from welded steel pipes with isolating valves that can be turned off in case of emergency.

11.9.7 Waste Handling, Storage and Disposal

Waste handling, storage and disposal are described in Chapter 8.

A regulated and hazardous waste facility will be located in the existing cleared area to the south of the workshop, comprised of an impermeable bunded base, and roofed to exclude rainfall (refer to Figure 11-9). This facility will house waste oil, oil and chemical drums, and other hazardous or regulated waste materials prior to removal off-site by barge. Drum bunds and spill pallets or similar will be utilised within the hazardous waste facility, workshop and any other areas of minor storage, including for chemical storage.

11.9.8 Bioremediation and Treatment of Soils and Sewage Sludge

The existing bioremediation pad is approximately 0.15 ha (see Figure 11-8). It will be used for contaminated soils and sewage sludge bioremediation from kaolin operations. The bioremediation pad is situated within the former kaolin mine wet plant area which is scheduled for within bauxite mine progression footprint (at the location of pit 12) and will be relocated as the mine progresses through the area. The replacement bioremediation pad will be established prior to decommissioning of the existing pad in a suitable location (adjacent to the landfill area in the Port infrastructure area) within appropriate bunding. The new bioremediation will be located immediately upgradient of the landfill at the Port infrastructure area. A contaminated land assessment will be undertaken prior to decommissioning of the existing pad. While not expected, any contaminated soils will be re-treated on the new bioremediation pad. The replacement bioremediation pad will be established prior to decommissioning of the existing pad.

The proposed bioremediation pad is shown in Figure 11-9. The new bio-remediation pad will be bunded to prevent ingress of runoff and any outflow to surface waters. As the landfill and bio-remediation pad areas will located in the same area, bunding will be established around the combined extent of these waste management areas.

The bioremediation pad will be collocated with the landfill, and will be utilised for:
- dewatering and inactivation of sewage sludge
- composting of grease trap and other organic wastes
- remediation of hydrocarbon contaminated soils.

11.9.8.1 Contaminated Soils

Spills of fuels or oils would be treated according to oil spill procedures. Hydrocarbon spills on soil outside bunded areas would be remediated by the contaminated soil being removed and transported to the bioremediation pad where it would be treated to break down the hydrocarbons. Composting material would be added including kitchen food waste, deep-fry oil and cardboard. Waste kaolin overburden soil would be added and the composting process encouraged with occasional irrigating with water and turning over the soil mix. When the hydrocarbon odour becomes undetectable and all material is composted, the final treatment would be ripping, top-soiling and seeding with native plants for woodland re-vegetation.
11.9.8.2 Bioremediation of Sewage Sludge

Sewage effluent management is dealt with in Chapter 8. Sludge will be stored in a waste sludge storage / thickening tank, appropriately vented and screened for mosquitos, subjected to anaerobic or aerobic digestion (depending on the sewage treatment plant design) and dewatered prior to removal to the bioremediation pad (dewatered water will be directed back to the sewage treatment plant).

Assuming the worst-case scenario (during operations) of 160 Equivalent Persons (EP) producing 300 L/EP wastewater per day, the total volume of wastewater produced per year is expected to be around 17.5 ML. Based on the sludge ratio of 0.1%, it is anticipated that 17,500 L (or 17.5 tonnes) of sludge per year would be produced resulting in at least 11,000 L (~11 tonnes) per year of biosolids, depending on the sewage treatment plant specification.

The above estimate of 11,000 L per year has been refined. Based on a typical activated sludge sewage treatment plant, allowing for primary sedimentation, the following can be derived:

- Sludge generation: 230 kg/ML x 17.5 ML = 4,416 kg/year
- Sludge volume @ 5% solids: \((4,416 \text{ kg/year}/(\rho_w(1000)\times S_{sl}(1.02)\times0.05))\) = 87 m\(^3\)/year (\(\rho_w\) = density of water; \(S_{sl}\) = sludge specific gravity)

The revised estimate is significantly lower than the initial estimate of around 11,000 kg/year of dry solids. There is a wide variation in possible sludge production depending on the type of plant, though it is anticipated that the lower volume will be more appropriate.

A 1 ha area has been set aside for the bioremediation pad, including for the pad itself, buffers to landfill and other areas, and for expansion if required. It is expected that the proposed dimensions of the bioremediation pad (based on the original estimate of sewage sludge volume) will be adequate for the purposes of bioremediation of biosolids.

The bioremediation pad will be constructed with impermeable base layers sourced from local clay (claystone overburden and kaolin) and spread, shaped and compacted to achieve a permeability of \(1 \times 10^{-9}\) m/s or less. Use of geomembrane liners or similar may be used to augment this material, and concrete may be used for smaller bunded areas. The bioremediation pad will be bunded to contain runoff and prevent ingress of clean water. Importantly, the minimum area required for biosolids remediation will be separately bunded, and runoff contained and reused for dust suppression and wetting of compost piles. Remediation and composting will be undertaken during the dry season only, limiting runoff from these areas.

Digested sludge will be aerobically composted on the bioremediation pad. Composting may also incorporate other smaller quantities of waste, such as grease trap and food waste materials. In the event that soil conditioning becomes unfeasible, an option to dry the biosolids waste on the bioremediation pad and then dispose directly to landfill also exists.

It is not expected that bioremediation of biosolids will be used in the rehabilitation process, as the native species proposed for rehabilitation do not require high nutrient loads. However, the use of remediated biosolids for rehabilitation remains an option. It is not expected that the Project will trigger the 200t or more of compost or soil conditioners in a year\(^{10}\) threshold for soil conditioner manufacturing under the EP Regulations\(^{11}\).


\(^{11}\) (Schedule 2: ERA 53 Composting and soil conditioner manufacturing; (1) Composting and soil conditioner from organic material or organic waste).
Should biosolids be used for rehabilitation than a ‘beneficial use approval’ under the *Waste Reduction and Recycling Act 2011* (see *Section 11.3.2.4*) will be required and an application be submitted following the determination of the required biosolid/soil application rate which is dependent on appropriate biochemical characterisation of the biosolid/soil mix.

Other composted materials will be windrowed to stabilise the material prior to disposal to landfill or reuse on-site, achieving similar stabilisation levels as for biosolids. Materials such as grease trap waste will be diluted in a larger organic or soil matrix (e.g. biosolids) to ensure this material can be safely and adequately controlled.

### 11.9.9 Groundwater Monitoring – Bio-Remediation Pad, Landfill and Hydrocarbon Storage

The Surface Water and Groundwater Monitoring Plan is provided in *Appendix 15*. This includes:

- the bores proposed for monitoring the landfill, bioremediation pad and Port area (see *Figure 11-9*)
- the parameters to be monitored (also provided in *Chapter 12, Table 12-2b*)
- water quality objectives (also provided in *Chapter 12, Table 12-2b*)
- frequency of monitoring (quarterly)
- methodology for assessing whether these activities are impacting groundwater quality by comparing data from upgradient and downgradient bores
- management measures to remediate and prevent contamination.

The existing kaolin mine EA (MIN104486212) made provision for monitoring to occur across a number of groundwater monitoring bores. The existing EA requires groundwater monitoring upgradient and downgradient of the waste disposal area (i.e. the existing landfill), namely:

- TMB01 upgradient
- TMB02 downgradient

To improve the monitoring data from groundwater in the vicinity of the landfill and bio-remediation pad, these monitoring bores will be replaced. The replacement monitoring bores (*Figure 11-9 and Table 11-3*) will monitor groundwater upgradient and downgradient of the existing landfill, proposed landfill and bioremediation pad.

The existing EA requires monitoring of two bores – up gradient and down gradient of the hydrocarbon (fuel) storage tanks. As these are the same tanks proposed for fuel storage for the Project, these bores will continue to monitored for the Project. However, bore G5 will be supplemented by an additional bore installed for upgradient monitoring (proposed bore G28), as shown in *Figure 11-9*.

### Table 11-3

**Groundwater Monitoring Locations – Port Area**

<table>
<thead>
<tr>
<th>New Bore Reference for Project</th>
<th>Purpose of Bore</th>
<th>Monitoring Point (reference in current EA)</th>
<th>Monitoring Bore Identification (current EA)</th>
<th>Easting</th>
<th>Northing</th>
</tr>
</thead>
<tbody>
<tr>
<td>G22</td>
<td>Upgradient of existing and proposed landfills</td>
<td>(replaces bore TMB01 per existing EA)</td>
<td>TMB01</td>
<td>616130</td>
<td>8699666</td>
</tr>
<tr>
<td>G23</td>
<td>Downgradient of existing landfill; upgradient of proposed landfill</td>
<td>(replaces bore TMB02 per existing EA)</td>
<td>TMB02</td>
<td>616969</td>
<td>8699674</td>
</tr>
<tr>
<td></td>
<td>Downgradient of existing and proposed landfills</td>
<td>n/a</td>
<td>n/a</td>
<td>616007</td>
<td>8699683</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>G25</td>
<td>Upgradient of bioremediation pad</td>
<td>n/a</td>
<td>n/a</td>
<td>616247</td>
<td>8699833</td>
</tr>
<tr>
<td>G26</td>
<td>Downgradient of bioremediation pad and proposed landfill</td>
<td>n/a</td>
<td>n/a</td>
<td>616066</td>
<td>8699867</td>
</tr>
<tr>
<td>G27</td>
<td>Downgradient of hydrocarbon storage tanks and Port infrastructure</td>
<td>G11: Impacted/Down gradient bore of all hydrocarbon storage tanks at the dry plant</td>
<td>EMB03</td>
<td>616665</td>
<td>8700108</td>
</tr>
<tr>
<td>G28#</td>
<td>Upgradient of all Port infrastructure</td>
<td>n/a</td>
<td>n/q</td>
<td>616543</td>
<td>8699875</td>
</tr>
</tbody>
</table>

# The existing EA describes bore ID AKM026 (reference G10) as the upgradient bore of all hydrocarbon storage tanks at the dry plant. This bore (now called G5) will continue to be monitored but proposed bore G28 will provide a more accurate assessment of groundwater upgradient of Port infrastructure.
Legend
- Mining Lease Boundaries
- Port Layout
- Existing Disturbance Footprint
- Groundwater Monitoring Bore
- Port Infrastructure Area

Port Area Groundwater Monitoring Bores

Figure 11-9
Gulf Alumina Limited

Date: 15/03/2016
Revision: R1

*Port/Wharf infrastructure are indicative layouts only and adapted from plans created by Sedgman Ltd.

No warranty is given in relation to the data (including accuracy, reliability, completeness or suitability) and accept no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of or reliance upon the data. Data must not be used for direct marketing or be used in breach of privacy laws. State Boundaries and Towns © Geoscience Australia (2006). Imagery sourced from Gulf Alumina (2014).
11.9.10 Management of Existing Contaminated Soils

A pre-construction assessment of contaminated land will be undertaken in any proposed disturbance area identified as having potential to contain contaminated soils. In the unlikely event of any contaminated material being found, it would be removed for treatment on the bioremediation pad. If, subsequent to an assessment, during bauxite mining activities, contaminated material is found, identified visually or by odour, it would be removed for treatment on the bioremediation pad.

Areas which have potential contamination (based on historical land uses and review of historical plans) are shown in Figure 11-8. Additional areas may be identified as requiring further investigation following an initial site inspection.

It is unlikely that the proposed bauxite activities may disturb potential contaminants associated with the kaolin mine, as described in Section 11.5. Where contaminants do exist they will be contained within the surface layer or the soils immediately below this layer. These surface and sub-surface soil layers will be stripped and stockpiled onsite, in order to gain access to the bauxite layer or for construction of infrastructure. Any soils that are suspected to be contaminated from visual/odour indications will be captured and contained pending further investigation.

With future activity in the bauxite mining operation, awareness of possible contamination will be maintained through use of visual and odour indicators, including:

- soil staining
- un-natural or chemical odour
- vegetation die-off.

If contamination is suspected during construction and mining activities, soil stripping activities, material will be stockpiled separately for further investigation. Such material would be managed to prevent release of any contaminants.

Once representative samples of stockpiled material are analysed and interpreted by suitably qualified and experienced personnel a management strategy for any impacted soils will be implemented, likely no more than treatment on the bioremediation pad being required. Regulatory approval would be sought if more complex treatment were required.

11.10 Risk Assessment

11.10.1 Land Use

A risk assessment for residual impacts to land use (i.e. impacts after implantation of mitigation measures) is provided in Table 11-4. The risk assessment uses the methodology described in Chapter 1. The risk of impacts to land use on properties intersected by, or adjacent to, the Project area is low or medium.

11.10.2 Land Contamination

A risk assessment for residual impacts from existing land contamination (i.e. impacts after implantation of mitigation measures) is provided in Table 11-4. The risk assessment uses the methodology described in Chapter 1. With the implementation of the management plans and mitigation measures described, the risk of contamination is medium.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Land use on properties intersected by or adjacent to the study area</td>
<td>Loss of native vegetation used for hunting by Traditional Owners</td>
<td>Refer Section 11.7.1</td>
<td>A (Almost Certain)</td>
<td>1 (Insignificant)</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alteration of hydrology of watercourses and drainage lines affects land use</td>
<td>Refer Chapter 13 – Hydrology and Hydrogeology</td>
<td>E (Rare)</td>
<td>2 (Minor)</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noise, vibration impacts on land use</td>
<td>Refer Chapter 20 – Noise and Vibration</td>
<td>D (Unlikely)</td>
<td>2 (Minor)</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dust impacts on land use</td>
<td>Refer Chapter 19 – Air Quality</td>
<td>D (Unlikely)</td>
<td>2 (Minor)</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dewatering of groundwater supplies affects land use</td>
<td>Refer Chapter 12 – Water Bodies and Quality</td>
<td>D (Unlikely)</td>
<td>2 (Minor)</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contamination of land</td>
<td>Refer Section 11.9 and Chapter 7 – Rehabilitation and Decommissioning, Chapter 8 – Non Mining Waste, Chapter 10 - Geology, Topography and Soils, Chapter 15 – Terrestrial Ecology, Chapter 17 – Coastal Processes, Chapter 23 – Hazards and Safety</td>
<td>C (Possible)</td>
<td>2 (Minor)</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contamination of water</td>
<td>Refer Section 11.9 and Chapter 6 – Water Management and Chapter 12 –Water Bodies and Quality.</td>
<td>C (Possible)</td>
<td>2 (Minor)</td>
<td>Medium</td>
<td></td>
</tr>
</tbody>
</table>
### Table 11-5  Risk Assessment for Existing Land Contamination

<table>
<thead>
<tr>
<th>Environmental Value</th>
<th>Impacts / Emissions / Releases</th>
<th>Proposed Practices</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Contaminated Sites</td>
<td>Disturbance of contaminated sites and dispersion of contaminants</td>
<td>Refer <strong>Section 11.9</strong> (pre-construction contaminated land survey).</td>
<td>C (Possible)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Consequence (Magnitude)</th>
<th>Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>C (Possible)</td>
<td>2 (Minor)</td>
<td>Medium</td>
</tr>
</tbody>
</table>
11.11 Cumulative Impacts

Consideration has been given to a number of existing and proposed mines in the region including:

- Rio Tinto Alcan’s existing Weipa bauxite mine operations.
- Rio Tinto Alcan’s proposed South of Embley project.
- Metro Mining’s Bauxite Hills Project.

Of those identified above and based on publically available information at the time of reporting it is likely that cumulative impacts directly relating to land use and contamination are limited to impacts associated with the proposed Metro Mining’s Bauxite Hills Project.

11.11.1 Land Use

The Project will create 1,376 ha of new disturbance over its 10 year mine life. The Metro Mining Bauxite Hills Project is expected to create a comparable area of disturbance which would be spread over a 27 year mine life. It has been assumed in making qualitative assessments of cumulative impacts that Metro Mining will provide similar compensation and management measures for the Bauxite Hills Project as Gulf is proposing for the Project.

Potential cumulative impacts with the adjacent Bauxite Hills Project are expected to result in the following effects:

- The combined area of land for mining has the potential to reduce recreational, cultural and hunting areas and is likely to result in a medium (>10 years) to long term (>30 years) reduction in approximately 30 km² of accessible land area until post mining rehabilitation is able to restore those areas to a comparable pre-mining land use. It is assumed that the Bauxite Hills Project will restore lands to their pre-mining land use following decommissioning.
- The Bauxite Hills Project mining leases are situated immediately to the east and west of the Project’s ML 40082. Gulf’s proposed four wheel drive track crossing point of the haul road is within ML 40082. There is potential that Metro Mining will restrict access along the existing four wheel drive track within their mining leases, thereby resulting in any proposed crossing by Gulf being superfluous. However, it is assumed that Metro Mining will work with the landowners to retain access along this four wheel drive track.
- The Bauxite Hills Project proposes a separate haul road, running north south and parallel to Gulf’s existing haul road, in the narrow section between Gulf’s mining lease and the Skardon River South Arm. With mining from two projects and two haul roads in this area, it is assumed that land use will be effectively restricted.
- The cumulative impacts on air quality and noise levels are described in Chapter 19 and Chapter 20 respectively.

11.11.2 Contaminated Land Impacts

The exact nature of any potential existing contamination in the Bauxite Hills Project area is unknown, however it is assumed that no prior mining activities or commercial agricultural activities have occurred on these land areas, and therefore the risk of mobilisation of contaminants is effectively limited to Gulf’s Project.

The potential exists for the uncontrolled release of contaminants from both projects into natural systems including surface soils or surface and groundwater systems. The exact nature of project construction and
operational procedures for the Bauxite Hills Project area is unknown, however it is assumed that the risk of the uncontrolled release of contaminants across the two project areas would be doubled, but that both projects would implement similar mitigation measures to limit the risk of release of contaminants.

11.12 Conclusion

11.12.1 Land Use

The Project is located within the Cape York Regional Plan area in a rural setting with mining proposed adjacent to the Project (Metro Mining’s Bauxite Hills Project). Existing mining (Rio Tinto Alcan, Weipa and South of Embley projects) occur in the wider region.

The Project MLs contain existing kaolin mine and Port infrastructure which will be upgraded to facilitate bauxite mining.

There are two properties intersected by the Project MLs, of which only Lot 11 SP204113 will be directly affected by the Project footprint. The land is owned by the Old Mapoon Aboriginal Corporation and is currently used for cultural activities, recreation, hunting and fishing. The Project will result in approximately 1,315 ha of new land disturbance, affecting an additional 8.1% of Lot 11 SP204113.

There are no dwellings in the Project area. The closest residences are the receptors identified at Mapoon (more than 10 km south of the southern ML boundary) and there will be no direct impact on these residences or their use.

OMAC, as owners of the land under the Aboriginal Land Act 1991 directly impacted by the Project, will receive a share of the royalty payments paid to the State government.

Land use mitigation inherent in the design of the Project includes water management, waste management, and spills and emissions management, which will prevent emissions having and irreversible or widespread impact on adjacent areas.

As the haul road will intersect the existing four wheel drive track allowing access to the west of the mining leases, a dedicated and controlled haul road crossing will be retained to allow ongoing use of the track. Other potential crossing points of Project linear infrastructure (e.g. the haul road) will be discussed with the landowner, as required.

Progressive rehabilitation of mined areas will be implemented with the intention of achieving of similar post mine land use to that which existed before mining. Cattle grazing and forestry will only be considered for the final land use within the Project MLs where specifically requested by, and in agreement with, landowners. Retention of mine infrastructure (e.g. the accommodation camp, water management dams, airstrip and roads) will considered for the final land use within the Project MLs where specifically requested by, and in agreement with, the landowners. The post bauxite mining land use will be regeneration of native vegetation.

The CYPLUS Project identified land suitable for cropping and horticulture and that all soil types would be suitable for low intensity grazing of native pastures. However, due to the low mineral content in the soil, irrigation requirements, distance from markets, it is unlikely that any cropping or pastoral activities would be viable.

No areas of regional interest under the RPI Act or areas designated for protection in the CYRP will be impacted as a result of the Project’s activities.

The proponent will comply with all regulatory requirements to notify and consult overlapping tenure holders.
Metro Mining’s adjacent Bauxite Hills Project will result in cumulative impacts to land use. However it is expected that, similar to Gulf, Metro Mining will provide compensation and other mitigation measures designed to minimise impacts to land use.

The proposed Project design, including selection of location for activities and infrastructure, and measures to mitigate impacts to land use will result in the Project achieving the relevant performance outcomes for site suitability, location on site and critical design requirements as stated in the EP Regulation. Following mitigation measures, the risk from impacts to land uses is low to medium.

11.12.2 Land Contamination

11.12.2.1 Identified Existing and Potential Contamination

Project activities are proposed in potential areas of existing contamination (from the former kaolin mine). These potential contamination areas have been identified based on historical land uses, aerial imagery and historical reporting relating to the kaolin mine.

It is assumed that no prior mining activities or commercial agricultural activities have occurred on the Bauxite Hills Project mining leases, and therefore the risk of mobilisation of contaminants is effectively limited former kaolin mine activities on Gulf’s Project.

Prior to bauxite mining occurring in any area identified or suspected as being contaminated (following a pre-construction contaminated land assessment), management measures will be implemented to avoid, contain, remediate or otherwise manage potential spread of contamination as required.

11.12.2.2 Prevention of Contamination from Project Activities

The Project’s activities and associated infrastructure have the potential to cause land contamination including via the following:

- mining
- hydrocarbon and chemical transport, storage and handling
- transport, storage and handling of regulated waste
- waste management including recyclable waste and non-recyclable waste and sewage effluent and sludge management.
- management of contaminated soil/substrate (waste) from hydrocarbon or chemical spills

Specific management measures to minimise the potential for contamination of identified environmental values have been addressed in the relevant chapters of this EIS, as described in Section 11.1. Management measures have been proposed for transportation of dangerous goods and hazardous materials; storage, handling and disposal of hydrocarbons, dangerous goods and hazardous materials; and bio-remediation of contaminated soils.

The level of impact to the environmental values will depend on the nature and extent of the contaminating activity or contamination event. The risk of contamination will be minimised through design of infrastructure and activities, monitoring programs, regular auditing of infrastructure and site processes and providing appropriate training to all site personnel.

It is expected that the Bauxite Hills Project will implement similar mitigation measures to those proposed for Gulf’s Project to minimise the risk of release of contaminants.

The proposed Project design, including selection of location for activities and infrastructure, and measures to mitigate impacts will result in the Project achieving the relevant performance outcomes for managing existing contamination and reducing the potential for the Project to cause contamination.